

## IOT COURSE CONTENT

Duration: 45 Hours

**Our Strength**  
**Shiva Sir**  
**0731-4069788**

<b>IOT Architecture</b>	<p><b>IoT Architecture</b> IoT Technology stack, Sensors &amp; Actuators, Hardware Platforms, Wireless Communication Protocols, Network communication Protocols, Cloud, its components and IoT, Data Streaming in IoT, Data Store and IoT, Analytics &amp; Visualization for IoT</p> <p><b>Sensor &amp; Actuator</b> What is Sensor &amp; Actuator?, What is a good sensor?, Sensor properties and their classification, Types of Sensors &amp; Actuators, Working of typical Sensors and Actuators, Categories of sensors Commercial/Industrial/Military/Medical/Food grade sensors, Selecting a sensor for your use case, IoT Hardware Platform &amp; comparison, Criteria for selecting Hardware platform</p> <p><b>Raspberry pi and Arduino Hardware Overview</b> The Raspberry Pi and Arduino Open Source Microcontroller Platform, Schematics, PCB Design Tools and prototype steps, Raspberry Pi and Arduino Board Layout &amp; Architecture, Why Raspberry Pi and Arduino?</p> <p><b>Arduino Programming fundamentals</b> How to program Arduino with Arduino IDE, How to make your Arduino respond to sensors and actuators, Reading data from analog/Digital Sensors, Writing data to analog (PWM)/Digital actuators</p> <p><b>Interfacing Sensors and Actuators with Hardware</b> Connecting sensors to Arduino to read data from sensor and display on serial monitor (Temperature, Humidity, Distance, Light, Moisture, Gas (Methane/Alcohol), Proximity, Motion)., Connecting actuator to Arduino and controlling Actuator (LED, Relay, Push button, Buzzer) Controlling a motor (actuator) by sensing Temperature, Controlling a buzzer using Ultrasonic ranger, PIR (Human presence) (Combining sensors to avoid false alarms), Controlling sprinklers using relay by sensing moisture in the soil using moisture sensor</p> <p><b>Program Raspberry Pi board</b> Working with Raspberry Pi 3 Model, Installing OS and Designing Systems using Raspberry pi, Configuring Raspberry Pi for VNC Connection, Getting introduced to Linux OS, Basic Linux commands and uses, Getting Started with Python, Variables, Functions and control Structure, File Handling in Python &amp; Importing or Exporting Data, Interface sensor and Actuator with Raspberry Pi</p> <p><b>IoT Communication Protocol</b> <b>IoT Wireless Protocols</b></p>
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<p>RFID, NFC, Blue Tooth, BLE, ZigBee, Zwave Mesh network, Comparison of wireless Protocols, How to select a wireless Protocol based on use case</p> <p><b>IoT Communication Channels</b> Wi Fi, GSM/GPRS, 2G, 3G, LTE, Comparison of Communication Channels, How to select a Communication Channels based on Use Case.</p> <p><b>IoT Network Protocols</b> MQTT/MQTTS, CoAP, 6LoWPAN, TCP, UDP, HTTP/s</p> <p><b>Comparison of the Network protocols</b> How to select a Network Protocol based on Use Case</p> <p><b>Introduction to IPv4 and IPv6</b> Issues with IPv4 in IoT, How IPv6 solves the issues with IPv4, Application issues with RF protocol, power consumption, LOS, reliability, Security aspects.</p> <p><b>TCP/UDP Transport layer Protocol</b> Introduction of TCP &amp; UDP, Difference between TCP/UDP Transport layer protocol, Practically testing the TCP v/s UDP by python socket programming.</p> <p><b>HTTP Application layer IOT Protocol</b> Introduction and structure of HTTP protocol, Start with HTTP protocol GET/POST Method, Work on python Flask library design web page, Control thing from webpage using HTTP protocol, Publish sensor data over webserver.</p> <p><b>MQTT IOT Protocol</b> Introduction to MQTT, Why MQTT?, Features of MQTT, MQTT Subscribe/Publish, MQTT Broker, MQTT QoS, MQTT Security</p> <p><b>MQTT with Raspberry Pi</b> Installation of Mosquito MQTT broker, Publish and Subscriber test on local server broker, Start with Paho MQTT, Publish/subscribe test on iot.eclipse platform.</p> <p><b>CoAP IOT Protocol</b> Introduction of CoAP, Architecher of CoAP IOT protocol, Diffrence between HTTP &amp; COAP, Implement of CoAP using CoAPthon Python library, Design server and client using Python</p> <p><b>IoT Cloud Platform(Ubidot)</b> Read data from sensors, Create JSON Object, Establish HTTPS connection using Wi Fi, Send JSON data to Ubidot Rest API over HTTPS, Create business rules in Ubidot for alarms, Send</p>
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<p>Data to Ubidot platform, Create rule and configure Alarm(SMS/Email) for your device, Send data to Ubidot which will trigger the alarm, Create and configure Chart/Graph for visualization, Control the actuator from Ubidot using polling technique</p> <p><b>Theory Introduction to the Big Data and Big data technologies.</b></p> <p><b>Cloud Computing</b> What is cloud?, What is cloud computing?, Benefits of cloud., Deployment Models., Top cloud providers., Service Models, Service Catalogue, Advantages for different offerings, Introduction to AWS, Service provided by AWS E2C, SimpleDB RDS, Dynamo DB, Elastic Beanstalk, SNS, Cloud Watch, Route 53, VPC, Elastic Load Balancing, S3, EBS, IAM</p> <p><b>BigData</b> Cloud data storage, Introduction to Big Data, BigData Definition and Characteristics, Who is Generating Big Data, Big Data Analytics, Why Big Data Analytics, Applications of Big Data Analytics, Different Data Stores, Big Data Technologies CouchDB, MongoDB, Node4J</p> <p><b>AWS IoT Setup for Application Development</b> Introduction to AWS IoT, Creating a Thing in AWS IoT, Downloading SDK and configuring RaspberryPi.</p> <p><b>Preparing the RaspberryPi to connect to AWS IoT</b> Downloading Certificates from AWS IoT console, Installing certificate in RaspberryPi, Connecting Sensors to RaspberryPi II.</p> <p><b>Connecting to AWS IoT</b> Configuring RaspberryPi sketch to connect to AWS IoT through Wi Fi, Establishing MQTT Connection, Publishing Sensor data to AWS IoT Thing Shadow, Subscribing MQTT Topic and controlling actuator from Thing shadow</p> <p><b>Send Data from raspberry Pi to AWS IoT</b> Run Ultrasonic ranger sketch in RaspberryPi and check, Updating of data from RaspberryPi to AWS Thing Shadow</p> <p><b>Dynamo DB</b> Configuration of Dynamo DB, Create table in Dynamo DB, Create rule link dynamo DB with AWS IOT, Store sensor data From AWS IOT in Daynamo DB.</p> <p><b>SNS</b> Setup SNS service, Test SNS service by publish/subscribe, Create a rule and link with AWS IOT, Notify through mail when Publisher publish data</p> <p><b>IOT Project</b></p>
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