January 23, 2024

Faculty Development program-ECE Department 2024

Title: Internet of Things (IoT)

Maharaja Surajmal Institute of Technology-ECE department organised a 5 day, Faculty Development Program from Jan 15 to Jan 19, 2024 on Topic "Internet of Things" in collaboration with Brain Mentors Pvt. Ltd. to bridge the gap between Industry and Academia. The Resource persons were:-

1. Mr. Nishant Tyagi-Sr. Manager at Brain Mentors Pvt. Ltd.
2. Mr. Vivek Kumar- Sr. software trainer at skill risers InfoTech Pvt. Ltd.
3. Mr. Aditya- Software trainer

The event was attended by Director MSIT, Prof. Archana Balyan , Prof. Naveen Dahiya, Dean Academics ,Prof. Neeru Rathee, HOD,ECE & Convenor of FDP, Prof. Pradeep Sangwan, HOD 2nd shift ECE, and faculty. Total 75 faculty members have attended this FDP in which 8 faculty members were from outside MSIT.

The Internet of Things (IoT) has revolutionized the way we interact with the physical world by enabling seamless connectivity and data exchange between devices. In this FDP, we explored an IoT implementation utilizing a range of sensors, microcontrollers, and communication modules to create a versatile and interactive system.

About the FDP

The Internet of Things, or IoT, is like turning our everyday objects into tech-savvy companions. In essence, IoT is a vast network of interconnected devices, sensors, and systems that communicate seamlessly over the internet. This interconnectedness allows for the exchange of data and real-time information, facilitating a myriad of applications across diverse domains. From smart homes and cities to industrial processes and healthcare, IoT is reshaping the way we interact with our surroundings, unlocking unprecedented levels of efficiency, automation, and innovation. As the IoT ecosystem continues to expand, its impact on daily life and Industry is poised to redefine the way we perceive and engage with technology. The Faculty Development Program (FDP) on IoT serves as a valuable opportunity for educators to delve into the realm of Internet of Things and enhance their expertise. Such programs on IoT empowers faculty members to stay abreast of advancements, ultimately enriching the educational experience.

Inauguration-

The event was inaugurated with the sapling presentation to the experts by Prof. Neeru Rathee, HOD ECE & convenor of FDP , Prof. Naveen Dahiya, Dean Academics , Prof. Pradeep Sangwan, HOD 2nd shift ECE. . Dr.Neeru Rathee, convenor and co-convenor Dr.Richa Gupta welcomed the experts and participants.

Topics covered in FDP-

The topics covered in IOT were regarding different sensors, actuators and Arduino as well as interfacing with the cloud. Different sensors were used like Temperature and Humidity Sensor, Ultrasonic Sensor, Motion Sensor, Bluetooth Module, Servo Motors, Buzzer, LEDs and Microcontrollers (Arduino and NodeMCU). Every faculty had a hands on experience of IOT sensors. The IoT system is designed with a modular architecture, where sensors collect data, microcontrollers process and transmit data, and external devices or applications receive and act upon the information. The integration of diverse sensors, microcontrollers, and communication modules in IoT applications provides a robust foundation for creating intelligent and interactive systems. As technology continues to advance, the possibilities for enhancing connectivity, automation, and data-driven decision-making in IoT are boundless.

Components Used

2.1 Sensors

a. Temperature and Humidity Sensor: Monitors ambient conditions, crucial for applications like climate control, agriculture, and environmental monitoring.

b. Ultrasonic Sensor: Measures distance by emitting ultrasonic waves, ideal for applications such as object detection, security systems, and smart parking.

c. Motion Sensor: Detects movement, commonly used in security systems, lighting control, and automated surveillance.

d. Bluetooth Module: Enables wireless communication between devices, facilitating connectivity with smartphones, tablets, and other Bluetooth-enabled devices.

e. Servo Motors: Actuators that provide precise control over angular position, employed in robotics, automation, and smart devices.

f. Buzzer: Audible alert component useful for notifications, alarms, and feedback in IoT applications.

g. LEDs: Light-emitting diodes used for visual feedback and status indication in IoT devices.

2.2 Microcontrollers

a. Arduino: A versatile microcontroller platform with an open-source ecosystem, commonly used for prototyping and developing IoT applications.

b. NodeMCU: An open-source IoT platform based on the ESP8266 Wi-Fi module, facilitating IoT projects with wireless connectivity.

IoT Implementation

3.1 System Architecture

The IoT system is designed with a modular architecture, where sensors collect data, microcontrollers process and transmit data, and external devices or applications receive and act upon the information.

3.2 Connectivity

The sensors and microcontrollers communicate through various interfaces:

a. Wired connections: Utilizing GPIO pins and serial communication for sensor-microcontroller connections.

b. Wireless connections: Leveraging Wi-Fi connectivity (NodeMCU) and Bluetooth communication for remote control and data transfer.

3.3 Use Cases

a. Smart Home Automation: Using temperature and humidity sensors for climate control, motion sensors for security, and servo motors for automated curtains or doors.

b. Distance Measurement: Employing ultrasonic sensors for object detection, useful in smart parking or obstacle avoidance systems.

c. Interactive Feedback: Utilizing LEDs and buzzers for visual and audible notifications based on sensor readings.

Challenges and Considerations

a. Power Consumption: Optimizing power usage, especially for battery-operated IoT devices.

b. Data Security: Implementing robust security measures to protect sensitive information transmitted over the network.

c. Compatibility: Ensuring seamless integration and compatibility between diverse sensors and microcontrollers.

Future Enhancements

Future iterations of the IoT system may include additional features such as:

a. Integration of artificial intelligence for advanced data analysis.

b. Expansion of sensor types to broaden the range of monitored parameters.

c. Implementation of cloud-based storage and analytics for remote data access.

Valedictory Session

The Faculty Development Program concluded with a Valedictory speech by Prof. Dr.Archana Balyan, Director, MSIT and Prof. Dr. Neeru Rathee, HOD, ECE gave a vote of gratitude to officially conclude the event followed by high tea. The session ended with distribution of certificates to the participants of the Faculty Development Program and a group photograph. The One Week Faculty Development Program ended with positivity and enthusiasm among the participants of the Program. Every participant was highly motivated and delighted after attending the various sessions of this Faculty Development Program.

Prof. (Dr.) Neeru Rathee   Dr.Richa Gupta

(Convenor, HOD,ECE)   (Co-Convenor, Associate Prof (ECE)