



Training Course	ROCHESTON Certified IOT Engineer (RCIE) Certification
Course Language	English
Course Duration	Total Number of hours: 40hours
Course Objectives	<p>This cutting-edge innovation training is for corporate executives and students seeking to understand the key concepts IoT. In the current era, IoT is being touted as the next big thing in the world of technology. The development of IoT implies that our society is not far from transforming into a comprehensive digitally connected world. At present, IoT finds application in the fields of transportation, design, education and healthcare.</p> <p>The sectors where knowledge of the IoT is being sought includes Product Management, Robotics, Hardware Engineering, Business Intelligence, Networking, Industrial Programming, Software Development, User Interface and Experience Design (UI/UX) and more. Understanding how machines and devices are built with embedded sensors and intuitive and interactive user interfaces enables professionals and businesses to take advantage of the opportunities created by the Internet of Things.</p>



Course Objectives

A Rochester Certified IoT Engineer will be trained in the various disciplines required to navigate the challenges of the Internet of Things revolution. The Rochester Certified IoT Engineer course is made up of a comprehensive set of modules that provide both an understanding and insight into developments in networking, data management and analytics, communication devices, embedded systems and user interface design.

Course Content

Course Key Topic Area Includes:

Module 01: IoT Concepts

- What is IoT?
- Impact of IoT
- IoT Definitions
- IoT and Digitization
- IoT Applications
- IoT Framework
- IoT Challenges
- IoT Statistics
- IoT and The Economy

Module 02: Infrastructure for IoT

- Hardware
 - Physical Engineering (Electrical and Mechanical)
 - Printed Circuit Boards
 - Design o Rapid Prototyping
 - Quality Control
 - UI/UX - software
- Govt Approval and Policy
 - The Policy framework of the IoT Policy in India focuses on Demonstration Centres, Capacity Building & Incubation, R&D and Innovation, Incentives and Engagements, Human Resource Development and 2 horizontal supports Standards & Governance structure.



Course Content

Module 03: IoT Network Architecture and Design

- IoT Architectural Drivers
- One M2M IoT Standardized Architecture
- Elements of M2M
- Application Layer
- Service Layer
- Network Layer
- IoT WF(World Forum) Standardized Architecture
- Collaboration and Processes
- Applications
- Data Abstraction
- Data Accumulation
- Edge Computing
- Connectivity
- Physical Devices and Controllers
- IoT Reference Models
- Perdue Model
- IIRA Model
- IoT –A Model
- Simplified IoT Architecture
- IoT Functional Stack
- IoT Data Management and Compute Stack
- Fog Computing

Module 04: IoT Business Models

- Making money with IoT o Ad based revenue (site ads, CPM, Cost per click, etc)
- Subscription and pay-per-access
- 'freemium'
- Revenue sharing
- Cross-selling and Upselling
- Selling the product
- Understanding your solution
- Engaging the proper people and channels (target audience)
- Simple and easy understanding of your product
- Simple procurement process



Course Content

- Sales pursuit plan must be built around a decentralized procurement process.

Module 05: Entrepreneurship Opportunities in IoT

- Hiring and setting up the right team
- Funding
- Infrastructure
- Webhosting
- Development and design
- Marketing
- Data Analysis

Module 06: IoT Standards

- IoT Standardization
- Spectrum energy communication protocol standards
- Standards for communication within and outside the cloud
- International quality and integrity standards for data creation and data traceability
- Standards for energy consumption
- Safety standards
- Privacy and security standards

Module 07: IoT Platforms

- AWS • Windows 10 IoT Core
- Kaa
- IBM Watson/Bluemix
- Google Cloud IoT
- Predix
- Oracle Integrated Cloud
- Salesforce IoT Cloud
- CISCO IoT Cloud
- Arduino
- PlatformIO
- GraspIO
- Node-RED
- Ardublock
- Modkit
- ReactiveBlocks



Course Content

Module 08: IoT Development Boards

- Arduino Uno
- Raspberry Pi
- Intel Edison
- Arduino 101
- Particle Photon 2G & 3G
- Dragonboard 410C

Module 09: IoT Circuits and Wirings

- Basics of circuits
- Understanding the different circuits
- Basics of wiring
- Different connectors and wires
- The functions and workings of the different pins on a development board

Module 10: IoT Sensors, Actuators and Smart Objects

- Sensor Types
 - Machine Vision/Optical/Ambient Light sensors
 - Acceleration/Tilt Sensors o Electric/Magnetic Sensors
 - Leak/Level Sensors o Force/Load/Torque/Strain/Pressure Sensors
 - Flow Sensor o Chemical/Gas Sensor
 - Acoustic/Sound/Vibration Sensors
 - Humidity/Moisture Sensors
 - Temperature Sensors
 - Motion/Velocity/Displacement Sensors
 - Position/Presence/Proximity Sensors
 - Flow Sensors
 - Radiation Sensor
 - Position Sensor
 - Bio Sensor
- Sensors in a Smart Phone
 - Camera Sensor
 - NFC Sensor
 - Pedometer Sensor



Course Content

- GPS Sensor
 - Light Sensor
 - Touchscreen Sensor
 - Thermometer Sensor
 - Digital Barometric Pressure Sensor
 - Fingerprint Sensor
 - Microphone Sensor
 - Moisture Sensor
 - Gyroscope Sensor
 - Humidity Sensor
 - Accelerometer Sensor
 - Magnetometer Sensor
 - Proximity Sensor
 - IoT Actuators
 - Hydraulic Actuators
 - Pneumatic Actuators
 - Electric Actuators
 - Electromagnetic Actuators
 - Thermal/Magnetic Actuators
 - Mechanical Actuators
 - Electromechanical Actuators
 - 3D Printed Soft Actuators
 - Smart Material Actuators
 - Micro and Nano Actuators
 - Micro Electro Mechanical Systems (MEMS)
 - Smart Objects
 - Wireless Sensor Networks
 - Sensor- Actuator Networks (SANET)
- Module 11: Interconnecting Smart Objects**
- IEEE802.15.4
 - IEEE802.1.5.4G
 - IEEE802.15.4e
 - IEEE1901.2A
 - IEEE802.11aH
 - LoRaWAN
 - NB-IOT
 - LTE
 - IFTTT



Course Content

- Frequency Bands
 - ITU
 - FCC
 - CISCO Jasper
 - YMAX
 - Narrow Band
 - IoT-NB
 - ISN
 - 2.4Ghz
 - IEEE.11.B/G/N WiFi
 - IEEE802.15.1 (Bluetooth)
 - IEEE802.15.4 WPAN
- IoT Topology
 - Star Topology
 - MESH Topology
 - P2P Topology
- Classes of Constrained Devices
 - Class 0
 - Class 1
 - Class 2
- Constrained Node Networks
- IoT Access Technologies
- IoT Standardization and Alliances
 - Zigbee
 - 6LoWPAN
 - Zigbee IP
 - ISA 100.11a
 - Wireless HART
 - Thread

Module 12: IoT Programming Languages

- C
- C++
- Java
- Python
- JavaScript
- Assembly
- B#



Course Content

- Go
- Parasail
- PHP
- Rust
- Swift
- Arduino

Module 13: IoT Network Layers

- IoT Protocols
 - IoT Application Protocol
 1. Transport Layer
 2. SCADA
 3. Web Based Protocols
 4. Application Layer Protocols
 5. MQTT
 - Cellular Provider and Technologies
 1. Serial Communications
 2. IPv6
- Internet Protocols for IoT
- 6TiSCH
- RPAL
- DODAG
- IoT Compliances
- Wi-Sun Alliance

Module 14: IoT Building Prototypes using 3D Printers

- Basics of 3D printing
- Modeling
- Printing
- Finishing
- Processes and Printers

Module 15: IoT Cloud Data Storage

- Storing your data in the cloud
- Indexing the data
- Integrating structured and unstructured data
- Combining and extending multiple databases to store and manage diverse types of data collected



Course Content

Module 16: Deep Learning

- What is deep learning?
- Neural Networks
- Machine Learning
- Supervised Learning
- Unsupervised Learning
- How to train and optimize basic neural networks, convolutional neural networks and long and short-term memory networks
- Learning systems in TensorFlow
- Caffe
- Theano
- Torch

Module 17: Big Data Analytics •

- What is big data analytics?
- Parallel Processing
- NoSQL Databases
- HADOOP
- Edge Streaming Analytics
- Network Analytics
- Net Flow Architecture
- Why we need big data analytics?
- Scope for big data analytics.
- Big data analytics and the IoT
- Challenges of Big Data Analytics(profitability)

Module 18: Industry 4.0

- Penetration of IoT into industries (how widely it is used?)
- How industries will benefit from IoT? (cost and productivity improvements)
- Applying IoT across all forms of industry (What else it can be used for? Include smart processes)
- Impact of Industry 4.0
- Smart products
- Smart supply chains



Course Content

Module 19: Smart Cities

- Digital Cities
- Virtual Cities
- Information Cities
- Intelligent Cities
- Ubiquitous Cities

Module 20: IoT Cloud Data Storage

- IoT in Manufacturing
- IoT in Oil and Gas
- IoT in Utilities
- IoT Smart and Connected Cities
- IoT in Transportation
- IoT in Mining
- IoT in Public Safety
- IoT in Healthcare

• Module 21: IoT Security

• Module 22: Io in Home Automation

Learning Outcomes

At the end of the program the trainees will be able to:

- Tremendously improve their marketability and career prospects especially for those aspiring to move forward in their present fields or seeking new opportunities in a rapidly transforming and ever-changing job market.
- Equip with in-depth knowledge about skills required in the IOT industry, bringing them closer to the real-life experiences. Users will be introduced to the various terms and definitions applicable in the IoT world.



Learning Outcomes

- **Analysis of tools with a hands-on experience of building basic IOT devices in the class. You get to understand the scenarios where network connectivity and computing capability allows various devices to exchange data with minimal human intervention.**
- **Create a understanding on the IoT framework which is crucial in the growth of IoT and the modules informs us about the three technological areas that are in focus for IoT.**
- **Understand how machines and devices are built with embedded sensors, intuitive and interactive user interfaces enables professionals and businesses to take advantage of the opportunities created by the Internet of Things. .**
- **Leverage current trends to develop better business strategies in the world of IOT.**
- **Help chart the way for future entrepreneurs and technology professionals lead the way in IoT-related development.**
- **Expanding existing job opportunities in the field of IOT with the increase in integration of IoT technologies in business practices and industrial processes. The market demand for IoT devices, tools and ever demand for professionals trained specifically to handle IoT devices and IoT processes in businesses will increase.**



Learning Outcomes	<ul style="list-style-type: none">• The Rocheston Certified IoT Engineer course is made up of a comprehensive set of modules that provide both an understanding and insight into developments in networking, data management and analytics, communication devices, embedded systems and user interface design.
Target Audience	<p>The RCCE program is aimed at IT Professional with IT/Computer qualifications, or working experience, IT Support Technician, IT Network Personnel, IT Degree Students and those with knowledge of C programming language.</p> <p>Requirement : Basic knowledge in programming or coding in C programming language .</p> <p>This course will not teach you how to do programming in C, but rather using C programming language codes to interact with the hardware/sensors or circuitry. Most of the codes are pre-provided, but students will be required to amend the codes to achieve different results during the hands-on session.</p> <p>Computer with minimum 4GB Ram but 8 GB is recommended, with a Intel Core i5 processor.</p> <p>Optional : Your own internet mobile broadband as the hotel only provides max 5MB per device.</p>
Course Material /Technology used/ Details Relevant to the course.	<p>Electronic Kit via Cyberclass (ROCHESTON's E-Learning Platform) inclusive of online Course Materials for 1 year access.</p> <p>On Registration, you will be provided with –</p> <ol style="list-style-type: none">1. Online Course Manuals/ Materials2. RCIE IoT Inventor's Physical Kit3. Cybernetwork® access to online labs4. Exam Voucher



**Course Material
/Technology
used/ Details
Relevant to the
course.**

Exam Duration: 120 minutes

No of Exam Question: 90

Passing Mark: 72

- **Exam Retake Fee: USD400**
- **The exam will be conducted on the last day of the training based on the trainer's discretion.**
- **The students will receive the RCCE Level 1 certification after passing this test. The certification is valid for 2 years. You can renew the certification.**