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A developer's guide to the Internet of Things (IoT)

IBM

Upcoming session:

July 11 - August 14

Enrollment ends July 16

Enrolled

Following session begins July 25

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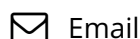## Course Ratings

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About this Course

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The Internet of Things (IoT) is an area of rapid growth and opportunity. Technical innovations in networks, sensors and applications, coupled with the advent of 'smart machines' have resulted in a huge diversity of devices generating all kinds of structured and unstructured data that needs to be processed somewhere. Collecting and understanding that data, combining it with other sources of information and putting it to good use can be achieved by using connectivity, analytical and cognitive services now available on the cloud, allowing development and deployment of solutions to be achieved faster and more efficiently than ever before.

This course is an entry level introduction to developing and deploying solutions for the Internet of Things. It will focus on capturing data from a trusted device and sending the data to a cloud platform where it can be exploited by the many services available. You will explore all the steps required to create a basic IoT solution using a popular device, the Raspberry Pi, and a trial version of the cloud-based IBM Watson IoT Platform.

What you will learn:
Quickly create applications that leverage connectivity and analytics as part of an integrated IoT platform. Use Node-RED, an open-source visual application development environment, on both the device and the cloud. Create a basic IoT solution by leveraging pre-built blocks of code that abstracts and speeds the development process. Use APIs to access the platform and explore the different connectivity options for various devices, gateways and applications. Explore options to ensure your solution makes best use of the captured data.

What technology is required to complete the course?
The programming assignments require you to have a Raspberry Pi device - any model of Raspberry Pi with a 40 pin header. The course also uses the SenseHAT extension board, whilst it is preferable to have a SenseHat there is a simulator provided if you can't get a SenseHAT. You will need internet connectivity to download software, connect to the platform, develop and deploy your IoT solution.
Your Rasberry Pi will need the latest Rasbian Jessie OS. This OS will be on a Micro SD Card. The

recommended size of the SD card is 8GB but 4GB will do. Note that the learner kit comes with a preconfigured SD card.

In order to setup the Micro SD card, you will need a computer with either a windows, apple or Linux OS. Since most computer do not have a micro SD port, you will need a Micro SD adapter or USB Micro SD card adapter. Your computer will also be used when working on the platform.

To work on your Raspberry Pi, you will need an HDMI monitor or TV to work as the display for the Raspberry Pi (DVI monitor will also work). To connect the monitor to the Raspberry Pi you will need an HDMI cable (or a DVI to HDMI cable).

Your Raspberry Pi needs a way to connect to the internet; either an Ethernet cable for connecting to the Router, or a USB WiFi dongle if you have wireless connectivity. Note that the Raspberry Pi 3 includes built-in WiFi

A USB Keyboard and mouse.

Your Raspberry Pi will also needs a 5V micro USB power supply i(This may be a phone charger for example)

What prerequisite skills are required ?

This is an entry level course, but does assume you have basic programming skills. The assignments set use both Python and JavaScript programming languages, so some basic skill in these languages is required. No previous experience with IBM Bluemix or the IBM Watson IoT Platform is required.

What additional resources do I need for this course?

The Server side code for the assignments will use the IBM Bluemix cloud platform, so you will need to sign up for a free account on that platform.

When your 30-day trial expires, you can enter a credit card to keep using Bluemix. Bluemix has a set amount of free resources available to users who have registered with their credit card. If you stay within these free resources limits you will not incur any charges. This is a good idea if you are planning to take longer than 30 days to complete the course, or if you have an existing trial account that that is about to expire and you need longer time on the platform to complete the course.

🌐 Subtitles available in **English**
👥 Volunteer to translate subtitles for this course
🕐 4 weeks of study, 2-4 hours/week

Instructors

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Syllabus

Week 1 | ## Introduction to the course

About this course
What is the Internet of Things?

Quiz: IoT Quiz

Week 2 | ## Rapid application development in the cloud

Introduction to a Platform as a Service - IBM Bluemix
Rapid application development for Internet of Things
NodeRED function node
Additional NodeRED nodes

Quiz: Using the function node
Programming Assignment: Your First NodeRED application
Programming Assignment: NodeRED application

Week 3 | ## Rapid application development on a Raspberry Pi

Raspberry Pi and SenseHAT
Rapid Application Development with NodeRED on a Raspberry Pi
Introduction to the Watson Internet of Things Platform
Controlling a device

Programming Assignment: QuickStart flow on Raspberry Pi
Quiz: Using the NodeRED flow editor with your own Watson IoT platform.
Programming Assignment: End-to-end scenario

Week 4 | ## Lower level programming for the Internet of Things

Watson IoT APIs
MQTT
Deploying Applications to Bluemix
Wrap up

Programming Assignment: SenseHAT python API
Quiz: MQTT in Watson IoT Platform
Programming Assignment: Using the IoT APIs in a Bluemix application

How to Pass the Course
Pass all graded assignments to complete the course.

Related Courses

Internet of Things: Sensing and Actuation From Devices
University of California, San Diego

Internet of Things: Setting Up Your DragonBoard™ Development Platform
University of California, San Diego

Internet of Things: Multimedia Technologies
University of California, San Diego

Internet of Things: How did we get here?
University of California, San Diego

Internet of Things: Communication Technologies
University of California, San Diego