

RESEARCH AND DEVELOPMENT
MECHANICAL ENGINEERING DEPARTMENT

List of R&D Projects for the past Five years
2017-2018' To 2021-22'

1. Project Title : THE NEXT GENERATION BAND

Project team:

1. Renish Sundrani (1604-16-737-047)
2. Shahid Dhamani (1604-16-736-064)
3. Kiran Lakhani (1604-17-737-002)
4. Syed Absaar Ul Haq (1604-16-736-109)

Project guides: (i) Dr. Mousmi Ajay Chaurasia, Prof., ITD (ii) Mr. Shaik Rasool, Asst. Prof., ITD and **(iii) Dr. Ishrat Meera Mirzana, Prof., MED**

Sanctioned amount: Rs. 37,000/-

The objective of this project was to make a band that will help lost soldiers communicate with base, inform generals about the whereabouts of all soldiers at all times, have a safe zone established in territory and have an emergency kit and torch for soldiers all with waterproof technology that works in all terrain or can also be utilized by common man for their kids when they visit overcrowded places. The existing models all work in the presence of network but the proposed next generation band works offline as well, which has offline GPS tracking system which makes it unique from the existing systems.

Making band that will help lost people communicate with dear ones (offline), have a safe zone established in territory and with waterproof technology that works in all terrain, along with fitness mapping features is the unique feature of the developed band. It utilizes the low range radio frequency to send encrypted signals to the receiver. The location tracking will be enabled by GPS which works offline at all places. All electronics will be waterproof by potting compound which will always provide mechanical durability.



Demonstration of Next Generation band

2. Project Title : SIX LEGGED ROV

Project team:

1. P. Mohd. Ikramullah (1604-15-736-076)
2. Md. Faseehuddin (1604-15-736-069)
2. Amayna Mohammadi Sajida (1604-16-739-003)
3. 4. Meraj Saleem (1604-16-739-011)

Project guide: (i) Dr. Ishrat Meera Mirzana, Prof., MED

Sanctioned amount: Rs.1,19,000/-

A hexapod robot is a robot with six legs. Hexapods can be used in applications with uneven, unpredictable terrain from stair-climbing inside a house to search-and-rescue operations in hazardous disaster zones. Wheeled robots are faster on flat surfaces compared to legged robots. However, they are horrible on uneven terrain in which legged robots excel.

Legged robots like hexapods can traverse uneven ground, step over obstacles and can choose footholds to maximize stability and traction unlike wheeled robots that need even flat surfaces. A hexapod can still travel by changing its walking mechanism even if some of its legs malfunction or gets damaged. Hexapods can also use one or more of its legs as hands to perform dexterous tasks while maintaining stability even when travelling.

Compared to wheeled or tracked robots, legged robots like hexapods have less

environmental effects because their leg tips have very low surface area that touch the ground compared to tires or tracks.



Display of the Six-Legged ROV during ADSOPHOS

3. Project Title : WANDERWAY- AN IMPROVED SEGWAY

Project team:

1. Syed Muzzamil Uddin Qureshi (1604-16-736-028)
2. Md. Idrees Hussain (1604-16-736-036)
3. Md. Wael (1604-16-735-114)
4. Syed Taha (1604-16-735-112)
5. Absar Ul Haq (1604-16-736-109)
6. Abdullah (1604-16-736-103)
7. M. Mujtaba Khan(1604-160737-028)

Project guides: (i) Mrs. O. Hemalatha, Asst. Prof., MED and (ii) Mrs. B. Sucharitha, Asst. Prof., ECED

Sanctioned amount: Rs.88,000/-

Segway is an electric scooter of future technology. It senses the tilt angle of the person riding it. It senses the tilt using accelerometer and keeps the vehicle stable using gyroscope. Segway is using gyroscope sensor, accelerometer along with an Adriano board, mechanical and electrical hardware. The Segway has a new handle, support stand and other amenities like storage space along with a smoother riding experience. It has optimum speed of 6 to 8 KMPH. To avoid the theft of the Segway, it has been secured with an IOT connection, which will be necessary to start the Segway.



Working of Wanderway being tested by Janab Syed Aamer Javeed,
Member, BOG, SUES

The components used in fabrication were well researched and calculated so that they meet the specifications of the Segway to be fabricated. In a world where commuting in large indoor spaces can be tiring, our product makes going from one end to another of a large airport, mall or campus easy and relaxing. The product is a modified Segway, called the Wanderway, which is a 2-wheeler self-transporting vehicle that works on the principle of self-balancing. It is an affordable electric scooter designed to provide smooth transportation without pollution and easy balancing to the user. It is a suitable alternative to walking or cycling to a desired destination in a large place. Also, in cases of emergency, it allows the responsible personnel to reach the place without exhausting themselves by running to the place of distress. The IoT locking system that we have implemented makes the vehicle save from unauthorized usage. The Wander way is designed with Obllu IMU sensor, Analog buttons and, Mudguards and fabricated with lightweight Aluminum material. It is a Cost effective Wanderway.

4.Project Tittle: SYNTHESIS AND HARACTERIZATION OF NANO MAGNETORHEOLOGICAL FLUIDS FOR

ENGINEERING APPLICATIONS

Project team:

1. Syed Imaduddin Ahmed (1604-16-736-020)
2. Murtuza Khat (1604-16-736-007)
3. Syed Murtuza Quadri (1604-16-736-042)

Project guides: (i) **Mrs. G. Sailaja, Asst. Prof., MED and**
(ii) Dr. M.G.V. Satyanarayana, Asst. Prof, Chemistry

Sanctioned amount: Rs.50,000/-

In the last three decades or so, there has been a great deal of interest in the use of control systems to mitigate the effects of dynamic vibrational hazards on both Mechanical and Civil Structures. Magnetorheological (MR) Fluids are controllable fluids that respond to an applied magnetic field with a dramatic change in rheological behavior. An MR Fluid is a free-flowing liquid in the absence of magnetic field, but under a strong magnetic field its viscosity can be increased by more than two orders of magnitude in a very short time (milliseconds) and it exhibits solid-like characteristics. MR Fluid Dampers, based on MR Fluids, have been shown to be semi-active control devices that mesh well with application demands and constraints to offer an attractive means of controlling the intensity of vibrations in structures due to their mechanical simplicity, high dynamic range, low power requirements, large force capacity and robustness. The focus of this work is to study the dynamic behavior of an aluminum structure using the Magnetorheological dampers with and without applying magnetic field. A large variety of combinations of nanoparticles and heat transfer fluids can be used to synthesize stable nanofluids with improved thermal transport properties. Nanoparticles of metals, oxides, carbides and carbon nanotubes can be dispersed into base fluids (heat transfer fluids), such as water, ethylene glycol, hydrocarbons and fluorocarbons with or without the presence of stabilizing agents. In most experimental studies, nano fluids are synthesized in a two-step process, which is the first and the most classic synthesis method of Nano fluids. In the first step, nanoparticles are prepared by mechanical comminuting, chemical reaction, vapor condensation or decomposition of organic complex. Then it is followed by the second step in which the as-produced nanoparticles are dispersed into base fluids with mechanical agitation (stirring) or ultrasonication.

When absorbed on the surfaces of solid particle, the surfactant

molecules can produce a barrier to prevent aggregation of nanoparticles and impart solubility to particles in base fluids, so that the prepared nanofluids can sustain the stability without visible precipitation for months or even years. Oxide nanoparticles are firstly used for nanofluids, mainly because they are easy to produce, chemically stable and easy to be dispersed into water due to their surface hydrophilicity. The presence of surfactants in the carrying liquid can further suppress the agglomeration of nanoparticles. After preparation of fluid it can be used in various applications like dampers, clutches, brakes and few biomedical applications like MR dampers in (artificial) leg.



Preparation of CuO Nano fluid using Ultrasonic probe sonicator

5.Project Tittle : LASER ENGRAVER

Project team:

1. R. Sai Aakash Reddy (1604-16-738-008)
2. Abdul Sohail (1604-16-738-004)
3. Altaf Hussain (1604-16-738-030)
4. Nihal (1604-16-737-120)
5. Hadi Ali Farooqui (1604-16-737-056)
6. Mohammed Faisal (1604-16-735-079)
7. Varha Khan (1604-16-733-011)
8. Md. Rehan Hussain Khan (1604-17-735-053)
9. Md. Moin Khan (1604-17-735-111)

Project guides: (i) Dr. Mohd. Viquar Mohiuddin (Prof., MED) and Ms. Maliha Naaz (Asst. Prof., ECED)

Sanctioned amount: Rs 97,000/-

In the most basic sense, laser engraving deploys the use of the heat of the laser in order to perform the engraving techniques on the surface of the material. The heat of the laser burns the surface, making it appear different from the surrounding areas. Laser cutting is a thermal separation technique which is achieved by prolonging the beam on the target area for a specified amount of time, dependent on the material.

Laser cutting is thermal separation which uses high intensity beams as compared to low intensity, used by the laser engraver. The machine deploys a 150W red laser. Simulation analyses are performed in the CAD software "LASER draw" in order to simulate each part of the machine. It was helpful in rooting out any errors found during the simulation and for remodelling the moving bed, or the job holder. It is low cost and easy maintainable set up that can be utilized for Laser engraving.



CO2 Laser Engraver Setup

6. Project Title: FLEXIBLE MANUFACTURING SYSTEM

Project team:

1. Zohaib Khan (1604-15-736-090)
2. Mohd Moazzam Mustafa (1604-15-736-093)
3. Mir Mohib Ali Quadri (1604-15-736-104)
4. Mohd Faiz ur Rahman (1604-15-736-106)
5. Mohammed Abdul Khaliq (1604-15-736-109)
6. Talha Mohiuddin Rafeeq (1604-15-736-119)

Project guide: (i) Mr. Hakeemuddin Ahmed, Asso.Prof., MED

Sanctioned amount: Rs. 85,491/-

Now industries are being replaced by Automation and robotics. All process and work are carried out by machines and robotics process automation. Today the development of technologies made it possible to introduce industry automation systems into almost all manufacturing fields every industrial sector like manufacturing, process industries, chemical, food & beverages, Oil Gas, Transport, machine tools everywhere Industrial automation is used. The advent of Industry 4.0 has enabled rapid prototyping and manufacturing using Automation and robotics. The concepts of Artificial Intelligence, IoT, Machine Learning is being integrated with PLC SCADA, which is used for controlling and monitoring the systems with logical programming. The FMS developed in-house utilizes the concepts of PLC for its controlling and automation of the manufacturing system. There are four stations that have been considered for which the automation has been carried out based on the principles of flexible manufacturing system.



Demonstration of Flexible manufacturing system

7. Project Title: 3D MAP GENERATING AUTONOMOUS BOT

Project team:

1. Umair Asharaf (1604-15-736-070)
2. Safoora Khan (1604-15-737-010)
3. Tabassum Sultana (1604-16-733-018)
4. Hadi Ali Farooqui (1604-16-737-056)
5. Rahila (1604-16-736-002)
6. Ayesha Manzoor (1604-16-737-003)
7. Syed Muzammil (1604-16-736-028)

Project guides: (i) Dr. Ishrat Meera Mirzana, Prof., MED and (ii) Mrs. Munavvara Tahaseen, Asst. Prof., ITD

Sanctioned amount: Rs.75,000 /-

The procedure of collecting 3D data via an input device and processing it to a virtual 3D model is called 3D reconstruction. It is a widely used technique in visual computing, since modern applications like games or visualizations tend to be more and more photo-realistic leading to high costs in content creation. By using 3D reconstruction high quality geometry can be generated out of real objects. However, to obtain good reconstructions special hardware is needed which is very expensive.

Since Microsoft released the Kinect camera, which has a depth sensor in addition to the RGB- sensor, a quite cheap hardware is available that is able to extract 3D data of its surroundings. Kinect Fusion also developed by Microsoft is a technique that uses the Kinect camera for 3D reconstruction in real-time. In order to achieve real-time speed, the algorithm is executed almost exclusively on the graphics card. The project presents a method of building 3D indoor maps using the Kinect (RGB-D cameras) in which a depth camera and a color camera are lined up.

The procedure is to first extract SURF (Sped Up Robust Features) from the input colour images and match the current features with the previous ones. The matched features are then transformed to 3D coordinate points data using depth information. The 3D points data sets of two consequent images

are combined by the ICP (Iterativ Closest Points) algorithm to estimate the camera pose, and finally a 3D map is built.

To show the effectiveness of the presented method, the map accuracy has been evaluated through comparison of the real environment and the 3D map built during indoor traveling of a Kinect equipped mobile robot. The 3D map has much more information than the case of 2D map. So, it would be helpful to improve the performance of motion control and localization of a robot in indoor environment where the GPS cannot be used. This study has taken one step towards vision- SLAM by create 3D map.



The working model of 3D Map Generating Autonomous Bot

8. Project Title: GIMMIC- A SEMI-HUMANOID FACE RECOGNITION ROBOT

Project team:

1. Mogal Abdul Sameer Baig (1604-15-735-112)
2. Sameena Begum (1604-15-735-065)
3. Nazia Fatima(1604-15-735-070)
4. Mohammed Abdul Nayeem (1604-15-736-115)
5. Mohammed Sohail Khan (1604-15-736-110)
6. Mohammed Saad Khan (1604-15-733-105)
7. Syed Imad Ul Hasan (1604-15-733-035)
8. Suhaib Nizar Ahmed (1604-16-736-037)
9. Abdul Sohail (1604-16-738-004)
10. Abdul Haseeb (1604-16-738-016)
11. Tabassum Sultana (1604-16-733-018)

12. Juveria Khatoon (1604-16-733-062)

13. Hadi Ali Farooqui (1604-16-737-056)

14. Aneequr Rahman (1604-17735-024)

15. Mohd Mudassir Ahmed (1604-16-737-049)

16. Mohd Safwan Hussain (1604-17-735-023)

17. Mohammed Azeemuddin (1604-16-737-032)

Project guides: (i) Dr. Mohammed Arifuddin Sohel (Prof., ECED), (ii) Mrs. B. Sucharitha (Asst. Prof., ECED) and Mr. Shaik Irfan Sadaq (Asst. Prof., MED)

Sanctioned amount: Rs.1,00,000 /-

The advancement of technology and sophistication in the field of automation and robotics has revolutionized every field of life. Machines that offer greater efficiency combined with the precision of the robotic systems are minimizing human involvement in dangerous areas and eliminating the limitations that bind the human body and brain. A Semi-Humanoid robot is a robot with its upper body shape built to resemble that of the human body. A design of Anthro is not only for functional purposes, such as interacting with humans and environment, but also for experimental purposes, such as the study of omni wheel mechanism for locomotion, or for other purposes.

In this project we have focused on developing Face Recognition feature and Speech Recognition. Now a days, Face Recognition and Speech Recognition are being acknowledged across the world for providing extremely safe and reliable security technology. The aim of our project is to develop a Semi - Humanoid robot which can perform recognition of faces and act as Voice Assistant.



8. Project Title : SINGLE USE PLASTIC TO FUEL CONVERSION SYSTEM

Project team:

1. Shahid Dhamani (1604-16-736-064)
2. Uroosa Fatime (1604-16-736-003)
3. Deeksha Rana (1604-16-736-001)
1. Mohd. Raheemuddin Ahmed (1604-16-736-063)

Project guides: (i) Dr. Ishrat Meera Mirzana, Professor, MED and (ii) Dr. M.G.V. Satyanarayana, Assistant Professor, Chemistry Dept.

Sanctioned amount: Rs.85,000/-

The plastic processing industry is estimated to grow to 22 million tonnes (MT) a year by 2020 from 13.4 MT in 2015 and nearly half of this is single-use plastic, according to a Federation of Indian Chambers of Commerce and Industry study and over 1.3 billion metric ton of plastic are being manufactured every year to meet the demands of the modern world. Plastic is synthetic or semi-synthetic organic compounds made by polymerization of hydrocarbons. These hydrocarbons are typically high molecular mass and may contain some



Plastic to Fuel Conversion set up

9. Project Title : EXPERIMENTAL AND CFD ANALYSIS OF VARIOUS AIRFOIL PROFILES USED IN WIND TURBINES

Project team:

1. R. Venkat (1604-18-736-063)
2. Akshay Kolli (1604-18-736-064)
3. Mirza Rizwan Ali Baig (1604-18-736-065)
4. 4. Mohd. Abdul Mateen (1604-18-736-086)

Project guide: (i) Mr. S. Irfan Sadaq, Assistant Professor, MED

Sanctioned amount: Rs.43,050/-

The R&D project involved the manufacturing of an airplane. The airplane was manufactured using Balsa wood which was laser cut according to specifications and then wrapped with metal sheet. The aircraft used a Brushless DC motor to propel itself. It used a 10-inch propeller with an 8-degree twist. A Lithium Polymer Battery was used to power the aircraft.

It used a 6-channel radio transmitter and receiver for communications. All of the control surfaces such as the ailerons and tail rudder were controlled using metal wire and servo motors. The wing was constructed by first laser cutting “ribs” from Balsa wood. These ribs were then connected using a 1.25-meter carbon rod and all of the ribs were attached to it using glue. This entire assembly was wrapped by a metal sheet and heat was applied to make it smooth and uniform.

The plane after being manufactured was taken to IIT Chennai for the Boeing IIT aeromodelling competition. After reaching the venue, first technical inspection was conducted for the plane. It produced a thrust of 750 grams, while weighing around 1.1 kg. It had a wingspan of 1.25 meters. The plane successfully passed technical inspection.



Model in making using Balsa wood with Laser cutting

10. Project Title : UPPER EXO-SKELETON

Project Team :

1. Syed Absar ul Haq(1604-16-736-109)
2. Abdullah(1604-16-736-103)
3. Taha Naveed Shibli(1604-16-736-097)
4. Muralidhar Nallapati(1604-16-736-105)
5. Mujtaba Khan(1604-16-737-028)
6. Mohammed Fazal Rahaman Pasha(1604-17-735-113)
7. Syeda Azra Mohi(1604-17-735-068)
8. Mohammed Waseem(1604-17-735-032)
9. Khaja Asad Ullah (1604-17-735-034)
10. Mohammad Ghouse Mohiuddin(1604-17-735-096)
11. Kausar Zaidi(1604-17-735-005)
12. Syed Ishaq Shehzad(1604-17-736-028)
13. Hafsa Taneem(1604-16-736-005)

Project guides: (i) Dr. K. Hemalatha, Assistant Professor, MED, (ii) Mrs. B. Sucharitha, Assistant Professor, ECED and (iii) Mr. Shaik Rasool, Assistant Professor, ITD

Sanctioned amount: Rs.60,000/-

There are a multitude of developments ongoing in the sector of industrial automation as researchers have begun to explore the various ideas related to building exoskeletons, which were once a part of science fiction, today are very much a part of our reality, owing to technological advancement. Essentially an Exoskeleton is an electro-mechanical device which can be worn by one so as to enhance/assist one's physical capabilities and manoeuvre. Presumably in near future exoskeletons will become a part of one's day to day life.

We stand on the brink of industrial revolution that will fundamentally alter the way Industry functions, evolves and relates to. This industrial revolution 4.0 which according to us represents not merely a prolongation of the Third Industrial Revolution but rather the arrival of a Fourth and a very distinct one comes with its own unique challenges. At the core of it are the developments of Exoskeletons besides Robotic arms powered by the artificial intelligence of the day. On the one hand it can be argued the introduction of robots has the potential to disrupt the employment of the workforce, The introduction of exoskeleton is bound to enhance the capabilities of labour while maintaining the dexterity and mental agility of humans there by compensating the formerly mentioned problem.



Structural Arm Model with Linear Actuator

11. Project Title : AERIAL SURVEILLANCE ROBOT

Project team:

1. Syed Ishaq Shahzad (1604-17-736-028)
2. Kausar Zaidi (1604-17-735-005)
3. Mohammad Ghouse Mohiuddin (1604-17-735-096)
4. Khaja Asad ullah (1604-17-735-034)
5. Syed Azhar Hussain Quadri (1604-17-733-082)

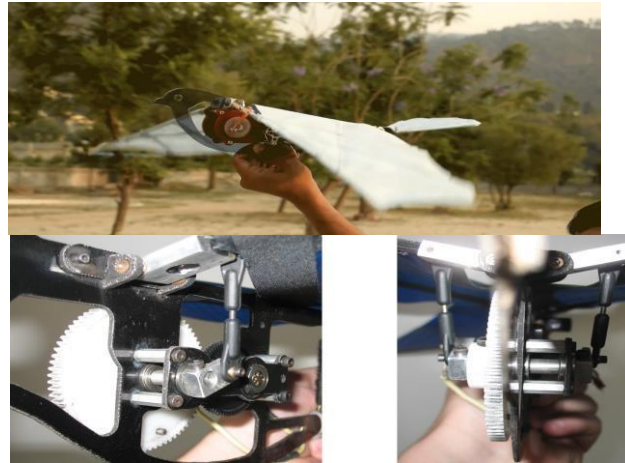
Project guides: (i) Dr. (Mrs.) G. Sailaja, Assistant Professor, MED and (ii) Mrs. B. Sucharita, Assistant Professor, ECED

Sanctioned amount: Rs.61,581/-

The construction of flying models should follow the principles of simplicity, slighthness and robustness. Thus the wooden raft, given to its low density and the enormous easiness which it can be worked out, is one of the basic materials in the construction of flying models. A main part of the bird is the wing. It is responsible for generating the forces that will raise the bird of the ground. It's in the construction of the wing, therefore, that becomes necessary to deposit a well-taken care and special attention. The wings had been made with wooden raft and carbon rods giving a good resistance and low weight. To give form to the wings, we connected the various airfoils made in raft with laths of raft and carbon tubes to strengthen the structure

To be able to have a wing movement similar to the one of real birds we used a set of springs and hinges in order to construct a mechanical spring mechanism in the wrist them. After receiving the start signal,

all the motors will go to this position. As said before, contrarily to the standard servos used in the other joints, for the wing beat we used digital servos allowing a better relation force/speed. These servos can make, without any load, a rotation of 60 in 0.06 seconds. In the first test, we didn't use the flexible plastic film to simulate the effect of feathers. We made a great wing beat speed of approximately 640 ms per cycle.



Stages and final model of Robird

12. Project Title : DESIGN AND FABRICATION OF AI BASED M-R DAMPER FOR GUN MOUNTED DRONE

Investigators:

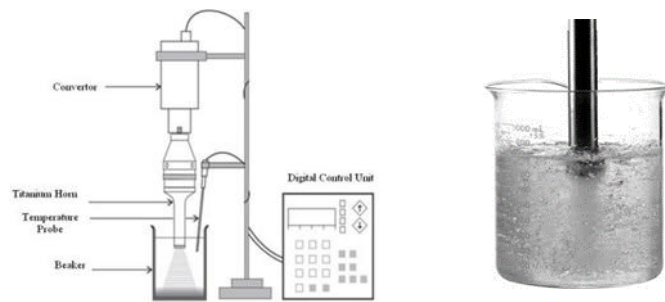
1. Dr. G Sailaja, Associate Professor, MED
2. Dr. Mahaboob Shaik, Associate Professor, EED
3. Dr Mohammed Sajid, Associate Professor, EED

Sanctioned Amount: Rs. 60,000/-

In most experimental studies, nano MR fluids are synthesized in a two-step process. The first step is the most classical method of synthesis, where nanoparticles are prepared by mechanical comminuting, chemical reaction, co-precipitation method, vapor condensation or decomposition of organic complex. Then it is followed by the second step in which the as-produced nanoparticles are dispersed into base fluids with mechanical agitation (stirring) or ultrasonication.

The present study deals with the synthesis of NiFe_2O_4 based

nano magnetorheological (MR) fluids prepared under probe sonication with varying carrier oils. To observe the flux line formations, the samples were tested for analytical ferrography. The study also explores the magneto viscous, viscoelastic and rheological measurements to analyze the responses of the colloids. The sweep measurements were carried out with varying shear rates and magnetic fields. The present article can find significance in design and development of nano magnetorheological (MR) fluids. The commercially purchased surfactant was added to silicone oil. Then the dispersion medium was mixed with an ultra-probe sonicator at room temperature. Then the nickel ferrite nanoparticles with diameter ranging from 40 – 80 nm were dispersed in silicone oil under continuous sonication. The test results of nano MR fluid samples show the excellent chain formations. The agglomerated chain formations were noticed for MR fluid samples



Probe sonicator line diagram and microcavity formation in the sample