

3 Months (80 Hrs)

# Course Curriculum



Online Certification In  
**Basic Embedded System and IoT**

By E&ICT Academy, IIT Guwahati

# ABOUT THE

## IIT GUWAHATI



Indian Institute of Technology Guwahati, the sixth member of the IIT fraternity, was established in 1994. The academic programme of IIT Guwahati commenced in 1995. At present the Institute has eleven departments and three inter-disciplinary academic centres covering all the major engineering, science and humanities disciplines, offering BTech, BDes, MA, MDes, MTech, MSc and PhD programmes. Within a short period of time, IIT Guwahati has been able to build up world class infrastructure and a reputation for itself.

# ABOUT

## E&ICT ACADEMY, IIT GUWAHATI



Electronics and ICT Academy aims to provide specialized training to the faculties of Engineering, Arts, Commerce, Science colleges and Polytechnics institutes by developing short term training programmes on fundamental and advanced topics in IT, Electronics & Communication, Product Design, Manufacturing. In addition, the Academy conducts specialized customized training programmes and research promotion workshops for corporate sector & educational institutions.



# PROGRAM CURRICULUM: LEARNING PATH

Master **Industry-relevant skills for Basic Embedded System & IoT** through the most relevant curriculum designed by E&ICT Academy, IIT Guwahati and leaders from the industry.

## C Programming and Data Structure

Module

01

C Basics, Control Statements, Loops, Memory Allocation, Functions, Arrays, Strings, Pointers, Structure and union, Linked-List, Tree, Graph.

## Basic Embedded Systems

Module

02

Processor Architectures, Types of Microcontrollers, 8-bit/16-bit/32-bit Microcontrollers

## NODEMCU(Esp8266)

Module

03

Install IDE Software, Programming of Nodemcu, Pinout of Nodemcu, Traffic Light Controller

## Connectivity protocols (wired and wireless) and Sensors/Actuator

Module

04

UART/USART, SPI, I2C, Wifi, BLE, USB, ADC,Ultra Sonic Sensor, Smoke Sensor, Gyroscope Sensor

## IOT Protocols

Module

05

HTTP/REST, MQTT, COAP

## IOT cloud services

Module

06

IoT Cloud Architecture, SAAS, PAAS, IAAS, Thingspeak cloud, Google Firebase

## Network Layered Architecture Communication

Module

07

OSI model, TCP/IP model, Ipv4 and Ipv6, Wireless sensor networks

# COURSE CURRICULUM

## C Programming and Data Structure

01

### Module-1: C Programming and Data Structure

- a. Keywords and Data types
- b. Operators
- c. Flow control
- d. Loops
- e. Memory allocation
- f. Storage class
- g. Functions
- h. Arrays
- i. Sorting and searching techniques
- j. Strings
- k. Pointers
- l. Function pointer
- m. Volatile
- n. Enumeration
- o. Structure and union
- p. File handling concepts
- q. Dynamic memory allocation
- r. Command line arguments
- s. Data structures
- t. Linked-list
- u. Tree
- v. Graph

#### **Hands-on :**

#### **Practical use of C Programming and Data Structure**

## Basic Embedded Systems

02

### Module-1: Basic Embedded Systems

- a. What is Embedded System?
- b. What is Microprocessor?
- c. Processor Architectures
- d. Difference between microprocessors and microcontrollers
- e. Types of Microcontrollers
- f. 8-bit/16-bit/32-bit Microcontrollers
- g. Programming Languages for Embedded system

## **Module-1: NODEMCU(Esp8266)**

- a. Install IDE Software
- b. Programming Of Nodemcu
- c. Pinout of Nodemcu
- d. Programming Of Nodemcu
- e. Bi-Directional Visitor Counter
- f. Traffic light controller

**Connectivity protocols (wired and wireless)and Sensors/Actuators**

**04**

## **Module-1: Connectivityed protocols (wired And wireless) and Sensors/Actuators**

- a. UART/USART
- b. SPI
- c. I2C
- d. Wifi
- e. BLE
- f. USB
- g. Sensors

## **Module-2: Sensors**

- i. Sensors types-analog and digital
- ii. Temperature/humidity sensor
- iii. Ultrasonic sensors
- iv. Photoresistor
- v. Smoke sensor
- vi. Gyroscope sensor
- vii. Accelerometer
- viii. OLED display

## **Hands-ON (Connectivity Protocols)**

- a. Car reverse parking alert system
- b. NodeMCU Internet clock with OLED display
- c. Smoke detection alert system
- d. Intruder detection system

## IoT Protocols

05

### Module-1: IoT Protocols

- a. HTTP/REST
- b. MQTT
- c. COAP

## IOT Cloud services

06

### Module-1: Iot Cloud Services

- a. IoT Cloud Architecture
- b. IoT Cloud services
  - SAAS
  - PAAS
  - IAAS
- c. Thingspeak Cloud
- d. Google Firebase

## Network Layered Architecture Communication

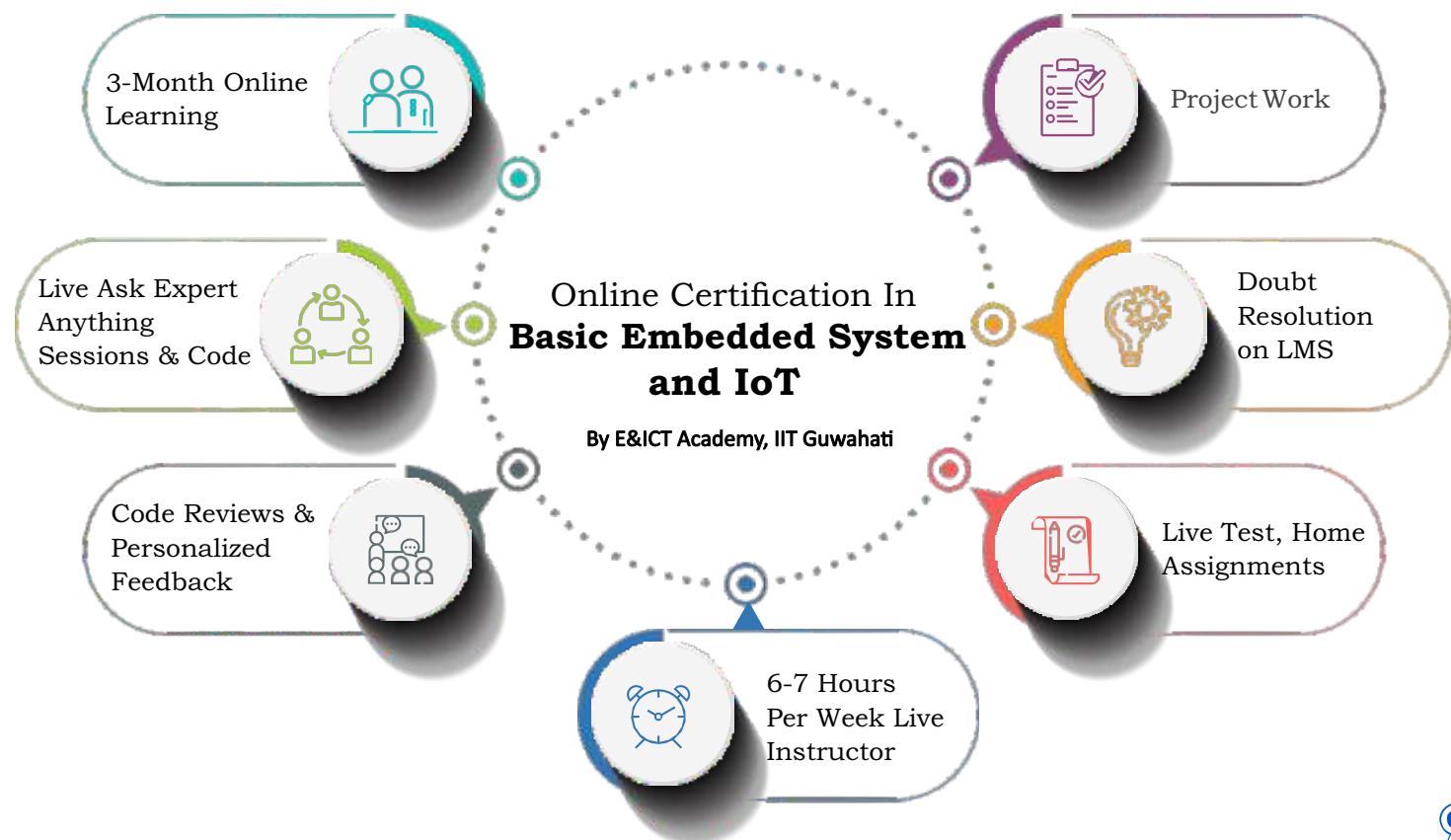
07

### Module-1: Network Layerd Architecture Communication

- a. OSI model
- b. TCP/IP MODEL
- c. IPv4 and Ipv6
- d. Wireless sensor networks
  - i. Layered Network Architecture
  - ii. Clustered Network Architecture

**Hands-On** Network packet analysis using Wireshark

Learn from one of the best faculty in India through live online sessions. While Academic Professors will help you learn Embedded & IoT concepts, industry experts will impart practical knowledge of Embedded System, IoT & Network Layered architecture through real world projects.



## TOOLS, LANGUAGES & FRAMEWORKS

 Master Slave SCK MOSI MISO CS				

# CONTACT DETAILS



## Program Information:

**Online Certification In Basic Embedded System  
and IoT**

**By E&ICT Academy, IIT Guwahati**



 [eict.iitg.ac.in](http://eict.iitg.ac.in)

 [theiotacademy.co](http://theiotacademy.co)

**Follow us on:**



**Follow us on:**

