GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING FOR WOMEN

ELECTRO SPECTRUM 2016

Volume—1

Vision of the Department	Produce competitive engineers instilled with ethical and social responsibilities to deal with the technological challenges in the field of Electronics and Communication Engineering.	
Mission of the Department		**Mission Statements**
	M1	Facilitate a value-based educational environment that provides updated technical knowledge.
	M2	Provide opportunities for developing creative, innovative and leadership skills.
	M3	Imbue technological and managerial capabilities for a successful career and lifelong learning.

	Program Educational Objectives Statements
PEO1	Analyze and apply the knowledge of Mathematics, Science, and Engineering concepts for solving Electronics and Communication Engineering problems.
PEO2	Solve complex problems in Electronics and Communication Engineering and its allied areas to attain optimum solutions.
PEO3	Excel in chosen career by exhibiting life skills and professional ethics in multidisciplinary fields through continuous learning and research.

	Program Educational Objectives Statements
PSO1	Acquire knowledge required for designing Electronics and Communication systems.
PSO2	Design, simulate and implement essential modules in the areas of Electronic circuits, VLSI, Embedded systems, Communication and Signal processing.

INDEX

President's Message:

It is a matter of great pride that Gayatri College of Engineering for Women has made consistent progress, year on year, in academic and co-curricular activities

Dear students, "You are the nation-builders. You are the movers of technology. You are the agents of change." It is our fervent hope that the years that you spend in this college would enable you to equip with holistic skills for your bright future. The knowledge that you will gain, the fine qualities that you will imbibe and the technical skills that you will learn to apply will be your major contribution to your parents, to society, and to the nation.

Secretary's Message:

I am pleased to know that Dept of ECE - GVPCEW is bringing out a e-magazine. So much goes into the making of a College where academic ambition lies at the heart of things. I can boldly say that we have excelled in every initiative that we undertook and we have stood together in facing the challenges in realizing quality education.

When looking at science in society, there is a vast interface to explore. As rightly quoted by Sir Isaac Asimov, 'Science can amuse and fascinate us all, but it is engineering that changes the world'. The budding Engineers of today should have a perspective to realize that Education is not just an act of acquiring knowledge but learning a skill to lead life and forming one's personality. I've been an academician most of my life, why college? I was often asked. My response would be, 'We go to college to know, assured that knowledge is sweet and powerful, that a good education emancipates the mind and makes us citizens of the world'.

I am hopeful that this small piece of literary work shall not only develop the taste for reading and writing among students but also develop a sense of belonging to the institution as well. After all a college Pride lies in its Alumni

Academic Director's Message:

I am very much delighted and pleased to know that Dept of ECE bringing out a e-Magazine with good and useful information on Engineering and Technology and also the available infrastructure and facilities provided for the benefit of students and Faculty. The efforts by the faculty and students to bring out this e-magazine with a beautiful getup needs a good word of appreciation and accolades. I wish this would continue in future too which certainly upholds the academic environment and decorum of this campus.

Let me thank all the senior teachers and the other faculty who had shared their experiences by their rich and highly informative contributions to the Magazine.

My hearty congratulations to all those concerned in planning, organizing and bringing out this colourful product which I believe, keeps this College in the limelight amongst all the Institutions in and around Visakhapatnam

Wishing you all the best

Principal's Message:

As I embark upon my journey as the Principal for Gayatri Vidya Parishad College of Engineering for Women, I am jubilant to meet through this page which is a driving force for the students and faculty at GVPCEW to be proactive towards learning. As we try to prepare the students always to " Think and Review" so as to discover the cause and effect of every event, would surely reveal the hidden talents of the academic fraternity. It gives me immense pleasure to encapsulate yet another occasion of success. I congratulate everyone who endeavours towards our cherished motto of empowering the students for all round development through technical education. Thorough acquisition of knowledge fringed with skills required and character building is our promise by providing necessary resources and resourceful intelligentsia ensuring expected settlement.

Vice Pricipal's Message:

Vision is strong;the dream comes true only through grit,determination and devotion. I bless all the young aspirants to strive hard, use synergy to reach paramounting position in your desired path. Realize the immanent strenght;never leave any stone unturned in the path of learning and gaining. I am a staunch believer that the actions speak more than the words and that everybody must keep his promises to discharge duties as a responsible person of the society.

Hod's Message:

Today, the corporate sector is looking for young, dynamic and creative students who are good at their technical and communicational skills. Hence it is essential that every student has to enrich themselves with these skills. In view of this, apart from regular academic curriculum, the students have to take part in various Group Discussions, Workshops and Training programs. The G.V.P. College of Engineering for Women is facilitating such a nice platform to the students of all branches to prove themselves and enrich their knowledge. Hope that each participant will enjoy the academic flavours of all programs and gain high confidence levels. I wish the program to be a grand success.

Editorial Message:

Dear readers

We are delighted to bring the first edition of ELECTRO SPECTRUM. At ELECTRO SPECTRUM – 2016, we have made sure that you enjoy reading the magazine and relish the experience.

This magazine would not have been possible without the help of you, the readers, every member of the ELECTRO SPECTRUM family and faculty members who brought us so.

Finally, we urge our readers to send in their valuable suggestions to help us improve their reading experience and also make sure send in your articles which we will be more than happy to publish.

~Team ELECTRO SPECTRUM

WORLD'S FIRST 1-TERABYTE SDXC CARD

SanDisk today showcased its upcoming 1TB SDXC card prototype at a European trade show for photo and video professionals.

"There is no definitive timing for availability as of now," a company spokesperson said in an email to Computerworld. "Western Digital plans to monitor industry trends and demands, and introduce the card in retail accordingly. Price would depend on market conditions at the time it's released."

Do you frequently record super-slow-motion 8K video? Do you want to back up your entire computer to your coin pocket? Then these measly 512-gigabyte SD cards probably aren't cutting it. Fortunately, Lexar has a 1-terabyte card for you. Only $500!

Terabyte cards have been promised for years SanDisk said it was going to, but never made it happen. Longsys (which owns the Lexar brand) beat them to the punch, and today you can buy one. Or pay for one, anyway it's unclear what the shipping date is. Funnily enough, Lexar was on its way out at the time as a brand, but has since returned and no doubt this card is a way to get it back into the conversation.

Beyond the capacity, the specs aren't anything exciting; 95 MB/s read rate, slower read rate, just like any normal SD card. Well, SDXC technically, but everyone just calls them SD.

Of course, a terabyte card isn't really practical for most people. For most photographers, it would be difficult, not to mention inadvisable, to fill up a card that big before offloading or backing up. If the card gets stolen or broken or corrupted, that's a whole lot of data you've just lost.

Even if you wanted to, it would take some three hours to read the entire card off. That's not ideal. I asked one of our video team if they'd want a terabyte card; the response: "Uh, no. No way."

On the other hand, for cameras with two card slots, one could hold a super-high-capacity card like this and the other a smaller card that you offload more frequently. If you write shots to both, it's like an in-camera backup. Even then, a terabyte is more than most would need.

But of course, we all laughed when the first gigabyte cards came out who needs that much space?

With 8K video capture becoming more common, mostly for the convenience of cropping and editing rather than for any increased fidelity, and higher frame rates being asked for in many forms of media, a terabyte actually disappears pretty quickly, even with a single shooter. So these terabyte cards will likely find a niche even if you and I don't really need one.

Even so, maybe wait for a sale.

FACULTY ARTICLE

Global Navigation Satellite System (Gnss)

Mrs M Mani Kumari (Asst. Prof.), Dept. Of ECE

GVP College of Engg. For Women Madhurawada, Visakhapatnam.

ABSTRACT:
Recently, there is an increase interest in positioning techniques based on Global Navigation Satellite Systems (GNSS) such as Global Positioning System (GPS), cellular network infrastructure or on the integration of the two technologies for a wide spread of applications such as Automatic Vehicle Location (AVL), tracking systems, navigation, Pedestrian Navigation Systems (PNSs), intelligent transportation Systems, precise positioning and emergency callers. During the last 15 years there are many important events in the field of satellite navigation systems such as: (a)the full operational GPS in 1993, when 24 GPS satellites were operating in their assigned orbits, available for navigation use and providing Standard Positioning Services 2 (SPS), (b) the new European satellite system Galileo, (c) the modernized of US satellite system GPS, and (d) the reconstruction of Russian satellite system Glonass
Key Words: Global Navigation Satellite System (GNSS), Global Positioning System (GPS), GLONASS, Geographic Information System (GIS), GALILEO, LBS, AVL, Wireless Networks, WAAS, EGNOS, Applications of GNSS/GIS to city planning and engineering.

1. INTRODUCTION

Satellite navigation systems has become integral part of all applications where mobility plays a important role (Heinrichs et al., 2005). These functions will be at the heart of the mobile phone third-generation (3G) networks such as the UMTS. In transportation systems, the presence of 3 receivers will become as common as seat belts or airbags, with all car manufacturers equipping their entry-level vehicles with these devices. As for the past developments, GPS launched a variety of techniques, products and, consequently, applications and services. The milestone of satellite navigation is the real time positioning and time synchronization. For that reason the implementation of wide-area augmentation systems should be highlighted, because they allow a significant improvement of accuracy and integrity performance. WAAS, EGNOS and MSAS provide over US, Europe, Japan a useful augmentation to GPS, GLONASS and Galileo services (Mulassano, et al., 2004). GNSS development has an interesting aspect due to its sensitive nature. Considerable events or developments are always subject to a couple of differentiators: technological developments and political decisions. GPS and Glonass in all stages of improvements are strictly related to those differentiators.

2. GNSS COMPONENTS

The GNSS consist of three main satellite technologies: GPS, Glonass and Galileo. Each of them consists mainly of three segments: (a) space segment, (b) control segment and (c) user segment. These segments are almost similar in the three satellite technologies, which are all together make up the GNSS. As of today, the complete satellite technology is the GPS technology and most of the existing worldwide applications related to the GPS technology. The GNSS technology will become clearer after the operation of Galileo and the reconstruction of Glonass in the next few years.

2.1 Global Positioning System:

The United States Department of Defense (DoD) has developed the Navstar GPS, which is an all-weather, space based navigation system to meet the needs of the USA military forces and accurately determine their position, velocity, and time in a common reference system, any where on or near the Earth on a continuous basis (Wooden, 1985). GPS comprises three main components: - Space segment: The Space Segment of the system consists of the GPS satellites; see Figure 1. These space vehicles (SVs) send radio signals from space as shown in Figure 2. - Control segment: The Control Segment consists of a system of tracking stations located around the world. The Master Control facility is located at Schriever Air Force Base (formerly Falcon AFB) in the State of Colorado, USA. - User segment: The GPS User Segment consists of the GPS receivers and the user community. GPS receivers convert space vehicle (SV) signals into position, velocity, and time estimates. 5 Figure 1. GPS Constellation Figure 2. GPS Satellite Signals

The satellites are dispersed in six orbital planes on almost circular orbits with an altitude of about 20,200 km above the surface of the Earth, inclined by 55 degree with respect to the equator and with orbital periods of approximately 11 hours 58 minutes (half a sidereal day). The categories are Block I, Block II, Block IIR (R for replenishment) and Block IIA (A for advanced) and a further follow-on category Block IIF has also been planned (ICD-GPS, 2003). Figure 3
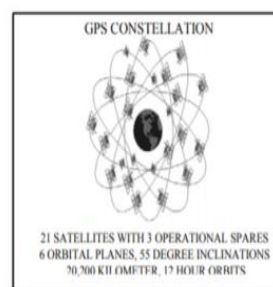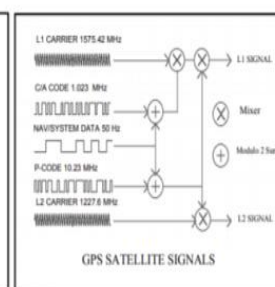

Figure 1. GPS Constellation   Figure 2. GPS Satellite Signales

shows the main GPS segments.

2.2 Modernized GPS

Due to the vast civil applications of GPS technology during the past decade or so and due to the new technologies used in the satellite and receivers, the U.S government has decided to extend the capabilities of GPS to give more benefits to the civil community. In addition to the existing GPS signals, new signals will be transmitted by GPS
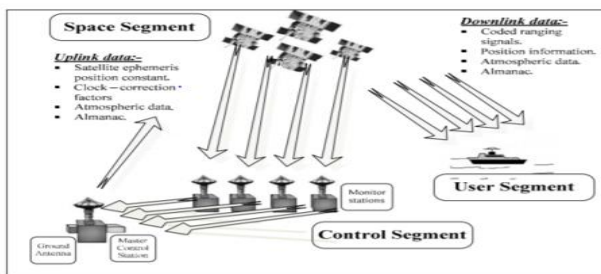
Figure 3. GPS segments (Aerospace Corporation, 2003).

satellite; see Figure 5. Moreover, this will increase the robustness in the signals and improve the resistance to signal interference. This definitely will lead to a better quality of service (QoS).

2.3 GLONASS

The GLONASS (GLObalNAvigation Satellite System or "GLObalnayaNAvigatsionnayaSputnikovaya Sistema") is nearly identical to GPS. Glonass satellite-based radio-navigation 9 system provides the positioning and timing information to users. It is operated by the Ministry of Defense of the Russian Federation (GLONASS-ICD, 2002). Glonass space segment is consist of 24 satellites, equally distributed in 3 orbit separated by o 120 in the equatorial plane. Satellite orbital altitude is about 19,130 km above the ground surface. This results in an orbital period of 11:15:44
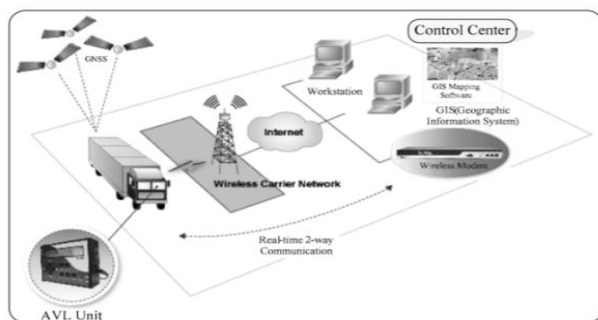

Figure 14. AVL system's components

corresponding to 8/17 of a sidereal day.

2.4 GALILEO

GALILEO is Europe's initiative for a state-of-the-art global

Figure 6. GALILEO System Architecture (GALILEO 2003).

navigation satellite system, providing a highly accurate, guaranteed global positioning service under civilian control. Galileo will be not too different from the other GNSS parts (modernized GPs and Glonass (Salgado et al., 2001). It will provide autonomous navigation and positioning services, but at the same time will be interoperable with the two other global satellite navigation systems; the GPS and GLONASS. A user will be able to take a position with the same receiver from any of the satellites in any combination. By providing dual frequencies as standard, however, GALILEO will

deliver real-time positioning accuracy down to the meter range. It will guarantee availability of the service under all, but the most extreme circumstances and will inform users within seconds of a failure of any satellite.

Galileo signals

The GALILEO frequency should respect the radio-C

Location Based Services (LBSs) provide personalized services to the subscriber based on their current position. LBSs employ accurate, real-time positioning to connect users to nearby points 32 of interest. LBS advises them of the current conditions such as traffic and weather, or provides routing and tracking information--all via wireless devices. Location of the caller is generally determined by various position determination techniques. These include Cell-ID, Enhanced Observed Time Difference (E-OTD), Observed Timed Difference of Arrival (OTDOA), Wireless Assisted GNSS (A-GNSS) and hybrid technologies (combining A-GNSS with other standard technologies. Some of these projects are based on the Mobile Client / Server architecture (Lohnert et al., 2001). The LBS applications and needs could be divided into four main areas:

1. Information and navigation services: These services provide data directly to end-users, in particular destination location and criteria for trip optimization.

2. Emergency assistance: This type of service provides the location of mobile users in case of distress and need for assistance such as: E-911 in US and E-112 in Europe. GIS
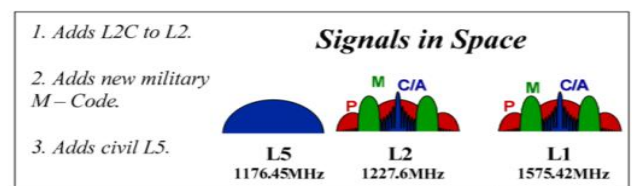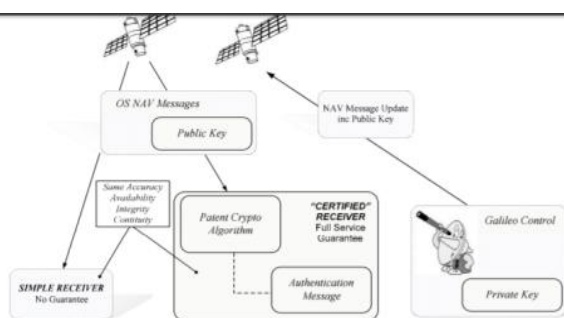

Figure 5. Modernized GPS signals

capabilities are essential in such services.

3. Tracking services: In general, an AVL system consists of GNSS receiver integrated with GSM/GPRS module mounted on the vehicle, communication link between the vehicle and the dispatcher, and PC-based tracking software for dispatching (Figure 14) (AlBayari and Sadoun, 2005).

4. Network related services: Here knowledge of user position improves communication services. Location can be achieved by integrating a GNSS receiver in the mobile phone (handheld solution) or by using the communication network itself. LBS techniques based on GSM, GPRS and WCDMA (Wideband Code Division Multiple Access) networks alone don't offer high accuracy. Moreover, GNSS alone is insufficient to maintain continuous positioning due to the inevitable difficulties caused by obstacles. When GNSS signals are blocked or lost, the precision of positioning will be minimized to unacceptable level. Hence, it is necessary to improve the accuracy and reliability of GNSS position.

6.CONCLUSION

Global Navigation Satellite Systems (GNSS) technology has become vital to many applications that range from city planning engineering and zoning to military applications. It has been widely accepted globally by governments and organizations. That is why we expect to have very soon at least three GNSS systems: the USA GPS, European Galileo, and the Russian Glonass systems. There is a multibillion

dollar investment in this field and intensive worldwide research activities. The impressive progress in wireless communications and networks has played a great role in increasing interest in GNSS and providing enabling methodologies and mechanisms. It is expected that all 3G and future generations of cellular phones will be equipped with GNSS chips. GNSS technology dominates the outdoor navigation, which provides accuracy to the range of few meters to 10 m in single point positioning technique or sub-meter to a few meter level in differential GNSS technique (DGNSS). Different techniques have been developed recently for 34 indoor positioning. They offer either absolute or relative positioning capabilities with acceptable precision (Hightower and Borriello 2001). Combining these technologies with GNSS allows to provide a more reliable and robust location solution. Most common implementation of Hybrid technology for GSM, GPRS and WCDMA is to combine A-GNSS with Cell-ID.

REFERENCES

Al-Bayari, O. and Sadoun, B., (2005). New centralized automatic vehicle location communications software system under GIS environment. International Journal of Communication System, 18(9): 833-846.

Aerospace Corporation, (2003). GPS Primer: A Student Guide to the Global Positioning System. Los Angeles, USA. Available at : http://www.aero.org/education/primers/gps/GPS-Primer.pdf (access date 12/2005).

Betz, J. W. (2002). Binary offset carrier modulation for radio navigation. Navigation, 48 (4): 227-246.

Dierendonck, A J and Hegarty, C. (2000). The new L5 Civil GPS Signal. GPS World, 11, 64-71.

Euler H. J. (2005): Reference Station Network Information Distribution, IAG Working Group 4.5.1: Network RTK.

Feng, Y (2003), Combined Galileo and GPS: A Technical Perspective. Journal of Global Positioning Systems, 2 (1): 67-72.

FACULTY ARTICLE

Design and Implementation of FPGA-Based Robotic Arm Manipulator

Mrs B.LAKSHMI, Dept, Of ECE

GVP College of Engg, For Women,

Madhurawada, Visakhapatnam

Abstract:

Robotic arm manipulators have a wide variety of applications. It is the core of manufacturing process in all factories nowadays. In this paper, the design, implementation and control of modified design of a six degrees of freedom (DOF) LYNX-6 robotic arm FPGA-based controller is introduced. In LYNX-6 arm, the lengths of the arms are modified and we used FR4 material to achieve the lightweight requirements of the arm structure. LYNX-6 arm has 5 DOF plus a grip movement (5+1). It is also similar to human arm from the number of joints point of view. Servomotors are controlled by pulse-width modulated (PWM) signals that control the position of the servo actuator. To position the robotic arm in 3D space, the angle of each joint must be set. A MATLAB GUI is designed to pick the desired (X, Y, Z) coordinates from the user, check the robot domain , perform the inverse kinematics algorithm and send the angles data serially through wireless module to FPGA controller to generate the necessary pulse-width modulated signals for the motors. The controller architecture is implemented on a Xilinx spartan3 FPGA evaluation board using VHDL. FPGA with its large number of I/O pins and parallel processing capabilities is suitable for interfacing and controlling the six motors at the same time. The proposed FPGA-based controller offered flexible, standalone, and compact design with high system reliability [1, 2]. Keywords—VHDL,LYNX-6,PWM,Arm manipulator I.
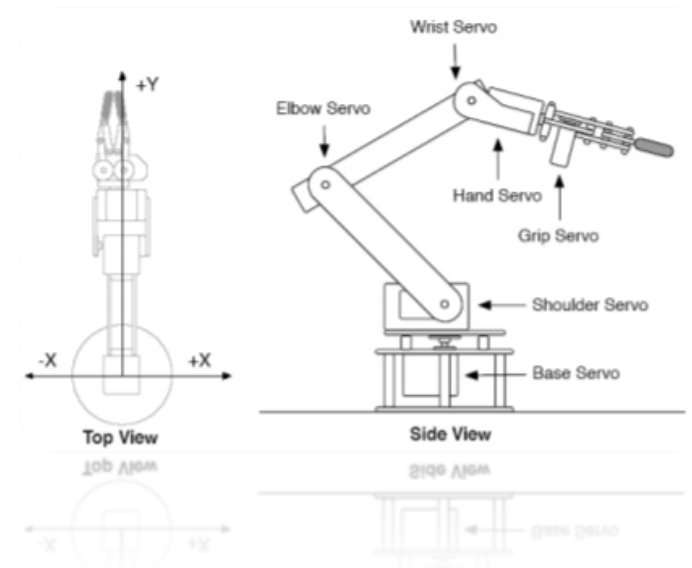
INTRODUCTION

Humans are fortunate that the human body is overall, a nearly perfect intelligent machine which can lift heavy loads, it can move itself around, and it has built-in protective mechanisms to feed itself when hungry. Robots are often modelled after humans if not in the form then at least in function. For decades, scientists and experimenters have tried to duplicate the human body, to create machines with intelligence, strength, mobility, and auto-sensory mechanisms. Like the human body, the body of the robot holds all its vital parts. The body is the substructure that prevents its electronic and electromechanical parts from spilling out. Robot bodies go by many names, including frame and chassis, but the idea is the same [3]. There are many industrial applications uses those robotic arms; for examples: pick and place application, welding, spray painting, polishing, material handling, water jet cutting and many more. Generally, all applications above use almost the same design robot arm but the different is the software programming depending on the applications. LYNX-6 is a good alternative for such robot manipulators, because it is inexpensive, flexible and similar to industrial, robot arms.

Lynx 6 robot arm has five directions of motion (DOF) plus a gripper movement (5+1). It is also similar to human arm from the number of joints point of view. These joints provide shoulder rotation, shoulder back and forth motion, elbow motion, wrist up and down motion, wrist rotation and gripper motion. It has three arms that are connected together using servomotors mechanism and these three parts are connected to a base that is rotating using base servomotor as shown in figure 1.

Figure 1 Side and top view of Lynx 6

To position the robotic arm in 3-D space, the angle of each joint must be set. If the physical dimensions of the robotic arm and the angles of all joints are known, the position of any point in the robotic arm assembly can be calculated by starting from the base and calculating the position of each joint successively, until the x, y, z coordinates of the point of interest are determined. This is called forward kinematics. The opposite calculation, calculating the required angle for each joint that results in the point of interest being located at a specific x, y, z coordinates, is called inverse kinematics. MATLAB GUI program is designed to pick the desired (X, Y, Z) coordinates from the user, check the robot domain, perform the inverse kinematics algorithm and send the angles data serially through a wireless module to an FPGA board to control the servomotors. A servomotor is a small DC motor with the following 1st components added: some gear reduction, a position sensor on the motor shaft, and an electronic circuit that controls the motor's operation. The gear reduction provided in a servo is large. Servomotors are typically used for angular positioning, such as in radio

controlled airplanes. They have a movement range of 0 up to 180 degrees, but some extend up to 210 degrees. Typically, a potentiometer measures the position of the output shaft at all times so the controller can accurately place and maintain its position. In practice, servos are used in radio-controlled airplanes to position control surfaces like the elevators and rudders. They are also used in radio-controlled cars, puppets, and of course, robots. Servos are extremely useful in robotics. The motors are small and have built in control circuitry, and are extremely powerful for their size. The servomotors are controlled using pulse width modulated signal. Pulse width modulation (PWM) is a technique to provide logic '1' or '0' for a specified period. It is a square wave, which, when sufficiently fast, creates an effective average voltage on the line. The ratio of high pulse length to period of the signal is called the duty cycle. By varying the duty cycle, you can vary the average voltage as shown in figure 2.
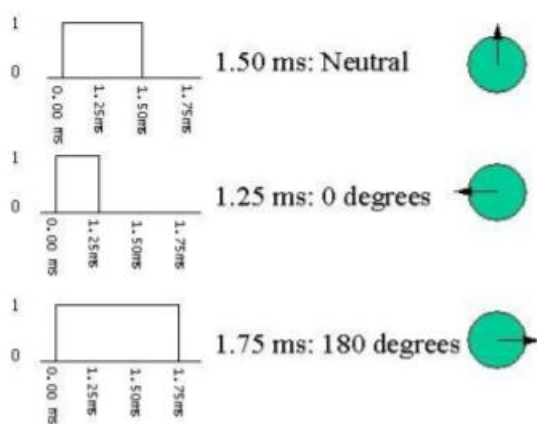

Figure 2 Relation between pulse width and angle Field Programmable Gate Arrays (FPGAs) are used to provide the required PWM signal to control the servomotors. FPGA is a regular structure of logic cells (or modules) and interconnect, which is under your complete control. This means that you can design, program, and make changes to your circuit whenever you wish. FPGAs are digital ICs that contain programmable logic blocks along with configurable interconnects between these blocks. Design engineers can configure such devices to perform tremendous variety of tasks. FPGA with its large number of I/O pins and parallel processing capabilities is suitable for interfacing and controlling the six motors at the same time. The proposed FPGA-based controller offered flexible, standalone, and compact design with high system reliability. The main controller is designed based on Spartan-3 kit.The Spartan=3 family of Field-Programmable Gate Arrays is specifically designed to meet the needs of high volume, and cost-effective consumer electronic applications.

REFERENCES

[1] Iovine J, "PIC Robotics: A Beginner's Guide to Robotics Projects Using the PICmicro", Mc-Graw Hill, 2004.

[2] Iovine J, "Robots, Androids, and Animatrons: 12 Incredible Projects You Can Build", Mc-Graw Hill, 2001.

[3] Lunt K., "Build Your Own Robot", A. K. Peters Ltd., 2000.

[4] Boylestad, R., and L. Nashelsky "Electronic Devices and Circuit Theory", Englewood Cliffs, N.J.: Prentice Hall. (1992).

[5] P. Myke "Programming Robot Controller." Mcgraw-Hill. (2003).

[6] Fu, K.S., Gonzalez R.C., Lee, C.S.G (1987). "Robotic: Control, Sensing, Vision and Intelligence". Singapore: McGraw-Hill Book Company.

[7] Saeed B.Niku "Introduction to Robotics Analysis, Systems, Application." Pearson Education, (2001).

[8] Dan W. Patterson "Artificial Neural Network Theory and Applications." Printice Hall, Inc.(1996)

STUDENT ARTICLE

PLASTIC SOLAR CELL TECHNOLOGY

M. Ramya Sri 13JG1A0477

1.1 Introduction

Developing nations like India should rely on the renewable energy sources, for the conventional sources are getting vanished slowly. Particularly, an equatorial nation like India, would expect to make the optimum usage of the vast source of solar power available. But the conventional methods have not been much into implementation, due to two straight reasons.

The first reason is that its efficiency is very less. Going deep into the working, we see that, in conventional silicon cells, used for solar power production, the incoming light photons are expected to have an optimum energy, so that it stimulates the photon. But, if the energy of the incident photon is less, the photon will easily penetrate and will pass through, without stimulating the electrons. On the other hand if the energy is in excess, there will be a loss of energy in the form of heat. This accounts for 70 % losses in the conventional solar cells, making them relatively less efficient.

The second reason is they are reasonably expensive. Fabrication of solar cell cost's tremendous. Its need in rural area is important. In remote places, wherein the households are spaced out, the conventional electric grid construction becomes tedious. When solar cells are used, the work gets easier and at the same time effect of pollution is reduced.

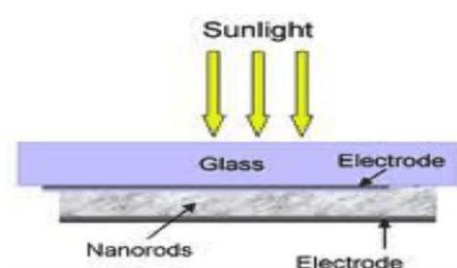But these remain unaffordable and hence less effective.

1.2 Plastic Solar Cells

Chemists at the University of California – Berkeley, have discovered a way to make cheap plastic solar cells that could be painted on almost any surface! This perhaps opens the gate, for many other applications. The solar power though already being used in calculators and such mini devices, if nanotechnology is introduced the efficiency and the demerits relating to the battery usage can become negligible. Though this seems small, this can bring about a vast revolution in the field of electricity.
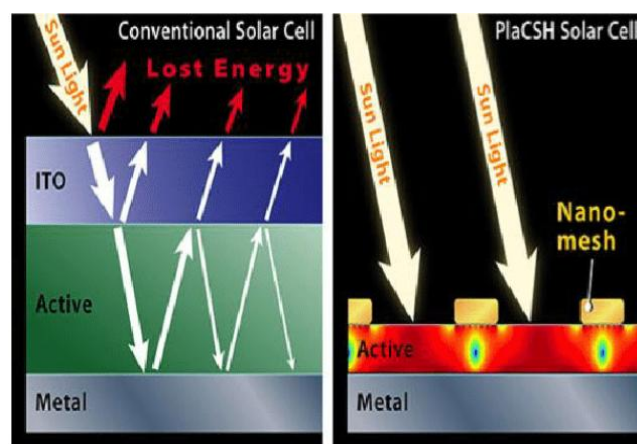

A Nano cell connected by two Nano rods

The plastic Nano cells explained above, utilize tiny Nano rods dispersed within in a polymer. The Nano rods behave as wires because when they absorb light of a specific wavelength they generate electrons. These electrons flow through the Nano rods until they reach the aluminium electrode, thus electricity is generated.

Working of a tiny plastic Nano solar cell
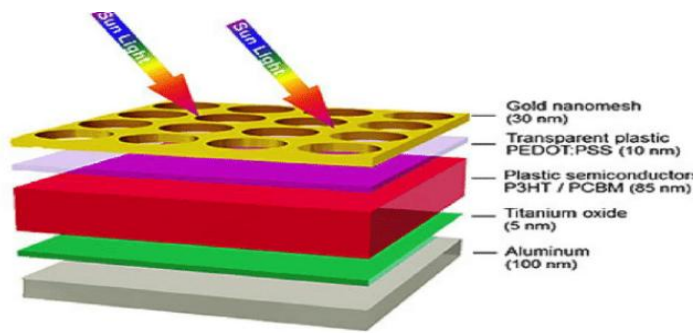
1.3 Plasmonic Cavity

Princeton University scholars have fabricated simple and excellent way of tripling the efficiency of the solar cells. This could perhaps be the future of the solar power. The researchers were able to increase the efficiency to about 175 % by using a nanostructured sandwich of a metal and plastic, in an appropriate manner, that collects and traps light. This sandwich structure called the sub wavelength plasmonic cavity has an ability of capturing eye opening 96 percent of incident sunlight light.

Difference between conventional solar cell and plaCSH cell

The top layer, known as the window layer, of the new solar cell uses an incredibly fine metal mesh: the metal is 30

nanometres thick, and each hole is 175 nanometres in diameter and 25 nanometres apart. This makes a mesh window structure, which is placed close to the bottom layer of the sandwich.
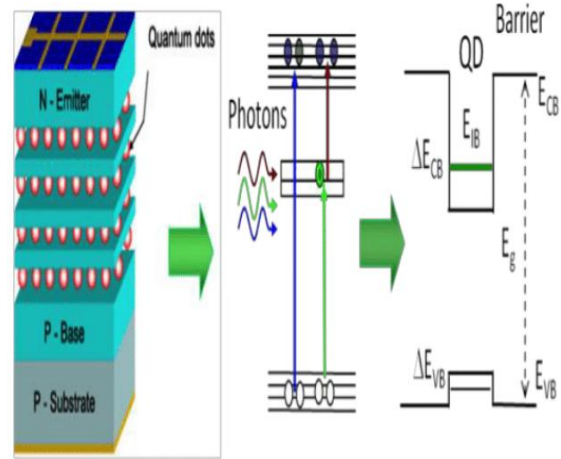

Composition of plaCSH cell

Between the two metals, a plastic of 85 nm thick is inserted. The spacing of the mesh, the thicknesses of the sandwich, the diameter of the holes are all smaller than the wavelength of the light being collected. This is critical because light behaves in very unusual ways in sub wavelength structures. Chou's team discovered that using these sub wavelength structures allowed them to create a trap in which light enters, with almost no reflection. These Nano plaCSH cells can be manufactured cost effectively also.

1.4 Quantum Dots

Quantum confinement can lead to increased Photovoltaic efficiency and could lead to increase in solar cell efficiency.Tiny quantum dots just a few nanometres in diameter can do great things when it comes to generating electricity. Researchers at the National Renewable Energy Laboratory (NREL) have certified the first all quantum-dot photovoltaic cell, which was based on lead sulphide and demonstrated reasonable performance, for an initial efficiency measurement along with good stability. The certified open-circuit voltage of the quantum dot cell is greater than that possible from bulk lead sulphide, because of quantum confinement. These results increase the motivation to explore quantum dots for their capacity to deliver multiple electrons from each photon, a phenomenon that if applied to solar cells could greatly improve even double their efficiency.

A Schematic Representation of operating principle and energy band diagram of proposed III – (As, SB) Solar

Quantum dots have such great photon to electricity potential because when a single photon of light, of sufficient energy is absorbed by a quantum dot, it produces more than one bound electron-hole pair, or excited. The process is called multiple excited generations.

1.5 Conclusion

One of man's enormous technical achievements is undoubtedly harnessing the omnipotent solar power. However nature proves symmetrical as always. The ill effects of the nanotechnologies are not completely negligible too. However, the present need seems to seek the best of technologies arising, provided the ill effects on environment are negligibly less. In this regard, nanotechnology surely proves worth it. Control of expenses is not optimum yet. On the whole, the reduction in size of a device to a large extent eventually makes it more efficient and reliable.

1.6 References

1. National Academy of Engineering.
2. Aldouss Scott, " How Solar Cells Work" – http://wcpssccsi.pbworks.com/w/file/fetch/67747809/solar%20cells-11162012150624.pdf
3. Princeton University News - http://www.princeton.edu/main/news/archive/S41/14/79S63/index.xml?section=topstories
4. UCONN Today
5. National Renewable Energy Laboratory (NREL).

Introduction to Wireless Power Transmission

B.JYOTHI

13JG1A0410

Abstract

In this paper, we have presented the concept of wireless transmission i.e. power transmission without using any type of the electrical conductor and/or wires. We have presented an idea that is discussed here about how electrical energy can be transmitted as microwaves so that to reduce the transmission, allocation and other types of losses. Such technique is known as Microwave Power Transmission (MPT). We have also presented and correlated several aspects with the currently available Power transmission systems to the related history of wireless power transmission systems and also the related developmental changes.

INTRODUCTION

Wireless communication would be the transmission in the energy spanning a distance without the usage of wires or cables, where distance can be short or long. Wireless operations permits services, for example long-range communications, which are merely unfeasible using wires. Wireless energy transfer or wireless power transmission may be the transmittance of electric power from your power source for an electrical load without interconnecting wires. Wireless transmission is advantageous in instances where interconnecting wires are inconvenient, hazardous, or impossible. The situation of wireless power transmission is different from that of wireless telecommunications, like radio. In the latter, the proportion of one's received becomes critical on condition that it can be too low for that signal being distinguished on the ground noise. With wireless power, efficiency is the more significant parameter. A big perhaps the energy sent out by the generating plant must arrive at the receiver or receivers for making the system economical. The most common form of wireless power transmission is completed using direct induction and then resonant magnetic induction. Other methods under consideration include radio waves such as microwaves or beam of light technology. Wireless communication is mostly regarded as a branch of telecommunications. Wireless operations permits services, for example longrange communications, which can be impossible and impractical in conventional methods.

Conventional Power System

One of the major problems in existing power system is the losses occurring in the transmission and allocation of energy to the end users. Because demand drastically increases daily, the power generation increases and also the power loss can be increased. The percentage of loss of power during transmission and distribution is approximated as 26%. The primary reason for power loss during transmission and distribution may be the resistance of wires used for grid. The efficiency of power transmission may be improved to a particular level by employing high strength composite over head conductors and underground cables who use warm super conductor. But, the transmission is inefficient.

Methods of Wireless Power Transmission

Transformer Coupling or Induction

Energy transfer between two coils through magnetic fields however in this technique, distance between two coils really should be too close. The principle of mutual induction between two coils can be used to the transfer electrical energy without using wires. The best demonstration of how mutual induction works would be the transformer, where there isn't a physical contact between primary plus the secondary coils. The transfer of energy develops due to electromagnetic coupling relating to the two coils.

Figure 1: *Transformer Coupling or Induction*

Resonant Induction Coupling / Evanescent Wave Coupling

Researchers at MIT have discovered an alternative way of wirelessly transferring power using non-radiative electromagnetic energy resonant tunnelling. Since electromagnetic waves would tunnel, they won't propagate through the air for being absorbed or wasted, and wouldn't normally disrupt electronics or cause injuries like microwave or radio transmission. Researchers anticipate around 5 meters of range. According to them, an electro-magnetic wave in a very high angular waveguide is called as evanescent waves which carry no energy, when if a proper resonant waveguide is brought at the transmitter then the tunnel is formed towards power drawing waveguide and this can be converted in DC using rectifier circuits. A prototype model is achieved with 5 meters of ranges using this method.

Radio/Microwave Energy Transfer

It is possible to achieve a long range using this method. In this method, microwave is sent to the long distances which are received through rectenna. Rectenna extracts microwave energy back to electrical energy. The main problem with this particular strategy is how the diameter of antenna needs to be order of kilometer. Power transmission via radio waves can be produced are actually realized.laser is beamed for the photovoltaic cells which extract the electrical energy. This method is quite challenging to implement and manage.
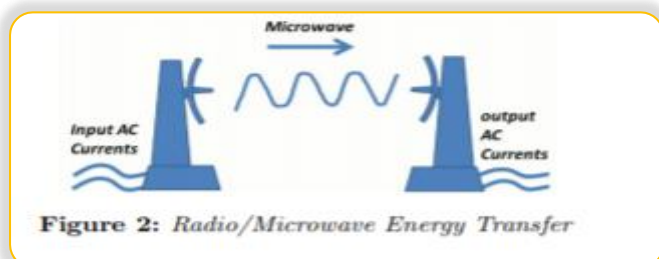

Figure 2: *Radio/Microwave Energy Transfer*

References

[1] A. Vijay Kumar, P. Niklesh, T. Naveen, Wireless Power Transmission International Journal of Engineering Research and Applications (IJERA), ISSN: 2248-9622, Vol. 1, Issue 4, pp. 1506-1510.

[2] Achanta Harish Babu, Sachin Kumar Bidichandani, Sri Ram Guntupalli, Thumati Ravi, Wireless Power Transmission, International Journal of Engineering Research & Technology (IJERT), Vol. 1 Issue 9, November2012, ISSN: 2278-0181

[3] B.Thomas W., Wireless Transmission of Power now Possible.

[4] U.S.Patent 787,412, Art of Transmitting Electrical Energy through the Natural Mediums.

[5] Dombi J., Basic concepts for a theory of evaluation: The aggregative operator. European Journal of Operation Research 10, 282-293, 1982.

Answers:

Across:	Down:
2. Shock	1. Ohmmeter
3. Awg	4. Grounding
7. Ohm	5. Wattmeter
9. Voltmeter	6. Volt
11. Earth	8. Fuse
12. Period	10. Resistor
13. Circuit	16. oscillator
14. Switch	
15. Microwave	

KNOW A SCIENTIST:

Jagadish Chandra Bose

Acharya Sir Jagadish Chandra Bose, CSI, CIE, FRS (Bengali:30 November 1858 – 23 November 1937) was a Bengal ipolymath, physicist, biologist, botanist, archaeologist, as well as an early writer of science fiction. He pioneered the investigation of radio and microwave optics, made very significant contributions to plant science, and laid the foundations of experimental science in the Indian subcontinent. IEEE named him one of the fathers of radio science. He is also considered the father of Bengali science fiction. He also invented the crescograph.

Born in Bikrampur (present day Munshiganj District near Dhaka in Bangladesh) during the British Raj, Bose graduated from St. Xavier's College, Calcutta. He then went to the University of London to study medicine, but could not pursue studies in medicine due to health problems. Instead, he conducted his research with the Laureate Lord at Cambridge and returned to India. He then joined the Presidency College of University of Calcutta as a Professor of Physics. There, despite racial discrimination and a lack of funding and equipment, Bose carried on his scientific research..

He made remarkable progress in his research of remote wireless signalling and was the first to use semiconductor junctions to detect radio signals. However, instead of trying to gain commercial benefit from this invention, Bose made his inventions public in order to allow others to further develop his research

Bose subsequently made a number of pioneering discoveries in plant physiology. He used his own invention, the crescograph, to measure plant response to various stimuli, and thereby scientifically proved parallelism between animal and plant tissues. Although Bose filed for a patent for one of his inventions due to peer pressure, his reluctance to any form of patenting was well known. To facilitate his research, he constructed automatic recorders capable of registering extremely slight movements; these instruments produced some striking results, such as Bose's demonstration of an apparent power of feeling in plants, exemplified by the quivering of injured plants. His books include Response in the Living and Non-Living (1902) and The Nervous Mechanism of Plants (1926).
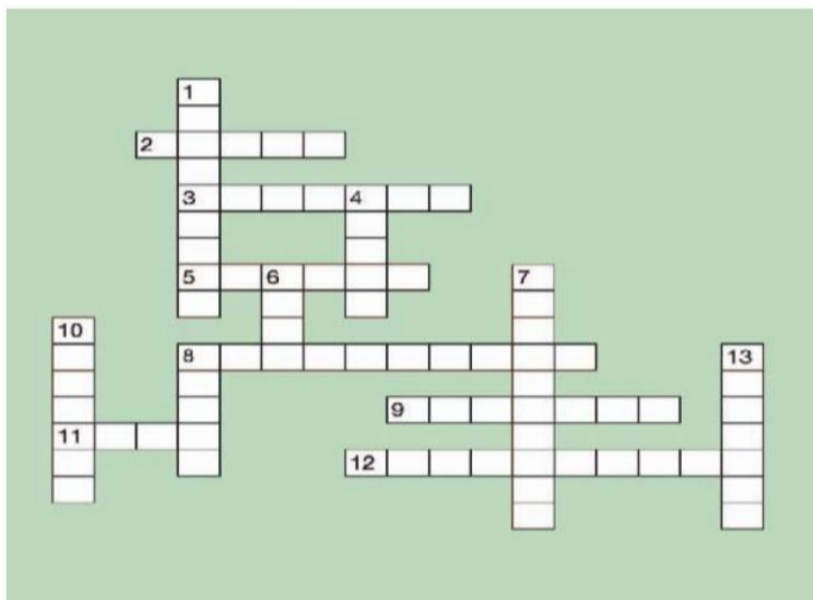
CROSSWORD PUZZLES

ACROSS

2) Multiple antennae arranged in an
3) 'Spread Spectrum' AKA Frequency
5) Diode like the Chunnel
9) waveguide (metric)
10) plot = imaginary vs. real frequency response
12) plot = magnitude vs. phase
13) The inverse of impedance

DOWN

1) Next after gigahertz
4) % Modulation AKA Modulation
6) Zero Vector
7) Opposite of amplifier (-dB)
8) Similar to a LASER (operates with microwave frequencies)
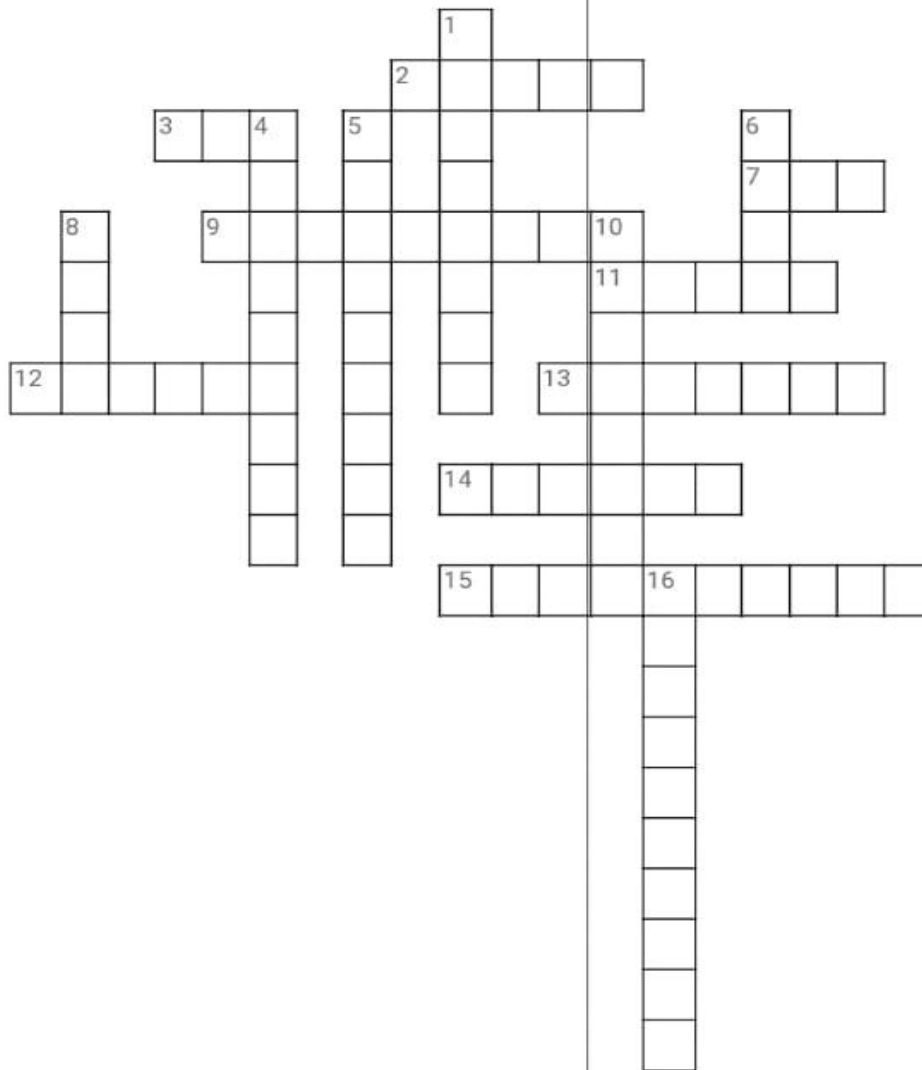11) dB
14) James Clerk (think coffee)

RIDDLES

1) What word, when written in capital letters are the same forwards backwards and upside down?

2) Two boys play checkers. They play 5 games, they win the same amount. How?

3) What is that when you take away the whole, you still have some left?

4) There is a common English word that is nine letters too long. Each time you remove a letter from it, it still remains an English word, from nine letters right down to a single letter. What is the original word and what are the words that it becomes after removing one letter at a time?

5) There is only one ten letter word in the English language which can be typed using only the top row of the keys on a type writer (or keyboard) what is it?

6) The day before yesterday I was 25 and the next year I will be 28. This is true only one day in a year. What day is my birthday?

7) What mathematical symbol can be placed between 5 and 9 to get a number greater than 5 and smaller than 9?

8) What can you break but not touch?

9) Say my name and I disappears what am I?

10) What kind of pet always stays on the floor?

ANSWERS

1) NOON

2) They did not play each other

3) wholesome

4) startling

5) Type writer

6) Born on Dec31st and spoke about it on January 1st

7) Decimal – 5.9

8) Promise

9) Silence

10) Orpit

Across

2 passage of current through body
3 wiring size
7 a law
9 measures electrical potential
11 a type of ground
12 symbol 'T'
13 enclosed path of current
14 to turn on and off current
15 electromagnetic wave

Down

1 measures electrical resistance
4 reference point in an electrical curren
5 measures electric power
6 symbol 'V'
8 protects against excessive current
10 electric component that transmits current
16 generates a continous output waveform

EVENTS:

Guest Lecture on "Opportunities for Women in Public Sector Organisations" (5-10-16):

Lecture by Chief Guest by Mrs. Pemmaraju Padma Savitri,

Scientist (G), BARC Vishakapatnam

Speech by Honorary President Dr. D. N. Madhusudan Rao

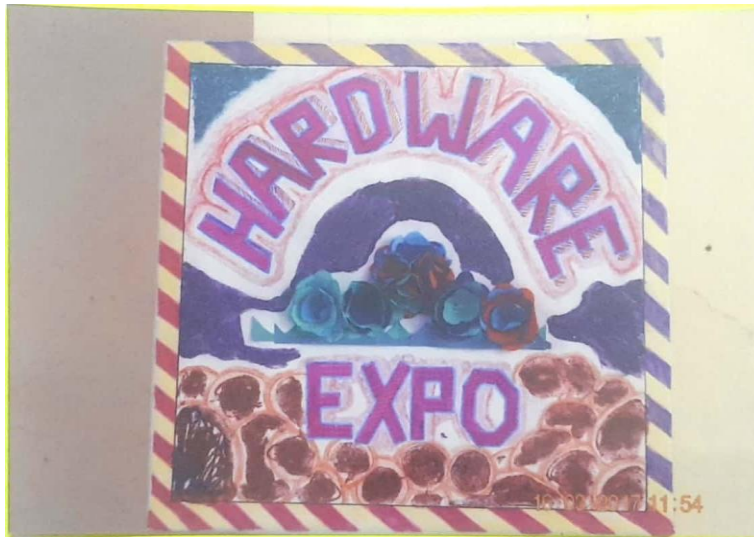**Workshop on Digital Communication and Wireless Communication Fundamentals (22-12-2016,23-12-2016):**

Speech by Chief Guest on the occasion of two day workshop on

Vote of Thanks by Assistant Professor Dr. K. Srinivas Rao

Workshop on "Internet Of Things" as a part of Technotsav-2K17 (16-3-17,17-3-17):

Lecture about "Internet Of Things"
by Assistant Professor Mr. V. V. V. Satyanarayana

Call For Papers:

> *The Faculty or Students who are interested in getting their articles in the magazine can send their papers to editor@gvpcew.ac.in*

For Further Queries mail to

gvpcewecemagazine@gmail.com

Editors:

DIVYA SATHI B, ASSISTANT PROFESSOR

B LAKHMI PRATYUSHA 13JG1A0418

KOMMANA KOMALI 13JG1A0464

G SAI ALEKHYA 14JG1A0434

K S S S S LIKHITHA 14JG1A0445

T BHAVANI 14JG1AO4A4

V SHILPA CHETTY 14JG1A04B1

G MANEELA 15JG1A0441

S S L HARSHITHA 15JG1A04A3

Vision of the Department	Produce competitive engineers instilled with ethical and social responsibilities to deal with the technological challenges in the field of Electronics and Communication Engineering.	
Mission of the Department	**Mission No.**	**Mission Statements**
	M1	Facilitate a value-based educational environment that provides updated technical knowledge.
	M2	Provide opportunities for developing creative, innovative and leadership skills.
	M3	Imbue technological and managerial capabilities for a successful career and lifelong learning.