RESEARCH AND DEVELOPMENT
Electronics & Communication Engineering Department
List of R&D Projects for the past Five years
2017-2018 To 2021-22

Project Title: FABRICATION OF OXIDE NANOPARTICLES FOR GAS SENSOR

Project team:

1. Abdul Majeid (1604-14-735-017)
2. Syed Arif (1604-14-735-301)
3. Syed Imaduddin Ahmed (1604-16-736-020)

Project guides: (i) Dr. Shaik Kareem Ahmmad, Physics Dept.,

(ii)Mr. Mohd. Abdul Raheem,Asst. Prof., ECED

Sanctioned amount: Rs.30, 500 /-

ZnO and Ti-doped ZnO nanoparticles were successfully prepared using sol-gel technique. Different concentrations of triethanolamine (TEA) were utilized as the preparation procedure to act as complexing agent that enhances the doping probability of the formed Ti-doped ZnO nanopowder. Thick films of the prepared nanopowders were fabricated with spinner coating. Morphological characteristics, phase structure, chemical composition, thermal stability, and optical properties of the prepared nanopowders were measured and analyzed. The average crystallite size of ZnO and ZnO:Ti powders ranged between 19–28 nm according to the XRD calculations and TEM observations. The gas sensitivity of the homemade devices based on Ti-doped ZnO nanoparticles towards and gases as a function of temperature was measured and compared with undoped ZnO films. The gas sensitivity of the films was greatly improved after doping with Ti and reached its maximum value of ~86% for gas at 93:7 wt% of Zn:Ti.

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)

Project guides: (i) Dr. Mohammed Arifuddin Sohel (Prof., ECED), (ii) Mrs. B. Sucharitha (Asst. Prof., ECED) (iii) 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. A Semi-Humanoid Robot may work with or without human assistance. Humanoid Robots can be classified into two types. The Autonomous humanoid robot is programmed for autonomous operation

and employ feedback loops to the controller which ensures proper operation. These robots do not require any human assistance once programmed. The other type of humanoid robot is the manual humanoid robot which is controlled by the user through various methods like controllers, switches, motion sensors and other sensory devices. This robot can be utilized in applications such as greeting guests, working like a chat boot performing face recognition giving a personalized experience while acting as a security & surveillance robot. The image recognition part is built around Raspberry Pi Hardware with Python Programming. Such a mobile robot with further improvements can also be used for defensive applications, diffusing bombs, during nuclear and chemical warfare and as a rescue-boot during fires and natural disasters.

Team with their Project Display

Demonstration of the Model to distinguished Dignitaries

Project Title: A PNEUMATIC QUADRUPED ROBOT

Project guides:(i) Dr. Ishrat Meera Mirzana, Asso. Prof., MED (ii) Dr. Kaleem Fatima, Prof., ECED

Sanctioned amount: Rs.79,966/-

Pneumatic Quadruped robot is MJCET R & D sanctioned project of 2017-18. The designed Quadruped robot consists of rectangular chassis, base block, thigh link, knee link and clevis joints and stopper. Each leg consists of knee and thigh links that are actuated by pneumatic actuators. The assembly set up consists of link with actutators, pneumatic storage tank. For the foot of the quadruped robot, spherical ball structure is utilized that helps them to mobilize on any type of terrain.

The frame structure of the pneumatic quadruped robot enables to have any accessory attachments to it. Thus, it can have an arm attachment with sensory system that can

enable them to detect the mines and remove them to avoid any accidents. The structure of the pneumatic quadruped robot has an ability to take payloads upto 80kgs, that enables it to attach accessories mounted easily on it that can help it as an equipment to avoid accidents or accomplish any other tasks.

It has won second prize in the Anveshana (A Science and Engineering Fair) – A competition conducted by AGASTYA International Foundation and won a cash prize of Rs.25,000/- conducted on 30th January, 2018.The Team was among the 30 teams selected at the south zonal competition among the 1100+ teams conducted at Bangalore DRDO and it has been selected as the top team in the south zone. The team has participated at Pune, DRDO for the National level competition held on 24th and 25th May, 2018. The project guides are Dr. Ishrat Meera Mirzana, Professor, Mechanical Engineering Department and Dr. Kaleem Fatima, Professor, Electronics and communication Engineering Department, MJCET.

Seeing the potential, our Advisor cum Director, **Dr. Basheer Ahmed** suggested for patent filing of the project. With the support and encouragement of management of SUES, especially Hony. Secretary **Janab Zafar Javeed Sahab**, we filed a patent of 31/12/2019, published it on 03/01/2020 and got patent granted for a period of 20 years on 16/12/2021

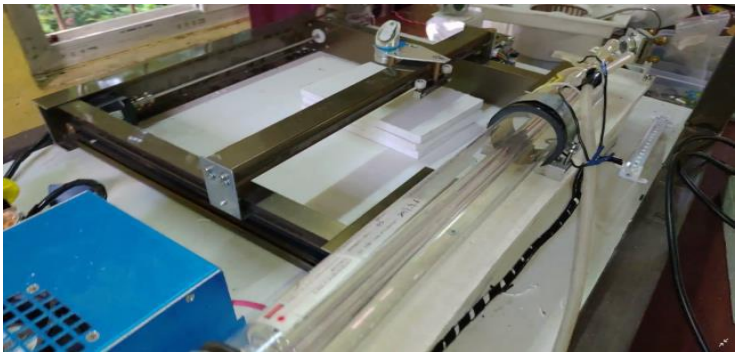
Project Title: LASER ENGRAVER

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) (ii) 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

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 secures with an IOT connection, which will be necessary to start the Segway. 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 Oblu IMU sensor, Analog buttons and, Mudguards and fabricated with lightweight Aluminum material. It is a Cost effective Wanderway.

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

Project Title: AERIAL SURVEILLANCE ROBIRD

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)

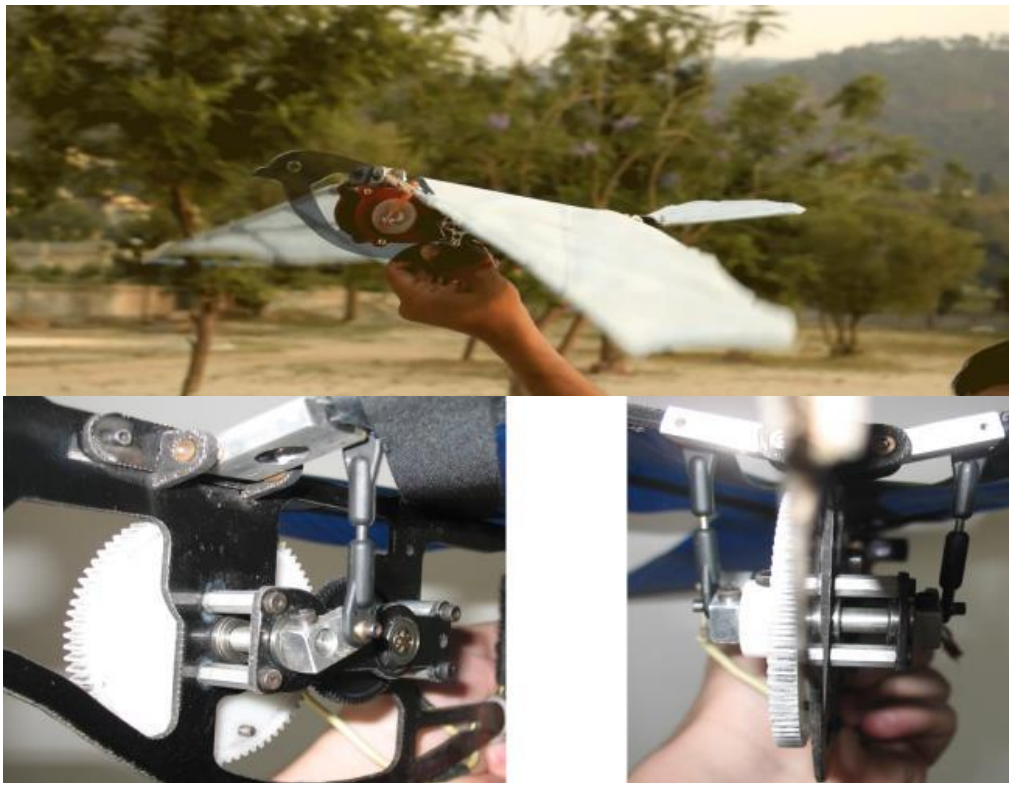
Project guides: (i) Dr. G. Sailaja, Assistant Professor, MED and (ii) Mrs. B. Sucharita, Assistant Professor, ECED

Sanctioned amount: Rs.61,581/-

The construction of flying models should follow the principles of simplicity, slightness 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

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)

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.

The need for exoskeleton is evident from the fact that they are now being widely adopted in several industry sectors to augment, amplify, or reinforce the performance of workers - primarily the lower back and the upper extremity. Industrial exoskeletons

may also play a role in reducing work-related musculoskeletal disorders arising from lifting and handling heavy materials or from supporting heavy tools in overhead work. One of the central problems associated with accessibility of exoskeletons is their expensive nature. This expensive price label makes it inaccessible and sparse in the industry. Making a low-cost efficient Exoskeleton will be a new feat in accessibility of technology in all sectors. Since the key focus is to design a capable system all the while being inexpensive, the whole design methodology was to be reengineered from the selection of the materials, the actuator to the very mechanisms. The anticipatory end result is an adaptable, versatile, industrially relevant inexpensive exoskeleton that enhances the human capabilities of lifting load by about 60% while providing some special capabilities

Arm Model With 90° Extension with emg sensors

Structural Arm Model with Linear Actuator

Project Title: LAIRA (GIMMIC 3.0)- LOW END ARTIFICIAL INTELLIGENCE ROBOTICS ASSISTANT

Project team:

1.Rizwana Tabassum(1604-16-735-066)
2.Bushra Fathima(1604-16-735-072)
3.Mohd. Tanzil Bilal(1604-16-735-090)
4.Mohammed Rehan Hussain Khan(1604-17-735-053)
5.Mohd. Safwan Hussain(1604-17-735-023)
6.Md. Aneeq Ur Rahman(1604-17-735-024)
7.Moin Khan(1604-17-735-111)
8.Mohd Abdul Aziz(1604-17-735-020)

9.Syed Sohaib Ali(1604-17-735-026)

10.Mohammed Shoeb(1604-17-735-019)

11.Mirza Ibrahim Baig(1604-17-738-303)

12.Mohd Shahzaib Ashher(1604-18-735-044)

13.Mohammed Ameer(1604-18-735-019)

14.Mohd. Abdul Khader(1604-18-735-096)

Project guides: (i) Dr. Mohammed Arifuddin Sohel, Professor & Head, ECED and

(ii) Mrs. B. Sucharita, Assistant Professor, ECED

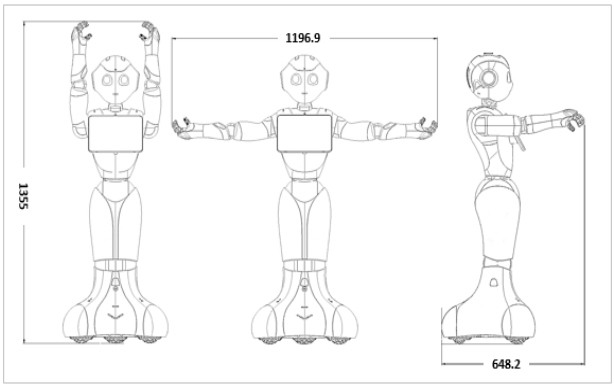
Sanctioned amount: Rs. 75,184/-

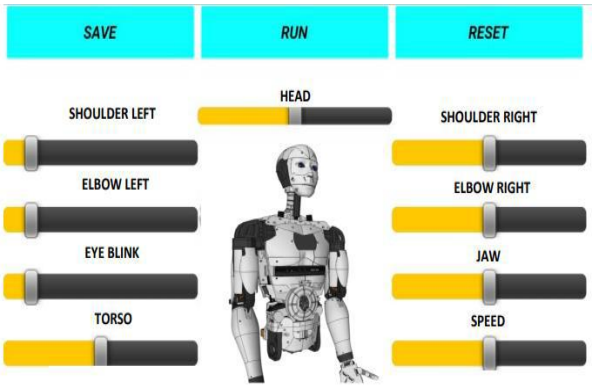
This project is the continuation of the previous R and D Cell Project titled GIMMIC-A Semi Humanoid Robot. Gimmic was controlled using PS2 controller and smart phone Bluetooth control. But in LAIRA, the control has been done through voice commands using Amazon‟s Alexa and can be flexibly used as home assistant. It could be connected to the internet with an IOT module and hence work in numerous applications.

The special features this project are as follows:

- It can also be controlled using hand gestures, with help of kinect sensor.
- The humanoid robot could also be given the feature of self-charging. The robot detects low battery and automatically plugs itself to the charging point.
- It can assist in patient support as a serving robot by carrying food and medicines to COVID affected patients thus avoiding direct contact with patients.
- It is a method of identifying or verifying the identity of an individual using their face. Face recognition systems can be used to identify people in photos, video, or in real-time. There are two main softwares used separately for application building and face recognition namely Kodular and Smart Luxand Face Recognition API
- The other key feature is the movement introduced in the jaw and eye blink to introduce the face response

A three-wheel design offers greater traction as any reactive force is distributed through only three points and the robot is well balanced even on uneven terrain. The entire robotic structure was 3D printed for the dimensions given below





Structure of LAIRA

Project Title: SMART OXYGEN CONCENTRATOR

Investigators: (i) Dr. Mohammed Arifuddin Sohel, Head, ECED (ii) Mr. Mohammed Muneeruddin, Asst. Professor, ECED

Sanctioned amount: Rs.49,915/-

The R and D project titled smart oxygen concentrator was the outcome of the COVID pandemic that affected humanity. The aim of project is to Sense the level of oxygen in the patient‟s body and automatically increase the outlet of oxygen from the oxygen concentrator, if the level is going down. Also, an alert will be sent to the caretaker/nurse for information and feedback control. The doctor will be able to open an app in his mobile phone and see the current patient oxygen level, he can then press soft keys on the app and increase the output of the concentrator in terms of LPM and monitor its affect in real time. This will reduce the exposure of doctor, nurse or caretaker to the patient. Though multiple solutions have existed earlier, the innovative aspect of this design lies in the real time control of remote equipment which can lead to life saving impact.

The starting point of the design is a pulse oximeter that is connected to Wi-Fi through a node MCU board and live tracking of patient oxygen levels can be done. An alert message will be sent to the mobile phone of doctor, nurse or caretaker. The design specialty is that it can be retrofitted on any commercially available concentrators. The design consists of a 3D printed setup that holds a pi camera which is connected to a raspberry pi board that will transmit live images of the concentrator levels to the mobile phone app. The control mechanism involves a stepper motor whose shaft is connected to the control knob of the concentrator using a belt drive mechanism. The doctor can press the increase and decrease buttons on the mobile screen that will

rotate the motor in clockwise and anticlockwise direction and manage the LPM output of the concentrator.