



Certified Internet of Things Specialist (CIoTS)

INTRODUCTION

The Internet of Things will involve trillions of connected devices which will use cloud computing and cloud based applications for accessibility.

According to a report by Gartner, IoT will include 26 billion units installed by 2020

This course will focus on the core technologies behind Internet of Things. This certification leverages and explores the infrastructure, communication, sensor technologies, networking technologies, data/storage/analytics and security aspects of IoT in building the next-generation computing realm, which makes the world fully connected.

After the course, participants will have a good understanding of the different pieces of an IoT system and how they interact.

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Job Role in NICF / TARGET AUDIENCE

- Cloud Operations Engineer
- Senior Cloud Operations Engineer
- Data Analyst - Statistics and Mining
- Data Analyst - Text Analytics
- Operations Research Analyst

PRE-REQUISITES

Participants are preferred to have min. 2 years of experience in software development, business domain or data/business analysis.

PROGRAM STRUCTURE

This is a 5-day intensive training program with the following assessment components.

Component 1. Written Examination

Component 2. Project Work Component (PWC)

These components are individual based. Participants will need to obtain 70% in both the components in order to qualify for this certification. If the participant fail one of the components, they will not pass the course and have to re-take that particular failed component. If they fail both components, they will have to re-take the assessment.

COURSE SESSION SCHEDULE

| | Session 1 (9:00 – 10:45) | Session 2 (11:00 – 12:30) | Session 3 (13:45 – 15:15) | Session 4 (15:30 – 17:00) |
|--------------|---|--|--|--|
| Day 1 | Context Setting and Introduction | IoT Applications | Overview of IoT | Components & Elements of IoT |
| Day 2 | Architecture of IoT system | Architecture of IoT system | Hands-on 1 | |
| Day 3 | Middleware of IoT | Middleware of IoT | Hands-on 2 | |
| Day 4 | IoT Device Management | Machine Learning for intelligent IoT | Hands-on 3 | |
| Day 5 | Databases for IoT | Security aspects of IoT | Hands-on 4 | Review, Discussion & Assessment |

COURSE OUTLINE

Unit 1. Introduction to IoT

- What is IoT?
- Effects of IoT
- Skill set for IoT
- Challenges and barriers to IoT
- Functional Requirements of IoT

Unit 2. IoT Applications

- Smart Cities
- Smart Environment
- Smart Water
- Smart Metering
- Security & Emergencies
- Retail
- Smart Logistics
- Industrial Control
- Smart Agriculture
- Smart Animal Farming
- Home Automation
- eHealth

Unit 3. Overview of IoT

- Communication aspects involved in IoT system
 - Wired connectivity and technologies
 - Wireless connectivity and technologies
- Power and Energy Management & Optimization
- Network Topologies for IoT
- IoT Protocols
- IoT – Technologies & Software

Unit 4. Components & Elements of IoT

- Components of IoT
- Elements of IoT
 - Radio Frequency Identification (RFID)
 - Wireless Sensor Networks (WSN)
 - Addressing schemes
 - Data, storage and analytics
 - Visualization
 - Security

Unit 5. Architecture of IoT system

- Internet of Things—Architecture – IoT-A
- The IoT-A Reference Model
- Backbone technologies for IoT
- Middleware for IoT

- Machine Learning for intelligent IoT
- Management of IoT

Unit 6. Databases for IoT

- Big Data turning into “HUGE DATA”
- SQL Databases
- NoSQL Databases
- Cloud Databases

Unit 7. Security Aspects of IoT

- IoT Security Aspects
- IoT features leading to security issues
- Security Issues in IoT based on RFID
- Design Considerations for
IoT Technologies

Unit 8. Privacy Aspects of IoT

- Privacy Analysis
- Data Loss – RFID, Bluetooth, Big Data
- Mechanisms to Prevent Privacy Hack
- Popular Privacy Legislations
- Case Study
- Privacy Enhancing Technologies (PET)
- Few Approaches to IoT Privacy
- Practical tips to Handle IoT Privacy

HANDS-ON

Participants will have guided hands-on sessions on IoT to get firsthand knowledge about IoT and backbone technologies needed to build IoT applications. During this session they will gain understanding of several factors in building a successful IoT system.

The program consists of three hands-on sessions, three hours duration each. Also, participants will have demonstration session on Arduino, Raspberry PI, ESP8266, UnaShield V2S Arduino Shield for Sigfox with antenna, Node-RED, RapidMiner

Hands-on 1: Setup and configure an IoT platform such as Carriots. Further, participants will also perform building applications and managing devices connected to Internet.

Hands-on 2: Set up and configure Dashboard using Node-RED, create the flow, and prepare the Arduino IDE to upload the code in ESP8266 module. The circuit is built without any coding.

Hands-on 3: Set up and configure Arduino to read the UnaShield's onboard sensors and send the sensor data to the Sigfox network. To process the sensor data, set up a Sigfox Callback to transmit the data to an IoT platform.

Hands-on 4: Participants will perform business analytics on an IoT application data (including data loading and analysis operations) using an open source BA tool.

WRITTEN ASSESSMENT

As part of the written examination, each participant will be assessed individually on the last day of the training for their understanding of the subject matter and ability to evaluate, choose and apply them in specific context and also the ability to identify and manage risks. The assessment focuses on higher levels of learning in Bloom's taxonomy: Application, Analysis, Synthesis and Evaluation.

This written examination will primarily consist of 40 multiple choice questions spanning various aspects as covered in the program. It is an individual, competency-based assessment.

EXAM PREPARATION

The objective of the certification examination is to evaluate the knowledge and skills acquired by the participants during the course. The weightage in key topics of the course as follows:

- **Introduction to IoT [10%]**
- **IoT Applications – Use Cases [8%]**
- **Overview of IoT [12%]**
- **Components of IoT [10%]**
- **Architecture of IoT system [20%]**
- **Databases for IoT [8%]**
- **Mobile integration to IoT [7%]**
- **Security Aspects of IoT [10%]**
- **Privacy Aspects of IoT [15%]**

SOFTWARES USED

- **Arduino**
- **MQTT**
- **OpenNebula**
- **Blynk**
- **RapidMiner**
- **Thingsboard**