

Short Term Courses-NIELIT Gangtok Centre

Certificate Course in Arduino based Embedded System Design

Objective:

An embedded system is a combination of hardware and software provided that both should be synchronized with each other. Some examples are as follows: industrial machines, automobiles, medical equipment, cameras, household appliances, airplanes, vending machines etc. The Arduino is an open-source computer hardware/software platform for building digital devices and interactive objects that can sense and control the physical world around them. In this course students will learn how the Arduino platform works in terms of the physical board and libraries and the IDE (Integrated Development Environment). The course will also cover programming the Arduino using C code and accessing the pins on the board via the software to control external devices.

Learning Outcome:

After the completion of the course, the students will be specialized in Embedded System Design using Arduino.

Duration of the Course: 1.0 Month (without project)/1.5 Months (with project)

Minimum Eligibility Criteria:

Pursuing/Passed BE/B.Tech/MCA/BCA/BSc/MSc/Polytechnic Diploma/ NIELIT 'O' Level with graduation/ NIELIT 'A' Level

COURSE OUTLINE

Sr. No.	Modules to be Covered
1	Embedded System design : Basics
2	Learning Arduino Platform
3	The basic sensors and actuators using Arduino
4	Controlling embedded system based devices using Arduino
5	Project Based on embedded system design using Arduino board.

Detailed Course Syllabus:

1. Embedded System design: Basics

Outcome	Contents
Basic Concepts	What is Embedded System, Main Components of Embedded Systems, Constraints of Embedded System, Power dissipation
Knowledge of Component	Embedded System Classifications(Small Scale, Medium Scale, Sophisticated) and its Components
Knowledge of Processors of embedded Systems	Processors: General purpose, Single purpose, Application Specific, Concepts of microprocessor and microcontroller, and other Elements of Embedded System
Software	What is Program/Software/Simulator/Compiler and their applications within Embedded Systems.

2. Learning Arduino Platform

Outcome	Contents
Microcontroller Fundamental	Microcontrollers, Programming Microcontrollers, Arduino Platform, The Boards, The Anatomy of an Arduino Board, The Development Environment
Arduino Component	Learning about Analog, Digital, Power, Other Pins, External/USB power supply, reset button, and other components of Arduino Board
Arduino Library and Emulator	Learning the standard library(13 default) of Arduino,
Knowledge of Arduino Software	Arduino Development Environment: Arduino Software, Different menus and Serial Monitor of Arduino IDE
Writing Arduino Programs	Acquiring the skills for writing Arduino Sketches, working with examples, Interfacing some led, switch, Potentiometer with Arduino

3. The Basics of Sensor & Actuators

Outcome	Topics
Sensor Fundamentals	How Sensors Work, Analog and Digital Sensors, Pull-Up/Down resistors and Examples of sensors , Connecting different sensors such as: Humidity, Heat/Temperature, proximity, IR Motion, Accelerometer, Sound , Light, distance, Pressure, Thermal, Infrared, LDR etc. to Arudino Board
LCD monitor	Working on LCD monitor, Reading Various Sensor data on Serial Monitor and LCD Display
Actuators	Actuators, Relay Switch, Servo Motor, Putting Things Together, Sensing the World, Reading from Analog Sensors

4. Controlling Embedded System Based Devices using Arduino

Outcomes	Topics
Sensor Fundamentals	How Sensors Work, Analog and Digital Sensors, Pull-Up/Down resistors and Examples of sensors , Connecting different sensors such as: Humidity, Heat/Temperature, proximity, IR, Motion, Accelerometer, Sound , Light, distance, Pressure, Thermal, Infrared, LDR etc. to Arudino Board
LCD monitor	Working on LCD monitor, Reading Various Sensor data on Serial Monitor and LCD Display
Actuators	Actuators, Relay Switch, Servo Motor, Putting Things Together, Sensing the World, Reading from Analog Sensors

5. Project

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