tech niyati

TECH NIYATI

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Electronics Electrical Computer Communication Technology Engineering Electronics Science Information Electrical Information Engineering Electrical Science Computer Computer Communication Information Electronics Technology Communication

Institute Vision

To emerge as an acclaimed centre for learning that provides value based technical education for the holistic development of students.

Institute Mission

Undertake activities that provide value based knowledge in science, engineering & Technology.

Provide opportunities for learning through industry-institute interaction on the state-of-the-art technologies.

Create collaborative environment for research, innovation and entrepreneurship to flourish.

Promote activities that bring in a sense of social responsibility.

Editorial Message

We are extremely happy with the support extended by the faculty members of Gayatri Vidya Parishad College of Engineering for Women for bringing out another issue of the technical magazine "*TechNiyati*". The cover study of the issue is on the history of computers which is bound to create an interest in the readers. There are two regular articles followed by trending article briefs, trending news and technology reviews. The pioneering computer scientists Alan Turing is featured in the section – *know a scientist*.

Some new sections such as puzzles, discussion topics, and paradoxes have been added in this issue.

We are continuously improving the outlook of the magazine. Your suggestions are always welcome.

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Cover Story:

History of Computers

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This article is a brief review of the events that led to the development of the modern computer. The aim of the review is to create an interest in the readers to go through the references for details of the development.

The first attempt to organize information processing on a large scale using human computers was for the production of mathematical tables, such as logarithmic and trigonometric tables. Logarithmic tables revolutionized mathematical computation in the sixteenth and seventeenth centuries by enabling time-consuming arithmetic operations, such as multiplication and division and the extraction of roots, to be performed using only the simple operations of addition and subtraction. Trigonometric tables enabled a similar speeding up of calculations of angles and areas in connection with surveying and astronomy. However, logarithmic and trigonometric tables were merely the best-known general-purpose tables. By the late eighteenth century, specialized tables were being produced for several different occupations: navigational tables for mariners, star tables for astronomers, life insurance tables for actuaries, civil engineering tables for architects, and so on. All these tables were produced by human computers, without any mechanical aid. The first commercially produced adding machine was the Arithmometer (Fig. 1), developed by Thomas de Colmar of Alsace at the early date of 1820. However, the Arithmometer was never produced in large quantities; it was hand-built probably at the rate of not more than one or two a month. The Arithmometer [1, 2] was also not a very reliable machine; a generation went by before it was produced in significant quantities (there is virtually no mention of it until the Great Exhibition of 1851 in London). Sturdy, reliable Arithmometers became available in the 1880s, but the annual production never exceeded a few dozen.

Fig. 1. Arithmometer at its latest form in 1914.

Dorr E. Felt and William S. Burroughs were classic inventor-entrepreneurs. The machines they created, the Comptometer [3] and the Burroughs Adding Machine [4], dominated the worldwide market well into the 1950s. Only the company founded by Burroughs, however, successfully made the transition into the computer age. Dorr E. Felt was an obscure machinist living in Chicago when he began to work on his adding machine. The technological breakthrough that he achieved in his machine was that it was “key-driven.” Instead of the dials of the Arithmometer, or the levers used on other adding machines that had to be painstakingly set, Felt's adding machines had a set of keys, a little like those of a typewriter.

Burroughs began to develop an adding machine for banks, which would not only add numbers rapidly like a Comptometer but also print the numbers as they were entered. In 1885 Burroughs filed his first patent, founded the American Arithmometer Company, and began to hand-build his "adder-lister." The first businesses targeted by Burroughs were the banks and clearing houses for which the machine had been specially designed. After a decade's mechanical perfection and gradual buildup of production, by 1895 the firm was selling several hundred machines a year.

As with the typewriter and the adding machine, there were many attempts to develop a cash register during the nineteenth century. The first practical cash register was invented by a Dayton restaurateur named James Ritty. Ritty believed he was being defrauded by his staff, so he invented "Ritty's Incorruptible Cashier" in 1879. His machine operated very much like a modern cash register: When a sale was made, the amount was displayed prominently for all to see, as a check on the clerk's honesty. Inside the machine, the transaction was recorded on a roll of paper.

Patterson understood that the cash register needed constant improvement to keep it technically ahead of the competition. In 1888 he established a small "inventions department" for this purpose. This was probably the first formal research and development organization to be established in the office machine industry, and it was copied by IBM and others. With Patterson's leadership; NCR came to dominate the world market for cash registers and grew phenomenally.

In 1895 Watson managed to get a post as a cash register salesman with NCR. Hollerith first went into business with his electric tabulating system in1886 (Fig. 2). On 3 December 1896, Hollerith incorporated his business as the Tabulating Machine Company (TMC). In 1905, unable to agree on terms, Hollerith broke off business relations with the Census Bureau and put all his efforts into the commercial development of his machines.

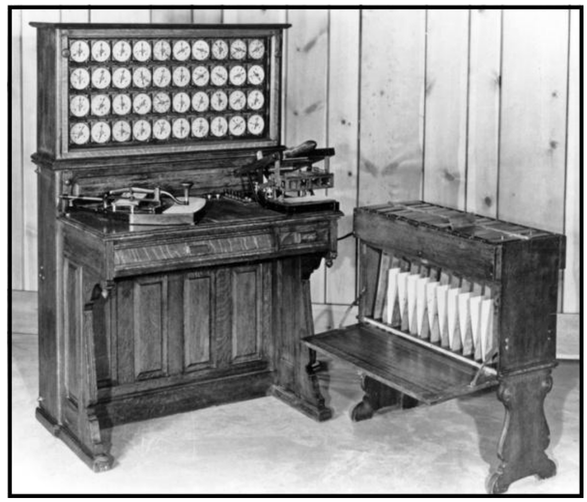

Fig. 2. Hollerith's tabulating machine [1].

With the introduction of the automatic machine, TMC raced ahead. By 1908, Hollerith had thirty customers. During the next few years the company grew at a rate of over 20 percent every half-year. By 1911 it had approximately a hundred customers and had completely made the transition to becoming an office-machine company. An offer to take over TMC came from one of the leading business promoter's of the day, Charles R. Flint, the so-called Father of Trusts. Flint was probably the most celebrated exponent of the business merger. He proposed the merging of tabulating Machine Company with two other firms—the Computing Scale Company, a manufacturer of shopkeeper's scales, and the International Time Recording Company, which produced automatic recording equipment for clocking employees in and out of the workplace. Each of these companies was to contribute one word to the name of a new holding company, the Computing-Tabulating-Recording Company, or C-T-R. Hollerith lived to see C-T-R become IBM in 1924. He therefore decided to accept an offer from Charles Flint to become general Manager of C-T-R.

In 1924, Watson renamed the company International Business Machines and announced, “Everywhere . . . there will be IBM machines in use. The sun never sets on IBM.”. If IBM was famous for its dynamic salesmen, it became even more celebrated for its apparent immunity to business depressions. The “rent-and-refill” nature of the punched-card business made IBM virtually recession-proof. The second source of IBM’s financial stability was its punched-card sales. The cards cost only a fraction of the dollar per thousand for which they were sold. IBM, however, found itself secure in the market of tabulator cards for its machines, because the cards had to be made with great accuracy on a special paper stock that was never successfully imitated. Technical innovation was the third factor that kept IBM at the forefront of the office-machine industry between the two world wars.

In the early 1930s, IBM leapfrogged the competition by announcing the 400 Series accounting machines, which marked a high point in interwar punched-card machine development. The most important and profitable machine of the range was the model 405 Electric Accounting Machine. The 400 Series was to remain in manufacture until the late 1960s when punched-card machines finally gave way completely to computers.

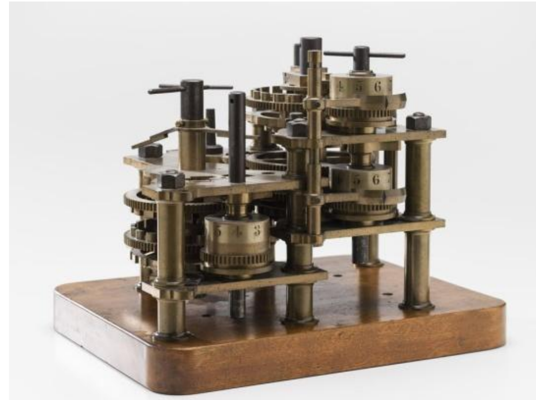

Fig. 3. First difference engine by Babbage

Babbage invented two calculating machines, the Difference Engine (Fig. 3) [5], and the Analytical Engine (Fig. 4) [6, 7]. Of the two, the Difference Engine was, historically and technically, the less interesting—although it was the machine that came closest to actually being built. Babbage worked on his Difference Engine for approximately a decade, starting in the early 1820s. Babbage never built a full-scale Difference Engine because in 1833 he abandons edit for a new invention, the Analytical Engine, the chief work on which his fame in the history of computing rests. The most significant concept in the Analytical Engine was the separation of arithmetic computation from the storage of numbers. In the original Difference Engine, these two functions had been intimately connected: in effect, numbers were stored in the adding mechanisms, as in an ordinary calculating machine.

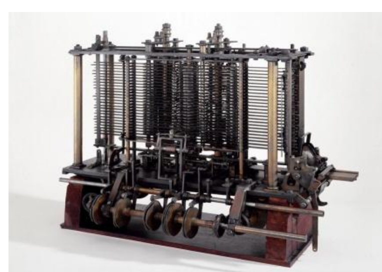

Fig. 4. Analytical engine by Babbage.

Between 1834 and 1846, without any outside financial support, Babbage elaborated on the design of the Analytical Engine. In Turin, Babbage encouraged a young Italian mathematician, Lieutenant Luigi Menabrea, to write an account of the Analytical Engine, which was subsequently published in French in 1842. Back in England, Babbage encouraged Ada—who was now in her late twenties and married to the Earl of Lovelace—to translate the Menabrea article into English. However, she went far beyond a mere translation of the article, adding lengthy notes of her own that almost quadrupled the length of the original. Her Sketch of the Analytical Engine was the only detailed account published in Babbage's lifetime—indeed, until the 1980s.

She has been pronounced the world's first programmer and even had a programming language (Ada) named in her honor. Later scholarship has shown that most of the technical content and all of the programs in the Sketch were Babbage's work. But, even if the Sketch were based almost entirely on Babbage's ideas, there is no question that Ada Lovelace provided its voice. Her role as the prime expositor of the Analytical Engine was of enormous importance to Babbage, and he described her, without any trace of condescension, as his "dear and much -admired Interpreter."

In 1834 Dionysius Lardner, a well-known science lecturer and popularizer, handwritten an article in the Edinburgh Review describing Babbage's Difference Engine. This article was read by a Swedish printer, Georg Scheutz, and his son Edvard, who began to build a difference engine. After a heroic engineering effort of nearly twenty years that rivaled Babbage's own, they completed a full-scale engine, of which Babbage learned in 1852.

The Scheutz engine was not a particularly reliable machine and had to be adjusted quite frequently. Some other difference engines were built during the next half-century, but all of them were one-of-a-kind machines that failed to turn a profit for their inventors and never came close to establishing an industry.

In the period 1935–1945, just as there was a boom in human-computing organizations, there was at the same time a boom in the invention of one-of-a-kind digital computing machines. By far the best known, and the earliest, of these machines was the IBM Automatic Sequence Controlled Calculator. Known more commonly as the Harvard Mark I, this machine was constructed by IBM for Harvard University during 1937–1943. The Harvard Mark I is important not least because it reveals how, as early as the 1930s, IBM was becoming aware of the convergence of calculating and office-machine technologies.

The significance of the Mark I lay not in its speed but in the fact that it was the first fully automatic machine to be completed. The IBM Automatic Sequence Controlled Calculator was officially dedicated at Harvard on 7 August 1944, some seven years after Aiken's first contact with IBM. Although the Harvard Mark I was a milestone in the history of computing, it had a short heyday before being eclipsed by electronic machines, which operated much faster because they had no moving parts. The Harvard Mark I, however, was a fertile training ground for early computer pioneers, such as Grace Murray Hopper. But above all the Harvard Mark I was an icon of the computer age—the first fully automatic computer to come into operation.

In the summer of 1942, John Mauchly proposed the construction of an electronic computer to eliminate the look of effective calculating technology. Mauchly's was by no means the only proposal for an electronic computer to appear during the war. For example, Konrad Zuse in Germany was already secretly in the process of constructing a machine. There was, however, another computer project at Iowa State University that was to play an indirect part in the invention of the computer at the Moore School.

John Vincent Atanasoff and Clifford Berry went on to build a complete machine—later known as the Atanasoff-Berry Computer (ABC). They developed several ideas that were later rediscovered in connection with electronic computers, such as binary arithmetic and electronic switching elements. Atanasoff, discovering a like-minded scientist, introduced himself and invited Mauchlyto's visit to see the ABC. Atanasoff, described by his biographer as the "forgotten father of the computer," occupies a curious place in the history of computing. He is the true begetter of the electronic computer, and the extent to which Mauchly drew on Atanasoff's work would be a key issue in determining the validity of the early computer patents fifteen years later.

Mauchly, with a kind of missionary zeal, discussed his ideas for an electronic computing machine with any of his colleagues at the Moore School. The person most taken with these ideas was a young electronics engineer named John Presper Eckert. He and Mauchly had already established a strong rapport by working on the differential analyzer, in which they had replaced some of the mechanical integrators with electronic amplifiers, getting it "to work about ten times faster and about ten times more accurately than it had worked before."

By August 1942 Mauchly's ideas on electronic computing had sufficiently crystallized that he wrote a memorandum on "The Use of High-Speed Vacuum Tube Devices for Calculating." In it, he proposed an "electronic computer" that would be able to perform calculations in one hundred seconds that would take a mechanical differential analyzer fifteen to thirty minutes, and that would have taken a human-computer "at least several hours." This memorandum was the real starting point for the electronic computer project. On 9th April a formal meeting was arranged with Eckert and Mauchly, the research director of the Moore School, Goldstine, and the director of the BRL. At this meeting, the terms of a contract between the two organizations were finalized. That same day witnessed the beginning of "Project PX" to construct this machine, known as the ENIAC (Electronic Numerical Integrator and Computer). It was Presper Eckert's twenty-fourth birthday, and the successful engineering of the ENIAC was to be very much his achievement.

The ENIAC was Eckert and Mauchly's project. Eckert, with his brittle and occasionally irascible personality, was "the consummate engineer," while Mauchly, always quiet, academic, and lay back, was "the visionary." Von Neumann was captivated by the logical and mathematical issues in computer design and became a consultant to the ENIAC group to try to help them resolve the machine's deficiencies and develop a new design. This new design would become known as the "stored-program computer," on which virtually all computers up to the present day have been based. Von Neumann's arrival gave the group the confidence to submit a proposal to the BRL to develop a new, post-ENIAC machine. While construction of the ENIAC continued, all the important intellectual activity of the computer group revolved around the design of ENIAC's successor: the EDVAC, for Electronic Discrete Variable Automatic Computer.

Von Neumann report entitled The First Draft of a Report on the EDVAC, dated 30 June 1945, was the seminal document describing a stored-program computer. It offered the complete logical formulation of the new machine and ultimately was the technological basis for the worldwide computer industry.

In November 1945, the ENIAC, at last, sprang into life. It was a spectacular sight. In a basement room at the Moore School, measuring fifty by thirty feet, the units of the ENIAC were arranged in a U-shaped plan around the two longest walls and the shorter end wall. Altogether there were forty individual units, each two feet wide by two feet deep by eight feet tall. Twenty of the units were the "accumulators," each of which contained five hundred tubes and stored a ten-digit decimal number. Three hundred twinkling neon lights on the accumulators made for a science-fiction-like sight when the room was darkened. The other racks around the room included control units, circuits for multiplication and division, and equipment for controlling the IBM card readers and punches so that information could be fed into the machine and the results punched out. Two great twenty-horsepower blowers were installed to draw in cool air and expel the 150 kilowatts of heat that were produced by the machine.

Britain had already built up significant experience in computing during the war in connection with code-breaking at Bletchley Park. A mechanical computer—specified by Alan Turing—was operational in 1940, and this was followed by an electronic machine, the Colossus, in 1943. Although the code-breaking activity remained completely secret until the mid-1970s, it meant that there were people available who had both an appreciation of the potential for electronic computing and the technical know-how. Max Newman, one of the prime movers of the Colossus computer, established the computer project at Manchester. The Manchester computer was the first to become operational.

The date was Monday, 21 June 1948, and the "Manchester Baby Machine" established incontrovertibly the feasibility of the stored-program computer.

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. . . Managers-Engineers

(Excerpt from https://www.cs.cmu.edu/)

The FBI has surrounded the headquarters of the Norne Corporation. There are n people in the building. Each person is either an engineer or a manager. All computer files have been deleted, and all documents have been shredded by the managers. The problem confronting the FBI interrogation team is to separate the people into these two classes, so that all the managers can be locked up and all the engineers can be freed. Each of the n people knows the status of all the others. The interrogation consists entirely of asking person if person j is an engineer or a manager. The engineers always tell the truth. What makes it hard is that the managers may not tell the truth. In fact, the managers are evil geniuses who are conspiring to confuse the interrogators.

Under the assumption that more than half of the people are engineers, can you find a strategy for the FBI to find one engineer with at most $n-1$ questions?

. . . Fork in the Road

(Excerpt from http://brainden.com/)

You are travelling down a country lane to a distant village. You reach a fork in the road and find a pair of identical twin sisters standing there.

- One standing on the road to village and the other standing on the road to neverland (of course, you don't know or see where each road leads).
- One of the sisters always tells the truth and the other always lies (of course, you don't know who is lying).
- Both sisters know where the roads go.

If you are allowed to ask only one question to one of the sisters to find the correct road to the village, what is your question?

(**Explore the magazine to search for the solutions.*)

Article:

Bio-medical Engineering

Application for Analyzing Healthcare Data using Soft Computing Techniques

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Bio-medical engineering, also known as bioengineering, is the application of engineering principles to the fields of biology and healthcare. Bioengineers work with doctors, therapists and researchers to develop systems, equipment and devices in order to solve clinical problems. Conventional computing known as hard computing, needs an accurate analytical model with lot of computation time. Real world problems exist in a non-ideal environment fails to compute accurately by many analytical models. Soft Computing (SC) differs from hard computing and unlike hard computing, it is tolerant of imprecision, un-certainty, partial truth, and approximation. The guiding principle of soft computing is to exploit the tolerance for imprecision, uncertainty, partial truth, and approximation to achieve tractability, robustness and low computation cost. The names of several soft computing tools are Fuzzy Systems, Neural Networks, Evolutionary Computation, Machine Learning and Probabilistic Reasoning. Different soft computing tools can be used in different phases of the planned analytical models. Several issues need to take care in data stored for analysis such as removing noise, hierarchical classification and clustering, searching, decision making, predicting the possible cause of illness and diagnosis, etc. Different soft computing techniques can be used to solve above mentioned issues such as Wavelets for removing noise, wavelets, fuzzy logic and neural network for the hierarchical classification and clustering, evolutionary algorithms for searching, fuzzy systems for decision making, artificial intelligence to predict the possible cause of illness and diagnose, etc.

Medical database system [1] uses soft computing, data mining and cloud computing features for efficient Data Analysis and Diagnosis. To gain control over the intelligent systems data mining features are added. Cloud computing involved for delivering services over the Internet. The planned intelligent systems using such techniques can provide new delivery models to make healthcare more efficient and effective, and at a lower cost to technology budgets.

1. Medical Data

To describe a single patient's medical history and concern a health care provides to come out of the diseases is termed as medical data or health record or medical chart. The medical data includes a variety of notes entered over the time into the database by health care professionals on their observations and direction of drugs and therapies based on test results [2], x-rays [3], reports [4], etc. The maintenance of complete and accurate medical records is a fundamental requirement of health care system. A good medical records management system could mean the difference between life and death for some individuals. Online data storage has led to the development of personal health records (PHR) that are compiled and maintained by health care professionals.

2. Soft Computing

Soft Computing is considered for many real world unclear states of affairs to provide the precision level, approximation of certainty and robust solutions. Many real world situations uses soft computing methodologies such as Fuzzy Systems, Neural Networks, Evolutionary Computation, Machine Learning and Probabilistic Reasoning alone or made with collaborative techniques termed as hybrid models by combining neural network with fuzzy logic, genetic algorithms with fuzzy logic, and genetic algorithm with neural network. SC methodologies [5] have paved the way for a major transformation in the field of medicine and knowledge engineering. Many developers had a novel view of exploring knowledge engineering which would provide a new dimension to medicine and provides path for new technologies. Now-a-days there is a less emphasis towards the importance given for the knowledge of medicine and for its support system. Complex medical information was scrutinized with the aid of either SC techniques [5, 6] or combined SC techniques named as hybrid models. SC includes fuzzy logic (FL), neural networks (NNs), and genetic algorithm (GA) methodologies. SC combines these methodologies to design efficient hybrid models such as FL and NN (FL–NN), NN and GA (NN–GA) and FL and GA (FL–GA). The immense growth of bio-informatics and medical informatics for interpreting and analyzing biological and healthcare data uses computational techniques which incorporate neural networks, evolutionary computation, and fuzzy systems because of strength in handling imprecise information and providing novel solutions to hard problems.

3. Data Mining

Presently data Mining concept [1] mostly used by corporations focusing strongly on consumers in the field of retail, financial, communication, and marketing to analyze the transactional data for predicting the price, customer preferences and product positioning, impact on sales, customer satisfaction and corporate profits. Also a retailer can use point-of-sale records of customer purchases to develop products and promotions to appeal to specific customer segments. Data mining holds great potential to improve health systems. It uses data and analytics to identify best practices that improve care and reduce costs. The great potential of data mining approaches like multi-dimensional databases, machine learning, soft computing, data visualization and statistics used by many researchers. Processes are developed that make sure that the patients receive appropriate care at the right place and at the right time. Data mining can also help healthcare insurers to detect fraud and abuse. Data mining constitutes one or more of the following functions, namely classification, regression, clustering, summarization, image retrieval, discovering association rules and functional dependencies, rule extraction, etc. There exist several domains where large volumes of data are stored in centralized or distributed database. Some of the important issues in data mining include the identification of applications for existing techniques and developing new techniques for traditional as well as new application domains like Web, bioinformatics. There are many areas we can predict, where data mining can be applied but some of these areas are mentioned below:

- Medicine: To determine disease outcome and effectiveness of treatment by analyzing patient diseases history to find some relationship between diseases
- Molecular or pharmaceutical: Identify new drugs and their effectiveness
- Historical data analysis: Search and access of historical data on similar case histories
- Scientific data analysis: Identify new medicines by searching for sub-clusters.

4. Medical Data Analysis and Diagnosis

Healthcare organizations aim at obtaining valuable predictions by using data mining and soft computing techniques on the enormous data that have been accumulated over the years. Healthcare sector has an extremely large source of patient-health related digital data which can be effectively used for predictive analytics. Most of the patient-health related digital data consist of missing, incorrect and incomplete instances that can have unfavorable effect on the prognostic analytics of the healthcare data. The challenge for reliable modelling involves pre-processing of selected data; specifically the assertion of missing values. A hybrid combination of Classification and Regression Trees (CART) and Genetic Algorithms to assign missing continuous values and Self Organizing Feature Maps (SOFM) to assign categorical values can be adapted. Artificial Neural Networks (ANN) is used to validate the improved accuracy of prediction after assertion. Different diabetic data like PIMA Indians Diabetes Data set (PIDD), and Mammographic Mass Data (MMD) are used to validate the proposed hybrid models. This approach is simple, and easy to implement and practically reliable.

Healthcare organizations aiming at ageing population will have considerable consequences, but biomedical engineering can contribute greatly to improve the quality of life of older people. Assisted living technologies such as tele-care, home-based devices and services that support daily life with a remote link to a call-centre, and tele-health – remote monitoring, consultation and diagnosis – can help support independent living at home, keeping patients out of hospital and residential care for longer.

The advanced technology like sensors, signal treatment, data analysis, robotics and machine intelligent systems are enabling the growth of remote care centres so that populace with progressive weakening of health conditions can remain in their own homes. Mentioned below is a list of projects for our inhabitants to provide a healthy life.

(A) Bio-Medical Engineering Projects:

1. Fall Detection And Activity Monitoring for Oldsters
2. Body Motion Information Collection
3. Patient Analyzing System over wireless personal area networks (WPANs)
4. Heartbeat Classification Using Feature Selection
5. Bedside Patient Monitoring With Wireless Sensor Networks
6. Design of a Wireless Medical Monitoring System
7. Remote Monitoring Patients System

Among several bio-medical engineering projects, Heartbeat Classification Using Feature Selection uses soft computing techniques extensively to classify various cardiac arrhythmias.

(B) Heartbeat Classification Using Feature Selection:

Cardiac diseases using computer assisted diagnosis system reduces the increase in death rate among heart patients. The finding of cardiac arrhythmias is a challenging task since the small disparity in electrocardiogram (ECG) signal cannot be noticed accurately by human eye. Accurate and computationally efficient classification of electrocardiography (ECG) arrhythmias has been the subject of research Endeavour in recent years. To achieve classification accuracy of ECG signals using soft computing concepts is a well-known process of classification ECG signals for early diagnosis of cardiac diseases. The neural network architecture named multi-layered perceptron (MLP) with back propagation training algorithm, fuzzy clustering NN architecture (FCNN), dual tree complex wavelet transform (DTCWT) [7], discrete wavelet transform (DWT) can be used to classify various cardiac arrhythmias comprises of complex QRS signal. A Decision Support System (DSS) for heart disease classification can be developed using soft computing methods like support vector machine (SVM) and integer-coded genetic algorithm [8]. For selecting the important and relevant features and discarding the irrelevant and redundant ones, integer-coded genetic algorithm is used to maximize classification accuracy of SVM. A study on Heartbeat Classification Using Feature Selection [9] validated a simple heartbeat classifier based on ECG feature models selected with the focus on an improved generalization capability. It considered features from the RR series, as well as features computed from the ECG samples and different scales of the wavelet transform, at both available leads. The classification performance and generalization were studied using publicly available databases.

5. Conclusion

Soft Computing (SC), information processing and data mining holds the state-of-the-art of intelligent computing systems in medical engineering. SC methods such as Fuzzy Logic (FL), Neural Networks (NN), and Genetic Algorithms (GAs) methodologies are becoming crucial for modern medical practice. Various SC methodologies are presented by researchers in the field of health care called MEDLINE. According to MEDLINE database searches, the rates of preference of SC methodologies in medicine were found as 68% of FL-NN, 27% of NN-GA and 5% of FL-GA.

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.... Managers-Engineers (Solution)

A correct, optimal, and elegant solution was submitted by Chris Peikert, Grant Wang, and Abhi Shelat of MIT. A number of others submitted partial solutions. Here's an n-1 query solution to part 1. Maintain three sets of people: UNSEEN, STACK, and DISCARD. Initialize the process by picking one arbitrarily to be the STACK, everything else is UNSEEN. Repeat the following step until UNSEEN is empty: Pick an UNSEEN element x, remove it from UNSEEN. Ask the top of the STACK y about x. If y says "manager" pop y off the stack and DISCARD both x and y. If it says "engineer" add x to the top of the STACK. After all elements have been processed in this way (n-1 comparisons), the top of the stack must be an engineer.

Why does this work? First observe that whenever we discard a pair, at least one of them is a manager. So among the rest of them (STACK and UNSEEN) a majority must still be engineers. So at the end, when UNSEEN is empty, there must be an engineer in the stack, therefore the top of the stack must be an engineer.

Article:

Positioning Strategies: Technique, Operation, and Comparison

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Recent years have seen rapidly increasing demand for services and systems that depend upon accurate positioning of people and objects. This has led to the development and evolution of numerous positioning systems. Some of the applications of positioning systems include (but are not limited to) military, road safety, law enforcement, tracking personnel, vehicles, security and mobile ad hoc networks. Positioning systems determine the location of a person or an object either relative to a known position (Local Positioning/Source Localization) or within a coordinate system (Global Positioning).

Global positioning systems (GPSs) allow each mobile (person or object) to find its own position on the globe. A local positioning system (LPS) is a relative positioning system and can be classified into self and remote positioning.

Self positioning systems allow each person or object to find its own position with respect to a static point at any given time and location. An example of these systems is the inertial navigation system (INS).

Remote positioning systems allow each node to find the relative position of other nodes located in its coverage area. Here, nodes can be static or dynamic.

Remote positioning systems themselves are divided into:

1. Active target remote positioning and
2. Passive target remote positioning.

In the first case, the target is active and cooperates in the process of positioning, while in the second, the target is passive and non cooperative. Examples of active target positioning systems are radio frequency identification (RFID), wireless local positioning systems (WLPSs), and traffic alert and collision avoidance systems (TCAS). Examples of passive target positioning systems are tracking radars and vision systems.

The accuracy of positioning systems (i.e. GPS or LPS) is affected by several factors such as measurement technique, atmospheric errors, multipath, geometry of system etc. Among these factors, identification of an optimal measurement technique is considered significant because an improper measurement technique provides a diverging solution. For instance, measurement technique which provides good results for a positioning application with air as a medium may not show the same performance in underwater environment.

This article reviews the operation of pivotal measurement techniques and compares their operation, application, and pros and cons. Several key positioning parameters such as accuracy, capability in line of sight (LOS) versus non line of sight (NLOS) positioning and number of base stations required for positioning are considered as the benchmark for comparison.

Measurement Technique used in Positioning System:

In this section, the fundamental techniques of positioning systems are explained. Different combinations of these techniques form the basis of various positioning systems.

(A) Time of Arrival (TOA)

TOA estimation allows the measurement of distance, thus enabling localization. Here, multiple base nodes collaborate to localize a target node via triangulation. It is assumed that the positions of all base nodes are known. If these nodes are dynamic, a positioning technique such as GPS is used to allow base nodes to localize their positions (GPS–TOA positioning). Assuming known positions of base nodes and a coplanar scenario, three base nodes and three measurements of distances (TOA) are required to localize a target node (refer to Fig. 1).

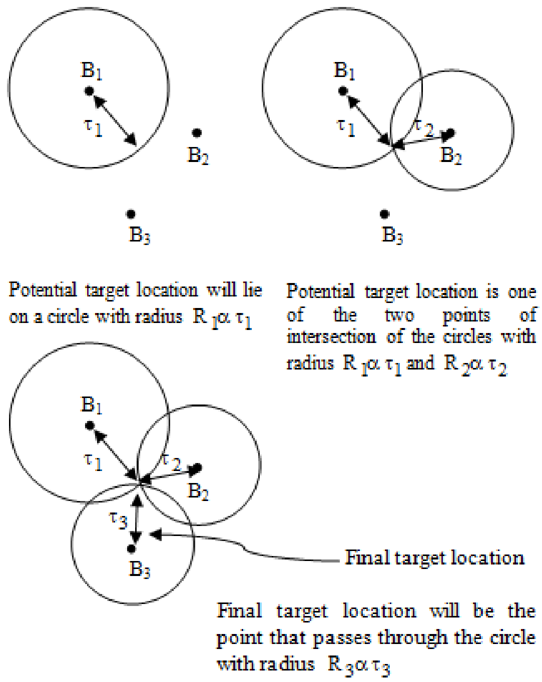

Fig. 4 Operation of TOA and RSS based positioning systems.

In a non-coplanar case, four base nodes are required. Using the measurement of distance, the position of a target node is localized within a sphere of radius Ri with the receiver i at the centre of the sphere (where Ri is directly proportional to the TOA τi as shown in Figure 1). The localization of the target node can be carried out either by base nodes using a master station or by the target node itself.

Although TOA seems to be a robust technique, it has a few draw backs:

1. It requires all nodes (base nodes and target nodes) to precisely synchronize: A small timing error may lead to a large error in the calculation of the distance Ri.

2. The transmitted signal must be labelled with a time stamp in order to allow the base node to determine the time at which the signal was initiated at the target node. This additional time stamp increases the complexity of the transmitted signal and may lead to an additional source of error.

3. The positions of the base nodes should be known; thus, either static nodes or GPS - equipped dynamic nodes should be used.

(B) Time Difference of Arrival (TDOA)

TDOA estimation requires the measurement of the difference in time between the signals arriving at two base nodes. Similar to TOA estimation, this method assumes that the positions of base nodes are known. The TOA difference at the base nodes can be represented by a hyperbola. A hyperbola is the locus of a point in a plane such that the difference of distances from two fixed points (called the foci) is a constant.

Assuming known positions of base nodes and a coplanar scenario, three base nodes and two TDOA measurements are required to localize a target node (refer Fig.2). As shown in the figure, the base station that first receives the signal from the target node is considered as the reference base station. The TDOA measurements are made with respect to the reference base station. For a non-coplanar case, the positions of four base nodes and three TDOA measurements are required.

TDOA addresses the first drawback of TOA by removing the requirement of synchronizing the target node clock with base node clocks. In TDOA, all base nodes receive the same signal transmitted by the target node. Therefore, as long as base node clocks are synchronized, the error in the arrival time at each base node due to unsynchronized clocks is the same.

With respect to the second drawback of TOA, the transmitted signal from the target node in TDOA need not contain a time stamp, since a single TDOA measurement is the difference in the arrival time at the respective base nodes. This simplifies the structure of transmitted signals and removes potential sources of error. This advantage of TDOA is again exploited by many applications such as emergency call localization on highways and sound source localization by an artificially intelligent humanoid robot.

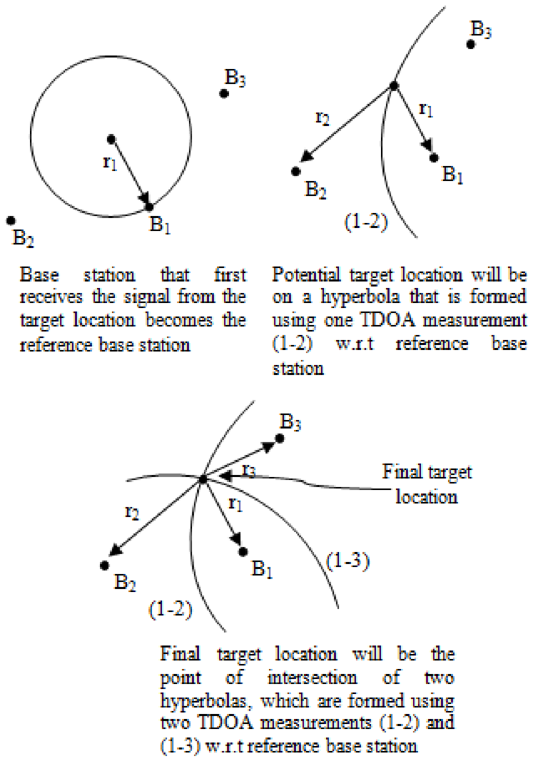

Fig.5 Operation of TDOA base positioning system.

C. Direction of Arrival (DOA)

In DOA estimation, base nodes determine the angle of the arriving signal (see Fig.3). To allow base stations to estimate DOA, they should be equipped with antenna arrays, and each antenna array should be equipped with radio frequency (RF) front end components. However, this incurs higher cost, complexity, and power consumption. Similar to TOA and TDOA estimation, in DOA estimation, the positions of base nodes should be known. However, unlike TOA and TDOA, for the known position of a base node and a coplanar scenario, only two base nodes along with two DOA measurements are required. For a non coplanar case, three base nodes are required. To determine the DOA, the main lobe of an antenna array is steered in the direction of the peak incoming energy of the arriving signal.

D. Received Signal Strength (RSS)

Similar to the TOA, in RSS, multiple base nodes collaborate to localize a target node via triangulation (refer Fig.1). However, instead of measuring the TOA at base nodes, the

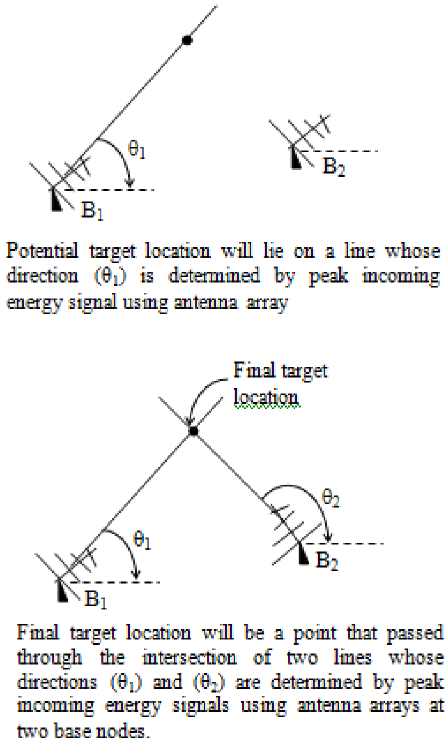

Fig. 6 Operation of DOA based positioning systems.

estimation is carried out using the received signal strength (RSS). In this method, the strength of the received signal indicates the distance travelled by the signal.

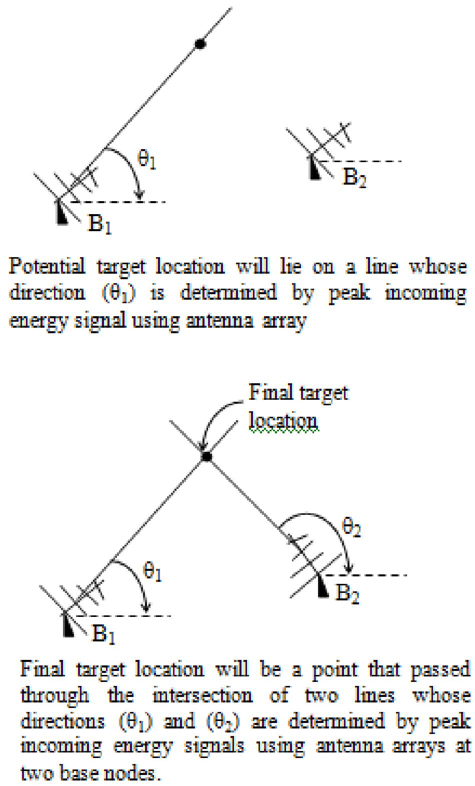

Fig. 4 Operation of DOA based positioning systems.

Table. 1. Comparison of measurement techniques.

Technique	Accuracy (meters)	LOS/ NLOS	Base Stations
TOA	50-100	LOS	≥ 3
TDOA	50-100	LOS	≥ 3
DOA	>100	LOS	≥ 2
RSS	0-100	NLOS	≥ 3

Assuming that the transmission strength and channel (or environment in which the signal is travelling) characteristics are known, for a coplanar case, three base nodes and three RSS measurements are required.

Compared with RSS, the performance characteristics of TOA, DOA, and TDOA techniques are very sensitive to the availability of LOS; that is, in NLOS situations, the computed TOA, DOA, and TDOA are subject to considerable error. However, the performance of the RSS technique is altered only mildly by the lack of LOS: NLOS leads to a shadowing (random) effect in the power distance relationship, which can be reduced using filtering techniques. Thus, many NLOS identification, mitigation, and localization techniques have been designed.

The below table compares basic positioning methods previously discussed in the article in terms of accuracy, a need for the availability of LOS, and the number of base stations required for localization. The table shows that on average, the accuracy of the DOA estimate is poorer relative to TOA, TDOA, and RSS estimates. This is mainly due to the fact that as the distance between the base station and the target increases, a small DOA error leads to a higher localization error. RSS is different from other methods when the availability of LOS is taken into account, since it operates in both LOS and NLOS environments. Other localization techniques are very sensitive to the availability of LOS.

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Trending Article:

QoE-Driven Big Data Architecture for Smart City

Excerpt from:

IEEE Communications Magazine, Vol.56, Issue.2

Xiaoming He; Kun Wang; Huawei Huang ; Bo Liu

The smart city is an innovation of the physical city with a high integration of advanced monitoring, sensing, communication, and control technologies aiming to provide real-time, interactive, and intelligent urbanization services to end users. With the rapid implementation of smart cities, large amounts of various sensing equipments have been deployed everywhere. As a consequence, such sensing devices are producing ever growing data, leading to the size of big data evolving from gigabytes to terabytes, and then to petabytes and even Exabyte's in the future. Extracted from these big data in the smart city, the enormous amount of meaningful information can not only enhance the quality of smart city from the perspectives of urbanization and industrialization, but also provide high quality of experience (QoE) for big data applications/services, since end users expect higher quality of information than in the traditional physical city.

The QoE of applications/services is in every aspect of smart cities, helping business gain improved performance, enhancing health-care through improved preventive services, and benefiting transportation systems. A smart city needs to be based on the digital city and associated with the physical city using the ubiquitous network of sensors. A variety of sensing devices produce various data quickly, as shown on the left of Fig.1.

Furthermore, following the gradual construction and improvement of a smart city, mankind and all kinds of sensing equipment will generate a mounting number of data making the growing size of big data evolve from gigabytes to Exabyte's. At any time, people are exchanging data and information online. The type of generated data differs due to the deployed system. A great variety of generated data with meaningful information provides the foundation of applications/ services feeding to end users.

Although the big data in smart cities brings end users applications/services with QoE, we are facing the challenges of retrieving the precise data of big data acquired from an ocean of data with diverse characteristics, and accurate information should be sent to end users with satisfactory QoE.

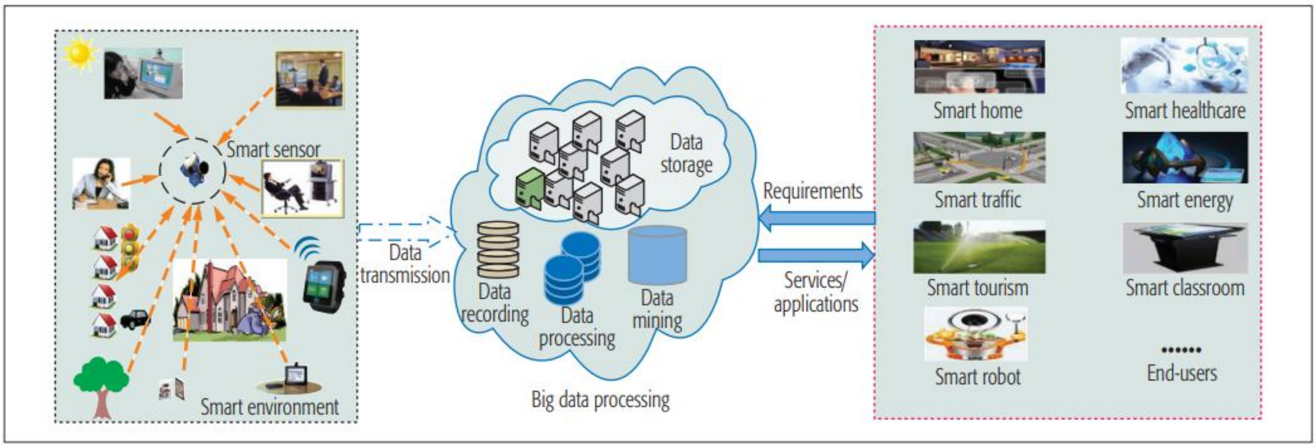

Fig.7. Big Data in the context of smart city.

Trending News:

Excerpt from:
Various sources

1. AUTOMATED DESIGN OF MACHINE LEARNING AND SEARCH ALGORITHMS

(Excerpt from IEEE Computational Intelligence Magazine, May-2018)

Machine learning and search techniques play an important role in solving real –world complex optimization problems in research such as transportation, data mining, computer vision, computer security and software development, amongst others. Given the growing complexity of optimization problems, the design of effective algorithms to solve these problems has become more challenging and time consuming. The design process is itself an optimization problem. Hence there is a design, especially from industry and business, to automate the design process there by to remove the heavy reliance on human experts and to reduce the man hours involved in designing machine learning and search algorithms.

Research into automated design of machine learning and search algorithms has also focused on generating new constructs used by these algorithms. These constructs have ranged from construction heuristics that are used to create initial solutions that these algorithms optimized further, creating operators used by search algorithms, generating machine learning work plans and architectures, to the inductions of solutions algorithms and software development. Identifying an appropriate algorithm or combination of algorithms to solve the problem at hand has also been investigated as part of automated design of machine learning and search algorithms. Hyper-heuristics, specifically selection Hyper-heuristics, and evolutionary algorithms have been examined for hybridizing algorithms to solve problems.

Various techniques have been examined for automated design however the most effective techniques have proven to be the machine learning and search algorithms themselves. Evolutionary algorithms, specifically genetic programming and variations thereof have played pivotal role in inducing new constructs such as construction heuristics, operators and software. Evolutionary algorithms have also been used for designing architectures E.g. Neural networks architecture and parameter control and tuning.

2. DIGITIZATION AND INTERCONNECTION DRIVEN INDUSTRIAL REVOLUTION

(Excerpt from Bell Labs Technical Journal, Vol-22, Issue-04)

The Lack of significant improvement in economic productivity over the past 30 years ,despite the rapid advances and growing investments in information and communication technologies and the digitization and global interconnection and accessibility of whole industries ,has been a topic of much concern and debate among economists and policy makers .the concern arises in large part due to the assessment of economic health by measuring increases in gross domestic product which is linked to productivity .the absence of such growth in the internet (information)age to date suggests that digitization will not produce economic growth but merely economic change with potentially increased inequality. The economist Robert J. Gordon makes a provocative but persuasive argument that the significant jump in productivity during 1940s was a one –time event Gordon argues that the current advances in information technology ,which define the so called third industrial revolution ,pale in social impact compared to the "great inventions" of the first and second industrial revolution ,such as electricity ,urban sanitation ,chemicals and pharmaceuticals ,the internal combustion engine and modern communication that powered economic growth in the golden century from 1870 to 1970.

Gordon argue that the great age of dramatic progress is behind us, as the advances over the last 30 years in ICT and digital technologies are not as transformative as the great inventions f the prior industrial revolutions. The analysis Gordon presents is coherent and compelling, however it ultimately rests on the question of the potential f the emerging technologies and whether their full potential has yet been realised or is still latent.

3. COBALT CLOUD UNTANGLE CHIPS WIRING PROBLEMS

(Excerpt from IEEE Spectrum, Feb-2018)

Today's computer chips contain tens of kilometres of copper wirings, build up in 15 or sole years. As the semiconductors industry has shrunk the size of transistors, it has also had to make these interconnections thinner. Today, some wiring layers are so fine that electrical current can actually damage them. And chipmakers are running out of new ways to deal with this problem.

Companies are now eyeing other materials such as cobalt, ruthenium, even grapheme, to replace copper for on-chip wiring. Copper boasts lower resistivity than aluminium, tungsten and even cobalt. However copper is particularly vulnerable to another problem at small scales called electro-migration. As electron speed through ultra thin wires, they dislodge atoms in the metal, bumping them out of the way like a harried commuter jostling a tourist off the sidewalk. To protect the copper inter-connects; the thin wires are lined with other material, such as tantalum nitride or even cobalt.

As copper interconnects get smaller the tantalum nitride liner remains relatively thick- it is difficult to make the liner much thinner than a nanometre or so, and it reaches a point where there is more liner than wire. Cobalt has three times as much inherent resistivity as copper but it is far less prone to electro-migration. For that reason, manufacturer is switching to cobalt for the metal layers that make up short range connections within and between transistors. In other chip layers, the wires are thicker and connect over longer distances, so sticking with copper are best. Intel is the first company to switch from copper to cobalt for this art of the chip. For its process update, then company changed from tungsten to cobalt for the layers of the metal that contact transistor gates. Tungsten had been the metal of choice because it is resilient and doesn't allow electro-migration to knock it around. But tungsten has high resistance. Intel is the firs

4. DRONE –AIDED COMMUNICATION AS A KEY ENABLER FOR 5G AND RESILIENT PUBLIC SAFETY NETWORKS (Excerpt from IEEE Communication Magazine, Jan-2018)

Wireless networks comprising unnamed aerial vehicles can offer limited connectivity in a cost effective manner to disaster struck regions where terrestrial infrastructure might have been damaged. While these drones offer advantages such as rapid deployment to far flung areas, their operations might be rendered ineffective by the absence of an adequate energy management strategy.

In view of their relative low cost and high mobility, unmanned aerial vehicles (UAVs) have recently found applications in area other than those related to the military ad reconnaissance. One of the ambitious projects undertaken by Facebook (called Aquila) aims to use swarms of drones to provide "WiFi in the sky" service to remote areas. This is one of the few promising projects proposed in the recent past that can potentially pave the way in exploiting drones as vehicles of communication for future wireless networks. UAV-aided communication is an emerging topic in the field of next generation networks. It is widely believed in academia that UAVs c help shape the public safety networks of the future whereby drones, due to their greater mobility , may provide fast service recovery in the event of network infrastructure being damaged. Even if such a scenario doesn't arise, UAVs may continue to relieve network congestion as their inclusion in the network would allow base stations to offload some of the latter's cellular traffic the former.

The motivation behind utilizing UAVs in futuristic public safety networks is that, given adequate planning, they would be able to provide sufficient connectivity in a disaster-struck area in a short span of time. In this regard, RF planning helps determine an estimate for the number of drones required for coverage, their optimal altitude, and the achievable user rates. If UAVs are to be deployed in cities, it is vital to determine the path loss experienced by signals given a region's urban landscape.

. . . Mysteries of India[1]

(Excerpt from https://timesofindia.indiatimes.com/)

The Kongka La Pass in Ladakh lies in the disputed border of India and China, and is truly the most inaccessible places in the world. In 1962, the armies of both the countries were engaged in a severe conflict. After this, both China and India entered into an agreement according to which none will be allowed to patrol the region, but can keep an eye on it from a distance. After this, a popular belief floated that the Kongka La Pass in Ladakh is a hideous base of UFOs. The area has forever remained a no man's land due to its territorial limits and is the reason why the UFOs have chosen it as their operational base.

Reportedly, many have seen these UFOs and both the Indian and Chinese Governments are aware of these developments. In 2006, Google Maps too baffled the world with some images that looked liked military facilities, but till date the whole issue remains mysterious and unexplainable. So at the end, when UNSEEN is empty, there must be an engineer in the stack, therefore the top of the stack must be an engineer.

Technology Review:

3-D Metal Printing

Excerpt from:

MIT Technology Review

While 3-D printing has been around for decades, it has remained largely in the domain of hobbyists and designers producing one-off prototypes. And printing objects with anything other than plastics—in particular, metal—has been expensive and painfully slow. Now, however, it's becoming cheap and easy enough to be a potentially practical way of manufacturing parts. The technology can create lighter, stronger parts, and complex shapes that aren't possible with conventional metal fabrication methods. It can also provide more precise control of the microstructure of metals. In 2017, researchers from the Lawrence Livermore National Laboratory announced they had developed a 3-D-printing method for creating stainless-steel parts twice as strong as traditionally made ones. Also in 2017, 3-D-printing company Markforged, a small startup based outside Boston, released the first 3-D metal printer for under $100,000.

Another Boston-area startup, Desktop Metal, began to ship its first metal prototyping machines in December 2017. It plans to begin selling larger machines, designed for manufacturing, that are 100 times faster than older metal printing methods.GE, which has long been a proponent of using 3-D printing in its aviation products has a test version of its new metal printer that is fast enough to make large parts.

. . . The Fletcher's Paradox (Taken from http://mentalfloss.com)

Imagine a fletcher (i.e. an arrow-maker) has fired one of his arrows into the air. For the arrow to be considered to be moving, it has to be continually repositioning itself from the place where it is now to any place where it currently isn't. The Fletcher's Paradox, however, states that throughout its trajectory the arrow is actually not moving at all. At any given instant of no real duration (in other words, a snapshot in time) during its flight, the arrow cannot move to somewhere it isn't because there isn't time for it to do so. And it can't move to where it is now, because it's already there. So, for that instant in time, the arrow must be stationary. But because all time is comprised entirely of instants—in every one of which the arrow must also be stationary—then the arrow must in fact be stationary the entire time. Except, of course, it isn't.

.... Fork in the Road (Solution)

Indirect question: "Hello there beauty, what would your sister say, if I asked her where this road leads?" The answer is always negated. Tricky question: "Excuse me lady, does a truth telling person stand on the road to the village?" The answer will be YES, if I am asking a truth teller who is standing at the road to village, or if I am asking a liar standing again on the same road. So I can go that way. A similar deduction can be made for negative answer. Complicated question: "Hey you, what would you say, if I asked you ...?" A truth teller is clear, but a liar should lie. However, she is forced by the question to lie two times and thus speak the truth.

Various sources

Alan Mathison Turing (23 June 1912 – 07 June 1954) was a British pioneering computer scientist. He was highly influential in the development of computer science, providing a formalization of the concepts of algorithm and computation with the Turing machine, which can be considered a model of a general purpose computer. Turing is widely considered to be the father of theoretical computer science and artificial intelligence.

1. Early life

The English scientist (Fig.1) was born on June 23, 1912, in Maida Vale, London, England. At a young age, he displayed signs of high intelligence, which some of his teachers recognized, but did not necessarily respect. When Turing attended the well-known independent Sherborne School at the age of 13, he became particularly interested in math and science. After Sherborne, Turing enrolled at King's College (University of Cambridge) in Cambridge, England, studying there from 1931 to 1934. As a result of his dissertation, in which he proved the central limit theorem, Turing was elected a fellow at the school upon his graduation.

In 1936, Turing delivered a paper, "On Computable Numbers, with an Application to the Entscheidungs problem," in which he presented the notion of a universal machine (later called the "Universal Turing Machine," and then the "Turing machine") capable of computing anything that is computable: The central concept of the modern computer was based on Turing's paper. Over the next two years, Turing studied mathematics and cryptology at the Institute for Advanced Study in

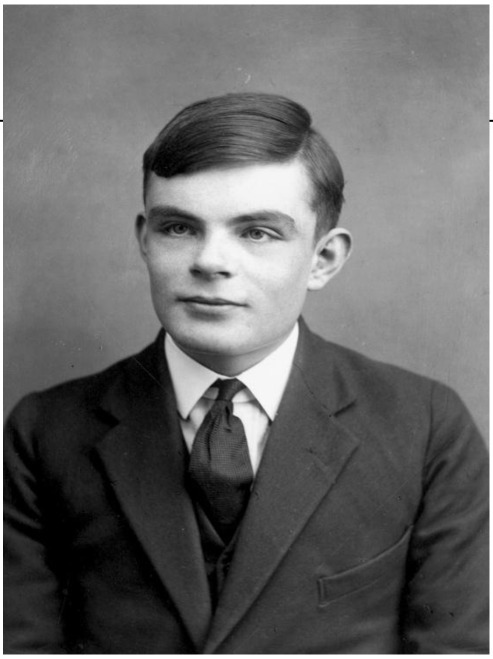

Fig. 8. Photo of Alan Turing.

Princeton, New Jersey. After receiving his Ph.D. from Princeton University in 1938, he returned to Cambridge, and then took a part-time position with the Government Code and Cypher School, a British code-breaking organization.

2. Education

English scientist Alan Turing was born Alan Mathison Turing on June 23, 1912, in Maida Vale, London, England. At a young age, he displayed signs of high intelligence, which some of his teachers recognized, but did not necessarily respect. When Turing attended the well-known independent Sherborne School at the age of 13, he became particularly interested in math and science. The first day of the term coincided with a general strike in Britain (1926), but he was so determined to attend the school that he rode his bicycle for more than 60 miles (97 km) from Southampton to Sherborne, stopping overnight at an inn. After Sherborne, Turing enrolled at King's College (University of Cambridge) in Cambridge, England, studying there from 1931 to 1934. As a result of his dissertation, in which he proved the central limit theorem, Turing was elected a fellow at the school upon his graduation.

In 1936, Turing delivered a paper, "On Computable Numbers, with an Application to the Entscheidungs problem," in which he presented the notion of a universal machine (later called the “Universal Turing Machine," and then the "Turing machine") capable of computing anything that is computable: The central concept of the modern computer was based on Turing’s paper. Over the next two years, Turing studied mathematics and cryptology at the Institute for Advanced Study in Princeton, New Jersey. After receiving his Ph.D. from Princeton University in 1938, he returned to Cambridge, and then took a part-time position with the Government Code and Cypher School, a British code-breaking organization.

3. Cryptanalysis and Early Computers

During World War II, Turing was a leading participant in wartime code-breaking particularly that of German ciphers. He worked at Bletchley Park, the GCCS wartime station, where he made five major advances in the field of cryptanalysis, including specifying the Bombe, an electromechanical device used to help decipher German Enigma encrypted signals. Turing’s contributions to the code-breaking process didn’t stop there: He also wrote two papers about mathematical approaches to code-breaking, which became such important assets to the Code and Cypher School (later known as the Government Communications Headquarters) that the GCHQ waited until April 2012 to release them to the National Archives of the United Kingdom. Turing moved to London in the mid-1940s, and began working for the National Physical Laboratory. Among his most notable contributions while working at the facility, Turing led the design work for the Automatic Computing Engine and ultimately created a groundbreaking blueprint for store-program computers. Though a complete version of the ACE was never built, its concept has been used as a model by tech corporations worldwide for several years, influencing the design of the English Electric DEUCE and the American Bendix G-15—credited by many in the tech industry as the world’s first personal computer—among other computer models.

Turing went on to hold high-ranking positions in the mathematics department and later the computing laboratory at the University of Manchester in the late 1940s. He first addressed the issue of artificial intelligence in his 1950 paper, "Computing machinery and intelligence," and proposed an experiment known as the “Turing Test”—an effort to create an intelligence design standard for the tech industry. Over the past several decades, the test has significantly influenced debates over artificial intelligence.

4. Conviction and Death

Homosexuality was illegal in the United Kingdom in the early 1950s, so when Turing admitted to police—who he called to his house after a break-in—in January, 1952, that he had had a sexual relationship with the perpetrator, 19-year-old Arnold Murray, he was charged with gross indecency. Following his arrest, Turing was forced to choose between temporary probation on the condition that he receives hormonal treatment for libido reduction, or imprisonment. He chose the former, and soon underwent chemical castration through injections of a synthetic estrogen hormone for a year, which eventually rendered him impotent.

As a result of his conviction, Turing's security clearance was removed and he was barred from continuing his work with cryptography at the GCCS, which had become the GCHQ in 1946. Turing died on June 7, 1954. Following a postmortem exam, it was determined that the cause of death was cyanide poisoning. The remains of an apple were found next to the body, though no apple parts were found in his stomach. The autopsy reported that "four ounces of fluid which smelled strongly of bitter almonds, as does a solution of cyanide" was found in the stomach. Trace smell of bitter almonds was also reported in vital organs. The autopsy concluded that the cause of death was asphyxia due to cyanide poisoning and ruled a suicide. In a June 2012 BBC article, philosophy professor and Turing expert Jack Copeland argued that Turing's death may have been an accident: The apple was never tested for cyanide, nothing in the accounts of Turing's last days suggested he was suicidal and Turing had cyanide in his house for chemical experiments he conducted in his spare room.

5. Awards, Recognition and Royal Pardon

Shortly after World War II, Alan Turing was awarded an Order of the British Empire for his work. For what would have been his 86th birthday, Turing biographer Andrew Hodges unveiled an official English Heritage blue plaque at his childhood home. In June 2007, a life-size statue of Turing was unveiled at Bletchley Park, in Buckinghamshire, England. A bronze statue of Turing was unveiled at the University of Surrey on October 28, 2004, to mark the 50th anniversary of his death. Additionally, the Princeton University Alumni Weekly named Turing the second most significant alumnus in the history of the school - James Madison held the number 1 position. Turing was honored in a number of other ways, particularly in the city of Manchester, where he worked toward the end of his life. In 1999, Time magazine named him one of its "100 Most Important People of the 20th century," saying, "The fact remains that everyone who taps at a keyboard, opening a spreadsheet or a word-processing program, is working on an incarnation of a Turing machine." Turing was also ranked 21st on the BBC nationwide poll of the "100 Greatest Britons" in 2002. By and large, Turing has been recognized for his impact on computer science, with many crediting him as the "founder" of the field. Following a petition started by John Graham-Cumming, then-Prime Minister Gordon Brown released a statement on September 10, 2009 on behalf of the British government, which posthumously apologized to Turing for prosecuting him as a homosexual. "Thousands of people have come together to demand justice for Alan Turing and recognition of the appalling way he was treated," Brown wrote in the statement. "While Turing was dealt with under the law of the time and we can't put the clock back, his treatment was of course utterly unfair and I am pleased to have the chance to say how deeply sorry I and we all are for what happened to him."This recognition of Alan's status as one of Britain's most famous victims of homophobia is another step towards equality and long overdue. But even more than that, Alan deserves recognition for his contribution to humankind," Brown stated. "It is thanks to men and women who were totally committed to fighting fascism, people like Alan Turing, that the horrors of the Holocaust and of total war are part of Europe's history and not Europe's present. So on behalf of the British government, and all those who live freely thanks to Alan's work I am very proud to say: we're sorry, you deserved so much better."

In 2013, Queen Elizabeth II posthumously granted Turing a rare royal pardon almost 60 years after he committed suicide. Three years later, on October 20, 2016, the British government announced “Turing’s Law” to posthumously pardon thousands of gay and bisexual men who were convicted for homosexual acts when it was considered a crime. According to a statement issued by Justice Minister Sam Gyimah, the law also automatically pardons living people who were “convicted of historical sexual offenses who would be innocent of any crime today.

1. <u>SERB Funded Biological Inspired Computing and Applications (BICA-2018)</u>

A three day workshop BIOLOGICAL INSPIRED COMPUTING & APPLICATIONS (BICA – 2018) was organized by computer science and engineering department during 09/03/2018.
11/03/2018.
Resource Persons:

i. Prof. B. K. Panigrahi, IIT Delhi,
ii. Prof. Ganapati Panda, IIT Bhubaneswar,
iii. Prof. B. K. Panigrahi, IIT Delhi,
iv. Dr. G. S. Ramamurthy, IIIT, Hyderabad,
v. Dr. Birendra Biswal, GVPCOE (A), Vishakhapatnam, Laboratory Sessions,
vi. Ms. Sasmita Panda, Ph.D. Scholar, IIT, Kharagpur.

2. Workshop on Cryptology and Cyber Security (WCCS-2018)

The Departments of Computer Science and Engineering and Electronics and Communication conducted a three days Workshop on Cryptology and Cyber Security (WCCS-2018)' during Mar 22-24, 2018. The Cryptology Research Society of India (CRSI), Institution of Electronics and Telecommunication Engineers (IETE) funded the workshop.

Resource persons:

i. Prof. Bimal K. Roy, Former Director, ISI, Kolkata,
ii. Prof. R. Balasubramanian, Former Director, IMSc, Chennai,
iii. Prof. Shri Kant, Former Director, DRDO,
iv. Prof. C. Pandurangan, IIT Madras,
v. Prof. Ganapati Panda, IIT Bhubaneswar,
vi. Dr. Y.V. Subba Rao, UoH,
vii. Dr. KannanSrinathan, IIIT Hyderabad,
viii. Prof. P. S. Avadhani, AUCE (A),
ix. Prof. M. S. Prasad Babu, AUCE (A),
x. Prof. J. Madanmohan Ram, GVPCE (A),
xi. Mr. P. NageshGautham, Citi Bank.

3. **<u>Workshop in Dept. of EEE on "*Bridging the Gap between Industry and Academia*" by Mr. Suresh Kumar Vengali (March-2018)</u>**

4. **<u>Expert Talk in the Dept. of EEE by Mr. D. S. N. Murthy, CEO and MD, Dhanush Infotech, in EEE Dept. (March-2018)</u>**

5. **CSI Student Branch Organized Exprt Talk by Mr. P. Rajasekhar (Feb-2018)**

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Other Institutions

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GVP Centre for Policy Studies

GVP Junior College

Indo German Institute of Advanced Technology (IGIAT)

GVP College for Degree & PG Courses School of Engineering

GVP Institute of Health Care & Medical Technology

GVP MLBT School