

Centre of Excellence – IOT

Objective:

To impart students the necessary skills to fulfil the industrial needs by providing practical exposure to modern Internet of Things (IoT) technologies and embedded system platforms.

List of Courses

Department: COE-IOT

Reporting Head: Dr. K. Satish Reddy

Center I/C: Mrs. V. Tejaswi

Faculty: Mrs. Ch. Shanthi Priya

Lab Assistant: Ms. P. Vishnu Priya

Established Year: 2017

| S.NO | Course | Duration |
|------|--------------------------|----------|
| 1 | ARDUINO PROGRAMMING | 16 Weeks |
| 2 | NODE MCU | 16 Weeks |
| 3 | RASPBERRY PI PROGRAMMING | 12 Weeks |

Outcomes:

- Apply theoretical knowledge through hands-on IoT development, effectively bridging the gap between classroom learning and real-world engineering practice.
- Develop strong problem-solving and automation skills using embedded platforms such as Arduino and ESP32 to address practical engineering challenges.
- Demonstrate industry-relevant technical skills in sensor interfacing, device programming, and connected system development required for modern IoT applications.
- Build confidence and career readiness by designing and implementing IoT solutions aligned with current industry technologies and practices
- Develop prototypes out of the ideas
- win the National/International Wide competitions
- Publish Research Papers & patents
- Organize certification programs for students
- Conduct Workshops and make the students understand various advanced technologies in IOT.

Benefits to the students

- Students gain the knowledge on various Advanced Technologies in IOT
- Students get the Certificates of Workshop and seminars
- Students get the internship at various core companies
- Students get the training and internship from IITH
- Students get the opportunity to work in teams in multidisciplinary mode
- Students get the opportunity to win/participate in State/ National wide Competitions
- Students publish papers
- Students Publish Patents
- Students get the procedure on how to convert the idea into business in collaboration with EDC
- Students gain the ability to find the problem Statements and also can create the solutions

Number of students have been part of the program since inception

- **Total: 902:**

This centre has students from multiple branches working on multiple problem statements in the Embedded/ IOT Background.

HYDERABAD INSTITUTE OF TECHNOLOGY AND MANAGEMENT
Gowdavelly (Village), Medchal (Mandal), Ranga Reddy (Dist.) – 501401. TS. India.

Center of Excellence – IoT
SYLLABUS

II YEAR

Arduino Programming and Applications

Prerequisite

Basic knowledge of computers and programming concepts.

Course Objectives

- To introduce the fundamentals of embedded systems and Arduino platform.
- To understand the Arduino programming environment and hardware architecture.
- To develop skills in interfacing sensors and actuators using Arduino.
- To enable students to design basic automation and IoT based applications.

Course Outcomes

CO1 – Understand Arduino architecture and programming environment.

CO2 – Develop Arduino programs using digital and analog I/O.

CO3 – Interface sensors and actuators with Arduino.

CO4 – Design basic automation applications using Arduino.

Module I: Introduction to Embedded Systems and Arduino

Embedded systems overview, Applications, Introduction to Arduino platform

Arduino boards, Arduino Uno architecture, Arduino IDE installation, Structure of Arduino program – Setup () and Loop ().

Programs:

1. Install Arduino IDE and verify board connectivity.
2. LED blinking program.
3. LED pattern generation program.

Module II: Arduino Programming Basics

Programming syntax, Variables and data types, Operators, Conditional statements, Loops, Functions, Digital input/output.

Programs:

1. Control LED using push button.
2. Toggle LED using switch.

3. Serial monitor output program.

Module III: Analog Interface and Communication

Analog input using sensors, PWM output, Serial communication, Sensor data reading, Data monitoring.

Programs:

1. Read analog values using potentiometer.
2. Control LED brightness using PWM.
3. Display sensor data on serial monitor.

Module IV: Sensor and Actuator Interfacing

Temperature sensor, LDR, Ultrasonic sensor, PIR motion sensor, Relay module, Buzzer interfacing.

Programs:

1. Temperature measurement using sensor.
2. Automatic street light using LDR.
3. Distance measurement using ultrasonic sensor.

Module V: Arduino Based Applications

Home automation concepts, Smart monitoring systems, Introduction to IoT using Arduino, Real-time applications.

Programs:

1. Automatic street light system.
2. Temperature monitoring system.
3. Motion detection alarm system.

Course Objectives

- To introduce the architecture and features of ESP32 microcontroller.
- To develop IoT applications using ESP32 with Wi-Fi and Bluetooth connectivity.
- To interface sensors and actuators with ESP32 for real-time monitoring.
- To enable students to design cloud-connected IoT systems.

ESP 32

Module I: Introduction to IoT and ESP32

Overview of Internet of Things – IoT architecture – Embedded systems for IoT – Introduction to ESP32 –

ESP32 architecture and features – Development boards – ESP32 programming environment.

Programs:

1. Install ESP32 board in Arduino IDE.
2. Verify ESP32 board connectivity.
3. Basic LED blinking program using ESP32.

Module II: ESP32 Programming Fundamentals

ESP32 programming using Arduino IDE – Digital input and output – Interrupts – Timers – Serial communication.

Programs:

1. LED control using push button with ESP32.
2. Serial communication using ESP32.
3. LED pattern generation using ESP32.

Module III: Sensor Interfacing with ESP32

Interfacing temperature sensor – LDR sensor – Ultrasonic sensor – PIR motion sensor – Analog and digital sensor reading.

Programs:

1. Temperature monitoring using ESP32.
2. Distance measurement using ultrasonic sensor.
3. Motion detection system using PIR sensor.

Module IV: Wireless Communication using ESP32

Wi-Fi communication – Bluetooth basics – ESP32 Wi-Fi configuration – HTTP communication – Introduction to MQTT protocol.

Programs:

1. Connect ESP32 to Wi-Fi network.
2. Send sensor data to web server.
3. Receive control signals from mobile application.

Module V: Cloud Based IoT Applications

IoT cloud platforms – ThingSpeak / Blynk – Data logging and visualization – Remote monitoring systems – IoT security basics.

Programs:

1. Upload sensor data to ThingSpeak cloud.
2. Remote device control using Blynk mobile application.
3. IoT based smart monitoring system.

Text Books

1. Marco Schwartz – Internet of Things with ESP32.

2. Colin Dow – IoT Development with ESP32.

Course Outcomes

CO1 – Understand the architecture and programming environment of ESP32.

CO2 – Develop programs using ESP32 for digital and sensor interfacing.

CO3 – Implement wireless communication using Wi-Fi and Bluetooth in ESP32.

CO4 – Design IoT based applications using ESP32 and cloud platforms.

Major achievements under the centre / initiative

- **IIITH Internship Program:**

IIITH RAP Program is a prestigious program started with a MOU with IIITH, this program completely has Four phases starting with Training and ended with Internship and MS Opportunity.

The main Outcome of this Program is, the students who completes the internship at IIITH IN 4 Phases will get an opportunity to convert themselves from interns into MS Students.

This program started in 2021

BATCH 1 (Academic Year 2021-22)

Total: 83

BATCH 2 (Academic Year 2022-23)

Total: 80

BATCH 3 (Academic Year 2023-24)

Total: 100

BATCH 4 (Academic Year 2024-25)

Total: 60

BATCH 5 (Academic Year 2025-26)

Total: 169



IOT



NLP



ROBOTICS

List Of Participating Institutions:

We Are Top

- KIET: KAKINADA INSTITUTE OF ENGINEERING AND TECHNOLOGY
- VASAVI COLLEGE OF ENGINEERING
- BVRIT
- ST. GEITS

Major Achievement

- Signed a MOU with Galactix Solution to develop a project on BCI Integration.
- This is providing internship opportunity to 60 students

| S.No. | Name | |
|-------|--------------------------|----------|
| 1 | S NOUSHITH | II Years |
| 2 | MALLEMPALLI SAI PRANEETH | |
| 3 | Thirunahari Aishwarya | |
| 4 | MAMINDLA PRANITH YADAV | |
| 5 | Sahithi Pantangi | |
| 6 | vashista gandla | |
| 7 | Ananya Dixit | |

| | | |
|-------|--------------------------------------|-----------|
| 8 | abhijeet | |
| 9 | Srithaja Lavu | |
| 10 | patlori nikhil chandra | |
| 11 | HARSH RAJ MISHRA | |
| 12 | YELIGETI SAMHITHA | |
| 13 | R.vyshnavi | |
| S.No. | Name | III Years |
| 1 | Helgire Rohan | |
| 2 | Karkala Avanish Acharya | |
| 3 | Teegaraju Deekshith Kumar | |
| 4 | Pathulavath Hari Kishan Singh Prasad | |
| 5 | YADAV PARINITA | |
| 6 | sreeman | |
| 7 | MARUTHI VENKATA SRI RAM BATTU | |
| 8 | Mohammed Huzefa | |
| 9 | SHAIK MUBEENA | |
| 10 | S Venkat Sai | |
| 11 | VARAGANTI MAHITEJA | |
| 12 | veeravalli mohan siddardha | |
| 13 | Boda Sasikala Sri | |
| 14 | kasturi sameer | |
| 15 | Challa Srinath | |
| 16 | ALLAVARAPU VEERA VAISHNAVI | |
| 17 | Kotekal Vijay | |
| 18 | VALLAMSETTY LAKSHMI RANGANATH | |
| 19 | N Pallavi | |
| 20 | Vasam Manogna | |
| 21 | D Reetvi Simha | |
| 22 | kristipati chaitanya reddy | |
| 23 | shaik imtiyaz | |
| 24 | Lingaraju Sai Kumar | |
| 25 | Manasa Vegesana | |
| 26 | CHOWDARIGARI AKSHAYA | |
| 27 | M.PRAVEEN CHARY | |
| 28 | VUTTI ROOPA SAI REDDY | |
| 29 | Siranji Shirisha | |
| 30 | Samanthula Mahesh | |
| 31 | KARNE SAISHASHANK | |
| 32 | mohammed fazal ali | |
| 33 | KODURU SHIVANI | |
| 34 | Bonu Sneha | |
| 35 | Daka sadhana | |
| 36 | KONDAMUDI VENKATA RAVI SHANKAR | |
| 37 | Rasamalla Anjali | |

| | | |
|-------|--|----------|
| 38 | Brahmani Darla | |
| 39 | MANNE ANJALI | |
| S.No. | Name | |
| 1 | Sunki Akhila | IV Years |
| 2 | kandregula Anusha | |
| 3 | PEDASANAGANTI RAVI KRISHNA NAGA SAI | |
| 4 | Harini Rayana | |
| 5 | Aryan Reddy | |
| 6 | R SAI SRUJAN | |
| 7 | SHANAM JOSHUVA | |
| 8 | Pradeep Varikuppala | |
| 9 | Akshitha Usirikapally | |
| 10 | Badhe Meghana | |
| 11 | CH. NISHITHA | |
| 12 | Badhe Meghana | |
| 13 | Medikonda Lohitha | |
| 14 | SAI SAMPREETH KACHAM | |
| 15 | Thanmaisree Karneti | |
| 16 | BONAGIRI RAVALI | |
| 17 | G.Shayanidhi Reddy | |

Published 2 Patents:

1. CONVERSION OF NOISE TO ELECTRICITY THROUGH RESONANCE
2. MONITORING AND PREDICTION SYSTEM USING ARTIFICIAL NEURAL NETWORKS(ANN)

- **Deployed 3 real time projects in Campus**

1. Air Quality Monitoring at HITAM Campus

This node monitors the air quality in terms of CO2, NO, particles

2. BCI Integrated Wheelchair for the Disabled.

Wheelchair is controlled using Thoughts using Brain Control.

3. Water Monitoring system

This project monitors the water level in HITAM tank and it will measure the temperature inside the tank and accordingly it will give the readings to cloud, we can monitor the values from remote areas.

4. Live Load monitoring system

This project will measure the load and accordingly it will act depending upon the conditions. This is deployed in lab.

5. Virtual Labs for monitoring Remote labs

This is used to monitor and perform lab in virtual mode

Won Various State wide/ National Wide Competitions



1st Prize at Hackathon



1st Prize in Circuitrics



1st Prize in Hackathon

- 4 Student's team got 1st Prize in Women Hackathon conducted by NiMSME



- 4 Student's Team have won 3rd Prize in Women's Hackathon conducted by NiMSME



- Ravi and Team won 1st prize in INEX International and got opportunity to represent the country in International Level



- Won State Level Hackathon ay Gulbagra



- 18 students from COE-IOT Centre have Participated in National Wide Hackathon at Rajasthan





- **7 Teams won AMD Global Hacksteir:** It is a global level Hackathon conducted by AMD in collaboration with NGO, 7 Teams from HITAM won the competition and was awarded with AMD Processor, the students are currently working on this processors to develop projects.

Wining Teams in AMD are :

| Name of the Student | Team Leader Roll Number | Team Members With Hall Ticket numbers | Title | Guide |
|-------------------------------|-------------------------|---|--|--------------------------|
| Anumula Nymisha Nandini Reddy | 20E51A6605 | Rupesh-20E51A6640;Thanmayee-20E51A0453 | 1.Virtuza: Your Personalized Companion | Mrs. V. Tejaswi |
| Mandapalli chatya manikanta | 22E55A0404 | heramba(22E55A0436),Richitha(21E51A0440), P. Yesho Pavan(21E51A0442) | 2. Deep dive (underwater robot) using kria KR260 robotics starter kit | Dr. Siva Prasad |
| R. Akshita Reddy | 21E51A0451 | Pradeep(21E51A0417), Sanjana(21E51A0450) | 6. AI Based Traffic Control System | Mrs. CH. Shanthi |
| P Charan Kumar | 21E55A0326 | D Pavani-20E51A6618,Neha-20E51A6639 | 3. OCTACLEANER: An Underwater Drone | Dr. Siva Prasad |
| Nallavelli Harshavardhan | 21E51A0435 | INDRASENA REDDY_2151A0447), SHAILESH(21E51A0441), AKBAR ZAINOOL(21E51A6934) | 4. GARDENING MONITORING ROBOTIC AI SYSTEM USING THE AMD PROCESSOR | Mr. P. N. V Naveen Kumar |
| Pravalika | 21E51A6913 | PULI VINAY(21E51A0448), Yadagiri(22E55A6902), SAI KRISHNA RAJU(21E51A0452) | 5. Road Guard: AI-Powered Road Damage Detection and Reporting System | Mr. P. N. V Naveen Kumar |
| Vishal Chowdary | 21E51A6227 | BIGIMALLA NIRMALA(21E51A6205), RESHMITHA(21E51A6911) | 5. AYUV -Transforming Healthcare, One Byte at a Time. | Mrs. V. Tejaswi |

- Conducted 2 Events. From Centre:
 - National Technology Day



Poster: National Technology Day



*Presentation at National Technology Day

2. Intra Innovation Competition, Resource Person: Sridhar Seshadhri



Mr. Sridhar have given valuable suggestions to students and also gave the opportunity to submit their ideas for business and also had good talk with Director regarding collaboration.

Internships:

1. RAVI (21E55A0411) IV Year ECE Student won internship at NIPER and got promoted to Core department working on PCB Programming and more.
2. KOUSHIK (20E51A0424) IV Year ECE student got Internship in T-Hub.

Help in EMPLOYABILITY:

- 35 Students are undergoing AMD AI Training which provides them required AI Skills and also the certificates

Publications:

1. A Unique Approach to Noise to Electricity Generation
2. Automatic Soldier Health Tracking and Monitoring System
3. Real Time Navigation of Robot using Path Memorizing Algorithm
4. River Cleaning Robot

5. Audio Adaptive Decoder for Dumb People
6. A secure scheme for group communication of wireless IOT Devices
7. Analysis of Different IOT Protocols for Heterogeneous Devices and Cloud Platform
8. IOT based street light monitoring system using Raspberry Pi Pico
9. A mechatronics Bot for an Aquarium Cleaning System
10. LoRa Surveillance Robot using Arduino
11. Air Map deep Learning Prediction in Air Quality for smarter Decisions

Projects:

- **AntiDrone System**



This project helps the army forces to automatically detect and shoot the enemy drones, this prototype uses laser to shoot and camera module to detect whether the object is drone or not.

- **Air Quality Monitoring at HITAM Campus**



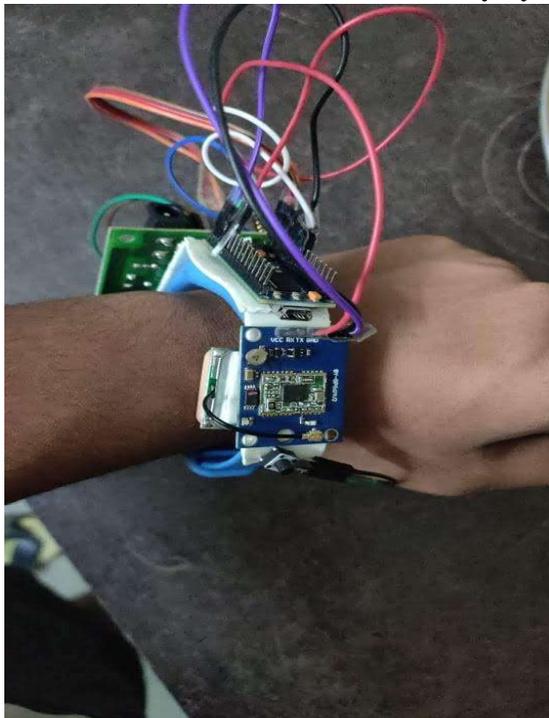
Monitoring the air quality on campus

- **Automatic Aquarium System**



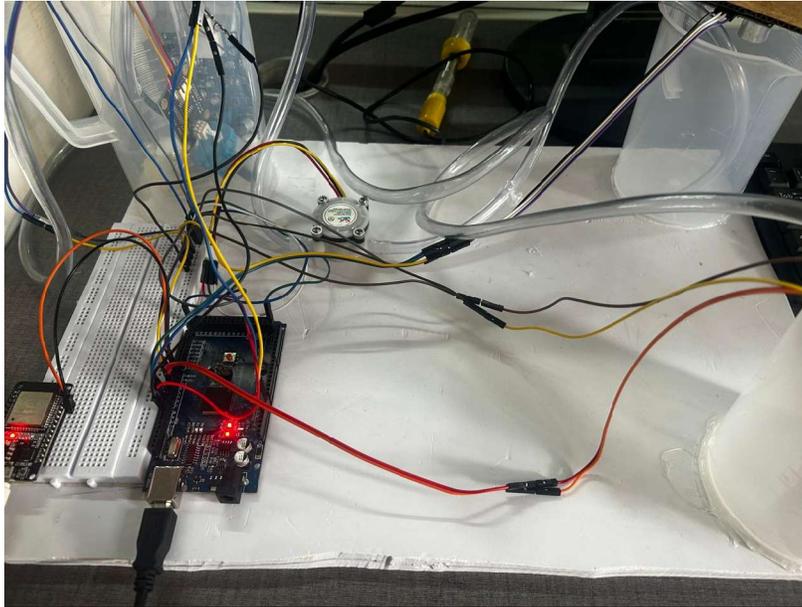
Many homes have aquariums but cleaning which may be a big task, hence this project is designed such that this system will automatically clean the aquarium using 3D Printing mechanism

- **Smart Wrist Band for women Security System**



This project is developed to help the women, whenever a women is in risk she can press the button in watch, this watch will send the mess and calls to the numbers of family members provided the message that the women is in risk along with location.

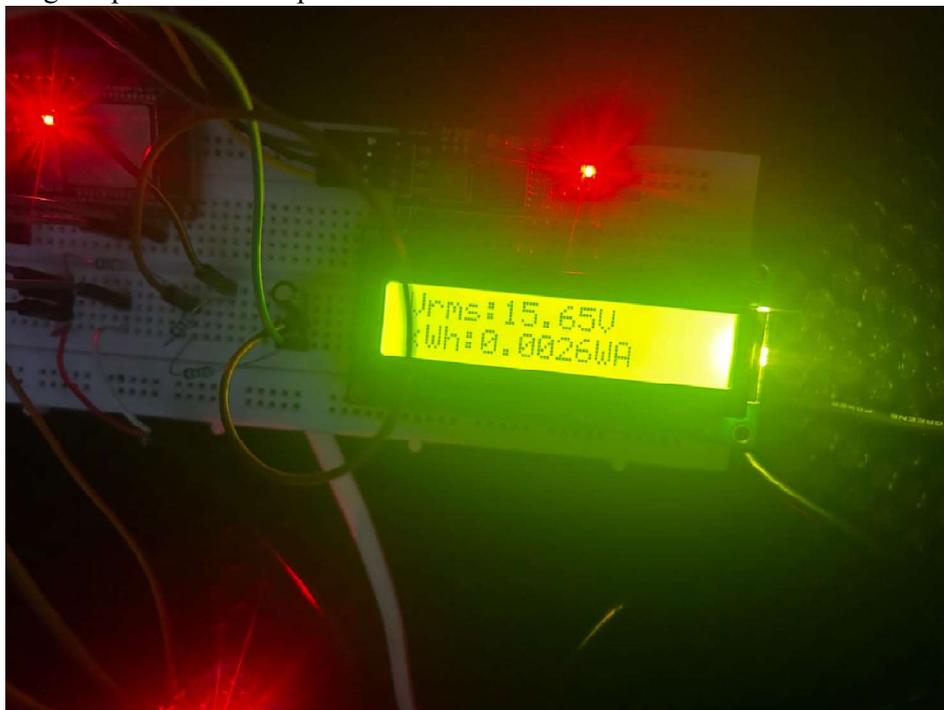
- **Water Monitoring System:**



This project monitors the quality of water based on Ph Meter, Conductivity, it also checks the level of water in tank and accordingly it will release the water supply from main tank to sub tanks only if the water quality is good.

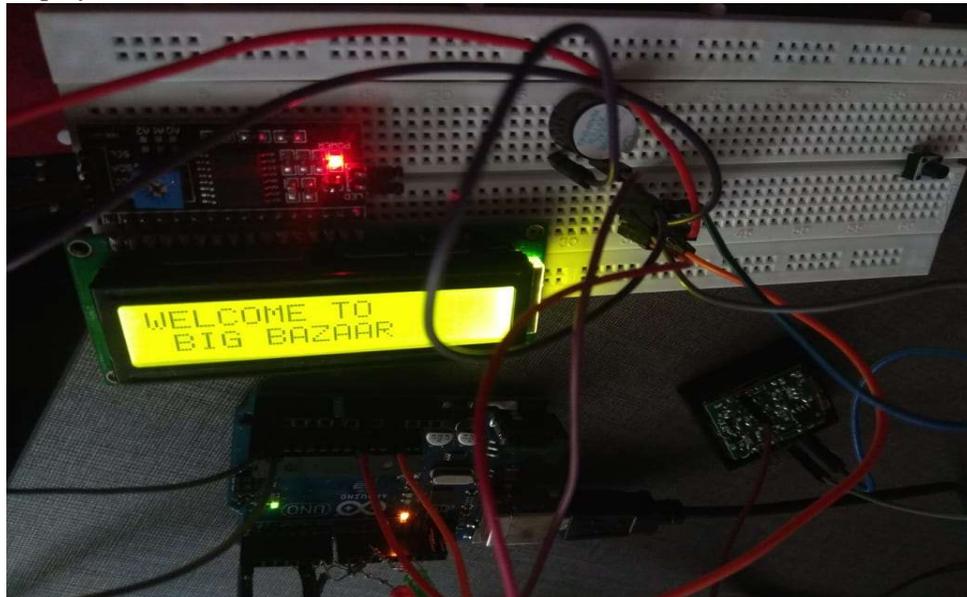
- **Home Automation using IOT**

The current and voltage values are checked and accordingly whenever there is excess usage of power then the power is cut



- **Smart Shopping Cart:**

The billing of the items taken in the shopping mall will be scanned and added directly in the cart and the customer can do the payment using the QR generated in the cart display



- **Automatic Bike Indicator:**

This project helps the society in prevention of accidents caused because of not giving signals when they turn, indicators will be coming to ON automatically using this project depending on the google maps.

- **Coin Based Mobile Charging System:**

This project is developed to provide charging to a mobile based on coin, when a coin is inserted then the equal proportion of charging is provided, this is designed to help the people during natural calamities.

- **Wireless Electric Vehicle charging system:**

This project helps in charging the electric vehicles using copper coils

Participation in Technical Events & Achievements:

| S. No | Students/Teams | Event Participated | Title | Won/ Participated | Month Year |
|--------------|-------------------------|--|----------------------------|--------------------------|-------------------|
| 1 | Ravi and Team | National Level Competitions, Rajasthan | Smart Wrist Watch | Participated | Feb 2023 |
| 2 | Koushik and Team | National Level Competitions Rajasthan | Smart Mirror | Participated | Feb 2023 |
| 3 | Sasi Vardhan and Team | National Level Competitions Rajasthan | Smart Aquarium | Participated | Feb 2023 |
| 4 | Vidya and Team | National Level Competitions, Rajasthan | Arrow | Participated | Feb 2023 |
| 5 | Pranathi and Team | National Level Competitions Rajasthan | Agri connect | Participated | Feb 2023 |
| 6 | Tushar and Team | National Level Competitions Rajasthan | Smart Kart | Participated | Feb 2023 |
| 7 | Sai and Team | Project Expo | Smart Kart | Won III Prize | Feb 2023 |
| 8 | Sanjana and Team | Project Expo | Smart Wrist Band | Participated | Feb 2023 |
| 9 | Harshavardhini and Team | Project Expo | Coin based Mobile Charging | Won II Prize | Feb 2023 |
| 10 | Ramojirao and Team | Project Expo | Antidrone System | Won I prize | Feb 2023 |
| 11 | Manogna and Team | Project Expo | Automatic Railway Gate | Participated | Feb 2023 |
| 12 | Sai Kiran and Team | Project Expo | Smart Aquarium | Participated | Feb 2023 |
| 13 | Charan and Team | Hackathon at VJIT | Smart Aquarium | Won I prize | Feb 2023 |
| 14 | Koushik and Team | ChatGPthon | Software on Arduino | Won II Prize | Feb 2023 |
| 15 | Nymisha and Team | AMD AI Global Hackathon | Embedded Projects on AMD | Won AMD Processor/Access | May 2024 |

| | | | | | |
|----|------------------------|--------------------------------|------------------------------|--------------------------|------------|
| 16 | Manikanta and Team | AMD AI Global Hackathon | Embedded Projects on AMD | Won AMD Processor/Access | May 2024 |
| 17 | Akshita Reddy and Team | AMD AI Global Hackathon | Embedded Projects on AMD | Won AMD Processor/Access | May 2024 |
| 18 | Charan Kumar | AMD AI Global Hackathon | Embedded Projects on AMD | Won AMD Processor/Access | May 2024 |
| 19 | Harshavardhan | AMD AI Global Hackathon | Embedded Projects on AMD | Won AMD Processor/Access | May 2024 |
| 20 | Pravallika | AMD AI Global Hackathon | Embedded Projects on AMD | Won AMD Processor/Access | May 2024 |
| 21 | Vishal Chowdary | AMD AI Global Hackathon | Embedded Projects on AMD | Won AMD Processor/Access | May 2024 |
| 22 | Ravi and Team | INEX International Competition | Audi Reactive LEDs | Won I Price | April 2024 |
| 23 | Karthik and Team | State wide Hackathon | AI Based Interview System | Won I Prize | April 2024 |
| 24 | Richitha and Team | Women Hackathon by NiMSME | Smart Dustbin | Won I Prize | July 2024 |
| 25 | Nithya and Team | Women Hackathon by NiMSME | Smart Kart | Won II Prize | July 2024 |
| 26 | Ravi and Team | Project Expo | No. Plate detection using RF | Matrix LED | July 2024 |
| 27 | Ravi and Team | Hackathon | Smart Centre | Smart Cradle | July 2024 |

| S. No | Workshop Organised | No. of Participants | Month/Year |
|-------|---------------------------------|---------------------|------------|
| 1 | Workshop on Node MCU | 80 | Feb 2022 |
| 2 | Workshop on Node MCU | 60 | Sep 2022 |
| 3 | Workshop on ARM Processor | 50 | Oct 2022 |
| 4 | Workshop on IOT-Cloud Computing | 50 | Dec 2023 |
| 5 | Workshop on AMD AI | 35 | July 2024 |

| | | | |
|----|--------------------------------|----|----------|
| 6 | Workshop on Raspberry Pi | 60 | Nov 2024 |
| 7 | Workshop on Soldering | 50 | Dec 2024 |
| 8 | Workshop on Arduino and ESP 32 | 50 | Jan 2026 |
| 9 | Workshop on Soldering | 60 | Jan 2026 |
| 10 | Workshop on 3D Printing | 40 | Jan 2026 |