

**Course Name** : **Internet of Things (IoT) and Training for Mindsphere**

**Course Duration** : 40 Hrs.

**Course overview**

○ **Intended audience**

- This course is suited for Automation, Instrumentation and Mechatronics Engineers, Computer science

○ **Prerequisites**

- Education: Diploma or B.E/B.Tech 2nd year completed and above in any one of following Streams.
  - Electrical, Electronics, Instrumentation, Mechanical, Mechatronics Engineering, Computer science.
- Software: There are no prerequisites for this class.

○ **Course objectives**

- This course focuses on the Introduction of Internet of things (IoT), Industrial IoT (IIoT), Architecture and Hardware used in IoT and IIoT, Applications of sensors.
- It covers the Hands on Experience with Raspberry Pi, NodeMCU, and MindConnect Nano.
- It enables participants to understand Insights into Mindsphere essential.
- It enables participants to build end-to-end Systems

○ **Course Contents**

- Introduction of IoT:
  - Study and Definition of IoT.
  - Characteristics of IoT.
  - Physical and Logical Designs of IoT.
  - Challenges of IoT.
  - Applications of IoT.
- IoT Architecture: Introduction to IoT Architecture and overview on other different Architectures.
  - ITUT Architecture.
  - IWF Architecture.
  - ESTI Architecture.
  - IOTA Architecture.
- IoT Design Platforms: Overview of different Platforms ( Siemens Mind sphere, Microsoft Azure, IBM Watson)
- Overview of Mind sphere: Overview of Mind sphere architecture, Mind sphere analytics, and Mind sphere security concepts.
- Software: Overview of different software's. Overview of Tinker Cad Software. Introduction of Python Programming Language. Handling hardware boards using Python.
- Introduction to Wireless Sensor Networks and Network Technologies: Introduction to wireless sensors networks in IoT.
  - Fog Computing
  - Cloud computing
  - Analysis

- Network Technologies: The role of Network Technologies in IoT.
  - RFID
  - Bluetooth
  - BTE
  - ZigBee
- Hardware:
  - Introduction to Hardware used in IoT application, Identify the types of hardware. Overview of different Types of hardware boards (Raspberry Pi, Arduino, Node MCU- ESP8266)
- Sensors:
  - Overview of different types of sensors. Pin configuration and working principles of sensors. Sensors types Agriculture based sensors, Health based sensors, and other sensors.
- Introduction to Arduino and Raspberry Pi:
  - Arduino Board: Intro to Arduino board, Types of Arduino boards, How to run Arduino boards using Tinker cad circuits software.
  - Getting Started with Raspberry pi: Introduction to Raspberry Pi, Comparison of various Raspberry pi Models, Pin Description of Raspberry Pi, On-board components of Raspberry pi.
  - Installation of Raspberry Pi: Operating System , Linux Commands,
  - Installing Raspbian on Pi, first boot and Basic Configuration of Pi. Sensing Data using Python.
- Asset Manager:
  - Introduction – Data model in Asset Manager – User interface – Creating Aspects – create assets – Sharing assets – Configuring Mind connect Element – Visual flow creator.
- Fleet Manager:
  - Introduction – User interface – Asset navigation – Using Extensions – Visualizing Data – Using Graphs – time range functions – Analyzing Graph – Exporting data.
- Introduction to Node –Red:
  - Introduction to Node-Red. Installation of Node Red. How to run Node-Red.
  - Overview of Contiki Operating System and Cooja Simulator.
  - Integrating IOT lab with Mechatronics Lab using Mind Connect Nano Box.
- **Course outcome:**
  - Participants will be explored to understand the various enabling IoT Concepts
  - To understand Applications areas of IoT, IIoT, IoT Platforms, Software's and Hardware's
  - Understands the block chain, cyber security in IoT, IIoT and IoT Eco System.