IoT With Cloud Course Syllabus

Module (1/6)
Module Name: Overview of IoT and High level Architecture

Objectives:

- To walk though technology timeline(brief history) and evolution of IoT
- Gain knowledge about IoT applications across various segments
- Understand IoT architecture and its building blocks
- Introduction to various IoT platforms
- Understand the technology and skills required in building and IoT product.

Detailed course contents:

- What Is the Internet of Things (IoT)?
- Brief History and evolution of IoT
- IoT Architecture and Protocols
- Various Platform of IoT
- Overview of IoT components and IoT Communication Technologies
- Trends in the Adoption of IoT
- IoT is Powerful and Pervasive
- Societal Benefits of IoT
- Risks, Privacy, and Security

Module (2/6)
Module Name: Setting up IoT Workflow

Objectives:

- Setup IoT platforms, by understanding the knowledge gained in the previous module
- Become familiar with the building blocks in IoT architecture
- Implement IoT use cases using various IoT platforms

Detailed course contents:

- Arduino Simulation Environment
- Arduino Uno Architecture
- Setup the IDE, Writing Arduino Software
- Arduino Libraries

Module (3/6)
Module Name: Advanced / Embedded C Programming

Objectives:

- Clearly understand concepts of C language
- To obtain good quality and style in programming
- Gear you up for programming in Embedded environment
- To induce confidence in you!

Detailed course contents:

- Basics of C:
- Operators
- Conditionals
- Arrays
- Functions
- Advanced C programming:
- Structures
- Unions
- Files
- Deep dive into pointers
- Pre-processor directives
- Recursion
- Project environment - Creating & Building a project, Makefiles
- Deep dive - Logic to program translation, Creating your own library, Dry-run
- Data Structures
- Basics of Embedded C programming for Arduino

- Interfacing LED, push button and buzzer with Arduino

- Interfacing Arduino with LCD

Module (4/6)
Module Name: Micro-controller programming using Arduino platform

Objectives:

- Understand Embedded Systems and its components
- Learn how to build embedded applications using Arduino Platform
- Become familiar with hardware interfacing using Arduino

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- Should be able to read device data sheets and board schematics
- Learn basic communication protocols and communicate using Arduino Libraries
- Build IoT applications using wired and wireless protocols (ex: Bluetooth, Wifi)
- Debug applications using Arduino IDE

Detailed course contents:

- Overview of Embedded Systems
- Components of Embedded Systems
- Micro-controller Architecture and Properties
- Installing and Setting up the Arduino development environment
- Blinky Sketch – A walk through
- Arduino Sketches
- Classes
- Sketch Structure
- Pins
- Arduino Shields
- Hands-on working with GPIOs, Analog I/Os, Memory usage
- Micro controller peripherals usage - Timers, Counters, Interrupts and its sources
- Communication protocols I - UART, SPI, I2C, CAN
- Interfacing IoT sensors and Actuators
- Debug applications using Arduino IDE
- Communication protocols II – Wired and Wireless communication
- Ethernet Client Server Implementation
- Build WiFi Application
- Build Bluetooth Application

Module (5/6)
Module Name: IoT Cloud Infrastructure

Objectives:

- To understand IoT cloud infrastructure blocks
- Making right IoT platform choice by understanding various popular platforms
- Configuring IoT platforms to get required analytics
- Learn integration elements (ex: REST APIs) for devices

Detailed course contents:

- IoT cloud building blocks
- Using the platform specific dashboards
- Device configuration and addressing
- IoT Platforms in detail
- MQTT Server
- Injection Engine
- Time Series database
- Rules Engine
- Data monitoring, visualization and IoT Analytics
- Rest API interface
- Device Management
- Application Service

Module (6/6)
Module Name: Performance and Security in IoT

Objectives:

- Learn how to benchmark IoT applications and platforms
- Understand the security risks in IoT, counter measures and design consideration
- Get an understanding of using crytography in IoT

Detailed course contents:

- Benchmarking IoT applications and Platforms
- MQTT vs HTTP performance
- Security considerations
- Firmware updates
- Cryptography basics
- Cryptography in IoT
- Privacy considerations and design guidelines