COURSE PROSPECTUS

Name of the Group: Embedded System and IOT

Name of the Course: Foundation course in Internet of Things (IoT)

Course Code: 2022/EHW/NIELIT/05321

Starting Dates: - 01/08/2023

Duration: 4 Weeks – 90 Hours

Course Coordinator: Mr. Prashant Pal, M. Tech from IIT Kharagpur, Scientist B, NIELIT Aurangabad

Preamble:-

Internet of Things (IoT) is a technology having potential to penetrate every aspect of our live. Everything around us is going smart and intelligent. Internet of Things (IoT) is essentially a seamless connected network of embedded objects/devices, with identifiers, in which M2M communication without any human intervention is possible using standard and interoperable communication protocols. The Internet of things has evolved due to the convergence of multiple technologies, real-time analytics, machine learning, commodity sensors, and embedded systems. Traditional fields of embedded systems, wireless sensor networks, control systems, automation (including home and building automation), and others all contribute to enabling the Internet of things. On Indian context, the various initiatives proposed to be taken under the Smart City concept and the Digital India Program to setup Digital Infrastructure in the country would help boost the IoT industry.

Objective of the Course: - The Certificate Program on Internet of Things will enable Electronics engineers in electronic industries to provide a comprehensive introduction to the Internet of things technical computing environment.
Course Outcomes:
• To provide an understanding of Internet of Things and its applications in various domains.
• Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks

Outcome of the Course: -
On successful completion of the course, a person will develop experience on working with the IoT kit. The person will understand the basics of IoT with reference to a case study including the reference architecture, functional blocks and various applications with deep insights into the multiple design challenges. The person will develop insights into
   • Microcontroller programming on IoT kit including peripheral configuration
   • Understanding of working of sensors & actuators depending on use cases
   • Interfacing analog sensor and digital sensors using inbuilt ADC and peripherals.
   • Interfacing network peripherals to setup Wi-Fi and BLE based networks
   • Hands-on for Wi-Fi and Bluetooth packet analysis

- Understand Edge Computing & its advantages in IoT, knowledge on various IoT platforms.

Expected Job Roles:

Junior R&D Engineer in IoT: Assisting in Research and development based activities in the field of IoT

Research assistant in IoT: Assisting in Development of IoT based ecosystems IoT Network Engineer: responsible for implementing, maintaining, supporting and developing IoT communication networks

IoT Test Engineers: Checking functionality of various IoT based systems and products

Home automation Engineer: Working on Internet of Things based Home Automation System.

Course Structure:

Sr. No.	Module Title	Duration (Hours)	
		Theory	**Lab**
1	IoT Introduction & Concepts	4	1
2	Sensors & Actuators	2	1
3	IoT Hardware platforms	6	20
4	Networking Fundament als	4	4
5	Wireless for IoT	6	20
6	IoT Protocols	3	3
7	IoT Graphical user interface and back end Application Design	2	6
8	Cloud platforms for IoT	3	5
Total		**90 Hours(Theory-30, Lab-60)**	

Other Contents:

I.   **Course Fees :** Course fee is Rs 10,000 including GST
II.   **Registration Fee:** An amount of Rs.1000/- (including all taxes as applicable) (non-refundable) should be paid at the time of registering for the course.
III.   **Course Fee Installment Structure:-** Not Applicable for this course
IV.   **Eligibility:** 2nd Year Polytechnic Diploma in Electronics /Electrical/ Instrumentation/ Computer Science/ IT Pursuing B.E/B.Tech in Electronics/Electronics & Communication/ Electrical/ Electrical & Electronics/Instrumentation

or

10+ ITI in Electronics/ Electrical/ Computer/ IT Domains + 1 Years of Experience in Electronics Domain

or

12th + 1 year of Experience in Electronics Domain

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or

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2nd Year B.Sc./MSc. Electronics

V.   Number of Seats :30

VI.   Selection of candidates : The candidates passed in the qualifying examination will be based on their marks obtained, subject to eligibility and availability of seats

VII.   Test/Interview (if applicable) : Not Applicable

VIII.   Counselling/Admission : Starting date of the course

IX.   Important Dates (if applicable) :

Starting date:	**01/08/2023**
Last date to submit application form:	**29/07/2023**
Selection intimation in website:	**31/07/2023**
Counselling/Admission	**01/08/2023**
Commencement of class work:	**01/08/2023**
Payment of Fee	**01/08/2023**

X.   Course Timings : 13:30 Hrs to 17:30 Hrs (Excl Saturdays, Sundays and National Holidays - 13:00 Hrs to 13:30 Hrs Lunch break)

XI.   .Placement : Support shall be provided

XII.   Lab Facilities:

LIST OF EQUIPMENT (For a batch of 30 students)

Sr. NO.	Description	Qty	Specifications
1	Classroom	1	
2	Student Chair	30	
3	Student Table	15	
4	Smart Interactive Display	1	
5	White Board	1	
	Computer Lab		
1	Desktop computer with accessories	25	Installed with • Arduino IDE and required software
2	Senors and actuators(DHT11,ultrasonic sensor, LDR,MQ3,MQ135,water level sensor, soil moisture sensor, Motor driver, Relay, Displays)	As per requirement	
3	Arduino Uno	15	
4	Raspberry Pi Boards, NodeMCU, ESP32,HC05,Nrf,RFID,Wifi Board, BLE Board	15	

XIII. Course Contents:

Sr. No.	Module Title	Topics	Duration (Hours) Theory	Lab	Learning Outcome
1	**IoT Introduction & Concepts**	IoT Architecture Physical & Logical IoT design Basics IoT Enabling Technologies, IoT Stack, IoT Applications	4	1	•Understand the Architecture of IoT •Building Blocks in development of IoT •IoT Applications
2	**Sensors & Actuators**	• Sensor working • Sensor Characteristic s • Types of sensors and working principle • Sensors used in IoT	2	1	• Understand the working principle of sensors and actuators • Sensors to be used for IoT applications
3	**IoT Hardware platforms**	• IoT Hardware platforms • Specifications and interfaces • Serial Communication Protocols • Arduino IDE • Arduino Programming • Interfacing various sensors, modules and devices to Arduino	6	20	• Working with Arduino IDE • Program Arduino board • Connect and program various peripherals with Arduino Uno
4	**Networking Fundamentals**	• TCP/IP Basics • IPV6 • Network devices & configurations •Web servers & Socket programming	4	4	• Understand the Networking basics required to set up IoT application. • Understand various IoT communication protocols
5	**Wireless for IoT**	• Overview of Wireless Sensor Networks • IEEE standards for IoT • Overview of Wireless Modems (RF, GSM/GPRS, Bluetooth, RFID, Wi-Fi etc.) •NodeMCU and ESP32	6	20	• Understand the technologies involved in IoT • Interface various wireless modules to embedded systems applications. • Build a wireless sensor network for IoT Application
6	**IoT Protocols**	• IoT Protocol overview • MQTT • COAP • HTTP/HTTPS • 6lowpan	3	3	• Understand various IoT communication protocols • Implementation of MQTT and COAP protocols
7	**IoT Graphical user interface and back end Application Design**	•Web development for IoT • Introduction to HTML and PHP • IoT application development for Mobile	2	6	• Understand the IoT application development tools. • Understand how to Implement IoT Applications
8	**Cloud platforms for IoT**	• IoT dashboards • Introduction to various cloud platforms • Device and data management from Cloud Platforms • Uploading data from hardware platforms to cloud	3	5	• Data collection and representation on various cloud based Dashboard • Data analysis and decision making for various application
	Total		**90 Hours(Theory-30, Lab-60)**		

XIV. **Registration Details: -**

https://docs.google.com/forms/d/e/1FAIpQLSdQbxf5ly44OWwIs6q085eNXx
uKHAPZPpfu5dCixM4MFXc10Q/viewform