

CERTIFICATION IN EMBEDDED SYSTEM



Course Code : OCIT0016

Embedded systems are special-purpose computers that are often tightly coupled with electronic and physical components and must operate within real-time performance, battery, and size constraints. This course will help you answer these questions by providing the foundational knowledge and hands-on experience in design and validation of embedded systems, with a focus on embedded C programming and real-time operating systems for ARM® Cortex™ -M Microcontrollers

Curriculum

Module 1: Introduction to Arduino

Introduction to Embedded Systems, Microprocessor vs Microcontroller, different microcontroller architecture, History of AVR Microcontrollers, The Arduino Platform, Block diagram, Architecture, Arduino Boards Pin functions, Overview of main features such as – I/O ports, timers, interrupts Serial port, PWM, ADC etc.

Module 2: Getting Started with Programming

Arduino Schematics, Concept of C-Language, C vs Embedded C, Introduction to Arduino IDE, Writing, Saving, Compiling and Uploading Sketches., Hello world program.

Module 3: Digital & Analog I/O Programming

Digital Output Programming by discrete LED interface, Timer & delay time function, 7-segment LED programming, Buzzer interface, and programming. Digital Input Programming by interfacing Switches, Analog out (PWM) programming using RGB-LED interface. Analog Input Programming using POT

Module 4: Sensors & Actuators Interfacing

Interfacing of Analog Sensors, Interfacing of Digital Sensors, Data Logger using Arduino Serial Monitor, Sensor condition based event triggering.

Module 5: Conditions, loops, switch-case & functions

If-Else conditions based programming, while –loop, Function- prototype, declaration, and calling, declaring local and global , condition based switch-case.

Module 6: Serial communication Protocols

Debugging & Debug Environment, Debug via Serial terminal, RS-232 & UART protocol communication, Reading & Writing using Serial, SPI Protocol with Arduino, I2C Protocol and sensor Interfacing.

Module 7: Programmable Peripherals Interfacing

Peripherals Interface & Programming: 16x2 Alphanumeric LCD Interface, 4x4 keypad interface, H-bridge & DC motor Interface

Module 8: Applications Development using Embedded System

Case Studies and Application development – Smart Electric Board, Wireless Robot, Person Counter Light Control etc.

Learning Outcomes

- The Embedded Systems/IoT and their applications
- The role of Hardware in IoT
- The basics to intermediate understanding of Open source hardware
- Design and development of small scale applications using open source platform (Arduino Hardware/Software)