

E-MINDS



Department Vision

- To be a hub for imparting knowledge, skills and behaviour for exemplary contributions in the field of Electrical & Electronics Engineering

DEPARTMENT OF EEE

Established in 2008, the Department of EEE has grown steadily, offering programs that cater to the evolving needs of the industry. The department began with a B. Tech program with an initial intake of 60 students in 2008, followed by the launch of an M. Tech program in Power Systems Control and Automation with 24 students in 2014. The department consists of qualified and dedicated faculty who serve as the key pillars supporting the department's growth and success in all aspects. Our curriculum and activities encompass key areas such as power systems, control systems, electrical machines, electromagnetic theory, and computer languages. They also integrate the latest advancements in rapidly growing fields like electric vehicles and renewable energy systems through honours and minor degree, which are essential for modern societal development and industrial progress

Department Mission

- M1: To impart technical education through the state-of-the-art infrastructural facilities, laboratories and instruction
- M2: To inculcate industry-oriented learning through industrial visits, internships, projects at industries, MoU's to make students technically skilled oriented
- M3: Creating conducive environment for higher education, employment and entrepreneurship through quality education, professional skills and research
- M4: To promote societal environment among students by inculcating moral and ethical values

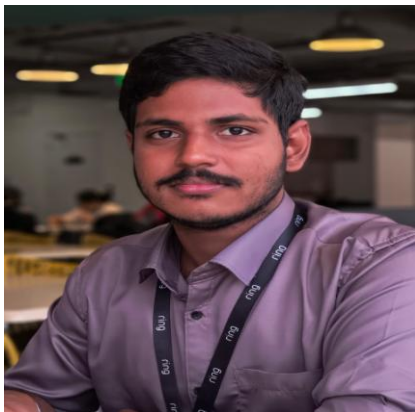
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HOD Message:

It is a privilege and honour to lead the EEE department at this esteemed institution. Our field is at the heart of modern technological advancements, with a particular emphasis on the rapidly growing electric vehicle (EV) sector. This dynamic field encompasses core technologies like power systems, power electronics, electrical machines, control systems, and electromagnetic theory etc., all of which are critical to the development of efficient and sustainable transportation solutions.



To stay at the forefront of innovation, our departmental association, ADVAYA, organizes workshops, technical training, and expert guest lectures. These initiatives focus on emerging trends, including EV technologies, drone, IOT Technologies and aim to equip our students and faculty with the knowledge and skills needed to excel in this exciting domains.

Our department is committed to playing a pivotal role in shaping the future of electric mobility. By fostering research, development, and education in EV-related areas, we strive to create a sustainable and electrified transportation ecosystem.

Department Profile

Established in 2008, the Department of Electrical and Electronics Engineering (EEE) offers a range of programs, starting with a B.Tech program with an initial intake of 60 students in the same year. The department expanded its offerings to include a Diploma program in 2012 with a 60-student intake and an M.Tech (Power Systems Control and Automation) program in 2014 with a 24-student intake.

Our faculty is highly qualified, with 2 Ph.Ds and 12 M.Tech's (4 of them are perusing PhD's in reputed universities). They are actively engaged in research and have published or presented papers in esteemed national and international journals and conferences.

The department recognizes the crucial role electrical engineers play in the growth of medium and large-scale industries. With India experiencing rapid industrial growth, the demand for electrical engineers has skyrocketed in various sectors, including the power sector, private companies, PSUs, and government organizations. This translates to a wealth of exciting career opportunities for our graduates.

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M2: To inculcate industry oriented learning through industrial visits, internships, projects at industries, MOUs, to make students technically skilled oriented.

M3: Creating conducive environment for higher education , employment and entrepreneurship through quality education ,professional skills and research.

M4: To promote societal commitment among students by inculcating moral and ethical values.

Program Educational Objectives

PEO1: Demonstrate the real-world engineering problem solving skills by applying the fundamental and conceptual engineering knowledge as a practicing Electrical and Electronics engineer or as a member/lead in a multidisciplinary project setting that utilize 21st century skills

PEO2: Provide research-based engineering solutions addressing the triple bottom line of environment and sustainability maintaining the professional standards, ethics and integrity

PEO3: Foster self-directed learning through their professional experience, technology advancements in their relevant field of interest and desiring graduates pursue advanced higher education leading to research

Dr. R. S. R. Krishnam Naidu,
Assoc. Professor & HOD – EEE

The following are the Activities and Achievements from the department of EEE during Dec to May, 2022-23:

S.No	Name of the Activity & Achievements	Organized by	Date of the Event	Page Numbers
1	3-Day Hybrid Workshop on EV Technology – Hands on Experience	NSRIT	21-12-2022 to 23-12-2022	5-9
2	3 day workshop on “Application of Arduino & ESP 32 Micro Controller in Multidisciplinary Engineering	NSRIT	15-03-2023 to 17-03-2023	9-16

1. 3-Day Hybrid Workshop on EV Technology – Hands on Experience

The Department of Electrical & Electronics Engineering at Nadimpalli Satyanarayana Raju Institute of Technology (Autonomous) successfully conducted a "3-Day Hybrid Workshop on EV Technology – Hands-on Experience" from 21st to 23rd December 2022 at Block I, APSSDC Lab. The workshop featured expert resource persons, including Dr. Raja, Associate Professor at IIIT D&M, Kancheepuram, Chennai; Dr. Selvajothi, Assistant Professor at IIIT D&M, Kancheepuram, Chennai; Dr. J. Ravi Kumar from Zoe Talent Solutions, Dubai; and Mr. Venkat Reddy from Vihaan Electrix.

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Zoe Talent Solutions, Dubai

DR. SELVA JYOTHI
Expert from IIT D & M, Chennai

DR. B. RAJA
Expert from IIT D & M, Chennai

DEPT. OF ELECTRICAL & ELECTRONICS ENGINEERING

3-DAY HYBRID WORKSHOP EV - TECHNOLOGY - HANDS ON EXPERIENCE
December 21 - 23, 2022
in association with

VIHAAN ELECTRIX

CONTACT US
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ABOUT EEE

The Department of Electrical and Electronics Engineering was formed in the year 2008. The department has started various programmes with an initial intake of 87 vech 40 in the year 2008, Diploma 06 in the year 2012, M. Tech/Power Systems Control and Automation 24 in the year 2016. The department has qualified teaching staff with 2 Ph.Ds and 9 M.Tech's. The faculty members are involved in research activities and published/presented papers in national and international journals and conferences. The department of Electrical and Electronics Engineering encompasses many technologies such as power systems, electrical machines, control systems, electromagnetic theory, and computer methods employed in all these areas, which have been among the fastest growing and most challenging technologies that enable the development of the modern society. The department conducts various programs under the experiential association called as AEWASA such as Workshops, Technical Training, Guest Lectures and Seminars by Experts from Industry and Academic background for constant knowledge up-gradation of staff and students. We continue to play a leading role in our discipline which leads us towards creating innovative and effective professional graduate community which would vivacious and provide continuous learning. The growth and progress of Medium and large scale Industries depend upon the expertise provided by the Specialist. With rapid industrial growth in the Country, the requirement of electrical engineers has tremendously increased in Power Sector and Industries in private, PSU and Government companies. It resulted in opening of enormous opportunities for graduate Electrical Engineers.

ABOUT NSRIT

Nadimpati Sairamanyama Raja Institute of Technology (formerly known as VITS College of Engineering) was established in the year 2009 by Sri. Veera Anilata Sairamanyama Educational Society. NSRIT offers quality education and technical competencies on the strong foundation of values, ideals and rich culture to the students across the country and beyond. NSRIT attempts to integrate classroom learning with industry exposure to ensure the application of knowledge during the course of study itself. The objective is to prepare young students to act as leaders for the promotion of the economic and industrial growth of the country and to play a creative role in society. We focus on imparting skills on cutting-edge technologies to our students. Quality research in the areas of science and technology is given considerable importance here. Our major strength comes by forging strong industry-academic linkage. The Institute celebrates freedom of thought, cultivates vision and encourages growth and also inculcates human values and concern for the environment and society.

NSRIT CREDENTIALS

- Institution is accredited by National Assessment and Accreditation Council (NAAC) with 'A' Grade (3.30 / 4.0).
- UGC granted the status of autonomy in 2020 and the Institute is under the transition state.
- Tagged the QS 1 –Gauge E-Learning Excellence for Academic Digitization (E – Lead) Certificate from QS with a score of 344 out of 350.
- Recognized under 2 (f) and 12 (b) of UGC Act 1956.
- Institution is rated by popular education magazines like Career 360 and Career Connect and Strong Industry – Institute Linkage.
- Recognized as a nodal centre for Andhra Pradesh State Council for Higher Education (APSCHE).
- Recognized under the scheme PMKVY during 2017 – 2018 & 2018 – 2019.

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ABOUT WORKSHOP

A three-day Workshop on the topic "Electric Vehicle Technologies – Hands on Experience" is scheduled to take place on 20-22 December 2022 at Department of EEE, NSRIT, Visakhapatnam through hybrid mode. This workshop is providing a platform for the people from academic and research community to get awareness on the recent emerging trends in EEE. The goal of the workshop is to provide a generic for participants to update about current thrust areas in Electrical Engineering.



DELIVERABLES

Evolution of Electric Vehicles (EVs), EV Market in India, Battery Technology, BMS, Disassembling and Assembling of EV, EV Test drive



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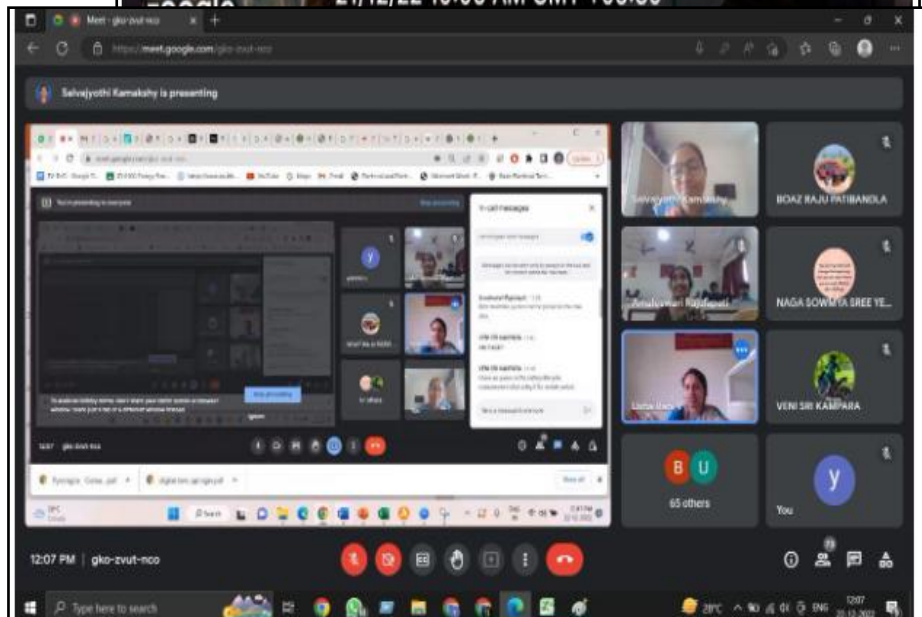
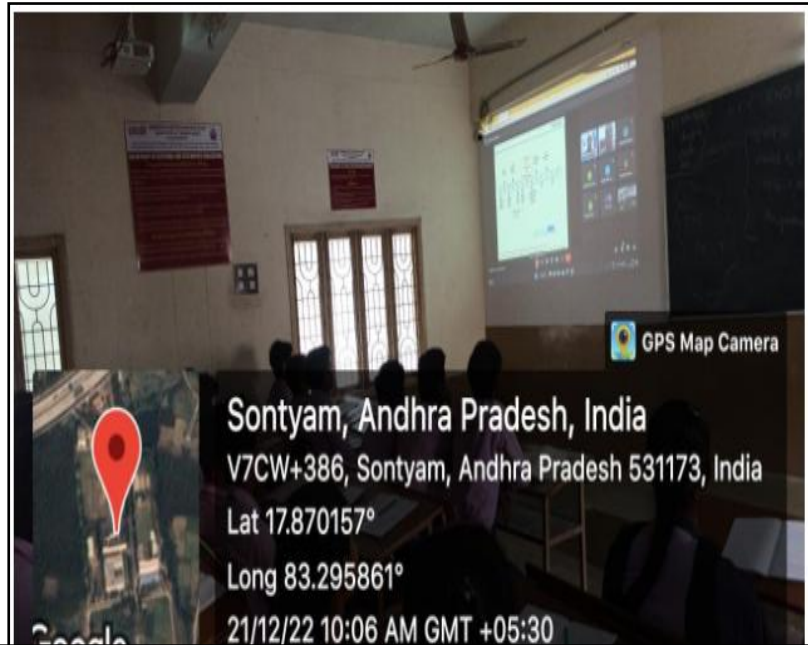
The event has been conducted for both internal and external participants. 119 internal participants are from EEE II, III & IV year of our college, 13 external participants are from various institutions across India such as Vellore Institute of Technology-Tamil Nadu, Dr. K.N.Modi University- Rajasthan, Institute of Aeronautical Engineering-hyderabad constituting a total of 132 students and 11 faculty members. The Head of the Department, Dr. R S R Krishnam Naidu has attended the event along with all the Department staff. Mrs. V. Usha Rani, Assistant Professor and Dr. R. Amalawari, Assistant Professor has hosted the event. The Head of the Department has addressed the gathering as well as thanked the Resource persons for accepting the invitation for the conduction of the event.

Basic Engineering knowledge concepts such as history of Electric Vehicles, different motors used in EVs and necessary controllers are discussed. Mathematical modeling and designing of Battery management system using MATLAB/SIMULINK is explained. The practical testing of BSDE results are exposed. The ethics to be followed during research and financial analysis of EV design is taught. This session addressed PO1, PO2, PO3, PO5, PO8, PO9, PO10, PO11, PS01 and PS02.

Day 1:21.12.22

History of Electric Vehicles (EVs)

The session has been started by the resource person. The session consisted of History of Electric Vehicles (EVs). Initially First IC Engine, First gasoline engine, First generation EVs is discussed along with evolution of EV. Next World oil consumption in transportation and other sectors, World oil discovery, remaining reserves, and cumulative consumption was presented. Later an early type of electric motor which created a small model car powered by that motor, 12 kW Electrical machine for a battery-driven electric locomotive, electrical hub motor, 1.5 kW electrical motors in both of its front wheels - Batteries weighing 1.800 kg are explained. Finally, The *Volkswagen Sedric*-self-driving EV, *Toyota Concept-I* future electric car are highlighted.



Day 2:22.12.22

Battery Management System (BMS) of Electric Vehicles (EVs)

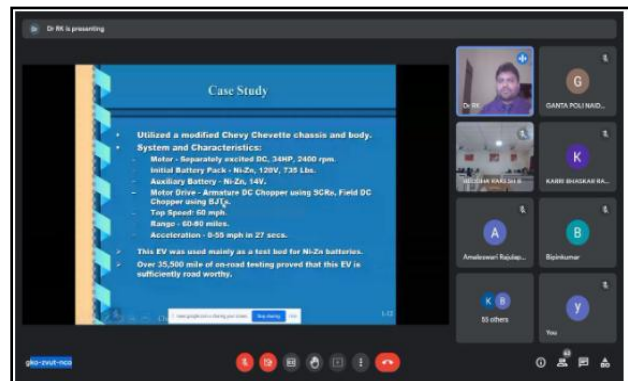
The session has been started by the resource person. The session consisted of Battery Management System (BMS) of



Department

Electric Vehicles (EVs). The Primary functions of the Battery Management System are 1. Battery and user Safety 2. Energy Recovery 3. Battery Balancing 4. Thermal Management 5. communication. Initially Present lithium ion Battery Technology, EV Subsystems, Requirement for BMS is discussed along with Battery Performance -Cell Voltage Under Load, Open-Circuit Voltage (OCV) Model. Next Technical Terms with Batteries, Electrical Equivalent Circuit Model, Pulse Discharge Test, OLV vs DOD –From Data Sheet, Calculation of Circuit Parameters, State Space Model was presented. Later Battery Pack Topology, Battery State estimation, Functionality of BMS In EV, Sensing Voltage, Sensing Current, Sensing Temperature, Temperature Effect, Protection, Charger Control, Communication via CAN bus, Log book function, Cell Balancing, Passive Balancing : Basic Dissipative Resistor, Active Balancing : Single Switched Capacitor, Pwm Controlled Shunting, Boost Shunting, Multi Winding Transformer are explained. Finally BMS-Based cloud-integrated data acquisition Framework for EV technology is highlighted.

The session has been started by the resource person. The session consisted of Motor Controllers for Electric Vehicles (EVs). Initially, EV existence and disappearance is discussed along with resurge of EV and comparison of EV and ICE. Later EV impact on market, EV components, EV motors and controllers, Types of Power Electronic Converters in EVs are explained. Finally acceleration, deceleration, regenerative braking, vector control of induction motor and importance of harmonic analysis is highlighted.



Day 3: 23.12.22

Practical Exposure to 2wheeler Electric Vehicle (EV)

The session has been started by the resource person. The session consisted of practical exposure to 2wheeler Electric Vehicle (EV). Initially, disassembling of EV outer casing parts, detaching of electronic components is discussed along with Disassembling & analysis of mechanical parts of EV in the morning session followed by lunch to all participants. Later in the afternoon, study on harness wiring connections, study on battery and charger are explained. Disassembling & assembling of Charger unit, total assembling of EV was done. Finally test drive on assembled EV is conducted followed by general discussion and queries.



The session has been concluded by Vote of Thanks by Dr. R. Amalawari,

Assistant Professor by thanking the Resource person and the Head of Department for conducting such a resourceful event. This hybrid event is an initiative to have more such fruitful sessions in the future.

2. 3 day workshop on “Application of Arduino & ESP 32 Micro Controller in Multidisciplinary Engineering”

The Department of Electrical & Electronics Engineering, Nadimpalli Satyanarayana Raju Institute of Technology (Autonomous) has conducted a “3 day hybrid workshop on Applications of Arduino & ESP 32 Micro Controller in Multidisciplinary Engineering” from 15th - 17th March 2023 at

Block – I, CP Lab. The resource persons were Mr. M. Satish / Tierra Automation

Tierra Automation is a leading technology company that specializes in providing innovative IoT, Industrial Automation, and Robotics solutions. Established in 2019, our company has successfully completed 14 industrial projects, 500+ security projects, and trained over 900 students in these technologies.

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DEPT. OF ELECTRICAL & ELECTRONICS ENGINEERING

3- DAY'S WORKSHOP ON "APPLICATION OF ARDUINO & ESP32 IN MULTIDISCIPLINARY ENGINEERING"
FROM MARCH 15 - 17, 2023
REGISTRATION FEE: ₹5,500
Mr. Satish Murrana
Founder & CEO
Tierra Automation

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- Recognized under 2(f) and 12(b) of UGC Act 1956.
- Institution is rated by popular education magazines like Career 360 and Career Compass and Strong Industry Institute League Recognized as a nodal centre for Andhra Pradesh.
- State Council for Higher Education (APCHHE) Recognized under the scheme NSRIT during 2017-2018 & 2018-2019a.

ABOUT WORKSHOP

A three-day Workshop on the topic "Application of Arduino & ESP32 in multidisciplinary engineering" is scheduled to take place on 15-17 March 2023 at Department of EEE, NSRIT, Visakhapatnam. Through this workshop, students will gain a foundational understanding of electronics, sensors, modules, development boards, IoT and their real-time applications. Additionally, they will become familiar with various modules such as relay, bluetooth, IR, Wi-Fi, GSM, GPS and learn how to work with development boards like Arduino and ESP32. By the end of the workshop, students will gain practical experience in coding and building real-time projects using Arduino and ESP32.



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The event has been conducted for internal participants. 90 internal participants are from EEE II & III year of our college. The Head of the Department, Dr. R S R Krishnam Naidu has attended the event along with all the Department staff. Dr. R. Amalawari, Assistant Professor has hosted the event. The Head of the Department has addressed the gathering as well as thanked the Resource persons for accepting the invitation for the conduction of the event. gathering as well as thanked the Resource persons for accepting the invitation for the conduction of the event.

Embedded systems basics are introduced. Role of micro controllers in embedded systems is clearly explained. The design of the circuit and interfacing ESP32 micro controller in PROTEUS software is described in detail. The programming and dumping into kit, practical testing is done. The financial aspects of design are discussed and work ethical procedures are discussed. This session addressed PO1, PO2, PO3, PO5, PO8, PO9, PO10, PO11, PS01 and PS02.

Day 1:15-03-23

On this day, the basic concepts are covered such as

What is EEE ?

There are Electrical as well as Electronic devices are present in our daily life surroundings.



For example : Electrical equipment like Fan, Air Conditioner, Light, TV etc.,

Electronic Devices like Mobile, laptop, Smart Watch etc.,

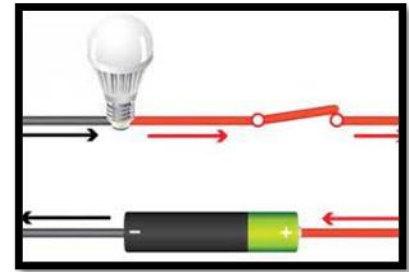
Electrical equipment requires 230V ac whereas electronic devices need 30V dc most cases.

Voltage, Current & Resistance

Voltage: The difference between two points i.e., between the higher potential & the lower potential

Current: Rate of flow of charge or by other means as Something which opposes the flow of electrons.

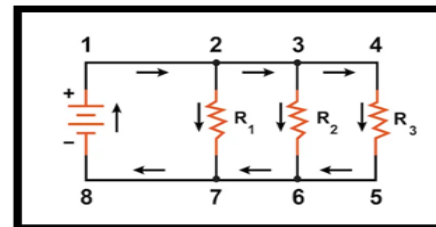
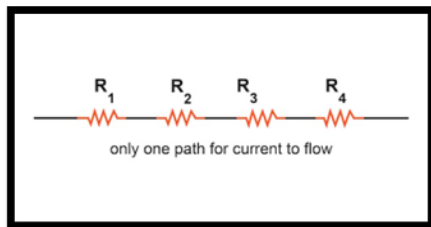
Resistance: Resists the flow of current.



Series & Parallel Circuits

In Series Circuit the electrical components are connected end-to-end in a line.

In parallel circuit the switch is connected in series with the whole circuit which are connected in parallel.



Example: House wiring

Active Components: Acts as a power source and deliver power to the circuit. Eg: Voltage & Current sources

Passive Components : It only consumes power. Eg: Resistor, Capacitor

Sensors

Sensor: Sensor is a device which measures any physical quantity and converts it into electrical quantity.

Types of Sensors:

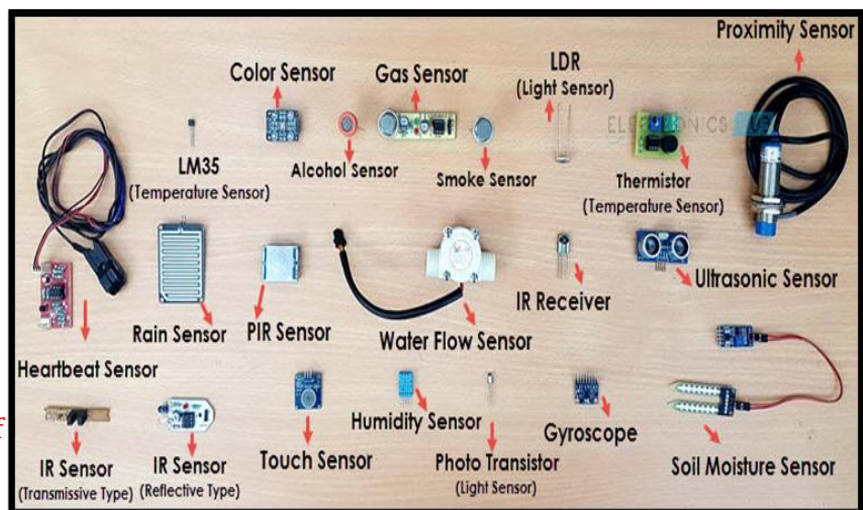
Analog and Digital Sensors

Different Sensors

Temperature sensor

Gas sensor

Humidity Sensor



Department of

- Tilt sensor
- Flow & level sensor
- Soil moisture sensor
- Color sensor
- Ultrasonic sensor
- Pressure sensor
- Proximity sensor
- PIR sensor
- Infra Ray sensor
- Touch sensor
- Light sensor
- Alcohol sensor



Actuator

Converting electrical signal into a physical movement

Different Actuators

- Motor
- Relay Module
- Radio Frequency

Wireless Communication Devices

- Radio Frequency
- GSM
- GPS
- Bluetooth
- Wi – Fi
- Li – Fi



Micro Controller

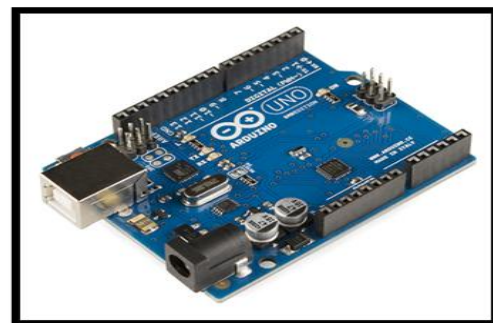
Arduino

Digital Pins

Acts as both input and output pins.
It consists of PWM pins for analog purpose.

Analog Pins

Only acts as the input pins



Tinkercad

Tinkercad is a free web app for 3D design, electronics and coding. Signup & Login

Sensor terminals

For sensors mostly any sensor is having 3 terminals and those are power, signal, and ground.

Analog Input

Potentiometer

Observing the analog values on the serial monitor by giving the input through the Arduino board (analog pin) by using the potentiometer.



Temperature Sensor

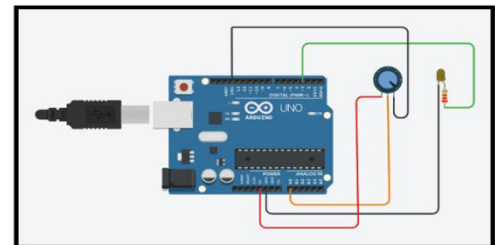
Observing the analog values on the serial monitor by varying the temperature from minimum to maximum.

Digital Input

PIR Sensor is used and its output is connected as input to the digital pin of the Arduino and necessary observations are noted which are appeared on the serial monitor.

Digital Output

An LED is connected to the digital pin and the necessary code is written in the code section for controlling the LED using digital Write in order make it HIGH or LOW.



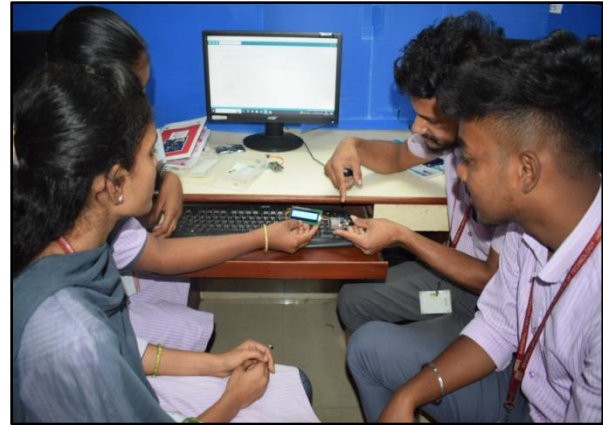
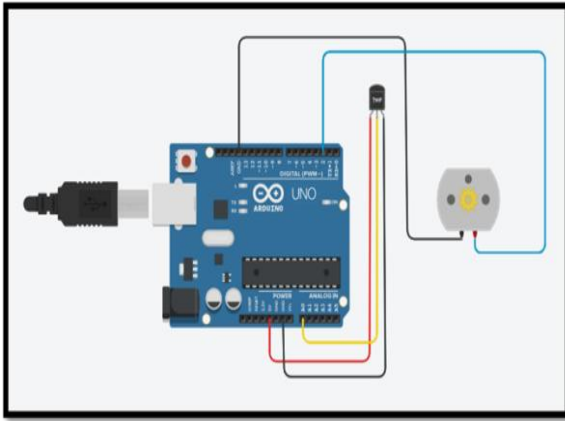
Analog Input Digital Output

Here, the potentiometer is connected as analog input and at the digital output pin LED is connected.

A resistance is connected to the LED in order to limit the current

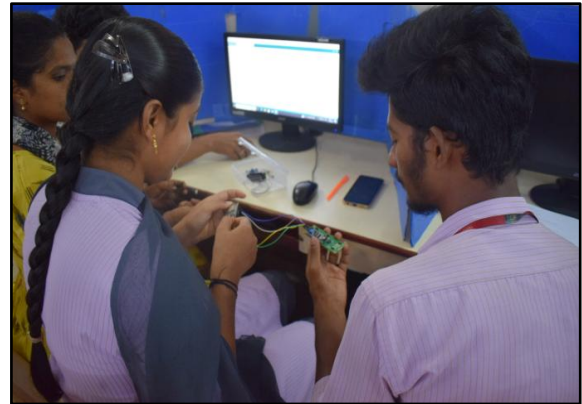
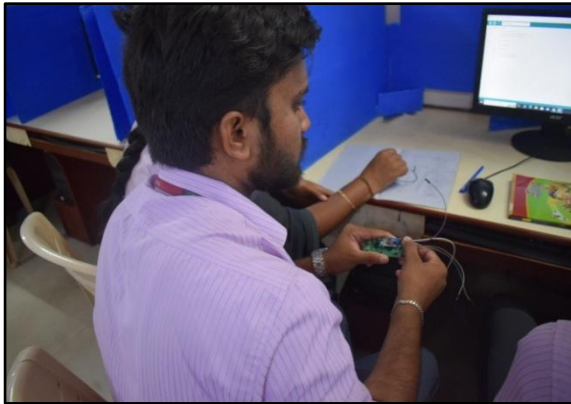
Day 2:16-03-23

On this day, the following projects are designed.



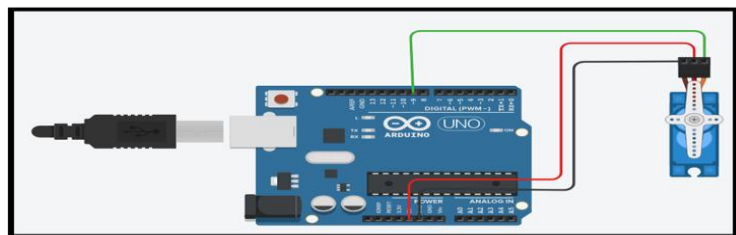
Air Conditioner Control using Temperature Sensor

Here air conditioner's motor is connected at digital output pin and temperature sensor is given as input to the analog pin. Here if condition is used to turn ON the AC after exceeding the certain temperature limit.



Air Conditioner Control using PIR Sensor

Here AC is turned ON after detecting the motion at the surroundings.



Servo Motor

Servo Motor is limited to only 180 deg rotation and the rotation speed can be declared using the delay().

Applications of Servo motor:

Automatic door openers

Elevators

Positioning

Door openings

Arduino IDE(Integrated Development Environment)

In the beginning stage, by using help option and Built-in examples available in Arduino IDE it is very much easier to learn Arduino coding.

While interfacing the Arduino or ESP 32 we have to select the board name and port.

For ESP 32, install ESP 32 from the library and choose the ESP32 Devkit as board and COM3 as port.

Comparison between ESP 32 and Arduino

ESP 32 Module

CPU: Tensilica Xtensa LX6 microprocessor @ 160 or 240 MHz (we can choose either 160 or 240)

ESP32 supports a data rate of up to 150 Mbps (Internet speed)

ESP 32 Module was developed by Espressif Systems.

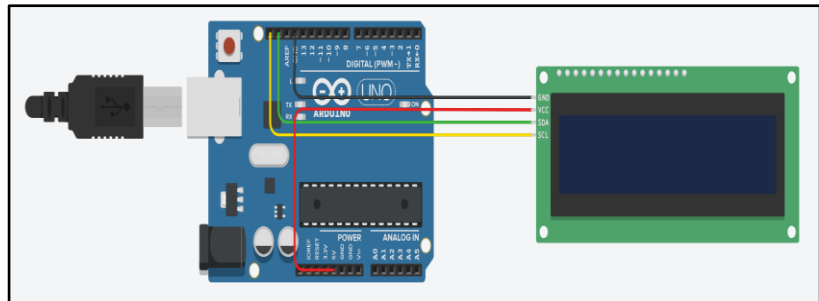
It has inbuilt dual Wi-Fi and Bluetooth support.

It has full TCP/IP support for full stack internet connection.

Arduino

CPU: Atmel AVR (8-bit)

16 MHz frequency speed



LCD(Liquid Crystal Display)

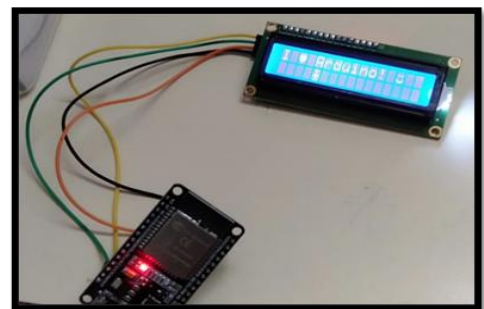
There are general LCD and I2C display

Here we are using the I2C display

LCD pin out

Available pins are VCC, GND, SDA, SCL

In the same way as above connections it is connected to the ESP 32 module.



The names or any sentences can be displayed on LCD on the particular row and columns by using the set Cursor function.

Necessary emoji's can be displayed on the LCD by using the I2C display examples i.e., Customchars and Custom Characters.

Using ESP 32 Module

Interfacing IR Sensor

Interfacing LCD I2C Display

Interfacing IR Sensor & LCD I2C Display

Combination of IR Sensor, LCD & Relay Module



Interfacing IR Sensor

The 3 pins (VCC, GND, Out) of IR Sensor is connected to the ESP32 (Vin, Gnd,D2).

Here the built-in LED is connected internally to the D2 pin.

An if condition is used i.e., the LED turns ON whenever it detects any object near to it otherwise it turns OFF.

Interfacing LCD I2C Display

Here the 4 pins (VCC,GND,SDA,SCL) of LCD are connected to the ESP32 (Vin,GND,GPIOD21,GPIOD22) respectively.

After writing the software code in Arduino IDE i.e., in such a way that the LCD displays the given names in the lcd.print function.

After uploading the code the given names are displayed on the LCD.

Interfacing IR Sensor & LCD I2C Display

Here the necessary connections are made as above and the slight change in the Arduino IDE code is to display the given name on the LCD display whenever IR Sensor detects any object around it.

Day 3:17-03-23

The interfacing of components is learned on the last day and lunch is provided for all participants

Combination of IR Sensor, LCD & Relay Module

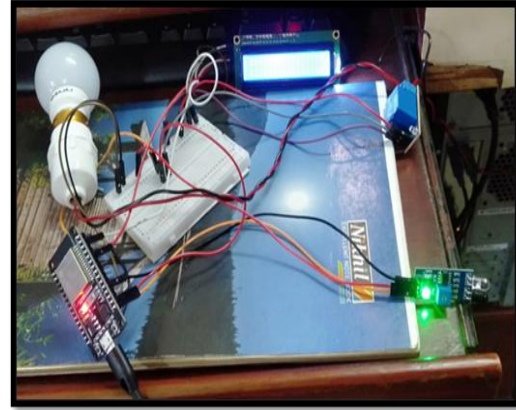
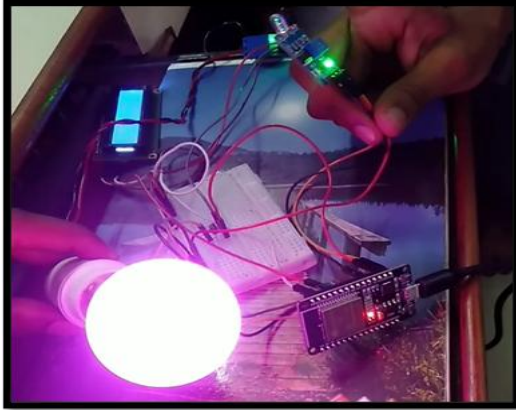
The relay module pins (VCC, Signal, GND) are connected to the ESP32 and in between these a transistor is connected, to boost up the signal in order to the make relay to get enough power supply.

The slight change in the IR sensor connections is to connect the VCC of it to the 3V3 pin of ESP32.

To the relay module an AC bulb is connected i.e., we can turn on the AC load by using this relay module.

Here the overall operation is that whenever the IR sensor detects any object around LCD displays the given name and AC bulb turns ON immediately.

For example, if a person enters the room then LCD displays as “PERSON ENTERED THE ROOM” and the relay operates so the bulb turns ON for an indication.



The session has been concluded by Certificate Distribution and Vote of thanks by Dr. R. Amaleswari, Assistant Professor by thanking the Resource person and the Head of Department for conducting such a resourceful event. The session was completely hands on and students gained more knowledge.