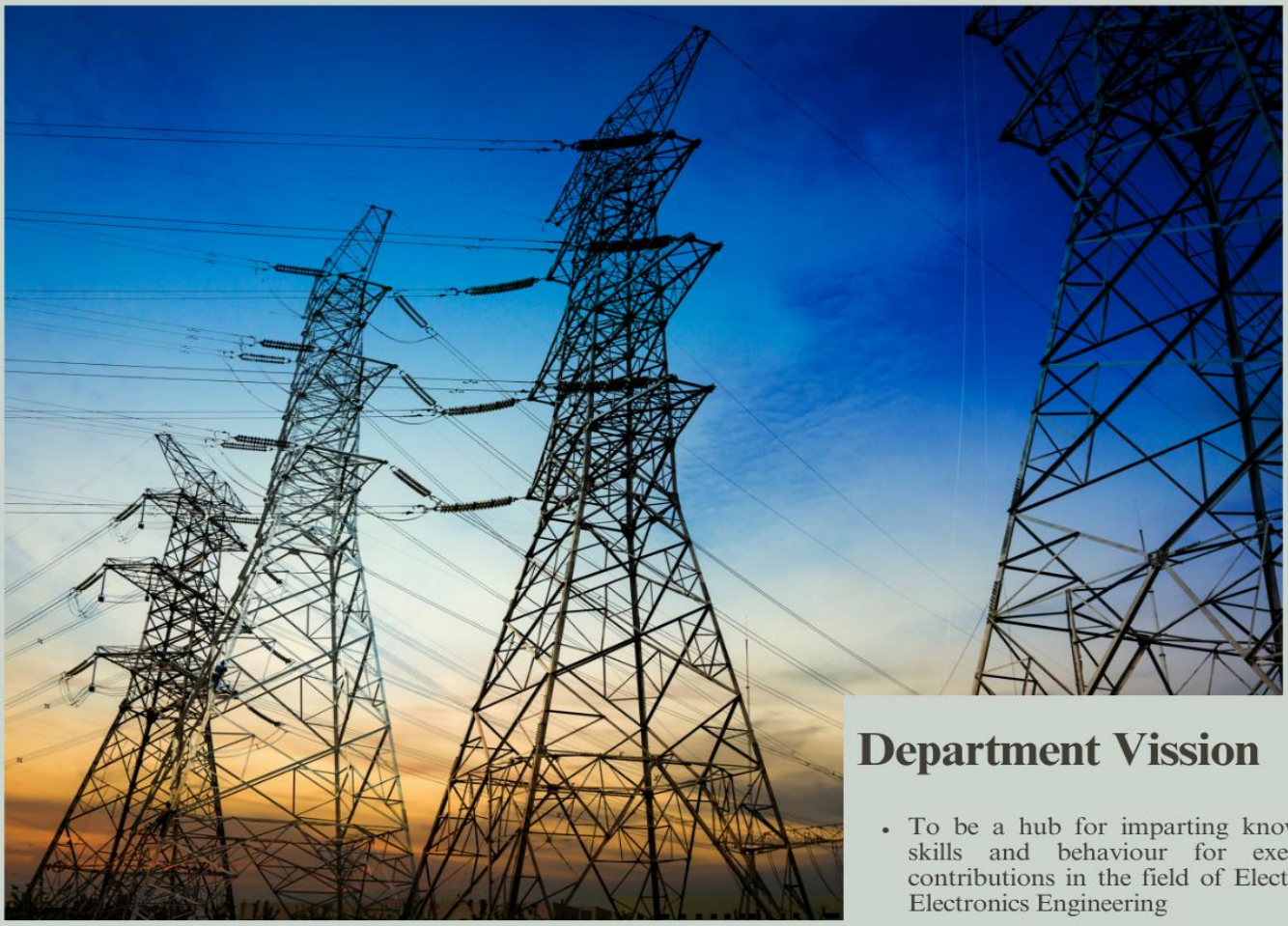
Volume - VIII, Issue - 2 (2022-23 A.Y)

NSRIT AUTONOMOUS

E-MINDS



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 honour and minor degree, which are essential for modern societal development and industrial progress

Department Vission

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

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 throughquality education, professional skills and research
- M4: To promote societal environment among students by inculcating moral and ethical values

THE CREW

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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.

Department Vision

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

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, 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. Selvajyothi, Assistant Professor at IIIT D&M, Kancheepuram, Chennai; Dr. J. Ravi Kumar from Zoe Talent Solutions, Dubai; and Mr. Venkat Reddy from Vihaan Electrix.

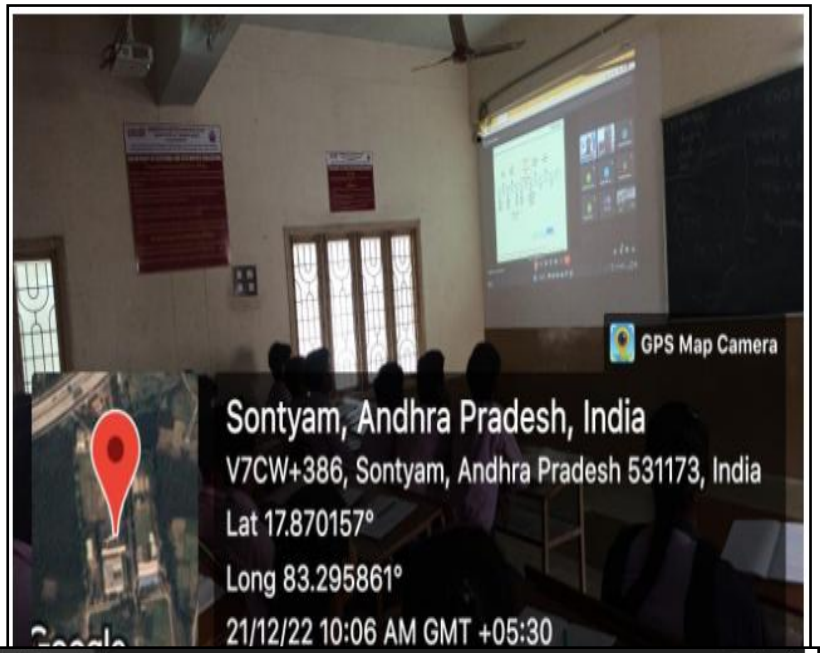
The event has been conducted for both internal and external participants. 119 internal participants are from EEE II, III & IV year of our college, 13 external participants are from various instituitions across India such as Vellore Institute of Technology-Tamil Nadu, Dr. K.N.Modi University- Rajasthan, 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. Amaleswari, Assistant Professor has hosted the event. The Head of the Department has adressed the gathering as well as thanked the Resource persons for accepting the invitation for the conduction of the event.

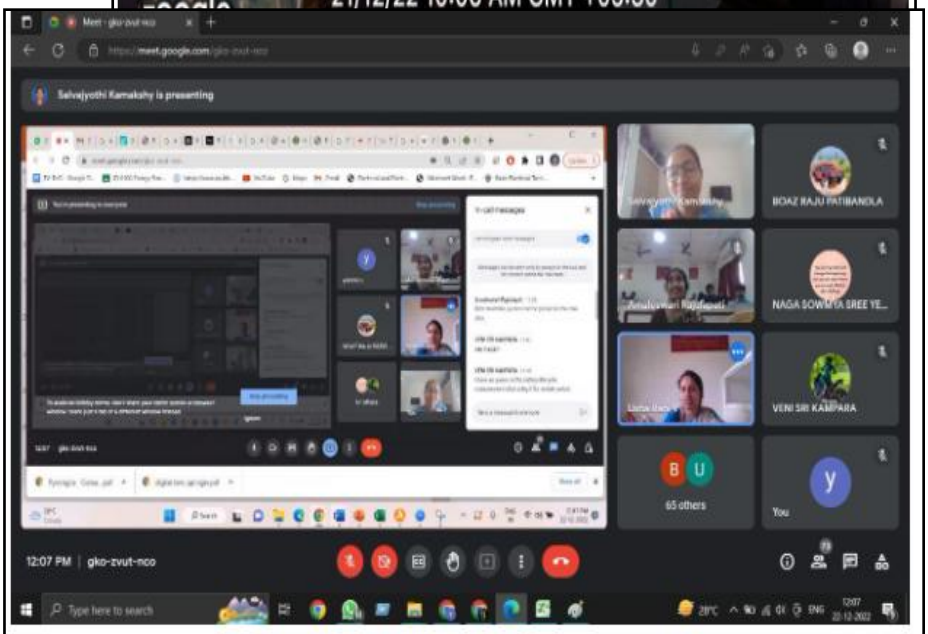
Basic Engineering knowledge concepts such as history of Electric Vehicles, different motors used in EVs and necessary controllers are discussed. Mathematical modeling and designing of Battery management system using MATLAB/SIMULINK is explained. The practical testing of BSDE results are exposed. The 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.





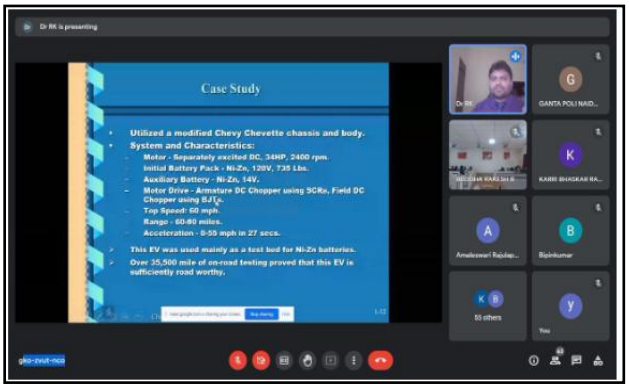
Day 2:22.12.22

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

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, dissembling of EV outer casing parts, detaching of electronic components is discussed along with Dissembling & 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. Dissembling & 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. Amaleswari, Assistant Professor by thanking the Resource person and the Head of Department for conducting such a resourceful event. This hybrid event is an iniative 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.

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. Amaleswari, 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.

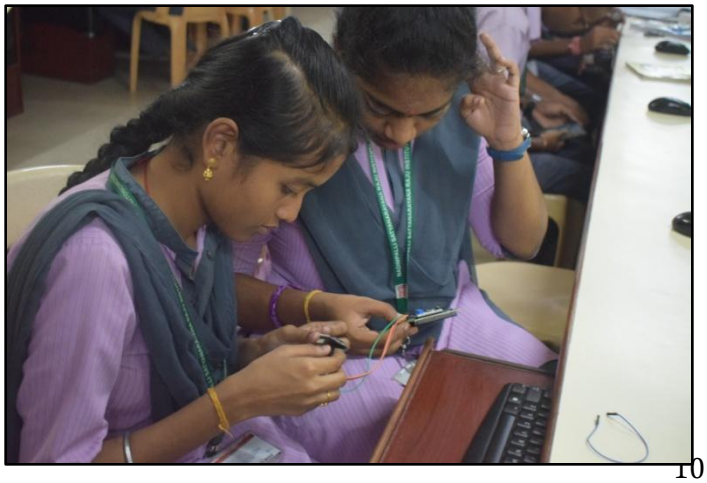
Embedded systems basics are introduced. Role of micro controllers in embedded systems is clearly explained. The design of the circuit and interfacing ESP32 micro controller in PROTEUS software is described in detail. The programming and dumping into kit, practical testing is done The financial aspects 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.

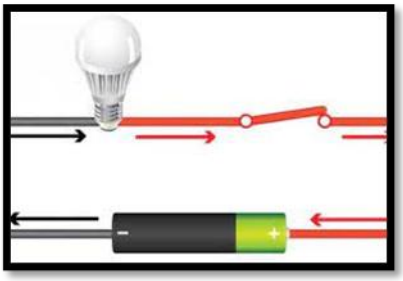


For example : Electrical equipment like Fan, Air Conditioner, Light, TV etc.,

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

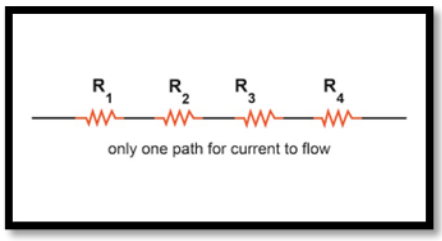
Current: Rate of flow of charge or by other means as Something which opposes the flow of electrons.

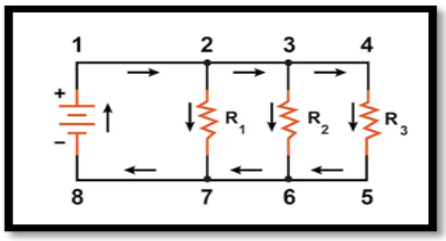
Resistance: Resists the flow of current.

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:

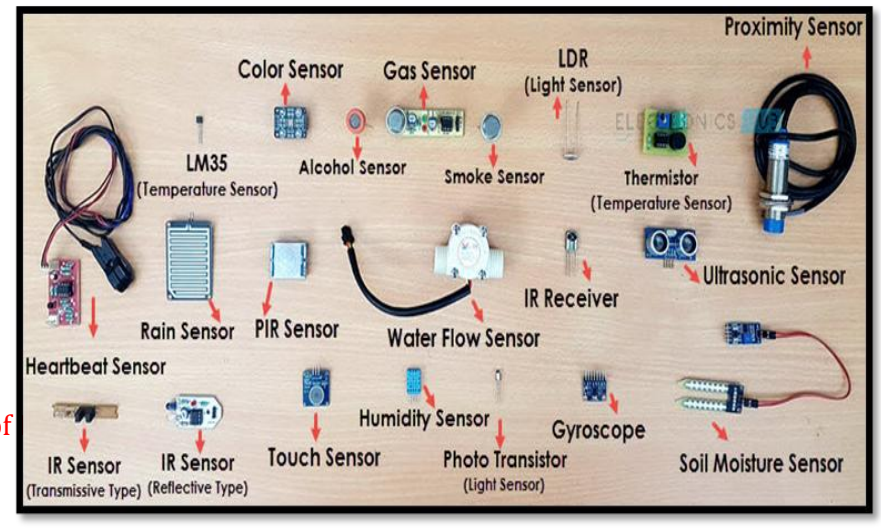
Analog and Digital Sensors

Different Sensors

Temperature sensor

Gas sensor

Humidity Sensor



Tilt sensor

Flow & level sensor

Soil moisture sensor

Color sensor

Ultrasonic sensor

Pressure sensor

Proximity sensor

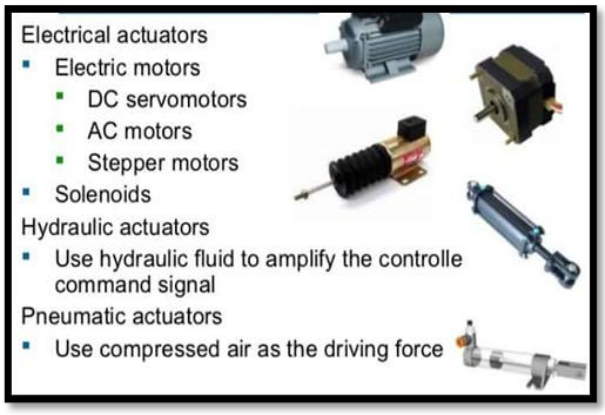
PIR sensor

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

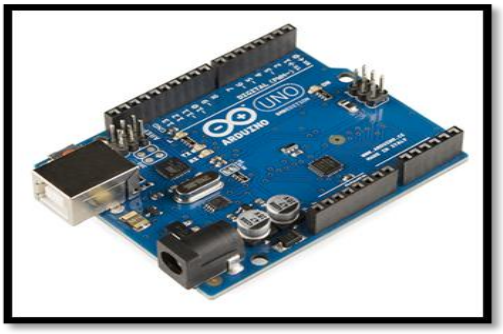
Digital Pins

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

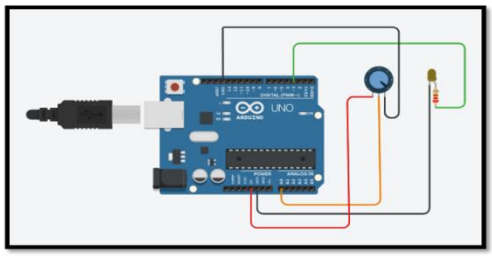
Observing the analog values on the serial monitor by varying the temperature from minimum to maximum.

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.

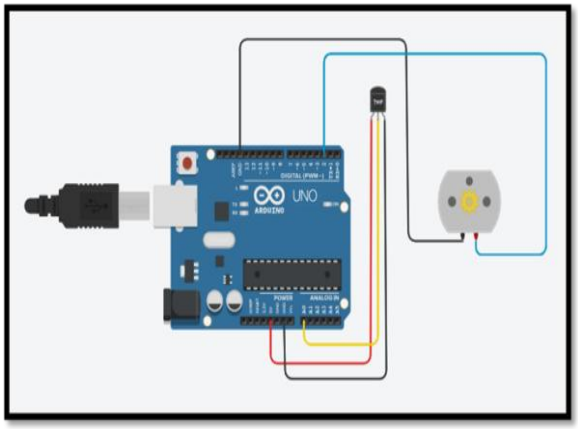


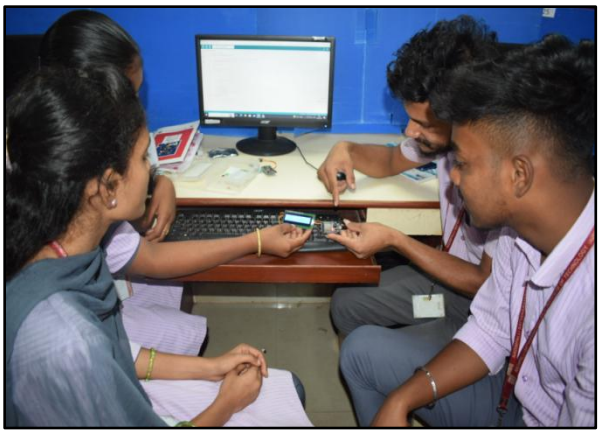
Analog Input Digital Output

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

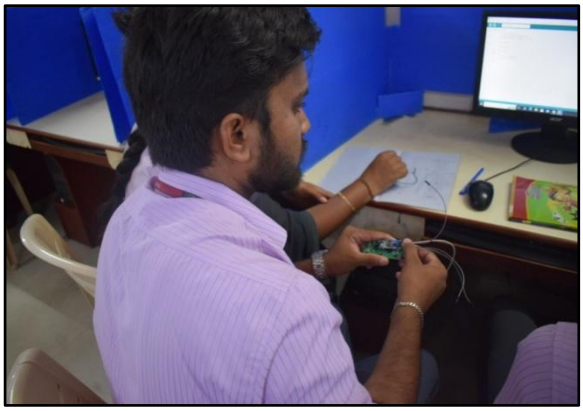
On this day, the following projects are designed.





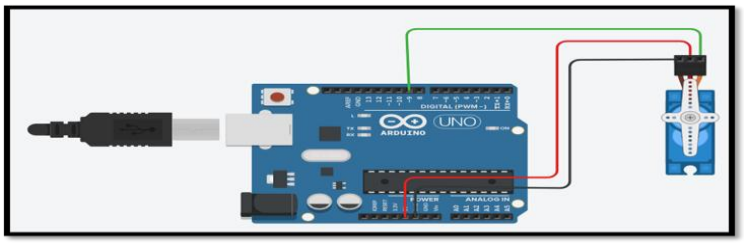
Air Conditioner Control using Temperature Sensor

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

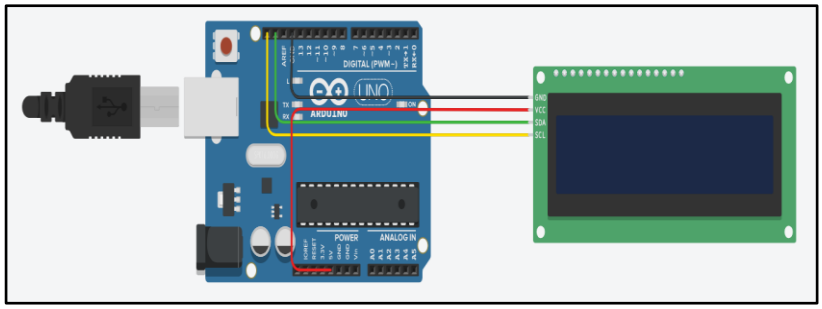
CPU: Tensilica Xtensa LX6 microprocessor @ 160 or 240 MHz (we can choose either 160 or 240)

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)

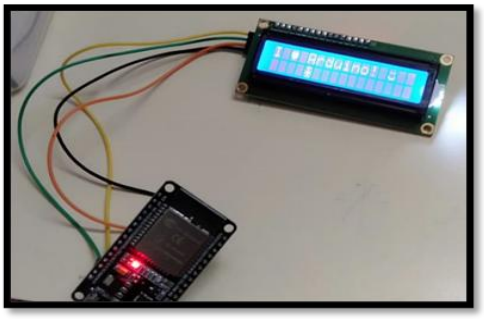
There are general LCD and I2C display

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

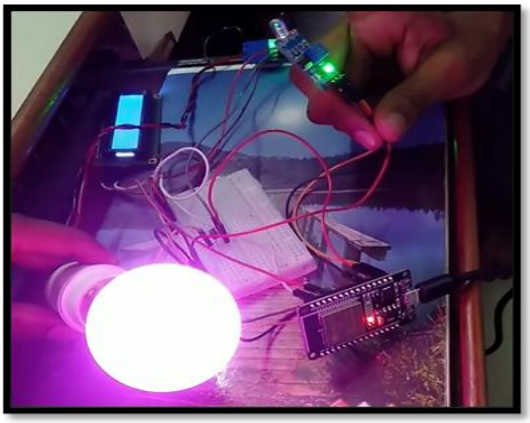
The relay module pins (VCC, Signal, GND) are connected to the ESP32 and in between these a transistor is connected, to boost up the signal in order to the make relay to get enough power supply.

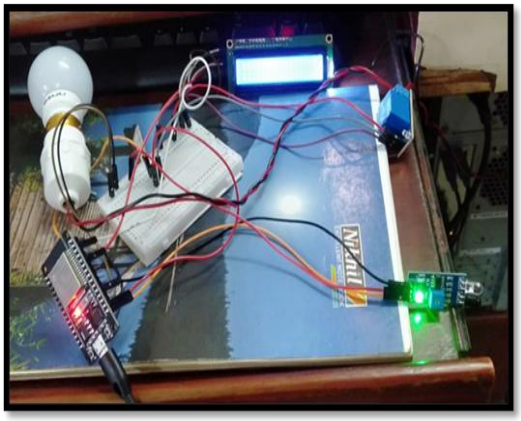
The slight change in the IR sensor connections is to connect the VCC of it to the 3V3 pin of ESP32.

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.