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INGENIEUR

A YEARLY

Science, Technology, Engineering & Mathematics

Magazine

(A Collection of Student Articles – 2018)

INDEX

Message from the Principal's Desk

Dr.E.V.PRASAD, Ph.D
Principal

Engineers have been the most instrument characters for the development of any nation. India is achieving great recognition as a developing nation in the international world and this has been possible due to the significant role of Indian Engineers. Engineer's day is celebrated on September 15th every year in India, commemorating the 157th birth anniversary of one of the greatest engineers of our country Bharat Ratna Sir Mokshakundam Visvesvaraya fondly called as Sir MV.

Engineer's day is celebrated for the great works of Sir MV towards the development of various places which are the most prominent cities of today. Sir MV is recognised for his master mind in harnessing water resources and successful in constructing, designing several dams and bridges. Sir MV, a great human being has been the personification of everything that a country needs to endeavour for a better future. This year marks the 50th anniversary of the engineer's day with the theme "Engineering challenges for knowledge era".

Engineers have been highly successful in creating the complex technical systems that make the present modern life possible. Engineering creativity emerges within the constraints of physical laws, commercial considerations, the needs of the client or employer, society, the law and ethics. Constraints provide boundaries within which engineering solutions are explored. Ethical considerations in relation to the safety of environment provide opportunities and inspiration for engineers to devise innovative solutions, directing their creativity to improve the performance of engineering technologies and systems.

I appreciate and acknowledge the budding engineers of our college for their stupendous participation and involvement in gathering information and presenting the technical paper proficiently. Engineers should aspire to high standards of leadership in the exploitation and management of technology. They hold a privileged and trusted position in society, and are expected to demonstrate their skills to help the community at large. On this eve, it is my privilege to acknowledge the endeavour of our faculty and students in bringing out the first of its kind, an exclusive student level technical magazine- **INGÉNIEUR**. The objective of this technical magazine is to bring out the spirit of research and encourage innovative skills among the young engineers. I wish our engineering aspirants to continue their research instincts with zeal and enthusiasm to publish technical articles. I strongly believe that engineer's possess versatile mindset that helps in filling the gap between science, technology and the society.

Message from the Vice-Principal

Dr.G.SUDHEEER, Ph.D
Professor & Vice-Principal

Engineering is one of the key influences that shape our world physically, digitally, socially and economically. Engineers are creative both as initiators and implementers of new ideas. The Engineering community across India celebrates Engineers day on 15th September every year as a tribute to the greatest Indian Engineer Bharat Ratna **Sir Mokshagundam Visvesaraya.** He was known for his sincerity, time management and is a main of principles and values. His Flood management measures and water preservation techniques are some of his contributions to the future generations whose value is immeasurable.

The aim of this technical student magazine – **INGÉNIEUR** is to enable students to relate theory to practical applications, think deeply, innovate and share diverse ideas about the profession. The concept of **S**cience, **T**echnology, **E**ngineering and **M**athematics (**STEM**) education is paying rich dividends to the World as a whole and GVP College of Engineering for Women wants to be a part of this global transformation. The integration of the four cornerstones of the technological revolution in the magazine is bound to give the students an edge in the comptetive world. The students are expected to integrate knowledge from different sources and present their ideas in a lucid manner. The college has made rapid strides in providing all the required facilties for the overall development of the student. This has been made possible due to the dedicated faculty, staff and highly understanding student community. We thank all of them for their contributions and request the students to read, think and prepare articles for future issues of the magazine in a thorough manner. We sincerely hope that the magazine will be known for its structure and content.

Message from Head of the Department's Desk

Dr.P.V.S.L.JAGADAMBA, Ph.D
Professor & HOD
Computer Science and Engineering

The Department of Computer Science and Engineering was established in the year 2008. Currently the Department is running with an intake of 120 students. The department is dedicated for providing best education and practical facilities to its students. A variety of computing facilities are available for our faculty member, students and staff. Our main strength is well qualified and experienced faculty members, who are very enthusiastic in learning new technologies and updating their skill sets. They are always ready to guide students apart from regular teaching hours to solve their problems related to curriculum as well as personal.

The department organizes events every year to commemorate the birthday of ***Bharat Ratna Sir MokshagundamVisvesvarayya*** which is celebrated as Engineers Day. The Engineers community across the India proudly celebrates this day. **Digital Transformation: A New Industrial Revolution"** is the themeof this year's Engineers Day 2018. This student level technical magazine is motivated by the desire to further enrich the capabilities of the students by providing them a platform to showcase their technical skills. I congratulate the students for their fabulous response in contributing good articles to the first issue. The diverse areas selected by them highlights the faculty's contribution in imparting the students with the required technical knowhow in addition to their regular curricular activities.

Message from the Coordinators

Ms.K.Rohini, Asst Prof, CSE
&
Mr.S.Sumahasan, Asst Prof, CSE

Computer Science and Engineering is a blend of all the STEM categories because it involves Science, Technology, Engineering and Mathematics. The magazine INGÉNIEUR is aimed at improving student's critical thinking, writing skills, summarizing skills and presentation skills.

The magazine is exclusively meant for churning out the latent talent which bears immense potentiality of sharpening the students skills as part of their overall personality development. We are happy that the students of CSE Department have responded favourably to this issue by contributing articles in the areas of machine learning, artificial intelligence, model validation, sentiment analysis and internet of things.

We sincerely hope that the students will make efforts to improve the standards of the magazine by contributing well prepared articles.

A note on BigQuery ML

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I. INTRODUCTION

BigQuery is Google's serverless, highly scalable, enterprise data warehouse designed to make all the data analysts productive at an unmatched price-performance. Because there is no infrastructure to manage, you can focus on analyzing data to find meaningful insights using familiar SQL without the need for a database administrator. BigQuery ML enables data scientists and data analysts to build and operationalize ML models on planet-scale structured or semi-structured data, directly inside BigQuery, using simple SQL in a fraction of the time. BigQuery ML empowers data analysts to use machine learning through existing SQL tools and skills. Analysts can use BigQuery ML to build and evaluate ML models in BigQuery. Analysts no longer need to export small amounts of data to a spreadsheets or other applications, and analysts no longer need to wait for limited resources from a data science team.

II. MODELS IN BIG QUERY ML

A model in BigQuery ML represents what an ML system has learned from the training data.

Two types of models are supported by BigQuery ML:

1. Linear regression for forecasting — for example, the sales of an item on a given day. Labels are real-valued (they cannot be +/- infinity or NaN).

2. Binary logistic regression for classification — for example, determining whether a customer will make a purchase. Labels must only have two possible values.

A. *Creating a Model*

To create a model in BigQuery, use the BigQuery ML CREATE MODEL statement. This statement is similar to the CREATE TABLE[1] DDL statement. When you run a standard SQL query that contains a CREATE MODEL statement, a query job[2] is generated for you that processes the query.

CREATE MODEL statements must comply with the following rules:

1. Only one CREATE statement is allowed.

2. For linear regression models, the label column must be real-valued (the column values cannot be +/- infinity or NaN).

3. For logistic regression models, the label column must contain only two distinct values.

4. In the model_option_list, the model_type option is required. All others are optional.

You can manually split your data into a training table and an evaluation table. The training table is named training_table. The evaluation table is named evaluation_table.

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B. *Evaluation Functions*

The ML.EVALUATE function is used to evaluate model metrics. The ML.EVALUATE function can be used with both linear regression and logistic regression models.You can also use the ML.ROC_CURVE function to evaluate logistic regression models. The output of ML.EVALUATE fuction is a single row containing common common metrics applicable to the type of model supplied.

The output columns for a logistic regression are:

- precision
- recall
- accuracy
- f1_score
- log_loss
- roc_auc.

The output columns for a linear regression are:

- mean_absolute_error
- mean_squared_error
- mean_squared_log_error
- median_absolute_error
- r2_score
- explained_variance

The ML.ROC_CURVE function is used to evaluate logistic regression-specific metrics. ML.ROC_CURVE only evaluates logistic regression models.

The output ML.ROC_CURVE function includes multiple rows with metrics for different threshold values for the model. The metrics include:

C. *Prediction Functions*

. The ML.PREDICT function can be used to predict outcomes using the model. The output of the ML.PREDICT function has as many rows as the input table, and it includes all columns from the input table and all output columns from the model.

Using ML.PREDICT function we can compare the outputs of two models.

D. *BigQuery ML Syntax*

- Creating a model:

  {CREATE MODEL | CREATE MODEL IF NOT EXISTS | CREATE OR REPLACE MODEL} model_name [OPTIONS(model_option_list)][AS query_statement]

- Evaluation a model:
    - ML.EVALUATE(MODEL model_name,

      {TABLE table_name | (query_statement)}

      [,STRUCT(AS threshold)])
    - ML.ROC_CURVE(MODEL model_name, {TABLE table_name | (query_statement)},

      [GENERATE_ARRAY(thresholds)])
- Predicting an outcome:

  ML.PREDICT(MODEL model_name, {TABLE table_name | (query_statement)})

E. Model and feature inspection functions

- ML.TRAINING_INFO function:

  The ML.TRAINING_INFO function allows you to see information about the training iterations of a model. ML.TRAINING_INFO can be run while the CREATE MODEL query is running, or after it is run.

  Syntax:

  ML.TRAINING_INFO(MODEL`project_id.dataset.model`)
- ML.FEATURE_INFO function:

  The ML.FEATURE_INFO function allows you to see information about the input features used to train a model.

  ML.FEATURE_INFO returns the following columns:
    - input — The name of the column in the input training data.
    - min — The sample minimum. This column is NULL for non-numeric inputs.
    - max — The sample maximum. This column is NULL for non-numeric inputs.
    - mean — The average. This column is NULL for non-numeric inputs.
    - stddev — The standard deviation. This column is NULL for non-numeric inputs.
    - category_count — The number of categories. This column is NULL for non-categorical columns.
    - null_count — The number of NULLs

  Syntax:

  ML.FEATURE_INFO(MODEL 'project_id.dataset.model')

II. USING BIGQUERY ML TO PREDICT BIRTH WEIGHT

Step 1: Create your model

create a linear regression model using the natality sample table[3] for BigQuery. The following standard SQL query is used to create the model you use to predict the birth weight of a child.

```
#standardSQL
CREATE MODEL `bqml_tutorial.natality_model`
OPTIONS
  (model_type='linear_reg',
    input_label_cols=['weight_pounds']) AS
SELECT
  weight_pounds,
  is_male,
  gestation_weeks,
  mother_age,
  CAST(mother_race AS string) AS mother_race
FROM
  `bigquery-public-data.samples.natality`
WHERE
  weight_pounds IS NOT NULL
  AND RAND() < 0.001
```

In addition to creating the model, running the CREATE MODEL command trains the model you create.

Step 2: Get training statistics

To see the results of the model training, you can use the ML.TRAINING_INFO function, or you can view the statistics in the BigQuery web UI.

A machine learning algorithm builds a model by examining many examples and attempting to find a model that minimizes loss. This process is called empirical risk minimization.

Step 3: Evaluate your model

After creating your model, you evaluate the performance of the classifier using the ML.EVALUATE function. The ML.EVALUATE function evaluates the predicted values against the actual data. A classifier is one of a set of enumerated target values for a label.
The query used to evaluate the model is as follows:

```
#standardSQL
SELECT
  *
FROM
  ML.EVALUATE(MODEL `bqml_tutorial.natality_model`,
    (
    SELECT
      weight_pounds,
      is_male,
      gestation_weeks,
      mother_age,
      CAST(mother_race AS STRING) AS mother_race
    FROM
      `bigquery-public-data.samples.natality`
    WHERE
      weight_pounds IS NOT NULL))
```

Step 4: Use your model to predict the outcome

Now that you have evaluated your model, the next step is to use it to predict an outcome. You use your model to predict the birth weight of all babies born in Wyoming.

```
#standardSQL
SELECT
  predicted_weight_pounds
FROM
  ML.PREDICT(MODEL `bqml_tutorial.natality_model`,
    (
    SELECT
      is_male,
      gestation_weeks,
      mother_age,
      CAST(mother_race AS STRING) AS mother_race
    FROM
      `bigquery-public-data.samples.natality`
    WHERE
      state = "WY"))
```

Output of Predict function:

Job information | Results | JSON

Row	predicted_weight_pounds
1	7.287220094004169
2	7.287220094004169
3	7.287220094004169
4	7.287220094004169
5	7.377607831676414
6	7.377607831676414
7	7.377607831676414
8	7.377607831676414
9	7.377607831676414
10	7.377607831676414

III. Advantages of BigQuery ML

BigQuery ML has the following advantages over other approaches to using ML with a cloud-based data warehouse:

- BigQuery ML democratizes the use of ML by empowering data analysts, the primary data warehouse users, to build and run models using existing business intelligence tools and spreadsheets. This enables business decision making through predictive analytics across the organization.
- There is no need to program an ML solution using Python or Java. Models are trained and accessed in BigQuery using SQL — a language data analysts know.
- BigQuery ML increases the speed of model development and innovation by removing the need to export data from the data warehouse. Instead, BigQuery ML brings ML to the data. Exporting and re-formatting the data:
- Increases complexity — Multiple tools are required.
- Reduces speed — Moving and formatting large amounts data for Python-based ML frameworks takes longer than model training in BigQuery.
- Requires multiple steps to export data from the warehouse, restricting the ability to experiment on your data.

V. Conclusion

BigQuery ML is a query service that allows us to create,train and test machine learning models to predict future events by using SQL like queries against multiple terabytes of data in matter of seconds. There is no need to program an ML solution using Python or Java.

VI. References

[1] https://cloud.google.com/bigquery/docs/reference/standard-sql/data-definition-language#create_table_statement

[2] https://cloud.google.com/bigquery/docs/jobs-overview

[3] https://cloud.google.com/bigquery/sample-tables

[4] https://cloud.google.com/bigquery/docs/bigqueryml-intro

Exploring and Mining the Dark Web

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Abstract*— This talk will review the emerging research in Terrorism Informatics based on a web mining perspective. Recent progress in the internationally renowned Dark Web project will be reviewed, including: deep/dark web spidering (web sites, forums, Youtube, virtual worlds), web metrics analysis, dark network analysis, web-based authorship analysis, and sentiment and affect analysis for terrorism tracking. In collaboration with selected international terrorism research centers and intelligence agencies, the Dark Web project has generated one of the largest databases in the world about extremist/terrorist-generated Internet contents (web sites, forums, blogs, and multimedia documents). Dark Web research has received significant international press coverage, including: Associated Press, USA Today, The Economist, NSF Press, Washington Post, Fox News, BBC, PBS, Business Week, Discover magazine, WIRED magazine, Government Computing Week, Second German TV (ZDF), Toronto Star, and Arizona Daily Star, among others. Recent Dark Web research includes: (1) epidemiological and social network modeling of internet radicalization and violent intents; (2) Dark Web Forum Portal and Video Portal for researchers and analysts; and (3) Geopolitical Web research of social media and news tracking for multi-cultural at-risk regions.

Keywords*— Data mining ,Government data processing ,Internet ,Terrorism.

I. INTRODUCTION

As shady as it sounds, Dark Web is an area of the internet which cannot be accessed directly and remains hidden beneath the web pages and social networks we browse. The internet is a big place, much bigger than what we are able to see by simply visiting Facebook or looking up on Google – the content on the dark web remains hidden and cannot be searched through conventional search engines.

The content which only exists on personal encrypted networks or peer-to-peer configurations is called the Dark Web.

It can only be accessed using special software and decryption tools such as a Tor browser and most of the websites on the Dark Web contain fishy content which need that kind of encryption. These websites cannot be visited using search engines or traditional browsers as their address are encrypted and cannot be traced using conventional methods.

The Dark Web sites generally use the Tor encryption tool to mask their identities due to which they can keep their activities hidden. The tool basically functions just like a VPN and consistently randomizes the host's location to a different country so its almost impossible to detect where the user is.

Tor-encrypted websites can easily be accessed using a Tor browser. It provides secrecy for both ends – the website and the visitor both. The IP addresses using the browser bounce constantly to random locations while getting concealed under several layers of encryption.

The websites can be visited by any user in any part of the world by simply inputting the address in their Tor browser, however, its difficult to spot the location or identity of the websites.

Depending on how actionable the Dark Web-based activity is, it can be extremely dangerous if the user's identity gets revealed.

II. HISTORY

You don't have to be a web wizard to have heard the stories of the dark, fantastical Deep Web. You know, the websites or Deep Web search engines where criminals and hackers collude to steal identities, change stock prices, or shut down a site of their choosing. The Deep Web history goes back a long way, but its presence has only recently been told as scary Internet campfire stories. However, the Deep Web is not only much larger than these stories imply, but it's also much more benign in nature than many have been led to believe. The "Dark" corner and the Deep Web space are based on anonymity. However, both are only accessible with a specifically designed web browser, meaning that you won't stumble upon a secret drug ring by just typing an inquiry into your search engine.

III. TYPES OF WEB

1. SURFACE WEB :: (Visible Web) The Surface Web (also called the Visible Web, Indexed Web, Index able Web or Light net) is the portion of the World Wide Web that is readily available to the general public and searchable with standard web search engines.

(i)Google:: Google is an American multinational technology company that specializes in internet-related services and products.

(ii)Wikipedia :: Wikipedia is a free online encyclopedia, created and edited by volunteers around the world and hosted by Wikipedia Foundation.

2.DEEP WEB :: (Invisible web) The deep web is a part of the word wide web (WWW) whose

contents are not indexed by standard search engines for any reason

2.Michael K . Bergman is credited with coining the term DEEP WEB in 2001

(i) Online Banking
(ii) Web Mail
(iii) Online Magazines.

3.Dark Web ::The **dark web** is the World Wide Web content that exists on darknets, overlay networks that use the Internet but require specific software, configurations or authorization to access. The dark web forms a small part of the deep web, the part of the Web not indexed by web search engines, although sometimes the term *deep web* is mistakenly used to refer specifically to the dark web.

1.The **dark web** is the World Wide Web content that exists on dark nets overlay networks that use the Internet but require specific software, configurations or authorization to access.

2.The dark web forms a small part of the deep web

IV. DEFINITION

Darknet websites are accessible only through networks such as Tor ("The Onion Routing" project) and I2P ("Invisible Internet Project"). Tor browser and Tor-accessible sites are widely used among the darknet users and can be identified by the domain ".onion". While Tor focuses on providing anonymous access to the Internet, I2P specializes on allowing anonymous hosting of websites. Identities and locations of darknet users stay anonymous and cannot be tracked due to the layered encryption system. The darknet encryption technology routes users' data through a large number of intermediate servers, which protects the users' identity and guarantees anonymity. The transmitted information can be decrypted only by a subsequent node in the scheme, which leads to the exit node. The complicated system makes it almost impossible to reproduce the node path and decrypt the information layer by layer. Due to the high level of encryption, websites are not able to Definition track geolocation and IP of their users, and users are not able to get this information about the host. Thus, communication between darknet users is highly encrypted allowing users to talk, blog, and share files confidentially. The darknet is also used for illegal activity such as illegal trade, forums, and media exchange for pedophiles and terrorists. At the same time traditional websites have created alternative accessibility for the Tor browser in efforts to connect with their users. ProPublica, for example, launched a new version of its website available exclusively to Tor users..

V . SERVICES UNDER DARK WEB ::

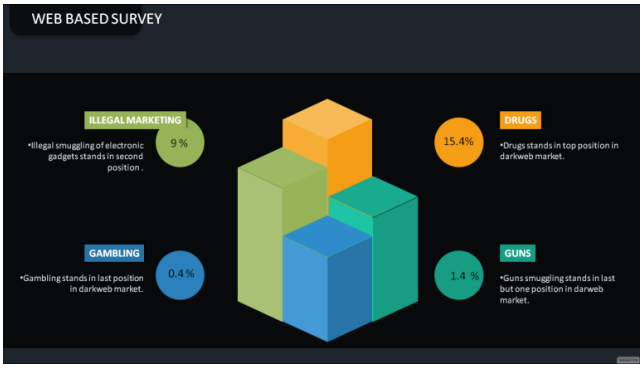
1.BITCOIN SERVICES :: Use Digital Currency Exchanger service which coverts Bitcoins into online game currency that will later be converted into money. Bitcoin services such as tumblers are often available on Tor, and some – such as Grams – offer darknet market integration. A research study undertaken by Jean-Loup Richet, a research fellow at ESSEC, and carried out with the United Nations Office on Drugs and Crime, highlighted new trends in the use of Bitcoin tumblers for money laundering purposes. A common approach was to use a digital currency exchanger service which converted Bitcoin into an online game currency (such as gold coins in World of Warcraft) that will later be converted back into money.

(i) HITMAN SERVICES : There are several ads for an expensive hitman who demanded payments in bitcoins and more.

(ii) BOTNET SERVICES : A bot is a special form of malware that is considered one of today's most sophisticated tools of cybercrime. Botnets are often structured with their command and control servers based on a censorship-resistant hidden service, creating a large amount of bot-related traffic.

(iii) HACKING : Cyber crimes and hacking services for financial institutions and banks have also been offered over the Dark web.

(iv) TERRORISM : There are at least some real and fraudulent websites used by ISIL(ISIS) in dark net. The Rawthi Shax is one of the terrorist group using darkweb.



VI . WHY IS THE DARK WEB HIDDEN ??

In the case of the deep web, since personal records, government documents and such are not meant for public view in the first place, those are understandably kept safe. However, they still are mostly connected to the Internet since much of that information forms an ecosystem for many surface web applications.

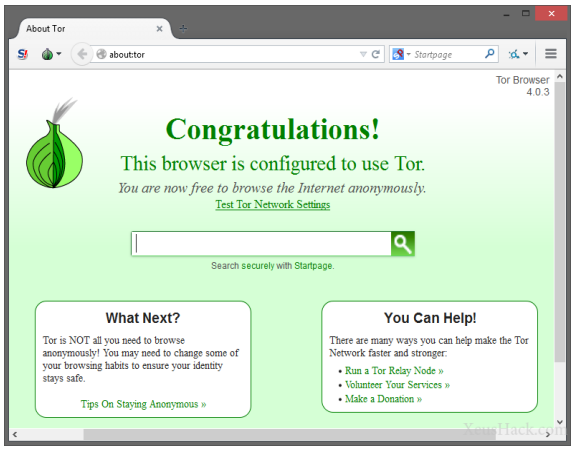
The Dark Web is slightly more complicated. This part of the world wide web is often run on networks of private servers, allowing communication only via specific means. This enables a high degree of anonymity and makes it difficult for authorities to shut down.

Unfortunately, this has led to Dark Web to become a place where many illegal activities take place.

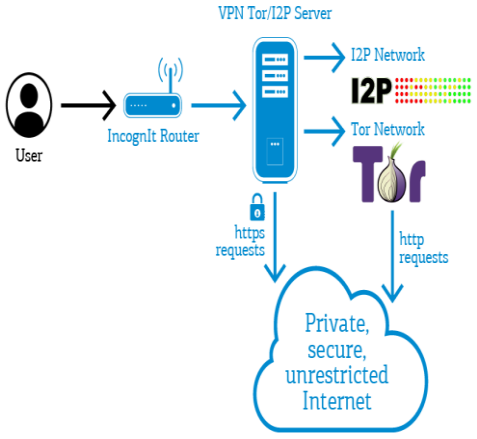
WEB BOWSERS THROUGH WHICH DARK WEB CAN BE ACCESED :

- TOR
- I2P(INVISIBLE INTERNET PROJECT)

1. TOR :

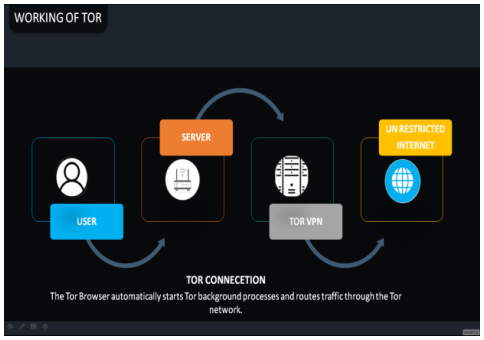


Tor is freesoftware forenabling anonymous communication. The name is derived from an acronym for the original software project name "The Onion Router".[8][9] Tor directs Internet traffic through a free, worldwide, volunteer overlay network consisting of more than seven thousand relays[10] to conceal a user's location and usage from anyone conducting network surveillance or traffic analysis. Using Tor makes it more difficult to trace Internet activity to the user: this includes "visits to Web sites, online posts, instant messages, and other communication forms".[11] Tor's intended use is to protect the personal privacy of its users, as well as their freedom and ability to conduct confidential communication by keeping their Internet activities from being monitored.



Download and install the TOR browser :

Despite its current usage as a browser that is often used to access parts of the Dark Web, TOR (aka. the dark web browser) was originally developed to help safeguard U.S. Intelligence online communication. Today, it is one of the few ways to access .onion websites, which are located on the Dark Web. TOR is a version of the popular Firefox web browser, modified to allow users to browse the web anonymously. The browser is designed to block or advise against user attempts to do things that might reveal their identity, such as resizing the dimensions of the browser window, for example. While you're waiting for TOR to download, take the time to stick a piece of dark tape over your webcam lens. You never know what might happen.



2. I2P **::**

The **Invisible Internet Project** (**I2P**) is an anonymous network layer that allows for censorship-resistant, peer to peercommunication. Anonymous connections are achieved by encrypting the user's traffic (by using end-to-end encryption), and sending it through a volunteer-run network of roughly 55,000 computers distributed around the world. Given the high possibility of paths the traffic can transit, a third party watching a full connection is unlikely. The software that implements this layer is called an "I2P router", and a computer running I2P is called an "I2P node". I2P is free and open source, and is published under multiple licenses.

VII .MORE ABOUT DARK WEB

The dark web (or deep web, if you prefer) is "dark" because the sites on it cannot be indexed by a web crawling browser, such as Google. That makes it hard for ordinary people, and law enforcement, to find specific websites. This anonymity has the advantage of creating a zone of free speech where individuals can communicate, think and explore ideas without government interference.

But it also creates a haven for illicit activity, including the buying and selling of drugs, child pornography and individuals' private information such as social security numbers, health records and passwords.

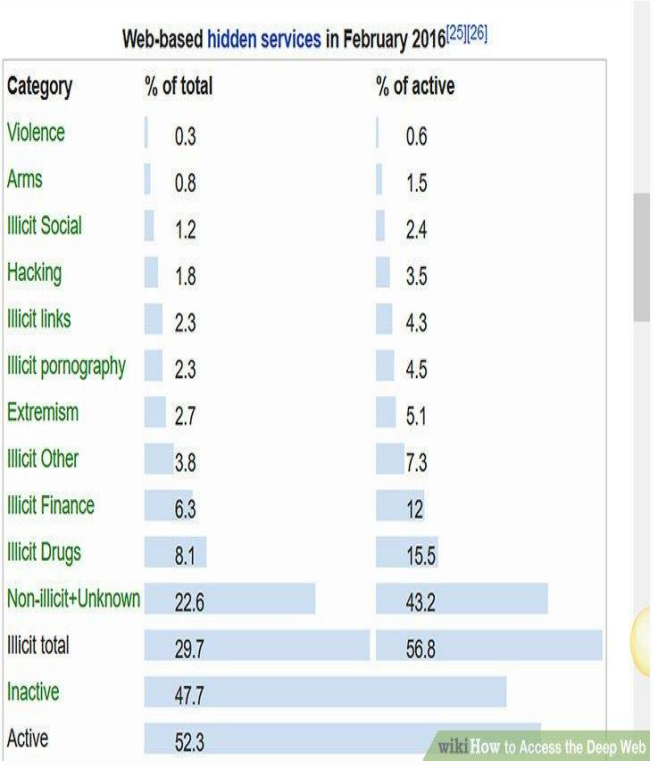
People who don't closely follow privacy issues probably associate the dark web with Silk Road, the infamous illegal drug marketplace that did millions in business before the FBI managed to shut the site down in 2013.

But the death of Silk Road didn't put an end to the dark web. This shady technological playground is still going strong, and many sites that thrive on the dark web are a daily threat to privacy and the economy.

Over the past three months, the website LeakedSource has uncovered huge caches of account data being sold on the dark web from eight websites including Twitter, MySpace and LinkedIn. In some cases, those accounts came from privacy breaches at the web companies. In other cases, data thieves were able to steal information directly from users.

The way the account information was stolen matters less than the fact that so much of it is for sale. Need a Netflix password? They're available for pennies on the dark web.

You can also get stolen passwords for Hulu, HBO Go and Spotify.The dark web has also become a haven for child pornography. According to an article on Wired, over 80% of dark web searches are related to pedophilia.
The government has taken small steps to shut down the more disturbing parts of the dark web. In 2014, a globally orchestrated strike known as "Operation Onymous" took down hundreds of domains and led to the arrest of 17 people in several countries. (Among the sites caught in the operation's web was Silk Road 2, a successor to the original drug market.)



But as we've seen from recent hacks, it isn't nearly enough. Allowing the dark web to thrive is causing real problems for everyone who uses the internet. Every time another hack is uncovered, people lose a little more faith in how well their privacy is being protected. If people start to shy away from shopping online and sharing their data with websites, we could see a slow erosion of the digital economy, which is expected to add $1.36 trillion to the global economy by 2020.

PRACTICAL APPLICATIONS :

While it can often be difficult to locate information on the Dark Web, there are several practical applications. For example, for attorneys tasked with protecting trademarks, patents or data, the Dark Web is a potentially excellent source for determining from where counterfeit goods are originating. The Dark Web may also be useful for finding the website from which illegally obtained personal data is being sold. Attorneys should have a general understanding of the Dark Web in the event they are defending a client charged with using it to conduct illegal activities.

VIII .Advantages

- ✓ IP Address is Secure.
- ✓ Anonymous web search.
- ✓ Access HTTP and HTTPs sites.

IX .Disadvantages

1. Trouble with the law.
2. Storing money in online wallets.
3. Shipment seizing.
4. You can never check the quality of the product.

IX .Safety tips

1. No to Torrents : Peer2peer client software is used for downloading torrent. hackers can see what your downloading .
2. Use Tails : It aims at preserving your privacy and anonymity, try not to use windows.
3. No Downloads : Do not download anything from the deep web you may either end up with getting child pornography or malicious files.
4. Cover Web Cam : Hackers watch you from webcam when you are in dark web .

CONCLUSION

- The dark web will continue to perplex and fascinate everyone who uses the internet.
- It contains an enthralling amount of knowledge that could help us evolve technology and as a species when connected to other bits of information.
- And of course, its darker side will always be lurking too , just as it always does in human nature.

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Model selection using Cross-Validation

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***Abstract*—This paper presents and assesses the problems associated with building a good model and validating it. We describe about a standard concept "Cross-Validation" in Machine Learning which can be used to solve these issues.**

Keywords*—*underfitting, overfitting, classification, regression, k-fold cross-validation, leave-one-out cross-validation

I. INTRODUCTION

Machine Learning, especially supervised learning techniques such as classification and regression require training data to build a model. A good classification or regression model can be built if significant amount of training data is supplied during the training process. This is followed by the validation process where test data is fed into the trained model to evaluate its predictive accuracy. Cross-validation is primarily such a way of measuring the predictive performance of a statistical model. But why do models lose stability and result in low performance? A model loses its stability in two cases: overfitting of the model and underfitting of the model. Overfitting refers to a model that models the training data too well. Overfitting happens when a model learns the detail and noise in the training data to the extent that it negatively impacts the performance of the model on new data. This means that the noise or random fluctuations in the training data is picked up and learned as concepts by the model. The problem is that these concepts do not apply to new data and negatively impact the models' ability to generalize. Underfitting refers to a model that can neither model the training data nor generalize to new data. An underfit machine learning model is not suitable model and will be obvious as it will have poor performance on the training data. Both overfitting and underfitting can lead to poor model performance. But by far the most common problem in applied machine learning is overfitting. Using cross-validation is a gold standard in applied machine learning for estimating model accuracy on unseen data. Cross-validation is used to compare learning algorithms by dividing the data into two segments: one segment used to train the model and the other used to validate the model. In a general classification problem, the goal is to learn a classifier that performs well on anonymous data derived from the same distribution as the available data. One common way to estimate the generalization capabilities of a learned classifier is to measure its performance on test data that has not been used to train the classifier. When a large data set cannot be easily acquired, resampling methods, such as cross-validation, are commonly used to estimate the generalization capabilities.

In typical cross-validation, the training and validation data sets must cross-over in successive rounds such that each data point has a chance of being validated against. Two types of cross-validation can be distinguished, exhaustive and non-exhaustive cross-validation. Exhaustive cross-validation methods are cross-validation methods which learn and test on all possible ways to divide the original sample into a training and a validation set. It includes Leave-p-out cross-validation (LpOCV), Leave-one-out cross-validation (LOOCV). Non-exhaustive cross-validation methods do not compute all ways of splitting the original sample. It includes k-fold cross-validation, Holdout method, Repeated random sub-sampling validation (Monte Carlo cross-validation). These methods are approximations of leave-p-out cross-validation.

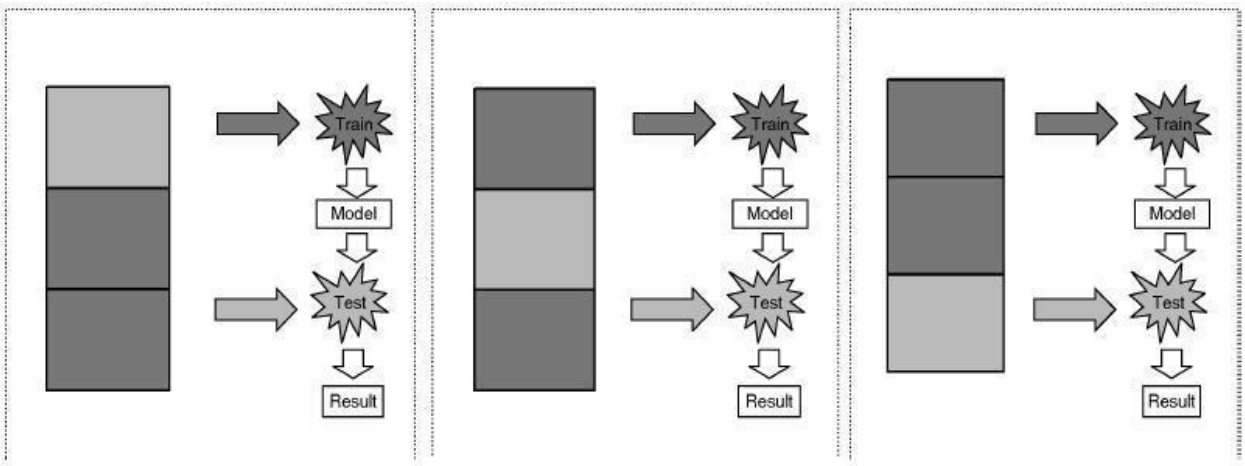
The basic form of cross-validation is k-fold cross-validation. Other forms of cross-validation are special cases of k-fold cross-validation or involve repeated rounds of k-fold cross-validation. In k-fold cross-validation the data is first partitioned into k equally (or nearly equally) sized segments or folds. Subsequently k iterations of training and validation are performed such that within each iteration a different fold of the data is held-out for validation while the remaining k _ 1 folds are used for learning. Fig. 1 demonstrates an example with k = 3. The darker section of the data are used for training while the lighter sections are used for validation. In data mining and machine learning 10-fold cross-validation (k = 10) is the most common.

Resampling methods, such as bootstrapping or cross validation[2][6] have typically been used to measure the generalization performance of a chosen algorithm, or possibly to select between a limited set of algorithms. Until the last decade, cross validation experiments could reasonable be performed only on a small set of algorithms or possible models; a k-fold or loocv run for a single algorithm, even on a small dataset, typically ran for several hours, if not days. As computers have become more powerful and due to recent advances regarding the computational efficiency of popular classification algorithms and techniques (for example: linear training time for SVMs[5] and n log(n) kernel computation), cross validation performance can be quickly computed on several thousands or even millions of algorithms. Recent developments in grid computing now allow computers distributed in a large geographic area to be harnessed for a specific task, exponentially increasing the computing power at hand.

II. SCIENTIFIC FUNDAMENTALS

There are two possible goals in cross-validation:

- To estimate performance of the learned model from available data using one algorithm. In other words, to gauge the generalizability of an algorithm.
- To compare the performance of two or more different algorithms and find out the best algorithm for the available data, or alternatively to compare the performance of two or more variants of a parameterized model.



Cross-Validation. Figure 1. Procedure of three-fold cross-validation.

The above two goals are highly related, since the second goal is automatically achieved if one knows the accurate estimates of performance.

Concerning these two goals various procedures are proposed:

Re substitution Validation

In re substitution validation, the model is learned from all the available data and then tested on the same set of data. This validation process uses all the available data but suffers seriously from overfitting. That is, the algorithm might perform well on the available data yet poorly on future unseen test data.

Hold-Out Validation

To avoid overfitting, an independent test set is preferred. A natural approach is to split the available data into two non-overlapped parts: one for training and the other for testing. The test data is held out and not looked at during training. Hold-out validation avoids the overlap between training data and test data, yielding a more accurate estimate for the generalization performance of the algorithm. The downside is that this procedure does not use all the available data and the results are highly dependent on the choice for the training/test split. The instances chosen for inclusion in the test set may be too easy or too difficult to classify and this can skew the results. Furthermore, the data in the test set may be valuable for training and if it is held-out prediction performance may suffer, again leading to skewed results. These problems can be partially addressed by repeating the hold-out validation multiple times and averaging the results, but unless this repetition is performed in a systematic manner, some data may be included in the test set multiple times while others are not included at all, or conversely some data may always fall in the test set and never get a chance to contribute to the learning phase. To deal with these challenges and utilize the available data to the max, *k*-fold cross-validation is used.

k-Fold Cross-Validation

In *k*-fold cross-validation the data is first partitioned into k equally (or nearly equally) sized segments or folds. Subsequently *k* iterations of training and validation are performed such that within each iteration a different fold of the data is held-out for validation while the remaining $k - 1$ folds are used for learning. Data is commonly stratified prior to being split into *k* folds. Stratification is the process of rearranging the data as to ensure each fold is a good representative of the whole. For example in a binary classification problem where each class comprises 50% of the data, it is best to arrange the data such that in every fold, each class comprises around half the instances.

Leave-One-Out Cross-Validation

Leave-one-out cross-validation (LOOCV) is a special case of k-fold cross-validation where k equals the number of instances in the data. In other words, in each iteration nearly all the data except for a single observation are used for training and the model is tested on that single observation. An accuracy estimate obtained using LOOCV is known to be almost unbiased but it has high variance, leading to unreliable estimates. It is still widely used when the available data are very rare, especially in bioinformatics where only dozens of data samples are available.

Repeated K-Fold Cross-Validation

To obtain reliable performance estimation or comparison, large number of estimates are always preferred. In k-fold cross-validation, only k estimates are obtained. A commonly used method to increase the number of estimates is to run k-fold cross-validation multiple times. The data is reshuffled and re-stratified before each round.

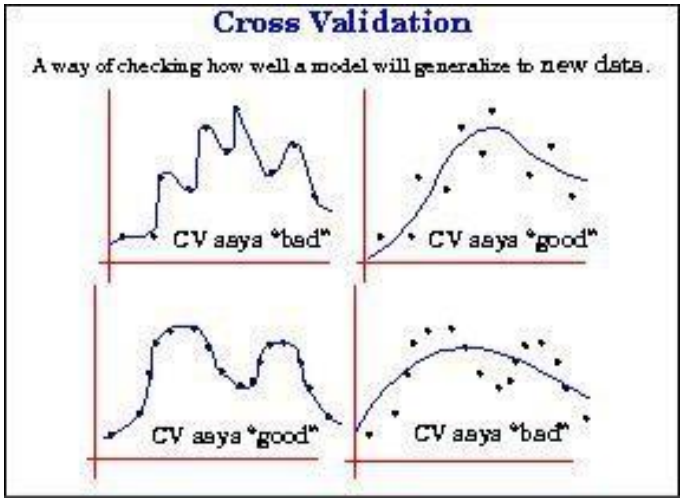


Figure 2: Cross validation checks how well a model generalizes to new data

III. MODEL SELECTION

We group in this section all the issues related to model selection. This may be done in the case of newly developed learning algorithms, in which case the designer may wish to compare the performance of the classifier with some existing baseline classifier on some benchmark dataset, or it may be done in a generalized model-selection setting. In generalized model selection one has a large library of learning algorithms or classifiers to choose from and wish to select the model that will perform best for a particular dataset. In either case the basic unit of work is pair-wise comparison of learning algorithms. For generalized model selection combining the results of many pair-wise comparisons to obtain a single best algorithm may be difficult, but this is beyond the scope of this article. Researchers have shown that when comparing a pair of algorithms using cross validation it is best to employ proper two sample hypothesis testing instead of directly comparing the average accuracies. Cross-validation yields k pairs of accuracy values for the two algorithms under test. It is possible to make a null hypothesis assumption that the two algorithms perform equally well and set out to gather evidence against this null-hypothesis using a two-sample test. The most widely used test is the paired t-test. Alternatively the non-parametric sign test can be used. A special case of model selection comes into play when dealing with non classification model selection. For example when trying to pick a feature selection algorithm that will maximize a classifier's performance on a particular dataset. There are in fact two variants of cross-validation in this case: performing feature selection before splitting data into folds (OUT) or performing feature selection k times inside the cross-validation loop (IN). The paper explains that there is potential for bias in both cases: With OUT, the feature selection algorithm has looked at the test set, so the accuracy estimate is likely inflated; On the other hand with IN the feature selection algorithm is looking at less data than would be available in a real experimental setting, leading to underestimated accuracy. Experimental results confirm these hypothesis and further show that:

● In cases where the two feature selection algorithms are not statistically differentiable, IN tends to be more truthful.

●In cases where one algorithm is better than another, IN often favors one algorithm and OUT the other.

OUT can in fact be the better choice even if it demonstrates a larger bias than IN in estimating accuracy. In other words, estimation bias is not necessarily an indication of poor pair-wise comparison. These subtleties about the potential for bias and validity of conclusions obtained through cross-validation should always be kept in mind, particularly when the model selection task is a complicated one involving pre-processing as well as learning steps.

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An Introduction to Artificial Neural Networks

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***Abstract*— An Artificial Neural Network (ANN) is an information processing paradigm that is inspired by the way biological nervous systems, such as the brain, process information.in In this paper we are dealing with Introduction, What is ANN, Model of Artificial Neuron, Training an Artificial Neural Network, Applications.**

Keywords*-*synaptic weight, activation function, adaptive learning, supervised learning.

I.INTRODUCTION

The study of the human brain is thousands of years old. With the advent of modern electronics, it was only natural to try to harness this thinking process.

The human brain processes information in a coordinated manner with the aid of a network of a very large number of densely interconnected, relatively simple decision-making elements, the neurons. Neurons are massively connected, much more complex and denser than telephone networks. Each neuron is interconnected to 10^3 to 10^4 neighboring neurons. The total number of synaptic interconnections where information is stored is extremely large, approaching 10^14 to 10^15.

There is a hierarchy of structure in the nervous system with an inherent C3I (Command, Communication, Control and Information) protocol stemming from the brain and converging to a cell. A single biological neuron:

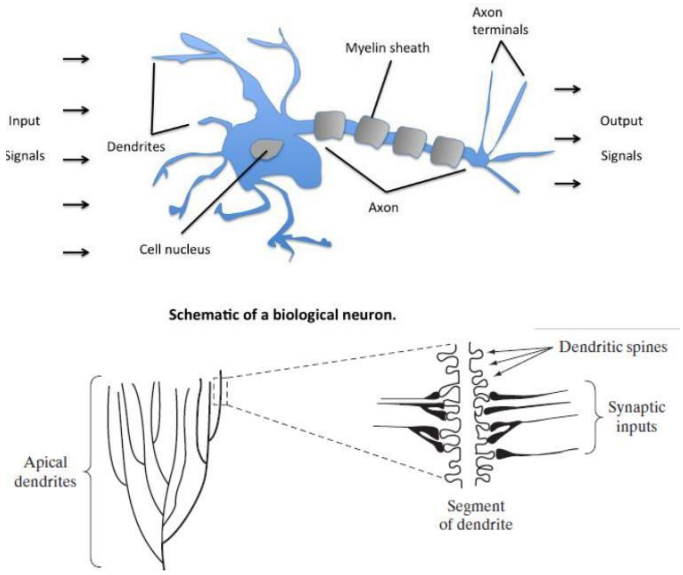


Fig.1: Biological Neuron

1. Synapses weight the individual parts of information: Incoming signals from other neurons or cells are transferred to a neuron by special connections, the synapses.
2. In the soma (cell nucleus) the weighted information is accumulated.
3. The axon transfers outgoing pulses.
4. Dendrites collect all parts of information.

The first step toward artificial neural networks came in 1943 when Warren McCulloch, a neurophysiologist, and a young mathematician, Walter Pitts, wrote a paper on how neurons might work[2]. They modeled a simple neural network with electrical circuits.

Neural networks, with their remarkable ability to derive meaning from complicated or imprecise data, can be used to extract patterns and detect trends that are too complex to be noticed by either humans or other computer techniques. A trained neural network can be thought of as an "expert" in the category of information it has been given to analyze. Other advantages include:

1. Adaptive learning: An ability to learn how to do tasks based on the data given for training or initial experience.
2. Self-Organization: An ANN can create its own organization or representation of the information it receives during learning time.
3. Real Time Operation: ANN computations may be carried out in parallel, and special hardware devices are being designed and manufactured which take advantage of this capability.
4. Fault Tolerance via Redundant Information Coding: Partial destruction of a network leads to the corresponding degradation of performance. However, some network capabilities may be retained even with major network damage.

Neural networks take a different approach to problem solving than that of conventional computers. Conventional computers use an algorithmic approach i.e. the computer follows a set of instructions in order to solve a problem. Unless the specific steps that the computer needs to follow are known the computer cannot solve the problem. That restricts the problem solving capability of conventional computers to problems that we already understand and know how to solve. But computers would be so much more useful if they could do things that we don't exactly know how to do. Neural networks process information in a similar way the human brain does. The network is composed of a large number of highly interconnected processing elements (neurons) working in parallel to solve a specific problem. Neural networks learn by example. They cannot be programmed to perform a specific task. The examples must be selected carefully otherwise useful time is wasted or even worse the network might be functioning incorrectly. The disadvantage is that because the network finds out how to solve the problem by itself, its operation can be unpredictable. On the other hand, conventional computers use a cognitive approach to problem solving; the way the

problem is to solved must be known and stated in small unambiguous instructions. These instructions are then converted to a high level language program and then into machine code that the computer can understand. These machines are totally predictable; if anything goes wrong is due to a software or hardware fault. Neural networks and conventional algorithmic computers are not in competition but complement each other. There are tasks are more suited to an algorithmic approach like arithmetic operations and tasks that are more suited to neural networks. Even more, a large number of tasks, require systems that use a combination of the two approaches (normally a conventional computer is used to supervise the neural network) in order to perform at maximum efficiency.

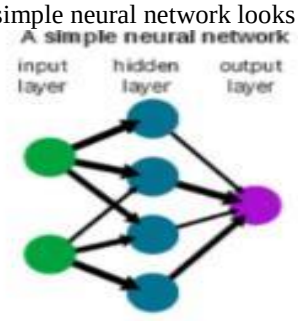
II.WHAT IS ARTIFICAL NEURAL NETWORK?

A *neural* network *is* a machine that is designed to *model* the way in which the brain performs a particular task or function of interest; the network is usually implemented by using electronic components or is simulated in software on a digital computer.

"A neural network is a massively parallel distributed processor made up of simple processing units that has a natural propensity for storing experiential knowledge and making it available for use. It resembles the brain in two respects:

1. Knowledge is acquired by the network from its environment through a learning process.
2. Interneuron connection strengths, known as synaptic weights, are used to store the acquired knowledge."

A simple neural network looks like



The procedure used to perform the learning process is called a *learning algorithm, the* function of which is to modify the synaptic weights of the network in an orderly fashion to attain a desired design objective.

The modification of synaptic weights provides the traditional method for the design of neural networks. Such an approach is the closest to linear adaptive filter theory, which is already well established and successfully applied in many diverse fields. However, it is also possible for a neural network to modify its own topology, which is motivated by the fact that neurons in the human brain can die and new synaptic connections can grow.

III.MODEL OF ARTIFICIAL NEURON

A *neuron* is an information-processing unit that is fundamental to the operation of a neural network. The block diagram shows the *model* of a neuron, which forms the basis for designing a large family of neural networks studied in later chapters.

Here, we identify three basic elements of the neural model:

1. A set of synapses, or connecting links, each of which is characterized by a *weight* or *strength* of its own. Specifically, a signal x_j at the input of synapse j connected to neuron k is multiplied by the synaptic weight w_{kj}. It is important to make a note of the manner in which the subscripts of the synaptic weight w_{kj} are written. The first subscript in w_{kj} refers to the neuron in question, and the second subscript refers to the input end of the synapse to which the weight refers. Unlike the weight of a synapse in the brain, the synaptic weight of an artificial neuron may lie in a range that includes negative as well as positive values.

2. An *adder* for summing the input signals, weighted by the respective synaptic strengths of the neuron; the operations described here constitutes a *linear combiner*.

3. An *activation function* for limiting the amplitude of the output of a neuron. The activation function is also referred to as a *squashing function*, in that it squashes (Limits) the permissible amplitude range of the output signal to some finite value.

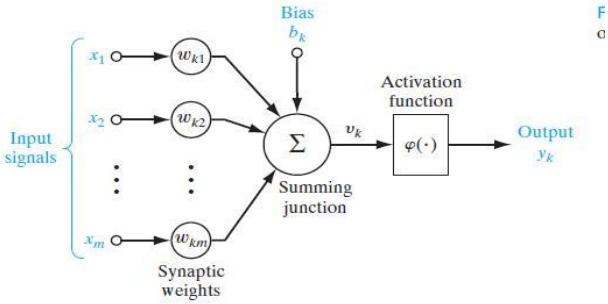


Fig 2.Non linear Model of neuron,labeled k.

Typically, the normalized amplitude range of the output of a neuron is written as the closed unit interval [0, 1], or, alternatively, [-1, 1].

The neural model above also includes an externally applied *bias*, denoted by b_k. The bias b_k has the effect of increasing or lowering the net input of the activation function, depending on whether it is positive or negative, respectively. In mathematical terms, we may describe the neuron k depicted in Fig. above by writing the pair of equations:

$$u_k = \sum_{j=1}^{m} w_{kj} x_j \qquad (1)$$

$$y_k = \varphi(u_k + b_k) \qquad (2)$$

where $x_1, x_2, ..., x_m$ are the input signals; $w_{k1}, w_{k2}, ..., w_{km}$ are the respective synaptic weights of neuron k; u_k (not shown in Fig above) is the *linear combiner output* due to the input signals; b_k is the bias; $\Psi(\cdot)$ is the *activation function*; and y_k is the output signal of the neuron. The use of bias b_k has the effect of applying an *affine transformation* to the

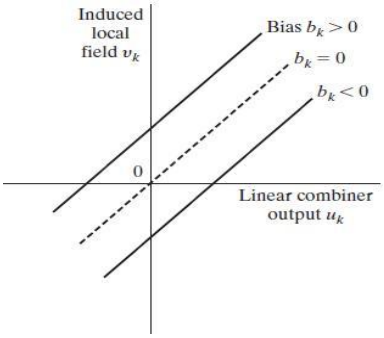
output u_k of the linear combiner in the model of neuron, as shown by

$$v_k = u_k + b_k \qquad (3)$$

In particular, depending on whether the bias b_k is positive or negative, the relationship between the *induced local field*, or *activation potential*, v_k of neuron k and the linear combiner output u_k is modified in the manner illustrated in Fig. 3; hereafter, these two terms are used interchangeably. Note that as a result of this affine transformation, the graph of v_k versus u_k no longer passes through the origin. The bias b_k is an external parameter of neuron k. We may account for its presence as in Eq. (2). Equivalently, we may formulate the combination of Eqs. (1) to (3) as follows:

$$v_k = \sum_{j=0}^{m} w_{kj} x_j \qquad (4)$$

Fig3: Affine transformation produced by the presence of a bias; note that v*k*=*bk* at *uk*=0.



and

$$y_k = \varphi(v_k) \qquad (5)$$

In Eq. (4), we have added a new synapse. Its input is

$$x_0 = +1$$

and its weight is

$$w_{k0} = b_k$$

We may therefore reformulate the model of neuron k as shown in Fig. 2. In this figure, the effect of the bias is accounted for by doing two things: (1) adding a new input signal fixed at +1, and (2) adding a new synaptic weight equal to the bias b_k. Although the models of Figs. 2and 4 are different in appearance, they are mathematically equivalent.

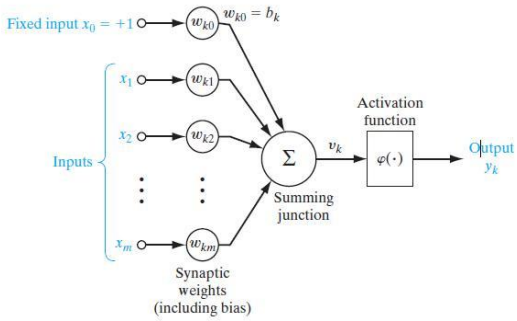


Fig.4 non linear model of a neuron: w_{k0} accounts for the bias b_k.

IV.Training an Artificial Neural Network

Once a network has been structured for a particular application, that network is ready to be trained. To start this process the initial weights are chosen randomly. Then, the training, or learning, begins. There are two approaches to training - supervised and unsupervised. Supervised training involves a mechanism of providing the network with the desired output either by manually "grading" the network's performance or by providing the desired outputs with the inputs. Unsupervised training is where the network has to make sense of the inputs without outside help. The vast bulk of networks utilize supervised training. Unsupervised training is used to perform some initial characterization on inputs. However, in the full blown sense of being truly self-learning, it is still just a shining promise that is not fully understood, does not completely work, and thus is relegated to the lab.

1. Supervised Learning:
   In supervised training, both the inputs and the outputs are provided. The network then processes the inputs and compares its resulting outputs against the desired outputs. Errors are then propagated back through the system, causing the system to adjust the weights which control the network. This process occurs over and over as the weights are continually tweaked. The set of data which enables the training is called the "training set." During the training of a network the same set of data is processed many times as the connection weights are ever refined. The current commercial network development packages provide tools to monitor how well an artificial neural network is converging on the ability to predict the right answer. These tools allow the training process to go on for days, stopping only when the system reaches some statistically desired point, or accuracy. However, some networks never learn. This could be because the input data does not contain the specific information from which the desired output is derived. Networks also don't converge if there is not enough data to enable complete learning. Ideally, there should be enough data so that part of the data can be held back as a test. Many layered networks with multiple nodes are capable of memorizing data. To monitor the network to determine if the system is simply

memorizing its data in some non-significant way, supervised training needs to hold back a set of data to be used to test the system after it has undergone its training. If a network simply can't solve the problem, the designer then has to review the input a0nd outputs, the number of layers, the number of elements per layer, the connections between the layers, the summation, transfer, and training functions, and even the initial weights themselves. Those changes required to create a successful network constitute a process wherein the "art" of neural networking occurs. Another part of the designer's creativity governs the rules of training. There are many laws (algorithms) used to implement the adaptive feedback required to adjust the weights during training. The most common technique is backward-error propagation, more commonly known as back-propagation. These various learning techniques are explored in greater depth later in this report. Yet, training is not just a technique. It involves a "feel," and conscious analysis, to insure that the network is not over trained. Initially, an artificial neural network configures itself with the general statistical trends of the data. Later, it continues to "learn" about other aspects of the data which may be spurious from a general viewpoint. When finally the system has been correctly trained, and no further learning is needed, the weights can, if desired, be "frozen." In some systems this finalized network is then turned into hardware so that it can be fast. Other systems don't lock themselves in but continue to learn while in production use.

2. Unsupervised or Adaptive Training:

The other type of training is called unsupervised training. In unsupervised training, the network is provided with inputs but not with desired outputs. The system itself must then decide what features it will use to group the input data. This is often referred to as self-organization or adaption. At the present time, unsupervised learning is not well understood. This adaption to the environment is the promise which would enable science fiction types of robots to continually learn on their own as they encounter new situations and new environments. Life is filled with situations where exact training sets do not exist. Some of these situations involve military action where new combat techniques and new weapons might be encountered. Because of this unexpected aspect to life and the human desire to be prepared, there continues to be research into, and hope for, this field. Yet, at the present time, the vast bulk of neural network work is in systems with supervised learning. Supervised learning is achieving results

V. APPLICATIONS

The various real time applications of Artificial Neural Networks are as follows:

1. Function approximation, or regression analysis, including time series prediction and modelling.
2. Call control- answer an incoming call (speaker-ON) with a wave of the hand while driving.
3. Classification, including pattern and sequence recognition, novelty detection and sequential decision making.
4. Skip tracks or control volume on your media player using simple hand motions- lean back, and with no need to shift to the device- control what you watch/ listen to.
5. Data processing, including filtering, clustering, blind signal separation and compression.
6. Scroll Web Pages, or within an eBook with simple left and right hand gestures, this is ideal when touching the device is a barrier such as wet hands are wet, with gloves, dirty etc.
7. Application areas of ANNs include system identification and control (vehicle control, process control), game-playing and decision making (backgammon, chess, racing), pattern recognition (radar systems, face identification, object recognition, etc.), sequence recognition (gesture, speech, handwritten text recognition), medical diagnosis, financial applications, data mining (or knowledge discovery in databases, "KDD").
8. Another interesting use case is when using the Smartphone as a media hub; a user can dock the device to the TV and watch content from the device- while controlling the content in a touch-free manner from afar. If your hands are dirty or a person hates smudges, touch-free controls are a benefit.

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An Introduction to Internet of Things

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Abstract— **This paper on internet of things explains detailly about what is IoT, how IoT works, present uses of IoT, Future of IoT, The potential of IoT, few applications of IoT, Technological challengers of IoT, criticisms and controversies of IoT**.

Keywords—internet of things, DDoS, knowledge management, potential.

I. INTRDUCTION

Internet of things is an ecosystem of connected physical objects that are accessible through internet. The thing in internet of things can be an automobile, a man with a heart monitor that is anything that is assigned a IP address and have an ability to transfer data without any manual assistance. The growth of things on internet would make connections more relevant and creating more opportunities for people, business , industries. The things can represent themselves digitally so that they can be controlled from anywhere. So the connectivity helps us capture more data from different places increasing the efficiency and improving the safety.

II. WORKING OF IOT

Internet of things can also be referred to as internet of everything, it consists wed enabled devices which collect, send information to the devices in their surrounding environment. These devices are called as 'smart' or 'connected' devices ,can sometimes talk to other related devices and this process is consider as machine to machine(M2M) communication, and behave accordingly depending upon the information they receive. Though humans give instructions to perform operations by devices most of the work is done by themselves. Connected devices nowadays generate a lot of internet traffic, including loads of data to make the device useful but this can also be used for other purpose.

III. INTERNET OF THINGS: PRESENT STATE

Some of the present applications of IoT are:

- Internet of Nano things: we introduce internet of nano materials as internet consisting of small networking for small personal devices. With the development of small networking devices and their performance is expected to be required in future also. Due the size of devices a difference is observed in the frequency range, energy consumption, and energy recharging.
- In few industries internet of things is already making impacts on the quality of their life. Connecting to remotely controlling monitor devices through satellite networks combined with more cost efficient points is making the internet of things a very real time solution in these companies.
- Many local government and municipalities dreams to minimize traffic jams water leakage. A number of communities are already making usage of IoT. For example water quality and wastewater is being checked by tiny sensors that wirelessly report from water levels and also the type of bacteria to block the water main.
- MHealth is term that is coined to practise medicine and public health through mobile phone. The real value of internet of things comes under consideration while enabling the doctor to remotely manage specific diseases.

IV. KNOWLEDGE MANAGEMENT FROM DATA TO WISDOM

Internet of Things (IoT) is being viewed as the next big disruptor that would change the way businesses are transacted; customer needs are identified and serviced. The IoT refers to communication between 'things' containing embedded technology connected via wireless networks without human interfaces.

We are experiencing an explosive growth of connected 'things' considering that in 2009 that number was less than 1 billion devices. While the proliferation of smartphones contributed a great deal in building the momentum for Internet of Things, what we are going to experience is more and more 'smart things'.

Smart cities, smart communities, smart household gadgets, smart healthcare systems and innumerable other smart and connected objects. This transformative phenomenon calls for an understanding of how learning and knowledge assimilation would have to adapt in the corporate context.

Thus the learning management system and the knowledge management system would have to be hooked to IoT and get smart at analyzing the huge amount of data that would be possible to access and with analytics understand the key focus areas of training and development required to be customized for each individual.

Knowledge management (KM) systems would have to be geared more and more for real time knowledge improvements. Customers buying patterns and the usage trends of equipment will come together to

provide new insights for marketing and product development teams and KM specialists have the opportunity to synthesize both data and arrive at new knowledge?
In the changing the world led by Internet of Things and Big Data, Knowledge needs of Individuals will get redefined. L&D functions have to get equipped with capabilities to deal with data, machine interface and the threats of the possibilities of machine intelligence surpassing human intelligence by rethinking methods and tools for making the talent pool to get the interpret system intelligence such that
Human intelligence becomes even sharper.

V.THE FUTURE OF IoT

IoT devices are now becoming a part of the mainstream electronics culture.
These devices are getting smarter day by day through machine learning and artificial intelligence.
Smartness of the devices depends upon the data they collect. Cities will transform into smart cited by the use of IoT connected devices. Smart homes lighting systems and coffee makers will all collect data on our habits and patterns of usage.

V.I PREDICTIONS OF FUTURE OF IoT

1. 21 billion connected devices are estimated in the year 2020.
Over 3.9 billion connected devices were used in worldwide in 2016 over 3.9 billion devices were connected where in the year 2015 only 4.9 million devices were connected.
2. Hackers to use IoT devices to facilitate DDoS attacks.
Internet of things mainly started in the year 2016 October which is a strain of malware that can infect the connected devices. In order to facilitate a Distributed Denial of Service attack the malware then turns the affected devices into botnet.
3. Cities being smarter.
IoT devices are not only being used by the consumers. To save both time and money many cities and companies are now trying to be more efficient by adopting the smarter technologies.
4. Artificial Intelligence is considered a type of machine learning.
Machine learning is considered as a type of artificial intelligence which helps the computers to perform itself without the human assistance. These computers mainly focus on data they receive. These computers will adjust themselves according to the data they have received.
5. Smarter and more secured routers.

Many manufacturers are now trying to get the product as fast as possible, so sometimes security can be overlooked. Here home router plays an important role. The router is considered as the entry point into our home. As connected devices cannot be protected themselves, the router provides security at the entry point**.**

VI.POTENTIAL OF IoT

The Internet of Things (IoT), or devices connected to the World Wide Web is rapidly emerging as a third and a bigger wave in the development of cyberspace. India released its first IoT framework in October that aims to create a 15 billion dollar impacting the growth of connected devices from current 200 million to 2.7 billion by 2020, largely by partnering with private firms.

For starters the government proposes to set aside21 million dollars over a period of three years as 50% of the investment required for minimum number of projects each from categories that include smart cities, water, environment, health.
There are more than 20 IoT characteristics which can complement and add value in aerospace system in many ways by reducing customer pain points such as flight cancellation, flight delays. Identification of potential systems and its relevant characteristics maturity is the key to implement and develop IoT products/systems in aerospace firm.

VII.APPLICATIONS OF IoT

There are many applications of IoT. IoT based systems make this world smarter and smarter.
For example, smart homes which are equipped with so many electronic devices and smart appliances, smart thermostats can now be controlled without human-appliance interaction by computers, smart phones and other mobile devices.
IoT finds its application in health care centers. Patients can be monitored more closely thus analyzing the data generated. IoT systems also help finish tasks such as catalogue management for both medical and pharmaceutical instruments.
Nowadays, sensors find a wide usage in smart buildings which help in reducing the energy costs. This again is an application of IoT. Air conditioner for example, detects the number of people in a room and accordingly maintains the temperature of the room.
IoT finds its application in smart farming systems. The IoT based smart farming systems can help monitor the surrounding temperatures, light and so on by making use of connected sensors.
The smartness of a city is measured in terms of IoT based systems being used in the city.

VIII. TECHNOLOGICAL CHALLENGES TO IoT

There has been a rapid increase in the use of technology. At the same time, there is an increase in risk to cyber attacks thus posing a threat to our personal data. If in case the IoT based systems are poorly secured, the cyber attackers may take an advantage and cause harm to other devices in the network. This might also result in the leakage of personal data into the public thus destroying the entire trust factor between the systems which have been connected by the internet and might also deteriorate the people using them.
Thus it is very important to ensure the security and

reliability of the internet applications and to make sure that IoT based systems is strongly secured.

Now since the devices are constantly connected to the Internet there is a possibility of tracking and observance of people by the government as well as the private agencies. These devices collect the data from the user without seeking their permission and analyze them for the purposes only known to the patent company.

The range of devices connected to each other might raise many security issues and there are no legal laws which actually address these issues.

There is no doubt that IoT provides a great platform which enables development in almost all the fields across the world. But, as a coin has two sides, there are lot of shortcomings which are related to the basic services related to technology and the enablement of high speed internet services.

There is no doubt that our future is based on IoT based systems but how we manage them is what which shapes our future.

IX.CONCLUSION

By the above discussion we can conclude that the future of IOT is virtually unlimited as there is much advancement in the technology and there is a desire to integrate smart phones with the appliances used in the household. The only limitation is that as the data is being transferred over a number of devices, security in technology must grow as fast as connectivity so as to be in pace with the demands. There will be an increase in the productivity and soon amazing things will come by connecting the world.

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Data Management in Semantic Technologies

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***Abstract*— The paper gives a brief idea about the concept of semantic web, and its history and its importance for it to be introduced and encouraged as a huge data management system, which is dealt different compared to the normal data management in the World Wide Web. A case study is explained which deals with the RDF representation and access to Master data which portrays the synchronizing of all product and customer information with heterogeneous systems and trading partners. It also sees how the semantic technologies or product information Management (PIM) and costumer Data Integration(CDI) have enhanced the IBM master data management. The advantages of OWL ontologies along with the IBM semantic tools and system for the data frame development have been discussed in detail. The application of using this type of web is briefed in the end.**

Keywords— Consortium, master data, meta model ontology, semantic web.

I. INTRODUCTION

The Semantic Web is an extension of the world wide web through standards by the world wide web consortium. The semantic Web provides a common framework that allows data to be shared and reused across application, enterprise, and community boundaries. The semantic Web is therefore regarded across different content, information applications and systems.

The term was coined by Tim Burners-Lee for a web of data that can be processed by machines-that is, one in which much of the meaning is machine-readable.

The concept of the Semantic Network model was formed in the early 1960's by the cognitive scientist Allan M. Collins, M. Ross Quillian and psychologist Elizabeth F. Loftus as a form to represent semantically structured knowledge . When applied in the context of modern internet , it extend the network of hyperlinked human readable web pages by inserting machine readable metadata about pages and how they are related to each other. This enables automated agents to access the Web more intelligently and perform more tasks on behalf of users.

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II. SEMANTIC WEB SOLUTIONS

The Semantic Web takes the solution further. It involves publishing in languages specifically designed for data: Resource Description Framework, Web Ontology Language, and extensible Markup language. HTML describes documents and the links between them.
These technologies are combined in order to provide descriptions that supplement or replace the content of Web documents. Thus, content may manifest itself as descriptive data stored in Web-accessible data bases, or as mark up within documents.

Abbreviations and Acronyms
Consortium: an association, typically of several companies.
Master data: Master data is the core data that is essential to operations in a specific business or business unit.
Meta model: A metamodel or surrogate model is a model of a model, and metamodeling is the process of generating such metamodels.
Semantic web : a proposed development of the World Wide Web in which data in web pages is structured and tagged in such a way that it can be read directly by computers.
Ontology: a set of concepts and categories in a subject area or domain that shows their properties and the relations between them.

A Case Study:
RDF Representation and Access to Master Data

Master data, as the core business entities a company uses, refers to lists or hierarchies of customers, suppliers, accounts, products, or organizational units. In this scope, Product and Customer information play a very important role since their accurate management is becoming critical for modern enterprises. They enable companies to centralize , manage and synchronize, all product and customer information with heterogeneous systems and trading partners. The most critical challenge is the need to build a common master model flexible enough to deal with business changes, and expressive enough to represent the semantic of master data.

To enhance IBM master data management (MDM) solutions, we developed semantic technologies or product Information Management (PIM) and customer data Integration (CDI) , respectively. Here I would like to highlight the value of semantic web technologies for MDM and brief completed and ongoing work. The advantages of OWL ontologies for product information include following:

- As based on RDF, OWL uses the concept of Universal Resources Identifiers(URIs) as web based identification scheme . It firstly allows one to refer to industry specific or external ontologies, and on the other hand it allows synchronization of product information management utilities to other core business entities, such as those in customer data integration (CDI).
- OWL allows the definition of richer properties and relationships. Object properties can be defined as symmetric, functional, inverse functional, or transitive. Object properties are then suitable to describe complex relationships among products and between products an other entities in product information.

- The expressivity of OWL allows the definition of logical class, which enables automatic classification on for product items. For instance, new product categories can be defined as the intersection of two others: smart phone products, which gather characteristics of both PDA and phones, are a good example . Any product which is simultaneously a PDA and a phone is then a smart phone.
- OWL restrictions can define dynamic categories which do not exist in the pre-designed category hierarchy and are specified by users at query time. It can represent complex and potentially evolving categories. For example using minimum cardinality restriction, it is possible to define an ”outdated products” category which gathers all products replaced by at least one other product. Items of dynamic category can be retrieved using OWL ontology reasoning.

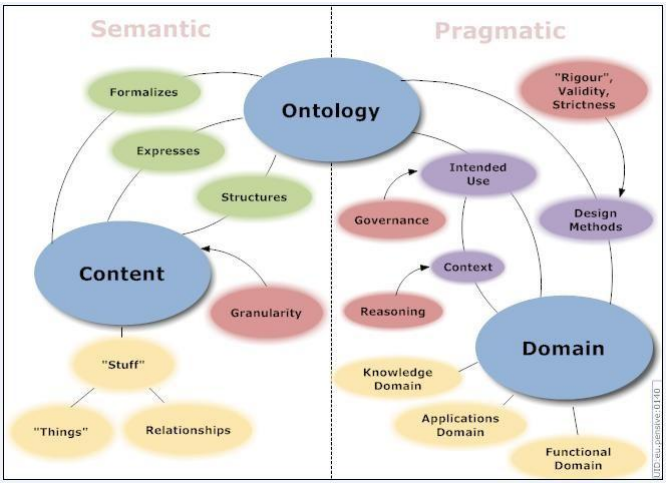
Since IBM PIM system currently uses technologies similar to triple store for storage, we support SPARQL queries over PIM storage easily by reusing SPARQL 2SQL query translation technologies developed . The query rewriting method translates a SPARQL query into a single SQL statement, utilizing well-developed SQL engines in a most effective manner.

The advantages of OWL ontologies for customer information are similar to those for product information. Representing and discovering various relationships among customers has a very high value for the CID , which is enables by ontology and rule reasoning. Different from the PIM system , IBM CID system make use of object oriented data base schema for storage. Each entity of the CID model owns a separate table to store corresponding instances. So we need a mapping to link the CID data with the OWL ontology generated and enriched from the CDI logical model. We proposed the following architectural model .

IBM Semantic tools and systems

Here, some IBMs ontology tools and systems related to RDF access to relational data. IODT is a toolkit for ontology driven development, including EMF ontology definition Metamodel(EODM) and an OWL ontology repository (named SOR). EODM is derived from OGMs ontology definition Metamodel (ODM) and implemented in eclipse modeling framework(EMF) .It is the runtime library that allows the application to put in and put out an PDFS/OWL ontology in RDF/XML format; manipulate an ontology using java objects, call an inference engine and access inference results; and transform between ontology and other models. SOR is an OWL ontology storage and a query system on the relational DBMS . It supports Description Logic Program (DLP), a subset of OWL DL, and SPARQL query language. SHER reasoned uses a novel method that allows for efficient querying of SHIN ontologies with large A boxes stored in databases, currently this method focuses on instance retrieval that queries of all individuals of a given class in the A Box. It is well known that all queries over DL ontologies can be reduced to consistency check, which is usually checked by tableau algorithm. SHER group individuals which are instances of the same class into a single individual to generate a summary A Box of a small size. This consistency check can be done on the dramatically simplified summary A Box, instead of the original A Box. It is reported that SHER can process A Box queries with up to million assertions efficiently, whereas the state of art reasons could not scale to this size.

To enable semantic queries over existing data sources , we need to store and leverage ontologies representing domain knowledge. SOR could be used to manage such ontologies . Similarly in the CDI case , we need an ontology repository to cache and materialize some inference results for performance improvement . In general , an RDF store , such as SOR , could be used to store domain knowledge or part of reasoning results for RDF access to relational databases. Obviously SHER engine could be used for scalable ontology reasoning for SPARQL queries over relational databases.



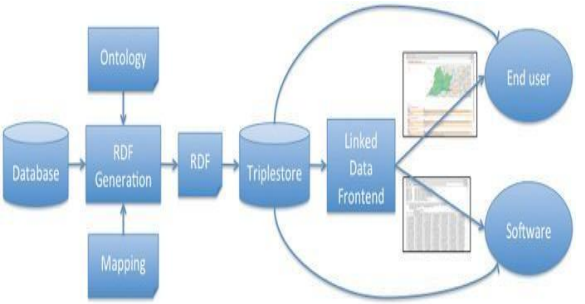
Applications

The intent is to enhance the usability and usefulness of the web and its interconnected resources by creating Semantic Web Services, such as;

- Servers that expose existing data systems using the RDF and SPARQL standards. Many converters to RDF exist from different applications. Relational databases are an important source. The Semantic web server attaches to the existing system without affecting its operation.
- Automated agents to perform tasks for users of the semantic web using this data.
- Facilitating the integration of information from mixed sources.
- Dissolving ambiguities in corporate terminology.
- Identifying relevant information with respect to a given domain.

CONCLUSION

Hence semantic web is a model where data is handled differently and web is accessed in a different way. The way it can be handled is by either web ontology language or by extensible markup language. Its way of handling is different and so is its syntax. A case study is presented and it explains the importance of master data, and also the establishment of modern enterprises based on customer and information. To enhance IBM master data management (MDM) solutions, we developed semantic technologies or product Information Management (PIM) and customer data Integration (CDI) , respectively. The advantages of OWL ontologies for product information are described. And IBM PIM system currently uses technologies similar to triple store for storage. Many applications we have discussed which include the importance of relational data bases. Also identifying reagent information and improving information revival are its highlights. So the advantages of using semantic web based on the standards of World Wide Web Consortium.



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A Survey on Sentiment Analysis

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***Abstract*—People are intended to develop a system that can identify and classify opinion or sentiment as represented in an electronic text. Sentiment Analysis is a process of automatic extraction of features by mode of notions of others about specific product, services or experience. This paper presents a survey covering the techniques and methods in sentiment analysis and challenges appear in the field.**

Keywords—opinion mining, machine learning, lexicon approach, retrieval.

1. INTRODUCTION

The era of electronic information in every phase of life is evolving rapidly, which tends to produce a large number of data. Sentiment analysis uses natural language processing, text analysis and computational linguistic in order to ascertain the attitude of speaker towards a specific topic. It is a series of method, technique and tools about detecting and extracting subjective information **.**Sentiment analysis, which is also called opinion mining, involves in building a system to collect and examine opinions about the product made in blog posts, comments, reviews or tweets.

2. BACKGROUND

The sentiment may be a judgment, mood or evaluation of the writer. Professor Lillian Lee is one of the founders of the field sentiment analysis .The work started with a seminal paper by Bo Pang and colleagues .

Languages that have been studied mostly are English and in Chinese .Presently, there are very few researches conducted on sentiment classification for other languages like Arabic, Italian and Thai. The emergence of sentiment analysis dates back to late 1990‟ s, but becomes a major emerging sub field of information management discipline only from 2000, especially from 2004 onwards, which this survey focuses.

3. ANALYSIS APPROACHES

The Sentiment classification is a task of classifying a target unit in a document to positive (favorable) or negative (unfavorable) class. There are three main classification levels :

- *document level*: classifies an opinion document as expressing a positive or negative opinion or sentiment. It considers the whole document a basic information unit (talking about one topic);
- *sentence-level*: classifies sentiment expressed in each sentence. If the sentence is subjective it classifies it in positive or negative opinions;
- *aspect-level*: classifies the sentiment with respect to the specific aspects of entities. Users can give different opinions for different aspects of the same entity.

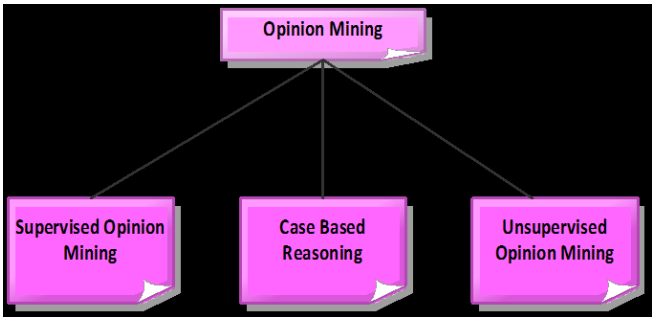
In a survey on different methods of sentiment analysis available in literature related to product reviews (such as machine learning, semantic orientation, opinion polling, holistic lexicon-based approach etc.) is carried out. The survey underlines that sentiment analysis/opinion mining play vital role to make decision about product /services. Another survey on approaches used for sentiment analysis is provided in which three approaches for performing sentiment extraction are described:

- **subjective lexicon approach**: is a list of words to witch is assigned a score that indicates its nature in terms of positive, negative or objective;
- **n-gram modeling approach**: that can use uni-gram, bi-gram, tri-gram or combination of these for the sentiments classification;
- **machine learning approach**: performs the semi and/or supervised learning through the extraction of the features from the text and learn the model .

4. ANALYSIS TECHNIQUES

Major data mining techniques used to dig the knowledge and information are: generalization, classification, clustering, genetic algorithm, association rule mining, data visualization, neural networks, fuzzy logic, Bayesian networks, and, decision tree. Number 5 has the techniques of Opinion Mining. Figure 5. Techniques of Opinion Mining

- **Supervised Machine Learning**: Classification is most often used and very popular data mining technique . Classification used to divide the possible results from a given data set is based on the basis of a defined set of attributes and a given predictive attributes. The given dataset is used as the training dataset consist of independent variables (properties of the dataset) and a dependent attributes (predicted attribute). A training dataset created model test on text corpus holds the same attributes but no predicted attribute. Accuracy of model checks on how faultless it is making a prediction. Double Propagation Algorithm is used to extract Product features and sentenced words.



- **Unsupervised Learning**- It differs to supervised learning, because unsupervised learning does not have definite targeted output connected with the input. Class label for any instance is not known so this technique of learning is about to learn by observation. Clustering is a technique which is also used in unsupervised learning. Clustering is an approach of bunching objects with similar properties into a group. Objects in a cluster are always dissimilar to the objects in other clusters.
- **Case Based Reasoning**- Case based reasoning is one of the emerging Artificial Intelligence supervised techniques. CBR is a fierce tool of computer reasoning and crack the problems (cases) in the closest way to real time scenario. This is a problem solving technique in which knowledge is personified as past cases in the library and it is not dependent on classical rules. The solutions of all the cases are stored in CBR warehouse known as Knowledge base or Case base.

5. STURCTURE OF ANALYSIS

K = {positive, negative}, sentiment classification is to classify each day in M, with a label expressed in K. The approach involves classifying review text into two forms namely positive and negative . Machine learning and dictionary based approach is more popular and comments by user.

5.1 Opinion Retrieval It is the procedure of collecting review text from review sites. Different review websites contain reviews for products, movies, hotels and news.

5.2 Information retrieval Techniques such as web crawler can be employed to collect the review text data from many sources and store them in a database. This step involves retrieval of reviews, micro-blogs and comments by user.

5.3 Opinion Classification Primary steps in sentiment analysis are a classification of review text. Given a review document M = {M1….. M1} and a predefined category set K = {positive, negative}, sentiment classification is to classify each day in M, with a label expressed in K. The approach involves classifying review text into two forms namely positive and negative [9]. Machine learning and dictionary based approach is more popular [3].

5.4 Opinion Summarization Summarization of opinion is a major character in the opinion mining process. Summary of reviews provided should be based on features or subtopics that are mentioned in the reviews. Many works have been done on summarization of product reviews.

6.APPLICATIONS:

- **Brand Monitoring**

One of the most well documented uses of Sentiment Analysis is to get a full 360 view of how your brand, product, or company is viewed by your customers and stakeholders. Widely available media, like product reviews and social, can reveal key insights about what your business is doing right or wrong. Companies can also use sentiment analysis to measure the impact of a new product, ad campaign, or consumer's response to recent company news on social media. Private companies like Unamo offer this as a service.

- **Customer service**

Customer service agents often use sentiment analysis to automatically sort incoming user email into "urgent" or "not urgent" buckets based on the sentiment of the email, proactively identifying frustrated users. The agent then directs their time toward resolving the users with the most urgent needs first. As customer service becomes more and more automated through Machine Learning, understanding the sentiment of a given case becomes increasingly important.

- **Market research and analysis**

Sentiment analysis is used in business intelligence to understand the subjective reasons why consumers are or are not responding to something (e.x. why are consumers buying a product? What do they think of the user experience? Did customer service support meet their expectations?). Sentiment analysis can also be used in the areas of political science, sociology, and psychology to analyze trends, ideological bias, opinions, gauge reactions, etc.

7 .CHALLENGES

Sentiment Analysis runs into a similar set of problems as emotion recognition does – before deciding what the sentiment of a given sentence is, we need to figure out what "sentiment" is in the first place. Is it categorical, and sentiment can be split into clear buckets like happy, sad, angry, or bored? Or is it dimensional, and sentiment needs to be evaluated on some sort of bi-directional spectrum?

In addition to the definition problem, there are multiple layers of meaning in any human generated sentence. People express opinions in complex ways; rhetorical devices like sarcasm, irony, and implied meaning can mislead sentiment analysis. The only way to really understand these devices are through context: knowing how a paragraph is started can strongly impact the sentiment of later internal sentences.

To address the context issue, a lot of research surrounding sentiment analysis has focused on feature engineering. Creating inputs to a model that recognize context, tone, and previous indications of sentiment can help increase accuracy and get a better overall sense of what the author is trying to say. For an interesting example, check out this paper in Knowledge-Based Systems that explores a framework for this kind of context focus.

Finally, one more challenge in sentiment analysis is deciding how to train the model you'd like to use. There are a number of pre-trained models available for use in popular Data Science languages. For example, TextBlob offers a simple API for sentiment analysis in Python, while the Syuzhet package in R implements some of research from the NLP Group at Stanford.

These modules can help you get off the ground quickly, but for the best long term results you're going to want to train your own models. Getting access to labeled training data for sentiment analysis can be difficult, but it's key to building models that work for your specific use case. You may execute a workflow where you gather your proprietary data (e.x. customer service conversations) and use a service like Crowd Flower to label and prepare it.

8.CONCLUSION

The field of sentiment analysis is an exciting new research direction due to a large number of real world applications where discovering people's opinions is important in better decision making. The development of technique for their document level sentiment analysis is one of the significant components of this area .Recently , people have started expressing their opinions on web , this increased the need of analyzing the opinionated online content for various real world applications .There is a huge cope of improvement of this existing sentiment analysis models .Existing models can be further improved with more semantic and technical knowledge.

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Breast Cancer Biosensors- A Brief Review

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***Abstract*— Breast cancer is highly prevalent in females and accounts for second highest number of deaths, worldwide. Cumber some, expensive and time consuming detection techniques presently available for detection of breast cancer potentiates the need for development of novel, specific and ultra sensitive devices. Biosensors are the promising and selective detection devices which hold immense potential as point of care (POC)tools. Present review comprehensively scrutinizes various breast cancer biosensors developed so far and their technical evaluation with respect to efficiency and potency of selected bioreceptors and biotransducers. Use of glycoproteins, DNA biomarkers, micro-RNA, circulatory tumorcells(CTC)and some potential biomarkers are introduced briefly. There view also discusses various strategies used in signal amplification such as nanomaterials, p19protein, duplex specific nucleases(DSN) and redox cycling.**

Keywords*— *Biosensors,bioreceptors,biomarkers,biotransducers.

*1.Introduction (*Heading 1*)*

Breast cancer is the most common invasive cancer in women, and the second main cause of cancer death in women, after lung cancer. Advances in screening and treatment have improved survival rates dramatically since 1989. There are around 3.1 million breast cancer survivors in the United States (U.S.). The chance of any woman dying from breast cancer is around 1 in 37, or 2.7 percent. In 2017, around 252, 710 new diagnoses of breast cancer are expected in women, and around 40,610 women are likely to die from the disease.

Breast cancer is a malignant tumor (a collection of cancer cells) arising from the cells of the breast. Although breast cancer predominantly occurs in women, it can also affect men. Breast cancer and its complications can affect nearly every part of the body.

Breast cancer can be:Ductal carcinoma: This begins in the milk duct and is the most common type.Lobular carcinoma: This starts in the lobules.Invasive breast cancer is when the cancer cells break out from inside the lobules or ducts and invade nearby tissue, increasing the chance of spreading to other parts of the body.Non-invasive breast cancer is when the cancer is still inside its place of origin and has not broken out. However, these cells can eventually develop into invasive breast cancer.Breast cancer can also affect men, but it is less common in men than in women.

The breast cancer diagnostic techniques include mammography (Detects only 70% of breast cancers), biopsy, MRI, sonography, molecular breast imaging, thermography etc .These are quite efficient methods and are able to detect 80–90% of breast cancers in women (Michaelson etal.,2002). A part from these, biomarker based expression techniques such as enzyme linked immuno sorbent assay (ELISA-time consuming), radio immunoassay(RIA) and immuno histo chemistry (IHC) also cater the present diagnostic needs. Although all these techniques are efficient, still, these are associated with some limitations. For this ,biosensorsaresensitive, specific and cost effective devices. These also exhibit the benefit of quick response due to direct assessment in physiological fluids (blood,serum, urine, saliva,milk etc.)in a non-invasive way.

A biosensor for cancer diagnosis usually consists of biomarker (target molecule),bioreceptor(recognitionelement) and compatible biotransducer.These components play an imperative role and decide the technical specifications of the biosensor device.

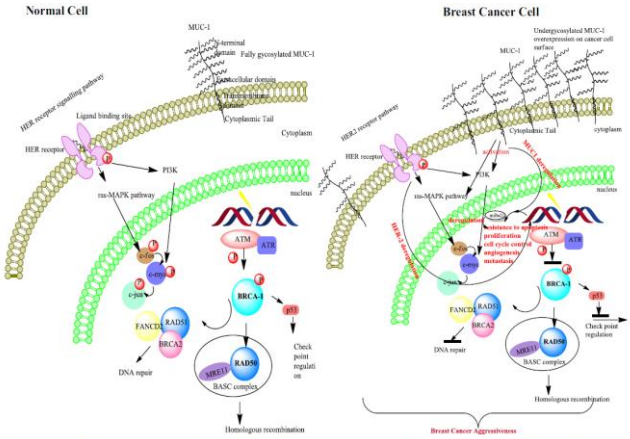


Fig. 2. Representation of HER-2, BRCA-1 and MUC-1 biomarker deregulation in the breast cancer vs normal cellular functions: Deregulated HER-2 receptor pathway lead to metastasis, cell cycle deregulation, angiogenesis, increased proliferation and reduction of apoptosis in the breast cancer cells. MUC-1 protein is under gycosylated and overexpressed throughout the membrane of cells leading to deregulation of PI3K pathway. MiR-21 overexpression leads to deregulated *bcl-2* expression leading to metastasis and activation of MAPK pathway on HER-2 stimulation. BRCA-1 down regulation in cancer cells leads to prevention of control over DNA repair and cell cycle regulation.

2.Biomarkers for breast cancer diagnosis:

There are certain biomolecules such as cell surface receptor proteins,mutatedgenes,microRNAs,etc. that are variedly expressed in/on tumor cells and are in dicative of cancer progression. These biologically relevant molecules are called biomarkers. Diagnostic assemblies demand that the biomarker shouldbean element easily extractable from the physiological fluids of the patients in a non-invasive procedure and should not exist in healthy person. As other cancer biomarkers,breast cancer biomarkers also follow two modes of classification, as stage dependent biomarkers and over expressed biomolecules based biomarkers(Mishra and Verma, 2010). From diagnostic point of view,biomolecules based biomarkers have more significance than therapeutic or prognostic biomarkers.Biomolecules like glycoproteins,DNA,micrRNA,circulatory tumor cells[CTC] are identified as target molecules for bio recognisation.

Glycoproteins:

Glycoproteins mainly consist of surface bound glycoprotein receptors like HER-2, Mucin1 (MUC1), carcinoembryonic antigen (CEA), epithelial cell adhesion molecule (EpCAM), epidermal growth factor receptor (EGFR) etc. These are usually deregulated and mediate cancer cell proliferation by production of growth factors which alter MAPK and PI3K/Akt pathways (Raina et al., 2004) and induce metastasis (Nath and Mukherjee, 2014). Among

the various glycoproteins, HER-2 and MUC1 are the most widely accepted diagnostic and prognostic biomarkers used in the detection of breast cancer.

3.Bioreceptors:

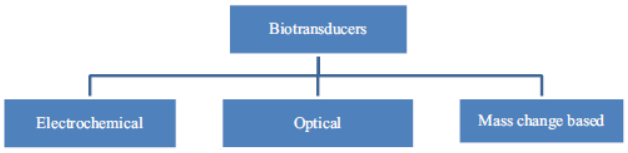
Bioreceptors are the biological part of the biosensor that in – teract with the biomarker and undergo biological reaction to produce asignal.These bioreceptors could be any biological entity that has specificity towards aparticular biomarker.Generally bioreceptors include antibodies,aptamers,DNA,enzymes,whole cells, etc.

Antibodies:

As convenient probes,antibodies have created explicit nichein breast cancer diagnosis bycontributing real nano-sense to the system.The specificity,sensitivity,and homogeneous nature of antibodies have attracted researcher's interest.Immobilization of biomarker specific antibodies on electrode surface and alteration in electron transfer rate of electrode is the principle for the development of impedance based electrochemical sensors.This isa process of direct and unlabelled form of detection that depends on change in physical parameters upon antigen-antibody complex (Ag-Ab) formation Indirect method of detection involves labelling of antibodies with signal producing molecules such as enzymes , redox mediators or fluorophores to capture voltametric oroptical changes.Enzymes such as horse radishperoxidase(HRP) and alkalinephosphatase are usually employed to produce electro active products leading to redoxreactions at electrode surface.Also,this approach makes use of sandwich immunoassay to make contact with electrode surface at one end and produce detectable signal at the other end.

4.Biotransducers and CTC capturing devices

Biotransducer is the part of biosensor that converts the biological signal produced by the interaction of target analyte and bioreceptor into a measurable signal.The compatibility of biotransducer with the bioreceptor is the key feature for the success of biosensor.Basically,a uniform trend with respect to biotransducers has been observed in the development of breast cancer biosensors.Majorly,electrochemical and optical biotransducers have been employed for biosensor construction. The studies have been divided and discussed in three broad categories of biotransducers as per Scheme 2. Inaddition,themi- crofluidic assemblies employed to capture CTC.



Scheme 2. Classification of biotransducers.

Electrochemical

biotransducers find wide application in biosensing due to their obvious high sensitivity, specificity, portability, ease of use and fast response. Electrochemical sensors offer a virtuous platform for immobilizing bioreceptors of various kinds that could deliver the signal with respect to analyte concentration. They also provide important information on the interaction of target molecule with the bioreceptor. Proteins, antibodies, aptamers and enzymes constitute wide array of components that could be attached to electrode surface through various means. Majority of electrochemical investigations take the advantage of this fact, and attempt to figure out the perfect combination of target – bioreceptor along with a conductivity enhancer(nanoparticles) to generate an amplified readout. A typical electrochemical workstation consists of three electrode system i.e. a working electrode, a reference electrode and an auxiliary electrode.The biochemical reactions pertaining to target-bioreceptor interaction occurs at the surface of working electrode.The electrochemical readout is obtained mainly through cyclic voltammetry(CV), differential pulse voltammetry(DPV), squarewave voltammetry(SWV), electrochemical impedance spectroscopy(EIS)etc. Nowadays,EIS is a preferred technique because it provides insight to the bimolecular interaction through their effect on electron transfer resistance (Ret). The interfacial resistance increases due to the bulky assembly of mono-dispersed layers(Ag-Aborprotein–aptamer)one lectrode surface. The increased resistance is evident by the enlarged semicircle in Nyquist plot obtained by EIS. The insulating effect of different layers of target-bioreceptor complex affect the mass transfer rate of electrons at the electrode surface and confer information on sequential binding of interacting biomolecules. Due to improved signal-to-noise ratio and ability to work in high resistive solutions, microelectrodes are reported to offer better current change characteristics than large diameter electrodes(Aryaetal.,2012; Aryaetal.,2013; Prabhulkar et al.,2009; Prabhulkar andLi,2009). The variousresearchershavemadeattemptstodevelopPOCfor earlydiagnosisofbreastcancerusingelectrochemicaltransducers and overexpressedbiomarkerssuchasmutated BRCA1, VEGF, MUC1, CEA, HER-2, CA15–3, miR-21.enlists the specifications and detection limits of various electrochemical biosensors developed for breastcancer.

Optical biotransducers

Light emission/absorption based determination of diverse analytes is a widely researched field with major emphasis on plasmonic effect of nanoparticles. With reference to clinical diagnosis and prognosis, use of nanoparticles has gained interest in past couple of years.Nano- particles have provided virtuous photo stable synthesis andnoise free fluorescence signal along with biocompatible environment Their prolonged fluorescence is responsible for surface enhanced Ramanspectroscopy(SERS) and has been utilized to differentiate between human breast normal cells,cancer cells and cancer stemcells based on scattering patterns.Shiftin resonance frequency of gold nano particles and similar nano composits define the adsorption of aptameror antibodies on their surface and correlate the shift with target density.The Ag-Ab interaction causes change inrefractive index of gold nanorods(GNRs)micro environment that can be qualitatively observed as shiftin longitudinal plasmon wavelength[LPW].

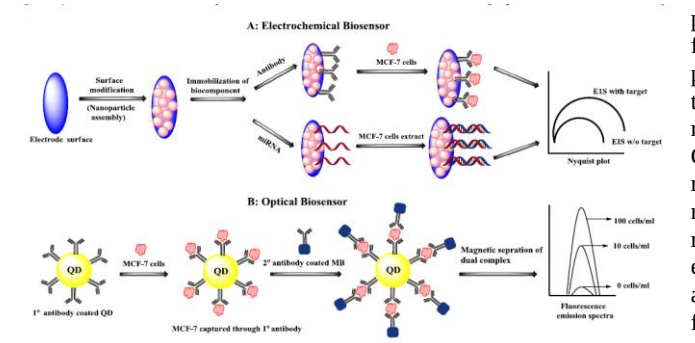


Fig. 3. Strategies to construct breast cancer biosensors: A) Electrochemical biosensor for detection of MCF-7 cells: Antibodies against surface proteins of MCF-7 cells are immobilized on nanoparticle assembled electrode to capture MCF-7 cells at the electrode surface which increases the interfacial resistance and hence enlarged semicircle in Nyquist plot. Alternatively cDNA complementary to miR can also be immobilized to capture target miR released from the cell extracts of MCF-7 cells. B) Quantum dot based optical biosensor for breast cancer: QDs are labelled with primary antibodies against MCF-7 cell surface proteins and subjected to sample containing MCF-7 cells. Addition of secondary antibody labelled magnetic beads (MB) enable their magnetic separation to obtain fluorescence emission spectra.

Mass change based biotransducers:

Some investigators have endeavored to develop mass change based biotransducres for breast cancer biosensors, through interaction of Ag-Ab on mass sensitive platform. The complex formation is associated with change inrefractiveindex or shiftin resonance in accordance with target concentration. Participation of nano composits to enhance target effect has also been investigate. Surface acoustic wave biosensors with surfaces modified with nanomaterials are reported to produce sensitive detection of breast cancer. Piezo electric micro cantilever sensors(PEMS)provide sensitive platform for Ag-Ab interaction,andpeptide18–4 based shift in resonance frequency. But longitudinal extension of piezo electric micro cantilever containing H3single-chainvariable fragment (scFv) antibody as bioreceptor is reported to offer lower detection limit for HER2 than lower frequency flexural mode.A costeffective, silicon micro ringresonator that enable destimation of resonance wavelength shift upon Ag-Ab interaction has also been reported. A very prominent technology pertaining to early diagnosis of breast cancer through detection of auto antibodies against ATP6AP1 proteins in saliva has been postulated. This study has given a blueprint for construction of a quartz crystal microbalance biosensor which could provide an easy and reliable(70%accuracy) detection method for regular and timely breast cancer check-ups.

Devices to capture and analyze circulating tumor cells

(CTC)in breast cancer Micro fluidic chip technology is the science of controlling fluids in multi-micro channels for analytical purposes. It has played a pivotal role in recognition and capture of breast cancer antigens because of restricted entry of cells through multichannel chip minimizes cell loss and contamination. Therefore, in addition to fluorescence based diagnostic techniques, some highly advanced automated micro fluidic devices have also been applied for isolation of CTC from serum samples. Diamagnetic property of cancer cells as compared to paramagnetic behavior of normal RBCs have also been exploited as isolation strategy . The basic idea for micro fluidic based biosensing was formulated by Nagrathetal.(2007). They designed a microchip(CTC chip) for isolation of CTC from varied meta static cancers including breast cancer. Flow rate through the device under shear forces was manifested as important parameter to attain capture efficiency of 65% . Fabrication of high through put micro – sampling unit (HTMSU) for prospective capture of CTC, equipped with conductivity sensor for enumeration has also been reported . The device provided the advantage over other sensors, as it omitted the need of sample pre-treatment (centrifugation) or post treatment (staining) for inventory. This also reduced the interference problems due to erythrocytes or leucocytes which are responsible for false positive or negative results. Workers were able to process1mlun treated whole blood in 30 min that could be reduced to 2.7min by designing the capture channel with different aspect ratio. CTC capture on solid surface is the primary requirement for CTC enumeration and initial studies were based on EpCAM realization on cell surface. Recently, employment of fluorescent nano particles (Ru(bpy)3 – SiNP) have been reported for recognition of CEA(Wei et al.,2011), HER-2andMUC1protein(Jo etal.,2015). Some dimension optimized flow channel devices have also been fabricated that allow size dependent segregation of CTC from normal WBC. Generally CTC are larger than WBC. Taking advantage of this fact, multiple micro chips have been designed to provide high throughput filtration efficiency . Highly efficient (99.24%) separation of CTC from RBC and WBC has been attain educing multi orifice flow fractionation (MOFF) followed by di-electrophoresis (DEP). Recently, a silicon nano wire platform (SiNW) has been fabricated to specifically isolatebreastBT20carcinomathrough EpCAM antibody labeling (Kim etal.,2015). Specific peptide18–4 assisted isolation of CTC is demonstrated through micro cantilever arrays with a detection limit of 50–100 cells ml_1.

5. Signal amplification strategies

Although the perfect combination of bioreceptor and the biotransducer decides the sensitivity of the developed biosensor but, incorporation of some signal amplification modules is necessary to magnify the output signal especially when dealing with very minute quantities of the target entities.This section is dedicated to discuss all such modifications adapted to enhance biosensor efficiency and lower down the detection limits.The secion is further divided into subsections, to entail various signal amplification strategies employed in electrochemical and optical biosensing.

Nanomaterials

Surface chemistry plays a pivotal role in biosensing, especially in electrochemical investigations, and it need to be managed to produce desired signal outcome. Certain inorganic components have been explored to functionalize the electrode surface that facilitate rapid electron transfer and improve recognition molecule adsorption on the electrode surface. The prerequisite for surface modifiers are that these should be biocompatible, thermally stable, easily functionalizable and provide antifouling effect. AuNPsor gold nanoclusters, grapheme oxide(GO),multi wall carbon nanotubes (MWCNT) or carbon nano rods are among there-cognized nanomaterials famed for their highly conductive nature and enlarged surface area. Such materials not only facilitate biomolecule immobilization on transient platforms but also expand electrochemical properties such as low background current, high signal to noise ratio and amplified signals. These properties help to attain surface characteristics that is ought to deliver sensitive output signals. Among all the nanomaterials, AuNPs are laced with all attributes required for electrochemical biosensing. An elaborate account to AuNP participation in cancer biomarker detection has been already discussed (Devi etal.,2015). Non-toxic, simple and rapid synthesis, convenient functionalization, large surface area to volume ratio and high electrical conductivity have raised their preference for clinical diagnosis of breast cancer.

6. Conclusion

Biosensors have changed the world of breast cancer diagnosis offering rapid, simple and cost effective routes. For low detection limits, glycoproteins are the most preferred targets for breast cancer diagnosis among miRs and CTC due to low abundance of latter ones. Among bioreceptors, aptamers have advantage of synthetic and thermo stable nature over antibodies that make them the perfect candidates for bio-detection. Electrochemical and optical routes of biosensing have enabled sensitive and specific detection in the past years. Latest improvement in signal amplification through nanomaterials, enzyme mediated cleavageorredoxcyclinghasleadto102–105 fold enhancement in detection limits. Still, realization of online application in complex biological matrices is a challenge and manifests major purpose of biosensors. Also, there is a lack of specific early stage biosensing breast cancer tools, and further research is needed in this area to reduce high mortality rate associated with the high risk breast cancer.

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A History of AI and it's Applications

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***Abstract*— This paper gives idea about use of neural networks in the world and it's applications in the various fields. Neural networks are today increasingly used in machine learning where they have become deeper and deeper to accurately model or classify high-level abstractions of data. Simple model of an artificial neuron. System identification is one of the most interesting applications for adaptive algorithms. About recurrent neural networks, artificial neural networks and predict using neural networks. This paper includes recent advances and future applications of neural networks. An idea of neural networks in the future.**

Keywords— Neural networks, Fuzzy logic, Neurobiological, Sigmodial and Hyperbolic tangent functions, RNN.

INTRODUCTION

Neural networks are distributed information processing systems made up of a great number of highly interconnected identical or similar simple processing units, which are doing local processing , and are arranged in ordered topology. An important feature of these networks is their adaptive nature, which means that its knowledge is acquired from its environment through an adaptive process called learning.

The construction of neural networks uses this iterative process instead of applying the conventional construction steps of a computing device. It is composed of a large number of highly interconnected processing elements(neurons) working in unison to solve specific problems. The area of neural networks probably belongs to the borderline between the artificial intelligence and approximation algorithms. The neural networks are used in (to name few) universal approximation (mapping input to the output), tools capable of learning from their environment, tools for finding non-evident dependencies between data and so on.

Neural networks are typically organized in layers. Layers are made up of a number of interconnected 'nodes' which contain an 'activation function'. Patterns are presented to the network via the 'input layer', which communicates to one or more 'hidden layers' where the actual processing is done via a system of weighted 'connections'. The hidden layers then link to an output layer as shown in figure.2

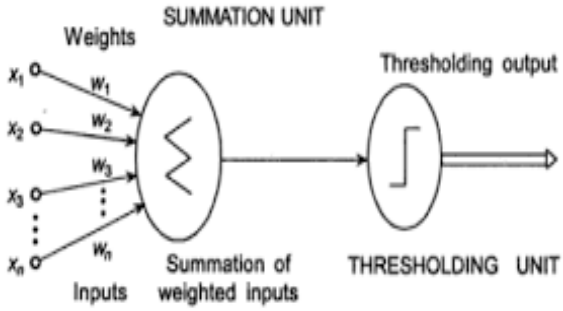


Fig.2: Simple model of an artificial neuron

Neural networks are also similar to biological neural networks in performing functions collectively and in parallel by the units, rather than there being a clear delineation of subtasks. The term "neural network" usually refers to models employed in statistics, cognitive psychology and artificial intelligence. Neural network models which emulate the central nervous system are part of theoretical neuroscience and computational neuroscience. Neural Networks are a different paradigm for computing.

- Von Neumann machines are based on the processing/memory abstraction of human information processing.
- Neural networks are based on the parallel architecture of animal brains. Neural networks are a form of multi processor computer system , with
  - Simple processing elements
  - A high degree of interconnection
  - Simple scalar messages
  - Adaptive interaction between elements.

A. Recurrent Neural Network :

A recurrent neural network (RNN) is a class of artificial neural network where connections between nodes form a directed graph along a sequence. This allows it to exhibit temporal dynamic behavior for a time sequence. Unlike feed forward neural networks, RNNs can use their internal state (memory) to process sequences of inputs This makes them applicable to tasks such as un segmented, connected handwriting recognition or speech recognition.

The term "recurrent neural network" is used indiscriminately to refer to two broad classes of networks with a similar general structure, where one is finite impulse and the other is infinite

impulse. Both classes of networks exhibit temporal dynamic behavior. A finite impulse recurrent network is a directed acyclic graph that can be unrolled and replaced with a strictly feed forward neural network, while an infinite impulse network is a directed cyclic graph that can not be unrolled.

Both finite impulse and infinite impulse recurrent networks can have additional stored state, and the storage can be under direct control by the neural network. The storage can also be replaced by another network or graph, if that incorporates time delays or has feedback loops. Such controlled states are referred to as gated state or gated memory, and are part of long short-term memory (LSTMs) and gated recurrent units.

Proposed Method :

Here we have considered RNN for identification. The proposed flow chat is as follows :

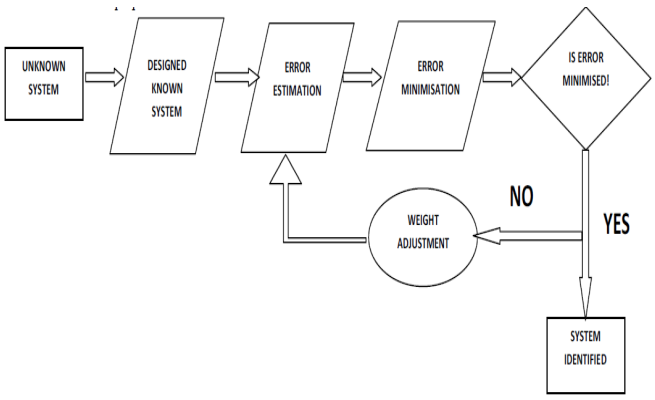
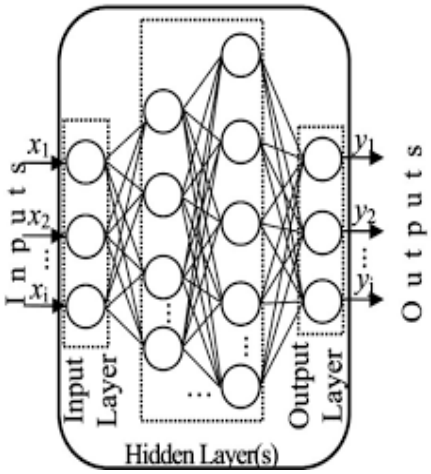


Fig.4: Basic flow chart of system identification using neural network adaptive algorithm

B. Artificial Neural Networks(ANNs) :

Artificial neural networks (ANNs) are one of the popular branches of artificial intelligence. They have very simple neuron-like processing elements (called nodes or artificial neurons) connected to each other by weighting. The weights on each connection can be dynamically adjusted until the desired output is generated for a given input. An artificial neuron model consists of a linear combination followed by an activation function. Different types of activation functions can be utilized for the network; however the common ones, which are sufficient for most applications, are the sigmoidal and hyperbolic tangent functions.

Amongst the different types of connections for artificial neurons, feed forward neural networks are the most popular and most widely used models in various applications. They are also known as the multilayered perceptron neural networks (MLPNNs). In an MLPNN, neurons of the first layer is send their output to the neurons of the second layer, but they do not receive any input back from the neurons of the second layer.



General structure of an MLPNN

The only task of the neurons in the input layer is to distribute the input signal X_i to neurons in the hidden layer. Each neuron j in the hidden layer sums up its input signal X_i after weighting them with the strengths of the respective connections W_{ji} from the input layer and computes its output Y_i as a function f of the sum, given by

$$Y_i = f(\sum W_{ji} X_i)$$

C. Predict using Neural Networks:

The increasing tendency to anticipate using artificial neural networks resulted in a remarkable increase in research activities in the recent decade. Artificial
Neural networks are suitable methods to indicate their efficiency in anticipating exchange rate, analyzing economical time series, issues related to stock and stock market. Results and the function of artificial neural networks have shown that this model has better function than popular methods considering assessment criteria of future time sequences anticipation In recent years, many complicated statistical methods have been developed and used for anticipation on process in the related issues. However, there are two basic problems about these methods .It includes personal statistical problem, power and certain analysis for a single and multi-dimensional time series . Artificial neural networks were reliable methods to remove statistical problems in anticipating multi-dimensional time series.
In the economic field, it is hard to anticipate macro-economic issues due to the lack of accurate and satisfying model. The most accurate model for economical anticipating is the time series model of black-box model which partly considers the economic structure. High noise levels, short time series, and nonlinear effects are introduced as time series problems solutions of regression method which are the popular ways to solve economical anticipations in the recent years. The given solution of artificial neural networks can be used to solve noted problems to anticipate macro-economic issues. By selecting the advanced parameters in artificial networks, the researchers have been provided the experimental results to

anticipate the indicator of industrial production in USA in which the given results of their simulation experiments indicate the better function of artificial neural networks than popular linear time series and regression.

D. Fuzzy logic controller:

We could try a fuzzy logic controller whose input variable will be the error in the level (desired level minus actual water height) and the output will be the velocity of the level . As a first approach we could design a Mhamdani system with the following rules:

- If level is okay, then value is no_ change.
- If level is low, then value is open_ fast.
- If level is high, then value is close_ fast.

The membership functions for the input variable 'level' (which is the error of the actual level) are chosen Gaussian functions to have a smooth answer.

E. Recent advances and future applications of NNs include:

Integration of fuzzy logic neural networks :

- Fuzzy logic is a type of logic that recognizes more than simple true and false values, hence better simulating the real world. For example, the statement today is sunny might be 100% true if there are not clouds , 50% true if it's hazy , and 0% true if rains all day. Hence, it takes into account concepts like- usually, somewhat, and sometimes.
- Fuzzy logic and neural networks have been integrated for uses as diverse as automotive engineering, applicant screening for jobs, the control of a crane, and the monitoring of glaucoma.

Pulsed neural networks :

- "Most practical applications of artificial neural networks are based on a computational model involving the propagation of continuous variables from one processing unit to the next.
- In recent years, data From neurobiological experiments have made it increasingly clear that biological neural networks, which communicate through pulses, use the timing of the pulses to transmit information and perform computation. This realization has stimulated significant research on pulsed neural networks, including theoretical analyses and modern development, neurobiological modeling, and hardware implementation".

Hardware specialized for neural networks :

- Some networks have been hardcoded into chips or analog devices? this technology will become more complex.
- The primary benefit of directly encoding neural networks onto chips or specialized analog devices is SPEED!
- NN hardware currently runs in a few niche areas, such as those areas where very high performance is required (e.g. high energy physics) and in embedded applications of simple, hardware networks(e.g. voice recognition)
- Many NNs today use less than 100 neurons and only need occasional training. In these situations, software simulation is usually found sufficient.
- When NN algorithms develop to the point where useful thing can be done with 1000's of neurons and 10000's of synapses, high performance NN hardware will become essential for practical operation**.**

Improvement of existing technologies :

- All current NN technologies will most likely be vastly improved upon in the future. Everything from handwriting and speech recognition to stock market prediction will more sophisticated as researchers develop better training methods and network architectures.

NNs might, in the future, allow:

- Robots that can see , feel, and predict the world around them
- Improved stock prediction
- Common usage of self-driving cars
- Composition of music
- Handwriting documents to be automatically transformed into formatted word processing documents
- Trends found in the human genome to aid in the understanding of the data compiled by the Human Genome Project
- Self- diagnosis of medical problems using neural networks.

CONCLUSION

Today neural networks provide the best classification methods in areas such as computer vision, speech recognition, neurobiological modeling, traffic prediction, stock market prediction, water quality prediction, financial prediction, earthquake prediction and so on. Nowadays in agriculture, we make use of computers and electronics. In this way we are using neural networks in various fields.

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Message from HOD

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The Engineering community celebrates Engineers' day on 15th September every year as a tribute to the greatest Indian Engineer **Bharat Ratna Mokshagundam Visvesaraya**. The year 2018 will mark the 50th anniversary of the Engineers day in India and the 157th birth anniversary of **Sir Mokshagundam Visvesaraya**. Engineers' day is celebrated for great works of Sir M.V towards the development of various places which are the most developed cities and for his brilliance and his great achievement in harnessing water recourses in India. He had successfully designed and constructed several river dams, bridges and revolutionarised the irrigation system in India by implementing efficient irrigation and drinking water system.

Engineers possess versatile minds and help in filling the gap between science, technology and the community. Electronics and Communication Engineers plays a vital role in the technological revolution of the world and there is bound to be a huge demand for competent ECE engineers in the coming years. I sincerely hope that the technical magazine- **INGÉNIEUR** would bring out the hidden talent of the students. The cooperation extended by the faculty and students of the department in bringing out the first issue of the magazine in a short time is excellent. I am really thankful to all of them. I am hopeful that excellent articles would be contributed by the students of the department in the coming years.

Message from the Coordinators

Mr.P.V.K.Chaitanya, Asst Prof, ECE
&
Ms.R.Jalaja, Asst Prof, ECE

Electronics and communication engineering plays a pivotal role in shaping the technological revolution of the world. A technical magazine exclusively for the students is an attempt to provide a platform to the students to express exchange and crystallize their technical views and ideas. We are happy to be a part of the team in bringing out the college technical magazine- **INGÉNIEUR**

It is a matter of great pride and immense pleasure to coordinate the technical articles for the first issue of the magazine. The articles we received in the diverse areas of Plasma Antennas, Cognitive Radio, Vehicle Monitoring, Flash-Light etc.., reveal that the technical minds of the students of our department are no less when it comes to creative technical writing. We hope that the tradition started will lead towards the glory of the institute.

Cognitive Radio Spectrum Sensing Detection Methods using Matlab Simulink

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***Abstract*—Cognitive radio networks provide an opportunity for unlicensed users (secondary users) to use the allocated spectrum band when not in use by legitimate users (primary users). To use a channel or spectrum, it is required to sense the channel for the presence of primary user which is called Spectrum Sensing. In order to reduce the sensing time of spectrum and to determine the state of the channel whether it is free or not in advance, spectrum prediction techniques can be used. In this paper, different techniques and learning models that can be applied to predict the state of spectrum band for the presence of primary user are discussed.**

Keywords—Cognitive Radio Networks, spectrum prediction, channel state prediction, activity modeling.

I. INTRODUCTION

With the increase in number of users, the need of spectrum has also increased significantly. However, the spectrum band or bandwidth available for the communication is limited. Federal Communications Commission (FCC) in US is one of the main central authorities that allocate and regulate the spectrum bandwidth. The FCC frequency chart shows the spectrum allocated over all the frequency bands. This chart explains the spectrum scarcity especially for the band under 3GHz. On the contrary, actual measurements that were taken in downtown Berkeley as shown in figure a distinctive utilization of 0.5% in 3-4 GHz frequency band which further drops to 0.3% in the 4-5 GHz band. This suggests that the spectrum available for communication is mostly allocated but it is often used inefficiently. To deal with the problem of spectrum scarcity and inefficient spectrum usage, FCC has permitted the unlicensed users to use the spectrum in the absence of licensed users. This provides a way to various technologies such as dynamic spectrum access, cognitive radio networks, software defined radios etc. Cognitive Radio Networks can be primarily used for this purpose due to their ability to adapt to networks conditions. A cognitive network is a network with a cognitive process that can perceive current network conditions, and then plan, decide, and act according to those conditions. The network can learn from these adaptations and use them to make its future decisions, while taking into account the end-to-end goals". Cognitive radio networks enables the unlicensed users often termed as secondary users to use the available channel bandwidth in the absence of licensed user or primary user. Since secondary users can use the spectrum band only in the absence of primary user, on the appearance of primary user appears they have to evacuate the band immediately. Thus to use a spectrum band, secondary users have a limited time period in which it has to select the appropriate band, transfer the data and evacuate the band. The major spectrum management functions are: spectrum sensing, spectrum decision, spectrum sharing and spectrum mobility.

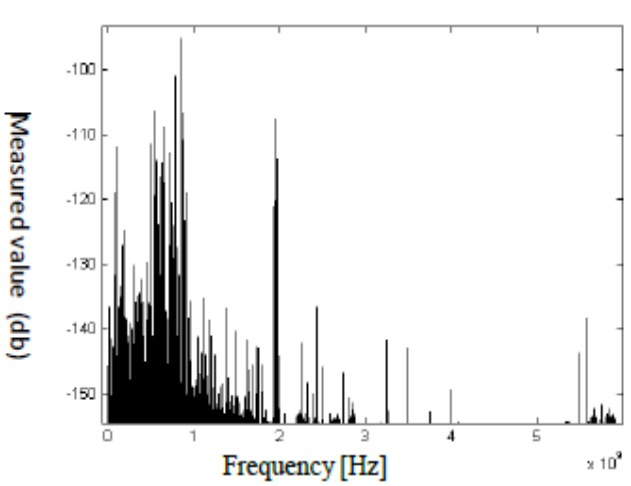


Fig. 1. Measurement of Spectrum utilization at BWRC

In order to use the available bandwidth, secondary users have to sense the spectrum for the presence of primary user, so that CR users or secondary users can dynamically use the available bandwidth. But the bandwidth is available only for a limited time period. Thus to save the spectrum sensing time and increase the efficiency of spectrum utilization, spectrum prediction or channel state prediction techniques can be used. By using channel state prediction techniques, CR user can skip sensing those channels which are predicted to be busy, hence saving the sensing time as well as energy. Figure 2 shows the tradeoff between spectrum sensing time and spectrum access time. Spectrum prediction techniques can also be used to determine the quality of service provided by the channel. A number of techniques have been introduced over a period of time to predict the channel state. Considerable amount of research is going on in this direction to provide more accurate predictions. In this paper, we discuss different methods and the research that has been done so far on the techniques that have been used for the channel state prediction.

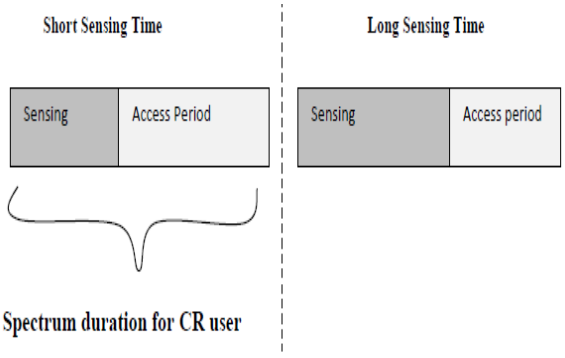


Fig. 2. Trade-off between Spectrum Sensing Time and Access Time

II. FUNCTIONS PERFORMED BY COGNITIVE RADIO NETWORKS

Cognitive radio networks consist of two types of users, primary users and secondary users. Primary users are the licensed users that are allocated the spectrum. Secondary users are CR users which use the available bandwidth or spectrum when primary users are not using it. If a primary user appears while secondary user is in the middle of communication, secondary users have to evacuate the spectrum and look for another channel to continue its communication. Figure 3 shows the different activities performed by CR users .

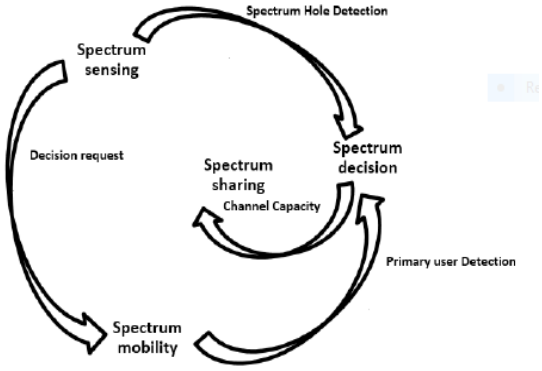


Fig. 3. Activities performed by CR Users

A. Spectrum sensing

Cognitive Spectrum sensing is one of the major functions of CR networks. Secondary users can use only the unused portion of the spectrum which requires monitoring of the spectrum and detection of the spectrum holes. The basic functions performed during spectrum sensing are:

1) Sensing control: Sensing control enables the CR users to adapt themselves to the network conditions. Figure 4 shows two main issues of sensing controller:

a) In-band sensing: for how much time and how frequently spectrum should be sensed to achieve sufficient sensing accuracy

b) out-of-band sensing: how quickly CR user can find the spectrum hole.

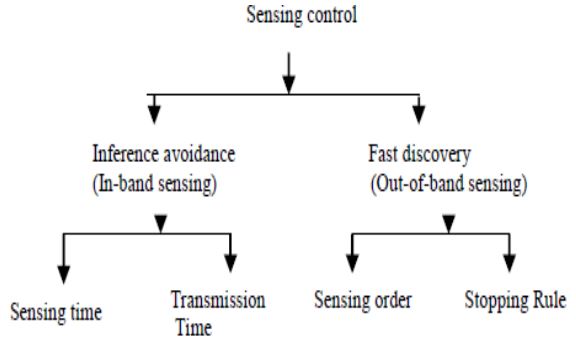


Fig. 4. Sensing control

2) PU detection: CR user monitors the environment for the presence of primary users and identifies the spectrum holes.

3) Coordination: In cooperative sensing gathered information is shared with other secondary users.

B. Spectrum decision

Spectrum decision is the capability of the secondary user to decide the best spectrum available according to the quality of service required by the application from the pool of available channels. It involves spectrum selection, spectrum characterization and CR reconfiguration function. After vacant channels are identified using Spectrum sensing, geo-location database or some other technique, each channel is characterized on the basis of statistical information and local observations. Based on this information most appropriate channel is selected. Then a CR user should be capable to reconfigure its transceiver parameters to support communication.

1) Spectrum characterization: Secondary users characterize the spectrum bands on the basis of interference, strength of received signal and the number of users currently residing in the channel.

2) Spectrum selection: It includes spectrum selection in centralized CR networks and distributed CR Networks.

C. Spectrum sharing

The main challenge after detecting the available spectrum is sharing the spectrum among CR users. Spectrum sharing is the distribution of spectrum among the secondary users according to the requirements and cost of usage. Spectrum sharing can be classified according to three main aspects :

1) Architecture: This spectrum sharing technique assumes that the spectrum access in Cognitive Radio networks can be distributed or centralized. In central spectrum sharing technique the spectrum allocation measurements are forwarded to a centralized entity that constructs an allocation map. Spectrum allocation and access is controlled by the centralized entity. While in distributed spectrum sharing, no central authority is present. Each node or user allocates and access the spectrum based on local measurements.

2) Behaviour of spectrum allocation: Spectrum can be accessed in a cooperative behaviour or a non-cooperative behaviour. Cooperative or collaborative spectrum sharing considers the effect of communication of node on other nodes. On the other hand, non-cooperative spectrum sensing considers only the node in hand.

3) Spectrum access technique: There are basically two types of access techniques overlay and underlay spectrum sharing. In overlay spectrum access method, a secondary user accesses the network via those channels which are currently not in use of primary users, thus creating minimum interference. Whereas in underlay spectrum access method, secondary users access the network by observing spread spectrum technique.CR user interferes with primary user at certain points in underlay method.

D. Spectrum mobility

If a channel currently in use by secondary user is required by the primary user, secondary user have to leave the channel and communication have to be continued in another vacant channel. This is called spectrum mobility which leads to

spectrum handoff. Spectrum mobility has mainly two functionalities spectrum handoff and connection management. Handoff in cognitive radio networks can be due to different reasons; a) primary user is detected, b) secondary user lost its connection due to mobility c) channel in use cannot meet the QoS requirements. Spectrum handoff mechanisms for selecting the target channel to continue the communication can be of two types:

Proactive spectrum handoff, where secondary users select their target channel before starting the transmission and perform handoff when any undesirable situation occurs. In proactive spectrum handoff spectrum switching is faster but it requires complex algorithms since it maintains its current transmission and search for the new band concurrently. It is mostly suitable for spectrum quality degradation and user mobility.

On the other hand, in reactive spectrum handoff, target channel is not selected in advance rather it is selected when link failure occurs. Spectrum mobility is performed on an immediate basis without any preparation time. There is a significant degradation in quality of ongoing transmission, but the algorithm is less complex. It is generally used when a primary user appears in the spectrum in use.

III. Spectrum Sensing Techniques

There are various spectrum sensing techniques which are employed for spectrum sensing such as :

1) Energy Detection: Energy detector is the most popular way of spectrum sensing because of its low computational and implementation complexities. The receivers do not need any knowledge about the primary users. An energy detector (ED) simply treats the primary signal as noise and decides on the presence or absence of the primary signal based on the energy of the observed signal. Digital implementations using FFT-based spectral estimates. Fig. 5 shows the architecture for digital implementation of an energy detector

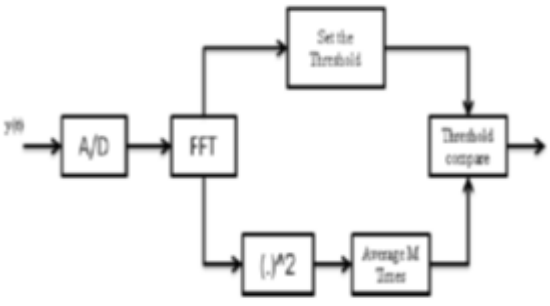


Fig. 5. Digital implementation of an energy detector

The process flow of the energy detector is, the received signal is passed through the ADC then calculate the FFT coefficient values then squared those values and average over the observation interval. Then the output of the detector is compared to a pre-defined threshold value to decide whether the primary user is present or not. Fig. 6.gives the Simulink based model for energy detection using FFT. Here, the analog signal is first filtered through a band pass filter and then converted into a digital signal. A 12-bit ADC quantize (Vain = 0V, Amax = 5V) is used. This output is then passed through an FFT to get the corresponding coefficients.

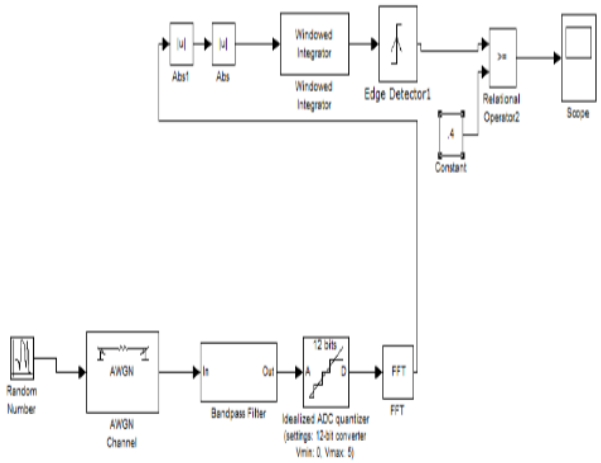


Fig. 6. Simulink model for Energy Detection

The signal is converted from time domain to the frequency domain by the FFT block. The magnitude of the received signal is then taken and it is squared. A minimum amount of signal is considered to be noise. The received signal is assumed to be present if and only if this threshold is crossed. This is done with the help of a relational operator which is placed in the comparator diagram.

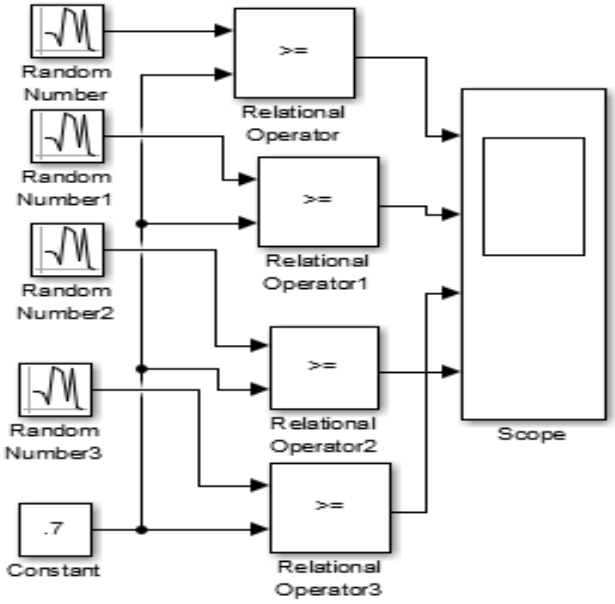
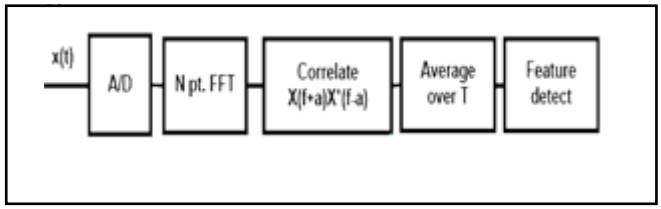


Fig. 7. Threshold comparison of 4 users using energy detection (ED) method

There are 4 users with different signal values which are compared with threshold value. Threshold value is set at 0.7 and is generated using constant block. Relational Operator compares the input signal value with threshold signal value and the difference of both values shown on Scope.

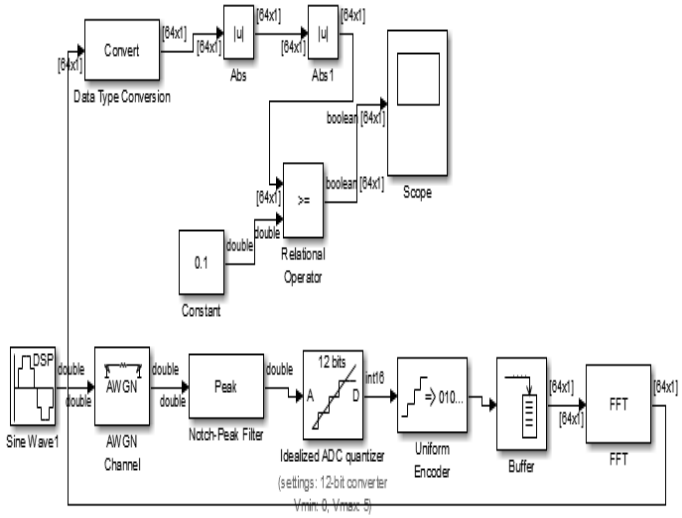
2) Cyclostationary Feature Detection: The most challenging task in the conniving and execution of cognitive radio (CR) is spectrum sensing (SS). By using spectrum

sensing, cognitive radios (CR) can familiarize themselves to the unending wireless spectrum environment. Cyclostationary sensing is an effective method for signal detection. A modified radio signal is considered as a cyclostationary process and the statistical properties of cyclostationary process differ periodically over time. The autocorrelation function is the cyclic processes with a periodicity T. Cyclostationary feature detection (CFD) deals with cyclostationary statistical characteristics of the signal. It accomplishes periodicity in received primary signal to identify the presence of primary user (PU). Cyclostationary feature detection (CDF) method obtains greater noise protection than any other spectrum sensing (SS) method because it has periodic statistics and spectral correlation that cannot be found in any interference signal or stationary noise.



Block diagram of cyclostationary feature detection

Implementation of a Cyclostationary feature detector is a spectrum sensing which can differentiate the modulated signal from the additive noise. A signal is said to beCyclostationary if its mean and autocorrelation are a periodic function. Cyclostationary feature detection can distinguish PU signal from noise and used at very low Signal to Noise Ratio (SNR) detection by using the information present in the PU signal that is not present in the noise.



IV. SIMULINK RESULTS AND ANALYSIS

Fig 8 shows the output result of Energy Detection method. Threshold is set to 0.4 and if user will cross the threshold value than user is present otherwise user will be idle and at that instant secondary user can occupy space.
In fig.9 we can see that threshold value is set at (0.7). Total number of users is 4. The user who will cross the threshold value is assumed to be present and who will not cross threshold value is assumed to be idle. As shown in graph that 1[st]and 3rd user cross the threshold value so they are assumed to be present. 2ndand4th user does not cross the threshold value so they are assumed to be idle.

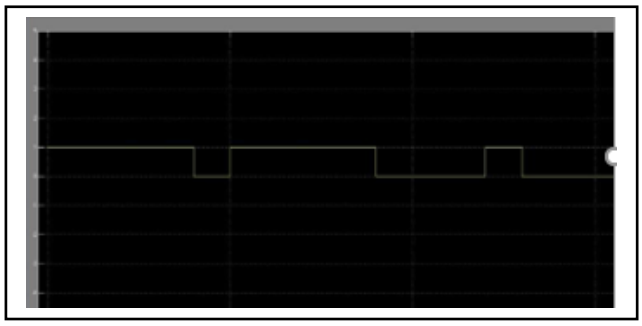


Fig.8 Simulink output for Energy Detection

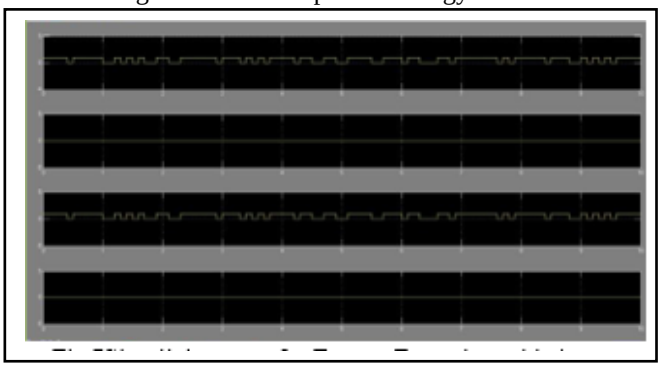


Fig.9Simulink output for Energy Detection with 4 users Comparison

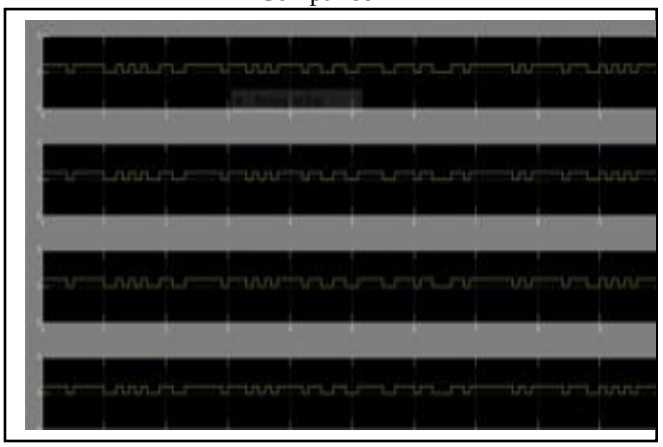


Fig.10 Simulink output for Energy Detection with 4 users Comparison

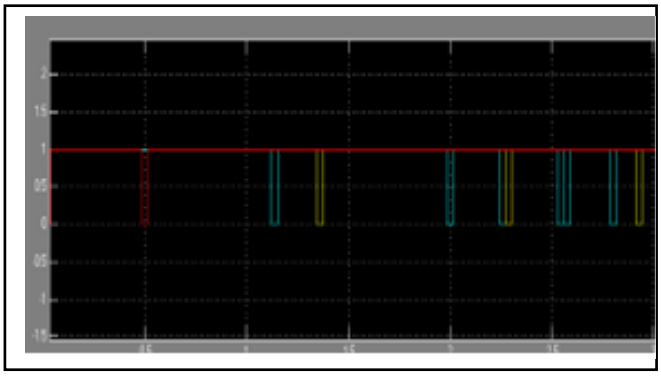


Fig. 11: Simulink output for Cyclostationary Feature Detection

In fig.10 we can see that threshold value is set at (0.7).As shown in graph that all 4 users cross the threshold level so they are present and no idle user detection (CFD). The threshold is set at 1. Cyclostationary feature detection (CFD) method has very less effect of noise so we can see that pulse fall down for very less time otherwise most of time remains high. It proves that user will be present under very heavy noise.

Conclusion

In this paper we presented the basic functionalities of Cognitive radio network and the paper has executed Simulink based spectrum sensing methods. The energy detection (ED) method for spectrum sensing (SS) is carried out for four users. The appearance or nonappearance of the licensed user is selected based on the threshold value which is manually adjusted. In energy detection method presence of noise is very much so it shows de-graded results which are overcome by the cyclostationary feature detection (CFD) method. In cyclostationary detection detectors employ the inherent periodicity of the modified signals. Although this method increases the complication of the system but still user is present under heavy noisy environment which proves that noise effect is very small. Hence cyclostationary feature detection (CFD) method is better as com-pared to energy detection (ED) method is better as com-pared to energy detection (ED) method.

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A Brief on Plasma Antennas

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***Abstract*—In the era of high speed communication and cognitive radio, Plasma antenna grown for its beam forming, to hide and fast switching properties. Using non thermal plasma sources in glass tubes,containing neutral gases, it is possible to design a Plasma Antenna. This paper shows the status of Plasma Antenna research, basic operation and its scope for future**

I. HISTORY

Cconceptually,the idea of plasma antenna is older than transistors. In the early part of the 20th century, due to extensive research in nuclear science from which the idea of plasma originated, it was theoretically estimated that the plasma medium can be exploited to make antenna having better capabilities and properties than metal antennas. The first patent for such antenna was issued toJ.HETTINGER in 1919.

II. INTRODUCTION

Before talking about plasma antenna, we should understand the term plasma. Plasma is one of the five states of matter. The five states of matter is known to be solid, liquid, gas, plasma and super-cooled solid. plasma is the 4th state of matter. SIR WILLIAM CROOKES , identified a matter, called plasma in 1879. According to Mark land technology, plasmas are conductive assemblies of charged and neutral particles and fields that exhibit collective effects.

Plasma can be defined as a set of quasi neutral particles with free electric charge carriers which behave collectively. In this definition two terms are important

(i)Quasi neutral: that there is same quantity of positive and negative particles so, as a whole, it behaves as a fluid without net charge.

(ii)Collectively: plasma as a whole is capable of carrying out process that generate electric and magnetic fields to which it can react. This is one of the most important property that leads to some unparalleled characteristics.

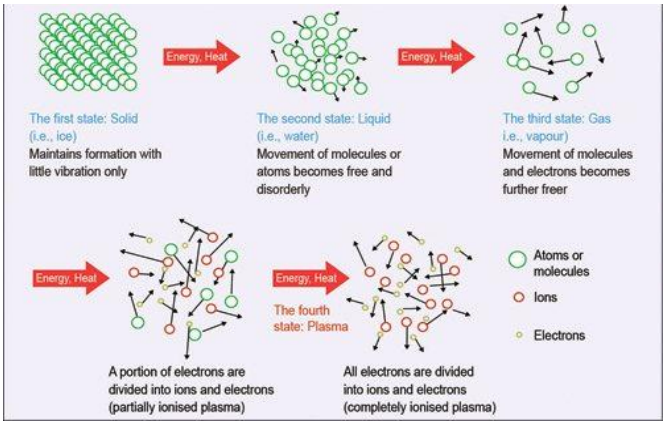

Figure 1: Different states of matter

III. ABOUT PLASMA ANTENNA

- A plasma antenna is a type of radio antenna currently in development in which plasma is used instead of the metal elements of a traditional antenna.
- A plasma antenna can be used for both transmission and reception.
- An RF antenna which uses plasma element instead of a metal conductor is known as plasma antenna.
- The plasma antenna uses ionized gas enclosed in tube enclosure as conducting element.
- When the gas is electrically charged or ionized to plasma state it becomes conductive. This allows RF signals to be transmitted or received.

A. Traditional Antenna Vs Plasma Antenna

- Traditional antennas are bulkier and of large size as compared to plasma antennas.
- Traditional antennas work at lower frequencies whereas at higher.
- Traditional antennas have ringing effect whereas plasma antenna don't have.

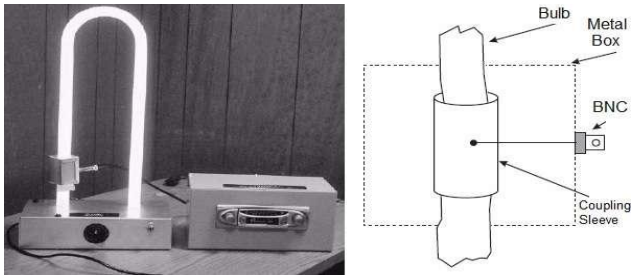

Figure 2: Plasma Antenna.

B. Basic Operation

Procedure to operate plasma antenna is first fill the neutral gas in the vacant glass tube. At some fixed pressure seal the tube; a care for the pressure should be taken sufficiently less than glass breakdown pressure. Connect a non-thermal plasma generation power source example RF and microwave discharge. At lower space frequencies, the ions accelerated in the field move towards the electrodes and produce secondary electrons, similar to what happens in a DC discharge.

As the frequency increases, the ions and subsequently also the electrons can no longer reach the electrode surface during the acceleration phase of the exciting external field. Connect a signal source or the receiver probe with coupling sleeves over the glass tube of plasma antenna, it is better to use a good conductor as a coupling sleeves. Take care of the distance between coupling

sleeves and power source arrangement. By controlling applied power vary the effective length of plasma column, and thus get the desired result

By changing the operating parameters, as working pressure, source frequency, input power, radius of glass tube , length of plasma column, and neutral gas, effective length and efficiency of plasma antenna should be changed.

Experiments has also carried out on fluorescent tube as a plasma antenna, and shown thesimplest model of plasma antenna. Using this model it has shown that frequency about 200Hz are enough to get stable plasma state in plasma column, and to use it as plasma antenna.

C. Specifications

Specifications	Traditional Antenna	Plasma Antenna
Construction	Metal	Plasma
Power	Lower	Higher
Efficiency	Low	High
Weight	Higher	Lower
Size	Large	Small
Ringing Effect	Yes	No
Transmission/Reception	Uses RF sinusoidal signals	Uses short pulse during the time of transmission/reception
Noise	Higher	Lower, plasma antenna has low collision rates among its charge carriers.

Figure 3: Specifications of plasma antenna

D. Characteristics Of A Plasma Antenna

- Plasma antenna can operate up to 90GHz.
- Plasma antenna can transmit and receive from the same aperture provided the frequencies are widely separated.
- A single dynamic antenna structure can use time multiplexing so that many RF sub system can share one antenna resource.
- Changes in the ion density can result in instantaneous changes in bandwidth over wide dynamic ranges.
- In plasma antenna, gas ionizing process can manipulate resistance and when deionized, the gas has infinite resistance and does not interact with RF radiation.
- Reduces computer signal processing requirements.
- Ability to focus a single beam.

E. Features Of A Plasma Antenna:

Ringing effect which was a problem associated with a regular antenna is due to the traditional metal elements which reduces its capabilities in high frequency short pulse transmission. But in plasma antenna the antenna gets deionised by sending a pulse and thus the problem of ringing effect is overcome. Another feature of plasma antenna is that it can easily communicate signals in very short pulses and also it has the ability to focus a single beam. This feature is useful in areas of Digital communication and Radar.

IV. TYPES OF PLASMA ANTENNA

A. Laser Induced Antenna

- The transmission was realized along a plasma channel that was created by the atmosphere breakdown
- The atmosphere breakdown was created by the focused laser emission
- The laser is used to designate the path of the antenna while an electric discharge is employed to create and sustain the plasma.

B. Plasma Antenna Using Tube Structure

- Using tube structure, We can achieve low baseband noise for HF and VHF transmissions
- When the plasma creating voltage is turned off, The antenna effectively disappears

C. Plasma Dilectric Antennas

- A simple explosive charge design, called a plasma cartridge can be used to generate a column of ionized gas.
- In this design 1-3 grams of seeded explosive charge, which contains Fe, Pb, C, N, K, Cl and O was used to create plasma.
- Due to high temperatures generated by the explosive materials, the surrounding gases became ionized, forming a plasma column.
- The maximum attainable temperature that can be achieved is dependent upon the available oxygen for the fuel recombination.
- It has been proven that a plasma jet antenna is feasible.

V. ADVANTAGES

- Lighter than conventional antennas
- Compact and so portable
- Maintenance free
- Invisible to radar
- Dynamically reconfigurable
- Capable of transmitting signals at fast speed
- Energized and de-energized in seconds

VI. DISADVANTAGES

- Ionizer adds weight and volume.
- Ionizer increaser power consumption.
- Stable and repeatable: Not all of the cases is ionized to become plasma, some parts remain unionized. Thus the volume of the plasma formed during each time should be same to generate stable electromagnetic. This can be achieved by keeping the current flowing through it constant, which will excite same amount of particles.

VII. APPLICATIONS

- Military applications for stealth, weight and easily reconfiguration.
- Unmanned air vehicle sensor antennas.
- Detection and tracking of ballistic missiles.
- Telemetry.
- Broad-band communications.
- Ground penetrating radar.
- Wind shear detection and collision avoidance.

CONCLUSION

Using non thermal plasma source and neutral gas filled tube, it is possible to make an agile antenna. Plasma antenna can do better in star exploration where wait of the product has to lift up from the earth surface should be under limit.

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Vehicle Safety System Using GSM and GPS

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***Abstract*— This embedded based vehicle safety system is an attempt to develop an advanced vehicle safety system. This system is a type of protective headgear used by the rider which makes driving safer than before. The main purpose of this system is to provide safety to riders. This main purpose is met by using some advanced features like alcohol detection, accident identification, location tracking, and enabling strict usage of helmets. This system contains GSM modem, vibration sensor, HT12D decoder, PIC (16F877A) microcontroller, relay switch. The system will be activated only after wearing the helmet or else the user cannot able to access the vehicle. A RF module acts as a wireless link between the transmitter and receiver. If rider gets drunk then it automatically locks the ignition switch and sends message automatically to their registered number with their current location. When accident occurs, it will send massage by GSM module to the registered numbers with their current location which can be traced by using GPS system.**

Keywords— GSM (Global system for mobile communication),GPS(Global Positioning System)

I. INTRODUCTION

In India a great loss of life due to road accidents has become prevalent where major mishaps are apropos to the bike riders. According to recent statistical report by W.H.O India has been confronting a loss of about 4 persons per minute. This system helps to curb these road accidents.

These days' vehicle robbery cases are higher than any other time. A vehicle is stolen every six minutes in India. It is known that millions of people lose their vehicles due to theft. Most cases of theft have been caused by the lack of remote control system. It is known that, traditional systems used to monitor the vehicles, which depends mainly on alarm signal. It has failed to perform its function for alarm can't be heard from distant places. To resolve such problems, it is decided to design this system to avoid vehicle theft and to know the current location of the vehicle using at any time. Using GSM technology whereas this system also enhances personal safety of individuals.

The main aim is to design and develop an advance and robust security system for vehicle that can prevent theft and provides information on robberies. The system being developed through the present work uses GSM system and can be made affordable so that it can be used in low cost vehicle even in two wheelers.

The increase of satellite communication technologies is easy to discover the vehicle locations with no trouble.GPS plays a significant role in enhancing the ease of locating or tracing an object .Hence this GPS can be used for development of this system.

This is an embedded system which will continuously monitor a moving vehicle and report the status of it on demand, recover a stolen vehicle, field service management.

The safety of travelers can be enhanced by adopting RFID system. Pethakar Paper on RFID, GPS, ad GSM based vehicle tracking and employee security system consolidate the establishment of an electronic gadget in a vehicle, with reason planned machine programming to empower the organization to track the vehicle's area. At the point when the vehicle picks the worker; he/she needs to swap the RFID card. The micro controller matches the RFID card no. with its database records and sends the representative's id, taxi id & the taxicab position co-ordinates to the organization unit by means of GSM module. The GSM modem will get the message through the organization unit. On the off chance that workers end up/herself in an issue, he/she will press the catch. Microcontroller will distinguish the activity and sends a sign to the GSM which will arrange with to the organization unit and police.

The anti-theft instrument based on PIC controller and operated using GSM technology. The instrument is simple and low cost vehicle theft control embedded system. The GSM is more popular and accepted standard for mobile phones in the world established in 1982. Vehicle tracking systems have brought this technology to the day-to-day life of the common person.

II. TECHNOLOGY USED

A. GSM System :

The SMS specification has defined a way for a computer to send and receive messages through a mobile phone or a GSM modem[4]. A GSM modem is a wireless modem that works with GSM wireless network. This wireless modem transmits the data through the wireless network. To send the SMS messages, first a valid SIM card is placed from a wireless carrier into a mobile phone or a GSM modem, which is then connected to the computer. There are several ways of making interaction between a computer and a mobile phone. These are through the USB cable, Serial cable, Bluetooth link or an infrared link. But the actual way to use depends upon the capability of the GSM modem or mobile phone. If a mobile phone does not support Bluetooth, it cannot get connected to the computer through the Bluetooth link [2]. After connecting the mobile or GSM modem, we can control the system by sending the instructions to it that is in the form of messages. The instructions that we give and the messages we receive is fully controlled by the software that we are using to control the system. We should write a source code for connecting the mobile to the system an sending and receiving commands to and fro between the GSM modem and the system.

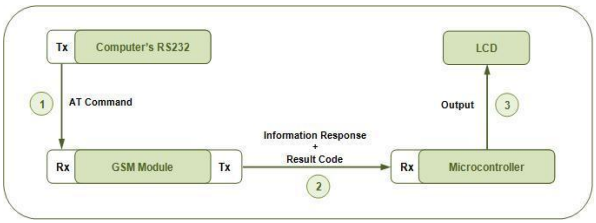

Fig1.1- GSM Block diagram

The created framework makes utilization of an implanted framework focused around Global System for Mobile correspondence (GSM) engineering. The planned and created framework is introduced in the vehicle. An interfacing portable is additionally associated with the microcontroller, which is finally, joined with the engine. Once, the vehicle is being stolen, the data is being utilized by the vehicle owner or user for further handling. The data is passed onto the local handling protection framework which is as the SMS, the microcontroller unit peruses the SMS and sends it to the Global Positioning System (GPS) module and utilizing the triangulation system, GPS module sustains the precise area as latitude and longitude to the owner or user mobile[3].

B. GPS System :

Wherever you are on the planet, at least four GPS satellites are 'visible' at any time. Each one transmits information about its position and the current time at regular intervals. These signals, travelling at the speed of light, are intercepted by your GPS receiver, which calculates how far away each satellite is based on how long it took for the messages to arrive. Once it has information on how far away at least three satellites are, your GPS receiver can pinpoint your location using a process called trilateration.

Trilateration:
Imagine you are standing somewhere on Earth with three satellites in the sky above you. If you know how far away you are from satellite A, then you know you must be located somewhere on the red circle. If you do the same for satellites B and C, you can work out your location by seeing where the three circles intersect. This is just what your GPS receiver does, although it uses overlapping spheres rather than circles.

The more satellites there are above the horizon the more accurately your GPS unit can determine where you are.

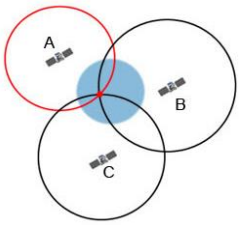

Fig 1.2 - Trilateration

This framework contain single-board inserted framework that is furnished with GPS and GSM modems alongside ARM processor that is introduced in the vehicle. Amid item movement, its area can be accounted for by SMS message. The motivation behind this framework is to outline and incorporate another framework which is coordinated with GPS-GSM to give emulation peculiarity like Location data, Real time following utilizing SMS, track transport driver action and Communication is prompt therefore one can get running report rapidly.
Rashed et al. [5] paper describes a GPSbased tracking system that keeps track of the location of a vehicle and its speed based on a mobile phone text messaging system. The system is able to provide real- time text alerts for speed and location. The present location can be locked and the system will alert the owner ifthe vehicle is moved from its presentLocked location.


Fig 1.3- GPS Tracking system

C. PIC (16F877A) Microcontroller

PIC stands for "peripheral interface controller,". A microcontroller is compact microcomputer designed to govern the operation of embedded systems in motor vehicles, robots, office machines, medical devices, mobile radios, vending machines, home appliances, and various other devices. A typical microcontroller includes a processor, memory, and peripherals. This microcontroller is light sensitive and operates with solar energy. It functionality is described below.
LDRs will rotate solar panels with the help of stepper motor. LDR is used to measure intensity of light with the help of microcontroller. Microcontroller reads values of both light dependent resistors. In other words microcontroller reads intensity of light with the help of light sensors.
If the intensity of light is same of both light sensors, solar panels don't rotate and stepper motor remains off. Solar panel also remain stable in night timing when there will be no light. In morning, left light sensor is turned on and start rotating solar panel with the help of stepper motor. Rotation of motor depends on the intensity of light. Solar panel keep rotating until intensity of light on both sensor become equal. When both sensors have same intensity of light, solar panel become stable. This process repeat in opposite direction after 12:00 am or after afternoon. In evening when light intensity of both light sensors become equal, solar panel again become stable. This process remains continue during day timing.

All instructions are embedded in this microcontroller and it functions in accordance with the instructions embedded. Hence it controls the system

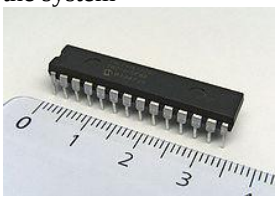

Fig 1.4 – PIC Microcontroller

D. Accelerometer

A dynamic accelerometer measures gravitational pull to determine the angle at which a device is tilted with respect to the Earth. By sensing the amount of acceleration, users analyze how the device is moving.

Accelerometers allow the user to understand the surroundings of an item better. With this small device, you can determine if an object is moving uphill, whether it will fall over if it tilts any more, or whether it's flying horizontally or angling downward. For example, smart phones rotate their display between portrait and landscape mode depending on how you tilt the phone.

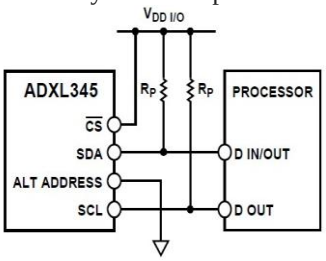

Fig 1.5 - InterfacingdiagramofAccelerometer

An accelerator looks like a simple circuit for some larger electronic device. Despite its humble appearance, the accelerometer consists of many different parts and works in many ways, two of which are the piezoelectric effect and the capacitance sensor. The piezoelectric effect is the most common form of accelerometer and uses microscopic crystal structures that become stressed due to accelerative forces. These crystals create a voltage from the stress, and the accelerometer interprets the voltage to determine velocity and orientation. The capacitance accelerometer senses changes in capacitance between microstructures located next to the device. If an accelerative force moves one of these structures, the capacitance will change and the accelerometer will translate that capacitance to voltage for interpretation. Accelerometers are made up of many different components, and can be purchased as a separate device. Analog and digital displays are available, though for most technology devices, these components are integrated into the main technology and accessed using the governing software or operating system. Typical accelerometers are made up of multiple axes, two to determine most two-dimensional movement with the option of a third for 3D positioning.

Most Smartphone's typically make use of three-axis models, whereas cars simply use only a two-axis to determine the moment of impact. The sensitivity of these devices is quite high as they're intended to measure even very minute shifts in acceleration. The more sensitive the accelerometer, the more easily it can measure acceleration. Accelerometers, while actively used in many electronics in today's world, are also available for use in custom projects. Whether you're an engineer or tech geek, the accelerometer plays a very active role in a wide range of functionalities. In many cases you may not notice the presence of this simple sensor, but odds are you may already be using a device with it.

E. Alcohol Detection

This device is used to detect whether the rider consumed alcohol or not. If it detects the alcohol then it sends the information to the microcontroller and it acts according to the embedded instructions and turns of the engine and displays the massage that "Driver is Drunk".

III. CONSTRUCTION:

In helmet unit, the force sensing resister is placed on inside upper part of the helmet where actually head was touched with sensor surface. And alcohol sensor is placed on in front of rider's mouth. It can sense easily. Solar panels are mounted on upper side of helmet which is in direct sunlight. And the battery and regular circuits was fixed inside the helmet. Secondary controller and RF transmitter circuit was also placed on inside the helmet, antenna are located outside the helmet.

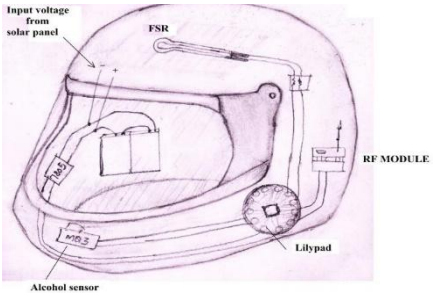

Fig 1.6 – Construction of helmet unit

If Helmet not wore then display Message "Please wear the helmet". Next step is check the condition of drunk if rider is drunk display message "You are Drunk" and then send the message to stored no. with Location. And ask for the password if password is correct then start bike. The sixth step, if accident detected, stop everything and send message with location.

Fig 1.7 – Notification on LCD

CONCLUSION & FUTURE WORK

This system provides security for all the vehicle users by avoiding the vehicle theft using GSM technology. It also reduces human risk by the strict usage of helmets while driving. The developed system used to display the current position of the tracked vehicle using GPS system. The system should be placed inside the vehicle in a suitable place so that it would not to be detected by the thief or unauthorized person. When the theft is identified, the vehicle engine can be turned off by sending a message from the monitor unit to the vehicle unit. The system owns many advantages over others such as represent real time tracking.

The additional advantage of this system is this system will turn off the engine when the alcohol detector detects the alcohol which would in turn reduces drunk and dive problems in society. For future needs it is very easy to add new facilities to the system. In addition to that, the system in the future can support biometric security approach for

authentication, such as using finger print, iris, voice or hybrid to distinguish between the owner and the thief.

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A Brief on Software Defined Radio

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***Abstract*— Software-defined radio (SDR) is a concept according to which RF communication is achieved by using software (or firmware) to perform signal-processing tasks that are typically performed by hardware. A SDR is an RF communication system that incorporates a significant amount of this software-based signal-processing functionality. In this article the history, channelization techniques, block diagram, working principle, rate of adoption, advantages, and disadvantages of the SDR are presented.**

Keywords—RF- Radio Frequency, GSM- Global System for Mobiles, CDMA-Code Division Multiple Access, DSP- Digital Signal Processing, FPGA- A Field Programmable Gate Array.

I. INTRODUCTION

A. Software Defined Radio

With the exponential growth in the ways and means by which people need to communicate- data communications, voice communications, video communications, broadcast messaging, command and control communications, emergency response communications, etc. - modifying radio devices easily and cost-effectively has become business critical. Software defined radio (SDR) technology brings the flexibility, cost efficiency and power to drive communications forward, with wide-reaching benefits realized by service providers and product developers through to end users.

B. Definition

Simply put Software Defined Radio is defined as: "Radio in which some or all of the physical layer functions are software defined." Software Defined Radio (SDR) is a radio communication system where components that have been traditionally implemented in hardware (e.g. mixers, filters, amplifiers, modulators/demodulators, detectors, etc.) are instead implemented by means of software on a personal computer or embedded system.While the concept of SDR is not new, the rapidly evolving capabilities of digital electronics render practical many processes which were once only theoretically possible.

Traditional hardware based radio devices limit cross-functionality and can only be modified through physical intervention. This results in higher production costs and minimal flexibility in supporting multiple waveform standards. By contrast, software defined radio technology provides an efficient and comparatively allowing multi-mode, multi-band and/or multi-functional wireless devices that can be enhanced using software upgrades.[1]

C. Short history

1) 1984 E-Systems coins "software radio" term:

E-Systems, now Raytheon, coined the term "software radio" in a company newsletter. It referred to a prototype digital baseband receiver equipped with an array of processors that performed adaptive filtering for interference cancelation and demodulation of broadband signals.

2) 1991 Speakeasy:

The first military program that specifically required a radio to have its physical layer components implemented in software was DARPA's Speakeasy. Its primary objective, originating from the U.S. Air Force, was to have a single radio that could support ten different military radio protocols and operate anywhere between 2 MHz and 2 GHz.

3) 1992 Joseph Mitola publishes paper about software radio at IEEE:

Joe Mitola was the first to publish on the topic of software radio, for the IEEE National Tele systems Conference in 1992, with his paper "Software Radio: Survey, Critical Analysis and Future Directions". Referred to by many as the godfather of software radio, Mitola is recognized as having coined the term "software radio", despite E-Systems' prior use. The E-Systems prototype was a receiver only and therefore not a complete radio. Later, in 1998, Mitola used the term "cognitive radio" to refer to the concept of radios being aware of their spectral environment and having the necessary intelligence to adapt as required.

4) 1997 Creation of the JTRS:

The Joint Tactical Radio System was created by the U.S. Department of Defense to increase interoperability and waveform portability through the definition and standardization of abstraction layers and interfaces, known as the Software Communication Architecture (SCA).

Nevertheless, it greatly stimulated advances in SDR development for a decade. SCA-compliant radios from manufacturers like Rohde & Schwarz, Thales, and Harris, have been deployed. Also, the European Defense Agency created the European Secure Software Defined Radio (ESSOR) program, which continues from the work of the JTRS SCA.

5) 1998 Automated code generation for embedded SDR:

Nutaq (then Lyrtech) teamed up with MathWorks to create the first development environment that could generate executables directly from a Simulink model for a Texas Instruments DSP and a Xilinx FPGA. This innovation addressed one of the biggest difficulties waveform developers and researchers had to deal with: writing code for embedded processors. The DSP and FPGA were collocated on a board called the Signal Master.

6) 2001 GNU Radio:

Evolved from an MIT-originating framework called PSpectra, GNU Radio was founded by Eric Blossom and funded by John Gilmore, employee #5 of Sun

Microsystems. GNU Radio was an open-source framework for the development of SDR applications within a PC environment. With more than 5,000 claimed users as of 2012, it is by far the most popular SDR development toolset.

7) 2004 FCC first approval of a commercial SDR:

Vanu Inc. succeeded in getting their Anywave base station approved by the FCC. The Anywave is a dual-mode base station capable of running GSM and CDMA carriers simultaneously, with all protocols layers being executed on x86 CPUs.

8) 2004 PHY processors:

Picochip (now Mindspeed Technologies) introduced its PC102, a processor specifically designed for PHY processing (commonly referred to as a baseband processor).

Designed for SDR right from the drawing board, the PC102 (and subsequent members of the PicoArray family) dramatically reduced the size, cost, and power consumption of wireless equipment. It forced traditional vendors to come up with SDR-optimized architectures. This led to the Keystone family from TI and the QorIQ from Free scale.

9) 2006 TI and Xilinx come together to facilitate embedded SDR development:

Texas Instruments and Xilinx, usually seen as competitors, joined forces along with Nutaq (then Lyrtech) to create the first completely integrated, stand-alone SDR development platform. It was tunable from 200 MHz to 1 GHz (other ranges came later).

Most notable was Microsoft's campus-wide whitespace experiments, which were conducted with movable small form-factor (SFF) SDR units onboard campus shuttles.

10) 2009 First commercial single-chip RF front-end:

Lime Microsystems unveiled its LMS6002, a radio frequency integrated circuit (RFIC). Since then, other silicon vendors have started offering RFIC solutions. As of this day, RFICs may be sourced from at least five vendors.[2]

II. BLOCK DIAGRAM

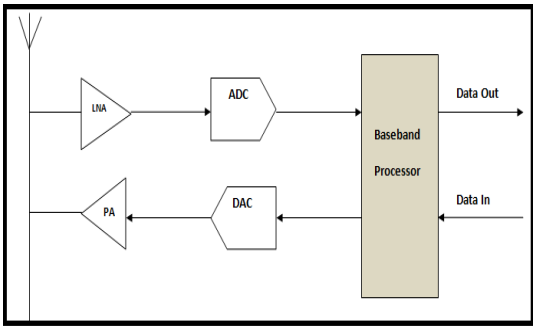

Fig 1. Block Diagram Of SDR

A. RF amplification:

In the transmission side of amplifier, the level of RF signal in a level equal to the transmitted power. At the receiver, the signals from antenna are amplified before passing into receiver.

B. Frequency conversion:

In some, analog processing is required. The radio frequency is convert.

C. Digital conversion:

In this stage the analog signal and digital signal is converted.

D. Baseband processor:

It digitally converts the incoming or outgoing signals. The main issue of the baseband processor is the amount of processing power required. The level of processing increases will increase the current consumption and it requires cooling. [4]

Channelization techniques

The ability to support multiple communications channels per RF band is a fundamental process for many software defined radio platforms. These platforms typically employ a channeliser to extract channels from the received RF band for follow-onbaseband processing, or to insert channels into the RF band for transmission.

The most popular channelization techniques: Digital Down Conversion, Frequency Domain Filtering, and Polyphase FFT Filter Banks.[3]

III. WORKING PRINCIPLE

An ideal receiver would be attaching an **ADC** to an **antenna**. A Digital Signal Processor (DSP) is used for signal processing. The digital signal processor generates a stream of output which is given to **digital to analog converter**. An ideal transmitter is also attached. The output is connected to the radio antenna. The ideal transmitter and receiver cannot be achieved due to its practical limitations of technology. The main problem is the analog to digital conversion and digital to analog conversion. It is difficult to maintain high accuracy and rate simultaneously. Other reasons are interference and electromagnetic resonance. [4]

IV. RATE OF ADOPTION

The Wireless Innovation Forum commissioned Mobile Experts LLC in 2011 to perform a market study evaluating the adoption of SDR technologies in various markets. The results of this study demonstrated that, in many markets, SDR has moved beyond the innovators and early adopters as defined by Geoffrey Moore in "Crossing the Chasm" into the early majority phase defining the mainstream market. In this phase, adopters select a technology not because it is innovative or visionary but because it has been shown tosuccessfully solve a problem within their specific market.

Examples of SDR adoption illustrating the transition to the mainstream are abundant:

- Over 93% of the mobile infrastructure market utilizes SDR technology, and future growth to support mobile data demand will simply drive more SDR base stations.
- Almost 1 billion software defined radios have been shipped in 2011 for mobile terminal applications.
- Virtually all of the tactical radios sold for military communications utilize SDR technology today. The new public safety radio equipment sold

on the marketplace (both in terms of base station infrastructure and field radios) has adopted software-defined radio technology.

- Satellite "modems" in the commercial and defense markets make pervasive use of SDR Technology for intermediate frequency and baseband signal processing.
- While these types of systems are often not marketed as "SDR's", they utilize and benefit from SDR technologies to solve market specific problems such as; cost of development, cost of production, cost of upgrades and maintenance, time to market in supporting new and evolving air interface standards, or problems associated with network interoperability.[5]

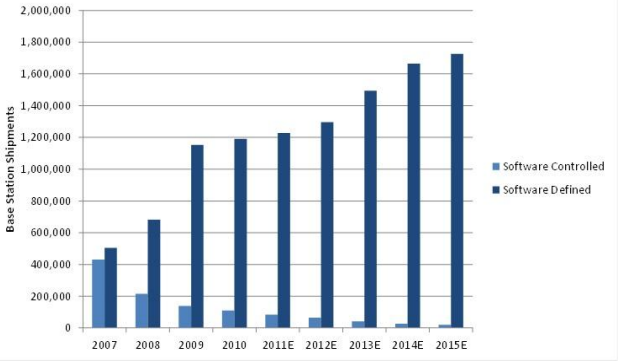

Fig2.Growth Of SDR Technology In The Market

V. List of Software-Defined Radios

- ADAT ADT-200A → Frequency range of 10 kHz – 30 MHz and Bandwidth 0.5–100 kHz and uses Embedded system (no computer needed), USB, Internet remote) as the Host Interface.
- AD-FMCOMMS2-EBZ → Frequency range of 2400 – 2500 MHz and uses FMC (to Xilinx board) then USB 2.0 or Gigabit Ethernet as the Host Interface.
- AD-FMCOMMS3-EBZ, AD-FMCOMMS4-EBZ, AD-FMCOMMS5-EBZ → Frequency range of 70 MHz – 6 GHz and Bandwidth of 54 MHz due to filter and uses FMC (to Xilinx board) then USB 2.0 or Gigabit Ethernet as the Host Interface.
- ADALM-PLUTO → Frequency range of 325 MHz – 3.8 GHz (70 MHz – 6 GHz with software modification) and Bandwidth of 20 MHz (streaming may be less due to USB 2.0) and uses USB 2.0, Ethernet & WLAN with USB-OTG adapter.
- Apache Labs ANAN-10E, Apache Labs ANAN-10/100, Apache Labs ANAN-100D/200D→ Frequency range of 10 kHz – 55 MHz and Sampling Rate of 122.88 Mbps and uses Gigabit Ethernet as the Host Interface.[6]

VI. Benefits

- New radio products are quickly introduced in the market by using the common platform architecture implemented in products.
- It reduces the development cost because the software can be reused.
- The time and cost for operation and maintenance can be reduced due to the bug fixing during radio is in service.
- It uses wireless communication. It uses for communicating with anyone at any time in any manner.
- Software upgrade automatically done and new features inserted. The capacity is improved by remote software downloads.[4]

VII. Applications

A. Military:

Software Defined Radio used in a military venture called Joint Tactical Radio System (JRTS). By using this single hardware platform, it could communicate using one if different waveforms by configuring the software for required application. JTRS is the program of US military. It provides flexible and interoperable communications.

B. Amateur and home use:

The amateur radio uses a direct conversion receiver. The SDR software performs all functions such as filtering, demodulation etc.

C. Satellite modems used in defense markets and commercial uses programmable processing devices for signal processing of baseband signals or intermediate signals.

D. Cellular handsets use System on Chip (*SoC*) devices which incorporate programmable DSP for processing baseband signals.

E. Cellular infrastructure utilizes programmable processing devices for creating common platform or multiband multiple protocol base station which supports multiple cellular infrastructure standards.[4]

VIII. Disadvantages

- Analog to digital converters limit top frequencies that can be used by the digital section.
- For very simple radios the basic platform may be too expensive.
- Development of a software defined radio requires both hardware and software skills.

IX. Things we can do with SDR

- Receiver broadcast radio
- Learn how global navigation system works
- Radio astronomy
- Track ships via AIS transmission
- Amateur radio
- Invent the wireless future
- Set up DRM transmitter
- Build a GSM network
- Experiment with LTE
- Track aircraft via mode S transmission.

Conclusion

In terms of cost and simplicity, SDR's cannot compete with single-chip hardware-based solutions. Nevertheless, they are interesting and valuable tools for R&D projects, and they also enable advanced functionality that could be very beneficial in specialized, high performance RF systems.

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A Note on Paper Batteries

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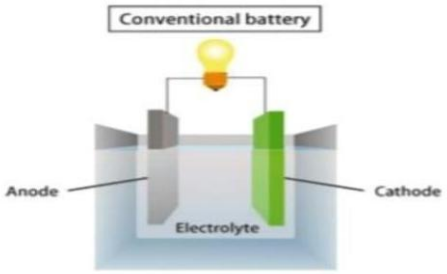
I. Introduction

An electric battery is a device consisting of one or more electrochemical cells that convert stored chemicalenergy into electrical energy. Each cell contains a positive terminal or cathode, and a negative terminal, or anode. Electrolytes allow ions to move between the electrodes and terminals, which allows current to flow out of the battery to perform work.

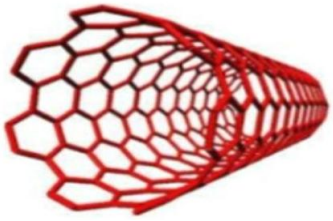
Batteries convert chemical energy directly to electrical energy. A battery consists of some number of voltaic cells. Each cell consists of connected in series by a conductive electrolyte containing anions and cations. One half-cell includes electrolyte and the negative electrode, the electrode to which anions (negatively charged ions) migrate;the other half-cell includes electrolyte and the positive electrode to which cations(positively charged ions) migrate. Redox reactions power the battery. Cations are reduced(electrons are added) at the cathode during charging, while anions are oxidized (electrons are removed) at the anode during discharge.



II. Paper Battery

A paper battery is an ultra-thin, flexible energy storage device that is used as a battery and also as a good capacitor. It is created by combining two things: nano compositepaper and nanotubes (nano composite paper made from cellulose and nanotubes made from carbon). Nanocomposite paper is a hybrid energy storage device made of cellulose, which combines the features of super capacitors and batteries. It takes the high-energy storage capacity of the battery and high-energy density of the super capacitor producing the bursts of extreme power. This combination allows the battery to provide long-term steady power production. Non-toxic, flexible paper batteries have the potential to power the next generation of electronics, medical devices and hybrid vehicles, allowing for radical new designs and medical technologies. A sample of paper battery is shown in Figure

A carbon nanotube material is a cylinder shaped material, made of carbon. These tubes have different structures that differ in thickness, length, type and number of layers. Carbon nanotubes are characterized into different types based on their structure. They are single walled carbon nanotube, double-walled carbon nanotube, triple-walled carbon nanotube and multi-wall carbon nanotube. Structural view of single walledcarbon nanotube is shown in Figure.



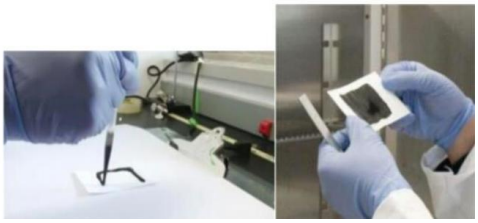
Paper batteries may be folded, cut or otherwise shaped for different applications without any loss of integrity or efficiency. Cutting one in half halves its energyproduction. Stacking them multiplies power output. Early prototypes of the device are able to produce 2.5 volts of electricity from a sample the size of a postage stamp. The devices are formed by combining cellulose with an infusion of aligned carbon nanotubes that are each approximately one millionth of a centimeter thick. The carbonis what gives the batteries their black color. These tiny filaments act like the electrodes found in a traditional battery, conducting electricity when the paper comes into contact with an ionic liquid solution. Ionic liquids contain no water, which means that there is nothing to freeze or evaporate in extreme environmental conditions. As a result, paper batteries can function between -75 and 150°C.

III. Manufacturing

One method of manufacturing begins with growing the nano tubes on a silicon substrate and then impregnating the gaps in the matrix with cellulose. Once the matrix has dried, the material can be peeled off of the substrate, exposing one end of the carbon nano tubes to act as an electrode.

When two sheets are combined, with the cellulose sides facing inwards, a super capacitor is formedthat can be activated by the addition of the ionic liquid. This liquid acts as an electrolyte and may include salt-laden solutions like human blood, sweat or urine. The high cellulose content (over 90%) and lack of toxic chemicals in paper batteries makes the device both biocompatible andenvironmentally friendly,especially when compared to the traditional lithium ion battery used in many present day electronic devices and laptops. Specialized paper batteries could act as power sources for any number of devices implanted in humans and animals, including RFID tags, cosmetics, drug-delivery systems and pacemakers. A capacitor introduced into an organism could be implanted fully dry and then be gradually exposed to bodily fluids over time to generate voltage. Paper batteries are also biodegradable, a need only partially addressed by current e-cycling and other electronics

disposal methods increasingly advocated for by the green computing movement .



IV. Working Of Paper Battery

A conventional battery or Rechargeable battery contains a number of separate components that produce electrons through a chemical reaction between the metal and the electrolyte of the battery. The Paper battery works when the paper is dipped in the ion-based liquid solution; next a chemical reaction occurs between the electrodes and liquid. The electrons move from the cathode to anode to generate electricity. The paper electrode stores energy while recharging within 10 seconds because the ions flow through the thin electrode quickly.

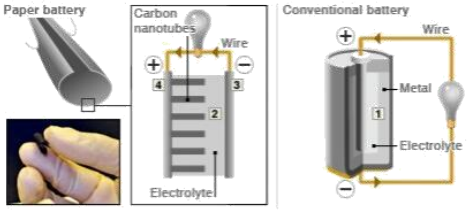


Figure shows the working of a paper battery. The best method to increase the output of the battery is to stack different paper batteries one over the other

V. Applications Of Paper Battery

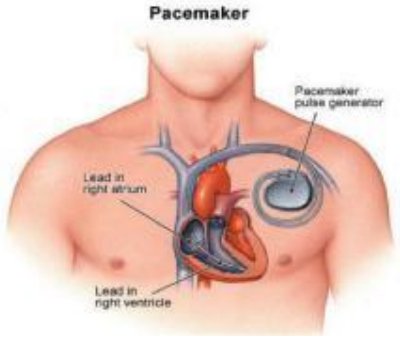
The paper battery has many applications ranging from greeting cards to medical devices , its flexibility and paper thin thickness allow it to be utilized in a wide array of products. Additionally, its biocompatibility allows for potential use in medical products and artificial organs. Moreover, stacking sheets of paper batteries could increase the overall power and lead to potential applications in larger electronics.

A. Medical

It is used to power artificial cardiac pacemakers which are implanted in a patient's heart. A pacemaker (or artificial pacemaker, so as not to be confused with the heart's natural pacemaker) is a medical device that uses electrical impulses, delivered by electrodes contracting the heart muscles, to regulate the beating of the heart. The primary purpose of a pacemaker is to maintain an adequate heart rate, either because the heart's natural pacemaker is not fast enough, or there is a block in the heart's electrical conduction system.

B. Automobiles And Aircrafts

Paper batteries are used in automobiles and aircraft such as in light weight guided missiles, hybrid car batteries, long air flights reducing refuelling and in satellite programs for powering electronic devices.



C. Electronics

Paper batteries are used mainly in many electronic devices, such as mobile phones, laptop batteries, calculators, digital cameras and also in wireless communication devices like mouse, Bluetooth, keyboard, speakers and headsets thereby removing the conventional bulky batteries leading to improved design and efficient production.

One important application of the paper battery is its use in powering radio frequency identification devices or RFID . In the past, RFID tags have been used to keep track of cattle and live-stock . However, paper batteries could allow companies to place RFID tags and smart labels on almost all products. For instance, in a grocery store using these RFID tags, the shopping cart could automatically process which items are placed in the cart, charge the customer's credit card and keep track of the store's inventories . Although many supermarkets do not have this technology in store now, with the help of the paper battery to power these RFID tags and labels, this sort of technology could appear in the near future. RFID electronics also appear in road toll collection, animal tracking, passports and airline baggage management; all these potential uses could benefit by having a more powerful and light weight battery, allowing for a longer lasting tag and better data storage.

D. Media And Advertising

Besides tracking devices, paper batteries could also play a large role in media and advertising. For instance a paper battery has enough power to light a small light emitting diode. Therefore, paper batteries could be used in greeting cards to power electronic displays or lights embedded in the card, they could also power any sort of audio device that would play a song or recording upon opening of the card. Other potential applications include using paper batteries to power electronic displayson packaging for items such as cereal boxes. The lightweight and compactness of a paper battery would allow the device to be easily fit into the cardboard design of a cereal box and display videos and play music, attracting more attention, and thus providing better advertising.

VI. Advantages Of Paper Battery

Paper battery is a rechargeable battery. As the substrate is made of paper which has 90% cellulose, the battery is completely bio degradable and biocompatible. There are no traces of mercury lead, cadmium or any other heavy metals

required to keep the device working. So, while disposal of the battery, there won't be any general concerns that exist usually with the conventional batteries.

Paper batteries are way better than conventional batteries not only because of the above stated uniqueness they own, but because of the dynamic operation range they withstand. It has no trace of water into its electrolyte, so nothing freezes or evaporates at extremities. The enlarged surface area helps in efficient heat dissipation, thus ensuring the battery doesn't cease to work due to overuse. No wonder that owing to its size and bio-degradability, it is a perfect choice for powering device in pacemakers buried close to the heart. They can take human blood, urine or sweat as electrolyte which makes their use highly lucrative for human health.

VII. Limitations Of Paper Battery

Before encouraging the widespread use of a new technology, one must always consider the possible ethical concerns surrounding that technology. Some of the major issues regarding paper batteries are the following:

- The Techniques and the Set-ups used in the production of carbon nanotubes are very expensive and very less efficient.
- Theses batteries generate e-wastage, by replacing all the existing batteries with paper battery.
- Since cellulose has low shear strength and can be torn easily.
- Batteries with large enough power are unlikely to be cost effective.

Conclusion

One of the major problems bugging the world now is Energy crisis. Every nation needs energy and everyone needs power. And this problem which disturbs the developed countries perturbs the developing countries like India to a much greater extent.

Standing at a point in the present where there can't be a day without power, Paper Batteries can provide an altogether path-breaking solution to the same.

Being Biodegradable, Light-weight and Nontoxic, flexible paper batteries have potential adaptability to power the next generation of electronics, medical devices and hybrid vehicles, allowing for radical new designs and medical technologies.

The concept of using paper as a novel substrate together with solution-processed nanoscale materials could bring in new opportunities for advanced applications in energy storage and conversion. By combining our paper-based energy storage with other types of devices developed, such as bioassays or displays on paper, full paper electronics could be realized in the future.

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AN INTRODUCTION TO HAPTIC TECHNOLOGY

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***Abstract*—"Haptics"—a technology that adds the sense of touch to virtual environment . Haptic interfaces allow the user to feel as well as to see virtual objects on a computer, and so we can give an illusion of touching surfaces, shaping virtual clay or moving objects around. The sensation of touch is the brain's most effective learning mechanism --more effective than seeing or hearing—which is why the new technology holds so much promise as a teaching tool. Haptic technology is like exploring the virtual world with a stick. If you push the stick into a virtual balloon push back .the computer communicates sensations through a haptic interface –a stick, scalpel, racket or pen that is connected to a force-exerting motors. With this technology we can now sit down at a computer terminal and touch objects that exist only in the "mind" of the computer.by using special input/output devices (joysticks, data gloves, or other devices), users can receive feedback from computer applications in the form of felt sensations in the hand or other parts of the body. In combination with a visual display, haptics technology can be used to train people for tasks requiring hand-eye coordination, such as surgery and space ship maneuvers. In this paper we explicate how sensors and actuators are used for tracking the position and movement of the haptic device moved by the operator. We mention the different types of force rendering algorithms. Then, we move on to a few applications of haptic technology. Finally we conclude by mentioning a few future developments.**

Keywords—Haptics, Sensation Of Touch, Feedback Devices, Virtual Environment.

I. INTRODUCTION

Haptics is the technology of adding the sensation of touch and feeling to computers. When virtual objects are touched, they seem real and tangible. Haptics senses links to brain sensing position and moment of the body by means of sensory nerves within the muscles and joints. Haptics devices may join tactile sensor that measure forces exerted by the user on the interface. Haptic technology has made it possible to investigate how the human sense of touch works by allowing the creation of carefully controlled haptic virtual objects. Haptics= touch= connection. Touch is the code of personal experience. Of the live sense, touch is the most proficient, the only one capable of simultaneous input and output

II. HISTORY OF HAPTICS

Scientist used term haptics to label the field of their studies that addressed human touch-based perception and manipulation. By 70's and 80's research efforts in a completely different field, robotics also began to focus on manipulation and perception by touch building a dexterous robotic hand. In the early 1990 a new usage of world haptics began to emerge. The confluence of several emerging technology made virtualized haptics or computer haptics possible.

III. HISTORY OF HAPTICS

A. Tactile Information:

It is acquired by the sensors connected to the body.

B. Kinesthetic Information:

It is acquired by sensors in the joints.

IV. CREATION OF VIRTUAL ENVIRONMENT

The Haptic Technology Is Based On Virtual Reality. Simulated Environment Can Be Either Same Or Different From Reality. Used To Describe Wide Variety Of Application. Users Interact With Virtual Reality Through Input Devices.

V. TYPES OF HAPTIC DEVICES

A. Virtual Reality Or Tele Robotics-Based Devices Information:

1) Exoskeletons And Stationary Devices.
2) Gloves And Wearable Devices.
3) Point Sources.
4) Specific Task Devices.
5) Locomotion Interfaces.

B. Feedback Devices:

1) Force.
2) Tactile.

VI. COMMONLY USED HAPTIC DEVICES

A. Phantom :

Providing a 3d touch to the virtual objects. When the user moves his finger then he could really feel the shape and size of the virtual 3d objects that has been already programmed. Virtual 3-dimensional space in which phantom operates is called haptics sense.

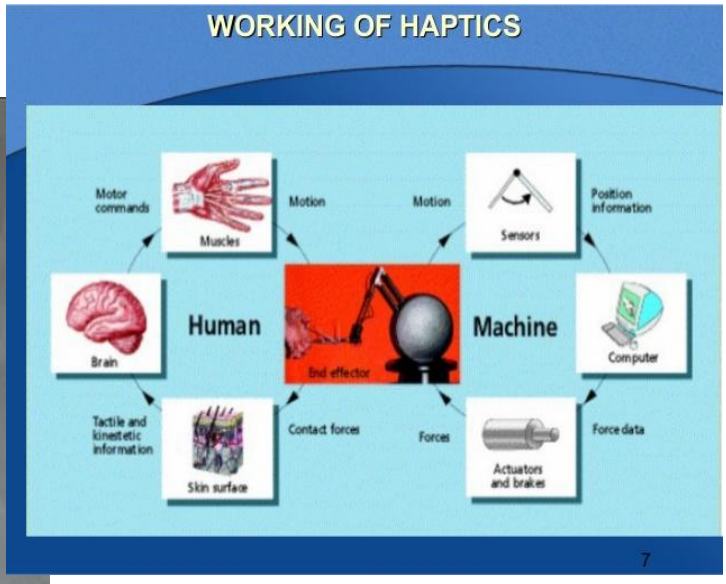
B. Cyber Grasp:

The cyber grasp system fits over the user's entire hand like an exoskeleton and adds resistive force feed back to each finger. Allows 4 dof for each finger. Adapted to different size of finger.

C. Principal Of Haptic Device:

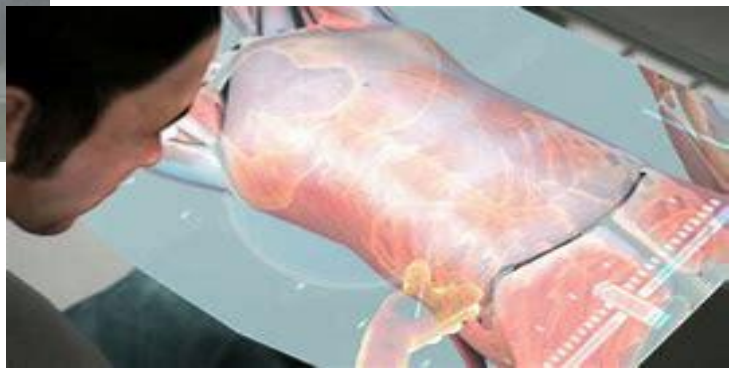
Interaction occurs at an interaction feel that mechanically copies to controlled dynamical systems: Haptic interface with the computer. Human user with the nervous system.

VII. CHARACTERSTIC OF HAPTIC TECHNOLOGY



Low Back-Drive Inertia And Friction. Balanced Range, Resolution And Bandwidth Of Position Sensing . Force Reflection, Minimal Constraints On Motion. Symmetric Inertia, Friction And Resonant Frequency Properties

VIII. APPLICATIONS OF HAPTIC TECHNOLOGY



1) Medical Application
2) Military Application
3) Museum Display
4) Assistive Technology For The Blind
5) Entertainment
6) Holographic Interaction

IX. LIMITATIONS OF HAPTIC TECHNOLOGY

1) High Cost
2) Large Weight And Size Of Haptic Devices
3) Haptic Interfaces Can Only Exert Forces With Limited Magnitude.
4) Haptic Rendering Algorithm Operate In Discrete Time Users Operate In Continuous Time.

CONCLUSION:

Advances in hardware will provide opportunities to produce haptic device in smaller packages, and haptic technology will find its way into increasingly the common place tools. Continued implementation of tactile device to aid people with disabilities will advance further. Currently limited to consumers. Perhaps also in desktop consumer and laptops still embryonic when compared to full fledged virtual reality stimulation.

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An Introduction to Wireless Power Transfer Technology

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Abstract **- The performance of devices is fundamentally constrained by the limited battery life whose operations are frequently disrupted due to the need of manual battery replacement/recharging. The recent advance in radio frequency (RF) enabled wireless energy transfer(WET) technology provides an attractive solution where the wireless devices are powered by dedicated wireless power transmitters to provide continuous and stable microwave energy over the air. Wireless energy transfer commonly known as WiTricity through which power transfer takes place up to few meters. In this article, we provide an overview of state-of-the-art RF-enabled WET technologies with highlights on the history of wireless power transmission, what are Magnetic resonance and strongly coupled regime system design need of HR-WPT advantages.**

Keywords- **WiTitricity, magnetic resonance, coupling, HR, WPT**

I. INTRODUCTION

In our present electricity generation system we waste more than half of its resources. Especially the transmission and distribution losses are the main concern of the present power technology. Much of this power is wasted during transmission from power plant generators to the consumer. The resistance of the wire used in the electrical grid distribution system causes a loss of 26-30% of the energy generated. This loss implies that our present system of electrical distribution is only 70-74% efficient. Advancement of technology has forced to invent the innovative technology like WiTricity.Wireless electricity or WiTricity is the transfer of electric energy or power over a distance without the use of wires. Since its founding, WiTricity Corporation has developed and commercialized systems to wirelessly power and recharge a wide variety of devices, ranging from surfaces that can recharge mobile phones at 5-10 W, to systems that can transfer 3.3 kW to charge electric vehicles.

II. ORIGINATION

Wireless power transmission is not a new idea. Nickolas Tesla demonstrated transmission of electrical energy without wires in early 19th century. Tesla used electromagnetic induction systems. William C Brown demonstrated a micro wave powered model helicopter in 1964. This receives all the power needed for flight from a micro wave beam. In 1975 Bill Brown transmitted 30kW power over a distance of 1 mile at 84% efficiency without using cables. Researchers developed several techniques for moving electricity over long distance without wires. Some exist only as theories or prototypes, but others are already in use. perhaps being the most well-known early attempts to do so. He had a vision of wirelessly distributing power over large distance using the earths ionosphere. Most approaches to wireless power transfer use an electromagnetic (EM) field of some frequency as the means by which the energy is sent. At the high frequency end of the spectrum are optical techniques that use lasers to send power via a collimated beam of light to a remote detector where the received photons are converted to electrical energy efficient transmission over large distances is possible with this approach. However, complicated pointing and tracking mechanisms are needed to maintain proper alignment between moving transmitters and/or receivers. In attrition, objects that get between the transmitter and receiver can block the beam, interrupting the power transmission and, depending on the power level, possibly causing harm. At my microwave frequencies , a similar approach can be used to efficiently transmit power our large distances using the radiated EM

field from appropriate antennas. However similar caveats about safety and system complexity apply for these radiative approaches.

1. Current from the wall outlet flows through a coil inside the charger, creating a magnetic field. In a transformer, this coil is called the primary winding.
2. When the device placed on the charger, the magnetic field induces a current in another coil, or secondary winding, which connects to the battery. placed on a charger. Supply is given to the charger and there is no electrical contact between charger and device. The recharging takes place in following steps
3. This current recharges the battery.

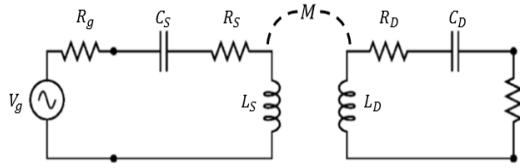
III. PHYSICS OF HIGHLY RESONANT WIRELESS POWER TRANSFER

1. Resonance is a phenomenon that occurs in nature in many different forms. In general, resonance involves energy oscillating between two modes,a familiar example being a mechanical pendulum in which energy oscillates between potential and kinetic forms. In a system at resonance, it is possible to have a large build-up of stored energy while having only a weak excitation to the system. The build-up occurs if the rate of energy injection into the system is greater than the rate of energy loss by the system. Formula of resonance frequency:

W=1/srq(LC) where $\omega = 2\pi f$, in which f is the resonance frequency in hertz, L is the inductance in Henries and C is the capacitance in farads when standard SI units are used.

2. Coupled Resonators

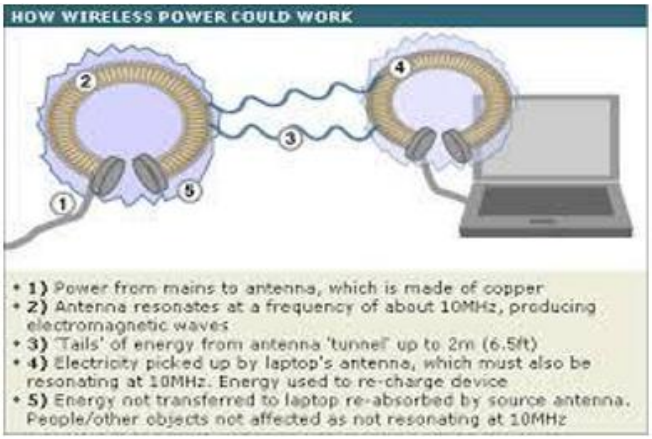
If two resonators are placed in proximity to one another such that there is coupling between them, it becomes possible for the resonators to exchange energy. The efficiency of the energy exchange depends on the characteristic parameters for each resonator and the energy coupling rate, κbetween them



Equivalent circuit for coupled resonator

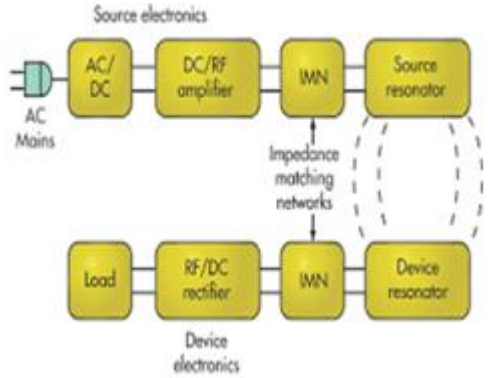
3.Principle Of WiTricity

It revels the main idea of the "resonance condition" between two circuits". A. Electrical resonance: - Electrical resonance occurs in an electric circuit at a particular resonance frequency when the impedance between the input and output of the circuit is at a minimum (or when the transfer function is at a maximum). Often this happens when the impedance between the input and output of the circuit is almost zero and when the transfer function is close to one. Resonance of a circuit involving capacitors and inductors occurs because the collapsing magnetic field of the inductor generates an electric current in its windings that charges the capacitor, and then the discharging capacitor provides an electric current that builds the magnetic field in the inductor, and the process is repeated continually.



IV. Description of a Typical HR-WPT system

The input power to the system is usually either wall power (AC mains) which is converted to DC in an AC/DC rectifier block, or alternatively, a DC voltage directly from a battery or other DC supply, In high power applications a power factor correction stage may also be included in this block. A high efficiency switching amplifier converts the DC voltage into an RF voltage waveform used to drive the source resonator.RF amplifiers are generally tuned amplifiers gives an output wave of frequencies in megahertz's. RF transistor mostly used BFW16A is a multi-emitter silicon planner epitaxial NPN transistor with extremely inter modulation properties and high power gain. Often an impedance matching network (IMN) is used to efficiently couple the amplifier output to the sourcewhile enabling efficient switching – amplifier operation.



Class D or E switching amplifiers are suitable in many applications and generally require inductive load impedance for highest efficiency .The IMN serves to transform the source resonator impedance, loaded by the coupling to the device resonator and output load into such impedance for the source amplifier. The magnetic field generated by the source resonator couples to the device resonator couples to the device resonator, exciting the resonator and causing energy to build up it. This energy is coupled out of the device resonator to do useful work. For example, directly for powering a load or charging the battery, for load requiring a DC voltage, then a rectifier converts the received AC power back in to DC.The output voltage of the rectifying circuit is too low for charging a battery. A DC-to-DC voltage converter will adapt the rectified voltage to a stable output voltage high enough for charging a rechargeable battery.

V. Benefits Afforded By A HR-WPT System

The high degree of scalability of power level and distance range in solution based on highly resonant wireless power transfer enables a very diverse array of configurations. Applications range from very low power levels for wireless sensor and electronic devices needing less than I watt, TO Very highpower levels for industrial systems and electric vehicles requiring in excess of 3 kilowatts. There are four (4) major functional benefits of using highly resonant wireless power transfer system as compared to system based on traditional magnetic induction. The first is the flexibility in the relative orientations of the source and device during operation. The flexibility opens the application space as well as makes systems easier and more convenient to use. Second, a single source can be used to transfer energy to more than one device, even when the device has different power requirements Forexample, instead of having a separate charger for each mobile phone in your family, you can have a charging surface that handles all of them at once. Third because of the ability to operate at lower magnetic coupling values, the sizes of the source and device resonations are not constrained to be similar. Finally, the distance range of efficient energy transfer can be extended significantly through the use of resonant .

VI. The Future

With a maturing technology base and a broad application space, wireless power transfer will become prevalent in many areas of life in the coming years. Since the original demonstrations at MIT early this century, the technology of magnetic resonance has moved from a scientific experiment to the production line where it will be incorporated into mass-produced consumer electronics such as laptops and mobile phones. Electric vehicles, both plug-in hybrids and full battery electric vehicles, will soon offer wireless charging so that plugging in to charge will no longer be a requirement. Development of world-wide standards for wireless power in both of these application areas is underway to ensure interoperability across products and brands, facilitate the deployment of wireless charging infrastructure and help to accelerate adoption of the technology. Some advanced automotive technology, such as vehicles with autonomous navigation and ultimately driverless operation, along with the expansion of car sharing services to provide better utilization of such vehicles, will benefit greatly from the ability to charge without human intervention. In fact, wireless charging is almost essential for the deployment of autonomous vehicles where there may not be anyone around to connect a wired charger (or otherwise add fuel). Imagine a in some cases. Of course, there will likely be applications

for wireless power that we cannot envision today. With the pace of technology innovation, expect to see wireless power technology deployed not only in the areas mentioned here, but in many more applications fleet of autonomous vehicles, offering ride services for example, that automatically find the nearest charging spot when charging is needed and go back into service once recharged. Research into dynamic charging of vehicles, using the same basic technology of magnetic resonance, is underway and may someday lead to real charging on the move. Another promising application area for wireless power transfer is in the medical arena. The use of medical implants for innovative therapies for a variety of chronic conditions is growing, and the ability to safely get power to such devices opens the door to new treatment options. For example, wireless power offers the ability to extend the useful lifetime of an implant because its battery can be recharged or even eliminate the need for a battery

VII. ADVANTAGES

- No need of line of sight - In witricity power transmission there is any; need of line of sight between transmitter and receiver. That is power! Transmission can be possible if there are any obstructions like wood, metal, or other devices were placed in between the transmitter and receiver.
- No need of power cables and batteries - Witricity replaces the use of power cables and batteries
- Does not interfere with radio waves.
- Wastage of power is small - Electromagnetic waves would tunnel, they would not propagate through air to be absorbed or dissipated. So the wastage is small.
- Highly efficient than electromagnetic induction - Electromagnetic induction system can be used for wireless energy transfer only if the primary and secondary are in very close proximity. Resonant induction system is one million times as efficient as electromagnetic induction system.
- Less costly - The components of transmitter and receivers are cheaper. So this system is less costly.
- No Harmful Radiation.
- Does not need LOS

VIII. LIMITATIONS OF WIRELESS ENERGY

- A number of companies and academic institutions (including Intel and MIT) are involved in a race to be the first to release marketable wireless energy packages;however, there are a number of limitations to the full implementation of wireless energy transfer:
- Size: The copper rings which create resonance and energy are simply too big for them to be part of any wireless energy package.
- Range: The range of wireless energy transfer is just a few meters, which is a major hurdle.
- Efficiency: Wireless energy transfer ensures between 45% and 80% of the energy put inis transferred, which is much less efficient than regular wired connections.5.Cost: The cost of developing and implementing wireless energy networks means that it would be too expensive for the end-user to afford at this point.

IX. RESULT

The earlier process of transfer of electricity with the help of magnetic induction is limited to few centimetres. With the help of WiTricity power can be transmitted to few meter .Now, due to the advancement in the RF waves power can transferred to far fields and it can be controlled.

This RF-enabled WET had driven a path for new concept called wireless powered communication. With the help of wireless powered communication IoT devices can powered continuously, continuous surveillance is possible.

CONCLUSION

Wireless transmission of electricity have tremendous merits like high transmission integrity and Low Loss (90 – 97 % efficient) and can be transmitted to anywhere in the globe and eliminate the need for an inefficient, costly, and capital intensive grid of cables, towers, and substations. The system would reduce the cost of electrical energy used by the consumer and get rid of the landscape of wires, cables, and transmission towers.

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A model of LPG/CNG Gas Detection System

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***Abstract*— There are many accidents happening due to CNG/LPG gas leakage in vehicles.The Gas leakage is one of the biggest problems with industrial sector, residential milieu and gas functioning vehicles like CNG (Compressed Natural Gas) buses,cars etc. One of the contraceptive methods to stop accidents associated with the gas leakage is to install a gas leakage detection device at vulnerable places .The system detects the leakage of the LPG using a gas sensor and uses the GSM to alert the person about the gas leakage via SMS .When the concentration of LPG in air exceeds a certain level, the sensor senses the gas leakage and the output of the sensor goes LOW .The detection is done by the gas sensor , through the microcontroller the LED and buzzer are turned ON simultaneously. An alert is provided to the user, sending an SMS to the programmed mobile number.**

Keywords—IC555 ,Opto coupler ,MOSFET ,Marx generator

I. INTRODUCTION

There are numerous answers for fireplace accidents that agencies continually endorse. Smoke detectors, hearthalarms, hearth extinguishers and sprinklers are examples of those gadgets. On reflection, those devices can also alert or prevent the unfold of fire but they do not save you hearth injuries, and that alone is a main downside already. This have a look at makes a specialty of the LPG fuel and the way to save you it from causing greater injuries. There's a want to build a system that aids people's negligence of their surroundings even as stopping the start of conflagration. The device also implements a shut-off mechanism which acts as the first line of defence inside the prevention of the coincidence ought to there be an absence of individual inside the residence.

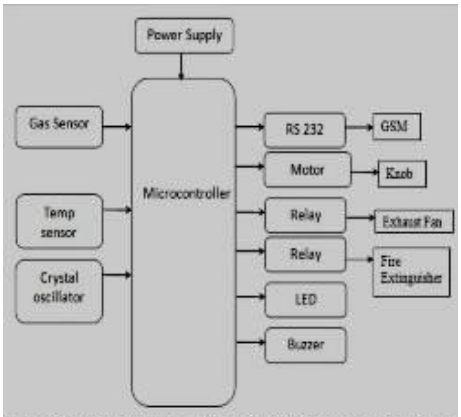
Liquefied Petroleum fuel is constituent of butane and propane gases, which can be distinctly inflammable in nature. The LPG is an odourless gasoline and hence the addition of ethanethiol allows it to show case a smell throughout its leakage. An ideal gasoline sensor may be used to feel the leakage of an LPG from cars, industries, homes and different residential regions. If there is a leakage of LPG, we will effortlessly perceive by using its concentration through the gasoline sensor and by using upward push in temperature. The LPG is broadly used for home functions such as boiling, heating and cooking. Some human beings can also have a low sense of scent and in such instances they'll now not be able to respond for the gasoline concentration present.

Consequently, a protection primarily based LPG detection system is crucial to provide alertness ,protection and protection from any harmful fuel leakage injuries . The incidents which include Kumbakonam and Bhopal fuel tragedy were the examples of the arena's worst fuel leakage injuries .This leakage detection gadget detects the fuel leakage and additionally stops the gasoline deliver together with an alarm and a GSM alerts the required person .The fuel sensor we used right here identifies the toxic gases other than LPG and its voltage goes LOW when there's a leakage of any toxic fuel .LOW signal is dispatched to a microcontroller which in flip sends those alerts to the buzzer hence, rising an alarm .After some milliseconds ,the fuel leakage message is sent to the user identified mobile range through GSM module .

II. PROPOSED METHOD

We purpose a system to come across LPG fuel leakage situations and offer a security alert to supposed customers .We right here endorse to build the gadget the use of a MQ5 gas detection sensor .If the LPG sensor senses any gas leakage from storage ,gas sensor is going stumble on it this sign is monitored by using the microcontroller and it'll perceive the gasoline leakage .Now the microcontroller is turn on LED and buzzer .After few milliseconds put off, microcontroller instructions driving force circuitry for exhaust fan to turn the fan on to release the gasoline outdoor from the room and concurrently microcontroller commands every other circuitry a relay circuitry to shut the fuel knob. In our proposed machine we designed two motive force circuitry one to power motor to close knob. And any other is relay circuitry in which relay is used to switched on and rancid for exhaust fan .Microcontroller is programmed by using embedded c language. It's far the complete control of the task .It controls the Exhaust fan, LED, Buzzer and when LPG leak takes place.

III. COMPONENTS OF THE SYSTEM



ig.1 Block Diagram of LPG/CNG gas detection

A. LPG concentration

MQ5 sensor module is responsible for detecting LPG concentration in the controlled environment.

B. Temperature sensor

LM35 Temperature sensor with 3 pins: V in, V out and Gnd. The V out pin is directly connected to themicrocontroller's analog input.

C. GSM (SIM900D)

Notification happens through SMS offerings .The GSM module block is in charge of processing the information while the sensors start to stumble on a presence of gasoline within the environment his facts then is exceeded to the GSM/GPRS module which utilizes SIM900D Mobile engine and passes the message to the cellular consumerassigned.

D. Gasoline Knob

The execution of actions in diffusing the concentration of LPG and preventing it right from its source manifest through the use of a knob.

E. LED

While LED is sparkling, this suggests the leakage of LPG gas .it's miles 2 V DC operated LED.

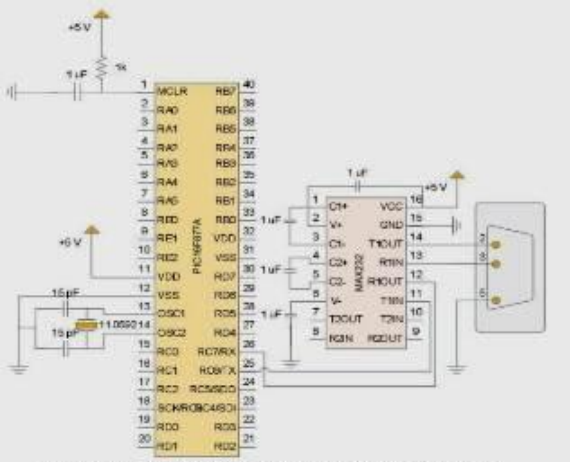


Fig. 2 Interfacing Of Microcontroller with MAX232

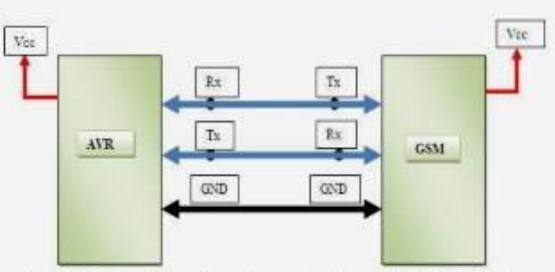


Fig.3: Connection with Microcontroller and GSM Module

The input/output ports of the microcontroller are used for this.

Fig.4 MQ5 gas sensor

Fig. Temp. Sensor

Fig. GSM SIM900D

F. PIC16F877 Microcontroller:

This powerful (200 nanosecond coaching execution) but smooth-to-application (simplest 35 unmarried phrase instructions) CMOS FLASH –primarily based eight-bit microcontroller packs Microchip's powerful % R structure into an forty-or 44-pin bundle and is upwards well matched with the PIC16C5X, PIC12CXXX and PIC16C7X gadgets.

The PIC16F877A functions 256 bytes of EEPROM statistics memory, self-programming, an ICD, 2Comprators,eight channels of 10-bit analog-to-virtual (A/D) converter,2 seize/evaluate/PWM capabilities , the synchronous serial port can be configured as either three-twine Serial Peripheral Interface(SPI^{TM}) or the tw-cord Inter-included circuit (I^2C^{TM}) bus and Asynchronous Receiver Transmitter (USART).All of those features make it a ideal for extra superior stage A/D programs in automobile, commercial, appliances and purchaser packages. Ceramic is class of artificial material, which poses piezo electric effect and is widely used to make disc, the coronary heart of piezo buzzer. While subjected to an alternating electric powered subject they stretch or compress, according with the frequency of the sign thereby producing sound. The piezo buzzer produces sound primarily based on opposite of the piezoelectric effect. The generation of strain version or pressure by using the software of electric potential across a piezoelectric material is the underlying precept .These buzzers can be used to alert a consumer of an occasion corresponding to a switching motion, counter signal or sensor enter. They are also used in alarm circuits.

G. Exhaust Fan:

This is used to send out the LPG to space and then the concentration of LPG is reduced.

H. Buzzer:

When buzzer is blowing, this indicates the leakage of LPG gas. It is 12V DC operated buzzer. Piezo buzzer is an electronic device commonly used to produce sound .Light weight, simple construction and low price make it usable in various applications like car/truck reversing indicator, computers, call bells etc. Piezo buzzer is based on the inverse principle of piezo electricity discovered in 1880 by Jacques and Pierre Curie. It is the phenomena of generating electricity when mechanical pressure is applied to certain materials and the vice versa is also true. Such materials are

called piezo electric materials. Piezo electric materials are either naturally available or manmade.

IV. WORKING PRINCIPLE

The sensing material in TGS gas sensors is metal oxide, most typically SnO2.When a metal oxide crystal such as SnO2 is heated at a certain high temperature in air, and oxygen is adsorbed on the crystal surface with a negative charge. Then donor electrons in the crystal surface are transferred to the adsorbed oxygen, resulting in leaving positive charges in a space charge layer .Thus, surface potential is formed to serve as a potential barrier against electron flow.

Inside the sensor, electric current flows through the conjunction parts (grain boundary) of SnO2 micro crystals. At grain boundaries, adsorbed oxygen forms a potential barrier which prevents carrier from moving freely. The electrical resistance of the sensor is attributed to this potential barrier. In the presence of a deoxidizing gas, the surface density of the negatively charged oxygen decreases, so the barrier height in the grain boundary is reduced. The reduced barrier height decreases sensor resistance.

Model Working

Regulated power supply is fed to MCLR Pin of PIC16F877 Microcontroller which is also supplied with crystal oscillator frequency i.e. from OSC 1 and OSC 2 for the working of the microcontroller. With the help of step down transformer of 230V AC primary to 0-12V,500Ma secondary power supply is taken from main supply. Full-wave rectifier and a capacitor filter provide the output voltage and then fed to 5-volt regulator (LM7805) whose output is used as power supply for IC's and microcontroller. Furthermore, temperature sensor and gas sensor is connected to the microcontroller. The Complete Connection Diagramconsists of the Microcontroller Circuit, GSMModule, PowerSupply, GAS Sensor Module and Exhaust Fan. The Power Supply is fed to the GSM Module. The output of the sensor goes low as soon as the MQ-5 Gas Sensor senses any gas leakage from the storage .This is detected by the microcontroller and the LED and buzzer are turned ON. After the delay of a few milliseconds, the exhaust fan is also turned ON for throwing the gas out and the microcontroller continues sending message as "GAS LEAKAGE" to a predefined mobile number using GSM Module.

V. ADVANTAGES AND DISADVANTAGES

There are various advantages and disadvantages of using LPG Gas detection system/kit using GSM module installed at residential homes/industries etc.They are discussed below.

Advantages:

- Low cost
- Low power consumption
- High accuracy
- It also detects alcohol so it is used as liquor tester.
- The sensor has excellent sensitivity combined with a quick response time.

Disadvantages:

- No prevention of fires possible with kit.
- Applicable only as an indicator/alarming device.
- It works only when at 5V power supply is given.
- It's sensitivity depends on Humidity and temperature.
- It is a little sensitive to smoke.

CONCLUSION AND FUTURE SCOPE

LPG Gas leakage is a major problem in many industries and households. We have designed such a system which can detect Gas Leakages effectively using a gas sensor and alert people either by using GSM to send a message to their mobile phones or by activating the LED, Buzzer.Hence this paperwill definitely prove to be a boon for households and industries in preventing future gas leakages. This research work being carried out is useful in the following fields:

- 1.Homes
- 2.Gas cars
- 3.LPG storage
- 4.Gas detector
- 5.Gas leakage detector
- 6.Combustible gas detector
- 7.Factories

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An Introduction to "Internet Of Everything"

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INTRODUCTION

The Internet of Everything was listed as one of the top trends of 2015 by *Gartner* .The term Internet of Everything (IoE) is a fairly new term , and there is a confusion about the difference between the Internet of Everything (IoE) and the Internet of Things (IoT) , to clarify that, let's start with definitions , applications and explore the future of this new concept.

Definition -
The Internet of Everything (IoE) is a broad term that refers to devices and consumer products connected to the Internet and outfitted with expanded digital features. It is a philosophy in which technology's future is comprised of many different types of appliances, devices and items connected to the global Internet.

The term is somewhat synonymous with the Internet of Things (IoT).

IoE is based on the idea that in the future, Internet connections will not be restricted to laptop or desktop computers and a handful of tablets, as in previous decades. Instead, machines will generally become smarter by having more access to data and expanded networking opportunities.

Actual IoE applications range from digital sensor tools/interfaces used for remote appliances to smarter and more well-connected mobile devices, industrial machine learning systems and other types of distributed hardware that have recently become more intelligent and automated.

IoE features fall under two main categories:

- Input: Allows analog or external data to be put into a piece of hardware
- Output: Allows a piece of hardware to be put back into the Internet

The IoE term is driving much discussion about IT's future. For example, organizations like Cisco use the term in its branding to refer to the potential of modern and future technology.

The Internet of Everything (IoE) "is bringing together people, process, data, and things to make networked connections more relevant and valuable than ever before-turning information into actions that create new capabilities, richer experiences, and unprecedented economic opportunity for businesses, individuals, and countries.", (Cisco, 2013) .
In simple terms: IoE is **the intelligent connection of people, process, data and things.** The Internet of Everything (IoE) describes a world where billions of objects have sensors to detect measure and assess their status; all connected over public or private networks using standard and proprietary protocols.

PILLARS OF THE INTERNET OF EVERYTHING (IOE)

- **People**: Connecting people in more relevant, valuable ways.
- **Data:** Converting data into intelligence to make better decisions.
- **Process:** Delivering the right information to the right person (or machine) at the right time.
- **Things:** Physical devices and objects connected to the Internet and each other for intelligent decision making; often called *Internet of Things (IoT).*

The Internet of Everything (IoE) with four pillars: people, process, data, and things builds on top of The Internet of Things (IoT) with one pillar: things. In addition, IoE further advances the power of the Internet to improve business and industry outcomes, and ultimately make people's lives better by adding to the progress of IoT. (*Dave Evans, Chief Futurist Cisco Consulting Services).*

THE FUTURE?

The Internet of Everything will re-invent industries at three levels: business process, business model, and business moment.
"At the first level, digital technology is improving our products, services and processes, our customer and constituent experiences, and the way we work in our organizations and within our partnerships," said Hung Le Hong, research vice president and Gartner Fellow.
"we do what we normally do,but digitalization allows us to do it better or develop better products within our industry"

As companies digitalize products and process, completely new ways of doing business in industries emerge. Gartner analysts expect more transformational changes as digitalization re-invents industries at the business model level. Mr. Le Hong gave the examples of Nike, playing on the edge of the healthcare industry with its connected sporting clothes and gear, and Google having a visible presence in autonomous vehicles. "These organizations had no business in your industry, and are now re-inventing them," said Mr. Le Hong.
The third level of digital re-invention is created by the need to compete with unprecedented business velocity and agility. Gartner calls this the "business moment."

The Internet of Everything will create tens of millions of new objects and sensors, all generating real-time data. "Data is money," said Nick Jones, research vice president and distinguished analyst at Gartner. "Businesses will need big data and storage technologies to collect, analyze and store the sheer volume of information. Furthermore, to turn data into money business and IT leaders will need decisions. As they won't have the time or the capacity to make all the decisions themselves they will need processing power."

"Now that digital is embedded in everything we do, every business needs its own flavor of digital strategy. Vanilla is off the menu," said Dave Aron, research vice president and Gartner Fellow. "Digital is not an option, not an add-on, and not an afterthought; it is the new reality that requires a comprehensive digital leadership."

Gartner predicts that enterprises will make extensive use of IoE technology, and there will be a wide range of products sold into various markets. These will include advanced medical devices, factory automation sensors and applications in industrial robotics, sensor motes for increased agricultural yield, and automotive sensors and infrastructure integrity monitoring systems for diverse areas such as road and railway transportation, water distribution and electrical transmission; an endless list of products and services.

DIFFERENCE BETWEEN THE INTERNET OF EVERYTHING AND THE INTERNET OF THINGS

A. The Difference Between IoE and IoT

The main concept to consider, when thinking of the Internet of Everything vs Internet of Things, is that "Things" are physical objects. What this means is that anything that has a real life presence, such as a computer, mobile phone, smart watch, or even a Nest, can be regarded as a "Thing."

One of the most common thoughts when thinking about Internet connected devices are items that can be interacted through an Internet connection, such as automatically changing the temperature on a Nest thermostat.

Some people might even have the concept of using the Internet of Everything to read data from these devices. That is, for example, instead of changing the temperature in the home based on commands, instead sending a notification to a user either by email or SMS whenever a certain temperature is reached.

All of this is good, but we need to consider that, even today, the Internet as we know it isn't just made of physical devices. For example, the world's biggest website, "Google", can't be considered to be a physical entity. It exists somewhere on the wires. This is true for services that you might use every day, such as DropBox or Instagram. This is the first addition to the Internet of Everything; services that you can't point a finger at and say "That exists in this physical space."

But the Internet is also made up of a lot more things than just the online services that we use. There is also the fact that you need to consider that the Internet is also made up of data streams passing between connections. You can also argue that the Internet also contains all of the people that are connected to it; the users.

The Internet of Everything connects up all of these separate concepts into one cohesive whole. It's not just about allowing devices to talk to each other, it's about allowing everything to talk about each other. In some ways, you can see the Internet of Things as the equivalent of a rail road line, including the tracks and the connections, whereas the Internet of Everything is all of that, and the trains, ticket machines, staff, customers, weather conditions, etc.

B. Solving both IoE and IoT problems

When some people use the Internet of Things they are actually talking about The Internet of Everything, and vice versa.

The Internet of Everything brings with it a lot more challenges than the Internet of Things, challenges that at CloudRail we are solving with our One API. The Internet of Things already has the problem of everything using a completely different API to talk to each other. Oh, sure, there are some devices that use the same standards, but almost all major manufacturers are in a standards war, meaning that developers can't use the same API to connect to Netatmo or a Nest.

But with the Internet of Everything, you also have to consider all of the data passing between devices. Data between one device can be in a completely different format for another, meaning that developers have to spend time translating these data streams. For an analogy, consider that an interconnected world would span the whole globe. Imagine weather researchers analyzing global trends, and having to constantly convert devices that report in Fahrenheit to Celsius.

These competing standards and different data sources is harmful to creating the future. Consider the reason why the Internet became one of the great changes in human history. It all started out with people with different skill sets and preferences working away at solving the problems that they faced every day. At the moment, it is hard for these kinds of people to coordinate with each other and devices with competing standards and data formats. If a developer builds something that uses DropBox as data storage, then another developer will find it harder to integrate their service using DropBox into it.

The CloudRail solution helps to solve this problem. They also solve the problem of catering towards those who use different programming languages, or wish for their API to work a certain way, as we allow developers to customize their endpoints and select just the services they need. This point is an important consideration for both the Internet of Things and Internet of Everything, as when Everything is online, that is a lot of data, devices, services, and things that can be integrated and one goal will be to keep programs to as low of a size as possible. The CloudRail solution will be able to bring both the Internet of Things and The Internet of Everything to it's full potential.

THE INTERNET OF EVERYTHING (IOE) DEVELOPMENT PLATFORM

The Internet of Everything (IoE) Development Platform with support for Oracle Java ME Embedded 8 lets software developers and systems integrators innovate, test and deploy IoE applications with embedded cellular connectivity. Designed specifically for developing applications requiring embedded-to-enterprise communications, for verticals such as:

Remote monitoring and tracking
Industrial controls

Healthcare

Optimized apps. Faster time to market. Lower development cost.
The IoE Development Platform enables you to write and test IoE applications on devices powered by Qualcomm Technologies' chipsets, ensuring an optimized end-solution and helping speed time-to-market. And, because Qualcomm Technologies integrates its industry-leading cellular Gobi modems and customized ARM-based application processors into its System-on-Chip designs, there's no need for additional processors, microcontrollers or memory, reducing PCB area and offering additional cost savings.

Powerful, flexible and always connected.
Oracle's Java platform combined with Qualcomm Technologies' innovative solutions delivers a powerful, flexible tool:
Java's write once, run anywhere flexibility delivers code portability and increased developer productivity. Qualcomm Technologies' chipsets enable the integration of always-on, cellular 3G connectivity into a wide range of devices and solutions.
The IoE Development Platform is designed to provide access to a large number of chipset IOs and interfaces, including GPIO, I2C, SPI and others.

Easy to set up and use.
The IoE Development Platform with Oracle Java ME Embedded 8 is designed to be easy to set up and use. It is built on JSRs and APIs for quick, connected-device application development. And, it is equipped with the sensors and indicators needed to create your first application.

The IoE Development Platform. A tool for unlocking new possibilities in IoE.
Interfaces
SPI configurable for 1.8V or 3.3V operation
I2C configurable for 1.8V or 3.3V operation
8 multiplexed ADC channels routed to onboard ADC on QSC6270T
5 GPIO controlled LED indicators
Micro USB for FW downloads, debugs, and AT commands
SD Card slot
USIM socket
4x DB9 connector
- 1 connector for UART
- 3 connectors connected to 7 GPIO pins

Board Configuration Sensors
Accelerometer controlled by SPI or I2C interface, with interrupt on GPIO
Light sensor
Temperature sensor

Memory
128MB NAND Flash
64MB DDR RAM

Multiband cellular coverage
Tri-band UMTS/HSDPA 2100/1900/850 MHz
Quad-band GSM 850/900/1800/1900 MHz

GPS
Standalone GPS, 1575.42MHz center frequency

WLAN
2.4GHz WiFi b/g/n
20-pin JTAG ICE connector

Flexible power supply
AC adapter
Battery with onboard charging for truly portable applications

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BODY HEAT POWERED FLASHLIGHT USING LTC3108

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***Abstract*— The proper usage of unused energy generated by humans in the form of heat by making it in glowing a flashlight. Thereby the flashlight runs solely on the heat of human palm without using any batteries. A peltier cell also known as a thermoelectric cooler is made up of a large number of series-connected p-n junctions, sandwiched between two parallel ceramic plates. Although peltier cells are often used as coolers by applying a dc voltage to their inputs, they will also generate a dc output voltage, using the seebeck effect, when the two plates are at different temperatures. Even with all the thermal and voltage conversion losses, there was still enough power in the palm to provide usable light. The results proved that some of the unused energy that has been wasted in the form of heat is utilized in glowing a flashlight using thermo-electric conversion by peltier tiles.**

Keywords*— *Thermoelectric Cooling, Thermo Electric Generator, PeltierTiles, Oscillator Circuit, Heat Sink, Set up Transformer.

I. INTRODUCTION

The average human consumes approximately 2000 Calories per day. This means that the average person expends ~8.37 x 106 joules of energy per day, since most of us are in some sort of equilibrium with our surroundings. Assuming most of this energy leaves us in the form of heat, on average we radiate ~350,000 J of energy per hour. Since Watt is just Joules per second, this is roughly equal to energy given off by a 100 Watt light bulb! This assumption, that most of our expended energy leaves us in the form of heat, is actually a decent one. Speaking as a relatively normal college student (in all relevant respects), the amount of energy I expend doing non-thermal work on my surroundings every day seems pretty trivial. Aside from playing tennis, probably the most energetic thing I do is walk

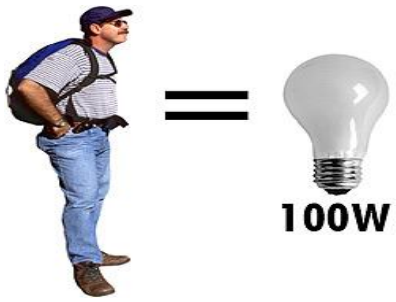

Fig 1: Energy Radiated by Humans per Hour

This assumption, that most of our expended energy leaves us in the form of heat, is actually a decent one. Speaking as a relatively normal college student (in all relevant respects), the amount of energy I expend doing non-thermal work on my surroundings every day seems pretty trivial. Aside from playing tennis, probably the most energetic thing I do is walk up 5 flights of stairs to my dorm room. This increase in gravitational potential energy, however, is only ~12,000 J, or on the order of 0.1% of my total energy expenditure.

II. DESIGN OF BODY HEAT POWERED LIGHT

The average surface area of the human skin is 1.7 m2 or 17,000 cm2, As human dissipates around 350,000 Joules per hour, or 97 watts so the heat so heat dissipation equals to 5.7mW/cm2. A useful area of the palm is about 10 cm2. This implies that 57 MW could be available but only 0.5 MW is needed to generate a bright light at the LED [1]. The design of body heat powered light includes:

- Peltier Tiles
- Oscillator Circuit
- Step-up Transformer
- Heat Sink

III. PELTIER TILES

A Peltier cell also known as a thermoelectric cooler is made up of a large number of series connected P-N junctions, sandwiched between two parallel ceramic plates. Although Peltier cells are often used as coolers by applying a DC voltage to their inputs, they will also generate a DC output voltage, using the Seebeckeffect [2], when the two plates are at different temperatures. The polarity of the output voltage will depend on the polarity of the temperature differential between the plates. The magnitude of the output voltage is proportional to the magnitude of the temperature differential between the Plates. When used this manner, a Peltier cell is referred to as a thermoelectric Generator.

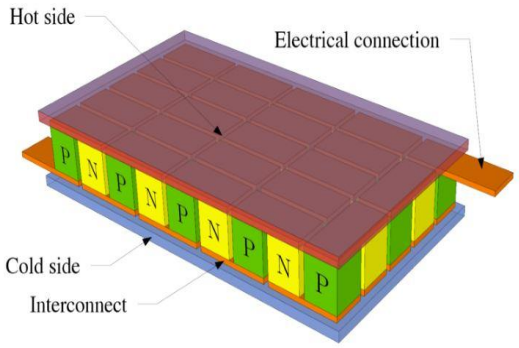

Fig 2: Construction of Peltier Tiles

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The output from the Peltier Device is Direct Current. Direct Current cannot be multiplied, but if the DC is changed to AC, the voltage can be stepped up with a transformer. The upper surface of the the peltier is made up of dielectric substrate and internally consists of P-type and N-type [3]. They have a lot of P-N contacts connected in series. They are also heavily doped, meaning that they have special additives that will increase the excess or lack of electrons. The Construction of peltier tile is shown in fig.2.

IV. ELECTRONIC OSCILLATOR

An electronic oscillator is an electronic circuit that produces a periodic, oscillating electronic signal oscillators designed to produce a high-power ac output from a dc supply are usually called inverters. An oscillator can be designed so that the oscillation frequency can be varied over some range by an input voltage or current. The output from the peltier is such a low voltage that needs to be busted for which linear IC ltc3108 is used.

Using a small step-up transformer, the ltc3108 provides a complete power management solution for wireless sensing and data acquisition. The 2.2v ldo powers an external microprocessor, while the main output is programmed to one of the four fixed voltages to power a wireless transmitter or sensors. The power good inductor signals that the main output voltage is within regulation. A second output can be enabled by the host. A storage capacitor provides power when the input voltage source is unavailable. Extremely low quiescent current and high efficiency design ensure the fastest possible charge time's ofthe output reservoir capacitor. The ltc3108 is available in a small, thermally enhanced 12-lead (3mm x 4mm) dfn package and a 16-lead ssop package. The linear IC ltc3108's top view is shownin the fig [2].the ltc3108 utilizes a mosfet switch to form a resonant step-up oscillator using an external step-up transformer and a small coupling capacitor. This allows it to boost input voltages as low as 20mv high enough to produce multiple regulated output voltages for powering other circuits. The frequency of oscillation is determined by the inductance of the transformer secondary winding and is typically in the range of 10 kHz to 100 kHz. For input voltages as low as 20mv, a primary-secondary turns ratio of about 1:100 is good.

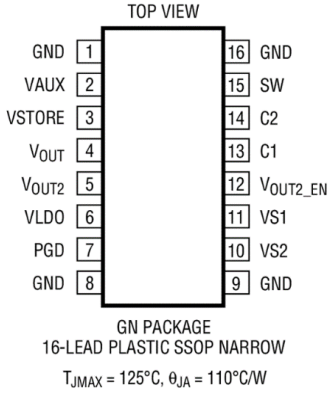

Fig3: Top view of LTC3108

V. STEP – UP TRANSFORMER

The transformer is static electrical equipment which transforms electrical energy (from primary side windings) to the magnetic energy (in transformer magnetic core) and again to the electrical energy (on these secondary transformer side). The operating frequency and nominal power are approximately equal on primary and secondary transformer side because the transformer is very efficient equipment, while the voltage and current values are usually different. Essentially, that is the main task of the transformer, converting high voltage (hv) and low current from the primary side to the low voltage (lv) and high current on the secondary side and vice versa. On a step up transformer shown in fig 4.there are more turns on the secondary side than the primary side so the voltage will be stepped up.

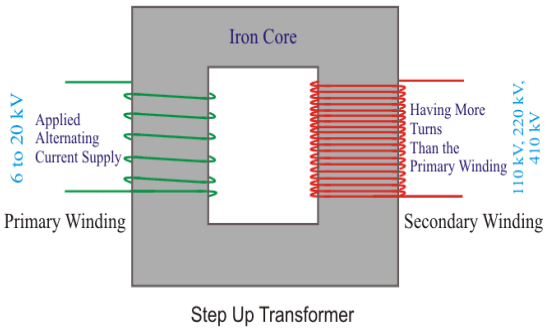

Fig: 4 Step Up Transformer

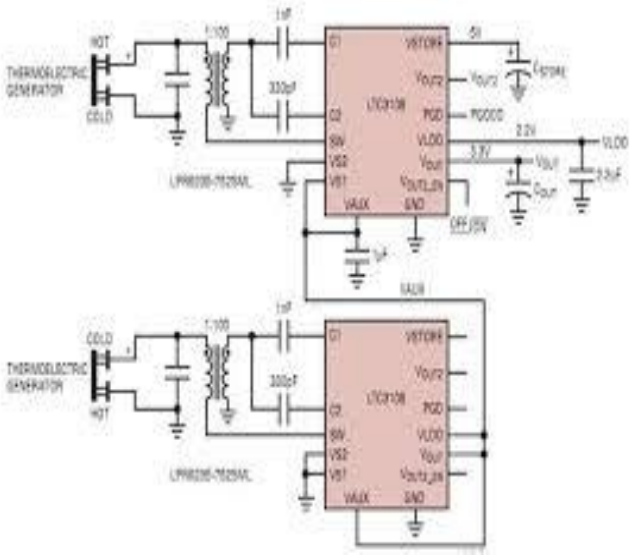

Fig5: Peltiers connected to Linear IC

Factors that affect performance are the dc resistance of the transformer windings and the inductance of the windings. Higher dc resistance will result in lower efficiency. The secondary winding inductance will determine the resonant frequency of the oscillator, according to the following formula.

Frequency = [1/ 2pi sqr (lc)] Hz

Where l is the inductance of the transformer secondary winding and c is the load capacitance on the Secondary

winding. Here two peltiers are used which are connected to linear IC one side of peltier is heated by the human palm and the other is cooled.

The fig 5 shows the two peltiers connection to the linear IC using the step-up transformer of the turn's ratio 1:100. The output of the circuit is taken and is tabulated. For the send time the 1:100 turns transformer is replaced by 1:20 turns, the output is found out and tabulated.

VI. HEAT SINK

A heat sink is a passive heat exchanger that transfers the heat generated by an electronic or a mechanical device to a fluid medium, often air or a liquid coolant, where it is dissipated away from the device, thereby allowing regulation of the device's temperature at optimal levels.a led panel needs a heat sink to dissipate the heat generated when producing light. Heat prematurely ages led's when they run hot which is also why they are underpowered. They are advertised as the total wattage the light can handle but the actual power is often much less. They work with the aluminum heat sinks to further remove excess heat.

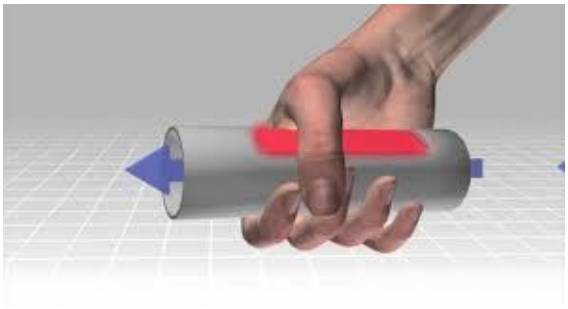

Fig6: Air flowing through Aluminum tube

Peltier tiles were mounted on the aluminum tube and placed inside a PVC pipe with a cut for the peltiers. The hollow space inside the tube allows passing the air currents freely. So the flashlight can be divided as the two medium the outer area and the inner area of the tube. The area also referred as hot side due to the contact of peltier with the human hand. The inner area also referred as cold side due to the passage of air currents.

CONCLUSION

Even with all the thermal and voltage conversion losses, there was still enough power in the palm to provide usable light. The results proved that some of the unused energy that has been wasted in the form of heat is utilized in glowing a flashlight using thermo-electric conversion by peltiertiles.

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From the desk of HOD-IT

C.SRINIVAS
M.Tech
Assoc Prof & HOD

The Department of Information Technology was established in the year 2008 with an intake of 60 students and has successfully completed 10 years not just as other branch of engineering but as a Department capable of imparting profound technical knowledge and professional skills making students capable of being Industry Ready. On par with the technical events and academic activities, the Department of IT takes up Engineer's Day as a special occasion in nurturing their budding engineers by commemorating the deeds of a remarkable engineer Sir Mokshagundum Vishveshwaraya as a part of which this student technical magazine- **INGÉNIEUR** has been initiated with a motivation towards keeping the students abreast with recent developments, technical advancements in IT and allied engineering areas. The students of the Department have a world of opportunities ranging from Data Mining to Data Analytics, Image Processing to Augmented Reality, Computing technology to Cognitive Technology and mere product testing to a major product development. The concepts of Digitization and Digital World are leaping ahead by masking off the technological differences and bringing varied technologies to a unique platform.

I take pride in congratulating the faculty and students of the Department for their excellent support in bring out the technical magazine. I hope this effort should go more beyond its expectation in helping the student community.

Message from the Coordinators-IT

Mr.V.Lakshmana Rao, Asst Prof, IT
&
Mr.G.Sankara Rao, Asst Prof, IT

Information technology has been named the most valuable STEM major based a recent global analysis. "Real world experience" is valuable to any Engineering graduate particularly the Information Technology graduate as the society is geared up towards grouping, analyzing, interpreting and using the technology based available information for its futuristic needs. We are immensely pleased to be a part of the team that helps bring out the technical abilities in a student. We are thankful to the students who have responsed favourably by contributing articles on Web development, Outlier Detection, Artificial Intelligence and the latest technologies. We thank our colleagues who have supported us in this task. We sincerely hope that the students will contribute more enthusiastically in the coming years.

Artificial Intelligence for Speech Recognition

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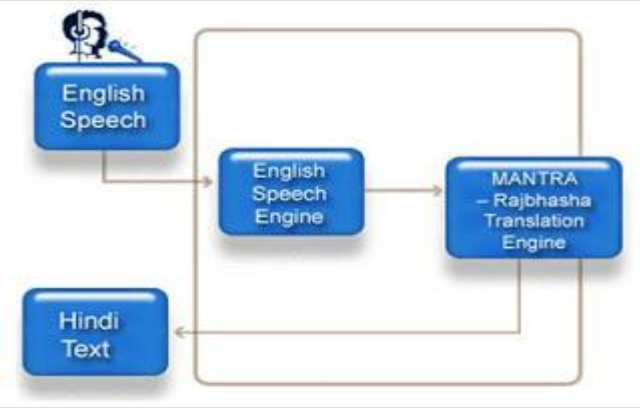
Artificial intelligence (AI) involves two basic ideas. First, it involves studying the thought processes of human beings. Second, it deals with representing those processes via machines (like computers, robots, etc.). AI is behavior of a machine, which, if performed by a human being, would be called intelligent. It makes machines smarter and more useful, and is less expensive than natural intelligence. Natural language processing (NLP) refers to artificial intelligence methods of communicating with a computer in a natural language like English. The main objective of a NLP program is to understand input and initiate action.

HOW ARTIFICIAL INTELLIGENCE IS GOING TO RULE THE WORLD?

According to a Narrative Science report, just 38% percent of the companies surveys used artificial intelligence in 2016—but by 2018, this percentage increased to 62%. Another study performed by Forrester Research predicted an increase of 300% in investment in AI in the year 2017, compared to previous year. IDC estimated that the AI market will grow from $8 billion in 2016 to more than $47 billion in 2020. "Artificial Intelligence" today includes a variety of technologies and tools, some time-tested, others relatively new.

WHAT IS SPEECH RECOGNATION?

Speech recognition is the ability of a machine or program to identify words and phrases in spoken language and convert them to a machine-readable format. Rudimentary speech recognition software has a limited vocabulary of words and phrases, and it may only identify these if they are spoken very clearly, the user communicates with the application through the appropriate input device i.e. a microphone. The Recognizer converts the analog signal into digital signal for the speech processing. A stream of text is generated after the processing. This source-language text becomes input to the Translation Engine, which converts it to the target language text.



TYPES OF SPEECH RECOGNITION

There are two types of speech recognition. One is called speaker–dependent and the other is speaker–independent. Speaker–dependent software is commonly used for **dictation software**, while speaker–independent software is more commonly found in **telephone applications**.

HOW TO RECOGNIZE SPEECH?

Simple inquiries about bank balance, movie schedules, and phone call transfers can already be handled by telephone-speech recognizers. Voice activated data entry is particularly useful in medical or darkroom applications, where hands and eyes are unavailable. Speech could be used to provide more accessibility for the handicapped (wheelchairs, robotic aids, etc.) and to create high-tech amenities (intelligent houses, cars, etc.)The 1990s shows the first commercialization of spoken language understanding systems. Computers can now understand and react to humans speaking in a natural manner in ordinary languages within a limited domain. Acoustic **signal is used** to identify a sequence of words uttered by a speaker

APPLICATIONS

a) One of the main benefits of speech recognition system is that it lets user do other works simultaneously. The user can concentrate on observation and manual operations, and still control the machinery by voice input commands..

b) Another major application of speech processing is in military operations. Voice control of weapons is an example. With reliable speech recognition equipment, pilots can give commands and information to the computers by simply speaking intotheir microphones - they don't have to use their hands for this purpose.

c) Another good example is a radiologist scanning hundreds of X-rays, ultra sonograms, CT scans and simultaneously dictating conclusions to a speech recognition system connected to word processors. The radiologist can focus his attention on the images rather than writing the text.

d) Voice recognition could also be used on computers for making airline and hotel reservations. A user requires simply stating his needs, to make reservation, cancel a reservation, or making enquiries about schedule.

VOICE RECOGNITION SOFTWARE ADVANTAGES AND DISADVANTAGES:

Advantages

- Allows user to operate a computer by speaking to it;
- Free up cognitive working space;
- Allows dictation of text, commands;
- Eliminates handwriting, spelling problems;
- Always spells correctly (doesn't always recognize words correctly);

Disadvantages

• Requires large amounts of memory to store voice files;
• Difficult to use in classroom settings, due to noise interference;
• Requires each user to train software to recognize voice, hard for poor decoders;
• Makes errors, can be frustrating without adequate support;
• Assists with one stage of the writing process, not a solution to the writing problem.

CONCLUSION

Speaker recognition technology is used in many fields. This technology helps physically challenged skilled persons. These people can do their works by using this technology without pushing any buttons. Automatic Speech Recognition (ASR) technology is used in military weapons and in Research centers. Now a day this technology was also used by CID officers to trap the criminal activities.

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Survey on Outlier Detection Techniques

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Abstract**—** Outliers once upon a time regarded as noisy data in statistics, has turned out to be an important problem which is being researched in diverse fields of research and application domains. As in the present world huge amounts of data are stored and transferred from one location to another. The data when transferred or stored is primed exposed to attack. Although various techniques or applications are available to protect data, still loopholes exist. Thus to analyze data and to determine various kind of attack, data mining techniques have emerged to make it less vulnerable. In this paper we make an attempt to bring together various outlier detection techniques, in a structured and generic description. This paper provides a better understanding of the different directions of research on outlier analysis for beginners .

Keywords— Outlier Applications, Outliers, Outlier Detection

I. INTRODUCTION

An outlier is a data point that is significantly different from the remaining data. Outliers are also referred to as abnormalities, discordant, deviants, or anomalies in the data. Hawkins [1] defined an outlier as "An observation which deviates so much from the other observations as to arouse suspicions that it was generated by a different mechanism

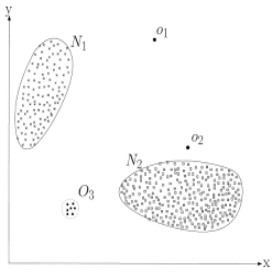


FIGURE 1.1: Outliers
N1 and N2 are normal data. o1 and o2 are two outliers and points in O3 is also considered as an outlier.

In most applications, the data is created by one or more generating processes, which could either reflect activity in the system or observations collected about entities. When the generating process behaves unusually, it results in the creation of outliers. Therefore, an outlier often contains useful information about abnormal characteristics of the systems and entities that impact the data generation process. The recognition of such unusual characteristics provides useful application-specific insights. Practically outlier detection has been found in wide-ranging applications from fraud detection for credit cards, insurance or health care, intrusion detection for cyber-security, fault detection in safety critical systems, to military surveillance.

Therefore, many outlier detection methods have been proposed to detect outliers from existing normal data. In general, the previous work on outlier detection can be broadly classified into distribution-based, clustering-based, density-based and model-based approaches.
Our objective in this paper is to present the existing algorithms for outlier detection with imperfect data labels, Designing a unique and effective algorithm and testing the algorithm on different data labels.

II. Efficient approach for outlier detection with imperfect data labels

A. *Proximity-based*

TechniquesProximity-based techniques are simple toimplement and make no prior assumptions about the data distribution model. However, they suffer exponential computational growth as they are founded on the calculation of the distances between all records. The computational complexity is directly proportional to both the dimensionality of the data m and the number of records n. Hence, methods such as k-nearest neighbour with O(n2m) runtime are not feasible for high dimensionality data sets unless the running time can be improved. There are various flavours of k-Nearest Neighbour (k-NN) algorithm for outlier detection but all calculate the nearest neighbours of a record using a suitable distance calculation metric such as Euclidean distance or Mahalanobis distance. Euclidean distance is given by equation Maintaining the Integrity of the Specifications

1. Distance Based Outlier Detection

Distance based outlier detection technique judge a point based on the distance(s) to its neighbors. Basic model of distance based outlier detection as shown in figure.

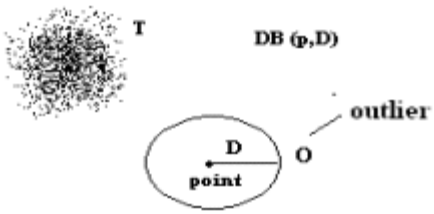


Fig. 2: Basic model of distance based method.

Explicit distance-based approaches are based on the well known nearest-neighbor principle. Ng and K norr [2] proposed a well-defined distance metric to detect outliers. They define outlier as the object which is greater in distance to its neighbors. The basic algorithm, the Nested Loop (NL) algorithm, calculates the distance between each pair of objects and then set as outliers those that are far from most objects. The NL algorithm has quadratic complexity, with respect to the number of objects, making it unsuitable for

mining very large databases such as those found in government audit data, clinical trials data, and network data. The distance-based outlier method was presented in K norr and Ng (1998) as: "An object O in a dataset T is a DB (p,D)-outlier if at least fraction p of the objects in T lie at a distance greater than D from O". The parameter p used here is the minimum fraction of objects that must lie outside an outlier's D-neighborhood.

This approach is further extended in . In which they given a prior consideration on distance of a point from its k the nearest neighbor, where top k point are declared as an outliers. This approach alternatively proposed by Anguilla and Pizzuti [3] on the basis of outlier factor. Each data point is assigned formulated outlier factor computed as sum of distance from its k nearest neighbors. For detecting outliers linear time is used in [8] where data set get randomized for efficient search space. Recently we witnessed that a non parametric unsupervised based methods used for outlier detection which was proposed by a branch et al [9]. To address the uncertainty, temporal relation and transiency present within data distance based outlier detection for data stream method proposed (DBODDS) with the help of continuously adaptive data distribution function

2. Density Based Outlier Detection

This method compares the density around a point with its local neighbors densities. The relative density of a point compared to its neighbors is computed as an outlier score. Density based outlier detection method uses density distribution of data points within data set. The idea of density based local outlier using comparison with density of local neighborhood. In this approach an outliers are measured by using a local outlier factor (LOF), which is ratio of local density of this point and the local density of its nearest neighbor. Data point whose LOF value is high is declared as outlier.

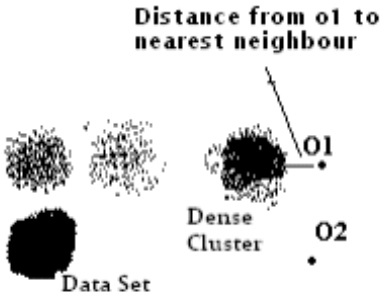


Fig. 3: Data set and dense cluster with outliers.

Papadimitriou[4] et al proposed a Local correlation Integral(LOCI) based method which uses Multi Granularity Deviation Factor (MDEF) as a measure that how the neighborhood count of a particular data element compares with that of the values in its sampling neighborhood.

3. Clustering Based Outlier Detection

Cluster analysis is popular unsupervised techniques to group similar data instances into clusters. Clustering partitions the data into groups, in which similar objects are contained. The assumed behavior of outliers is that they either do not belong to any cluster, or are forced to belong a cluster where they are very different from other members or belong to very small clusters

A variation regarding clustering is the use of a fuzzy model. Fuzzy clustering assigns a membership degree to each sample for each cluster. The most popular known fuzzy clustering algorithm is the Fuzzy C means (FCM). The fuzzy C means is an unsupervised clustering algorithm due to Dunn (1974) and it is based on the minimization of an objective function which is defined as the weighted sum of squared error within groups, as described in the following equation:

$$J_m(U,V;X) = \sum_{K=1}^{N}\sum_{I=1}^{C} u_{ik}{}^m \|x_k - v_i\|^2$$

where V = (v1 , v2 ,..., vc) is the vector of the centers of the clusters, is the grade of membership of data to the cluster i . When a stable condition is reached the iteration stops and a point is associated to the cluster for which the value of membership is maximal

B. Non-Parametric Methods

Other techniques such as those based around convex hulls and regression and the PCA approaches assume the data follows a specific model. These all require a priori data knowledge. Such information is often not available or is expensive to compute. Many data sets simply do not follow one specific distribution model and are often randomly distributed. Hence, these approaches may be applicable for an outlier detector where all data is accumulated beforehand and may be pre-processed to determine parameter settings or for data where the distribution model is known. Non parametric approaches, in contrast are more flexible and autonomous

1. Kernel k-Means clustering-based method

We adopt the kernel k-means clustering algorithm to generate likelihood values for each input data. In kernel based method, a nonlinear mapping function φ(.) maps the input samples into a feature space. Kernel k-means clustering minimizes the following objective function

$$j = \sum_{i=1}^{k}\sum_{j=1}^{i+n} \left\| \oint (x_j) - \oint (v_i) \right\|^2$$

where k is the number of clusters and vi is the cluster center of the cluster. By solving this optimization problem, kmeans clustering returns a set of local clusters, in which data samples belonging to a same cluster are more similar to each other. Intuitively, for a data sample, if most of data samples in the same cluster are normal, it would have a high probability of being normal, and if there is an outlying point that does not belong to any cluster, it would have a high probability of being an outlier. Therefore, we calculate the likelihood values for single likelihood model and likelihood model as follows. For a given cluster j, assume there exist normal examples and negative examples.

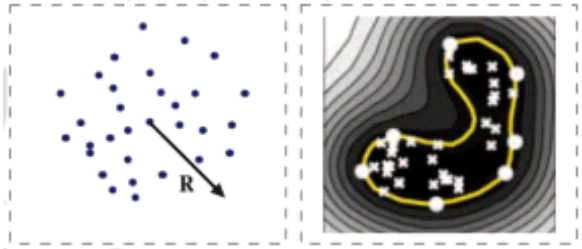
D. Parametric Methods

Parametric methods allow the model to be evaluated very rapidly for new instances and are suitable for large data sets; the model grows only with model complexity not data size. However, they limit their applicability by enforcing a pre-selected distribution model to fit the data. If the user knows their data fits such a distribution model then these approaches are highly accurate but many data sets do not fit one particular model.

1.Support vector data iteration

The support vector data description (SVDD) has been proposed for one-class classification learning. Given a set off target data {xi}, i = 1, . , l, where xi ∈ R m, the basic idea of SVDD is to find a minimum hyper-sphere that contains most of target data in the feature space, as illustrated in fig.4

Figure 4: (a) Illustration of SVDD hyper-sphere in feature space.(b) Illustration of SVDD decision boundary in input space



$$\text{Min } F(R,o,\xi i) = R^2 + C\sum_{i=1}^{l}\xi i$$

$$\text{s.t. } \| \phi(xi) - o \|^2 <= R^2 + \xi i,$$

$$\xi i \geq 0, (1)$$

where φ(.) is a mapping function which maps the input data from input space into a feature space, and φ(xi) is the image of xi in the feature space, ξi are slack variables to allow some data points to lie outside the sphere, and C > 0 controls the tradeoff between the volume of the sphere and the number of errors ξi l i=1 is the penalty for misclassified Samples. By introducing Lagrange multipliers αi, the optimization problem (1) is transformed into:

$$max\sum_{i=1}^{l}\alpha_i K(x_i,x_i) - \sum_{i=1}^{l}\sum_{k=1}^{l}\alpha_i \acute{a} k K(x_i,x_k)$$

$$\sum_i \alpha_i = 1$$

in which kernel function K(, .,) is utilized to calculate the inner pair wise product of two vector , that is $k(x_i, x_j)$. The samples with αi > 0 are support vectors (SVs). For a test point x, it is classified as normal data when this distance is less than or equal to the radius R. Otherwise, it is flagged as an outlier

III. APPLICATIONS

The data we had considered here is from California energy market price data of the year 2000 http://www.ucei.berkely.edu

1. Program in python for Outlier detection using Density-Based-Outlier-Detection:

```
count2,count1=0,0
val=0
for i in range(n):
        x=data.iloc[i].values
        for j in x:
                val+=j
val=val/n
for i in range(n):
        x=data.iloc[i].values
        for j in x:
                if(j<val):
                        count1+=1
                if(j>val):
                        count2+=1
print(count1,count2)
```

In the above program we calculate outliers based on density ,where we first calculate the average of the given data , and based on that we check the data that is close to one other based on that we classify it in to groups

Using this process out of 8784 data entries we found 6929 as correct input data and 1855 are considered as the outlier's

2. Program in python for Outlier detection using Distance-Based-Outlier-Detection:

```
val=0
count1,count2=0,0
from scipy.spatial import distance
for i in range(n):
   x=data.iloc[i].values
   for j in x:
      val+=j
val=val/n
l=[]
for i in range(n):
   x=data.iloc[i].values
   for j in x:
      g=distance.euclidean(j,val)
      l.append(g)
c=sum(l)/len(l)
for j in l:
   if(j<c):
      count1+=1
   if(j>c):
      count2+=1
print(count1,count2)
```

IV. CONCLUSION

The speed of processing the data is to be increased that helps in the reduction of processing cost of data. There is no single universally applicable outlier detection approach of the current techniques. This paper presents the study of different existing outlier detection techniques and the way in which they are categorized. It is concluded that performance of clustering algorithms is comparatively better than other outlier detection algorithms on huge data sets. It is found that efficiency and computational complexity depends upon the data distribution and type of data. It is also observed that no individual algorithm is much suited for the high dimensional data

In the above program we calculated Distance based outlier detection ,where we assume a point from that point we calculate the distance of all other points and based on that we classify into groups and identify the outliers.

And Using this process out of 8784 data entries we found 8112 as correct input data and 672 are considered as the outlier's.

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AI-ENABLED FACE RECOGNITION

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Abstract— Facial recognition is a Biometric Artificial Intelligence based application that can uniquely identify a person by analyzing patterns based on the person's facial textures and shape. This page includes how the face is authenticated and recognized using nodal points on the face, it also includes the components and stages involved in face recognition, how neural networks helps in face recognition.

Keywords— Face recognition, biometric, neural network

I. INTRODUCTION

A facial recognition system is a technology capable of identifying or verifying a person from a digital image or a video frame from a video source. There are multiple methods in which facial recognition systems work, but in general, they work by comparing selected facial features from given image with faces within a databases.
It is typically used in security systems and can be compared to other biometrics such as fingerprint or eye iris recognition systems. Recently, it has also become popular as a commercial identification and marketing tool
The information age is quickly revolutionizing the way transactions are completed. Everyday actions are increasingly being handled electronically, instead of with pencil and paper or face to face. This growth in electronic transactions has resulted in a greater demand for fast and accurate user identification and authentication. Access codes for buildings, banks accounts and computer systems often use PIN's for identification and security clearances.
Using the proper PIN gains access, but the user of the PIN is not verified. When credit and ATM cards are lost or stolen, an unauthorized user can often come up with the correct personal codes.
Despite warning, many people continue to choose easily guessed PIN‟s and passwords: birthdays, phone numbers and social security numbers. Recent cases of identity theft have heighten the need for methods to prove that someone is truly who he/she claims to be.
Face recognition technology may solve this problem since a face is undeniably connected to its owner expect in the case of identical twins .Its nontransferable. The system can then compare scans to records stored in a central or local database or even on a smart card.

II.Methods

A. What is biometric?

A biometric is a unique, measurable characteristic of a human being that can be used to automatically recognize an individual or verify an individual's identity. Biometrics can measure both physiological and behavioral characteristics. Physiological biometrics (based on measurements and data derived from direct measurement of a part of the human body) include:

a. Finger-scan
b. Facial Recognition
c. Iris-scan
d. Retina-scan
e. Hand-scan

B. Why we choose face recognition over other biometric?

There are number reasons to choose face recognition. This includes the following:
1.It requires no physical interaction on behalf of the user.
2. It is accurate and allows for high enrolment and verification rates.
3. It does not require an expert to interpret the comparison result.
4. It can use your existing hardware infrastructure, existing cameras and image capture .Devices will work with no problems
5. It is the only biometric that allow you to perform passive identification in a one to.
Many environments (e.g.: identifying a terrorist in a busy Airport terminal.

C. Face recognition

For face recognition there are two types of comparisons

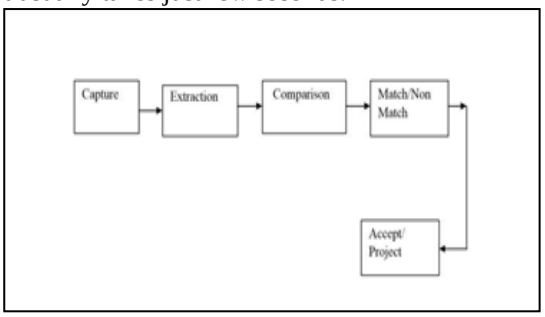
1. Face Verification
Face verification involves a one-to-one match that compares a query face image against an enrollment face image whose identity is being claimed.

2. Face Identification
Face identification involves one-to-many matching that compares a query face against multiple faces in the enrollment database to associate the identity of the query face to one of those in the database

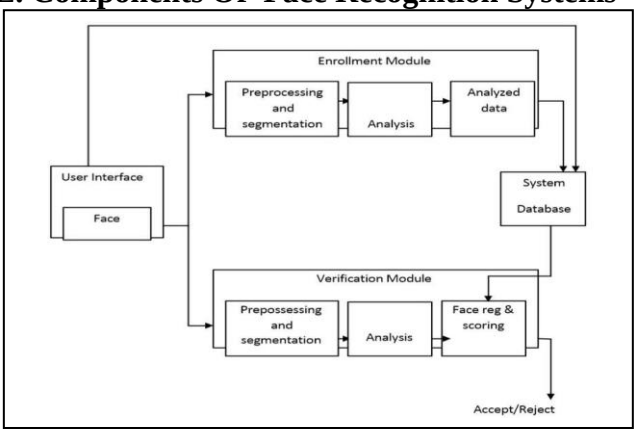
D. Authentication technologies operate using the following four stages

1. Capture The first step is for the to collect physical or behavioral samples in predetermined conditions and during a stated period of time.
2. Extraction Then all this gathered data should be extracted from the samples to create templates based on them.
3. Comparison After the extraction, collected data is compared with the existing templates.

4. Matching The final stage of face detection technology is to make a decision whether the face's features of a new sample are matching with the one from a facial database or not. It usually takes just few seconds.



E. Components Of Face Recognition Systems



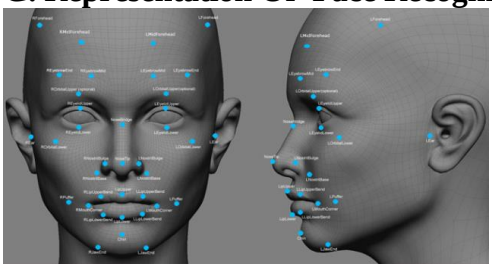
1**. Enrollment module** An automated mechanism that scans and captures a digital or an analog image of a living personal characteristics
2. Database Another entity which handles compression, processing, storage and compression of the captured data with stored data
3. Identification module The third interfaces with the application system

F. How Face Recognition System Works

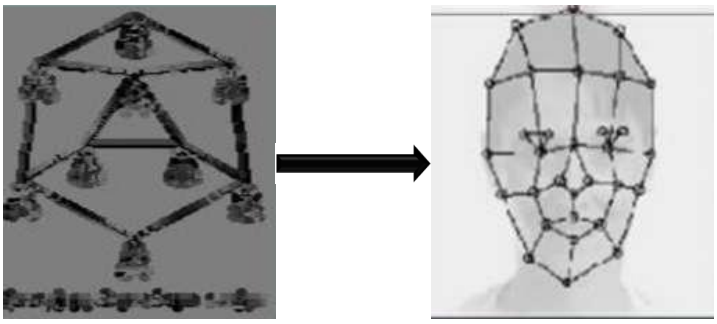
If you look at the mirror, you can see that your face has certain distinguishable landmarks. These are the peaks and valleys that make up the different facial features. Software defines these landmarks as nodal points. There are about "80 nodal points" on a human face. Here are few nodal points that are measured by the software.

- distance between the eyes
- width of the nose
- depth of the eye socket
- cheekbones
- jaw line

G. Representation Of Face Recognition

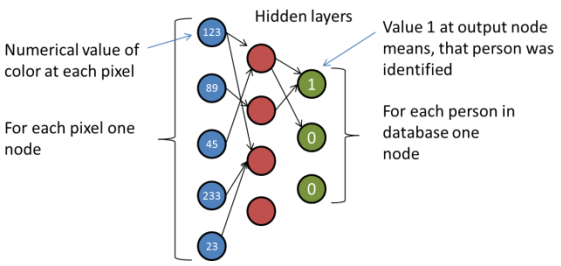


1. Face Bunch
A Face bunch graph is created from "70 nodal points" to obtain a general representation of face. Given an image the face is matched to the Face bunch graph to find the same point. These nodal points are measured to create a numerical code, a string of numbers that represents a face in the database. This code is called face print.Only 14 to 22 nodal points are needed for face it software to complete the recognition process.



H. NEURAL NETWORK

Neural network is a very powerful and robust classification technique which can be used for predicting not only for the known data, but also for the unknown data. It works well for both linear and non linear separable dataset. NN has been used in many areas such as interpreting visual scenes, speech recognition, face recognition, finger print recognition, iris recognition. An ANN is composed of a network of artificial neurons also known as "nodes". These nodes are connected to each other, and the strength of their connections to one another is assigned a value based on their strength: inhibition (maximum being -1.0) or excitation (maximum being +1.0). If the value of the connection is high, then it indicates that there is a strong connection. Within each node's design, a transfer function is built in. There are three types of neutrons in an ANN, input nodes, hidden nodes, and output nodes



.

The input nodes take information, in the form of numeric expression. The information is presented as activation values, where each node has given a number, if the higher the number greater the activation. This information is then passed throughout the network. Based on the connection strengths which are weights, inhibition or excitation, and transfer functions, the activation value is passed from node to node. Each of the nodes sums the activation values it receives; it then modifies the value based on its transfer function. The activation flows through the network, through hidden layers, until it reaches the output nodes. The output nodes then reflect the meaningful.

I. Advantages and Disadvantages

1. Advantages

The improvement of security level
Easy integration process
High accuracy rates
Full automation
Forget the time fraud

2. Disadvantages

Face recognition systems can't tell the difference between identical twins.
Processing and storing
Image size and quality
Surveillance angle

III. APPLICATIONS

The natural use of face recognition technology is the replacement of PIN.

1. Government Use

a. Law Enforcement Minimizing victim trauma verifying Identify for court records, and comparing school surveillance camera images to know child molesters.

b. Security Access control, comparing surveillance images to Know terrorist.

c. Immigration Rapid progression through Customs.

d. Voter verification Where eligible politicians are required to verify their identity during a voting process this is intended to stop "proxy" voting where the vote may not go as expected

2. Commercial Use

a. Residential Security Alert homeowners of approaching personnel.

b. Banking using ATM The software is able to quickly verify a customer's face.

c. Information security Physical access control of buildings areas, doors, cars or net access

IV. CONCLUSION

Face recognition technologies have been associated generally with very costly top secure applications. Today the core technologies have evolved and the cost of equipment is going down dramatically due to the integration and the increasing processing power. Certain applications of face recognition technology are now cost effective, reliable and highly accurate. As a result there are no technological or financial barriers for stepping from the pilot project to widespread deployment. From this we can conclude that face recognition has more secure compared to finger print.

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WEB DEVELOPMENT

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***Abstract*— Responsive web design have receive a popular attention in recent years because of they can meet a variety of internet terminals resolution. This paper will discuss how to use Media Queries, Bootstrap responsive navigation, and layout of streaming technology to achieve responsive web design. And make a rational analysis about responsive web development at the present stage.**

Keywords—RWD,Media Query

I. INTRODUCTION

With the rapid development of mobile Internet, Internet terminals are increasingly designed in many ways, the screen size of the device meets the different needs of users, but the size of the site is impossible to design a dedicated interface for each device. Therefore, responsive web design get progressively generate and more widely used. Responsive Web Design (Responsive Web Design, RWD), integrate three kinds of existing development skills (flexible network pattern, flexible pictures, media and media inquiries) and named responsive Web design. Its essence is to design a web content display mechanism in perfect layout for any device. Responsive design is not only changing the page-layout based on the size of the viewport, but also to subvert the whole methods from the current design. Formerly, web designers fixed width design for the desktop computer, then zoomed out and rearranged content for the small screen. Design and Development of the web page should make an appropriate response and adjustment according to user's system platform, screen size, screen orientation and so on. That means no matter what screen size of the device is being used, we should be able to switch the page resolution, picture size and related scripting capabilities automatically, so as to adapt to different devices.Some of this is dependent on the server environment on which the scripting language, such as Python, html and JavaScript is running, and therefore is not necessarily down to the web developer themselves to maintain.

II. UNDERSTANDING RESPONSIVE WEB DESIGN

Responsive Web Design (abbreviated RWD and sometimes referred to simply as responsive design) is the most common name given to a collection of techniques and technologies used to adjust the layout and features of a website to meet the needs of the particular context (generally assumed to be the device type) in which it is being presented. This allows producers to create a single code base and point of entry for all visitors. Although RWD is the name generally used, other terms have been used to describe similar or related techniques. These terms include fluid web design, liquid web design, reactive web design, and adaptive web design. Many of these terms are still in use, but RWD is quickly becoming the catch-all term for user-centered contextual design. Combined with a progressive enhancement design philosophy—which emphasizes that sites do not have to look exactly the same across all platforms on all browsers, but must simply be accessible by them—RWD is used to create sites that can be automatically scaled and reconfigured based on the capabilities of the platform. This allows optimization of the presentation with minimal extra production work. With an increasing number of website visitors using smartphone and tablet devices, RWD is seen as the best strategy for ensuring these audiences' needs are met with minimal extra production or development work.

III. CREATING RESPONSIVE WEB SITES

If a new site is being constructed or an existing site is being rebuilt, it should be constructed using responsive web design (RWD) techniques to ensure that it is as cross-platform-capable as possible. This means that if you follow traditional workflows for web design and development, you are potentially tripling your work, making tasks like wire-framing for RWD a nightmare. You are not only defining the structure for the page as it appears on the desktop/laptop screen but, at a minimum, two breakpoints where the interface is changed (smartphone and tablet) as well.

This also includes:

>Planning
>Prototyping
>Building
>Content
>Testing

A. THE MOST POPULAR PROGRAMMING LANGUAGES IN WEB DESIGN

The universe of programming languages is wide and knowing all or learning each one of them is neither practical nor possible. If you are a developer who is interested in learning the most useful and popular ones, then you must first know which ones of the thousands of languages to learn. Thankfully, there are certain websites and platforms that create lists of the top languages, according to their popularity. Java, Python are the most popularly used languages.

Python works on a core philosophy and follows its main principles in all seriousness. The language was designed with the aim of making it highly extensible. This means that the language can easily be incorporated or embedded in existing applications. The goal of the developers of this language was to make it fun to use one. The developers worked on the language in such a way that it could reduce upon premature optimization. Here's a look at some of the principles that have been summarized for you:

- Readability is important
- Complex is better than complicated-
- Beautiful is better than ugly
- Simple is better than complex
- Explicit is better than implicit

Java

Java is yet another highly popular and widely used language that you can consider for web development. This language is an object-oriented, class-based and concurrent language that was developed by Sun Microsystems in the 1990s. Since then, the language continues to be the most in-demand language that also acts as a standard platform for enterprises and several mobile and games developers across the world. The app has been designed in such a way that it works across several types of platforms. This means that if a program is written on Mac Operating system then it can also run on Windows based operating systems.

- It must be a secure and robust programming language
- It must be an object-oriented, simple language which becomes familiar soon.
- It must be capable of being implemented and executed with high performance.
- It must be threaded, dynamic and interpreted.
- It must be portable and architecture-neutral.

Python

Python is a highly used and all-purpose programming language which is dynamic in nature. Being dynamic in nature means that you as a developer can write and run the code without the need of a compiler. The design of the language is such that it supports code readability which means that its syntax is such that only a few lines of codes are needed to express a point or a concept. This concept of code readability is also possible in the case of Java and C++, etc. This is a high-level or advanced language that is considered easy for beginners to understand and learn.

Some of the apps that are powered by Python are Rdio, Instagram, and Pinterest. Besides this, some other web platforms that are supported by Python are Django, Google, NASA, and Yahoo, etc. Some of the other features of this language include automatic memory management, large library, dynamic type system and support of many paradigms.

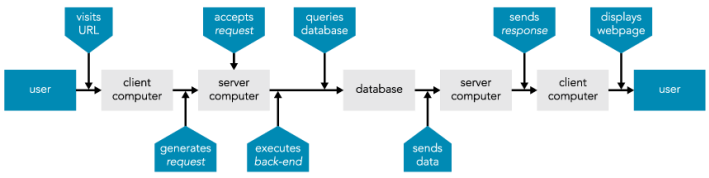
Modern Website:

While every website is built slightly differently, there are a few fundamental components that handle every interaction between a user and the site:

Client: The local computer (desktop/laptop) or device (phone/tablet) the user is interacting with to access the website.
Server: The remote computer that "physically houses" all the files (and thus code) that make up the website.

Database: A sub-component of the remote server, the database is a large series of data tables used to store all the dynamic information generated or used within the website. For example, the account information of a logged in user would be stored in the database.

With our three fundamental components identified, we can briefly examine how a website recognizes a visiting user and ultimately displays the appropriate page for viewing. The following diagram provides an approximate illustration of the process.



CONCLUSION

This module gave a fundamental understanding of the models *Web Site Planning Models*. You will see both models applied throughout this course, as a way of making the complex concepts of Web development concrete. In addition, it is hoped that WebTeam continues to put a human face on the Web development process.

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The Future of Nanotechnology in The Healthcare IT Technology

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***Abstract*— The human characteristics of curiosity, wonder, and ingenuity are as old as mankind. People around the world have been harnessing their curiosity into inquiry and the process of scientific methodology. There is increasing optimism that Nanotechnology applied to medicine will bring significant advances in the diagnosis, treatment, and prevention of diseases. Growing interest in the future medical applications of Nanotechnology is leading to the emergence of a new field called Nanomedicine. Nanomedicine needs to overcome the challenges for its application, to improve the understanding of pathophysiologic basis of disease, bring more sophisticated diagnostic opportunities, and yield more effective therapies and preventive properties. When doctors gain access to medical robots, they will be able to quickly cure most known diseases that hobble and kill people today, and extend the human health span. Molecular technology is destined to become the core technology underlying all of 21st century healthcare industry. In this article, we have made an attempt to have an early glimpse on future impact of Nanotechnology in medicine.**

Keywords—
Nanomedicine,Nanotechnology,Nanoscience, healthcare.

I. INTRODUCTION

The world began without man, and it will complete itself without him - Cloude Levi Strauss. Winfred Phillips, said, "You have to be able to fabricate things, to be able to analyze things, and handle things smaller than ever imagined in ways not done before"[1]. Many researchers believed that in future, scientific devices that are dwarfed by dust mites may one day be capable of grand biomedical miracles.

The vision of Nanotechnology introduced in 1959 by late Nobel physicist Richard P Faynman Still to quote, "There is plenty of room at the bottom,"[2] proposed employing machine tools to make smaller machine tools, these are to be used in turn to make still smaller machine tools, and so on all the way down to the atomic level." He suggested Nanomachines, Nanorobots, and Nanodevices ultimately could be used to develop a wide range ofprecise microscopic instrumentation and manufacturing tools that could be applied to produce vast quantities of ultra-small computers and various Nano-and scale micro-scale robots.

Nano comes from the Greek word for dwarf. Typically, Nanotechnology is defined as the research anddevelopment of materials, devices, and systems exhibiting physical, chemical, and biological properties that are different from those found on a larger scale (matter smaller than scale of things like molecules and viruses)[3].

Nanotechnology will affect everything, says William Atkinson, author ofNanoscom. Nanotechnology and the big changes coming from the inconceivably small. It'll be like a blizzard; snowflakes whose weight you can't detect can bring a city to a standstill.

The scientists in the field of regenerative medicine and tissue engineering are continually looking for new ways to apply the principles of cell transplantation, material science, and bioengineering to construct biological substitutes that will restore and maintain normal function in diseased and injured tissue. Development of more refined means of delivering medications at therapeutic levels to specific sites is an important clinical issue, for applications of such technology in medicine, and dentistry[4].

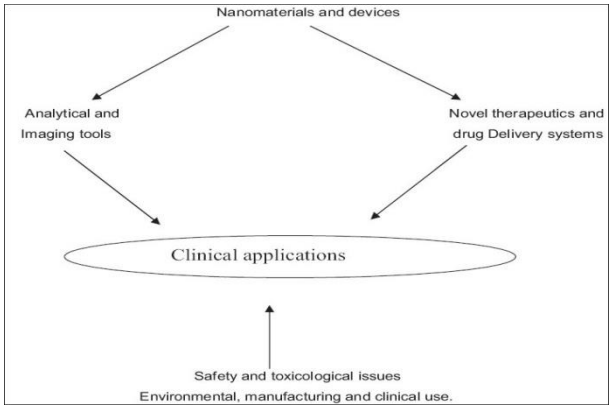

Figure 1

II. APPLICATIONS OF NANOTECHNOLOGY

A. Nano medicine

The field of "Nano medicine" is the science and technology of diagnosing, treating, and preventing disease and traumatic injury, of relieving pain, and of preserving and improving human health, using Nano-scale structured materials, biotechnology, and genetic engineering, and eventually complex machine systems and Nano-robots[6]. It was perceived as embracing five main sub-disciplines that in many ways are overlapping by common technical issues [Fig. 1].

B. Nanodiagnostics:

Nano devices are to be used for the early disease identification or predisposition at cellular and molecular level. In *in-vitro* diagnostics, Nanomedicine could increase the efficiency and reliability of the diagnostics using human fluids or tissues samples by using selective Nanodevices, to make multiple analyses at subcellular scale, etc. On the other hand, *in-vivo* diagnostics in Nanomedicine could develop devices that work inside the human body in order to identify the early presence of a disease, quantify toxic molecules, and tumor cells.

C. Regenerative medicine:

It is an emerging multidisciplinary field to look for the reparation, improvement, and maintenance of cells, tissues, and organs by applying cell therapy and tissue engineering methods. With the help of Nanotechnology it is possible to interact with cell components, to manipulate the cell proliferation and differentiation, and the production and organization of extracellular matrices. Present day Nano medicine exploits carefully structured Nanoparticles such as dendrimers, carbon fullerenes, and Nano shells to target specific tissues and organs. Years ahead, complex Nano devices and evenNano robots will be fabricated, to achieve the most powerful results[6].

III. Applications in Medical Field

Within 10–20 years it should become possible to construct machines on the micrometer scale made up of parts on the Nanometer scale. Subassemblies of such devices may include such as useful robotic components as 100 nm manipulator arms, 10 nm sorting rotors for molecule by molecule reagent purification, and smooth super hard surfaces made of flawless diamond.

Nano computers would assume the important task of activating, controlling, and deactivating such Nanomechanical devices. Nanocomputers would store and execute mission plans, receive and process external signals and stimuli, communicate with other Nanocomputers or external control and monitoring devices, and so onSuch technology has enormous medical and dental implications.

Programmable Nanorobotic devices would allow physicians to perform precise interventions at the cellular and molecular level. Medical Nano robots have been proposed for genotological[6] applicatons in pharmaceuticals research,[7] clinical diagnosis, and in dentistry,[8] and also mechanically reversing atherosclerosis, improving respiratory capacity, enabling near-instantaneous homeostasis, supplementing immune system, rewriting or replacing DNA sequences in cells, repairing brain damage, and many othersWithin 10–20 years it should become possible to construct machines on the micrometer scale made up of parts on the Nanometer scale. Subassemblies of such devices may include such as useful robotic components as 100 nmmanipulator arms, 10 nm sorting rotors for molecule bymolecule reagent purification, and smooth super hard surfaces made of flawless diamond.

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A. Nanoroboticmicrobivores:

Artificial phagocytes called microbivores could patrol the bloodstream, seeking out and digesting unwanted pathogens including bacteria, viruses, or fungi[9,10]. Microbivores would achieve complete clearance of even the most severe septicemic infections in hours or less. The Nanorobots do not increase the risk of sepsis or septic shock because the pathogens are completely digested into harmless sugars, amino acids, and the like, which are the only effluents from the Nanorobot.

B. Surgical Nanorobotics

A surgical Nanorobot, programmed or guided by a human surgeon, could act as a semiautonomous on site surgeon inside the human body, when introduced into the body through vascular system or cavities. Such a device could perform various functions such as searching for pathology and then diagnosing and correcting lesions by Nano manipulation, coordinated by an onboard computer while maintaining contact with the supervising surgeon via coded ultrasound signals[9].

C. Nano Generators

They could make new class of self-powered implantable medical devices, sensors, and portable electronics, by converting mechanical energy from body movement, muscle stretching, or water flow into electricity.

Nanogenerators produce electric current by bending and then releasing zinc oxide Nanowires, which are both piezoelectric and semiconducting. Nanowires can be grown on polymer-based films, use of flexible polymer substrates could one day allow portable devices to be powered by movement of their users.

IV. FUTURE

Diagnosis and treatment will be customized to match the preferences and genetics of each patient. Treatment options will become more numerous and exciting. All this will demand, even more so than today, the best technical abilities, professional skills that are the hallmark of the contemporary dentist and periodontist. Developments are expected to accelerate significantly.

Nanometres' and Nanotubes, technologies could be used to administer drugs more precisely. Technology should be able to target specific cells in a patient suffering from cancer or other life-threatening conditions. Toxic drugs used to fight these illnesses would become much more direct and consequently less harmful to the body.

V. CONCLUSION

The visions described in this article may sound unlikely, implausible, or even heretic. Nanotechnology will change dentistry, healthcare, and human life more profoundly than many developments of the past. As with all technologies, Nanotechnology carries a significant potential for misuse and abuse on a scale and scope never seen before. However, they also have potential to bring about significant benefits, such as improved health, better use of natural resources, and reduced environmental pollution. These truly are the days of miracle and wonder.

Once Nanomechanics are available, the ultimate dream of every healer, medicine man and physician throughout recorded history will, at last become a reality. Programmable and controllable micro scale robots comprised of Nanoscale parts fabricated to Nanometer precision will allow medical doctors to execute curative and reconstructive procedures in the human body at the cellular and molecular levels. Nanomedical physicians of the 21st century will still make good use of the body's natural healing powers and homeostatic mechanisms, because all else equal, those interventions are best that intervene least.

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Message from Head of the Department's Desk

Dr.R.V.S.L.Kumari, Ph.D
HOD
Electrical and Electronics Engineering

The Department of Electrical and Electronics Engineering was established in the year 2011 with a sanctioned intake of 60 with an objective of imparting quality education in Electrical and Electronics Engineering. The Department has well qualified & experienced faculty having specializations in Power Systems, Power Electronics & Drives and Control Systems etc and adequate, well furnished laboratories to cater to the needs of the students as per the university norms & curriculum.

The Department of EEE is always encouraging the students to participate in Co-curricular activities like Paper Presentations, Poster Presentations, Live Model Exhibition etc as these activities pave a platform to showcase their hidden talent and discuss the current trends in the field of Electrical and Electronics Engineering. In continuation of this, the department is organizing Paper Presentation Contest on the auspicious occasion of Engineer's day, i.e on 15th September and selected papers will be published in the technical magazine- **INGÉNIEUR**. The response received from the students is fabulous with topics ranging from trends to technology. I thank the faculty and students of the deapartment for their excellent support and response.

Message from the Coordinators

Mr.D.Srinivasa Reddy, Asst Prof, EEE
&
Mr.G.S.S.Harsha, Asst Prof, EEE

Electrical engineering covers the large-scale production and distribution of electrical power, whereas electronic engineering is about much smaller electronic circuits, such as those found in computers and other modern technologies. An electrical and electronics engineering student will be equipped with the necessary engineering skills and technological knowledge to design, assess and improve electrical and electronic systems. We are happy to coordinate the technical articles for the first issue of the technical magazine- **INGÉNIEUR.** The technical magazine is aimed at boosting the thinking,writing and creative skills of the student.The students of the Department have come out with excellent articles covering diverse areas of Electrical and Electronics Engineering.The articles include those on Super Capacitors, Green Building, DC to AC Converters, Switch Gears and Artificial Intelligence. We thank all the students for their excellent contributions and request them to develop and share their skills and knowledge.

A STUDY ON AC DRIVES FOR PLUG-IN ELECTRIC VEHICLE

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***Abstract*—the connection of Plug-in electric vehicles (PEV) to the power grid poses a series of new challenges for electric utilities. PEVs can drastically reduce our dependence on oil; they emit no air pollutants when running in all electric modes. PEVs have several benefits compared to conventional internal combustion engine vehicles (ICEVs). They have lower operating and maintenance cost. A PEV is any motor vehicle with rechargeable battery packs that can be charged from electric grid and the electricity stored on board drives or contributes to drive the wheels for propulsion.**

In this review paper, the operating process of the various types of ac drives is presented. Comparative analysis is discussed as a possibility to increase the energy capacity of PEV.

INTRODUCTION

It is recognized that wide applications of electric vehicles (EVs) will bring tremendous social, economical and ecological benefits. With the growing interests in electric vehicles, much effort is demanded for the development of efficient, reliable and economical ac drives for EV propulsion purpose. Both induction motor (IM) drives and permanent magnet brushless dc motor (BDCM) drives have been applied to EVs. Switched reluctance motor (SRM) drives have been proposed as an alternative for EV propulsion. In order to assess the suitability of IM; BDCM and SRM drives for EV applications and to provide a technical support for the development and selection of future EV propulsion systems, the existing EV ac propulsion drives were compared, and a survey of experts' opinions was conducted. Comparison of the three ac drives was made on a relative and a quantitative basis using the survey questionnaires. According to the majority of the experts, induction motor drives are best suited for EV propulsion purpose, due to their low cost, high reliability, high speed, established converter and manufacturing technology, low torque ripple/noise and absence of position sensors. BDCM drives feature compactness, low weight and high efficiency and therefore provide an alternative for EV propulsion. The experts regard insulated gate bipolar transistors (IGBTs) as the most suited power semiconductor devices for ac drive converters at the present stage.

A. Model of PEV

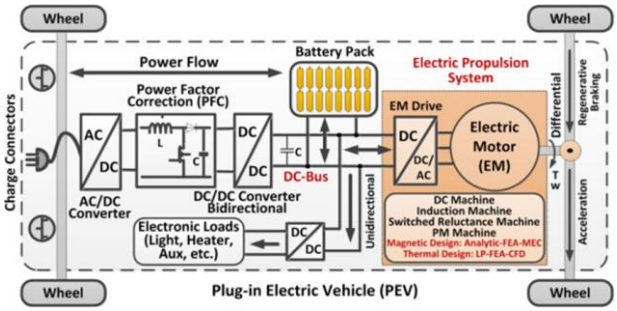

Fig.1 .Block diagram of PEV

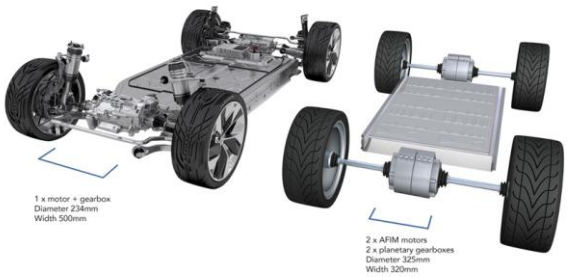

Fig .2.

B. PEV with I.M

In an induction motor only the stator winding is fed with an AC supply.

Alternating flux is produced around the stator winding due to AC supply. This alternating flux revolves with synchronous speed. The revolving flux is called as "Rotating Magnetic Field" (RMF).

The relative speed between stator RMF and rotor conductors causes an induced emf in the rotor conductors, according to the Faraday's law of electromagnetic induction. The rotor conductors are short circuited, and hence rotor current is produced due to induced emf. That is why such motors are called as induction motors.

Now, induced current in rotor will also produce alternating flux around it. This rotor flux lags behind the stator flux. The direction of induced rotor current, according to Lenz's law, is such that it will tend to oppose the cause of its production.

As the cause of production of rotor current is the relative velocity between rotating stator flux and the rotor,

the rotor will try to catch up with the stator RMF. Thus the rotor rotates in the same direction as that of stator flux to minimize the relative velocity. However, the rotor never succeeds in catching up the synchronous speed. This is the basic working principle of induction motor of either type, single phase of 3 phases.

The squirrel cage type of induction motor is very popular in case of variable speed drives. It is available in all power ratings and also used for constant speed applications. It is of low cost, minimum maintenance, high reliability and high efficiency

C. PEV with BDCM

It may be described as electronically commuted motor which do not have brushes. These types of motors are highly efficient in producing large amount of torque over a vast speed range. In brushless motors, permanent magnets rotate around a fixed armature and overcome the problem of connecting current to the armature. Commutation with electronics has large scope of capabilities and flexibility. They known for smooth operation, and holding torque when stationary.

Before explaining working of brushless motor DC, it is better to understand function of brushed motor. In brushes motors, there are permanent magnets on the outside and a spinning armature which contains electromagnet is inside. These electromagnets create a magnetic field in the armature when power is switched on and help to rotates armature. The brushes change the polarity of the pole to keep the rotation on of the armature. The basic principles for the brushed DC motor and for brushless DC motor are same i.e., internal shaft position feedback. Brushless DC motor has only two basic parts: rotor and the stator. The rotor is the rotating part and has rotor magnets whereas stator is the stationary part and contains stator windings. In BLDC permanent magnets are attached in the rotor and move the electromagnets to the stator. The high power transistors are used to activate electromagnets for the shaft turns. The controller performs power distribution by using a solid-state circuit.

Brushless motors are more efficient as its velocity is determined by the frequency at which current is supplied, not the voltage. As brushes are absent, the mechanical energy loss due to friction is less which enhanced efficiency which makes it more reliable, high life expectancies, and maintenance free operation. There is no sparking and much less noise during operation. There is no ionizing sparks from the commutator, and electromagnetic interference is also getting reduced. They accelerate and decelerate easily as they are having low rotor inertia.

All of today's electric vehicles use a BLDC motor. Green car manufacturers often prefer BLDC motors over the alternatives because the peak point efficiency is higher and rotor cooling is simpler. The motors can also operate at "unity power factor," meaning the drive can operate at its maximum efficiency levels. Batteries and brakes. One of the most important components of the BLDC motor drive system is the batteries. In addition to supplying energy to the engine, they allow the electrical receivers to function. Therefore, it's important that the batteries in green cars be as efficient as possible.

Whenever a battery gets used, an irreversible change in the chemical structure occurs. As a result, a rechargeable battery is most efficient when maintained close to full charge. Thanks to the permanent magnets in the brushless DC motor and the ability for the external torque to work as a generator, a person operating a green car can pulse-charge the battery by applying the brakes. It's important to note, however, that braking alone won't fully charge an electric car's battery.

Motor response. Green car manufacturers and entities like NASA prefer BLDC motors because of their fast motor responses. The high-performance, small-diameter magnetic rotors reduce the inertia of the armature, allowing high acceleration rates, a reduction in rotational losses, and smoother servo characteristics. This optimal motor response also allows for more constant speeds, instant speed regulation and a quieter drive system

D. PEV with SRM

This is also known as variable reluctance motor or brushless reluctance or commutated reluctance motor. The SRM has wound field coils as in a DC motor for the stator windings. The rotor however has no magnets or coils attached. It is a solid salient-pole rotor (having projecting magnetic poles) made of soft magnetic material (often laminated-steel). When power is applied to the stator windings, the rotor's magnetic reluctance creates a force that attempts to align the rotor pole with the nearest stator pole. In order to maintain rotation, an electronic control system switches on the windings of successive stator poles in sequence so that the magnetic field of the stator "leads" the rotor pole, pulling it forward. Rather than using a mechanical commutator to switch the winding current as in traditional motors, the switched-reluctance motor uses an electronic position sensor to determine the angle of the rotor shaft and solid state electronics to switch the stator windings, which enables dynamic control of pulse timing and shaping. This differs from the apparently similar induction motor that also energizes windings in a rotating phased sequence. In an SRM the rotor magnetization is static (a salient 'North' pole remains so as the motor rotates) while an induction motor has slip, and rotates at slightly less than synchronous speed. SRM's absence of slip makes it possible to know the rotor position exactly, allowing the motor to be stepped arbitrarily slowly.

E. Comparitive analysis for AC drives in PEV

With a comparison of IM, BDCM and SRM drives on a relative basis, the opinions of the experts can be summarized as follows:

(1) IMs have low efficiency, high reliability, low power density, low torque ripple, high overload capacity, large size, low cost and medium maximum speed. IM converters have low efficiency, mediumhigh control complexity, low power density and high cost.

(2) SRMs have mediumflow efficiency, medium reliability, medium power density, high torque ripple,

mediumbow overload capacity, mediumflow size, medium cost and high maximum speed. SRM converters have medium efficiency, low control complexity, medium power density and low/medium cost.

(3) BDCMs have high efficiency, low reliability, high power density, small size, high cost and low maximum speed. BDCM converters have high efficiency, high/medium control complexity, high power density and mediumlow cost.

(4) The sizes of IM, SRM and BDCM converters are similar. Insulated gate bipolar transistors (IGBTs) are the most suitable power semiconductor devices for all converters.

In selecting EV propulsion systems, the experts considered the following cri ten a: cost, efficiency, reliability/maintenance, high speed operation hide speed range, size/volume, and torque ripple/acoustic noise and feedback sensor. About 72% of respondents prefer IMs for EV propulsion purpose due to the drives' low cost, high reliability, wide speed range/high speed, established converter and manufacturing technology, low torque ripplemoise and absence of the need for position sensors. About 17% of respondents regard BDCM drives as suited for EV propulsion because of their compactness, low weight, high efficiency and high controllability. Only 11% of respondents chose SRM drives for EV propulsion, citing their high reliability, low cost, simplicity and high speed potential.

Motors	**IM**		**SRM**		**BDCM**	
Parameters	**Val**	**dev**	**Val**	**dev**	**Val**	**dev**
Efficiency (%)	**93.4**	**1.80**	**93**	**2.8**	**95.2**	**1.6**
Power density(kW/kg)	**0.7**	**0.5**	**0.7**	**0.6**	**1.2**	**1.1**
Torque ripple (%)	**7.3**	**6.3**	**24.0**	**14.5**	**10.0**	**4.1**
Over load capacity (%)	**243**	**56**	**186**	**57**	**212**	**54**
size(l/Kw)	**1.8**	**1.6**	**2.6**	**1.8**	**2.3**	**1.6**
Cost($US/Kw)	**19.0**	**6.9**	**20.0**	**7.5**	**32.0**	**19.2**
Max speed(rpm)	**12700**	**6300**	**12400**	**8260**	**9400**	**4670**

TABLE: 1 COMPARISON OF VARIOUS MOTORS

CONCLUSION

With the growing interests in electric vehicles, much R&D effort is demanded for efficient, reliable and economical ac drives for EV propulsion purpose. Both induction motor drives and brushless dc motor drives have been applied to EVs. Switched reluctance motor drives have been proposed as an alternative for EV propulsion. In order to assess the suitability of IM, BDCM and SRM drives for EV applications and to provide a technical support for the development and selection of future EV propulsion systems, the existing EV ac propulsion drives were compared, and a survey of experts' opinions was conducted. According to the majority of the experts, induction motor drives are preferred for EV propulsion purpose, due to their low cost, high reliability, high speed, established converter and manufacturing technology, low torque ripplehoise and absence of position sensors. BDCM drives feature compactness, low weight and high efficiency and therefore provide an alternative for EV propulsion. The experts regard insulated gate bipolar transistors (IGBTs) as the most suited power semiconductor devices for ac drive converters at the present stage.

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Artificial Intelligence in Power Systems

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Abstract— **The application of Artificial Intelligence (AI) methods in power systems has been addressed in this paper. Particular emphasis has been put on Artificial Neural Networks (ANN),Fuzzy Network(FL),Expert system and Genetic Algorithms . Practical application of AI systems in Transmission Lines is also explained. Need for AI in Power Systems is addressed. Advantages applications and efficiencies of all the above mentioned AI methods are listed.**

Keywords—Power systems , Artificial Intelligence.

I. INTRODUCTION

A continuous and reliable supply of electricity is necessary for the functioning of today's modern and advanced society. Since the early to mid 1980s, most of the effort in power systems analysis has turned away from the methodology of formal mathematical modeling to the less rigorous and less tedious techniques of artificial intelligence (AI) . AI techniques have become popular for solving different problems in power systems like control, planning, scheduling, forecast, etc.

Artificial Neural Networks(ANN),Fuzzy Logic,Expert system and Genetic Algorithms are the methods that are used through AI in power systems predominantly. These techniques can deal with difficult tasks faced by applications in modern large power systems with even more interconnections installed to meet increasing load demand. The application of these techniques has been successful in many areas of power system engineering.

A. POWER SYSTEMS

An electric power system is a network of electrical components used to supply, transmit and use electric power. Power systems engineering is a subdivision of electrical engineering that deals with the generation, transmission, distribution and utilisation of electric power and the electrical devices connected to such systems like generators, motors and transformers.

B. ARTIFICIAL INTELLIGENCE

Commonly, artificial intelligence is known to be the intelligence exhibited by machines and software, for example, robots and computer programs. The term is generally used to the project of developing systems equipped with the intellectual processes features and characteristics of humans, like the ability to think, reason, find the meaning, generalize, distinguish, learn from past experience or rectify their mistakes. Artificial general intelligence (AGI) is the intelligence of a hypothetical machine or computer which can accomplish any intellectual assignment successfully which a human being can accomplish.

C. NEED FOR AI IN POWER SYSTEMS

Power system analysis by conventional techniques becomes more difficult because of:
(i) Complex, versatile and large amount of information which is used in calculation, diagnosis and learning.
(ii) Increase in the computational time period and accuracy due to extensive and vast system data handling.

The modern power system operates close to the limits due to the ever increasing energy consumption and the extension of currently existing electrical transmission networks and lines. This situation requires a less conservative power system operation and control operation which is possible only by continuously checking the system states in a much more detail manner than it was necessary. Sophisticated computer tools are now the primary tools in solving the difficult problems that arise in the areas of power system planning, operation, diagnosis and design. Among these computer tools, Artificial Intelligence has grown predominantly in recent years and has been applied to various areas of power systems.

II. ARTIFICIAL INTELLIGENCE TECHNIQUES

The most widely used Artificial Intelligence Techniques in Power systems are :

(i)Artificial Neural Networks (ANN)

(ii)Fuzzy Networks (FL)

(iii)Expert System

(iv)Genetic Algorithms (GA)

A. ARTIFICIAL NEURAL NETWORKS (ANN)

Artificial Neural Networks are biologically inspired systems which convert a set of inputs into a set of outputs by a network of neurons, where each neuron produces one output as a function of inputs. A fundamental neuron can be considered as a processor which makes a simple non linear operation of its inputs producing a single output. The understanding of the working of neurons and the pattern of their interconnection can be used to construct computers for solving real world problems of classification of patterns and pattern recognition.

They are classified by their architecture: number of layers and topology: connectivity pattern, feedforward or recurrent.

Input Layer: The nodes are input units which do not process the data and information but distribute this data and information to other units.

Hidden Layers: The nodes are hidden units that are not directly evident and visible. They provide the networks the ability to map or classify the nonlinear problems.

Output Layer: The nodes are output units, which encode possible values to be allocated to the case under consideration.

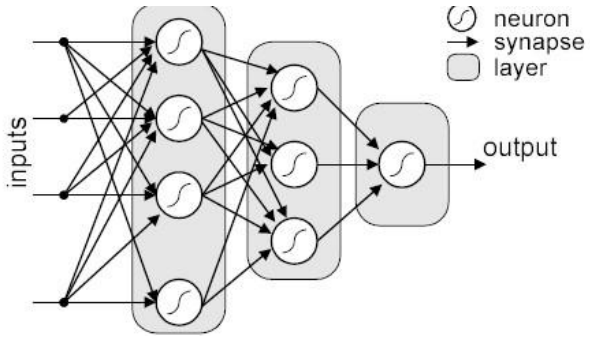


Fig.1 Architecture of a feed forward ANN

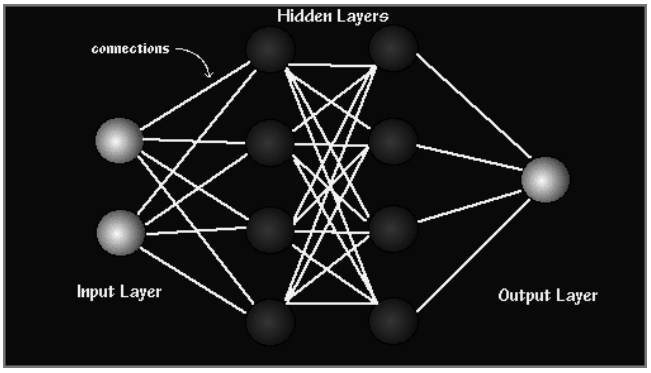


Fig.2 Typical structure of an ANN

Operation of ANNs in power systems:

As ANNs operate on biological instincts and perform biological evaluation of real world problems, the problems in generation, transmission and distribution of electricity can be fed to the ANNs so that a suitable solution can be obtained. Given the constraints of a practical transmission and distribution system, the exact values of parameters can be determined. For example, the value of inductance, capacitance and resistance in a transmission line can be numerically calculated by ANNs taking in various factors like environmental factors, unbalancing conditions, and other possible problems. Also the values of resistance, capacitance and inductance of a transmission line can be given as inputs and a combined, normalized value of the parameters can be obtained. In this way skin effect and proximity effect can be reduced to a certain extent.

Advantages:

(i) Speed of processing.
(ii) They do not need any appropriate knowledge of the system model.
(iii) They have the ability to handle situations of incomplete data and information, corrupt data.
(iv) They are fault tolerant.
(v) ANNs are fast and robust. They possess learning ability and adapt to the data.
(vi) They have the capability to generalize.

Disadvantages:

(i) Large dimensionality.
(ii) Results are always generated even if the input data are unreasonable.
(iii) They are not scalable i.e. once an ANN is trained to do certain task, it is difficult to extend for other tasks without retraining the neural network.

Applications:

Power system problems concerning encoding of an unspecified non-linear function are appropriate for ANNs. ANNs can be particularly useful for problems which require quick results, like those in real time operation. This is because of their ability to quickly generate results after obtaining a set of inputs.

B. FUZZY LOGIC

Fuzzy logic or Fuzzy systems are logical systems for standardisation and formalisation of approximate reasoning. It is similar to human decision making with an ability to produce exact and accurate solutions from certain or even approximate information and data. The reasoning in fuzzy logic is similar to human reasoning. Fuzzy logic is the way like which human brain works, and we can use this technology in machines so that they can perform somewhat like humans. Fuzzification provides superior expressive power, higher generality and an improved capability to model complex problems at low or moderate solution cost. Fuzzy logic allows a particular level of ambiguity throughout an analysis. Because this ambiguity can specify available information and minimise problem complexity, fuzzy logic is useful in many applications. For power systems, fuzzy logic is suitable for applications in many areas where the available information involves uncertainty. For example, a problem might involve logical reasoning, but can be applied to numerical, other than symbolic inputs and outputs. Fuzzy logic provide the conversions from numerical to symbolic inputs, and back again for the outputs.

Fuzzy Logic Controller :

Simply put, it is a fuzzy code designed to control something, generally mechanical input. They can be in software or

hardware mode and can be used in anything from small circuits to large mainframes. Adaptive fuzzy controllers learn to control complex process much similar to as we do.

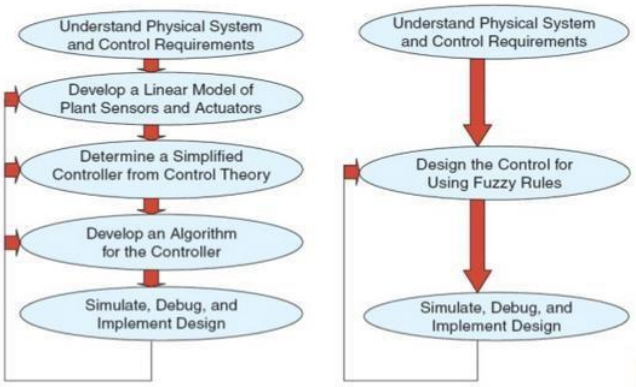
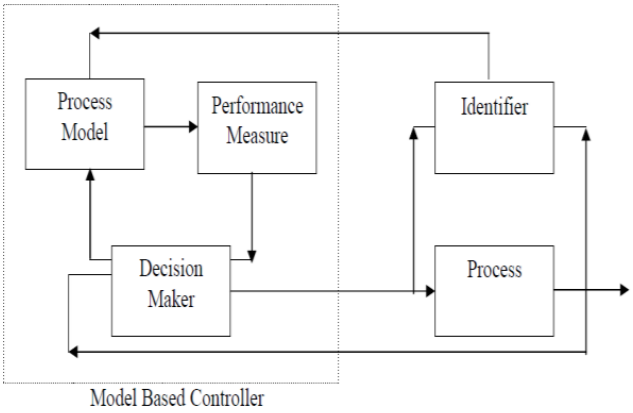


Fig.3 Benefits of using Fuzzy Logic



Reactive Power and Voltage Control:

Main types of voltage problems are:
(i) Planning of system reactive power demands and control facilities.
(ii) Installation of reactive power control resources.
(iii) The operation of existing voltage resources and control device.

For reactive power control with the objective of enhancing the voltage profile of power system, fuzzy logic has been applied. The voltage deviation and controlling variables are converted into fuzzy set or fuzzy system notations to construct the relations between voltage deviation and controlling ability of the controlling device. The main control variables are generator excitation, transformer taps and VAR compensators. A fuzzy system is formed to select these control variables and their movement.

The control variables are selected on the basis of:
(i) Local controllability towards a bus having unacceptable voltage.
(ii) Overall controllability towards the buses having poor voltage profile

Operation of Fuzzy Logic in power systems:

Fuzzy logic can be used for designing the physical components of power systems. They can be used in anything from small circuits to large mainframes. They can be used to increase the efficiency of the components used in power systems. As most of the data used in power system analysis are approximate values and assumptions, fuzzy logic can be of great use to derive a stable, exact and ambiguity-free output.

Applications:

(i) Stability analysis and enhancement
(ii) Power system control
(iii) Fault diagnosis
(iv) Security assessment
(v) Load forecasting
(vi) Reactive power planning and its control
(vii) State estimation

C. EXPERT SYSTEMS

An expert system obtains the knowledge of a human expert in a narrow specified domain into a machine implementable form. Expert systems are computer programs which have proficiency and competence in a particular field. This knowledge is generally stored separately from the program's procedural part and may be stored in one of the many forms, like rules, decision trees, models, and frames. They are also called as knowledge based systems or rule based systems. Expert systems use the interface mechanism and knowledge to solve problems which cannot be or difficult to be solved by human skill and intellect.

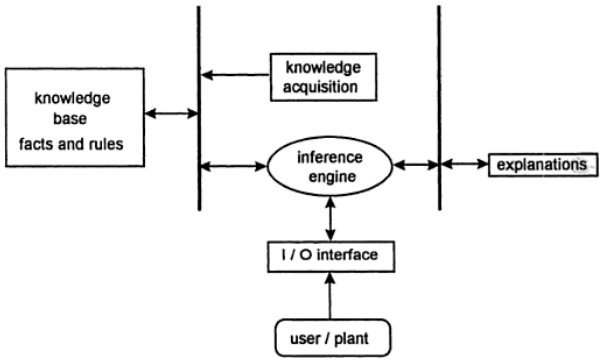


Fig.4 Structure of an Expert system

Operation of Expert Systems in power systems:

Since expert systems are basically computer programs, the process of writing codes for these programs is simpler than actually calculating and estimating the value of parameters

used in generation, transmission and distribution. Any modifications even after design can be easily done because they are computer programs. Virtually, estimation of these values can be done and further research for increasing the efficiency of the process can be also performed.

Advantages:

(i) It is permanent and consistent.
(ii) It can be easily documented.
(iii) It can be easily transferred or reproduced.

Disadvantage:

Expert Systems are unable to learn or adapt to new problems or situations.

Applications:

Many areas of applications in power systems match the abilities of expert systems like decision making, archiving knowledge, and solving problems by reasoning, heuristics and judgment. Expert systems are especially useful for these problems when a large amount of data and information must be processed in a short period of time.

D. GENETIC ALGORITHMS (GA)

Genetic algorithm is an optimization technique based on the study of natural selection and natural genetics. Its basic principle is that the fittest individual of a population has the highest probability and possibility for survival. Genetic algorithm gives a global technique based on biological metaphors. The Genetic algorithm can be differentiated from other optimization methods by:
(i) Genetic algorithm works on the coding of the variables set instead of the actual variables.
(ii) Genetic algorithm looks for optimal points through a population of possible solution points, and not a single point.
(iii) Genetic algorithm uses only objective function information.
(iv) Genetic algorithm uses probability transition laws, not the deterministic laws.
Genetic algorithm is derived from an elementary model of population genetics. It has following components:
(i) Chromosomal representation of the variable describing an individual.
(ii) An initial population of individuals.
(iii) An evaluation function which plays the environment's part, ranking the individuals in terms of their fitness which is their ability to survive.
(iv) Genetic operators which determine the configuration of a new population generated from the previous one by a procedure.
(v) Values for the parameters that the GA uses.

Operation of Genetic Algorithms in power systems:

As genetic algorithms are based on the principle of survival of fittest, several methods for increasing the efficiency of power system processes and increasing power output can be proposed. Out of these methods, using genetic algorithms, the best method which withstands all constraints can be selected as it is the best method among the proposed methods (survival of fittest).

Applications:

Areas of applications in power systems include:
(i) Planning – Wind turbine positioning, reactive power optimisation, network feeder routing, and capacitor placement.
(ii) Operation – Hydro-thermal plant coordination, maintenance scheduling, loss minimisation, load management, control of FACTS.
(iii) Analysis – Harmonic distortion reduction, filter design, load frequency control, load flow.

E. Practical Application of AI Systems In Transmission Line

Consider a practical transmission line. If any fault occurs in the transmission line, the fault detector detects the fault and feeds it to the fuzzy system. Only three line currents are sufficient to implement this technique and the angular difference between fault and pre-fault current phasors are used as inputs to the fuzzy system. The fuzzy system is used to obtain the crisp output of the fault type. Fuzzy systems can be generally used for fault diagnosis.

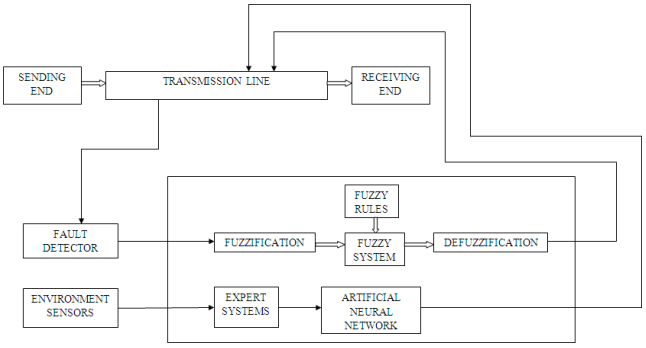


Fig.4 Block diagram

Artificial Neural Networks and Expert systems can be used to improve the performance of the line. The environmental sensors sense the environmental and atmospheric conditions and give them as input to the expert systems. The expert systems are computer programs written by knowledge engineers which provide the value of line parameters to be deployed as the output. The ANNs are trained to change the values of line parameters over the given ranges based on the environmental conditions. Training algorithm has to be given to ANN. After training is over, neural network is tested and the performance of updated trained neural network is evaluated. If performance is not upto the desired level, some variations can be done like varying number of hidden layers, varying number of neurons in each layer. The processing speed is directly proportional to the number of neurons. These networks take different neurons for different layers and different activation functions between input and

hidden layer and hidden and output layer to obtain the desired output. In this way the performance of the transmission line can be improved.

Table 1. Comparison Of Ai Techniques In Power System Protection

Feature	Approach		
	XPS	ANNs	FL
Knowledge used	Expert knowledge in the form of rules, objects, frames, etc.	Information extracted from the training set of cases.	Expert knowledge in the form of protection criteria.
Trouble-shooting and improving a relay	Change of rules required.	Difficult - the internal signals are almost impossible to interpret.	Convenient - the internal signals are understandable and analyzable
Self-learning	Possible.	Natural.	Possible.
Handling unclear cases	Possible.	Natural.	Natural.
Robustness	Not-critical and easy to ensure.	Difficult to ensure.	Not-critical and easy to ensure.
Setting a relay	Convenient.	Large number of simulation required.	Convenient. Both knowledge and simulation are used.
Computations	Extensive.	Dedicated hardware.	Moderate.

F. Current Application Of Ai In Power Systems

Several problems in power systems cannot be solved by conventional techniques are based on several requirements which may not feasible all the time. In these situations, artificial intelligence techniques are the obvious and the only option.

Areas of application of AI in power systems are:

(i) Operation of power system like unit commitment, hydro-thermal coordination, economic dispatch, congestion management, maintenance scheduling, state estimation, load and power flow.

(ii) Planning of power system like generation expansion planning, power system reliability, transmission expansion planning, reactive power planning.

(iii) Control of power system like voltage control, stability control, power flow control, load frequency control.

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(iv) Control of power plants like fuel cell power plant control, thermal power plant control.

(v) Control of network like location, sizing and control of FACTS devices.

(vi) Electricity markets like strategies for bidding, analysis of electricity markets.

(vii) Automation of power system like restoration, management, fault diagnosis, network security.

(viii) Applications of distribution system like planning and operation of distribution system, demand side response and demand side management, operation and control of smart grids, network reconfiguration.

(ix) Applications of distributed generation like distributed generation planning, solar photovoltaic power plant control, wind turbine plant control and renewable energy resources.

(x) Forecasting application like short term and long term load forecasting, electricity market forecasting, solar power forecasting, wind power forecasting.

CONCLUSION

The main feature of power system design and planning is reliability, which was conventionally evaluated using deterministic methods. Moreover, conventional techniques don't fulfill the probabilistic essence of power systems. This leads to increase in operating and maintenance costs. Plenty of research is performed to utilize the current interest AI for power system applications. A lot of research is yet to be performed to perceive full advantages of this upcoming technology for improving the efficiency of electricity market investment, distributed control and monitoring, efficient system analysis, particularly power systems which use renewable energy resources for operation.

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SWITCHGEAR PROTECTION

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***Abstract*— This paper describes the protection of electrical systems from electrical risks using switchgears. Topics covered are how these switchgears detect and remove electrical faults, components of switchgears and types of switchgears. Also paper covers different ways of protection.**

Keywords*— *components, electrical faults, protection of switchgear

I. INTRODUCTION

During the operation of power system the generating plants, transmission lines, distributors and other equipment are required to be switched off under normal and abnormal operating conditions. The apparatus including its associated auxiliaries employed for controlling, regulating or switching on or off the electrical circuits in the electrical power system is known as switchgear.In a power system, Switchgears serves two basic purposes:

a. Switching during normal operating conditions for the purpose of maintenance and operation.
b. Switching during abnormal conditions such as short circuits and interrupting fault currents.

II. COMPONENTS AND SWITCHGEAR

A. Circuit Breakers

Circuit Breaker is a device that interrupts the abnormal or fault currents and in addition performs the function of a switch. They are subjected to varying stresses under different operating conditions.

B. Current Transformers

The transformer used for the measurement of current is called Current Transformer. It is used with its primary winding connected in series with the line carrying current to be measured and the primary current is dependent on the load connected to the system.

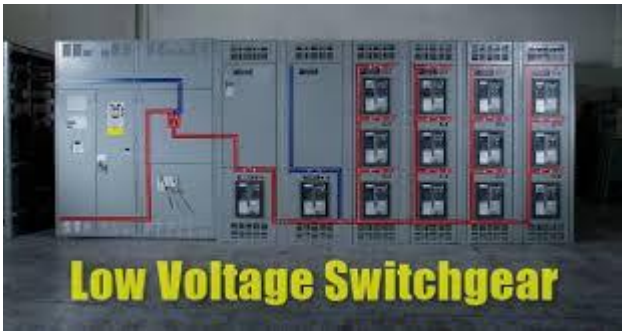
C. Relay

Protective relay functions as sensing device, it senses the fault, then determines its location and finally sends command to the circuit breaker. The circuit breaker after getting the command from the protective relay, disconnects the fault element. So, Protective relay is the brain of the scheme and plays a vital role.

D. Main Bus

The bus bars in an electrical power system are quite essential. Bus bars are means of connecting switches and other equipment in to various arrangements.

III. FIGURES



IV. TYPES OF SWITCHGEAR

Several classifications can be made based on the fault at the electrical power system.

A. By Voltage Rating

1. Low voltage (less than 1 kv AC)
2. Medium voltage (1 kv to 75 kv AC)
3. High voltage (75 kv to 230 kv AC)
4. Extra high voltage (more than 230 kv)

B. By Insulating Medium

1. Air
2. Gas
3. Oil
4. Vacuum
5. Carbon Dioxide

C. By Construction Type

1. Indoor

2. Outdoor
3. Industrial
4. Marine

D. By Interruptive Device

1. Fuses
2. Air circuit breaker
3. Oil circuit breaker

E. By Operating Method

1. Manually operated
2. Motor or stored energy operated
3. Solenoid operated

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APPLICATIONS OF SUPERCAPACITORS

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Abstract– A new technology, the supercapacitor, has emerged with the potential to enable major advances in energy storage. Supercapacitors are governed by the same fundamental equations as conventional capacitors, but utilize higher surface area electrodes and thinner dielectrics to achieve greater capacitances. This allows for energy densities greater than those of conventional capacitors and power densities greater than those of batteries. As a result, supercapacitors may become an attractive power solution for an increasing number of applications. This brief overview focuses on the different types of supercapacitors, the relevant quantitative modeling areas, and the future of supercapacitor research and development.

I. Introduction

This paper is concerned with the applications of supercapacitors (electrochemical capacitors) in electric drive vehicles in place of or in combination with batteries. Special attention is given to sizing the supercapacitor unit to minimize volume and cost and to control strategies that take advantage of the high efficiency and charge acceptance of supercapacitors compared to batteries. Present vehicle applications of supercapacitors include their use in braking systems and stop-go hybrids and future applications can be charge sustaining and plug-in hybrids and battery powered electric vehicles using advanced batteries having high energy density (>300Wh/kg).

The most common electrical energy storage device used in vehicles is a battery. Batteries have been the technology of choice for most applications, because they can store large amounts of energy in a relatively small volume and weight and provide suitable levels of power for many applications. Shelf and cycle life have been a problem/ concern with most types of batteries, but designers have learned to tolerate this shortcoming due to the lack of an alternative.

In recent times, the power requirements in a number of applications have increased markedly and have exceeded the capability of batteries of standard design. This has led to the design of special high power, pulse batteries often with the sacrifice of energy density and cycle life. Supercapacitors have been developed as an alternative to pulse batteries. To be an attractive alternative, capacitors must have much higher power and much longer shelf and cycle life than batteries. By “much” is meant at least a factor of 2-3.

II. SUPERCAPACITOR CONCEPTS:

A supercapacitor, often referred to as an electrochemical capacitor, is an electrical energy storage device that is constructed much like a battery in that it has two electrodes immersed in an electrolyte with a separator between the electrodes.

The electrodes are fabricated from a high surface area, porous material having pore diameters in the nanometer (nm) range. The surface area of the electrode materials used in an electrochemical capacitor is much greater than that used in battery electrodes being 500-2000 m2/gm.

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III. CLASSIFICATION

There are three types of capacitors and the most basic is the electrostatic capacitor with a dry separator. This classic capacitor has very low capacitance and is mainly used to tune radio frequencies and filtering. The size ranges from a few pico-farads (pf) to low microfarad (μF).

The *electrolytic capacitor* provides higher capacitance than the electrostatic capacitor and is rated in microfarads (μF), which is a million times larger than a pico-farad.

These capacitors deploy a moist separator and are used for filtering, buffering and signal coupling. Similar to a battery, the electrostatic capacity has a positive and negative that must be observed.

The third type is the *supercapacitor*, rated in farads, which is thousands of times higher than the electrolytic capacitor. The supercapacitor is used for energy storage undergoing frequent charge and discharge cycles at high current and short duration.

Units:
Farad is a unit of capacitance named after the English physicist Michael Faraday (1791–1867). One farad stores one coulomb of electrical charge when applying one volt. One microfarad is one million times smaller than a farad, and one pico-farad is again one million times smaller than the microfarad.

IV. PRINCIPLE OPERATION

The supercapacitor has evolved and crosses into battery technology by using special electrodes and electrolyte. While the basic Electrochemical Double Layer Capacitor (EDLC) depends on electrostatic action, the Asymmetric Electrochemical Double Layer Capacitor (AEDLC) uses battery-like electrodes to gain higher energy density, but this

has a shorter cycle life and other burdens that are shared with the battery. Graphene electrodes promise improvements to supercapacitors and batteries but such developments are 15 years away. Several types of electrodes have been tried and the most common systems today are built on the electrochemical double-layer capacitor that is carbon-based, has an organic electrolyte and is easy to manufacture.

All capacitors have voltage limits. While the electrostatic capacitor can be made to withstand high volts, the supercapacitor is confined to 2.5–2.7V. Voltages of 2.8V and higher are possible, but at a reduce service life. To get higher voltages, several supercapacitors are connected in series. Serial connection reduces the total capacitance and increases the internal resistance. Strings of more than three capacitors require voltage balancing to prevent any cell from going into over-voltage. Lithium-ion batteries share a similar protection circuit.

The specific energy of the supercapacitor ranges from 1Wh/kg to 30Wh/kg, 10–50 times less than Li-ion. The discharge curve is another disadvantage. Whereas the electrochemical battery delivers a steady voltage in the usable power band, the voltage of the supercapacitor decreases on a linear scale, reducing the usable power spectrum.

Figures 1 and 2 demonstrate voltage and current characteristics on charge and discharge of a supercapacitor. On charge, the voltage increases linearly and the current drops by default when the capacitor is full without the need of a full-charge detection circuit. On discharge, the voltage drops linearly. To maintain a steady wattage level as the voltage drops, the DC-DC converter begins drawing more and more current. The end of discharge is reached when the load requirements can no longer be met.

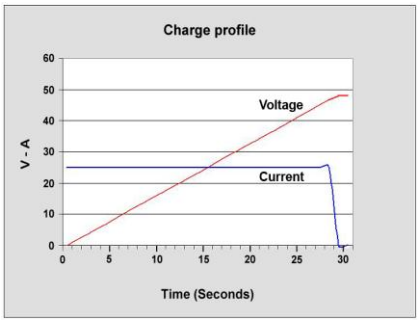

Figure 1: Charge profile of a supercapacitor. The voltage increases linearly during a constant current charge. When the capacitor is full, the current drops by default.
Source: PPM Power

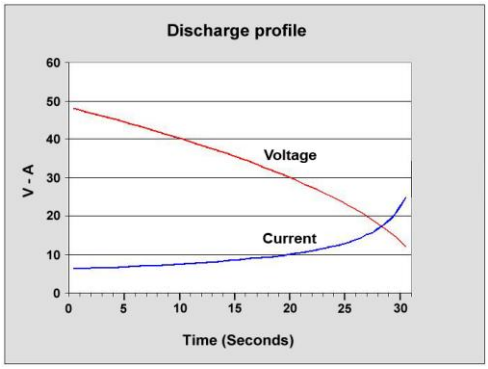

Figure 2: Discharge profile of a supercapacitor. The voltage drops linearly on discharge. The optional DC-DC convertor maintains the wattage level by drawing higher current with dropping voltage.

The charge time of a supercapacitor is 1–10 seconds. The charge characteristic is similar to an electrochemical battery and the charge current is, to a large extent, limited by the charger's current handling capability. The initial charge can be made very fast, and the topping charge will take extra time. Provision must be made to limit the inrush current when charging an empty supercapacitor as it will suck up all it can. The supercapacitor is not subject to overcharge and does not require full-charge detection; the current simply stops flowing when full.

Table 3 compares the supercapacitor with a typical Li-ion.

Function	Supercapacitor	Lithium-ion (general)
Charge time	1–10 seconds	10–60 minutes
Cycle life	1 million or 30,000h	500 and higher
Cell voltage	2.3 to 2.75V	3.6V nominal
Specific energy (Wh/kg)	5 (typical)	120–240
Specific power (W/kg)	Up to 10,000	1,000–3,000
Cost per kWh	$10,000 (typical)	$250–$1,000 (large system)
Service life (industrial)	10-15 years	5 to 10 years
Charge temperature	–40 to 65°C (–40 to 149°F)	0 to 45°C (32°to 113°F)
Discharge temperature	–40 to 65°C (–40 to 149°F)	–20 to 60°C (–4 to 140°F)

Table 3: Performance comparison between supercapacitor and Li-ion.
Source: Maxwell Technologies, Inc.

The supercapacitor can be charged and discharged a virtually unlimited number of times. Unlike the electrochemical battery, which has a defined cycle life, there is little wear and tear by cycling a supercapacitor. Age is also kinder to the supercapacitor than a battery. Under normal conditions, a supercapacitor fades from the original 100 percent capacity to 80 percent in 10 years. Applying higher voltages than specified shortens the life. The supercapacitor is forgiving in hot and cold temperatures, an

advantage that batteries cannot meet equally well.

The self-discharge of a supercapacitor is substantially higher than that of an electrostatic capacitor and somewhat higher than an electrochemical battery; the organic electrolyte contributes to this. The supercapacitor discharges from 100 to 50 percent in 30 to 40 days. Lead and lithium-based batteries, in comparison, self-discharge about 5 percent per month.

V. APPILICATIONS

Due to Its unique properties Supercapacitors haves wide application in Medical field for Non-life-support applications such as:

Pump or solenoid activation for drug delivery. Heating wire to vaporize a drug for inhalation. Critical Supercapacitors are strong contender for to be used in defibrillators where they can deliver 300-500 joules of energy to shock the heart back into sinus rhythm.

Supercapacitors are most effective to bridge power gaps lasting from a few seconds to a few minutes and can be recharged quickly

Supercapacitors have also made critical inroads into electric powertrains. Supercapacitors have low specific energy and are expensive in terms of cost per watt.

CONCLUSIONS

Based upon the review of the literature described above, it seems unlikely that super capacitors will replace batteries as the general solution for power storage. This is primarily because presently envisioned supercapacitor systems do not store as much energy as batteries.

Because of their flexibility, however, supercapacitors can be adapted roles for which electrochemical batteries are not as well suited. Also, supercapacitors have some intrinsic characteristics that make them ideally suited to specialized roles and applications that complement the strengths of batteries. In particular, supercapacitors have great potential for applications that require a combination of high power, short charging time, high cycling stability, and long shelf life.

Thus, supercapacitors may emerge as the solution for many application-specific power systems. Especially, there has been great interest in developing supercapacitors for electric vehicle hybrid power systems, pulse power applications, as well as back-up and emergency power supplies [1-3, 5].

Despite the advantages of supercapacitors in these niche areas, their production and implementation has been limited to date. There are a number of possible explanations for this lack of market penetration, including high cost, packaging problems, and self-discharge. Recent research suggests that at least some of these issues might be surmounted [2-3].

For all of these reasons, as the products of R&D efforts continue to mature, supercapacitors may become a realistic, widely available power solution for an increasing number of applications. It is hoped that this survey may further stimulate the R&D required for this outcome, as well as serve as a point of departure for developing future applications.

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Fundamentals of Permanent Magnet Brushless DC Motor

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***Abstract*— This paper presents Permanent magnet Brushless DC motor construction and speed torque characteristics. Brushless DC motors are gaining popularity due to their advantages. BLDC are generated by virtually inverting the stator and rotor of DC motors. The main advantage is removal of brushes, which leads in eliminating problems related to brushes. Another advantage is the ability to produce large torque because of the rectangular interaction between current and flux. These are used in industries such as appliances, aerospace, consumer, medical, automotive instrumentation and industrial automotive equipment. BLDC motors have many advantages compared to DC motor and Induction motor.**

Keywords*— *Brushless DC motor, Induction motor, Dc motor, Permanent magnet

I. INTRODUCTION

BLDC motors do not use brushes for commutation instead they are electronically commutated. A Brushless DC motor consists of a rotor in form of a permanent magnet and stator in form of a polyphase armature winding. BLDC motor can be constructed in two ways. One by placing the rotor outside the core and windings inside the core and the other by placing the windings outside the core. In the former arrangement, the rotor magnets act as insulator and operate at low current. In the latter arrangement, the motor dissipates more heat causing an increase in torque.

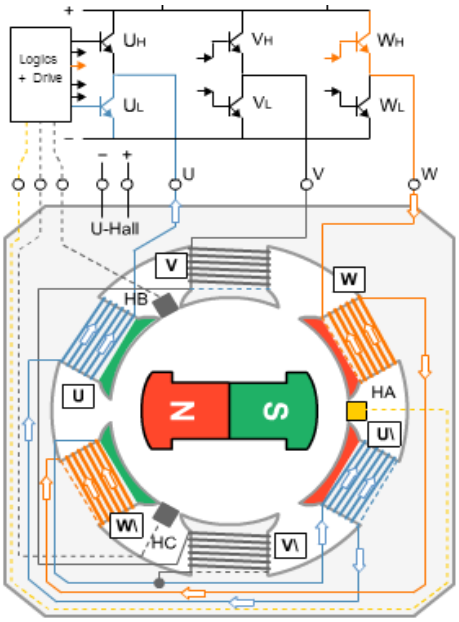
II. CONSTRUCTION AND OPERATING PRINCIPLE

BLDC motors are similar to induction motors and dc motors in construction. Its Working is similar to synchronous motor. That is magnetic field generated by stator and rotor rotate at same frequency. Similar to other motors BLDC motors also have stator and rotor. In addition also have hall sensor.

A. Stator

BLDC motor consists of stacked steel laminations with windings placed in the slot. Windings in a stator can be arranged in two patterns. One is star pattern and the other is delta pattern. At low RPM in star pattern high torque is produced while in delta pattern low torque is produced. This is because in delta configuration half of the voltage is applied across the winding that is not driven. This increases the losses.

Steel laminations in stator can be either slotted or slot less. As slot less core has low inductance it can run at high speeds. Because of absence of teeth in the lamination stack, requirements for the cogging torque goes down making the fit for low speeds also. The main disadvantage with slot less core is its higher cost due to more winding required to compensate large air gap.



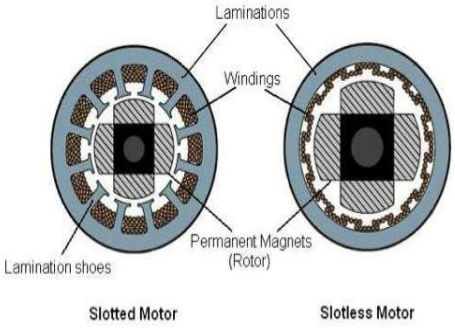


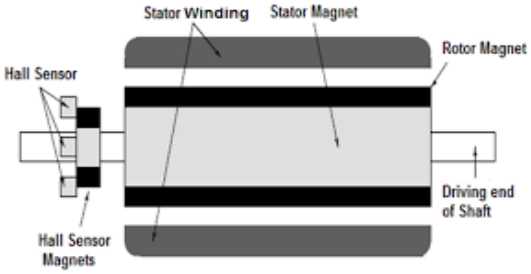
Figure 2: Slotted and slotless motor

B. Rotor

The rotor is made of permanent magnet and poles can vary from two to eight pairs with alternate north and south poles. The magnet material is chosen based on magnetic field density. The higher the flux density the higher is the torque. Rotor magnet cross sections are different type as shown below.

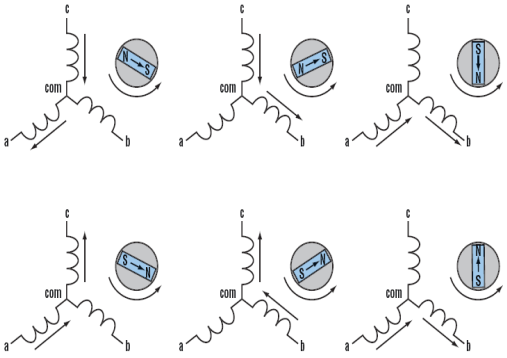
C. *Hall Sensors*

In BLDC motor commutation is electronically controlled. To rotate the BLDC motor, the stator windings should be energized in a sequence. It is important to know the rotor position in order to understand which winding will be energized following the energizing sequence. Rotor position is sensed using Hall Effect sensors embedded into the stator. Hall sensors are placed on non driving end of the motor. When rotor magnetic poles pass through the sensors, they give a high or low signal, indicating the N or S pole is passing near the sensors.

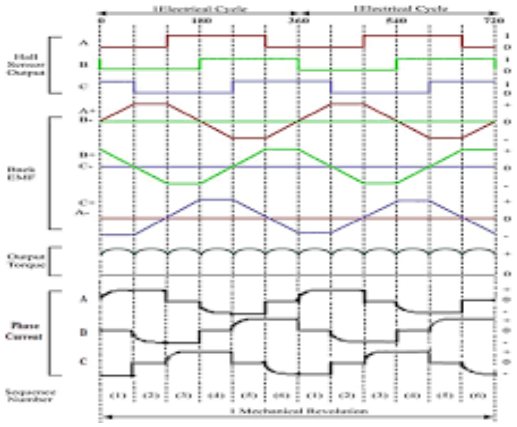


D. *Commutation Sequence*

For every 60 electrical degrees of rotation, one of the hall sensors changes the state. In this way, it takes six steps to complete an electrical cycle. The phase current switching is updated in synchronous for every 60 degrees electrical. One electrical cycle is not equal to complete mechanical revolution of the rotor. The number of electrical cycles to be repeated to complete a mechanical rotation depends on rotor pole pairs. For each rotor pole pair, one electrical cycle is completed. So, the number of electrical rotations equals the rotor pole pairs.



Winding Energizing Sequence With respect to the Hall Sensor



Hall Sensor Signal, Back EMF, Output Torque and Phase Current.

E. *Commutation Sequence*

When a BLDC motor rotates, each winding generates a voltage known as back EMF, which opposes the main voltage supplies to the windings according to Lenz's law. The polarity is opposite to energized voltage. It depends on Angular velocity of the rotor, Magnetic field generated by rotor magnets.

The number of turns in the stator windings

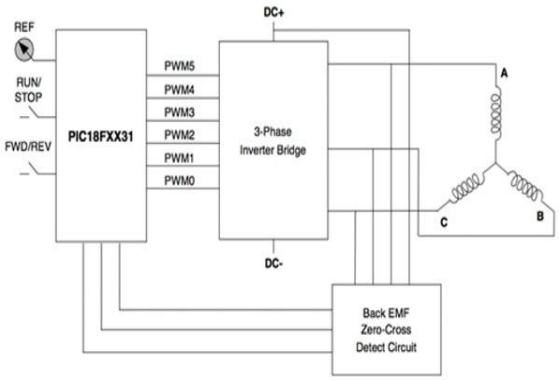
$$\text{Back EMF} = (E) \propto NlrB\omega$$

Where, N is number of winding turns per phase,l is length of rotor, r is the internal radius of rotor and B is rotor magnetic field density.

The potential difference across a winding can be calculated by subtracting the back emf value from the supply voltage. The motor is designed in such a way that potential difference between back emf and supply voltage is sufficient to draw rated current and deliver the rated torque.

F. *Commutation Sequence*

BLDC motors can also be commutated by monitoring the back EMF signals instead of the hall sensors. We know that every commutation sequence has one of the windings energized positive, the second negative and the third left open. Ideally the hall sensor signal must change the state when back emf cross zero, but practically there will be some delay due to the winding characteristics. This delay can be compensated by micro controller.



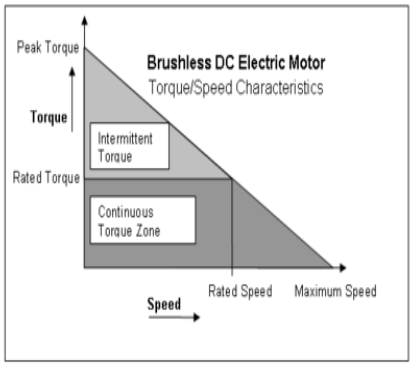
By using this method hall sensors and magnets for hall sensors can be eliminated. This results in less cost and simplified motor construction. This method is advantageous if the motor is operating in dusty or oily environments, where occasional cleaning is required in order for the hall sensors to sense properly. The same is applicable if the motor is mounted in a less accessible location.

III. SPEED AND TORQUE CHARACTERISTICS

There are two torque parameters used to define BLDC motor, peak torque and rated torque. At the time of continuous operations, the motor can be loaded up to the rated torque. In BLDC motor, the torque remains constant for a speed range up to the rated speed. The motor can be

run up to the maximum speed, which can be up to 150% of rated speed, but later the torque gradually drops.

Applications that have frequent starts and stops and frequent reversals of rotation with load on the motor, demand more torque than the rated torque. This requirement comes for a brief period, especially when the motor starts from a standstill and during acceleration. During this period, extra torque is required to overcome the inertia of the load and the rotor itself. The motor can deliver a higher torque, maximum up to peak torque, as long as it follows the speed torque curve. Refer to the "Selecting a Suitable Motor Rating for the Application" section to understand how to select these parameters for an application.



IV. SELECTING A SUITABLE MOTOR RATING FOR THE APPLICATION

Based on the load characteristics, the motor must be selected with the proper rating. Motor selection is based on three parameters. They are:

• Peak torque required for the application
• RMS torque required
• The operating speed range

A. Peak Torque Requirement

The peak, or maximum torque required for the application, can be calculated by summing the load torque (TL), torque due to inertia (TJ) and the torque required to overcome the friction (TF). There are some other factors which contribute to overall peak torque.

$$\therefore TP = (TL + TJ + TF) * 1.2$$

B. RMS Torque Requirement

This depends upon factors like peak torque(TP), load torque(TL), torque due to inertia(TJ), frictional torque(TF) and acceleration, deceleration and run times.

$$TRMS = \sqrt{[\{TP2\ TA + (TL + TF)\ 2\ TR + (TJ - TL - TF)\ 2\ TD\}/(TA + TR+TD)]}$$

C. Speed Range

This is the motor speed required to drive the application and is determined by the type of application. For example, an application like a blower where the speed variation is not very frequent and the maximum speed of the blower can be the average motor speed required. Whereas in the case of a point-to-point positioning system, like in a high-precision conveyer belt movement or robotic arm movements, this would require a motor with a rated operating speed higher than the average movement speed. The higher operating speed can be accounted for the components of the trapezoidal speed curve, resulting in an average speed equal to the movement speed. The trapezoidal curve. It is always suggested to allow a safety margin of 10%, as a rule of thumb, to account for miscellaneous factors which are beyond our calculations.

V. APPLICATIONS

- Improving sleep for apnea sufferers
- Powering electric vehicles
- Preventing blood clots in hospitalized patients
- Adjusting solar arrays on space vehicles
- Providing mobile breathing assistance

VI. CONCLUSIONS

Compared to DC motors and Induction motors BLDC motors are more advantageous. They have better speed versus torque characteristics, high dynamic response, high efficiency, long operating life, noiseless operation, higher speed ranges, rugged construction and so on. Also, torque delivered to the motor size is higher, making it useful in applications where space and weight are critical factors. The cost of BLDC motors has been decreasing drastically over last 10 years causing their adapting rate to spike, a strong need for the development of "improved control and their performance enhancement" becomes essential and this is motivation for the present work. With these advantages, BLDC motors find wide spread applications in automotive, appliance, aerospace, consumer, medical, instrumentation and automation industries.

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A Model of Green Building

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Abstract- The main emphasis of this work is to promote the subject and to make the people aware of green building. Industrialization and technology development exerts excess load on local environment in terms of energy demand and pollution emission green building uses optimum energy and puts less impact on environment. It is found that appropriate uses of green building we can promote energy efficiency, water efficiency improves life cycle. This paper present deal with the features advantages, disadvantages, practical applications of green building paper.

KEYWORDS - IGBC council, water efficiency, energy efficiency life cycle assessment

I.INTRODUCTION

The building sector in India is growing at a rapid pace and contributing immensely to the growth of the economy. The tremendous growth in construction activity across the globe is placing pressure on natural and environmental resources. India is a developing nation and green buildings have large scope . The green concepts and technique in the building sector can help national issues like water efficiency, energy efficiency and also reduce co2 emissions and also improves life cycle, promote flora and fauna. Rating system procedure helps for construction of green building .green building have both benefits like tangible and intangible.

II. GOALS OF GREEN BUILDING

Fig 1- goals of green building

A. WATER EFFICIENCY

Green buildings are incorporated with innovative technologies to reduce water consumption and efficient usage of waste water Taps ,showers are fitted with altered nozzle ,so water consumption is reduced by 75%.The water is atomized into vapor and water flow is reduced. These are provided with rainwater harvesting system and roof rain water discharge. Collection of roof rain water and utilizing them for cleaning and discharging into the ground through a hole increases the ground water level. These are also provided with gray water treatment the water discharge are used for irrigation purpose.

B. ENERGY EFFICIENCY

Green building are built in a such a way to reduce energy consumption. these are provided with passive ventilation system. Here natural sunlight is mostly use for our purpose and also improves human health by inculcating vitamin D and resistive power.cfc reduction in HVFC epiqument by fundamental and enhanced refrigerant management that is selecting refrigerants which are used in heating ventilating purpose. Zero use of cfc based refrigerants in the newly based HVAC&R system. These are provided with advanced windows and energy system for residential heating and cooling purpose .these optimize and minimize energy performance by 25% .green building promote green power(renewable energy resources) like solar, wind (hybrid plants) to serve the purpose of lighting garden, charging vehicles.

C. MATERIALS AND RESOURCES

Most of the solid waste come from buildings and construction site which lead to the pollution .in order to reduce them green building promote reuse techniques. the brick which are used can be obtained from the fly ash of thermal power plant the waste woods can be used to built the base of the wall. Sometimes buildings are provided with the natural wool to provide tensile strength to the building.

D. INDOOR ENVIRONMENT QUALITY

Green buildings promote high indoor environment quality which is essential but unfortunately lacking in the present era. even through we have adequate sunlight people are deficient to vitamin D .this problem is solved by green building they provide passive ventilization and the interior is designed in such a way that light is focused on the area where it is provided light spreading is less and energy consumption is also reduced.

E.SUSTAINABLE SITE DESIGN

Green construction considers not just building but its environment. Key strategies include using space efficiently preserving wetlands and other valuable key features, orienting and designing the building to take the natural dynamics of insulation, air flow, light pollution reduction, aesthetic appeal.

III.INNOVATION IN DESIGN PROCESS

We have many technologies like Green fencing is planting of trees around the compound walls. in this we have 3-tier of cooling system.1-tier system is a basic building design which minimize heat losses in winter and heat gain in summer.2-tier system is passive system to compensate the remaining loads on the building.3-tier system is of redesign deficits 1and 2 tier .wind towers are installed for ventilization and cooling of buildings in hot and humid areas.

IV. LIFE CYCLE ASSESSMENT

LCA evaluate impacts throughout a product's entire lifespan, from raw material extraction through materials processing, manufacturing, distribution, use, repair and maintenance, and eventual disposal or recycling. It helps consumers and building-code officials make more informed decisions during the design and building processes. It drives innovation by revealing opportunities for manufacturers to improve a product's efficiency and quality.LCA has been utilized to analyze the water consumption, carbon emission, cost of building.LCA can be applied to either the entire building/individual components to evaluate their impacts on environment hence improve building design (2,3)

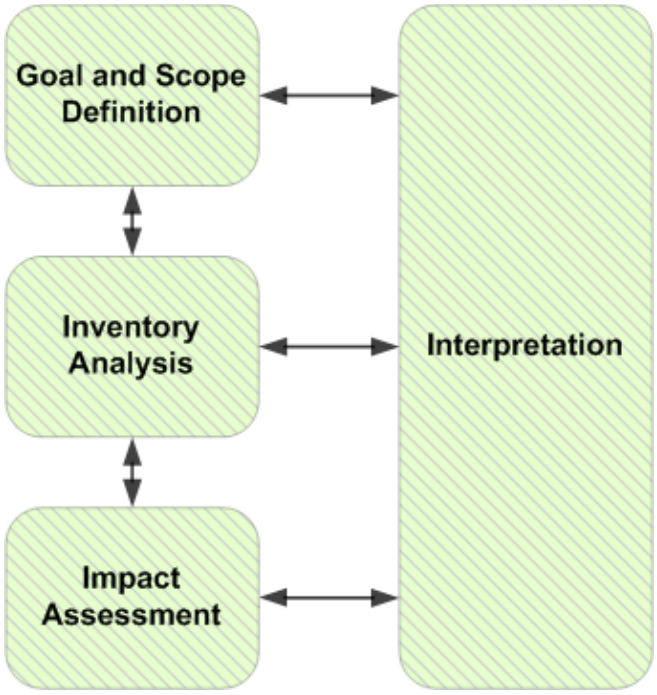

FIG 2- life cycle assessment

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The goal and scope document includes technical details that guide subsequent work. Life Cycle Inventory (LCI) analysis involves creating an inventory of flows from and to nature for a product system. Inventory flows include inputs of water, energy, and raw materials, and releases to air, land, and water. To develop the inventory, a flow model of the technical system is constructed using data on inputs and outputs. Process LCA, Hybrid Approach ,Economic Input Output LCA ARE Methods. Life cycle impact assessment. This LCL phase of LCA is evaluating the significance of potential environmental impacts based on the LCI flow results. Life Cycle Interpretation is a systematic technique to identify, quantify, check, and evaluate information from the results of the life cycle inventory and/or the life cycle impact assessment the best alternative is the one that the LCA shows to have the least cradle-to-grave environmental negative impact on land, sea, and air resources. Life cycle energy analysis (LCEA) is an approach in which all energy. inputs to a product are accounted for, not only direct energy inputs during manufacture, but also all energy inputs needed to produce components, materials and services needed for the manufacturing process. An earlier term for the approach was energy analysis.

V. IGBC COUNCIL

Indian Green Building Council (IGBC) Green Factory Buildings is the first rating programme developed in India, exclusively for the industrial sector. It is based on accepted energy and environmental principles and strikes a balance between known established practices and emerging concepts. The system is designed to be comprehensive in scope, yet simple in operation. This rating system would address the factory buildings and not the processes. It would be applicable to all sectors of industry and for all climatic zones of India. IGBC Green Factory Building Rating System is a voluntary and consensus based programme. The rating system has been developed based on materials and technologies that are currently available. This rating system would facilitate the development of energy efficient, water efficient, healthy, The rating system evaluates certain credit points using a prescriptive approach and other credits on a performance based approach. more productive, environmentally friendly factories. Green Existing Buildings can have tremendous benefits, both tangible and intangible. Health & wellbeing of the occupants and enhance air indoor quality. energy savings(30-40%),water savings(20-30%). The Indian Green Building Council (IGBC) was formed by the Confederation of Indian Industry (CII) in 2001. The council is based out of the CII Green Business Centre, Hyderabad which is India's 1st Platinum rated green building. Nokia –Guragon gold rated green building. Rajiv Gandhi international airport with silver rated green building. In Tamil Nadu, the government is planning to build solar-powered green houses for rural poor. It has allotted Rs.1058 crore for construction of 60,000 houses. In Maharashtra, near Mumbai in the Thane District, Govardhan Eco Village, a community in India, has built buildings with compressed stabilized Earth blocks, Rammed Earth Technique, Cob Houses(ADOBE Bricks) with traditional thatched roofs. These buildings have received a five-star rating from GRIHA, an Indian Nationwide Green Standards for Buildings, a wing of the famous TERI. Traditional buildings were energy efficient because architecture depended on the places. Buildings in the hot and dry regions, had corridors directing the wind to cool naturally. In wet regions, structures using natural light and breeze Hawa Mahal Articulated windows provides cool breeze in a desert area. Golconda - Ventilation is designed

to let in fresh cool breeze, in spite of summer. The traditional building practices were utilized in constructing the Dhyanalinga. Mud mortar stabilized with lime, sand, alum and some herbal additives was used.

Table- criteria for certification l levels

Certification Level	Points	Recognition
Certified	51 - 60	Best Practices
Silver	61 - 70	Outstanding Performance
Gold	71 - 80	National Excellence
Platinum	81-100	Global Leadership

These are the different rating are given to green building. IGBC Green Factory Buildings rating is valid for a period of 3 years from the date of issue of the certification.

Fig 3- green building in Thane ,Mumbai.

ADVANTAGES

- Economic benefits
- Socal benefits
- Waste reduction
- Conservation of water
- Environmental benefits

DISADVANTSAGES.

- Initial cost
- Location factor
- Availability of materials
- Hard to get funding from banks".

VI. REVIEW ON GREEN BUILDINGS

Green building is also called as green construction or sustainable building. Green building refers to a structure and using process that is environmentally responsible and resource-efficient throughout a building's life-cycle. Building life-cycle consists of design, construction, operation, maintenance, renovation, and demolition. This whole process requires cooperation of the design team, the architects, the engineers, and the clients. Main goals of green building is Life cycle assessment (LCA), Sitting and structure design efficiency, Energy efficiency, Water efficiency, Materials efficiency, Indoor environmental quality enhancement, Operations and maintenance optimization and Waste reduction. it also rate the green building according to the criteria.

VII. RESEARCH PAPERS

Compared with conventional (non-green) buildings, green buildings cost more to construct, and the extra cost includes not only the higher purchase and acquisition costs of green building technologies (such as solar heating appliances and ground- source heat pumps) but also costs relating to installations that conform to design specifications and higher labour costs (Geng, Dong, Xue, & Fu, 2012). Many studies (Darko & Chan, 2016;Darko, Zhang, & Chan, 2017;Hwang & Tan, 2012;Mulligan et al., 2014;Nahmens & Reichel, 2013;Opoku & Ahmed, 2014;Potbhare, Syal, & Korkmaz, 2009;Samari, Ghodrati, Esmaeilifar, Olfat, & Shafiei, 2013;Shi, Zuo, & Zillante, 2012;Zhang, Platten & Shen, 2011) have discussed that anxiety about the high-cost premium of green buildings remains a prominent barrier to its widespread adoption. It is vital, to fully appreciate that the high cost of a green building is a real and major barrier that prevents stakeholders from adopting it.

CONCLUSION

As India is a developing country we have large scope for green building. Green building can meet the demand of people and it more efficient . green buildings are eco-friendly and green buildings saves the environment from the pollution.

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Review of Different DC to DC Converters Used for Renewable Energy Applications

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Abstract— This paper deals with study of DC-DC converters which are used for Renewable Energy applications. Now a day's, huge problem in many countries is the power storage. This problem occurs because of the high load which is cannot be covered by the conventional energy power generation. This leads to search for new sources of energy to extract electric power from it. DC to DC converters are a good solution to this problem in order to increase the power conversion efficiency. In this paper five types of non isolated DC to DC converters are presented which are Buck boost converter, Cuk converter, SEPIC converter, Positive output super left Luo converter and Ultra life Luo converter. The performance of non-isolated converters is evaluated based on the results to determine the best converter that is match with renewable energy.

Keywords— DC to DC converter, non-isolated converter, renewable energy, Buck boost converter, Cuk converter, Spic converter, Luo converter.

I. INTRODUCTION

Now a day's electric power demands are increasing. Many countries and application starts to move to renewable energy source instead of exact sources that are used. The reasons of changing to renewable energy are free pollution, does not cost and it is easy to access. The thermal power plants cause about 75 – 82% of thermal pollution which is caused undesirable changes in the environment. Within a few coming years the depletion of fossil fuel will finish because of the increasing of extraction by time. It is difficult and expensive to implant the normal distribution system on hilly region. The stand-alone renewable energy system (SARES) which is known as remote area power supply (RAP) scenario is overcoming. The Solar and wind are the most popular renewable energy that is utilized among other renewable energy sources like geothermal, biomass and tidal. These resources have future scope on grid parity [1].
Various issues of renewable energy have been investigated by many countries like China, Mexico, India, Finland and other Europe countries to deploy [2]. This research is focus on PV solar generation only, because it is easy to install and more reliable. Due to the uncertainty of irradiances, the photo voltaic system's output voltage is variable. DC to DC power electronic converters are used to provide a constant or regulated output voltage. In 1920s they establish a DC to DC converters technique. They start using it in many industrial applications such as computer hardware circuits especially in energy power generation. Power electronic based DC–DC converters are employed to resolve the use of conventional simple voltage divider circuits such as rheostat and potential divider. This method provides less output voltage than input and less efficiency. According to the applications, there are several DC to DC converters that are used to modulate the input voltage. Generally, there are two types of DC to DC converters which are isolated DC to DC converter and non-isolated DC to DC converter.

The input and output of isolated DC to DC converter are isolated also depending on the electrical barrier. This is done by using high frequency transformer. Protecting the sensitive load is the major advantage of isolated DC to DC converter. Either positive or negative polarity can be used for configuring the converter output. The problem is it has high interference noise capability. The electrical barrier is absent in case of non-isolated DC to DC converter. The non-isolated DC to DC converters are low cost and simple design compare to the isolated DC to DC converters. Five types of non-isolated DC to DC converters are presented in this paper. To concerning reliable switching strategies control, higher efficiencies and fault-tolerant configurations, different topologies of DC to DC converters are developed and they based on renewable energy applications. Figure 1 shows the typical renewable energy system with DC to DC converter [3].

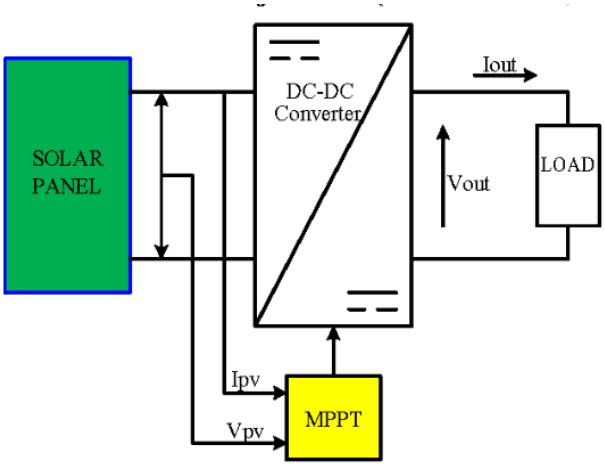

Fig-1:Typical renewable energy system

This research focuses on different non-isolated DC to DC converters performance analysis. These converters are buck boost, Cuk, SEPIC and two types of Luo converters (Positive output super lift and ultra-lift).

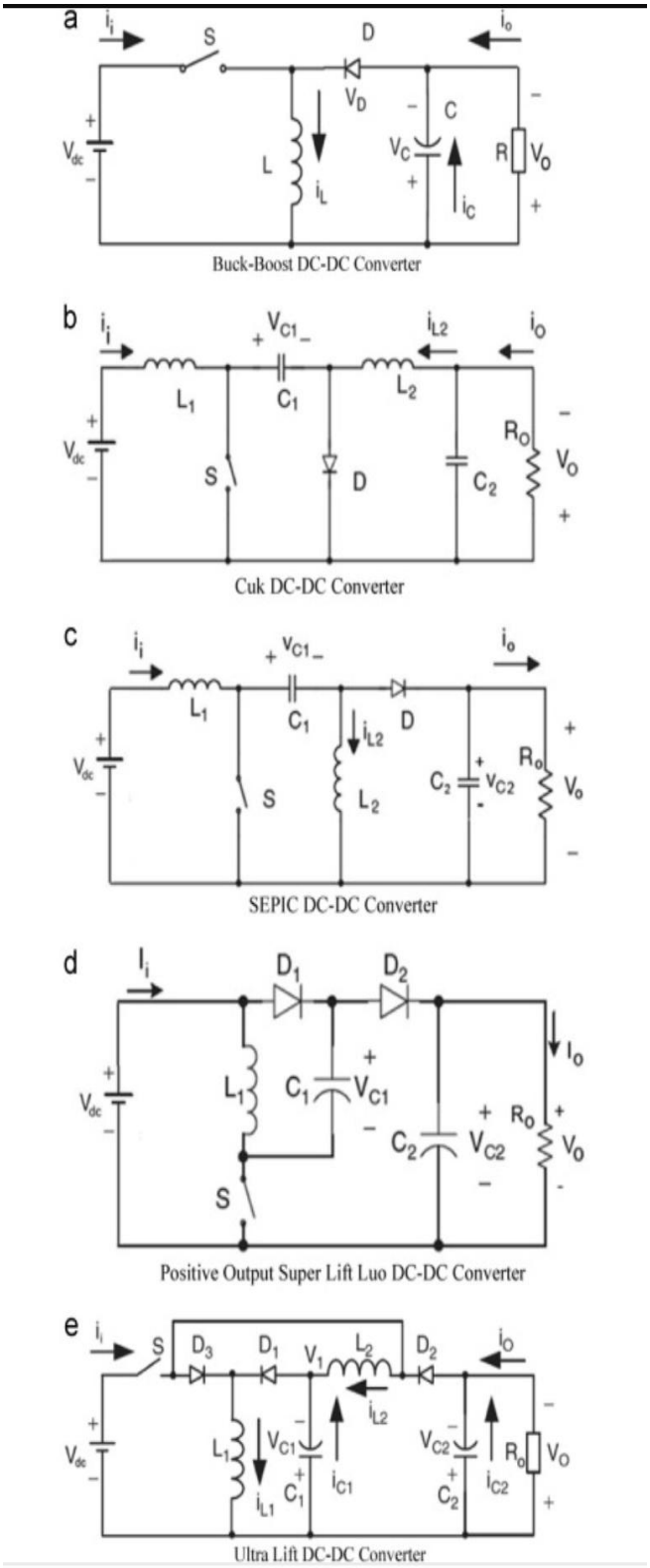

Fig -2: DC to DC converters a- Buck boost converter, b- Cuk converter, c- SEPIC converter, d- Positive output super lift Luo and e- Ultra-lift Luo

Each converter has its unique characteristics that are differ to other types [4]. These converters are used in many different applications like electric vehicles, distributed DC systems, electric traction, machine tools, fuel cell, special electrical machine drives and solar PV based applications [5, 6, 7]

II. DC TO DC CONVERTERS TYPES

A. Buck boost converter

The basic buck is combined with boost DC converter topology to introduce the buck boost converter. Different applications are based on buck boost converter implementation such as motor drives, stand alone and grid connected photo voltaic system . The solar PV based applications using buck boost converter still under research to increase the efficiency . Based on buck boost converter topology, different non-isolated DC to DC converters are developed by worldwide researchers such as cuk, SEPIC and Luo converters to increase the voltage gain. A group of researchers analyzed the effect of discontinuity in buck boost non inverting converter that happened by the effective duty cycle . A novel compensation technique is used for rectifying to smooth transition during mode changes. The advantage of proposed converter is it can step the voltage up or down between any two ports. For renewable energy applications, this converter offers an alternate solution. A novel solar cell power supply system is proposed based on buck boost topology . The proposed topology works with two input DC to DC converter. A commercial AC line and solar PV array are used as power sources. To track the optimum operating voltage, an inexpensive and simple optimum operating point tracker has been developed. Many other researchers' groups are developed and implement DC to DC converters based on buck boost converter. Some of them focuses on optimization, other group presents dynamic and synchronous buck boost converter. Other research group proposed a high efficient converter depending on smooth transition control strategy.

B. Cuk converter

Cuk converter is a negative output capacitive DC to DC fly back energy converter. It is developed based on the simple buck boost converter. The only difference is that cuk converter is using capacitor for power transfer and energy storage rather than inductor . The cuk converter output voltage polarity is reversed of the input voltage. This converter is produces free ripple output if it is connected is suitable way and it can be sued in many applications . Depending on cuk converters there are different topologies are introduced . The modified cuk converter efficiency is significantly improved. To control the current and voltage, this converter is recommended for optimal bidirectional operation . Several control techniques like sliding mode control and conventional proportional integral (PI) are used within closed loop systems and fuzzy logic controller to regulate the output voltage . BLDC motor drive and renewable energy like PWM contains this converter in their implementation.

C. SEPIC converter:

SEPIC is single ended primary inductance converter. In order to obtain higher output voltage using this converter the ON switch time should be longer than OFF time. if this condition did not occur the converter will fail to provide the required output. The converter design should take in account several parameter considerations. By adding high frequency transformer to the conventional SEPIC converter, the output voltage ripple is reduced. This type of arrangement leads to

obtain continuous output current, low switching stress, and minimized output ripple . To obtain the DC power from available AC line, AC to DC converter is required. To correct the power factor in AC line, the SEPIC converter is proposed. SEPIC converter is widely used in solar power generation field to regulate flickering DC voltage. There are different control methodologies that are recommended to obtain the maximum power like PI control, sliding mode control, dP/dV feedback control and fuzzy logic control that can be used to increase the robustness . Solar fed DC motor sensor less is performed through the SEPIC converter . This proposed system can be the solar based transportation solution. The major criteria of SEPIC converter design are the switching losses and conduction. This issue can be reducing by using soft switching technique and it will minimize the current ripple output . For fuel cell generation system, a hybrid topology which is the combination of fly back and SEPIC converters is proposed.

D. Positive-output super-lift Luo converter :

Super-lift technique is more powerful than cuk and SPIC converters. What makes it powerful; it can generate arithmetic progression output voltage and has high efficiency and power density. A positive output super-lift Luo converter operates high voltage transfer gain and large voltage amplification in first quadrant. This converter is used by industrial and domestic applications but it is still under research . Luo et al, introduced a new super left technique that contains series of inductors and capacitors which are implemented together to rise the output voltage in high geometric progression. At same time other researcher group introduces other modification on positive output super lift Luo converter which works on increasing the voltage transfer gain . By applying sliding mode control technique with positive output super lift Luo converter in parallel, the load voltage regulation and proper load current sharing will balance .

E. Ultra-lift Luo converter:

Ultra-lift Luo converter performs very high voltage transfer gain conversion. The product of voltage lift Luo converter and super lift Luo converter equals to the voltage transfer gain of ultra-lift Luo converter. It has complex closed loop control design because it using small variation to generate high output voltage in duty ratio. It has higher efficiency than other non-isolated DC to DC converters.

III. PERFORMANCE AND ANALYSIS COMPARISON

In this section a brief comparison between the different nonisolated DC to DC converters . There are different characteristic properties for each converter in various aspects. With maximum power point tracking algorithm, buck boost, Cuk and SEPIC DC to DC converters are studied for photo voltaic systems. In this section, individual performance of DC to DC converters are presented for optimum operating point. The study shows that the buck boost DC to DC converter gives optimum MPPT operation in any load condition and solar irradiation. From the experiment results. It can be concluding that only buck boost and Cuk converters have the ability to achieve the optimal operation. In order to limit the output voltage ripple, the capacitance of the filter must be larger than boundary capacitance maximum value. It can be noticed that the buck boost, Cuk and SEPIC DC to DC converters have same voltage transfer gain according to the nature configuration of them. The voltage transfer gain of positive output super lift Luo and ultra-lift Luo converters is higher compared to previous three types. For maximum permissible, the values of indicator and capacitor can be determined by using the mathematical expressions of peak to peak indicator ripple current and peak to peak capacitor ripple voltage. To determine the operating conditions of the individual elements in the circuit, the RMS current flowing is used to compute the efficiency through total power loss. The operating duty ratio of maximum voltage across the switch is provided by the voltage stress on the power semiconductors. In DC to DC converters design, this is useful to select the switch rating. For renewable applications, the switching converter efficiency is a prime factor during design DC to DC converters

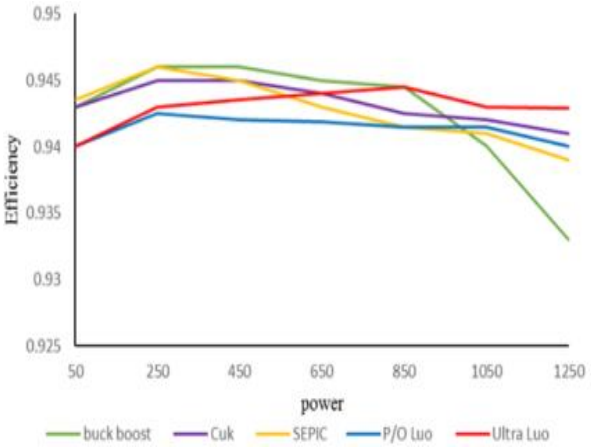

Fig-3: Efficiencies of different diodes

There is a small variation between different DC to DC converters when taking into account only output power. For particular input and output power rating, the Buck boost converter efficiency is reasonable because the efficiency reduces is very low with power increasing when comparing it with other non-isolated DC to DC converters. At higher power, Ultra-lift Luo converter gives higher efficiency. For medium power applications, the Cuk, SEPIC and super lift Luo are most suitable converters.

For low power, the Buck boost is the best one. Ultra-lift Luo converter is the more advisable one for high power renewable energy systems because it offer higher efficiency than other types. The issues with Ultra lift Luo converter is it produces inverted output of input voltage. When the duty ratio is increasing, the voltage stress is become larger on the switch; this will increase the semiconductor switch power ratings and the cost. Nonisolated DC to DC converters switching power loss are studied well. In the minimum loss of elements that is using switching converters, it is noticed that the efficient energy conversional is so lies. Figure 4. and figure 5. Shows the total power loss in switches and

diodes.

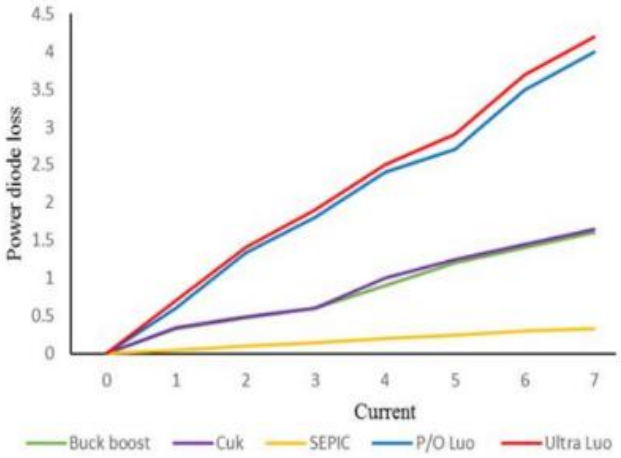

Fig- 4:Power loss in diode

From figures it can be noticed that when the input current is increasing the losses is increasing also. Because of the configuration of each converter, it is noticed that the Ultra-lift and super lift Luo converters have a higher power loss in diodes. Generally, there is a high power loss in diode at the SEPIC, super lift Luo and Ultra-lift Luo. Buck boost and Cuk have power loss also but not high as others. The durability of the converter is determined by the loss and frequency operation of switch power. The loss of ON/OFF of switches is counted with total switch losses that shown in figure 6. Using high performance soft switch will minimize the switching loss. The Buck boost and Luo converters have low switching loss, the Cuk and SEPIC have higher switching loss. The energy storage elements power loss is shown in Figure 6.

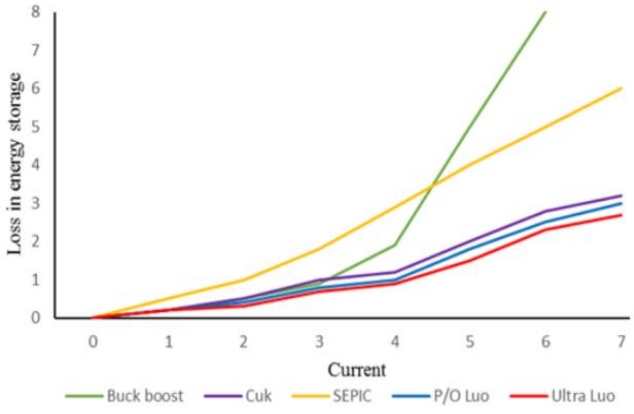

Fig -5: Total loss in energy storage elements

The total energy storage elements loss contains the capacitor power loss and indicator power loss. The energy storage loss in Buck boost converter is small because it contains one inductor only, the energy storage loss is increasing by increase the input current only. The SEPIC converter has higher energy storage power loss. The Cuk, super lift and Ultra-lift Luo have very similar loss. Generally, the capacitors have a higher failure rate at electronic circuits. Selecting of inductors and capacitors will affect the converters design because of power loss in energy storage.

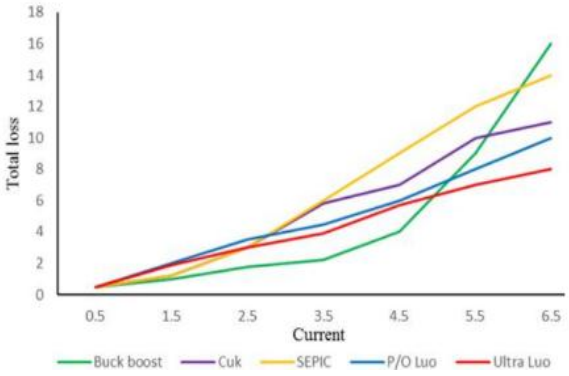

Fig -6: Total power loss

CONCLUSION

The best solution to reduce system cost and increase the efficiency is by using non-isolated DC to DC converters. Five types of non-isolated DC to DC converters are reviewed in this paper. These are Buck boost, Cuk, SEPIC, super lift Luo and Ultra-lift Luo converters. There are limitations for each kind of these converters which are well discussed in this paper. Different parameters are analyzed to determine the characteristics of each converter. From the result we can conclude that Buck boost converter is best for low power applications. It is applicable for many low power applications like solar PV, portable applications, drives motor and fuel cell. Ultra-lift Luo is the best one for high power applications that they need large voltage from low voltage source. For medium range power, Cuk and SEPIC are the right choice according to their characteristics.

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HY-WIRE-THE FUTURE AUTOMOTIVE

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***Abstract*- The world today consumes a large amount of energy. Most of the energy requirements are fulfilled using conventional sources of energy. Of this energy consumed a large part is utilized by the automotive sector. If the people continue using the conventional sources of energy at this rate, the earth will be facing an energy crisis very soon . The introduction of an efficient electric vehicle can greatly improve the conditions of today by helping curb the use of traditional fuels.**

I.INTRODUCTION

The Hy-Wire discussed in this paper ,runs on the electricity generated by a hydrogen fuel cell, more accurately called the 'Proton Exchange Membrane' fuel cell. This fuel cell uses hydrogen as a source of fuel. The fuel cell produces DC voltage, which is converted to AC voltage and used to run an AC motor.

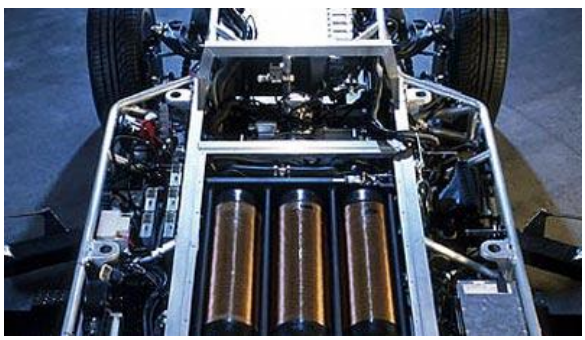
The by-wire concept removes the mechanical linkages and replaces all of them by wires and electromechanical actuators. This makes the whole vehicle lighter and more spacious. In the Hy-Wire vehicle, the whole system has been modeled into an 11-inch thick chassis. This chassis houses all the electrical components and mechanical components of the vehicle. This lets us make the body in a customized version and also lets us change the chassis architecture with radical new designs.

II. DESIGN

Due to hydrogen fuel cell drive system used by the Hy-wire, the conventional car layout has been revamped. Without the need for a conventional engine block and transmission system coupled to the steering column and pedals through mechanical linkage, the car's power system and single electric motor are built into a flat skateboard configuration. This serves to lower the car's centre of gravity, but more importantly to standardize vehicle drive train systems. Because all propulsion and energy storage systems are housed in the skateboard, designers are free to arrange the passenger compartment however they see fit. This allows for highly flexible modular vehicle configurations such as a 4-door sedan, mini-van, or even a small bus to be placed on the same drive system, with the only difference being the shape of the car's upper body and the location of seats. The skateboard itself contains crumple zones similar to those in conventional automobiles.

III. WORKING

The "Hy" in Hy-wire stands for hydrogen, the standard fuel for a fuel cell system. Like batteries, fuel cells have a negatively charged terminal and a positively charged terminal that propel electrical charge through a circuit connected to each end. They are also similar to batteries in that they generate electricity from a chemical reaction. But unlike a battery, you can continually recharge a fuel cell by adding chemical fuel -- in this case, hydrogen from an onboard storage tank and oxygen from the atmosphere.



The basic idea is to use a catalyst to split a hydrogen molecule (H2) into two H protons (H+, positively charged single hydrogen atoms) and two electrons (e-). Oxygen on the cathode (positively charged) side of the fuel cell draws H+ ions from the anode side through a proton exchange membrane, but blocks the flow of electrons. The electrons (which have a negative charge) are attracted to the protons (which have a positive charge) on the other side of the membrane, but they have to move through the electrical circuit to get there. The moving electrons make up the electrical current that powers the various loads in the circuit, such as motors and the computer system. On the cathode side of the cell, the hydrogen, oxygen and free electrons combine to form water (H2O), the system's only emission product. In a hydrogen fuel cell, a catalyst breaks hydrogen molecules in the anode into protons and electrons. The protons move through the exchange membrane, toward the oxygen on the cathode side, and the electrons make their way through a wire between the anode and cathode. On the cathode side, the hydrogen and oxygen combine to form water. Many cells are connected in series to move substantial charge through a circuit.

In a hydrogen fuel cell, a catalyst breaks hydrogen molecules in the anode into protons and electrons. The protons move through the exchange membrane, toward the oxygen on the cathode side, and the electrons make their way through a wire between the anode and cathode. On the cathode side, the hydrogen and oxygen combine to form water. Many cells are connected in series to move substantial charge through a circuit.

One fuel cell only puts out a little bit of power, so you need to combine many cells into a stack to get much use out of the process.

IV. RESULT

The fuel-cell stack in the Hy-wire is made up of 200 individual cells connected in series, which collectively **provide 94 kilowatts of continuous power and 129 kilowatts at peak power**. The compact cell stack (it's about the size of a PC tower) is kept cool by a conventional radiator system that's powered by the fuel cells themselves.

V. ADVANTAGES & DISADVANTAGES

a. Advantages

Below are the 5 top advantages for using a fuel cell electric vehicle rather than a battery electric vehicle.

1. **No Oil Needed** – Since hydrogen is used as the fuel source, there is no need for traditional fuel sources like gas or oil.
2. **Fewer Gas Emissions** – Hydrogen only causes heat and water to be emitted from its tailpipe. You won't find any carbon emissions coming out.
3. **Better Fuel Efficiency** – Fuel cell cars have been found to give drivers more miles per gallon than gas or diesel engine cars.
4. **Silent Operation** – The electrochemical reaction of fuel cells is mostly silent, unlike the process of burning fossil fuels.
5. **Easy Maintenance** – Fuel cell vehicles have fewer moving parts than regular vehicles. This makes them easier to maintain.

b. Disadvantages

Below are the 5 top disadvantages to using a fuel cell electric vehicle rather than a battery electric vehicle.

1. **Expensive Vehicles** – Fuel cell vehicles tend to be on the expensive side since the fuel cell technology is still quite new and unique. You can expect to pay upwards of $50,000 for the vehicle.
2. **Few Hydrogen Stations** – Even if more fuel cell vehicles were to be produced, there simply aren't enough public fueling stations which distribute hydrogen.
3. **Low Durability** – Compared to the durability of internal combustion engines, fuel cell systems are greatly lacking strong durability. This is especially true in humid environments.
4. **Low Reliability** – You will get about half the reliability from a fuel cell system that you would with an internal combustion engine.
5. **Still Unknown** – Fuel cell vehicles are still in the dark ages. The general public doesn't even know what they are and there is little information about them available at most car dealerships.

VI. CONCLUSION & FUTURE SCOPE

Automakers rapidly are closing in on making hydrogen fuel cell vehicles an everyday fact of life, with several test models set to debut over the next few years. Hydrogen fuel cells to power

vehicles is desirable, experts say, because hydrogen is a renewable fuel that can be used to create electricity to run cars. A chemical reaction between oxygen and hydrogen produces the electric power, and when pure hydrogen is used, the only emission from the tailpipe is harmless water vapour.

BMW last week introduced the world's first hydrogen-drive luxury car, the Hydrogen 7, which can run either on hydrogen or gasoline. And **General Motors** this month introduced a production-ready version of Chevy's hydrogen fuel cell-powered Sequel and said it planned to release a fleet of hydrogen fuel cell-powered.

We have 600 stations of 180,000 gasoline stations in the country that even have ethanol. To bring out hydrogen is a whole new task.

Both **GM** and Honda are hoping to bypass concerns about the lack and cost of developing hydrogen filling stations by creating home hydrogen refueling devices that would allow cars to be refilled overnight in garages.

Much of the push for hydrogen fuel-cell vehicles is aimed at putting the public at ease through demonstration models and projects.

GM, for example, opened the nation's first hydrogen filling station in suburban Washington, D.C., two years ago, and touts the spirited acceleration 0 to 60 in 10 seconds and the "unprecedented range" of 300 miles between fill-ups of its Sequel.

FUEL CELLS- FUIELING THE FUTURE

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***Abstract*—fossil fuels from conventional resources are finite and they will run-out one day, where renewable energy resources can fulfill the need of a human without any end; this paper explains the basic functions of a fuel cell, working concept and future applications, together with its merits to generate electricity. In the last two decades fuel cell technology has been researched and implemented as a most promising technology in the future. In addition to energy security and environment protection, hydrogen and fuel cells are the first step in a smooth transition to a hydrogen-based economy. Fuel cells as alternative energy is increasingly used in various small and large applications, both stationary and portable. Fuel cell technology can generate electrical and thermal energy, thereby increases its overall efficiency. The applications are highly suitable and viable in developing countries**

I. INTRODUCTION TO FUEL CELL

. A fuel cell is an electrochemical device (a galvanic cell) which converts free energy of a chemical reaction into electrical energy (electricity); byproducts are heat and water/steam if hydrogen and air are the reactants; in some fuel cell types, the additional byproducts may be carbon dioxide and leftover lower forms of hydrocarbons depending on the fossil fuels used. There is no combustion in this process and hence no NO_X are generated. Sulfur is poison to all fuel cells so it must be removed from any fuel before feeding to any fuel cell type; hence, no SO_X are generated. A fuel cell produces electricity on demand continuously as long as the fuel and oxidant are supplied.

A fuel cell is like a battery in that it generates electricity from an electrochemical reaction. Both batteries and fuel cells convert chemical potential energy into electrical energy and also, as a by-product of this process, into heat energy. However, a battery holds a closed store of energy within it and once this is depleted the battery must be discarded, or recharged by using an external supply of electricity to drive the electrochemical reaction in the reverse direction. A fuel cell, on the other hand, uses an external supply of chemical energy and can run indefinitely, as long as it is supplied with a source of hydrogen and a source of oxygen (usually air).

II. HISTORY OF FUEL CELL

19th century-first fuel concept demonstrated by Humphry Davy.

1839-william grove invents gas voltaic battery that produces an electrochemical reaction between hydrogen and oxygen.

1950s-1960s-nasa collaboration with industrial cerates fuel cell generators for manned space missions.

1970s-significant field demonstrations of large fuel cell units off-grid established natural gas infrastructure.

1880s-increase in R&D for fuel cell technology for transportation applications.

1990s-CA air resource board introduces zero emission vehicle mandate. Drives development and improvement in alternative power trains (not improving internal combustion engine).

2000s-increased concern over energy security, efficiency and CO2 emissions drives investment into fuel cells as potential alternative energy source.

2007-fuel cells are commercialized and solid to end-users.

A. Construction of fuel cell

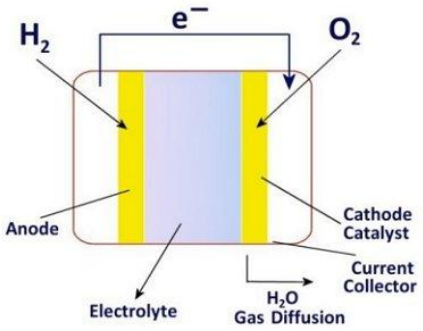

Fig. 1.

. The components of a fuel cell are anode, anodic catalyst layer, electrolyte, cathodic catalyst layer, cathode, bipolar plates/interconnects and sometimes gaskets for sealing/preventing leakage of gases between anode and cathode. The stack of such fuel cells (a repeated stack of such components) is connected in series/parallel connections to yield the desired voltage and current. The anode and cathode consist of porous gas diffusion layers, usually made of highly electron conductivity materials (and having zero proton conductivity theoretically) such as porous graphite thin layers. One of the most common catalysts is platinum for low temperature fuel cells and nickel for high temperature fuel cells, and other materials depending on the fuel cell type. The electrolyte is made of such material that it provides high proton conductivity and theoretically zero electron conductivity.

B. Working:

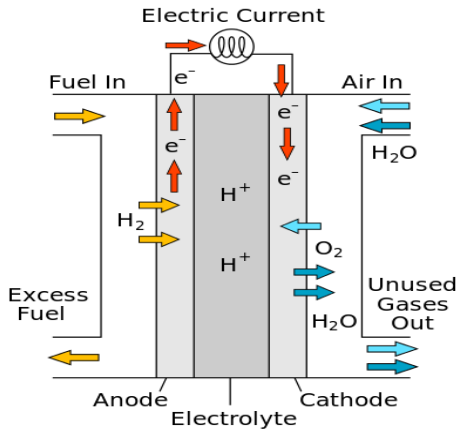

Fig. 2.

- First, a hydrogen fuel is channeled to the anode via flow fields. Hydrogen atoms become ionized (stripped of its electrons), and now carry only a positive charge. Then, oxygen enters the fuel cell at the cathode, where it combines with electrons returning from the electrical circuit and the ionized hydrogen atoms. Next, after the oxygen atom picks up the electrons, it then travels through the electrolyte to combine with the hydrogen ion. The combination of oxygen and ionized hydrogen serve as the basis for the chemical reaction

$$2\ H_2 + O_2 \rightarrow 2\ H_2O + \text{energy}$$

C. Different fuel cells

1) Polymer electrolyte membrane (PEM) fuel cell

- PEM fuel cells operate at relatively low temperatures, around 80°C (176°F). Low-temperature operation allows them to start quickly (less warm-up time) and better durability.
- PEM fuel cells are used primarily for transportation applications and some stationary applications. Due to their fast start up time and favorable power-to-weight ratio

2) Alkaline (AFS)

- AFCs that use a polymer membrane as the electrolyte have been developed
- A key challenge for this fuel cell type is that it is susceptible to poisoning by carbon dioxide (CO2)

3) Phosphuric acid(PAFC)

- PAFCs are more tolerant of impurities in fossil fuels that have been reformed into hydrogen than PEM cells
- PAFCs are also less powerful than other fuel cells, given the same weight and volume.

4) Molten carbonate (MFC)

- Molten carbonate fuel cells (MCFCs) are currently being developed for natural gas and coal-based power plants for electrical utility, industrial, and military applications.
- The primary disadvantage of current MCFC technology is durability. The high temperatures at which these cells operate and the corrosive electrolyte used accelerate component breakdown and corrosion, decreasing cell life

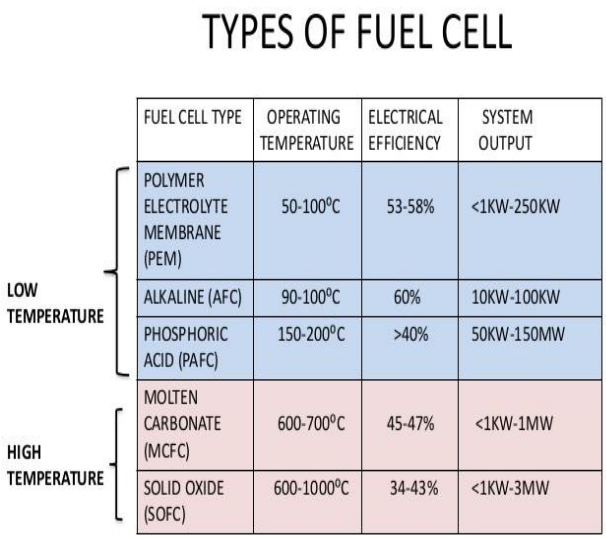

Fig. 3.

D. Applications

1) Transportation:

Fig. 4.

- Automobiles powered by fuel cells meet the requirements of zero emission vehicles, as the only output of hydrogen fuel cell is pure water
- Buses and trucks
- Trains and trams
- Ferries and smaller boats
- Manned light aircraft
- The fuel cell bus sector is showing year-on-year growth
- It has a top speed of over 150km/hr with a power output of 75kw(100hp) [6]

2) Portable

- portable soldier power, skid mounted fuel cell generators
- Auxiliary Power Units (APU) (e.g. for the leisure and trucking industries)

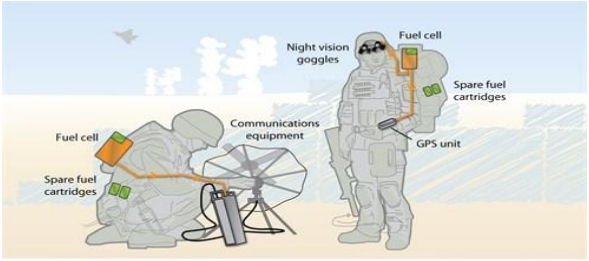

Fig. 5

- portable products (torches, vine trimmers etc), small personal electronics (mp3 players, camera etc.)
- off-grid operation
- longer run-times compared with batteries
- rapid recharging
- significant weight reduction potential (for soldier-borne military power)
- convenience, reliability, and lower operating costs also apply [6]

3) grid-connect applications

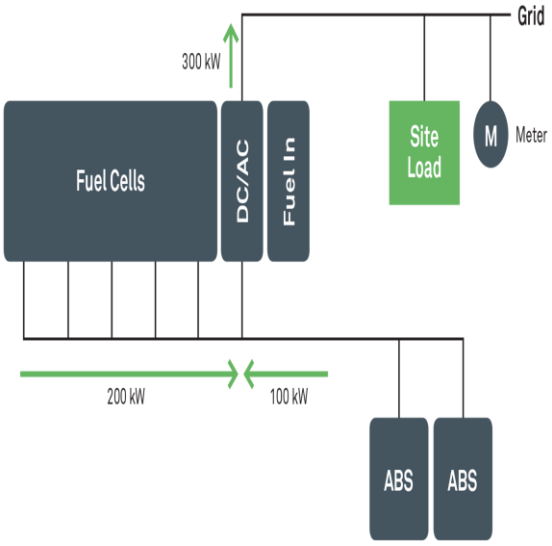

Fig. 5.

- In case of a power outage on the grid, a distributed power plant can continue to provide power to essential services, by using fuel cells and eliminating the need of an uninterruptible power supply (UPS)
- An additional quality of a fuel cell power plant for UPS applications is that the average down time is anticipated to be low, (3.2 to 32) sec per year versus typically nine hours for a conventional battery bank ups.
- For industries where ups systems are critical, such as banking minimizing down time is of most up importance
- backup power applications include computer systems, manufacturing facilities, homes, and utility substation. [6]

4) Non- grid connect applications

- Stand alone back up power generators
- Supplying power for as long as required, from stored hydrogen, producing electrical power cleanly and virtually silently .[6]

5) Residential power

- Fuel cell customers include computing organizations, government agencies, retail

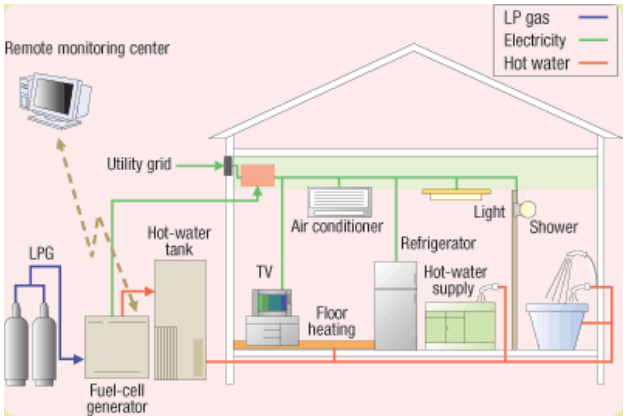

Fig. 6.

- Warehouse operations, utilities, and telecommunications companies.
- This list of fuel cell customers continues to grow as more municipal and corporate entities [6]

E. Benefits

- Efficiency – Hydrogen-powered fuel cells are two to three times more efficient than traditional combustion technologies. A conventional combustion based power plant typically generates electricity at efficiencies of around 35 percent, while fuel cell systems can easily generate electricity at efficiencies up to 60 percent (and even higher with cogeneration).
- Fuel flexible – Fuel cells cells can be powered by natural gas, biogas, and renewable power such as solar and wind.
- Low maintenance – Fuel cells require less maintenance (e.g., oil changes, etc.) than traditional combustion engines since there are so few moving parts.
- Quiet– Fuel cells operate at very low noise levels.
- Emission and air quality benefits - Using hydrogen as a form of energy can not only reduce our dependence on imported oil, but also benefit the environment and air quality by reducing emissions.
- Reliable- continuous operation as long as fuel supplied [5]

F. Challenges

1) Quite expensive

- need for materials such as platinum in the creating of hydrogen fuel cells, on average it can be a lot more expensive.

2) Not Beneficial for the Big Companies

- Big companies are certainly not going to be contributing money to the development of hydrogen fuel cells. Some of the biggest companies in America are those that deal with fossil fuels in one capacity or another.

3) Not Very Robust

- Unlike coal, gas and oil, hydrogen fuel cells are not terribly robust. Unfortunately, because of the delicate and intricate workings that they require, they are more sensitive to their surroundings and environment, and contamination and temperature can render them useless.

4) Safety Issues

- The main idea so far for the implementation of hydrogen fuel cells into everyday life is to put them into cars. The technology has been developed with this in mind and the science works perfectly. The only real problem is the issue of safety. Hydrogen is highly flammable – more so than regular fuel – and is harder to contain than oil [3].

G. The future of fuel cells.

- Find low-cost material alternatives
- Decrease dependency on non-renewable methane sources
- Continue R&D of contaminant removal technologies from renewable energy sources.
- Increase power density, reduce complexity of integrated system, minimize temperature constraints.
- Increased use as a technology (first costs and operating costs)improves efficiency, cell stack life and reduced GHGs.
- Economies of scale, streamline manufacturing process

a) Short life cycle

- Degradation: increase durability of existing component materials and create new materials with same essential properties, greater durability and performance.

b) Efficiency of technology

- Decrease cost per KW of existing technology..... increases power density by 20%

H. conclusion

As our demand for electrical power grows, it becomes increasingly urgent to find new ways of meeting it both responsibly and safely. In the past, the limiting factors of renewable energy have been the storage and transport of that energy. With the use of fuel cells and hydrogen technology, electrical power from renewable energy sources can be delivered where and when required, cleanly, efficiently and sustainably.

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Message from the HOD-BS &H

Dr.K.L.SAI PRASAD, Ph.D
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Dept of Basic Sciences & Humanities

Engineering theory is based on the core principles of Science and Mathematics. The contributions of these two areas in engineering education is immense. Students who have sufficient background in Science and Mathematics can excel themselves in Engineering. I am immensely pleased that GVP College of Engineering for Women is bringing out a technical magazine named **INGÉNIEUR** on the occasion of Engineers Day on September 15. Engineers day celebration is a small tribute to the noted Indian Engineer Bharat Ratna **Sir Mokshagundam Visvesaraya.** The magazine will definitely boost the creative skills of the First year students and will help them gain an understanding of the different areas of Engineering. The response shown by the first year students in contributing diverse articles for the first issue is exemplary. I sincerely congratulate all those involved in bringing out the magazine in an excellent form. I wish the readers a delightful reading.

Message from the Coordinators-BS&H

Dr.A.SUSEELATHA, Asst Prof, Mathematics
&
Dr.B.RAJESH BABU, Asst Prof, Physics

Science and Mathematics are two corner stones of STEM education. Engineering utilizes science for the benefit of mankind and mathematics is the fundamental knowledge under pinning engineering practice. Engineering students need "Techno-mathematical literacies" combined with scientific temperament to achieve success in engineering practice. We are immensely pleased to be a part of the team that is involved in bring out the technical magazine. The first year students have responded enthusiastically to the call for articles in the first issue of **INGÉNIEUR** by contributing articles in the areas of physics, technology and mathematics. The wide spectrum of articles give us a sense of pride that our students possess creative potential in ample measures.Each article is entertaining and absorbing. We thank all the faculty for their and guidance in shaping the articles for the issue. We sincerely hope that the technical magazine inculcates in the students the ability to think logically and scientifically.

A Brief on Google Search Engine

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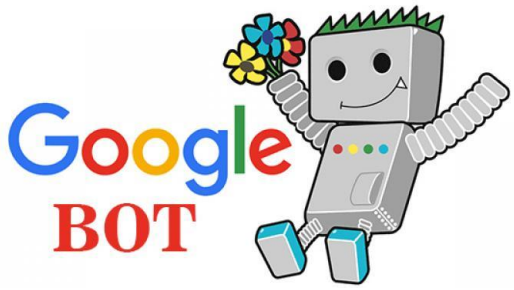
A search engine is a service that allows internet users to search for content via the World Wide Web (WWW). A user enters keywords or key phrases into a search engine and receives a list of web contents results in the form of websites, images, videos, or other online data. The list of contents returned via a search engine to a user is known as a Search Engine Result Page (SERP).

A search engine consists of two components a Web crawler and a Database First a spider/web crawler trolls the web for content that is added to the search engine's index. Then, when a user queries, a search engine, relevant results are returned based on the search engine's algorithm. Early search engines were based largely on page content, but websites learned to game the system, algorithms have become much more complex and search results returned can be based on literally hundreds of variables.

Google began in January 1996 as a research project by Lary Page and Sergy Brin when they were both Ph.D students at Stanford University in Stanford California. Page and Brin originally nicknamed their new search engine "Back Rub", because the systems check back links to estimate the importance of a site, Eventually, they changed the name to Google(Global Organization Of Oriented Group Language Of Earth). Google, the name of the search engine originated from misspelling of the word "Googol", the number 1 followed by 100 zeros. Google always follows a slogan "Don't be evil". Personalized search was originally introduced on 29th March, 2005. It was made available as a non-beta service. Google provides an interesting explanation of the search process which states the special software running.

GOOGLEBOT



Googlebot is the search bot software used by Google, which collects documents from the web to build a searchable index for the Google search engine. Googlebot is the webcrawler used by Google to find and retrieve web pages and is constantly visiting pages all over the web.

Googlebot uses sitemaps and databases of links discovered during previous crawls to determine where to go next. Whenever the crawler finds new links on a site, it adds them to the list of pages to visit next. If Googlebot finds changes in the links or broken links, it will make a note of that so the index can be updated. The program determines how often it will crawl pages. To make sure Googlebot can correctly index your site, you need to check its crawlability. If your site is available to crawlers they come around often

Google retrieves the content of web pages (the words, code and resources that make up the webpage). Web crawler sometimes called a spider or spiderbot and often shortened to crawler, is an internet bot that systematically browses the World Wide Web, typically for the purpose of Web indexing(web spidering). A web crawler starts with a list of URLs to visit called seeds. As the crawler visits these URLs, it identifies all the hyperlinks in the page and adds them to the list of URLs from the frontier are recursively visited according to a set of policies. If the crawler is performing archiving of websites it copies and saves the information as it goes. The archives are usually stored in such a way they can be viewed, read and navigated as they were on the live web, but are preserved as 'snapshots'. Junghoo Cho et al. made the first study on policies for crawling scheduling. Their data set was a 180,000-pages crawl. The ordering metrics tested were breadth-first, backlink count and partial Page Rank calculations with high Page Rank early during the crawling process, then the partial Page Rank strategy is the better.

PAGE RANK

The Eigen Value problem was suggested in 1976 by Gabriel Pinski and Francis Narin, who worked on scientometric ranking scientific journals in 1977 by Thomas Saaty in his concept of Analytical Hierarchy process which weighed alternative choices, and in 1995 by Bardeley love and Steven Sloman as a cognitive model for concepts, the centrality algorithm. Larry Page and Sergey Bin developed Page Rank at Stanford University in 1996 as a part of a research project about a new kind of a search engine.

Page Rank is an algorithm used by Google to rank websites in their search engine results. Page Rank was named after Lary Page, one of the founders of Google. Page Rank is a way of measuring the importance of website pages. It is not the only algorithm used by Google to order search engine results, but it is the first algorithm that was used by the company and it is the best known.

Page Rank is a link analysis algorithm and it assigns a numerical weighting to each element of a hyperlinked set of documents, such as the World Wide Web, with the purpose of "measuring" its relative importance within the set. The algorithm may be applied to any collection of entities with reciprocal quotations and references. The numerical weight that is assign to any given element E is referred to as the Page Rank of E and denoted by PR(E). A Page Rank results from a mathematical algorithm based on the web graph, created by all World Wide Web pages as nodes and hyperlinks as edges, taking into consideration.

Toolbar PageRank (log base 10)	Real PageRank
0	0 - 10
1	100 - 1,000
2	1,000 - 10,000
3	10,000 - 100,000
4	and so on...

We can't know the exact details of the scale because, as we'll see later, the maximum PR of all pages on the web changes every month when Google does its re-indexing! If we presume the scale is logarithmic (although there is only anecdotal evidence for this at the time of writing) then Google could simply give the highest actual PR page a toolbar PR of 10 and scale the rest appropriately.

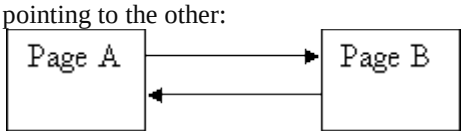
We assume page A has pages T1...Tn which point to it (i.e., are citations). The parameter d is a damping factor which can be set between 0 and 1. We usually set d to 0.85. There are more details about d in the next section. Also C(A) is defined as the number of links going out of page A. The PageRank of a page A is given as follows:

$$PR(A) = (1-d) + d\,(PR(T1)/C(T1) + \ldots + PR(Tn)/C(Tn))$$

PageRank or PR(A) can be calculated using a simple iterative algorithm, and corresponds to the principal eigenvector of the normalized link matrix of the web.

What that means to us is that we can just go ahead and calculate a page's PR without knowing the final value of the PR of the other pages. That seems strange but, basically, each time we run the calculation we're getting a closer estimate of the final value. So all we need to do is remember the each value we calculate and repeat the calculations lots of times until the numbers stop changing much.

Lets take the simplest example network: two pages, each pointing to the other:



Each page has one outgoing link (the outgoing count is 1, i.e. C(A) = 1 and C(B) = 1).

CALCULATING PAGE RANK

We don't know what their PR should be to begin with, so let's take a guess at 1.0 and do some calculations:

d = 0.85

PR(A) = (1 – d) + d(PR(B)/1)

PR(B) = (1 – d) + d(PR(A)/1)

i.e.

PR(A) = 0.15 + 0.85 * 1 = 1

PR(B) = 0.15 + 0.85 * 1 = 1

FACTORS ON WHICH PAGE RANK DEPENDS

On-Page factors:

The way your page is optimized has the most profound effect on its rankings. Here are the page optimization factors that can affect its search visibility:

Keyword in the title tag. The title meta tag is one of the strongest relevancy signals for a search engine. The tag itself is meant to give the accurate description of the pages content. Search engines use it to display the main title of a search result. Including a keyword in it will indicate to search engine what to rank the page for. Ideally, the keyword should be placed at the start of the title tag. Pages optimized this way will rank better than those with keyword closer to the title's tag end.

Keyword in meta description tag. The importance of the meta description tag today is often discussed in SEO circles. It is nonetheless still a relevancy signal. It is also crucial for gaining user clicks from search results pages. Including the keyword in it makes it more relevant to a search engine and a searcher.

Keyword in H1 tag. H1 tag is yet another relevance factor, serving as a description of the pages content. In spite of an ongoing discussion about its importance, it is still a good practice to include your keyword in a unique H1 tag on a page.

Using keywords in the pages copy. Up until recently, stuffing your page with keywords was a surefire way to increase its rankings for a particular keyword. That's not the case anymore. Using the keyword in the copy still sends a relevancy signal of what the content is about. How you place it, however, has changed drastically.

The length of the content. These days searchers want to be educated and won't satisfy with basic information. Google, therefore, looks for authoritative and informative content to rank first. And it's common sense that the longer your content is, the greater the chance that you can cover more aspects of your topic. Don't be shy of writing long but highly useful copy then.

Duplicate content. Not all factors can influence your rankings in a positive way. Having similar content across various pages of your site can actually hurt your rankings. Avoid duplicating content and write original copy for each page.

Canonical tag. Sometimes, however, having two URLs with similar content is unavoidable. One of the ways from preventing this from becoming a duplicate content issue is by using a canonical tag on your site. This tag does one simple thing; it tells Google that one URL is equivalent of another, clearly stating that in spite of two pages having the same content, they are in fact one.

Image Optimization. It's not only text that can be optimized on a page but other media too. Images, for instance, can send the search engine relevancy signals through their alt text, caption, and description for example.

Content Updates. Google algorithm prefers freshly updated content. It does not mean that you have to edit your pages all the time. I believe that for commercial pages, such as product descriptions Google recognizes the fact that they are not as time sensitive as blog posts covering recent events. It is wise however to include some strategy to update certain types of content once every 12 months or so.

Outbound links. Linking to authoritative pages sends trust signals to the search engine. Think of it this way, the only

reason why you would send a user to another site is if you wanted them to learn more of the subject. This can be a huge trust factor for Google. Too many outbound links, however, can significantly diminish the page's PageRank, hurting its search visibility. Outbound links can affect your rankings but use them in moderation.
Internal links. Interlinking pages on your site can pass their strength between them.
Keyword in URL. Including the keyword in the URL slug (that's the bit that appears after the ".com/"part of the URL) is said to send another relevancy signal to Google.
Site factors:
There are certain site-wide factors that can affect your site's search visibility as well:
Sitemap. A sitemap helps search engine to index all pages on your site. It is the simplest and most efficient way to tell Google what pages your website includes.
Domain trust. Trust matters. It's hard no to think that sites Google trusts should rank higher. But how do you build that trust? Brian from Backlinko has a full list of trust factors here. Needless to say, building trust factors of your domain will certainly pay off.
Server location. Some SEOs believe that a server's location helps to boost rankings for that particular country or region.
Mobile optimized site. Only a year ago, 46% of searchers used mobile exclusively to research. I believe this number increased exponentially in the last 12 months. It would be no surprise then that having a mobile optimized site would affect rankings in some way.
Google Search Console integration. Lastly, having your site verified at Google Webmasters Tools is said to help with your sites indexing. Even if that's not the case, the tool provides valuable data you can use to optimize your site better.
Off Page factors:
When ranking your pages, Google looks at factors outside of your site as well. Here are some of the key ones:
The number of linking domains. The number of domains linking to you is one of the most important ranking factors.
The number of linking pages. There might be some links from a particular domain to your site; their number is a ranking factor too. However, it is still better to have more links from individual domains rather than from a single domain.
Domain Authority of linking page. Not all pages are equal. Links to pages with higher domain authority will be a bigger factor than those on low authority domains. Therefore, you should strive to build links from high domain authority websites.
Link relevancy. Some SEOs believe that links from pages related to your pages topic carry more relevancy for search engines.
Authority of linking domain. The authority of a domain may be a ranking factor too. For that reason, a link from low authority page on a high authority site will be worth more that from a lower domain authority one.
Links from a homepage. Similarly, some SEOs believe that links from a home page of a linking domain carry more strength than those on one of its pages.
A number of do follow vs. nofollow links. Google officially stated that they don't count nofollow links (link with rel=nofollow attribute attached). Therefore the number of your do follow links should affect your rankings too.
The diversity of link types. The types of links you build to your site matters too. Too many links of one type may be a spam indicator and impact your rankings negatively.
Contextual links. It is said that links within the content of the page are worth more than links in a sidebar for instance.
Link anchor. Anchor text of a link used to be a strong ranking factor. Today it can be utilized as a web spam indicator, negatively impacting your rankings.

Domain factors:
Lastly, your domain can affect your rankings as well. Some of the domain signals aren't as strong as they used to be, there are few things worth paying attention to:
Domain registration length. Google considers domains registered for longer than a year as more trustworthy. QUOTE.
Domain history. You may not be the first person who registered the domain. And if your domain has been penalized in the past, its history might affect its current rankings.

ADVANTAGES AND DISADVANTAGES OF USING GOOGLE
simplicity - the results are displayed in an easily consumable fashion.
Holds the all-round reputation for generating the most relevant results.
Continually evolves with improvements and updates to enhance quality of results.
Offers enhanced and unrivalled features such as Street Views; Google Maps.
In Search engine optimization, Google's algorithm here is what most corporations contemplate when optimizing their websites. Google SEO allows websites to attract more visitors, which can translate to greater revenue for the operators or site owners. Instance searching for reviews will more than likely produce more hits on marketing content or products.
Google search credibility is likely to be strongly influenced by trends in the SEO market which can make relevancy of results less 'natural'. Of course one can argue that all engines can be impacted accordingly Google is a great source of information. It's good to find scientific resources when you search for answers. However, there is one disadvantage of Google Search engine. Google has been fighting piracy by all means. So for those who search for free music (mp3), free videos, and free software, Google won't be an ideal search engine in that case. In relation to other search engines Google returns results very quickly, even on less common or misspelled keywords and with spelling suggestions too.
Although very few comparative cons, even Google isn't a perfect search engine. Some searches still yield results with little relevance on top. Though Google has both advantages and disadvantages but still it is very helpful to the humans. It is very user friendly and also helps both literate and illiterate and even for blind people also.

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A Brief Note on Role of Mathematics in Computer Science

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People who create new algorithms or designs need some ability to independently apply mathematical techniques, and at the high-math end of the spectrum, those who conduct research in an area need a deep ability to work with its mathematics [1].

The relationship between mathematics and computer science has two faces: many software engineers perform well without relying on mathematics, while at the same time there are rich connections between the fields that can be exploited by those prepared to do so. What is hard is identifying an appropriate level of detail at which computing uses of Mathematics, and imposing some standard of completeness on that analysis. The 2012 ACM computing classification system [2] as a guide to the subject matter that makes up "computer science," and attempted to identify the mathematics that is important in each top-level category [1].

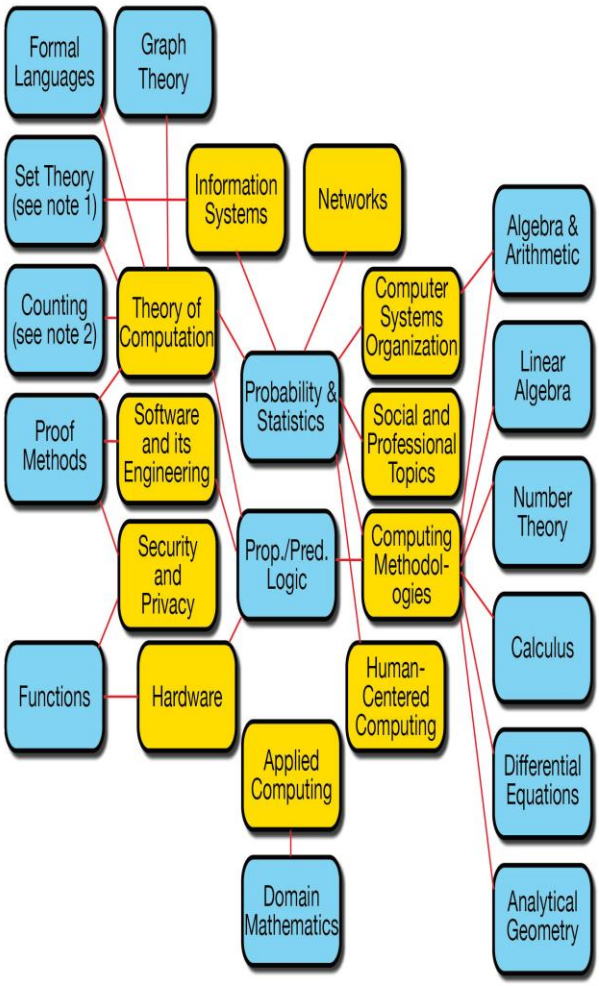

Figure 1: Mathematics associated with computer science areas.

This article makes an attempt to present some of the major area of computer science where the mathematics plays a crucial role.

Data Compression
Uses probability and statistics

A lot of algorithms by themselves exploit advanced mathematics. Probability is a perennial favourite. Data compression schemes are used to *compress* files by exploiting patterns in the data. For instance, instead of writing 'aaaaa', a computer could simply mark that region in memory as 5a, indicating that this section has five a's, cutting down the number of characters needed to express that from 5 to just 2. However, sometimes it's not very easy to discern patterns that can be exploited. That's where probability comes in.

Computer Vision, Graphics and Image Processing
Uses linear algebra (occasionally calculus)

If you've ever played a video game or watched animation, you're really looking at one of the most monumental mathematical feats in computer science. Nearly everything in computer graphics can be described as a *transformation*: Take a vector, and you apply a number of matrices to it to get a new vector. The vector is the fundamental unit of graphics - a good analogy is a straight line. Chaining them together builds interesting graphics.

Computer vision deals with computers to understand what pictures mean. Pictures are actually nothing more than RGB values encoded in a matrix, so, for a computer a picturesque work of art is only a giant area of numbers. For example, if you've ever applied a filter on Instagram, you've really been doing some remarkable advanced matrix multiplications.

A lot of game engines make use of physics, to compute light scattering in 3D games and it has to evaluate complicated Integrals. In such cases most computers use numerical algorithms (like finite difference methods) to solve them.

For a computer an image, on the most basic level, is a matrix of intensity levels. So to start in the spatial domain, knowledge of matrix and matrix operations is required. Knowledge of transforms (DFT, FFT, wavelet transforms), Statistical analysis methods are needed for image processing in frequency domain. These lay the foundation for basic image processing using a digital computer.

Cryptography
Uses Number Theory, Matrix Algebra

It is hard to overestimate the ubiquity and importance of secure communications and information processing in modern society. From private individuals to industry or governments — they all rely on technology guaranteering the confidentiality, integrity and authenticity of their communication. To realise these security goals, one relies on cryptographic algorithms, often totally transparent to their users.

Modern cryptography lies at the intersection of mathematics and computer science, involving number theory and algebra. In this information age, highly mathematical codes (cipher) are used every day by almost everyone, whether at the bank ATM, at the grocery checkout, or at the keyboard when you access your email or purchase products online.

Most of the ciphers like Block cipher, steam cipher, the public-key system RSA and One Time Pads (OTP) are designed, by applying the concepts of Number theory and Matrix algebra [3].

Data Science

Uses Probability theory, Statistics and Linear Algebra

The importance of statistics and probability cannot be ignored in the field of data science. Many practitioners in the field call classical machine learning as statistical learning. Almost all the techniques of modern data science (including all of the machine learning techniques) have some deep roots in mathematics.

Matrices and matrix algebra is an essential branch of mathematics by which one can create insights into Data streaming. For example, Friend suggestion on Facebook, Song recommendation in Spotify, transferring your selfie to a portrait drawing Salvador Dali style uses the concepts of Deep Transfer learning.

Thus, Computer science, like the physical sciences and traditional engineering fields, widely uses mathematics to model the phenomena it studies.

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A brief survey on Blue brain technology

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Abstract - Brain is the most valuable creation of God. This paper presents a survey on the Bule Brain Technology . Scientists today are in research to take Artificial Intelligence to a level beyond everything,to create a virtual brain that could think, react, make decisions and do everything that of a normal human brain can.To achieve this the main approach is to upload an actual brain in a virtual brain. After the persons death it functions exactly as a normal brain in the form of a machine. The concept of blue brain is started in 2005,IBM along with scientists at BMT(Brain and Mind Institute) Ecole Polytechnique Federale de Lausanne (EPFL) Research University in Switzerland are simulating the brains biological systems into a 3D model , which would recreate the electrochemical interactions that plqace inside the brain.IBM names this project as the "Blue Brain Project".

KEY WORDS:

Nuerons, Brain modeling, Super computers, Computational modeling, Data models.

1. INTRDUCTION:

Human Brain is the greatest gift of God.Man is superior over the all creatures, the main reason for his superiority is his brain. The brain translates the information delivered by the impulses, which then enables the person to react.But the knoledge , intelligence and power of the brain is destroyed after the death of the man. The same knowledge could have been used for further development of the society.Imagine the marvels that would be back into existence if we could restore the brains of geniuses like Sir Albert Einstein or Newton or Srinivasa Ramanujan or APJ Abdul kalam.

1.1 WHAT IS BLUE BRAIN

Blue Brain is the name of the worlds first virtual brain, that means the machine that functions same as a human brain.With this blue brain the man can think, take decision without any effort. After the death of the body, the virtual brain will act as the man.So, even after the death of a person we will not loose the knowledge, intelligence, personalities, feelings and memories of that man that can be used for the development of the human society. No one has ever understood the complexity of human brain. It is complex than any circuitry in the world. With the Blue Brain it is possible to upload the contents of human brain into a virtual brain.IBM is in research to create a virtual brain,called "BLUE BRAIN".If it is possible it is the first virtual brain and with in a few years we can scan oursevels into a computer.

1.2 NEED OF BLUE BRAIN:

Intelligence is the inborn qualitiy that can't be created by others,expect God.Some people have the quality of intelligence so that they can think such an extent where others can't be reached.But the intelligence will be lost after the persons death. And another problem is we often face difficulties in remembering things such as people's names, their birthdays, and the spellings of words, proper grammar, important dates, history, facts etc.....The solution for this problems is "Blue Brain". It is possible by using a super computer, with a huge amount of storage capacity, processing power and an interface between the human brain and this artificial one. Through this interface the data stored in the natural brain can be up loaded into the computer. Raymond Kurzweil recently provided an interesting paper on this topic. The most promising is the use of very small robots, or nanobots. These robots will be small enough to travel throughout our circulatory systems. Traveling into the spine and brain, they will be able to monitor the activity and structure of our central nervous system.

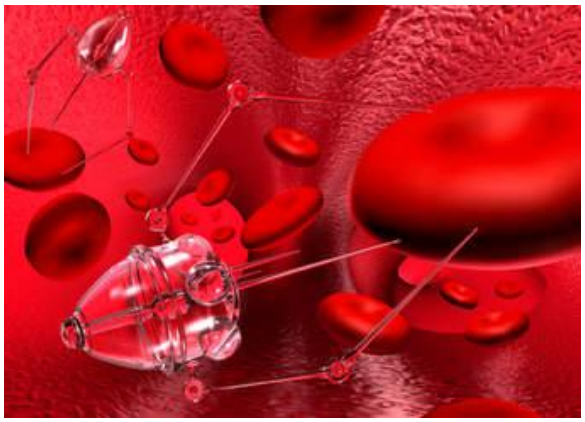

Fig.1. Nano Robots

2. NATURAL BRAIN FUNCTIONALITY:

The brain the center of the hole human body. It receives signals from sensory neurons (nerve cell bodies and their axons and dendrites) in the central and peripheral nervous systems, and in response it generates and sends new signals that instruct the corresponding parts of the body to move or react in some way.The brain consisiting of 2% body weight and weighs 1500 grams(3 pounds). The nervous system is quite like magic because we can't see it, but its working through electric impulses through your body.To understand the brain working system one must know the three simple functions: sensory input,integration,motor output.The action of getting information from the surrounding environment is called sensory input.In the integration the neurons work together to understand the surrounding environment.The brain sends the message from neurons to effecter cells, muscle or gland cells,which perform the work , in the motor output.

3. FUNCTIONALITY OF BLUE BRAIN

Swiss National Brain initiative aims to create a digital reconstruction of the brain by reverse engineering mammalian brain circuitry. Blue Gene/L is built using system-on-a-chip technology in which all functions of a node (except for main memory) are integrated onto a single application-specific integrated circuit (ASIC).In the blue brain working there are some stages. They are Architecture of Blue Gene, Modelling the Microcircuit, Simulating the Microcurcuit, Interpreting the results, Data Manipulation Cascade, Whole Brain Simulation

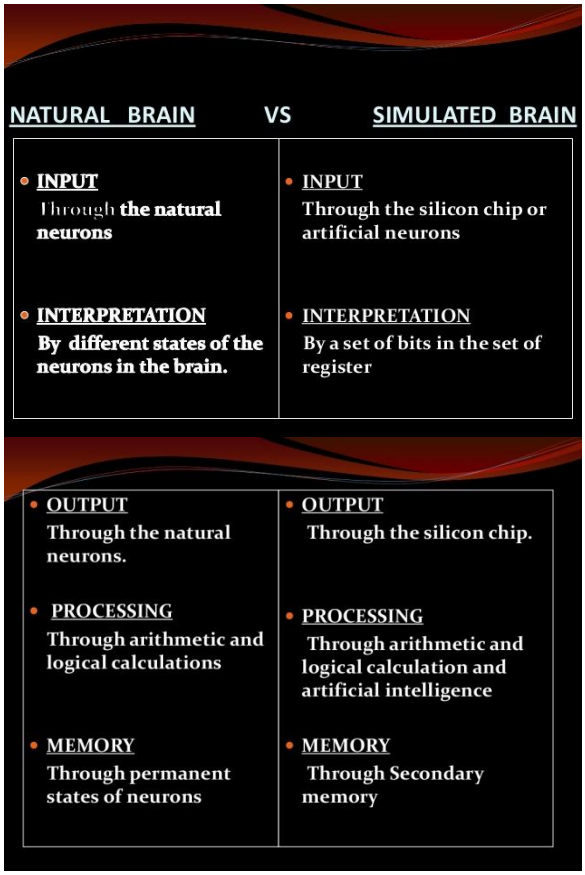

Fig.2. Natural and Simulated Brain out puts

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4. APPLICTIONS/ADVANTAGES OF BLUE BRAIN

The best example of utilization of blue brain is in "short time memory".

The activity of different animals can be understood. That means by interpretation of the electric impulses from the brain of the animals, their thinking can be understood easily.

It is also useful for those who forget their past due to accidents or other reasons. It would allow the deaf to hear via direct nerve stimulation, and also be helpful for many psychological diseases. By down loading the contents of the brain that was uploaded into the computer, the man can get rid from the madness. A another situation is that when a person gets older,

then he starts forgetting or takes a bit more time to recognize to a person. This disease also known as "Alzheimers". Scientists think that blue brain could also help to cure the "Parkinson's Disease". It will search for insights into how human beings think and remember. With out any effort we can remember the things. If the person is not in available, it can take the decisions. The intelligence of a person can be used after his death also.

5. LIMITATIONS

There are many disadvantages will raise when this technology is opens. We will become dependent on computers. The real threat, however, is the fear that people will have of new technologies. That fear may culminate in a large resistance. Clear evidence of this type of fear is found today with respect to human cloning. This technology may used against us. Another fear is found with respect to human cloning. A very costly procedure of regaining the memory back.

6. FUTURE PERSPECTIVE

As a complement to experimental research, it offers rapid assessment of the probable effect of a new finding on preexisting knowledge, which can no longer be managed completely by any one researcher. Detailed models will probably become the final form of databases that are used to organize all knowledge of the brain and allow hypothesis testing, rapid diagnoses of brain malfunction, as well as development of treatments for neurological disorders. In short, we can hope to learn a great deal about brain function and disfunction from accurate models of the brain. There is no fundamental obstacle to modeling the brain and it is therefore likely that we will have detailed models of mammalian brains, including that of man, in the near future. Even if overestimated by a decade or two, this is still just a 'blink of an eye' in relation to the evolution of human civilization.

7. CONCLUSION

In conclusion, we will be able to transfer ourselves into computers at some point.This technology will bring both benefits and harms to the scoiety.Very soon this technology is accepected by the whole world.

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A Brief Introduction to Artificial Neural Networks

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Artificial Neural Network (ANN) is a computational model that is inspired by the way biological neural networks in the human brain process information. Artificial Neural Networks have generated a lot of excitement in Machine Learning research and industry, thanks to many breakthrough results in speech recognition, computer vision and text processing. This article makes an attempt to develop an understanding of Artificial Neural Networks. The simplest definition of a neural network, more properly referred to as an 'artificial' neural network, is provided by the inventor of one of the first neurocomputers, Dr. Robert Hecht-Nielsen. He defines a neural network as: a computing system made up of a number of simple, highly interconnected processing elements, which process information by their dynamic state response to external inputs. Neural networks, with their remarkable ability to derive meaning from complicated or imprecise data, can be used to extract patterns and detect trends that are too complex to be noticed by either humans or other computer techniques.

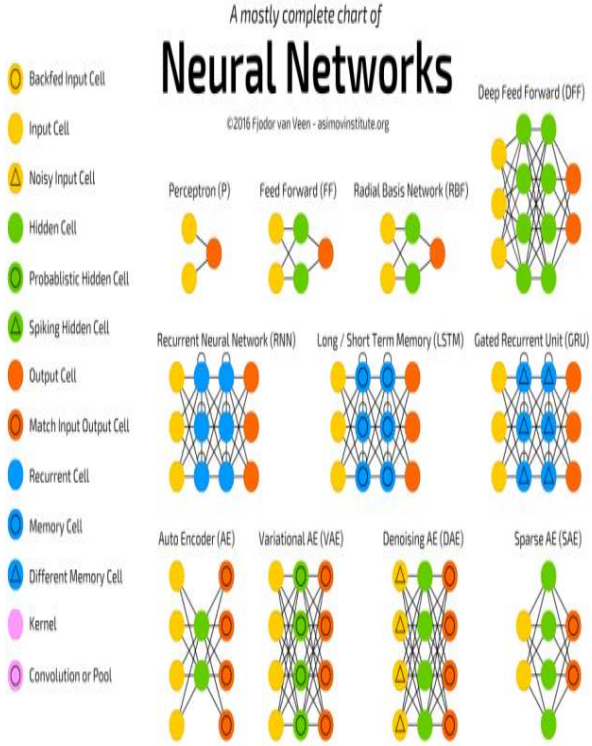


Fig.1. Complete Chart of Neural Networks

A trained neural network can be thought of as an "expert" in the category of information it has been given to analyse. This expert can then be used to provide projections given new situations of interest and answer "what if" questions [1].

ARTIFICIAL NEURAL NETWORKS

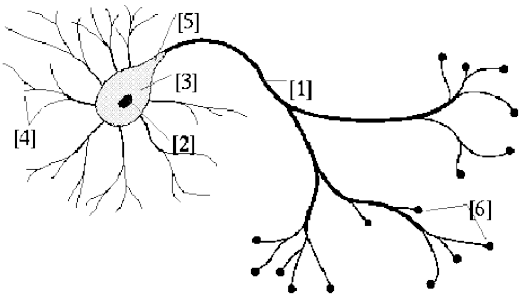
Artificial neural networks (ANN) are computing systems vaguely inspired by the biological neural networks that constitute animal brains. Such systems "learn" to perform tasks by considering examples, generally without being programmed with any task-specific rules. An ANN is based on a collection of connected units or nodes called artificial neurons which loosely model the neurons in a biological brain. Each connection, like the synapses in a biological brain, can transmit a signal from one artificial neuron to another. An artificial neuron that receives a signal can process it and then signal additional artificial neurons connected to it.

TRAINING AN ARTIFICIAL NEURAL NETWORK

Once a network has been structured for a particular application, that network is ready to be trained. To start this process the initial weights are chosen randomly. Then, the training, or learning, begins. There are two approaches to training - supervised and unsupervised. Supervised training involves a mechanism of providing the network with the desired output either by manually "grading" the network's performance or by providing the desired outputs with the inputs. Unsupervised training is where the network has to make sense of the inputs without outside help. The vast bulk of networks utilize supervised training. Unsupervised training is used to perform some initial characterization[3].

BIOLOGICAL NEURAL NETWORKS

Our brain has a large network of interlinked neurons, which act as a highway for information to be transmitted from point A to point B. To send different kinds of information from A to B, the brain activates different sets of neurons, and so essentially uses a different route to get from A to B.



1.Axon 2. Nucleus 3.Soma (Body) 4. Dendrite 5. Axon Hillock 6. Terminals (Synapses)

Fig.2. Biological Neuron

The majority of neurons encode their activations or outputs as a series of brief electrical pulses (i.e. spikes or action potentials). The neuron's cell body (soma) processes the incoming activations and converts them into output activations. The neuron's nucleus contains the genetic material in the form of DNA. This exists in most types of cells, not just neurons.. Dendrites are fibres which emanate from the cell body and provide the receptive zones that receive activation from other neurons. Axons are fibres acting as transmission lines that send activation to other neurons. The junctions that allow signal transmission between the axons and dendrites are called synapses.[2]

DIFFERENCE BETWEEN ARTIFICIAL NEURAL NETWORKS (ANN) AND BIOLOGICAL NEURAL NETWORKS (BNN)

Characteristics	**Artificial Neural Network**	**Biological(Real) Neural Network**
Speed	Faster in processing information. Response time is in nanoseconds.	Slower in processing information. The response time is in milliseconds.
Processing	Serial processing.	Massively parallel processing.
Size & Complexity	Less size & complexity. It does not perform complex pattern recognition tasks.	Highly complex and dense network of interconnected neurons containing neurons of the order of 1011 with 1015 of interconnections.<strong
Storage	Information storage is replaceable means new data can be added by deleting an old one.	Highly complex and dense network of interconnected neurons containing neurons of the order of 1011 with 1015 of interconnections.
Fault tolerance	Fault intolerant. Information once corrupted cannot be retrieved in case of failure of the system.	Information storage is adaptable means new information is added by adjusting the interconnection strengths without destroying old information
Control Mechanism	There is a control unit for controlling computing activities	No specific control mechanism external to the computing task.

TYPES OF ANN

There are different types of Artificial Neural Networks (ANN) – Depending upon the human brain neuron and network functions, an artificial neural network or ANN performs tasks in a similar manner.

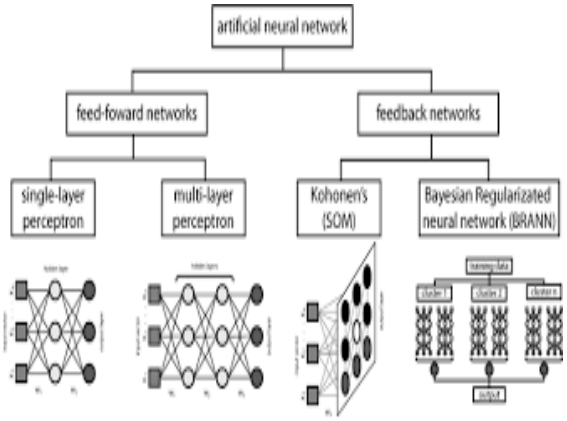


Fig.3 Types of Artificial Neural Network

Feed Forward ANN

A feed forward neural network is an artificial neural network where in connections between the nodes does not form a cycle. Flow is unidirectional. A unit sends information to other unit from which it does not receive any information. There are no feedback loops in Feed Forward ANN, it was the first and simplest type of ANN. Application of Feed forward neural networks are found in computer vision and speech recognition where classifying the target classes are complicated. These kinds of Neural Networks are responsive to noisy data and easy to maintain.

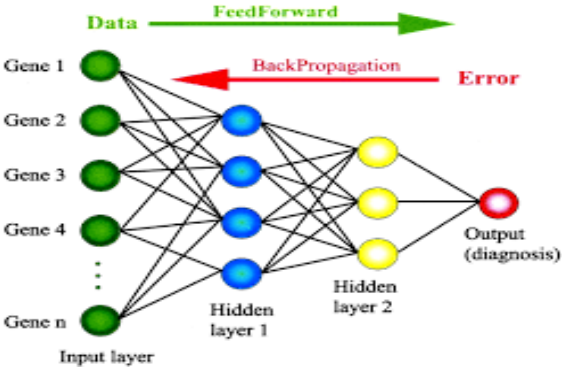


Fig.3. Flow of Data in Feed Forward ANN

Feed Back ANN or Recurrent NNs

A recurrent neural network is a class of artificial neural network where connections between nodes form a directed graph along a sequence. Unlike feed forward neural networks, RNNs can use their internal state (memory) to process sequences of inputs.[1]

ADVANTAGES

A neutral network can perform tasks in which a linear program can't perform. When an element of neural network fails, it can continue without any problem by their parallel nature. A neural network does not need to be reprogrammed as it learns itself.It can be implemented in an easy way without any problem.In adaptive, intelligent systems, neural networks are robust and excel at solving

complex problems. Neural network are efficient in their programming and the scientists agree that the advantages of using ANNs outweigh the risks. It can be implemented in any applications .Other advantages include:

Adaptive learning: An ability to learn how to do tasks based on the data given for training or initial experience. Self-Organisation: An ANN can create its own organisation or representation of the information it receives during learning time. Real Time Operation: ANN computations may be carried out in parallel, and special hardware devices are being designed and manufactured which take advantage of this capability.

Fault Tolerance via Redundant Information Coding: Partial destruction of a network leads to the corresponding degradation of performance. However, some network capabilities may be retained even with major network damage

DISADVANTAGES OF ARTIFICIAL NEURAL NETWORKS (ANN)

Hardware dependence: Artificial neural networks require processors with parallel processing power, in accordance with their structure. For this reason, the realization of the equipment is dependent.

Unexplained behaviour of the network: This is the most important problem of ANN. When ANN produces a probing solution, it does not give a clue as to why and how. This reduces trust in the network.

Determination of proper network structure: There is no specific rule for determining the structure of artificial neural networks. Appropriate network structure is achieved through experience and trial and error.

Difficulty of showing the problem to the network: ANNs can work with numerical information. Problems have to be translated into numerical values before being introduced to ANN. The display mechanism to be determined here will directly influence the performance of the network. This depends on the user's ability.

The duration of the network is unknown: The network is reduced to a certain value of the error on the sample means that the training has been completed. This value does not give us optimum results [1]. The neural network needs the training to operate .The architecture of a neural network is different from the architecture of microprocessors, therefore, needs to be emulated. It requires high processing time for large neural networks [3].

CONCLUSIONS

Neural networks are suitable for predicting time series. The neural network algorithms are very calculation extensive. Require highly efficient computing machines. It helps in data analysis. It also helps in recognizing images. But it can also be done by splitting the task between more general purpose hardware ANN takes data samples rather than entire datasets to arrive at solutions.

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A Brief Introduction to Cloud Computing

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Cloud computing metaphor: the group of networked elements providing services need not to be individually addressed or managed by users; instead, the entire provider-managed suite of hardware and software can be thought of an amorphous cloud.
Cloud computing is shared pools of configurable computer system resources and higher level services that can be rapidly provisioned with minimal management effort, often over the internet. Cloud computing relies on sharing of resources to achieve coherence and economics of scale, similar to public utility.
Third party cloud enable organisations to focus on their core businesses instead of expending resources on computer infrastructure and maintenance. Advocates note that cloud computing allows companies to avoid or minimize up-font IT infrastructure costs. Proponents also claim that cloud computing allows enterprises to get their applications up and running up faster, with improved manageability and less maintenance, and that enables IT teams more rapidly adjust resources to meet fluctuating and unpredictable demand.

DEVELOPMENT MODELS

Private Cloud

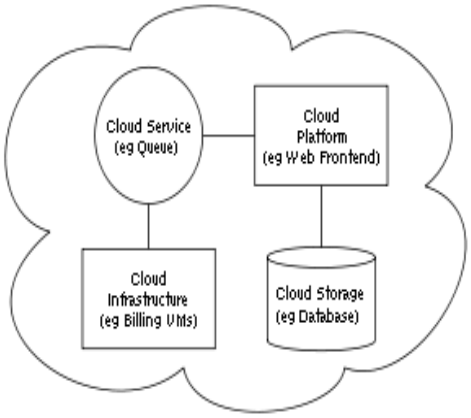
A cloud is called a "public cloud" when the services are rendered over a network that is open for public use. Public cloud services may be free. Technically there may be little or no difference between public and private cloud architecture, however, security consideration may be substantially different for services (applications, storage, and other resources) that are made available by a service provider for a public audience and when communication is effected over a non-trusted network.

Hybrid Cloud

Hybrid cloud is a composition of two or more clouds (private, community or public) that remain distinct entities but are bound together, offering the benefits of multiple deployment models. Hybrid cloud can also mean the ability to connect collocation, managed and/or dedicated services with cloud resources.defines a hybrid cloud service as a cloud computing service that is composed of some combination of private, public and community cloud services, from different service providers. A hybrid cloud service crosses isolation and provider boundaries so that it can't be simply put in one category of private, public, or community cloud service. It allows one to extend either the capacity or the capability of a cloud service, by aggregation, integration or customization with another cloud service.

CLOUD ARCHITECTURE

Cloud architecture, the systems architecture of the software systems involved in the delivery of cloud computing, typically involves multiple *cloud components* communicating with each other over a loose coupling mechanism such as a messaging queue. Elastic provision implies intelligence in the use of tight or loose coupling as applied to mechanisms such as these and others.



SECURITY AND PRIVACY

Cloud computing poses privacy concerns because the service provider can access the data that is in the cloud at any time. It could accidentally or deliberately alter or even delete information. Many cloud providers can share information with third parties if necessary for purposes of law and order even without a warrant. That is permitted in their privacy policies, which users must agree to before they start using cloud services. Solutions to privacy include policy and legislation as well as end users' choices for how data is stored. Users can encrypt data that is processed or stored within the cloud to prevent unauthorized access.

EMERGING TRENDS

Cloud computing is still a subject of research. A driving factor in the evolution of cloud computing has been chief technology officers seeking to minimize risk of internal

outages and mitigate the complexity of housing network and computing hardware in-house. Major cloud technology companies invest billions of dollars per year in cloud Research and Development. For example, in 2011 Microsoft committed 90 percent of its $9.6 billion R&D budget to its cloud. Research by investment bank Centaur Partners in late 2015 forecasted that SaaS revenue would grow from $13.5 billion in 2011 to $32.8 billion in 2016.

DIGITAL FORENSICS IN CLOUD

The issue of carrying out investigations where the cloud storage devices cannot be physically accessed has generated a number of changes to the way that digital evidence is located and collected. New process models have been developed to formalize collection.

In some scenarios existing digital forensics tools can be employed to access cloud storage as networked drives (although this is a slow process generating a large amount of internet traffic).

An alternative approach is to deploy a tool that processes in the cloud itself

For organizations using Office 365 with an 'E5' subscription there is the option to use Microsoft's built-in e discovery resources, although these do not provide all the functionality that is typically required for a forensic process.

Design and Development of Internet of Things in Agriculture

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India is the agriculture based country and plays an important role in economy. Two-third of the population is dependent on agriculture directly or indirectly. As the population rate goes on increasing there is a demand of the time to improve the productivity with the help of the tools and technology. It is also important to save the life of the farmer from the consequences of agriculture. Nearly, 1000 farmers across India were died due to the poisoning pesticides. By 2050, there will be 9.6 billion people in the planet. Feeding the whole worldwide population will be a central challenge for the next generations. The severe situation of many deaths of the farmers due to poisoning pesticides, lack of electricity, extreme weather conditions and rising climatic changes, and environmental impact etc. motivated the scientists to develop the technology to balance the situation of the demand for more food to be met. This article analyses how agriculture can be inter-connected with the modern technologies like Internet of Things, Drone technology (robotics) and solar energy.

DRONE TECHNOLOGY

Farmers continue to be under pressure to reduce operating costs like water and pesticides, increase yields, and create greater end-market returns all the while being more environmentally friendly. The use of drones in agriculture is allowing agriculture to become more productive through technology and protect the farmers from the chronic diseases and even from death. Agriculture Drones have shown early promise for example in aiding the detection of crop variability via automated drone flights to capture imagery followed by post-processing by sophisticated, cloud-based algorithms. The Cape Drone Tele presence and Data Mangement (DTDM) system has been proven to deliver real utility to agriculture; the technology is easy to use and provides clear operational efficiencies. The drones can play a central role in agricultural productivity and sustainability as follows

Soil and field analysis:

Drones produce precise 3-D maps for farmers to decide where to plant. After planting, soil analysis provides data for irrigation and nitrogen-level management.

Drone-planting systems can shoot pods with seeds and nutrients into the soil. Drones can scan the ground and spray the correct amount of liquid for the plants to grow. Drones provide time-series animations which show the precise development of a crop and reveal production inefficiencies. Drones with thermal sensors can identify which parts of a field are dry or need improvement. Drones also allow the calculation of the vegetation in index, which presents the relative density and health of the crops. With the drones saving farmers time, money and health there is no limitations to how drone technology use in agriculture will improve the industry.

INTERNET OF THINGS

The Internet of Things (IoT) has the capability to transform the world we live in; more-efficient industries connected cars and smarter cities are all components of IoT equation. However, the application of technology like IoT in agriculture could have the greatest impact. Smart irrigation system is that it checks the moisture present in the environment or in the water lines that have been created. The some of the devices that are for this purpose : Adreno board, Rasp-berry pi.

Raspberry pi becomes the main processing unit and place an adreno board for each of the water channels these adreno boards (addressing modes) connected to multiple sensors which are part of this water channel so what these sensors do is that they check the moisture present in these lanes as such so let's say a specific link does not meet the minimum required moisture than what it would do is that it would send a signal to the raspberry pi again all these devices are connected on the same wireless router network and the raspberry pi would identify the level of moisture and pass a signalto the relay.

The relay in turn would intitiate the water pump and water would be pumped now in order to ensure that water would be pumped now in order to ensure that water is not wasted we would create gate controls and only the gate where the moisture is less would the gate be open. Once sensor detects that the moisture level has gone beyond the required limit it would again say another signal to raspberry pi asking it stop the pump as well so this in turn helps to save a lot of water and also makes your life quite easier as well so after this your only task set up new plants and setting water channels.

APPLICATION OF IoT IN AGRICULTURE

Precision Farming

Crop Metrics is a precision agriculture organization focused on ultra-modern agronomics solutions. The products and services of CropMetrics include VRI optimization, soil moisture probes, virtual optimizer PRO, and so on. VRI (Variable Rate Irrigation) optimization maximizes profitability on irrigated crop fields with topography or soil variability, improve yields, and increases water use efficiency.

Livestock Monitoring

Large farm owners can utilize wireless IoT applications to collect data regarding the location, well-being, and health of their cattle. It also lowers the labor costs as ranchers can locate their cattle with the help of IoT based sensors.

Smart Greenhouses

Greenhouse farming is a methodology that helps in enhancing the yield of vegetables, fruits, crops, etc. Greenhouses control the environmental parameters through manual intervention or a proportional control mechanism.

SOLAR ENERGY

While the shift towards solar energy is a wise move, as India is endowed with unlimited sunshine for most of the year than any country. Solar energy is renewable energy source supply solar electricity to many applications, ranging from systems supplying power to city buildings to systems supplying power to remote telecom relay stations.

Solar electricity is created by using Photovoltaic (PV) solar panels which use sunlight to power ordinary electrical equipment, for example, household appliances ,electrical water pumps in agricultural fields or solar installing electricity thermal technology used for space heating and hot water production. A PV cell consists of two or more thin layers of semi-conducting material, most commonly silicon. When the silicon is exposed to light, electrical charges are generated and this can be conducted away by metal contacts as direct current (DC).The electrical output from a single cell is small, so multiple cells are connected together and encapsulated (usually behind glass) to form a module (sometimes referred to as a "panel"). The PV module is the principle building block of a PV system and any number of modules can be connected together to give the desired electrical output.

To some extent, India's solar industry is weak in terms of its backward linkage (that is, which provides goods and services for its production activities). The basic primary input for solar cells is pure silicon, a product India is yet to optimize its production in. By contrast, among the high technology export items, silicon invariably figures as a bulk item of 'high technology chemical export' in developed countries like the USA, Germany and Japan. China has recently entered this export market and has nearly mastered these technologies, India lags behind in this aspect.

Thus, if India does not intend to repeat the mistakes of its mobile revolution, Indian policy-makers need some serious introspection for promoting the growth of the domestic solar industry and it must be regarded if such solar power plant electricity generators are used in the agricultural farms, it would help the farmers and the rural people to make their life easier.

Internet of Things in Agriculture is an idea that intends to increase the productivity of crops and creates major and modern changes in the intensive farming practices. Solar energy is supposed to participate importantly in the global energy supply over the next century, as society transitions away from the use of fossil fuels. To achieve this, Indian government have to work on it and establish the technological processes and industrial equipments and scientists have to work to capture, transfer and store energy with maximum efficiency at affordable cost. And the major reform is the use of agricultural drones. All we need to do is conducting some basic awareness classes for the farmers on operation of drones and developing some easy possessed technological things that can be easily accessed or operated by farmers with basic knowledge.

Quantum Computing and DNA Computing: A Boom to Global Technology

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INTRODUCTION

Quantum computing is essentially harnessing and exploiting the amazing laws of quantum mechanics to process information. A traditional computer uses long strings of “bits,” which encode either a zero or a one. A quantum computer, on the other hand, uses quantum bits, or qubits. Well a qubit is a quantum system that encodes the zero and the one into two distinguishable quantum states. But, because qubits behave quantumly, we can capitalize on the phenomena of "superposition" and "entanglement." These word rather seem convincing about something better than our classical computers.. but why do we need other types of computers?

Well, calculating the prime factors for large numbers can be done in quantum computing. We may ask if our supercomputers can’t do the work. It becomes increasingly difficult for conventional computers to factor them. Once you reach a certain number of digits, you find that it would take even the fastest conventional computer months, years, centuries, millennia, or even countless eons to factor it. Other problems related to modern science and mathematics include certain molecular modelling and mathematical optimization problems which promise to crash any supercomputer that dares to come anywhere near them. All these drawbacks can be overcome by replacing them with a high defined Quantum computer. But what is stopping us from putting this theory into practice?

The main initiative that led to the development of this theory relates back to quantum mechanics.Quantum mechanics is a fundamental theory in physics which describes nature at the smallest scales of energy levels of atoms and subatomic particles. However, quantum mechanics allows the qubit to be in a coherent superposition of both states/levels at the same time, a property that is fundamental to quantum mechanics and thus quantum computing.

PRINCIPLES OF OPERATION

Quantum superposition is a fundamental principle of quantum mechanics. It states that, much like waves in classical physics, any two (or more) quantum states can be added together ("superposed") and the result will be another valid quantum state; and conversely, that every quantum state can be represented as a sum of two or more other distinct states. The non-classical nature of the superposition process is brought out clearly if we consider the superposition of two states, *A* and *B*, such that there exists an observation which, when made on the system in state *A*, is certain to lead to one particular result, *a* say, and when made on the system in state *B* is certain to lead to some different result, *b* say. What will be the result of the observation when made on the system in the superposed state? The answer is that the result will be sometimes *a* and sometimes *b*, according to a probability law depending on the relative weights of *A* and *B* in the superposition process. It will never be different from both *a* and *b* . The intermediate character of the state formed by superposition thus expresses itself through the probability of a particular result for an observation being intermediate between the corresponding probabilities for the original states, not through the result itself being intermediate between the corresponding results for the original states.This principle of superposition gives the qubits its traits in behaving like bits in a classical computers which represent the binary code.

ENTANGLEMENT

An important distinguishing feature between qubits and classical bits is that multiple qubits can exhibit quantum entanglement. Quantum entanglement is a nonlocal property of two or more qubits that allows a set of qubits to express higher correlation than is possible in classical systems. Entanglement is an extremely strong correlation that exists between quantum particles — so strong, in fact, that two or more quantum particles can be inextricably linked in perfect unison, even if separated by great distances. The particles remain perfectly correlated even if separated by great distances. The particles are so intrinsically connected, they can be said to “dance” in instantaneous, perfect unison, even when placed at opposite ends of the universe. This seemingly impossible connection inspired Einstein to describe entanglement as “spooky action at a distance

While using the internet, it is easy to send details from one direction but difficult but not impossible to decode it from the other direction. The may lead to breach of ones data. Hacking is usually done by factorising large prime numbers,which becomes easy with quantum computing. large companies like IBM google and many start-ups like rigetti are racing to find a solution to this obstacle. Though

this kind of model is difficult to build, IT companies argue that trials for achieving this technology should start somewhere.

There is no doubt that this technology is going to take aeons to build but that doesn't prevent us from finding other alternatives.DNA computing is one such alternative.

MOLECULAR COMPUTING

DNA computing is a branch of computing which uses DNA, biochemistry, and molecular biology hardware, instead of the traditional silicon-based computer technologies. Research and development in this area concerns theory, experiments, and applications of DNA computing. The term "molectronics" has sometimes been used, but this term had already been used for an earlier technology, a then-unsuccessful rival of the first integrated circuits; this term has also been used more generally, for molecular- scale electronic technology. This field was initially developed by Leonard Adleman of the University of Southern California, in 1994. Adleman demonstrated a proof-of-concept use of DNA as a form of computation which solved the seven-point Hamiltonian path problem. In 2002, researchers from the Weizmann Institute of Science in Rehovot, Israel, unveiled a programmable molecular computing machine composed of enzymes and DNA molecules instead of silicon microchips. On April 28, 2004, Ehud Shapiro, Yaakov Benenson, Binyamin Gil, Uri Ben-Dor, and Rivka Adar at the Weizmann Institute announced in the journal Nature that they had constructed a DNA computer coupled with an input and output module which would theoretically be capable of diagnosing cancerous activity within a cell, and releasing an anti-cancer drug upon diagnosis. In January 2013, researchers were able to store a JPEG photograph, a set of Shakespearean sonnets, and an audio file of Martin Luther King, Jr.'s speech I Have a Dream on DNA digital data storage.

In March 2013, researchers created a transcriptor (a biological transistor).

In August 2016, researchers used the CRISPR gene-editing system to insert a GIF of a galloping horse and rider into the DNA of living bacteria.

IDEA AND DEVELOPMENT

The organisation and complexity of all living beings is based on a coding system functioning with four key components of the DNA-molecule. Because of this, the DNA is very suited as a medium for data processing. According to different calculations a DNA-computer with one liter of fluid containing six grams of DNA could potentially have a memory capacity of 3072 exabytes. The theoretical maximum data transfer speed would also be enormous due to the massive parallelism of the calculations. Therefore, about 1000 petaFLOPS could be reached, while today's most powerful computers do not go above a few dozen (99 petaFLOPS being the current record). In 1994 Leonard Adleman presented the first prototype of a DNA-Computer. The TT-100 was a test tube filled with 100 microliters of a DNA-solution. He managed to solve for example an instance of the directed Hamiltonian path problem.

In another experiment a simple version of the "travelling salesman problem" was "solved". For this purpose, different DNA-fragments were created, each one of them representing a city that had to be visited. Every one of these fragments is capable of a linkage with the other fragments created. These DNA-fragments were produced and mixed in a test tube. Within seconds, the small fragments form bigger ones, representing the different travel routes. Through a chemical reaction (that lasts a few days), the DNA-fragments representing the longer routes were eliminated. The remains are the solution to the problem. However, current technical limitations prevent evaluation of the results. Therefore, the experiment isn't suitable for application, but it is nevertheless a proof of concept. Scientists could manage to develop this system to play a tic tac toe game and a DNA-based artificial neural network that can recognize 100-bit hand-written digits. A partnership between IBM and Caltech was established in 2009 aiming at "DNA chips" production. A Caltech group is working on the manufacturing of these nucleic-acid-based integrated circuits. One of these chips can compute whole square roots .A compiler has been written in Perl.

The slow processing speed of a DNA-computer (the response time is measured in minutes, hours or days, rather than milliseconds) is compensated by its potential to make a high amount of multiple parallel computations. This allows the system to take a similar amount of time for a complex calculation as for a simple one. This is achieved by the fact that millions or billions of molecules interact with each other simultaneously. However, it is much harder to analyze the answers given by a DNA-Computer than by a digital one.

CONCLUSION

All these technologies promise us a blooming future . though they are at their infant stage, if completely developed,they might replace classical computer. Quantum computing is paving its way in helping us solve complex problems in a very less time. On the other hand DNA computing , though it takes a lot of time, helps give accuracy and enables us to do many tasks at one time. these technologies remind us of the time when our classical computers took up an entire room and are now replaced by much smaller devices. It was just a matter of time when the latter was developed. We can expect the same from these evolving concepts.

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In-Built GPS and Cancer detecting pills

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Abstract --- The system proposed in this paper is an advanced solution for detecting some fatal problems in the body in advance. The technology behind this is introducing a GPS inside our body which stays for long inside our stomach and can pinpoint the location of ingestible implants inside the body using low-power wireless signals. The device is called Re-mix. To test ReMix, Katabi's group first implanted a small marker in animal tissues. To track its movement, they used a wireless device that reflects radio signals at the patient, and a special algorithm to pinpoint the exact location of the marker. The team used a wireless technology that they've previously demonstrated to detect heart rate, breathing and movement. Interestingly, the marker inside the body does not need to transmit any wireless signal. It simply reflects the signal transmitted by a device outside the body, without needing a battery or any other external source of energy .Google is working on a nanoparticle pill that could identify cancers, heart attacks and other diseases before they become a problem. The pill would contain magnetic particles approximately 10,000 times smaller than the width of a human hair. These tiny particles will have antibodies or proteins attached to them that detect the presence of "biomarker" molecules inside the body that indicate diseases such as cancer or an imminent heart attack."Essentially the idea is simple; you just swallow a pill with the nano particles, which are decorated with antibodies or molecules that detect other molecules, explained Andrew Conrad, head of life sciences inside the Google's "moonshot" X research lab to WSJD Live conference in California Tuesday. "They course through your body and because the cores of these particles are magnetic, you can call them somewhere and ask them what they saw." "If you look at your wrist you can see these superficial veins – just by putting a magnet there you can trap [the nanoparticles]," Conrad said explaining that a wrist-worn device like a smart watch could be used to read what the particles have detected on their trip through the blood stream."We ask them: Hey, what did you see? Did you find cancer? Did you see something that looks like a fragile plaque for a heart attack? Did you see too much sodium?" said Conrad. It is worth of 10 percent of economy of the developed nations. It is part of the move away from reactive medicine, which treats diseases once they have become serious enough to cause symptoms for patients prompting them to go and see a doctor and towards pre-emptive medicine, which catches signs of disease much earlier, before it becomes a problem. Pre-emptive or proactive medicine will require new ways of monitoring the normal health of individuals so that changes, even small ones, can be detected. Google's "Baseline" health study unveiled in July is part of this effort and another project from Google's X lab, which now has a team of around 100 scientists, including Conrad, who was the chief scientific officer of a diagnostics lab firm LabCorp, which previously developed a cheap test for HIV. This prototype of İntroducing a GPS inside our body and cancer detecting pills is trying to meet all objectives derived and planned. The projects are approaching the stage of implementation in a faster rate and will be coming to use in real system implementation

Keywords- In-built GPS (03), Cancer detecting pills (09),Re-mix (03), nanoparticle (10)

INTRODUCTION

Medical processes like imaging often require cutting someone open or making them swallow huge tubes with cameras on them. But with some new technological inventions we could get the same results with methods that are less expensive and invasive. Researchers from MIT's Computer Science and Artificial Intelligence Laboratory (CSAIL) led by professor Dina Katabi are working on exactly that with ReMix, a system that they describe as an "in-body GPS." ReMix can pinpoint the location of ingestible implants inside the body using low-power wireless signals. In animal tests the team demonstrated that they can track implants with centimeter-level accuracy, and said that one day similar implants could be used to deliver drugs to specific regions in the body. Researchers from the Massachusets Institute of Technology Institute of Technology Brigham and Women's Hospital and the Charles Stark Draper Laboratory have developed the means to wirelessly power electronic devices that stay in the digestive tract indefinitely. The team suggests that these devices could be used as sensors in the GI tract or carry drugs to be delivered over a controlled period of time. "If we're proposing to have systems reside in the body for a long time, power becomes crucial," co-senior author Giovanni Traverso said in prepared remarks. "Having the ability to transmit power wirelessly opens up new possibilities as we start to approach this problem."The team published their work in the journal *Scientific Reports*. They developed a way to wirelessly transfer power from an antenna outside of the body to another antenna inside the patient's digestive tract. The team has previously explored galvanic cells as a power source for ingestible electronics. However, the metal electrodes in that type of battery eventually stops working. So the researchers set out to engineer a way they could avoid using electrodes. They decided to explore midfield transmission as a way to transfer power between antennas. Using this method, the team delivered 100 to 200 microwatts of power to their

device, which is suitable for small electronics.In a pig model, the external antenna was able to transfer power from 2 to 10 centimeters away. The team added that the energy transfer did not cause any tissue damage."We're able to efficiently send power from the transmitter antennas outside the body to antennas inside the body, and do it in a way that minimizes the radiation being absorbed by the tissue itself," Abid said.

A DRUG POWERED BY STOMACH ACID

The citric acid from the lemon allows a small electrical current to flow between the electrodes. Using this idea, the researchers attached zinc and copper electrodes to the ingestible sensor they created. The stomach acid receives the zinc ions and powers the voltaic . MIT and Brigham and Women's Hospital researchers have announced an ingestible device innovation: a small voltaic cell that can withstand the acidity of fluids in the stomach and still transmit information to a base station.The small device can stay in the gastrointestinal tract for long periods of time and can produce enough power to operate small sensors or drug delivery devices. Researchers say that this power is a safer and cheaper alternative to the batteries that are used to power devices now. To replicate that strategy, researchers attached zinc and copper electrodes to the surface of the ingestible sensor. The zinc emits ions into the acid in the stomach to power the voltaic circuit, generating enough energy to power a commercial temperature sensor and a 900-mega-hertz transmitter. While in the stomach, the voltaic cell produced enough energy to power a temperature sensor, and to wirelessly transmit the data to a base station located two meters away, with a signal sent every 12 seconds. Once the device moved into the small intestine, which is less acidic than the stomach, the cell generated only about 1/100 of what it produced in the stomach.

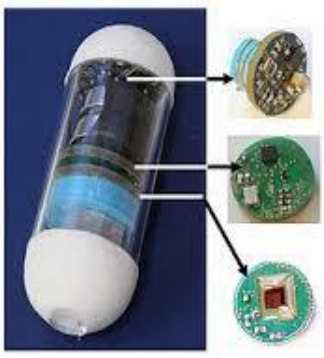

Figure 1- GPS pill

The current prototype of the device in figure 1 is a cylinder about 40 millimeters long and 12 millimeters in diameter, but the researchers anticipate that they could make the capsule about one-third that size by building a customized integrated circuit that would carry the energy harvester, transmitter, and a small microprocessor. A challenge in implantable medical devices involves managing energy generation, conversion, storage, and utilization. This work will enable researchers to envision new medical devices where the body itself contributes to energy generation, enabling a fully self-sustaining system. Once the researchers miniaturize the device, other types of sensors can be added, and it could be developed for applications such as long-term monitoring of vital signs. For example, a self-powered pill could monitor vital signs from inside the body for a couple of weeks, making measurements and transmitting them to a mobile phone. Such devices could also be used for drug delivery. The power generated by the voltaic cell could release drugs encapsulated by a gold film. This could be useful for situations in which doctors need to try different dosages of a drug, such as medication for controlling blood pressure.

CANCER DETECTING PILLS

Google may be best known for search and its crazy employee perks, but the company is constantly cooking up far-out, big-picture, enormously ambitious projects. Self-driving cars,Face computers .Contact lenses that measure glucose levels in a wearers' tears.Now comes word of another moonshot project from the company's Google X division: an ingestible disease-detecting pill containing thousands of microscopic magnetic particles that course through a person's bloodstream in search of malignant cells, according to the *Associated Press*. Early detection of cancers increases the chance for successful awareness to better treatment. But some cancer patients' lifestyle was almost free of risk, there is not a fair reason to have cancer. It would be the main reason to fail the diagnosis of cancer in early stages. The effort to develop a better way to detect cancer was inspired by the experience of Google engineer Tom Stanis

If the nanoparticles find an early indication of a disease, they send out signals that can be picked up by a wearable device.He said the team is working on the nanoparticle project includes a cancer specialist and other doctors, as well as electrical and mechanical engineers and an astrophysicist who has been advising on how to track the particles through the body.Google is hardly working on a pill looks for cancers in the human body. They plan to design this pill to detect

the presence of malignant cells and other signs of diseases like imminent heart attacks and other non-communicable diseases.

Figure-2 Cancer detecting pills

Actually, they are successfully building an easy, accurate and smart way to catch cancer earlier in the molecule levels by constantly monitoring the patient's blood. Google's pill aims to change the strategy from reactive to proactive -- adopting a "preventative maintenance" approach – by continuously monitoring the body for disease triggers, so they can be identified and treated as soon as they appear. The pill would contain tiny magnetic nanoparticles that would travel through a person's bloodstream and search for cancerous cells. The nanoparticles findings would be transmitted to a wearable sensor, the Associated Press reported. The objective of the team at Google's X lab is to improve on single-sample blood tests that aren't comprehensive enough to detect the early stages of many types of cancer.

WORKING OF CANCER DETECTING PILLS

As many as 2,000 of these microscopic "nanoparticles" could fit inside a single red blood cell to provide doctors with better insights about what is happening inside their patients.The designed cancer detecting pill by Google X labs, can send microscopic particles into the patient's bloodstream and they can identify the presence of chemicals and the cells associated with diseases. The pill contains nanoparticles that combine a magnetic material with antibodies or proteins that can attach to and detect other molecules inside the body. Patients should swallow this pill. After the nanoparticles released into the bloodstream, it attempts to identify the affected molecule in the body.There is another wearable magnetic bracelet handover to the patient. They have to wear it on their wrist. This bracelet has an ability to gather the nanoparticles back together.

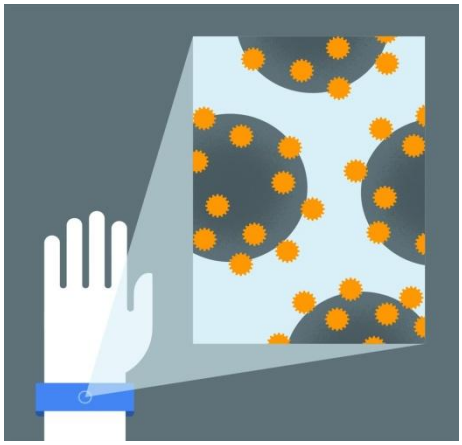

Figure-3-Nano particles sending Signal to the wrist band

Actually, the nanoparticles draw to the skin area to the part of the magnetic core of this bracelet. They can send their signals to the wristband. The wristband can also read and analyse the details that the nanoparticles found. It should inspect the body one or more times a day. Google believes the cancer-detecting nanoparticles can be coated with antibodies that bind with specific proteins or cells associated with various maladies. The particles would remain in the blood and report back continuously on what they find over time while a wearable sensor could track the particles by following their magnetic fields and collecting data on their movement through the body. Data from the sensor could be uploaded or stored on the Internet until it can be interpreted by a doctor The goal is to get a fuller picture of the patient's health than the snapshot that's obtained when a doctor draws a single sample of blood for tests that aren't comprehensive enough to spot the early stages of many forms of cancer.

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An outline on Solar Energy harvesting

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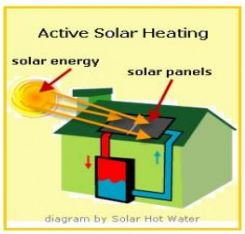
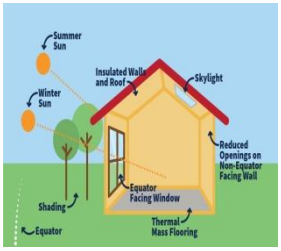
Solar energy is radiant light and heat from the Sun that is harnessed using a range of ever-evolving technologies such as solar heating, photovoltaic, solar thermal energy, solar architecture, molten salt power plants and artificial photosynthesis. It is an important source of renewable energy and its technologies are broadly characterized as either passive solar or active solar depending on how they capture and distribute

solar energy or convert it into solar power.

Active solar techniques include the use of photovoltaic systems, concentrated solar power and solar water heating to harness the energy. Passive solar techniques include orienting a building to the Sun, selecting materials with favorable thermal mass or light-dispersing properties, and designing spaces that naturally circulate air.



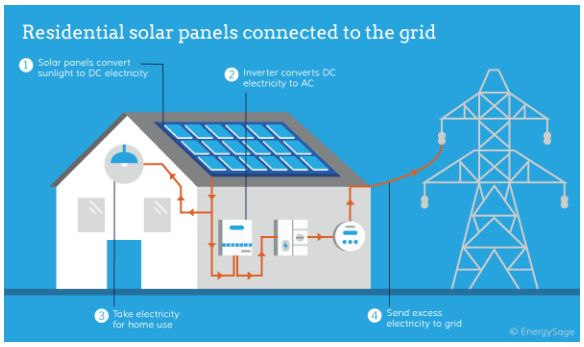


The large magnitude of solar energy available makes it a highly appealing source of electricity. The United Nations Development Programme in its 2000 World Energy Assessment found that the annual potential of solar energy was 1,575–49,837 exajoules (EJ). This is several times larger than the total world energy consumption, which was 559.8 EJ in 2012.

In 2011, the International Energy Agency said that "the development of affordable, inexhaustible and clean solar energy technologies will have huge longer-term benefits. It will increase countries' energy security through reliance on an indigenous, inexhaustible and mostly import-independent resource enhance sustainability, reduce pollution, lower the costs of mitigating global warming, and keep fossil fuel prices lower than otherwise. These advantages are global. Hence the additional costs of the incentives for early deployment should be considered learning investments; they must be wisely spent and need to be widely shared".

HOW DOES SOLAR ENERGY WORK

solar panels work by absorbing sunlight with photovoltaic cells, generating direct current (DC) energy and then converting it to usable alternating current (AC) energy with the help of inverter technology. AC energy then flows through the home's electrical panel and is distributed accordingly.



A standard solar panel consists of a layer of silicon cells, a metal frame, a glass casing and various wiring to allow current to flow from the silicon cells. Silicon (atomic #14 on the periodic table) is a nonmetal with conductive properties that allow it to absorb and

convert sunlight into electricity. When light interacts with a silicon cell, it causes electrons to be set into motion, which initiates a flow of electric current. This is known as the "photovoltaic effect," and it describes the general functionality of solar panel technology.

In the general photovoltaic process, as described in the step by step breakdown above, the silicon cell absorbs and converts sunlight into direct current (DC) electricity that is then turned into alternating current (AC) electricity with the help of a solar inverter. That AC energy is then distributed through your home's electrical panel and becomes readily available for devices and appliances to use.

In addition to silicon solar cells, a typical solar panel includes a glass casing that offers durability and protection for the silicon PV cells. Under the glass exterior, the panel has a layer for insulation and a protective back sheet, which protects against heat dissipation and humidity inside the panel. The insulation is important because increases in temperature will lead to decrease in efficiency, resulting in a lower solar panel performance.

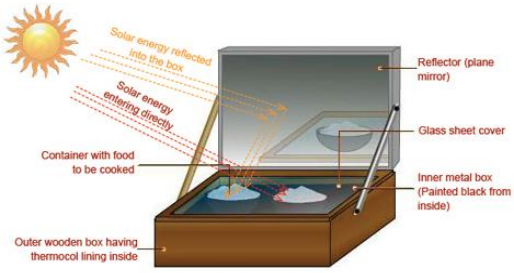
Solar panels have an anti-reflective coating that increases sunlight absorption and allows the silicon cells to receive maximum sunlight exposure. Silicon solar cells are generally manufactured in two cell formations: mono crystalline or polycrystalline. Mono crystalline cells are made up of a single silicon crystal, whereas polycrystalline cells are made up of fragments or shards of silicon. Mono formats provide more room for electrons to move around and thus offer a higher efficiency solar technology than polycrystalline, though they are typically more expensive.

ADVANTAGES

- Solar power is pollution free and causes no greenhouse gases to be emitted after installation
- Reduced dependence on foreign oil and fossil fuels
- Renewable clean power that is available every day of the year, even cloudy days produce some power
- Return on investment unlike paying for utility bills
- Virtually no maintenance as solar panels last over 30 years
- Creates jobs by employing solar panel manufacturers, solar installers, etc. and in turn helps the economy
- Excess power can be sold back to the power company if grid inter tied

- Ability to live grid free if all power generated provides enough for the home / building
- Can be installed virtually anywhere; in a field to on a building
- Use batteries to store extra power for use at night
- Solar can be used to heat water, power homes and building, even power cars
- Safer than traditional electric current
- Efficiency is always improving so the same size solar that is available today will become more efficient tomorrow

- Aesthetics are improving making the solar more versatile compared to older models; i.e. printing, flexible, solar shingles, etc.
- Federal grants, tax incentives, and rebate programs are available to help with initial costs



SOLAR COOKER USAGE

DISADVANTAGES

- High initial costs for material and installation and long ROI
- Needs lots of space as efficiency is not 100% yet
- No solar power at night so there is a need for a large battery bank
- Some people think they are ugly (I am definitely not one of those!)
- Devices that run on DC power directly are more expensive
- Depending on geographical location the size of the solar panels vary for the same power generation
- Cloudy days do not produce much energy
- Solar panels are not being massed produced due to lack of material and technology to lower the cost enough to be more affordable
- Solar powered cars do not have the same speeds and power as typical gas powered cars
- Lower production in the winter months

SOLAR WATER HEATERS

Solar hot water systems use sunlight to heat water. In low geographical latitudes (below 40 degrees) from 60 to 70% of the domestic hot water use with temperatures up to 60 °C can be provided by solar heating systems. The most common types of solar water heaters are evacuated tube collectors (44%) and glazed flat plate collectors (34%) generally used for domestic hot water; and unglazed plastic collectors (21%) used mainly to heat swimming pools

USAGE OF WATER HEATERS

SOLAR WATER DISTILLATION

Solar distillation can be used to make saline or brackish water potable. The first recorded instance of this was by 16th-century Arab alchemists. A large-scale solar distillation project was first constructed in 1872 in the Chilean mining town of Las Salinas. The plant, which had solar collection area of 4,700 m^2 (51,000 sq ft), could produce up to 22,700 L (5,000 imp gal; 6,000 US gal) per day and operate for 40 years. Individual still designs include single-slope, double-slope (or greenhouse type), vertical, conical, inverted absorber, multi-wick, and multiple effect. These stills can operate in passive, active, or hybrid modes. Double-slope stills are the most economical for decentralized domestic purposes, while active multiple effect units are more suitable for large-scale applications.

Solar water disinfection (SODIS) involves exposing water-filled plastic polyethylene terephthalate (PET) bottles to sunlight for several hours. Exposure times vary depending on weather and climate from a minimum of six hours to two days during fully overcast conditions. It is recommended by the World Health Organization as a viable method for household water treatment and safe storage. Over two million people in developing countries use this method for their daily drinking water.

Solar energy may be used in a water stabilization pond to treat waste water without chemicals or electricity. A further environmental advantage is that algae grow in such ponds and consume carbon dioxide in photosynthesis, although algae may produce toxic chemicals that make the water unusable.

Solar distilled water bottles

SOLAR POWER

Solar power is the conversion of sunlight into electricity, either directly using photovoltaics (PV), or indirectly using concentrated solar power (CSP). CSP systems use lenses or mirrors and tracking systems to focus a large area of sunlight into a small beam. PV converts light into electric current using the photoelectric effect.

AGRICULTURE

Agriculture and horticulture seek to optimize the capture of solar energy in order to optimize the productivity of plants. Techniques such as timed planting cycles, tailored row orientation, staggered heights between rows and the mixing of plant varieties can improve crop yields. While sunlight is generally considered a plentiful resource, the exceptions highlight the importance of solar energy to agriculture.

During the short growing seasons of the Little Ice Age, French and English farmers employed fruit walls to maximize the collection of solar energy. These walls acted as thermal masses and accelerated ripening by keeping plants warm. Early fruit walls were built perpendicular to the ground and facing south, but over time, sloping walls were developed to make better use of sunlight. In 1699,

Greenhouses convert solar light to heat, enabling year-round production and the growth (in enclosed environments) of specialty crops and other plants not naturally suited to the local climate. Primitive greenhouses were first used during Roman times to produce cucumbers year-round for the Roman emperor Tiberius.

The first modern greenhouses were built in Europe in the 16th century to keep exotic plants brought back from explorations abroad. Greenhouses remain an important part of horticulture today, and plastic transparent materials have also been used to similar effect in poly tunnels and row covers.

Transport , Energy storage, economic development are also some of the majors factors of solar energy in the daily advancements.

ISO standards

The International Organization for Standardization has established several standards relating to solar energy equipment. For example, ISO 9050 relates to glass in building while ISO 10217 relates to the materials used in solar water heaters. India's role in advancing towards solar energy

The European Investment Bank has invested $400m in solar power in India. Many businesses are already finding rooftop installations cheaper than the grid, and roll-out projects are in the works from train stations to farms. When it comes to solar power, India is swinging for the fences. Prime Minister Narendra Modi's energy agenda has set an ambitious target for renewables, with an aim to increase renewable capacity on the grid from around 57GW in May 2017 to 175GW by the end of 2022. Around 100GW of that capacity is expected to come from solar photovoltaics (PV).The rise of solar, alongside other renewable energy sources, such as wind, is a benefit not only for a country that still uses coal for nearly 60% of its energy mix, but for the world's climate change agenda more broadly. And there are signals that significant investments and a supportive stance from governments are starting to pay off.

Falling costs are making renewables increasingly competitive with fossil fuels on a level playing field, with new solar and wind now 20% cheaper than the average wholesale price for existing coal-fired power. The transition away from fossil fuels is supported by government targets as well as changing markets – India's Central Electricity Authority has proposed the closure of nearly 50GW of coal-fired capacity by 2027.Increasingly expensive coal generation will fall further from profitability."

Speaking at the founding conference of the International Solar Alliance (ISA), Modi presented a 10-point action plan that includes making affordable solar technology available to all nations, raising the share of electricity generated from photovoltaic cells in the energy mix, framing regulations and standards, consultancy support for bankable solar projects and creating a network of centres for excellence.

"First of all, we should ensure cheap and easy availability of solar technology. The solar ratio in the energy mix should be increased and innovation should be encouraged so that solutions for our various needs can be provided," he said..

"We should work for increased participation and inclusiveness. We should build a comprehensive network of centres of excellence keeping local circumstances and factors in mind. We should look at our solar energy policy development in totality so that this can play a role in meeting the SDGs (Sustainable Development Goals of the UN)."

Launched by Modi and then French President Francois Hollande in 2015, the ISA was conceived as a coalition of solar resource-rich countries to address their special energy needs and provide a platform to collaborate on dealing with the identified gaps through a common, agreed approach.

"Of the 121 prospective nations, 61 have joined the alliance, 32 have also ratified the framework agreement. But in this alliance our biggest partner is the sun god which spreads light outside and gives strength to our resolve," Modi said.

"Even before life first opened its eyes on earth, for ages the sun has been enlightening and enriching people. From Japan to Peru, be it Greece or Rome, Egypt, Incas and the ancient Mayan culture, every civilization has glorified and given importance to the sun.

"However, in India, from thousands of years ago, the central place that has been given to the sun is unparalleled. From thousands of years ago, the Vedas in India have seen the sun as the soul of the world.

"In India, the sun has always been seen as the nurturer of life. Today, when we are trying to find paths to fight challenges like climate change, we have to look at this ancient idea."

Stating that a green future will depend on "what we can all do together", Modi said in India work had started on the world's largest new energy initiative.

"By 2022, we will generate 175 GW of renewable energy of which 100 GW will be solar power," he said. "Of this, we have already met a target of 20 GW of installed solar power."

"The Solar Study Lamp Scheme has benefitted seven million school going children.

"We need a solar revolution not only in India but in the world," the Prime Minister asserted.

"I am happy to announce that India will provide 500 training slots per year for ISA member states."

Modi said 13 solar projects by India across the world worth $143 million have been completed or are in the process of being executed.

India, he said, would give $1.4 billion in aid to 15 other developing nations for 27 more solar projects.

"We have set up a project preparation facility consultancy support to partner countries in designing bankable projects.

RESOUCES

1) https://en.wikipedia.org/wiki/Solar_energy
2) https://www.sepco-solarlighting.com/blog/.../Solar-Power-Advantages-and-Disadvantage.

A brief introduction on applications of Nanotechnology

B.PALLAVI AND V.PRIYARSHA

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One of the outstanding features of technological progress in the last century is the continuous miniaturizing of technical devices and components. On 29th December 1959,physicist and Nobel laureate, RICHARD FEYMANN presents a visionary and prophetic lecture at the annual meeting of American physical society ,entitled " THERE IS A PLENTY OF ROOM AT THE BOTTOM ". He said "..the principle of physics, as far as I can see don't speak against the possibility of maneuvering things atom by atom".

In recent years ,the term" NANOTECHNOLOGY" has increasingly been used to describe any nano scale products ,from thin coatings to tiny particles and any tiny objects in general. Thus NANOTECHNOLOGY has been developing along two different lines .One of them is leading to technological developments on the nanometer scale ,usually 0.1-100 nm .Much of current interest and enthusiasm is focussed on this. The other line anticipates designing and building atom by atom , Nano machines and devices which would along bring in the next industrial evolution.

$1nm=10^{-9}m=10^{-3}\mu m=10Å$

A single human hair is about 80000nm wide and a red blood cell is approximately 7000nm wide. The term nanotechnology was first coined in 1974 By NORIO TANIGUCHI of the TOKYO SCIENCE UNIVERSITY. In 1986 , K.ERIC DREXLER wrote "ENGINES OF CREATION" and popularized the term NANOTECHNOLOGY .Originally nanotechnology meant building things from the bottom up starting from molecular level while it implies nowadays the study control of phenomena and materials at length scales below 100 nm.

There are two types of nanotechnology:

MOLECULAR NANOTECHNOLOGY

This technology is a hypothetical advanced form of nanotechnology that is believed will be developed in the future. Nanotechnology aims at building machines on the scales of molecules, a few nanometers wide. Motors, robots arms , and even whole computers far smaller than a cell.

NANO BULK TECHNOLOGY

The broadened version of the technology may be more properly called "NANOSCALE BULK TECHNOLOGY". It exploits the storage properties of nano scale materials to produce nano useful products.

Nanotechnology is the design, characterization, production and application of structures , devices and systems by controlling shape and size at the nanometer scale.

"I WANT TO BUILD A BILLION TINY FACTORIES , MODELS OF EACH OTHER, WHICH ARE MANUFACTURING SIMULTANEOUSLY ……..THE PRINCIPLES OF PHYSICS, AS FAR AS I CAN SEE, DO NOT SPEAK AGAINST THE POSSIBILITY OF MANEUVERING THINGS ATOM BY ATOM. IT IS NOT AN ATTEMPT TO VIOLATE ANY LAWS; IT IS SOMETHING IN PRINCIPLE THAT CAN BE DONE; BUT IN PRACTICE , IT HAS NOT BEEN DONE BECAUSE WE ARE TOO BIG.

----------RICHARD FEYMANN

(NOBEL PRIZE WINNER IN PHYSICS)

FOUR GENERATIONS OF NANOTECHNOLOGY DEVELOPMENT

The nanotechnology as it is evolving nowadays has been developing through the following stages. Starting with the nano bulk scale technology, we ultimately end up in molecular nano technology.

1. The first phase is that of passive nanostructures, materials designed to perform one task.

2.The second phase introduces active nanostructure for manufacturing for example, actuators, drug delivery devices and sensors.

3. The third phase will feature nano systems with thousands of interacting components.

4.A few years after that, the first integrated nano systems, functioning much like a mammalian cell with hierarichal systems into systems, are expected to be developed.

WHY TECHNOLOGY?

With nanotechnology it is possible to control matter on every important length scale, enabling tremendous new power in materials design. It is also possible to produce composites that combine the most desirable properties of very different materials to obtain characteristics that are equally greatly improved over that nature supplies or that appear in combinations nature does not produce.

As on date , nanotechnology is still in its infancy. It has a great potential for producing improvements and innovations in many areas of our lives.

PRODUCTION TECHNIQUES

1. BOTTOM UP TECHNIQUE: It is a technique in which materials and devices are built up atom by atom. The amount of information that could be stored in devices build from bottom up approach would be enormous.

a. Molecular self assembly: It is the assembly of molecule without guidance or management from an outside source.

b. Positional assembly: It implies development of molecular robotics.

Example : robotic devices that are molecular both in their size and precision.

2. TOP DOWN TECHNIQUE: It is a technique in which devices are fabricated by removing existing material from larger entities.

a. Lithography: It is a technique that generates pattern on the surface which is used in fabricating integrated circuits.

"IN LITHOGRAPHY THE PHOTOSENSITIVE METAL USED IS TYPICALLY A PHOTORESIST . WHEN RESIST IS EXPOSED TO UV RADIATION SOURCE, THE CHEMICAL RESISTANCE OF THE RESIST TO DEVELOPER SOLUTION CHANGES**."**

b. Nano print technology: it is low cost , high production rate technology. It patterns a resist by physically deforming the resist shape with a mold having a nano pattern on it. It can produce patterns having 10 nm resolution at low cost because it does not require the use of sophisticated radiations beams for generating patterns.

c. Dip pen technology: It is a lithography techniques where photo resist is not used.

METAL NANOCLUSTERS

Condensed "hard" matter nano particles are generally termed n a no clusters. A nano cluster is a nanometer sized particle made up of equal submits.

PROPERTIES OF NANOCLUSTERS

1 .Magic number

2. Jellium model

3. Geometric structure

4. Inter particle spacing

5. Melting temperatures

6. Reactivity and catalytic properties

7. Optical properties

8 .Magnetic properties

9. Mechanical properties

APPLICATIONS OF NANOMATERIALS

1. Tougher and harder cutting tools

2. Better insulation materials

3.Ductile,machinable, ceramics

4. Low cost flat panel electronic displays

5. Elimination of pollutants

6. High power magnets

7 .High energy density batteries

8. High sensitive sensors

9. Stereospace components with enhanced performed characteristics

10. Sunscreen

11. Self cleaning glass

12. Clothing

13. Scratch resistant coatings

ADVANTAGES OF USING NANOTECHNOLOGY IN ELECTRONICS

1.Increasing the density of memory chips.
2.Decreasing the weight and thickness of screens.

3. Nanolithography is used for the fabrication of chips

4. Reducing the size of transistors used in circuits.

5. Improving display screens on electronic devices

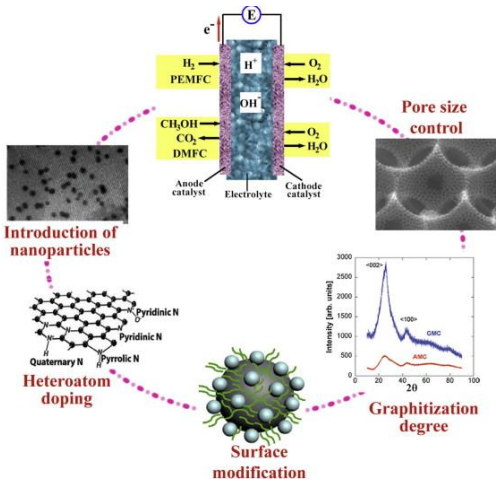
6. Reducing power consumption.

WAYS OF IMPROVING NANOELECTRONICS

1. Allowing more transistors to be packed into a single chip, allows a high electron mobility
2. A higher dielectric constant (faster frequency)
3. Single electron transistors
4. Using electrodes made from nano wires
5. Using nano -sized magnetic rings

NEED OF NANOTECHNOLOGY IN ELECTRONICS

1. Today microelectronics are used and they solve our most of the problems.



2. The two exceptional disadvantages of microelectronics are, physical size and increasing cost of fabrication of integrated circuits.

3. To overcome these disadvantages nanotechnology can be used.

A Brief Introduction to Artificial Intelligence

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Artificial intelligence (AI) is the study of computer systems that attempt to model and apply the intelligence of the human mind. AI is a branch of computer science dealing with the simulation of intelligent behavior in computers i.e., the capability of a machine to imitate intelligent human behavior. Google Now, Siri and Cortana are all intelligent digital personal assistants on various platforms (iOS,Android,and Windows mobile). They help in finding useful information when we ask for it using our voice.

IMPORTANCE OF AI IN OUR DAILY LIFE

AI Used in Bank and Financial System

Banks are using AI technology to handle numerous activities. They handle work like financial operations, Money investing in stocks, Managing different properties and much more. Using AI to handle these activities beat a human in trading challenges. Using AI in the bank helps the bank to handle their customer and give them a quick solution

Use of AI in Medical Science

AI technology changes the face of medical science. There is a number of application in which AI are used and give incredible value. In medical science AI is used to create virtual personal health care assistant. They are used for research and analytics. Even Healthcare bots are also introduced to give customer support. Bot are used for scheduling an appointment in hospitals. And the most important thing they give 24/7 assistance.

Heavy Industries

Today in most of the big manufacturing company AI are mostly used in the production unit. They are used as a robot who give a different shape to an object, who displace object from one place to another, they are used as a convey belt and much more.

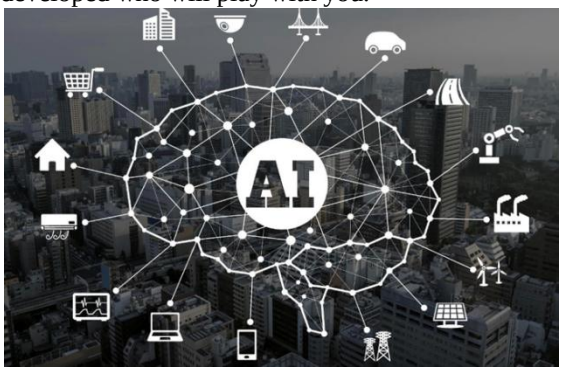
If they are used in management system also. They are used to keep the records of the employee. They are used to extract correct data for decision making of the company. Using AI in the big industry help them to complete their task in time and helps business to get proper leads generation.

Role of AI in Air Transport

One of the most systematic transport is air transport. And without AI air transport can't survive. A machine which is used in the plans for performing different functions is run on the basis of AI. All most all the activity which performed to control air transportation is based on AI technologies. There are different software designed on the AI platform to give better flight to passengers and feel free from the danger.

AI role in Gaming Zone

Computer and TV games got more development and updates in their fields. There was a time when "Super Mario" was considered as the best game. But nowadays there are different gaming bots are introduced and you don't have to weight for other to play with yours. Bot are developed who will play with you.



EARLY HISTORY

In 1950 english mathematician Alan Turing wrote a landmark paper titled "Computing machinery and Intelligence"that asked the question : "Can machines think ?". Further work came out of a 1956 workshop at Dartmouth sponsored by John McCarthy. In the proposal for that workshop ,he coined the phrase a "study of Artificial Intelligence". 1941:Development Of The Electronic Computer

Some trace the origin to John Atanasoff and Clifford Berry at Iowa State University.Required large,separate air-conditioned rooms,and separate configuration of thousands of wires.The data fed into systems by punched cards.

1949:FirstCommercial, Stored Program Computer

It made job of entering a program easier and advancements in computer theory-computer science(and eventually to AI).Invention of means of processing data makes AI possible.

1956:Dartmouth Conference

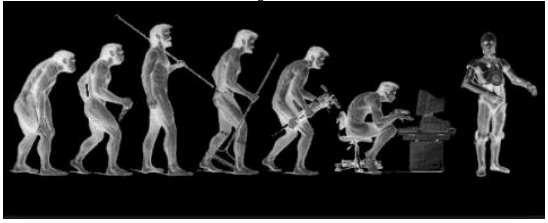
John McCarthy ("father of AI")organizes conference.A month of brain storming in VT.Talent and expertise of others interested in machine intelligence,its biggest gain is that the field is now called Artificial Intelligence.

1958:Lisp Language Developed

McCarthy announces new development:LISP language,and it is still used today.LISt Processing-language of choice among AI developers.

1963:Start Of DoD's Advanced Research Projects

MIT receives 2.2 million dollar grant from US govt. to research Machine-Aided Cognition(AI),from dept. of defense.US wants to stay ahead of Soviet Union.

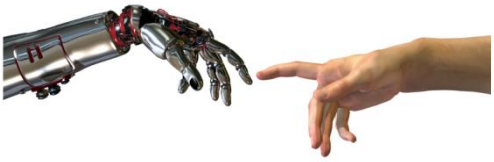


1968:MicroworldProgram,SHRDLU Created
SHRDLU part of microworlds project-research & programming in small worlds.When confined to small subject matter,computer programs can solve spatial and logic programs.

1970:First Expert System
Predicts the probability of a solution under the set conditions,potential to interpret statistics,formulate rules.Over course of 10 years ,can forecast stock markets,aid doctors in diagnosis,show miners promising mineral locations.And conditional rules and storage of information.
1972:PROLOG Language Revealed
It is a general logic programming language,represented as facts and rules.Developed in France,it remains one of most possible programming languages today .
1986:AI Based Hardware Sells $425 Million to Companies
Expert systems in particular demand.DuPont,General Motors,Boeing rely heavily on export systems.Companies develop that specialize in creating software that aids in producing expert systems.
1991:AI Military Systems Used Effectively in DESERT STORM
Used in missile systems,heads-up-displays,ets.AI truly put to the test.
AI System Beats Human Chessmaster
AI system placed against a human chessmaster to see who would win,AI wins –shows skills & abilities.

THE RISE OF ARTIFICIAL INTELLIGENCE
AI have taken many shapes and forms over recent years like Mobile phone(Siri/Cortana),Video Games Characters,GPS/Voice Recognition and Robotics. Google has been a major play on AI transcendence and Deep Learning. Deep learning is a machine learning based on algorithms.

CHALLENGES
Computing Power , AI-specifically the machine learning and deep learning techniques which show the most promise,require a huge number of of calculations to be made very quickly.This means they use a lot of processing power.
Lack Of People Power as AI has been something talked about by science fiction writers and worked on in the depths of university IT research labs .In other words,without mass market use cases there has not a been a great deal of money in it (unless you are making Hollywood films about robots taking over the earth).
Building Trust,Brobst predicts that by 2020 there will be a revolt by a "noisy 10%"against the hold AI has taken over our lives."The problem is that AI is a black box-people don't feel comfortable when they don't understand how the decision was made".
One-track Minds,specialized AI ,often referred to as "applied AI",is created to carry out one specific task and learn to become better at it.It does this by simulating what would happen given every combination of input values,and measure the results,until the most effective output is achieved.Whereas,Generalised AI such as that powering robots like Star Trek's Data ,capable of turning their hand to any task just as a human can,will still be a science fiction dream for some time yet.



FUTURE OF AI
Beyond negotiation,Moore says CMU is betting several other AI areas are going to be hungry important in the near future. Self driving cars, Improved Medical Care & Treatment, Open up doors to future explorations and many such.With the rate at which technology is improving it is logical to believe AI will continue to get more and more sophisticated.

ADVANTAGES OF AI

Dealing with mundane tasks
One massive advantage of artificial intelligence is its potential to complete mundane tasks through intricate automation that will increase productivity. Theoretically this can even remove "boring" tasks from humans and free them up to be increasingly creative.
Faster decisions
Using artificial intelligence alongside cognitive technologies can help make faster decisions and carry out actions quicker.
Avoiding errors
The phrase "human error" was born because humans, naturally, make mistakes from time to time. Computers however, do not make these mistakes – that is, of course, assuming they are programmed properly. With artificial intelligence, data could be processed error-free, no matter how big the dataset might be
Taking risks on behalf of humans
With artificial intelligence, you can arguably lessen the risks you expose humans to in the name of research. Take, for example, space exploration and the Mars rover, known as Curiosity. It can travel across the landscape of Mars, exploring it and determining the best paths to take, while learning to think for itself. Using artificial intelligence in this manner could potentially lead to massive benefits in areas such as demand forecasting, medical diagnosis and oil exploration.

LIMITATIONS OF AI
Job losses
There is little doubt that artificial intelligence will displace many low-skilled jobs. Arguably, robots have already taken many jobs on the assembly line – but now this could extend to new levels. Take, for example, the concept of driverless cars, which could displace the need to have millions of human drivers, from taxi drivers to chauffeurs, very quickly. Of course some would argue that artificial intelligence will create more wealth than it destroys – but there is genuine risk that this will not be distributed evenly, particularly during its early expansion.
Distribution of power
Artificial intelligence carries the risk, in the minds of some, of taking control away from humans – de-humanising actions in many ways. Nations that are in

possession of artificial intelligence could theoretically kill humans without needing to pull a trigger.

Lack of judgement calls

Humans can take unique circumstances and judgement calls into account when they make their decisions, something that artificial intelligence may never be able to do. One example occurred in Sydney, Australia, in 2014 when a shooting drama in the downtown area prompted people to make numerous calls to Uber in an effort to escape the area. The result was that Uber's ride rates surged based on its supply and demand algorithm – there was no consideration involved for the circumstances in which the riders found themselves.

Finally we can conclude that the Artificial Intelligence (AI) is the intelligence of machines and the branch of Computer Science that aims to create it. AI systems are now in routine use in various field such as economics, medicine, engineering and the military, as well as being built into many common home computer software applications, traditional strategy games etc.

RESOURCES

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2)https://www.techopedia.com/definition/190/artificial-intelligence-ai
3)https://futureoflife.org/background/benefits-risks-of-artificial-intelligence/
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5)https://en.wikipedia.org/wiki/Artificial_general_intelligence
6)https://hackernoon.com/how-artificial-intelligence-will-change-the-human-experience
7)bigdata-madesimple.com/the-future-of-artificial-intelligence-6-ways-it-will-impact
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9)https://aitopics.org/misc/brief-history

A Note on Li-Fi: Light based communication

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In the era of overcrowded world, Li-Fi is a new way of wireless communication that uses LED lights to transmit data wirelessly. Transmission of data is one of the most important day to day activities in the fast growing world. The current wireless networks that connect us to the Internet are very slow when multiple devices are connected.

Also with the increase in the number of devices which access the Internet, the availability of fixed bandwidth makes it much more difficult to enjoy high data transfer rates and to connect a secure network. Radio waves are just a small part of the electromagnetic spectrum available for data transfer. Li-Fi has got a much broader spectrum for transmission compared to conventional methods of wireless communications that rely on radio waves. The basic ideology behind this technology is that the data can be transferred through LED light by varying light intensities faster than the human eyes can perceive. This technology uses a part of the electromagnetic spectrum that is still not greatly utilized- The Visible Spectrum, instead of Gigahertz radio waves for data transfer.

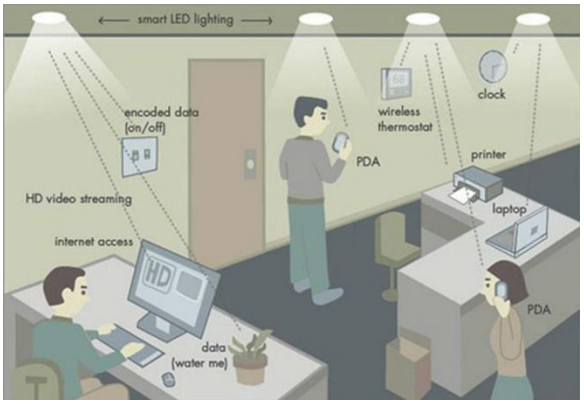
By Communication through visible light, Li-Fi technology has the possibility to change how we access the Internet, stream videos, receive emails and much more. Security would not be an issue as data can't be accessed in the absence of light. As a result, it can be used in high security military areas where RF communication is prone to eavesdropping.

Working of Li-Fi

Light Fidelity (Li-Fi) technology is a wireless communication system based on the use of visible light between the violet (800 THz) and red (400 THz). Unlike Wi-Fi which uses the radio part of the electromagnetic spectrum, Li-Fi uses the optical spectrum i.e. Visible light part of the electromagnetic spectrum. The principle of Li-Fi is based on sending data by amplitude modulation of the light source in a well-defined and standardized way. LEDs can be switched on and off faster than the human eyes can detect since the operating speed of LEDs is less than 1 microsecond. This invisible on-off activity enables data transmission using binary codes. If the LED is on, a digital '1' is transmitted and if the LED is off, a digital '0' is transmitted. Also these LEDs can be switched on and off very quickly which gives us a very nice opportunity for transmitting data through LED lights, because there are no interfering light frequencies like that of the radio frequencies in Wi-Fi. Li-Fi is thought to be 80% more efficient, which means it can reach speeds of up to 1Gbps and even beyond. Li-Fi differs from fiber optic because the Li-Fi protocol layers are suitable for wireless communication over short distances.

The working of Li-Fi is very simple. There is a light emitter on one end i.e. an LED transmitter, and a photo detector (light sensor) on the other. The data input to the LED transmitter is encoded in to the light by varying the flickering rate at which the LEDs flicker 'on' and 'off' to generate different strings of 1s and 0s. The on off activity of the LED transmitter which seems to be invisible enables data transmission in light form in accordance with the incoming binary codes: switching ON a LED is a logical '1', switching it OFF is a logical '0'. By varying the rate at which the LEDs flicker on and off, information can be encoded in the light to different combinations of 1s and 0s.

In a typical setup, the transmitter (LED) is connected to the data network and the receiver on the receiving end receives the data as light signal and decodes the information, which is then displayed on the device connected to the receiver. The receiver registers a binary '1' when the transmitter (LED) is ON and a binary '0' when the transmitter (LED) is OFF. Thus flashing the LED numerous times or using an array of LEDs will eventually provide data rates in the range of hundreds of Mbps.



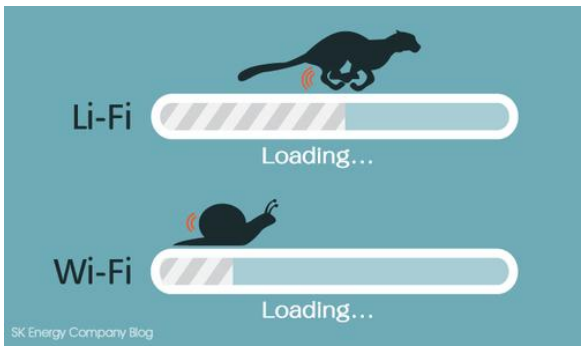
ComparisonBetween Li-Fi and Wi-Fi and other RadioCommunication

Companies are currently working on this concept, which promises to solve the problem of lack of radio spectrum, space and low internet connection speed. By deployment of this technology, we can migrate to greener, cleaner, safer communication networks. The very concept of Li-Fi promises to solve issues such as, shortage of radio-frequency bandwidth and eliminates the disadvantages of Radio communication technologies. Li-Fi is the upcoming and growing technology acting as catalyst for various other developing and new technologies. Therefore, there is certainty of development of future applications of the Li-Fi

which can be extended to different platforms and various walks of human life.

Both Wi-Fi and Li-Fi can provide wireless Internet access to users, and both the technologies transmit data over electromagnetic spectrum. Li-Fi is a visible light communication technology useful to obtain high speed wireless communication. The difference is:

Wi-Fi technology uses radio waves for transmission, whereas Li-Fi utilizes light waves. Wi-Fi works well for general wireless coverage within building/campus/compound, and Li-Fi is ideal for high density wireless data coverage inside a confined area or room and is free from interference issues unlike the Wi-Fi.



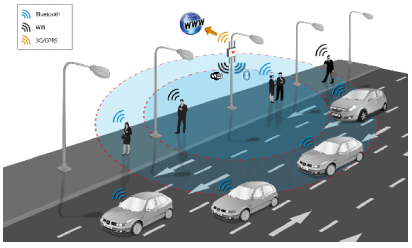
Advantagesof Li-Fi:

- security
- high speed
- availability
- cheaper

Limitationsof Li-Fi:

Some of the major limitations of Li-Fi are:

- Internet cannot be accessed without a light source. This could limit the locations and situations in which Li-Fi could be used.
- It requires a near or perfect line-of-sight to transmit data
- Opaque obstacles on pathways can affect data transmission
- Natural light, sunlight, and normal electric light can affect the data transmission



Applications of Li-Fi

a) Education systems: Li-Fi is the latest technology that can provide fastest speed for Internet access. So, it can augment/replace Wi-Fi at educational institutions and at companies so that the people there can make use of Li-Fi with the high speed.

b) Medical Applications: Operation theatres (OTs) do not allow Wi-Fi due to radiation concerns. Usage of Wi-Fi at hospitals interferes/blocks the signals for monitoring equipment's. So, it may have hazardous effect to the patient's health, due to improper working of medical apparatus. To overcome this and to make OT tech savvy Li-Fi can be used to access internet and also to control medical equipment's. This will be beneficial for conducting robotic surgeries and other automated procedures.

c) Cheaper Internet in Aircrafts: The passengers travelling in aircrafts get access to low speed Internet that too at a very high price. Also Wi-Fi is not used because it may interfere with the navigational systems of the pilots. In aircrafts Li-Fi can be used for data transmission. Li-Fi can easily provide high speed Internet via every light source such as overhead reading bulb, etc. present inside the airplane

Conclusion

Although there's still a long way to go to make this technology a commercial success, it promises a great potential in the field of wireless internet. A significant number of researchers and companies are currently working on this concept, which promises to solve the problem of lack of radio spectrum, space and low internet connection speed. By deployment of this technology, we can migrate to greener, cleaner, safer communication networks. The very concept of Li-Fi promises to solve issues such as, shortage of radio-frequency bandwidth and eliminates the disadvantages of Radio communication technologies. Li-Fi is the upcoming and growing technology acting as catalyst for various other developing and new technologies. Therefore, there is certainty of development of future applications of the Li-Fi which can be extended to different platforms and various walks of human life.

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PAPER BATTERY

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I. INTRODUCTION

A paper battery is a thin flexible energy production and storage device that is formed by combining carbon nano tubes with a conventional sheet of cellulose-based paper.In addition to being disposable,paper batteries may be floded,cut or otherwise shaped for different applications with out any loss of integrity or efficiency.

II. EASE OF USE

As sensors are increasing being embedded in everyday objects, there has been a corrersponding need for alternative power sources in the internet of Things(IOT).The high cellose content and lack of toxic chemicals in paper batteries make them both biocompatible and environmentally friendly,especially when compared to lithim ion batteries used in many present-day electronic devices.

Specialized paper batteries are expected to act as power sources for any number of devices implanted in humans and animals,including RFID tags,drug-delivery systems and pacemakers.In theory,a capacitor introduced into an organism could be implanted fully dry and then be gradually exposed to bodily fluids over time to generate voltage. Recently, researchers at the State University of New York printed thin layers of metals and polymers onto a paper surface that contains freeze-dried exoelectrogens, a type of bacteria that can transfer electrons outside the bacteria's cellular walls. Any type of bio-liquid can be used to revive the exoelectrogens and activate the paper battery by allowing bacteria to pass through cell membranes and make contact with external electrodes.

PAPER BATTERY OFFERS FUTURE POWER

Flexible paper batteries could meet the energy demands of the next generation of gadgets, says a team of researchers.

They have produced a sample slightly larger than a postage stamp that can store enough energy to illuminate a small light bulb. But the ambition is to produce reams of paper that could one day power a car. Professor Robert Linhardt, of the Rensselaer Polytechnic Institute, said the paper battery was a glimpse into the future of power storage. The team behind the versatile paper, which stores energy like a conventional battery, says it can also double as capacitor capable of releasing sudden energy bursts for high-power applications.

GRAPHIC:HOW A PAPER BATTERY WORKS

While in a single conventional battery contains a number of separate components, the paper battery integrates all of the battery components structure,making it more energy efficient.As the paper battery is more tremendious issue in todays technical world there is a lot of importance to it.
The research appears in the Proceedings of the National Academy of Sciences (PNAS)."Think of all the disadvantages of an old TV set with tubes," said Professor Linhardt, from the New York-based institute, who co-authored a report into the technology.

"The warm up time, power loss, component malfunction; you don't get those problems with integrated devices. When you transfer power from one component to another you lose energy. But you lose less energy in an integrated device."The battery contains carbon nanotubes, each about one millionth of a centimetre thick, which act as an electrode. The nanotubes are embedded in a sheet of paper soaked in ionic liquid electrolytes, which conduct the electricity.The flexible battery can function even if it is rolled up, folded or cut.

Although the power output is currently modest, Professor Linhardt said that increasing the output should be easy."If we stack 500 sheets together in a ream, that's 500 times the voltage. If we rip the paper in half we cut power by 50%. So we can control the power and voltage issue".Where it can be used to power pacemakers within the body because the battery consists mainly of paper and carbon, it could conventional batteries pose a toxic threat."I wouldn't want the ionic liquid electrolytes in my body, but it works without them," said Professor Linhardt. "You can implant a piece of paper in the body and blood would serve as an electrolyte. But Professor Daniel Sperling at University of California, Davis, an expert on alternative power sources for transport, is unconvinced. It is better to use a paper battery rather than electrical battery.

'MORE DIFFICULT'

"Batteries and capacitors are being steadily improved, but electricity storage is much more difficult and expensive than liquid fuels and probably will be so forever," he said. "The world is not going to change as a result of this new invention any time soon."

Professor Linhardt admitted that the new battery is still some way from the commercial market."The devices we're making are only a few inches across. We would have to scale up to sheets of newspaper size to make it commercially viable," he said. But at that scale, the voltage could be large enough to power a car, he said.However, carbon nanotubes are very expensive, and batteries large enough to power a car are unlikely to be cost effective."I'm a strong enthusiast of electric vehicles, but it is going to take time to bring the costs down," said Professor Sperling.

But Professor Linhardt said integrated devices, like the paper battery, were the direction the world was moving."They are ultimately easier to manufacture, more environmentally friendly and usable in a wide range of devices," he said.
The ambition is to produce the paper battery using a newspaper-type roller printer.

CONSTRUCTION OF PAPER BATERY

The major components used for the construction of paper battery include:

Carbon Nanotube

1. (CNT) used for cathode terminal
2.Lithium metal (Li+) used for anode terminal
3.Different types of electrolytes that include blood, urine, and sweat (which are termed as bio-electrolytes)
4.Paper (Cellulose-Separator)

CONTRUCTION :

Step 1: Take cellulose-based paper and apply black carbon

Step2: Sread this ink applied on the paper

Step3: After spreading ink, laminate a thin film over the cellulose surface

Step4: Heat the cellulose paper for 5min at 80 degrees C

Step5: Then, peel off the film from the substrate

Step6: The electrodes of paper battery are formed by film. The electrolytes LTO and LCO are connected to different films

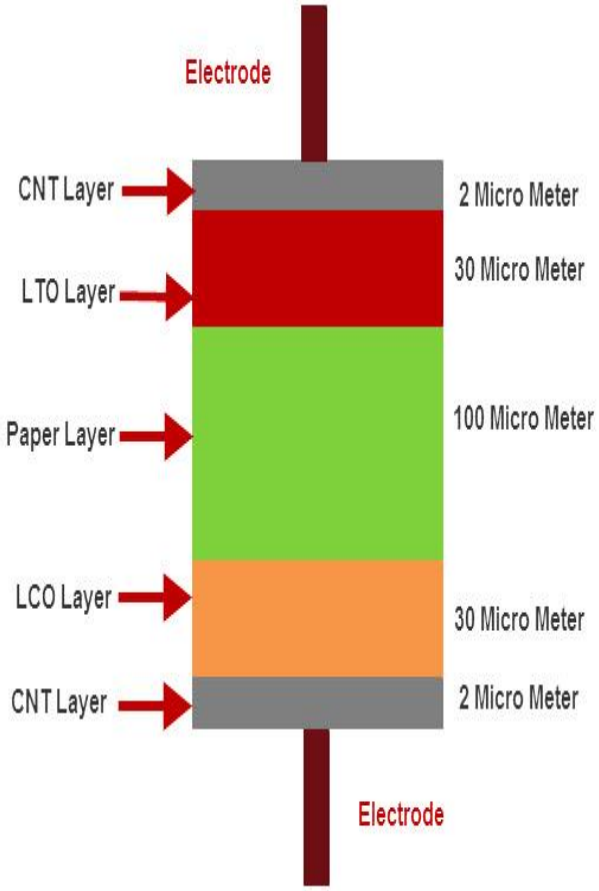
Step7: The functioning of paper battery can be checked by connecting battery terminals to the LED

PAPER BATTERY WORKING

The conventional rechargeable batteries which we use in our day-to-day life consist of various separating components which are used for producing electrons with the chemical reaction of a metal and electrolyte. If once the paper of the battery is dipped in ion-based liquid, then the battery starts working i.e., electricity is generated by the movement of electrons from cathode terminal to anode terminal. This is due to the chemical reaction between the electrodes of paper battery and liquid. Due to the quick flow of the ions within a few seconds (10sec) energy will be stored in the paper-electrode during the recharging.

By stacking various paper-batteries up on each other, the output of the paper battery can be increased. The conventional rechargeable batteries which we components which are used for producing electrons use in our day-to-day life consist of various separating with the chemical reaction of a metal and electrolyte. If once the paper of the battery is dipped in ion-based liquid, then the battery starts working i.e., electricity is generated by the movement of electrons from cathode terminal to anode terminal. This is due to the chemical reaction between the electrodes of paper battery and liquid. Due to the quick flow of the ions within a few seconds (10sec) energy will be stored in the paper-electrode during the recharging. By stacking various paper-batteries up on each other, the output of the paper battery can be increased.

As the paper batteries are connected each other very closely for increasing their output, there is chance of occurring short between the anode terminal and cathode terminal. If once the anode terminal contacts with cathode terminal, then there will be no flow of current in the external circuit. Thus, to avoid the short circuit between anode and cathode a barrier or separator is needed, which can be fulfilled by the paper separatoer equations consecutively.

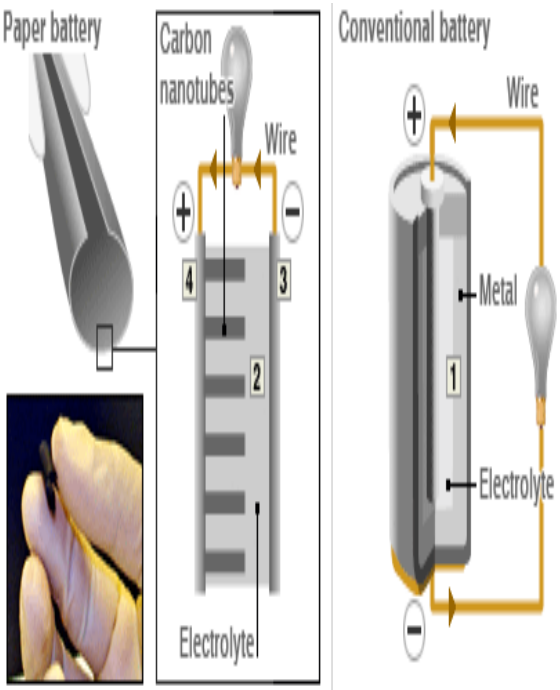


ADVANTAGES OF PAPER BATTERY

1)Paper battery is a modern storage device with ultra-thin in size.
2)Paper battery is a battery as well as capacitor.
3)It has a special properties such as more economical,bio-degradable,and bio-compatible.
4)Paper battery can generate electrical energy of 1.5V.The output voltage of paper battery can be customized based on requirement.
5)Environmental friendly
6)Light,rugged, flexible,can be rolled,crunched,cut,made into a shape.

DISADVANTAGES OF PAPER BATTERY

1)Carbon nanotubes and pattering, are more expensive & and complicated. They are:
a. Arc discharge.
b. Chemical Vapour Deposition(CVD)
c. Laser Ablation.
d. Electrolysis
2)The paper battery wastage may damage lungs if it is inhaled.
3)The e-wastage is generated by paper batteries.
4)Have low shear strength:they can be torn easily.



PAPER BATTERY PROPERTIES

The properties of paper battery can be recognized from the properties of cellulose such as excellent porosity, biodegradability, non-toxic, recyclability, high-tensile strength, good absorption capacity, and low-shear strength and also from the properties of carbon nanotubes such as low mass density, flexibility, high packing density, lightness, better electrical conductivity than silicon, thin (around 0.5 to 0.7mm), and low resistance.

APPLICATIONS OF PAPER BATTERY

There are numerous applications of paper battery in various fields. In electronics paper battery is used in mobiles, calculators, laptops, keyboard, mouse, Bluetooth cameras and so on. Similarly in medical sciences artificial tissues, cosmetics, drug delivery systems and so on. In auto mobiles, air crafts paper batteries are used in hybrid vehicles and because of their light weight.

CONCLUSIONS

In this conventional battery (electrochemical cell, solar cell and fuel cell) are compare with paper battery on the basis of operational mechanisms, limitations and different properties such as flexibility, biodegradable & non-toxic, recyclable,reusable,biocompatible, rechargeable, leakage & overheating, electrical conductivity, durability, size & shape, tensile strength, weight, cost and efficiency. After overall analysis it found that the paper battery is better than the other battery for renewable and sustainable development of the battery in sector of renewable energy storage system as per future expectation point of view and so, one of plan model for renewable energy based paper battery system proposed and shown in paper. But still there is need of extra ordinary research work to improve the manufacturing related problems of the paper battery, so it can easily implemented on desired applications. Hence,the paper battery is more essential when compared to electrical battery.

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A Note on 5G Wireless Technology

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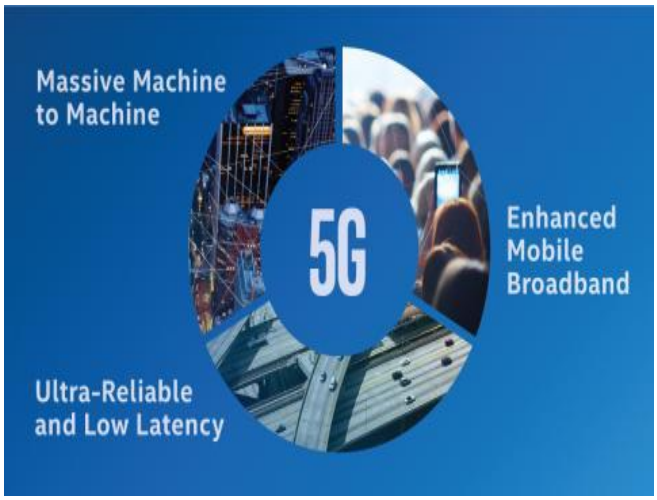
Fifth generation wireless (5G) is a wireless networking architecture built on the 802.11ac IEEE wireless networking standard, which aims to increase data communication speeds by up to three times compared to its predecessor, 4G (IEEE 802.11n) [1]. 5G Wireless Technology denotes the proposed next major phase of mobile telecommunications standards beyond the current 4G standards. Rather than faster Internet connection speeds, 5G planning aims at a higher capacity than current 4G, allowing a higher number of mobile broadband users per area unit, and allowing consumption of higher or unlimited data quantities in gigabyte per minute and user. This would make it feasible for a large portion of the population to consume high-quality streaming media many hours per day on their mobile devices, also when out of reach of wifi hotspots. 5G research and development also aim at the improved support of machine to machine communication, also known as the Internet of things, aiming at lower cost, lower battery consumption, and lower latency than 4G equipment.

Although it is too early to decide on what exactly 5G wireless technology is and its offerings, we can conclude on following basic requirements to fulfill 5G Wireless Technology:

- High & increased peak bit rate (Up to 10Gbps connections to endpoints in the field)
- Efficient use of energy in devices
- Larger data volume per unit area (i.e. high system spectral efficiency)
- High capacity to allow more devices connectivity concurrently and instantaneously (100percent coverage)
- More bandwidth
- Lower battery consumption
- Better connectivity irrespective of the geographic region, in which you are
- Larger number of supporting devices (10 to 100x number of connected devices)
- Lower cost of infrastructural development
- Higher reliability of the communications (One millisecond end-to-end round trip delay)

With a huge array of innovative features, now smart phone would be more parallel to the laptop. You can use broadband internet connection; other significant features that fascinate people are more gaming options, wider multimedia options, connectivity everywhere, zero latency, faster response time, and high-quality sound and HD video can be transferred to another cell phone without compromising the quality of audio and video.

The most distinguishing feature of 5G Network is that the network will be based on the User experience, System Performance, enhanced performance, business models and Management & Operations. 5G will utilize the advance access technologies such as Beam Division Multiple Access (BDMA) and Non and quasi-orthogonal or Filter Bank Multicarrier (FBMC) Multiple Access. The new advanced technology called Fog Computing is going to support the 5G development; this will help in achieving the low latency, high mobility, high scalability and real-time execution.



5G Wireless Technology uses UWB (Ultra Wide Band) networks with higher Band Width at low energy levels. Band Width is of 4000 Mbps, which is 400 times faster than today's wireless networks. It uses a smart antenna and CDMA (Code Division Multiple Access). 5G will be the single unified standard for different wireless networks, including LAN technologies, LAN/WAN, WWWW – World Wide Wireless Web, unified IP combination of broadband. It follows Master Core technology to be operated in parallel multimode including all IP network mode and 5G network mode. In this mode (as shown in the image given below), it controls all network technologies of RAN and Different Access Networks (DAT). Any service mode can be opened under 5G New Deployment Mode as World Combination Service Mode (WCSM). WCSM is a wonderful feature of this technology; for example, if a teacher writes on the whiteboard in a country – it can be displayed on another whiteboard in any other part of the world besides conversation and video. Further, new services can be easily added through parallel multimode service [2].

APPLICATIONS OF 5G WIRELESS TECHNOLOGY

- 5G will revolutionize the mobile experience with supercharged wireless network, which can support up to 10 to 20 GBPS of data download speed.
- It is equivalent to a fiber optic Internet connection accessed wirelessly. 5G networks will enable secure access to cloud storage; access of enterprise applications, run powerful tasks with greater processing power virtually.
- Augmented reality and virtual reality requires HD video with low latency. 5G network is powerful

enough to power AR and VR with amazing virtual experience.

- 5G wireless technology will open greater opportunity for new device manufactures and application developers. New VoIP devices and smart devices will be introduced in the market and thus more job opportunities as well.
- Mobile downloads will be much faster, always on, always connected and responsive mobile Internet offer power mobile experience.

HOW INDIA IS PREPARING FOR 5G LAUNCH?

Compared to other countries(U.S,Japan,Korea) India fell behind during the implementation of 3G and 4G but it is in the process of building a roadmap to launch 5G along with other advanced countries. Internationally India has gained a remarkable name in providing the IT services, like many other countries Indian Telecom industry is designing the roadmap for 5G launch in India, major Telecom companies like Reliance Jio in collaboration with Apple, Idea and other companies are working on developing the effective environment in India. Bharati Airtel recently partners with the Swedish telecom giant Ericsson to deploy 5G in India and conducted tests. It commented that **"5G has an extremely high throughput and ultra-low latency".** The TRAI has researched that the 3300-3400 MHz and 3400-3600 MHz bands in the country suit for the 5G. Along with this GSMA association is also collaborating with Indian Telecom to prepare the roadmap for launching the 5G.

5G Wireless Technology is more intelligent technology, which will interconnect the entire world without limits. It is designed to provide unbelievable and extraordinary data capabilities, unhindered call volumes, and vast data broadcast. Our world would have universal and uninterrupted access to information, communication and entertainment that will open a new dimension to our lives and will change our lifestyle meaningfully. Moreover, governments and regulators can use this technology as an opportunity for the good governance and can create healthier environments, which will definitely encourage continuing investment in 5G, the next generation technology.

It is expected that the implementation of 5G Wireless Technology would take four more years from now to make it usable for the people. We need more time to develop its functionality. We need more research on its users and security. The speed, it is promised to serve is hard to achieve and we need high infrastructure for 5G wireless technology Deployment. There are various challenges to overcome. So we can expect its deployment in 2020. Currently, the United States and South Korea are leading in the implementation of 5G. The South Korean government has reportedly invested $1.5billion in 5G research and promised a trial of 5G in 2017 [3].

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