



# IoT Developer

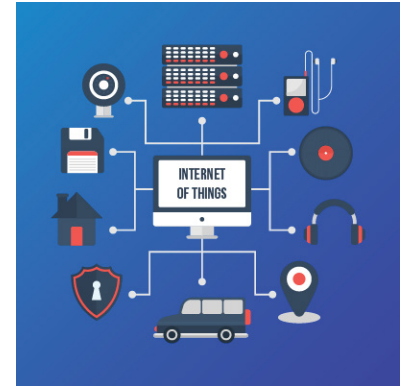
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The Internet of Things is one among the advanced technologies that is shaping the future in the fourth industrial revolution. It has the potential to fundamentally shift the way we live, interact with our surroundings and take data-driven decisions to transform businesses & processes.

The program allows you to take full advantage of the explosive growth opportunity. It lays a strong foundation to conceptualize, prototype end-to-end IoT solutions merging the physical and digital systems thereby innovate or start an exciting career.

# Introduction to Internet of Things

In this course, you will learn about the Internet of Things with the help of live demonstrations and explore various real-life applications. You will understand the widely used terminology in IoT, explore the ecosystem and ideate to apply IoT in your daily life.



## What is the Internet of Things?

- Understanding the Internet of Things
- Smart Things & Connected Things
- IoT Verticals

## Live Demonstrations

## Prototype: Build an IoT Prototype in 15 minutes!

## Architecture of IoT Solutions

## Activity: IoT in a day

## Activity: Ideate an IoT application

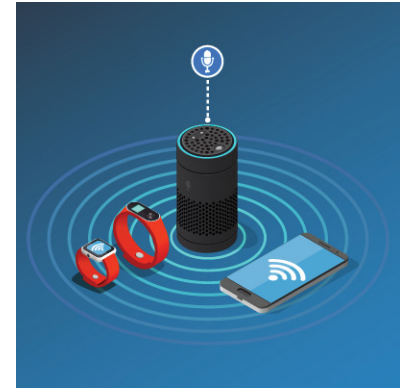
## Is IoT already here?

- Trending IoT Products
  - How big is IoT?
  - Career and Innovation Opportunities in IoT
  - IoT Ecosystem
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## Career Road Map

# Understanding an IoT Device

In this course, you will learn what constitutes an IoT device, and the product life cycle of an IoT device. You will be able to identify various parts of an IoT device and gain high-level overview of device requirements.



## What is inside an IoT device?

- IoT Product Teardown
- Overview of building blocks
- Sensors and Actuators
- Mixed Signal Interfaces
- Computation
- Wireless Connectivity
- Power Management
- Embedded Software

## Activity: Identify parts of an IoT Device

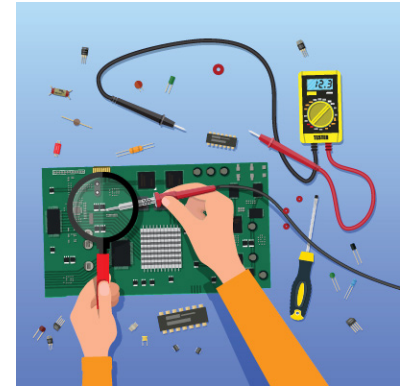
## Activity: IoT Product Canvas

## IoT Product Lifecycle

- Problem Research
- Proof-of-Concept
- Engineering
  - Looks-like prototype
  - Works-like prototype
- Validation
- Mass Production

# Getting started with Prototyping

Prototyping is the most crucial and exciting phase of a product. In this course, you will learn about hardware & software development platforms, capture real world data and most importantly develop application logic based on data from your surroundings.



## IoT Hardware Development Platforms

- Can microcontrollers fuel rapid prototyping?
- What is a DevBoard?
- The world of Arduino Dev Platform
- Wireless DevBoards
- Single Board Computers
- Hardware specifications

## IoT Software Development Platforms

- Overview
- Arduino IDE
- Embedded Programming Platforms
- Embedded Operating Systems

## Hello to IoT World!

- Overview
- Interfacing hardware
- Basics of Arduino Programming
- Controlling LED output
- Blinking an LED
- Reading GPIO inputs
- Working with Serial library

## Hello to sensors!

- Overview
  - Activity: Play with Smartphone Sensors
  - Interfacing a Temperature and Humidity sensor
  - Reading sensor data
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## Hello to actuators!

- Overview
  - Interfacing Servo Motor
  - Run the Servo Motor
- 

## Deep Dive into Sensors

- Overview
  - Identify a sensor
  - Qualify a sensor
  - Integrate a sensor
  - Read sensor data
  - Evaluate a sensor
- 

## Deep Dive into Actuators

- Overview of Actuators
- Integrate an actuator
- Evaluate an actuator

## Hardware Interfaces

- I2C
- SPI
- 1-wire
- UART
- MODBUS
- DALI

## Prototype: Ambient lighting



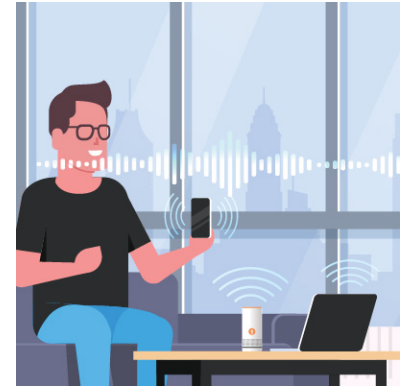
### Course Project

#### Smart Vault

Do you have your own secret draw or box to treasure all your valuables and secrets? Then, why not build a secret vault that will unlock only if you knock with a secret pattern.

# Going Wireless

Get an overview of the backbone of all IoT Solutions – Communication. Go wireless in IoT by exploring various wireless communication technologies, get your hands-on with Wi-Fi and Bluetooth and build interesting wireless prototypes.



## Connectivity in IoT

- Overview
- Communication Technologies for IoT

## Add Wi-Fi Connectivity

- Overview
- Client-Server communication
- Install firmware packages
- Connect to a Wi-Fi network
- Find the IP address of the device
- Configure a client
- Host a server

## Prototype: Fuzzy Weather Machine

## Add BLE Connectivity

- Fundamentals of Bluetooth
- Master-slave communication
- Interfacing Bluetooth communication module
- Configuration of Bluetooth communication module
- Establish serial communication



## Prototype: Smart Tag - A Bluetooth Tracker

### **Course Project** Smart Door-Light

Worry not to enter dark rooms. Build a door activated lighting system which will turn on the light as soon as you open the door

# Leveraging IoT Platforms

Here, you will come across numerous IoT applications in different verticals which use various sensors, actuators, cloud platforms and communication protocols. You will work on multiple IoT Solutions by integrating sensors, actuators and IoT Platforms.



## The concept of IoT Platforms

- Overview
- IoT Platform Technology Stack
- Remote Management
- Data Visualisation
- Device Management
- Identity Management
- Configuration Management
- Software Updates (OTA)
- Rule Engine
- Control Widgets
- Analytics
- Drag and Drop app development

## Live Demonstrations

## Trending Platforms in the Market

### Develop an IoT Solution: Mood Light

- Overview
- Integrate the hardware
- Develop an IoT app
- Program the hardware
- Remotely manage & control hardware

## Develop an IoT Solution: Smart Socket

- Overview
- Integrate the hardware
- Develop an IoT app
- Program the hardware
- Control the socket
- Monitor sensor data

## Develop an IoT Solution: Asset Tracker

- Overview
- Condition Monitoring of an Asset
- Track location
- Integrate services using NodeRed
- Develop a real-time IoT Dashboard
- Program the hardware
- Monitor Events
- Trigger Alerts

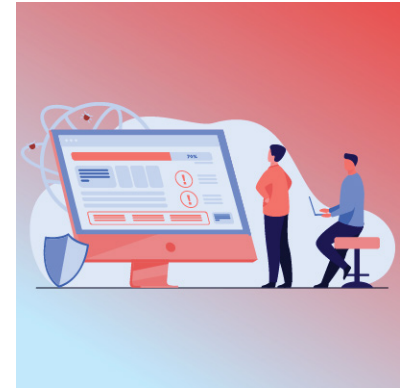


### Course Project Smart Bins for Smart City

Aggregate data from Smart Bins and build a cloud-based monitoring system for fill-levels, improving waste collection efficiency from thousands of bins throughout a city

# Data Modeling and Processing

In this course, you will get familiarized with IoT protocols and how to build custom integrations using the same



## IoT Protocols

- Overview
- HyperText Transfer Protocol (HTTP)
- Message Queue Telemetry Transport (MQTT)
- Constrained Application Protocol (CoAP)
- Advanced Message Queuing Protocol (AMQP)
- Comparison of IoT Protocols

## Data Modeling using HTTP

- Overview
- HTTP Clients
- HTTP Server
- Request Response Model
- Client – Server communication

## Data Modeling using MQTT

- Overview
- MQTT Clients
- MQTT Brokers
- PubSub Model
- Clients – Broker communication

## Develop an IoT Solution: COVID-19 Automated Occupancy Monitoring

## Develop an IoT Solution: Control your home with a custom App

### **Course Project** Connected Factory

Build connected systems for air quality, vibration monitoring, emergency response etc., to ensure worker safety and operational efficiency of factories

# Architecting IoT Solutions

In this course, you will learn IoT architecture and different building blocks of IoT like sensors, actuators, etc through real-life examples around you. You will also learn about IoT product life cycle and different steps involved in it.



## How to architect an IoT Solution?

### Activity: Budding Architect

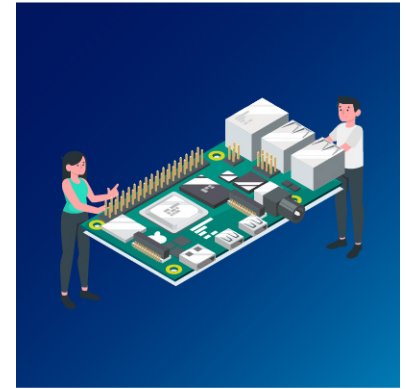
### Essence of IoT Edge

#### **Course Project** Architect an IoT solution

Put the hat of an IoT Architect and propose an architecture along with device blocks for a given problem statement

# Developing IoT Edge Solutions

In this course, you will start off with Raspberry Pi and learn basics in it along with some interesting projects built on Raspberry Pi. You will also build solutions for a real-world problems using Raspberry Pi



## Getting Started with Raspberry Pi

- Setting up Operating System on Pi
- Pi as your personal computer
- Adding and using software
- Interfacing hardware to Pi
- Coding with Pi
- Remote access and security

## Gesture controlled Robot buggy

- Overview
- Physical Computing using Python
- Working with GPIOs using Python library
- Interact with input and output components
- Obstacle avoidance algorithms
- Gesture control algorithms

## IoT Edge

- Overview
- Deploy code to a Linux device
- Develop custom code modules
- Machine Learning at the Edge
- IoT Edge device as a Gateway
- Production Deployment Checklist
- Manage with DevOps Tools



## Course Project

### Smart Spaces

Learn to forge new ground in workspaces by automating solutions such as environment monitoring, occupancy monitoring, meeting room availability etc.,



# Course Wrap up

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In this course, you will understand the challenges in IoT and how IoT can go hand-in-hand with other advanced technologies.



## Challenges in IoT

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## IoT Security

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## IoT + AI/ML

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## IoT from Space

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## Road Ahead

# Contact us

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 [support@onthegomodel.com](mailto:support@onthegomodel.com)

 [www.onthegomodel.com](http://www.onthegomodel.com)