MJCET R & D NEWS

RESEARCH IS A FORMALIZED CURIOSITY

Volume 2 Issue 1 2013-14

Ninety-Ninety rule for Project schedules

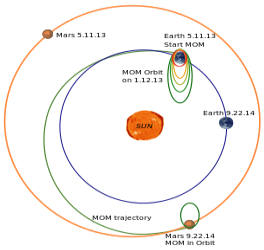
The First 90% of the task takes only 10% of the time and the last 10% takes the other 90%.

From the Editor's Desk…

2014 is one of the most memorable years for Indian science. By successfully launching Mars Orbiter Mission (MOM) MANGALYAN, our scientists have shown to the world that ours is a great nation with the best brains and is capable of achieving the impossible…. And how we have arrived!

Taking a pay load of 15 kg to an orbit of Mars is not a simple job. The launch mass was 1337 kg including fuel, the volume was 1.5 m^3 and required a power of 840 W, which was supplied by three solar panels of 1.8 x 1.4 m^2 area. It was more of a Technology demonstrator project for Design and Development of a Mars Orbiter with capability to perform earth bound maneuvers, a Cruise phase of 300 days. It is a precursor to the launch of a stationary vehicle by 2017. The primary objective of the Mars Orbiter Mission is thus to showcase India's rocket launch systems, spacecraft-building and operations capabilities and to develop the technologies required for design, planning, management and operations of an interplanetary mission. A secondary objective is to explore Mars' surface features using indigenous scientific instruments. It is gratifying to note that the very people, who laughed at our scientific efforts few years back, are marvelling at our scientific development now.

Launch of MOM



MOM Trajectory

Our college wants to be an active part of this endless journey to better tomorrows. Every new academic year brings to us a large number of fresh minds, to be moulded and developed by us. The seeds of new ideas and thoughts must be planted, grown and harvested for the benefit of all of us. In 2007, R&D Cell of MJCET was formed for giving all out encouragement for this process.

We have already demonstrated the imaginative genius of our fraternity by several projects, including human centrifuge, bio fuel from algae, hover craft, magnetic levitation etc. and several products, relating to renewable energy sources. All departments of our college contribute to this endeavour. After two years, when we look back we find that we have indeed travelled long and a relook at our ash laden path would give us energy and encouragement to move further forward. This is a humble attempt in that direction and we hope you enjoy this and encourage us in this voyage searching for new vistas of knowledge and fulfilment.

RESEARCH AND DEVELOPMENT CELL, MJCET

It is always necessary to know where we stand and remind ourselves about the Vision for MJCET, as conceived by our elders. It is 'to create a brand name MJCET at national level by imparting quality education and ensuring 100% placements, while building Institutional commitments in faculty and students'. The thrust areas are identified as Research and development and Consultancy services. As per these guide lines, MJCET has established an R&D Cell to encourage the research oriented activities and develop an R&D atmosphere in the college among the staff and students and the following high level committee has been constituted to control the activities of R&D Cell.

It is decided to give seed funds to promising projects after discussion and scrutiny by the committee so as to give a thrust to R&D jobs with creativity and innovation in MJCET. The idea of encouraging R&D among faculty and students is fully endorsed by SUES and budget is allotted for R&D activities. R&D budget has progressively increased from Rs.1 Lakh to 6 Lakhs during the last 5 years.

Most of the projects are application-oriented and aim towards improving the existing technologies to encourage innovation and flair for R&D in the minds of students to promote creativity and new ideas. Most of the U.G/ P.G projects emphasize on critical analysis of the analytical/ experimental data. The R&D experiment was success and a few student projects got all round appreciation.

It is expected that an R&D atmosphere where innovative ideas, creative problem solving methods, PhD works of the faculty and publication of technical papers and presentations would prevail in MJCET due to the encouragement given to R&D activities. It is hoped that the R&D Cell would accelerate our march towards fulfilling the vision and mission of MJCET. To achieve this, it has been decided to encourage research activities at all levels and include the promising student projects of BE and ME students also.

MJCET (RE)CREATES HISTORY…

MJCET has recreated history by fabricating and demonstrating successfully, the Experiment in Millimeter waves, originally conducted by Sir J.C. Bose in 1894 in Calcutta University. Dr.M.A. Khadeer, HOD, Department of Physics and his colleagues achieved this unique distinction, conclusively proving the greatness of Indian science and scientists to the world.

Project: Demonstration of the Millimeter waves Experiment of Sir J.C. Bose

External help: Dr. Jagirdar, Dr. Tapas and Dr. Sarala Scientists from RCI

Team: Dr. M. A. Khadeer, Mr. Syed Ilyas Mohiuddin, Mrs. M. S. S. Bharathi, Mr. J. Prasanth Kumar, Department of Physics, MJCET

Sponsorship: Prof. V. Kodali, Prof. K. Gopalakrishna and Prof. K. Laxminarayana

In the early 20th century, it was assumed that science could not take root in India. Sir Jagadish Chander Bose (1858-1937), who did his graduation from University of Calcutta and post-graduation from Cambridge disproved this fallacy and did path breaking works in the area of communication. He was the First to use semiconductor junction to detect radio waves, Horn antenna and also developed Point contact Galena detector. He also anticipated the existence of p-type and n-type semiconductors. His Point contact receiver is the present Semiconductor diode, which created the field of Electronics. He has inspired many young minds to take up scientific research paved the way for the development of India.

However, one year after the achievement of Sir Bose, Marconi and Popov conducted similar experiments at much lower frequency and won Nobel prize for Physics. The pioneering work by Sir Bose is getting the due recognition now, after the experiments are revalidated in MJCET, under an IEEE sponsored project.

Chairman – Mr. Khan Lateef Khan and Members of SUES checking the Sir. J. C. Bose Experimental Setup

Electro magnetic waves play an important role in every walk of life. Maxwell predicted existence of these waves in 18th century. Sir J.C. Bose generated and detected the Millimeter wave in 1894. They are presently used in various fields- in short distance communications, military, automotive industry, detection of hidden objects and 5G mobile communications.

On 14th September 2012, IEEE recognized Sir. J.C. Bose's experimental work in Millimeter band radio as a Milestone in Electrical and Computer Engineering, the first such recognition for a discovery in India. To pay homage to Sir J.C. Bose, IEEE, Hyderabad chapter wanted to make a working model of the Experiment in mm waves and MJCET took up the challenge. The first working model of the experiment was made in

November 2012. The model is successfully designed and fabricated and its output frequency of 60 GHz is measured by Dr. Khadeer and his team, which was subsequently verified by RCI laboratory, DRDO, Hyderabad. The model is exhibited for public among the IEEE exhibits in Birla Science Center, Hyderabad. The project got tremendous appreciation from the Delegates of 'International Symposium on Fundamental Physics', held at G.P.Birla Science Center.

R&D Cell funded projects (2013-14)

The number of students coming up with new ideas and presentation of the same to the expert committee is an indication that the R&D cell is on the right path. This year, 16 projects came up for discussions in the meeting. Though, all of them did not qualify for the funding due to some technical reasons, we are happy to publish their details here. It is hoped that this enthusiasm would progressively increase and engulf the entire student community of MJCET.

R & D Cell meet for evaluating and sanctioning fund for the projects

1) Automobile heat recovery systems (MED)

Project team: 1. Mekala Aditya (1604-10-738-016) 2.ChavalaPruthvi Gupta (1604-10-738-034) 3.Zaheeruddin Ali Khan (1604-10-738-013) 4.Prudhvi Varma Datla (1604-10-738-025)

Project guide: Mr.A.S. Reddy, Asso. Prof., MED

2)Portable waste water hydroelectric generator (IPE, MED)

Project team: 1. Farhan Ali Khan (1604-10-738-017) 2.MominaHadi (1604-10-738-004) 3.Rohan Bhandari (1604-10-738-022) 4.Dawood Siddiqui (1604-10-738-028)

Project guide: Mr. Syed Ferhatullah Hussainy, Professor, MED

3) Magnetic Levitation based Wind Turbine (EEED)

Projectteam:1. Mohammad Abdul Aleem (1604-10-734-029) 2. HaroonAhmed (1604-10-734-065), 3. Jawad Mohiuddin (1604-10-734-064)

Project guide: Dr. J.L. Bhattacharya, Professor, EEED

4) Installation of Automatic Drip Irrigation System (EIE, EEED)

Project team: 1. Shaik Mazhar (1604-10-739-027) 2.Mohammad Farooq (1604-10-739-028) 3.Abdul Hameed (1604-10-739-049)

Project guide: Mrs. Shazia Khaliq, Sr. Asst. Prof., EEED

5) Single Phase Efficient Induction Motor (EEED)

Project team: 1. Mohammad Imran Ul Haq Khan (1604-10-734-028), 2. Mohammed Ismail (1604-10-734-055), 3. Mirza Akheel Baig (1604-10-734-301)

Project guide: Ms. Fabia Akbar, Asso. Prof., EEED

6) Cost Effective and Efficient Portable Solar Water Pump (MED)

Project team:1. Mohammed Burhanuddin (1604-10-736-055) 2. Mohammed Affan (1604-10-736-118) 3. Zeeshan (1604-10-736-056) 4.Anuraag Haridas (1604-10-736-004) 5.Zafar Bin Muzaffar (1604-10-736-047)

Project guide: Mr.Irfan Sadak, Asst.Prof., MED

7) Wi-Fi Based Home Control Using Android (ECED)

Project team: 1. Mohd Afwaan Ahmed Quadri (1604-10-735-107) 2. Tabrez Ahmed Kazmi (1604-10-735-091)

Project guide: Mr. Jaideep Kumar Nag, Asso. Prof., ECED

8) Automation of TIG Welding and a Study of the effect of different parameters on the strength of the joint (IPE, MED)

Project team: 1. Mohd. Kaleem Uddin (1604-10-738-302) 2.Mohd.Munassar Ahmed (1604-10-738-054) 3.Mohd. Abdul Mateen (1604-10-738-015) 4. Mohammed Asher Ali (1604-09-738-032)

Project guide: Mr. Sirajuddin Elyas Khany, Asso.Prof., MED

9**) Development of a Prototype Potentiometer (EEED)**

Projectteam:1. Dr. Satyanarayana M.G.V.(Asst.Prof.,Chemistry) 2. Mrs.Srujana R.U.(Asst.Prof.,EEED)

Project guide: Dr. Satyanarayana M.G.V., Asst.Prof., Chemistry Dept.

10) Simulation and working of microgrid based power system (EEED)

Project team: 1. Mansoor Nawaz Khan (1604-10-734-063) 2. Mohammed Farhan Siddiqui (1604-10-734-062)

Project guide: Mrs. Srujana R. U., Asst. Prof., EEED

12) Power Quality Improvement Using D-STATCOM for an Isolated 3.5 kW Induction Generator (EEED)

Project team: 1. Jakeer Syed (1604-10-734-060) 2.Mohammad Khaja Moinuddin (1604-10-734-308) 3.Mohammed Abdul Raheem (1604-10-734-312)

Project guide: Mr. K. Mahammad Rafi, Asst. Prof., EEED

13) Intersection Cross Traffic Warning System (ICTWS) (EIE, EEED)

Project team:1. Mohammed Fawad Malik (1604-10-739-047) 2.AbdulKarimKhan (1604-10-739-031) 3.Mohammed Omer (1604-10-739-029)

Project guide: Mr. Mohammed Ismail, Sr. Asst. Prof., EEED

14) Space Exploration Vehicle (SEV) (ECED)

Project team: 1.Baig Mirza Mohammed Asim (1604-10-735-109) 2.Mushtaq Ahmed (1604-10-735-112) 3.Syed Wahajuddin (1604-10-735-088) 4. SohailSiddiqi (1604-11-735-022)

Project guide: Mr. MohammedArif Uddin Sohel, Asso. Prof., ECED

15) Vibration Suppression of a Variable Speed Rotating Cantilever Beam using Smart Fluid (M.E.-CAD/CAM)

Project team: 1. Ms. Nida Irfan (1604-12-765-001) 2.Ms.Salma Sultana (1604-12-765-011)

Project guides: 1.Mr.Sadak Ali Khan, Asso. Prof., MED 2. Mr. Hakeemuddin Ahmed, Asso. Prof., MED

16**) Sir J.C. Bose pioneering experiment for high continuous mm waves (Physics)**
Projectteam1.Dr.M.A.Khadeer(Prof.,Physics);2.Dr.KaleemFatima(Prof.,ECED), 3.Membersof the team from outside MJCET

Project guide: Dr. M.A. Khadeer, Professor & Head, Physics Dept.

17) Title of the project: The detachable car (M.E.-CAD/CAM)

Project team: 1. Syed Hamza Shareef (1604-12-765-014)

Project guide: Mr. G.M. Sayeed Ahmed, Sr. Asst. Prof., MED

REFURBISHING OF MANUAL SPINNING CHARKHA WITH SOLAR POWER

Project Team : Aditya Mekala and Farhan Ali Khan of B.E. - Production

Project Guide: Mr. A.S.REDDY, Assoc. Professor, MED

Advisor : A. Janardhan Reddy Ex. MLA, karimnager and President, Hindu KushtNivaranSangh, AP Branch, Hyderabad, Ph: 9290814360

It is said that India's independence struggle started with the spinning wheel. Gandhiji believed that independence for India means saving millions of villagers from the economic slavery under British. Thus Charkha and Khadi became the symbols of the independence struggle.

The charkha has come a long way from the old fashioned spinning wheel to the modern spinning machine with gear mechanism, which converts cotton and polyester bobbins to fine thread. Majority of the workers who work on these machines are women. They spin the charkha for hours at a stretch. As the process is entirely manual, the production rate of thread is very low. Every operator makes 25yanks in 8hrs and with Rs. 3 per yank, the take home wages Rs. 75 per day, which is roughly Rs.1875 per month, assuming 25 working days of 8 hr duration. This income is very meager and it is very difficult for a family to survive only on this work. This has resulted in people leaving the vocation for other tasks that yield better income.

Mr. A.S. Reddy, Asso. Prof, MED, Aditya and Farhan Ali Khan and dignitaries with the solar charka setup

Hence the idea of providing an alternate power for the '8 spindle Charkha' is conceived, which would increase the quality and yield of the thread, decrease the burden on worker and increase the wages of the by workers. Due to the non-availability or reduced availability of power in villages, the Power source selected is solar power, available in abundance everywhere in the country. Solar energy is converted to electrical energy with the help of Solar panels, battery and inverter system. With the

help of battery the working hours of Charkha may be extended by another 4 hrs after sun set.

Powering the charkha not only relieves the worker from the drudgery, but also increases the earnings by increasing the output and quality of the thread. Testing of the solar powered charka by the actual working women users at MJCET yielded 50 yanks per 8 hrs and they had enough time to run one more machine.

A woman, who earlier used to work on only one simple charkha is now able to work on two solar charkhas simultaneously and earn Rs.250 per day (equivalent to monthly wages of Rs. 6250). This will automatically attract rural youth to Charkha and promote employment generation.

Technology:

The Solar charka is powered by an AC motor of 100-120 W, which receives power from the Solar cells, battery and inverter system. The spindle is designed to run between 60-90 rpm with the help of a speed regulator. As the spindle speed increases, the quality and quantity of the yarn increases. The machine can be fitted with LED lights for working in the nights.

Economics of Charkha

Refurbishing the manual charkha to solar powered charka is done at a cost of Rs.55000 for two machines. At present, Government of India is offering 30 % subsidy and AP state governments is offering 20 % subsidy on solar energy equipment and projects. With this, the cost of the solar charkha will reduce to Rs.27500.Average wages of the worker is expected to increase from Rs. 22500 to Rs.75000 per annum.

Advantages:

Technology is very simple and easily adoptable to local conditions. Physically challenged people can also operate the solar powered charkha. More jobs are created in villages, which will reduce the migration of the people and reduce the burden on infrastructure of the cities. Exposure of solar energy technology to rural areas, which are facing severe power shortage, can result in number of new applications with this technology for rural education, cottage industries and business. The introduction of solar charkhas is expected to contribute in raising income of spinners and weavers and start an economic revolution in villages.

SMALL SCALE MAGLEV TRAIN

Project Team: Syed Azam Lateef, Shaik Abdur Rehman Imran and Mir Shuja Ur Rahman of B.E.- EED

Project Guide: Dr. Mohammed Haseeb Khan, EEE

A flying train! Really a crazy idea! When it was first suggested, the listeners must have had a hearty laugh. Now, with the advent of MAGLEV train, probably, scientists are having the last laugh. Here is a system of transportation that uses Magnetic Levitation to suspend, guide and propel locomotives with magnets rather than using conventional wheels, axles and bearings. High-speed maglev trains promise dramatic improvements for long distance transportation. Department of EEE of MJCET has already come up with an Indian prototype.

The aim of the project is to design and demonstrate a train that operates on the principle of magnetic levitation. A scaled-down, proof-of-concept maglev train that traverses 2m long track with a speed of up to 0.3 kmph is designed and fabricated. It utilizes a linear synchronous motor for propulsion and permanent disk magnets for stabilization and levitation. The Train levitated in air and propelled forward. Contact guide ways are required to hold it steady, which is being planned now. The Maglev train was thus demonstrated successfully.

The arrangement of the winding for MAGLEV Train

Salient features of the present design

The present model of the Maglev train uses electromagnetic suspension including some part of the Inductrack system. The propulsion is due to the interaction of magnetic field between the primary (3-phase winding) and the secondary (an array of NdFeB permanent magnets) of the linear synchronous motor and the levitation is obtained by the repulsive forces between the permanent magnets.

Stator:

The stator comprises of a single layer 3 phase progressive winding made of 19 gauge copper wire. The winding is embedded in the slots with a configuration of 1 slot per pole per phase with 12 turns per slot. An AC Drive is used to supply the winding to produce the required flux for the linear motion.

Secondary of Linear Synchronous Motor (LSM):

The secondary of the LSM is an array of four magnets with alternating north and south poles attached to a light weight train car. These four magnets interact with the LSM primary that runs along the track and are crucial for propulsion. The alternating magnetic field induced in LSM due to the high current flowing through the wires interacts with the magnetic field produced by

these permanent magnets. As a result of the interaction, the train propels down the track.

Side Rails:

The purpose of side rails is to achieve levitation. Neodymium disc magnets are placed along these rails. For this a grove is made on the rails of width 25mm and depth of 2mm.

Dimensions:

Criteria	Design specifications
Length	1524mm
Width	35mm
Height	180mm

After much study and several attempts at designing a levitation and propulsion system for the small scale maglev train, the proposed design was finalized on the basis of having the least concerns regarding availability of raw materials, craftsmanship and cost effectiveness. With the complete setup now in place, the train was finally ready for real time testing.

Motion is first observed at a frequency of 1.7 Hz, and a voltage of 1.7 Volts. As the frequency is increased a little, the train cart starts moving down the track and at a frequency of 5Hz and 5 supply voltage of 5.1 volts, the train moves down the track steadily.

The motion of the train, however, is wobbly in nature. This is primarily due to two reasons: 1. In the LSM stator winding, the 3 phase conductors are not placed on an equal plane due to being pressed the overhangs of the upper conductors on the lower conductors. 2. The levitation magnets, being disc shaped, provide a force more non uniform than expected.

The important measurements recorded are

Frequency = 5.0 Hz ; Voltage = 220 Volts ; Current drawn = 5.3 A; Maximum Current drawn = 12 A; Maximum Power capacity = 2.2 kW; Levitation obtained = 1-2 mm ;Distance travelled = 125 cm ; Time taken = 17 seconds; Velocity = 125/17 = 7.35 cm/s; Weight of the train cart = 300 grams.

Though the weight carrying ability is far greater than 300 grams, the limit was imposed considering the less number of ampere turns and non-metallic core in the LSM stator.

Automation in Drip Irrigation using PLC

Project Team: Mohd. Amir Abdullah, Md. Nayeemuddin and Mohd. Abdul Raoof of B.E- EED

Project Guide: Mrs. Shazia Khaliq, Asst. Prof., EED.

It is predicted that the future wars will be fought not for land but for water. This unique combination of Hydrogen and Oxygen is the main supporter of life on this planet. It is also known that water is going to be a precious material.

Since a high percentage of water is used for agriculture, the story starts there. The project is about the automatic Drip Irrigation in the agricultural fields. The moisture content in the field can be sensed using Soil moisture sensor and fed to a PLC logic, which controls the amount of water and fertilizers given to the crop. The amount of water required for drip irrigation can be optimized and the yield improved. The Project thus aims at the real time application in Agro production system, to maintain the required water flow and avoid wastage of water.

In the present project, study is done about automatic Drip Irrigation, automatic sprinkler Irrigation and Spraying of pesticides. These parameters are controlled using 24-point MicroLogix 1200 PLC manufactured by Rockwell Automation. It had RS Logix-500 software for ladder programming, RS View-32 software for SCADA Monitoring and RS Linx software for Communication with PC. The project was completed successfully and the system is demonstrated.

Further work on the system can be carried out by running it using wireless sensors. The radio signal is interpreted by a receiver which converts the wireless signal to a specific output like an analog current. The data analysis will be done by a computer.

Drip Irrigation using PLC setup

The possible modifications are(i) Monitor from a convenient location, (ii) Monitor a number of locations together and (iii)Reduction of the cost using solar energy

Miniature Hybrid Wind-Solar Power Generating System Using Lab View

Project Team: Fahmeeda Begum, Asfiya Fathima and Tanveer Sultana

Project Guide: Mohd. Abdul Muqeet, Assoc. Professor, EED

Single source renewable energy systems like solar system or wind turbines do not provide continuous supply of energy. For example, a wind turbine output is less in summer. The solar panels produce less power during rainy or winter days. A Hybrid system combining both these sources looks to be a solution. The present project is aimed at development of electronics for a

hybrid Power generation system using wind energy and solar energy.

Broadly, the project is divided into three systems, Wind Power Generating System, Solar Power Generating System and Solar Tracking System. The software package 'LabView' and 'NI-DAQ 6009' provide the real-time data acquisition of the system variables like Wind power, Solar Power, dc voltages, currents and the solar tracking. The work is aimed at generating the electronics of the Hybrid arrangement.

The Wind power generating system consists of a Horizontal-axis wind turbine (HAWT) and the hardware components like Rotor, Gearbox, Generator, Wind voltage regulating circuit, and an interface circuit with NI-DAQ 6009. The software components like a LabView VI for monitoring the Power generated is also included.

Set up of Miniature Hybrid Wind-Solar Power Generating System Using Lab View

solar power generating system is designed to track sun on single axis. The system consists of hardware components like Solar Panel and Solar Voltage regulating circuit, a motor driver circuit interfaced with NI-DAQ 6009 and a LabView VI to monitor the generated Power. Solar tracking is achieved with the help a circuit comprising of LDRs and DC motors which provides the logic of solar ray's direction, connected to NI DAQ 6009.

The system was successfully completed and commissioned. The field trials are planned in the college in due course. A Hybrid system is being developed using solar and wind power for further tests.

Embedded Web Server for Wireless Sensor Network in Industrial Applications.

Project Team: Aaquib Junaid, Mohd Abdul Jabbar and Shibashish Banerjee of B.E - EED

Project Guide: Mohammad Ismail. B, Sr. Asst. Prof., EED

The embedded web server designed in the project performs two tasks i.e., Continuously displays the output of WSN to all the systems connected through LAN/Ethernet and allows the operator to control the operation of AC/DC devices in order to monitor the parameters (Humidity, Temperature, Light) measured.

The Embedded Web Server design primarily aims at incorporating intelligent electronics systems in Industrial field control. There are numerous parameters that are required to be monitored and controlled in an industrial setup and in the current scenario data transmission systems are thoroughly dependent upon wired transmissions. Wired transmission of information in industry suffers heavily from the dependability problems. For future developments, wireless systems will be essential.

One comes across a number of sensors that are utilized for the purpose of data acquisition. We have successfully set up a network of three sensors wirelessly known as 'Wireless Sensors Network'; this module serves as the 'Sensor node'. The data acquired from the sensor node is wirelessly transmitted to the Embedded Web Server that acts as the data host for the intercepted information. As the name suggests the Embedded Web Server adopts the concept of data hosting of a web server, and therefore has the capability of carrying out the various functionalities of a server.

Thus instead of connecting a single computer monitoring system to each process individually, with the help of the embedded web server we create a network of computers using LAN/Ethernet so that the data acquired by the sensor networks is made available to all these computer systems and users in real time. This resultantly enables all the desired users to continuously receive the information of the wireless sensor networks as displayed on the destined system. If any operator thus desires to monitor and control a particular process then he can easily access it through the assigned IP address. This provides direct control through an html page designed for the purpose. Any alteration in the html page reflects directly upon the process in real time.

The Embedded Web Server design proposed here performs the following integral tasks:

a) Continuously displays the output of and data acquired by the Wireless Sensor Network from all the processes to all the computer systems connected over a Local Area Network.

b) Allows the operators to perform the desired operations and monitor the processes in real time in order to have a certain control over all the parameters. Concurrently avails the data over the network for usage and control while providing required encryption.

With the Embedded Web Server as the backbone of the design, we also developed a wireless network of three sensors for enabling wireless transmission and control of parameters

specifically in Industrial Applications; Hence the title "Embedded Web Server for Wireless Sensor Networks in Industrial Applications".

The sensor node consists of the sensors, control devices and Xbee module. This small Ethernet remote device opens a completely new world of fantastic applications. It's small, it's easy to build and there are endless possibilities to use it. The communication is fast! There is no delay between the sending of the command and the answer. That is very different from RS232 at standard 9600 baud as used for most microcontroller communication.

Here in this project we are developing one client and server where the client consists of sensor, devices and XBee module. The work of the client is to detect the temperature and send it to the server. Both the server an d sensor node consist of MEGA32 microcontroller and Xbee module (transceiver).

Faculty demonstrating the Embedded server system

REQUIREMENTS:

HARDWARE REQUIREMENTS:

- ATMEGA32
- AC DEVICE (AC BULB)
- DC DEVICE (DC MOTOR)
- LM35
- LDR
- HUMIDITY SENSOR
- LCD
- RF MODULES
- RJ-45 CONNECTOR
- ENC28J60

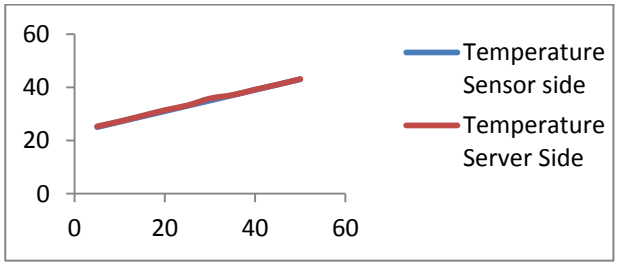
SOFTWARE REQUIREMENTS:

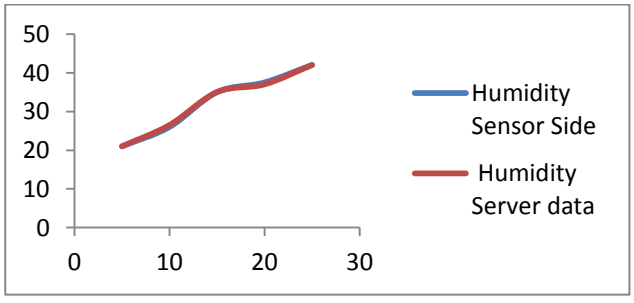
- CODE VISION AVR
- WINAVR
- PROGRAMMING IN EMBEDDED C
- ISP PROGRAMMER

A wireless sensor network (WSN) consists of spatially distributed autonomous sensors to monitor physical or environmental conditions, such as temperature, humidity, pressure, etc. and to cooperatively pass their data through the network to a main location. The more modern networks are bi-directional, also enabling control of sensor activity.

The aim of this project is to monitor the physical parameter values from the remote areas, so wireless communication is required to fulfill the application. There are different wirelesses communications that exists. For this application we prefer XBee modules as RF. In this project there sensors have been utilized LM35 temperature sensor for temperature measurement, LDR for the measurement of light sensitivity and SYH-2 SYH-2S humidity sensor for measurement of humidity. As per RF communication basic RF modules works on 434MHz frequency.

LM35 Temperature readings:





The Embedded Web Server for Wireless Sensor Networks for Industrial Applications has tremendous scope for growth both in the industrial and academic sector. The data acquired in the above system are displayed with the help of a PAN. Control of

both the AC and DC devices are possible with the help of any of the systems connected to the PAN network.

The future development for this system could be making the data available over a LAN/WAN. To a great extent, it could also be possible to publish the designed website on a public server allowing monitoring and control of devices remotely through the internet. In this manner all the systems present in the network are also capable of displaying the information acquired from the sensors simultaneously. Currently the distance limitation for data transmission between the sensor node and the embedded server is about 40 m indoor and 120 m outdoor as per the manufacturer's specifications. This limitation can be overcome by the usage of an Xbee pro module, which provides a maximum distance coverage of 1.2 km.

EXTRACTION OF BIO-DIESEL FROM WASTE USED OILS OBTAINED FROM RESTAURANT

INVESTIGATORS:
1. Dr. SATYANARAYANA M.G.V., Assistant Professor, Department of Chemistry
2. Mrs. AMINA SARWAR, Assistant Professor, Department of Chemistry.

Biodiesel is substitute to diesel oil, produced from renewable sources such as vegetable oil, animal fats and micro algal oil. It is biodegradable in nature, sustainable and environmentally beneficial, thereby providing lower gas emission profile. Biodiesel is considered to be carbon neutral as plants yielding biodiesel like jatrophacurcas, rape plant, palm trees etc. absorb CO_2 to a greater extent than that contributed to the atmosphere.

Biodiesel has similar physicochemical properties to that of diesel produced from crude oil and can be used directly to run existing diesel engines without major modifications or as a mixture with petroleum diesel and produces less harmful gas emission. Direct use of oil as fuel in compression ignition engine is difficult due to their viscosity, low volatility and tendency to form carbon deposits in the fuel injectors. These problems are overcome by carrying out transesterification of the oil to produce biodiesel. Due to high cost of fresh vegetable oils, waste cooking oil is selected as the resource for conversion to biodiesel.

Transesterification is an organic reaction, where alcohol group is substituted to give ester and glycerol. In transesterification of vegetable oils, a triglyceride reacts with three molecules of alcohol in presence of a catalyst producing a mixture of fatty acids alky esters and glycerol. The overall process is a sequence of three consecutive reactions in which di- and mono- glycerides are formed as intermediates. Transesterification is a reversible reaction. Excess alcohol is used to increase the yields of the alkyl esters and to allow its phase separation from the glycerol formed.

BASECATALYSED TRANSESTERIFICATION:

The base catalyzed transesterification of vegetable oil proceeds faster than acid-catlyzed reaction and also being less corrosive than acidic catalyst. Industrially used catalyst includes alkaline metal alkoxides and hydroxides as well as sodium or potassium carbonates.

Alkaline metal alkoxides are the most active catalyst since they give high yield in short reaction time even if applied at low molar concentration. However they required absence of water which makes them in appropriate for typical industrial process. Alkaline metal hydroxides KOH and NaOH are cheaper than metal alkoxides but less active.

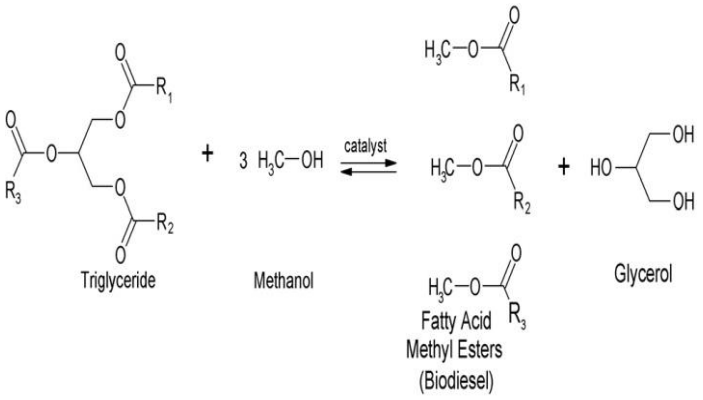


Fig. Transesterification reaction of triglyceride and methanol to fatty acid methyl esters (biodiesel) and glycerol.

EXPERIMENTAL SET-UP AND PROCEDURE:

The waste cooking oil used for the process was obtained from a fast food restaurant. The acid value of waste cooking oil was less than 2mg of KOH g/lit. The reactor consisted of a spherical flask which was put inside a heat jacket. Thermostat was a part of heat jacket which maintained the temperature. A commercial heating system equipped with a mechanical stirrer and a condenser was used for conventional heating reactions. The reaction was carried at 65-70^{0}C. The stirrer operated at 600rpm with a motor. The condenser was used to reflux the vapours of alcohol back to the reactor to prevent any reactant loss.

A known quantity of waste cooking oil (100ml for each run) was taken inside the reactor and heated at about 70^{0}C. This temperature is maintained throughout the reaction by the thermostat inside the heat jacket. Preheating is done to remove unwanted moisture in the oil. The transesterificationis carried out in basic medium using NaOH as catalyst dissolved in alcohol. Once the oil temperature reached 70^{0}C, alcohol solution containing the catalyst is added to the reactor and temperature was maintained. During the reaction alcohol gets vaporized.

To prevent any reactant loss, condenser was used to condense the alcohol vapor and reflux it back into the reactor. Condenser was also helpful in maintaining atmospheric pressure inside the reactor.

Once reaction was over the mixture was taken in a separating funnel. Two phases having different density are formed due to transesterification. Separation was done using separating funnel. The upper phase consisted of methyl esters – Biodiesel, alcohol and some soap, whereas, the lower layer consisted of glycerin, excess alcohol, catalyst, impurities and traces of unreacted oil.

PURIFICATION:

Purification of upper layer was done in two steps.

a) Removal of alcohol – by heating the mixture at high temperature around 80^0C.

b) Removal of saponified products – by washing with warm water. Water is immiscible with biodiesel hence can be easily separated. The catalyst was removed by adding silica gel.

PROPERTIES OF BIODIESEL:

During frying vegetable oil undergoes various physical and chemical changes forming undesirable and unknown compounds which form fatty acid esters influencing the fuel characteristics. Biodiesel yield from waste cooking oil under heating systems:

REACTION TIME (min)	YIELD (%)
30	66.3
45	81.5
60	83.4
75	84.2
90	85.0

CONCLUSIONS:

The study has enabled us to confirm that waste cooking oil can be used as a raw material to obtain biodiesel which can be used as a fuel in diesel engine. The engine performance with biodiesel is similar to that of diesel while emissions are less in the case of biodiesel.

The main challenges are its cost and availability of fats and oil resources. By collecting used frying oils and converting them to biodiesel fuel the cost of biodiesel is significantly lowered and the negative impact of disposing used oil to environment reduced.

The quality of biodiesel is most important for engine parts. Hence, various downstream processing like separation of biodiesel from glycerol, purification to remove and recover alcohol, biodiesel washing, drying and if required distillation are carried out.

The biodiesel was characterized by determining the density, viscosity, calorific value, Cetane number, Flash point, Pour point and the Cloud point. The characteristic properties of biodiesel are same as that produced from virgin oil and generally similar to those of petroleum diesel fuel. Bio-diesel scores very well as an alternate fuel of choice as it helps in decreasing dependence on fossil – fuels and also as it has almost no sulphur. Higher cetane of biodiesel as compared to petro diesel implies its much improved combustion profile in an internal combustion engine. The pollutant components from exhaust are also decreased by using biodiesel. So the focus of work from onward should be development of 100% biodiesel.

Biodiesel oil Experimental Setup

MAGLEV Wind Turbine

Project Team: Mohammed Abdul Aleem (EEE), Haroon Ahmed (EEE) Jawad Mohiuddin (EEE)

Project Guide: Dr. J.L. Bhattacharya, Professor EED, MJCET

The main advantage of the magnetic levitation is the minimization or elimination of friction from the equipment. For example, a MAGLEV train does not have the wheel friction and hence very high speeds can be achieved with minimum motive power. The same principle is applied to run a vertical axis wind turbine for power generation.

This project proposes an alternate configuration of the wind turbine-generator system for power generation using the effects of magnetic repulsion. The system consists of spiral shaped wind turbine blades, fitted on a shaft for stability during rotation and suspended on magnets instead of ball bearings, normally used for conventional wind turbines.

Power is generated with an axial flux generator, incorporating permanent magnets and a set of coils. A rectifier is used to regulate the varying voltage from the axial flux generator to steady DC voltage.

It is expected that with the use of the levitated turbine design, even low wind speeds like 1m/s would be able to generate power. Output of the wind farms can be significantly increased using this concept. This type of wind turbines do not require any specific land for installation, as its can be easily put up on rooftops, towers or buildings.

Maglev Wind Turbine

ROBOCON 2014

The students of Muffakham Jah College of Engineering and Technology participated in ABU ROBOCON 2014 held at Maharashtra Institute of Technology, Pune. The event is a national level robotics competition which has the best of all the Engineering Colleges showcasing their might in robotics. The competition lasted three days, from 6th March to 8th March this year. The competition began with league matches between the 90 registered teams, followed by super league matches between the top 15, and the knock out rounds among the top 8 teams from all over the country. This year's theme, released by India, was 'A Salute to Parenthood' which required all the participating teams to make a manual parent robot and an autonomous child robot set over a play ground arena.

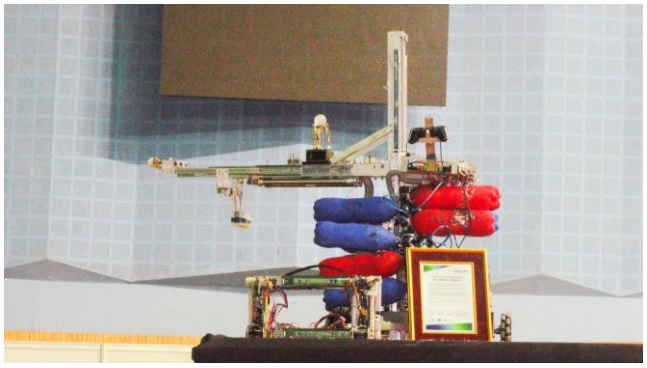
ABU Robocon (Asia Pacific Broadcasting Union Robotics Contest) is a robotics contest held at national and international level every year. It showcases the creativity and technical aspects of the undergraduate students from all over the world. MJCET has been a forerunner in the field of Robotics and have been taking part in this contest for the past 5 years. The team held places in the top 15 for the last 3 years. In 2013, MJCET was placed 6th among 81 teams and was awarded 'The Best Idea Robot'. This year, after working for 7 months on the robots while keeping in mind all the restrictions and the strict rules, the Team Robocon MJCET stood 4th in the country and were also awarded the 'Best Manual Robot'. The 25 member team comprising of students from various branches of engineering was the only team from South India to do so while beating all the IITs and NITs on the way.

The team looks forward to continue its participation in ROBOCON and indulge in more innovative designs and mechanisms. We hope to attain newer heights with the co-operation and motivation from the college management and faculty.

The team Robocon MJCET 2014, receiving the 'Best Manual Robot' award

The team Robocon MJCET 2014, after winning the 'Best

Manual Robot' and the 'Best Man-Machine Co-ordination' at Robocon 2014.



The Manual and the Autonomous Robots of the Team Robocon MJCET 2014, along with the award and the certificate.

WASTE HEAT RECOVERY SYSTEM USING Thermo Electric Generator

Project Team : Aditya Mekala, Zaheeruddin Ali Khan, DatlaPrudhvi Varma, Chavala Pruthvi Gupta of B.E- Prod.

Project Guide: A.S. Reddy, Associate Professor, MED, MJCET

Every drop of oil saved is a wealth and every unit of energy saved is a contribution to the existence of life for one more day. There are many systems to save energy, provided the saving is significant. But, there are many occasions, when the wasted heat is low quality and is often overlooked.

Following the adage 'little drops of water, make the mighty ocean', an attempt is made to recover low quality energy using affordable means and using for specific applications. Energy in exhaust gases of I.C engines after the regenerative recovery system, developed by MJCET is an example.

Engine losses account for 70 – 72 % in an automobile. Out of this, the thermal exhaust heat is about 60 – 62 % resulting in the rise of atmospheric temperature of approximately 0.50-1^{0}C in the immediate vicinity. A thermocouple is constructed, which absorbs maximum heat, and gives an output of around 3.5 - 4W. Two such Thermo electric generators, giving an output of around 7.5-8W is used in the present project. It can light an LED or charge a mobile phone.

CONSTRUCTION: TEGs are made from thermoelectric modules which are solid-state integrated circuits. They consist of pairs of p-type and n-type semiconductor materials forming a thermocouple. Two unique semi-conductors, one n-type and one p-type, are used because they need to have different electron densities. The semi-conductors are placed thermally parallel to each other and electrically in series and joined with a thermally conducting plate on both sides. TEGs are typically connected side by side and sandwiched between two ceramic plates. Then they are then connected electrically forming an array of multiple thermocouples (thermopile) and sandwiched between two thin ceramic wafers. The module is clamped between the heat source and the heat sink by bolting along the edges.

WORKING: The thermoelectric module will generate DC electricity as long as there is a temperature difference across the module. More power is generated when the temperature difference across the module becomes larger, and the efficiency of conversion of energy also increases. Seebeck coefficient is highest for Selenium (900 microV/K) and Tellurium (500) with respect to Platinum.

As a green environmentally friendly energy conversion technology, thermoelectric power can be used in candle lamps, heat fans, firewood generator, bio-fuel generator, vehicle exhaust waste heat recovery, waste incineration systems etc. The concept can be used for domestic applications like tapping the heat of Gas Stove to produce electricity.

For example, consider the automobile exhaust, which has a lot of waste heat. The temperature available is of the order of 200 C and by a properly designed 'thermo generator', it may be possible to recover power for head lights!

This idea is put to practical use in the project. The experimental system developed 10W. It is expected that the efficiency of heat recovery can be considerably increased after more studies.

Waste Heat Recovery Setup

DESIGN AND DEVELOPMENT OF ACTIVE HEAD RESTRAINT SYSTEM FOR WHIPLASH PROTECTION

Project guide: Mohammad Ismail. B, Sr. Asst. Prof., EED

The Project aims to design and develop an active head restraint system that can effectively reduce occurrence of whiplash Injury for rear collisions in a car.

Whiplash is a soft tissue injury to the neck, which is often called neck sprain or neck strain. It is characterized by a collection of symptoms, occurring following damage to the neck, usually because of sudden extension and flexion.

The head restraint system is designed to move forward and upward in a rear end collision to decrease the space between the restraint and the occupant's head. This reduces the degree to which the head accelerates before contact. Lesser the acceleration, lower is the chance of injury. The adjustable head restraint system automatically detects and adjusts itself for the optimum position. Lifting the head restraint without interfering with the internal rods of the seat frame ensures the structural stability of the seat and the person sitting on it

An ultrasonic sensor is used to determine the optimum height, comparable to a normal male adult ensuring the safety under all conditions and reducing the dead zone area where the sensor cannot detect any distance.

The system is also tested using a track system that replicated the settings of a rear end collision. The tracks are at an elevated

position and the cart with the seat was positioned at the highest point. When it is released, it would roll back and hit the stationary end. The crash test dummy will undergo the motions in a whiplash Injury.

It is demonstrated that that this simple and economical system can do the same function as that of a complex sophisticated system in a luxury car. The system can be implemented in Indian cars thereby reaching a large population and addressing its safety needs.

WORKING OF THE SYSTEM

A custom made cam is designed using 14mm thick Teflon to lift the horizontal bar of the head rest. The sensors are looped to measure the distance continuously at intervals of 20msec. This data is sent to the microcontroller, which compares the variables with the preset values to execute the lifting motion. The lifting assembly consists of a DC motor which is controlled via a L293D motor driver chip interfaced with the Micro-controller. The 12V High torque motor with low rpm and offset shaft has sufficient capacity to handle the medium load of head up to 8 kg.

Complete Set-up of Whiplash Protection System

POWER GENERATION USING SPEED BREAKER

Project Team: Mohammed Bilal, Shaik Afzal mohiuddin, Mohammed Imran and Syed Zakir Hussain of MED

Project Guide: Mr. Sadak Ali Khan, Associate Professor, MED, MJCET

In the present scenario power becomes major need for human life. Due to day-to-day increase in population and shortage of the conventional sources, it becomes necessary that we must depend on non-conventional sources for power generation. While moving, the vehicles possess some kinetic energy and it is being wasted. The energy that normally gets lost in the running of the automobiles can be effectively utilized to produce electricity. This model is a beneficial one because of its simplicity and economic viability.

Team members with the prototype of the speed breaker set up for the power generation

The Kinetic energy of moving vehicles can be converted into mechanical energy using rack and pinion with compound gearing mechanism. The shaft is connected to the electric dynamo and it produces electrical energy proportional to traffic density. All this mechanism can be housed under the dome like speed breaker, which is called hump. The generated power can be used for general purpose like streetlights, traffic signals. The electrical output can be improved by arranging these power humps in series this generated power can be amplified and stored by using different electric devices.

Encapsulating wind power through Horizontal Axis Wind Turbine

Project team: 1.Kouser Ali 2. V. Amruth Sagar and 3. E. Sujeet Kumar

Project guide: Mrs. Ishrat Meera Mirzana, Associate Professor, MED

The main objective of this project is to design, fabricate & install a 1Kw Horizontal axis wind turbine (HAWT).The project

required a fund of Rs.52, 000/- which was fully funded by R&D cell MJCET.

A wind turbine includes the following components namely the aerofoil blades, nacelle, yaw & tail. The basic concern of the project was to have light weight and strong materials. Design of the aerofoil blades has been the major task. The blades have been designed and analyzed using Q-blade software. FRP material has been used for the blades. Blades have been manufactured in Pune.

Nacelle is the component which acts as a gear box and the generator is located.MS material has been used for nacelle. Nylon has been used for manufacturing of gears which has a gear ratio of 5.Acrylic material has been selected as the covering of the nacelle which is not only light in weight but also transparent so that any repairs can be identified without much effort.

Aluminum has been used as the tail material which is light in weight. One of the major component is the yaw. Yaw is bearing which helps the turbine move towards the wind direction. The bearing had to possess heavy static loads and dynamic loads.

A strong bearing SKF22214E has been used which suited the requirements. High tension and SAE approved UNBRAKO bolts have been used for critical zones where tension and centrifugal forces occurred.

The tower used was a 20ft pipe and was installed on the college terrace of the principal's block. Guy wire support has been given to the tower for additional support and strength. In order to increase the power generation capacity, the height of the wind turbine can be increased for more wind with higher velocity. Installing more wind turbines promote more generation of power hence in the future this project can power a part of the colleges building power demands.

V. Amruth, Sujeet and Kouser Ali with their project guide Mrs. Ishrat

Wind Turbine installed on the roof of block 5 in college premises

QUAD TORC-2014

Students from Mechanical Engineering Department of Muffakham Jah College of Engineering and Technology have participated in the National Level Competition **QUAD TORC – 2014** organized by ISNEE (Indian Society of New Era Engineers) from 2nd to 4th August 2014 at SRM University, NCR campus, Meerut, New Delhi.

The theme of the competition is to compete in an off road championship by designing and fabricating a **Quad Bike** (a four wheeler bike, which was initially developed as a farm-to-town vehicle in isolated and mountainous areas) which will be tested for Static, Dynamic and Durability events.

In Static events, the Team was tested for Engineering Design Report, Design Evaluation, Marketing Presentation and Cost Analysis. In Dynamic events the vehicle was tested for Break test, Acceleration test, Skid Pad test and Auto Cross, and in Durability events the vehicle was tested for Fuel Economy and Endurance.

In this competition, 32 teams have been shortlisted from all around the country, from which 27 teams participated at the venue with their vehicles to compete with other teams. Out of 27 teams, 17 teams cleared the inspection test and allowed to participate in the final endurance test. From 17 teams, only 4 teams could manage to complete rigorous endurance test for Three hours on a rough terrain and our team was one among them completing 46 laps in 3 hours. (The maximum laps covered by the winning team were 47). Having paid a penalty of 20 points for trouble shooting, the Team MJCET settled at 3rd

position in overall ranking, after sharply missing the first two positions.

Team MJCET have received **Best Business Plan Award** (Trophy and Free registration to National Go-carting championship), the **Best Driver Award** (Trophy and a cheque of Rs. 10,000/-), **Overall India 3rd rank** and South India 1st rank in the competition. The total cost of the project is rupees Two Lakh Fifty Thousand (Rs. 2,50,000/-).

Team MJCET consists of 17students from B.E. Mechanical and Production Engineering streams, lead by the team captain Mohd. Anas Fareed of final year Mechanical, driver receiving the award was Syed Furkhan Ali from 3rd year Production and two Faculty Advisors -Mr. Mohd. Viquar Mohiuddin and Mr. D. Srinivas Rao, Associate Profesors, MED. The project was actively supported by Prof. S. Khadar Vali, Head of Mechanical Engineering Departmentand powered by Dr. Basheer Ahmed, Director cum Advisor, MJCET, Hyderabad.

Team MJCET with the QUAD TORC Bike and Certificate

Gesture Controlled Wheel Chair For Impaired Persons

Project Team: Mohd. Ali Hyder, Mohd. Khadeer and Mr. Shanawaz Ali of B.E. – 4/4 EIE.

Project Guide: Mr. Mohammed Ismail, Asst. Professor, EED

The project has been successful in designing a system which is capable of moving the wheel chair based on the movement of head. A MEMS (micro electro mechanical sensor) technology sensor is attached to a cap which is worn by the physically challenged person. This sensor detects the tilt (Direction) of the head and moves the chair in that particular direction (Forward, Reverse ,Left& Right) as the person Desires.

The project consists of DC motors which are connected to wheels of the chair which helps in chair movement and a Relay used for switching the devices for a movement in particular direction. Microcontroller detects the motion of MEMS Sensor & accordingly switches the relay which in turn activates motors for moving the wheels of the chair.

Students demonstrating the Gesture Controlled Wheel Chair

Gesture Controlled Wheel Chair for Impaired Persons was presented in medical conference OSMECON on 5th September, 2014 conducted by OSMANIA MEDICAL COLLEGE and have won first prize.

Research is to see what everybody else has seen, and to think what nobody else has thought.

-Albert Szent-Gyorgyi

You can't be a professor without having been a student. You can't be a consultant without having been a research associate. So, if you outsource the least sophisticated jobs, at some stage, the next step of the ladder has to follow. **-Nirmalya Kumar**

"I do not think there is any thrill that can go through the human heart like that felt by the inventor as he sees some creation of the brain unfolding to success... Such emotions make a man forget food, sleep, friends, love, everything."

-Nikola Tesla

Team MJCET receiving the trophy at SRM University, Meerut, New Delhi from Mr. Sanjeev Kathuria, Director, Venus Group

Electronic Charkha driven by Solar Power designed by MJCET Mechanical Engineering Students – Inaugurated by Mr. Khan Lateef Khan, Chairman, SUES

Mr Edward Davey, Secretary of State for Energy and Climate Change, UK, examining the setup Electronic Charkha driven by Solar Power along with Mr. Zafar Javeed, Secretary, SUES, Prof. Basheer Ahmed, Advisor cum Director, MJCET, Mr. A.S. Reddy, Associate Professor, MED, MJCET, Dr. Shaik Khadarvali, HEAD, MED, MJCET and Prof. Ashfaque Jafari, Dean, Academics.

MJCET College has filed a patent for the Solar Powered Spinning Wheel with Docket no.30035.

Ph.D. Research Center

MJCET college has O.U recognized Ph.D. research centers in the departments of Electronics and Communication Engineering and Mechanical Engineering. The recognized supervisors for ECED are Prof. Kaleem Fatima and Prof. Arshia Azam and in MED are Prof. S. Nawazish Mehdi, Prof. N. Seetharamaiah and Prof. S. Khadarvali. The college is in process of getting permission of research centers in the department of civil engineering and electrical engineering Department. There are several faculty members who are pursuing their Ph.D. in these research centers.