

INTRODUCTION TO ROBOTICS

Module 01

- Introduction to Robotics
- Why things must be automated
- Introduction to Embedded systems
- Introduction to Open Source platforms
- Life Cycle & Product development
- Robotics market overview
- Case Studies on market product
- Industrial revolution 4.0

Module 02

- Basic of Electronics
- Introduction to Digital Circuit
- Introduction to Power Supply
- Introduction to Micro-controllers
- Introduction to Development Boards
- How Micro-controller is programmed
- Digital Input / Digital Output

Module 03

- Introduction to Arduino
- Pin Configuration of Arduino
- Architecture of Arduino
- Concept of digital & analog ports
- Introduction to I/O Pins
- Software & Driver setup for Arduino
- Basics of Arduino IDE (Editor)

Module 04

- Pins Configured as INPUT
- Pull-up Resistors
- Pins Configured as OUTPUT
- pinMode Function
- digitalWrite Function
- analogRead Function
- Arduino Interrupts
- Incorporating delay time
- delay Function

Module 05

- Interfacing LEDs LED Glowing/ Blinking / Pattern Switch Interfacing
- Controlling LEDs Using Switch
- **PROJECT 1 : MAKING A BLYNKY PROGRAM**
- **PROJECT 2 : LED FLIP FLOPPING**
- **PROJECT 3 : TRAFFIC LIGHT CONTROLLER**
- **PROJECT 4 : ITEM COUNTER**
- **PROJECT 5 : BEEP COUNTING**

Module 06

- Conditional Statements
- if statement
- if-else statement
- Nested if-else statement
- if-else if ladder
- Switch Statement
- Conditional Loops
- While loop
- For loop implementation
- **PROJECT 6 : HOME LIGHT CONTROLLING**
- **PROJECT 7 : DISPLAYING VISUAL DATA ON SERIAL MONITOR**
- **PROJECT 8 : DISPLAYING DIFFERENT PATTERN ON SERIAL MONITOR**

Module 07

- Introduction to Pulse width modulation
- Concept of Duty Cycle
- Modulated wave generation
- Effect of PWM on LEDs
- Intensity Control using PWM
- Concept of Serial Monitor
- Baud Rate for data transmission
- Controlling the device intensity through switch using the concept of PWM

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- **PROJECT 9 : PWM SOUND SYNTHESIS**
- **PROJECT 10 : LED CHASING**
- Introduction to DC Motor
- Various Configuration of DC Motor
- Concept of motor rotation
- Effect of PWM on Motor
- Motor controlling using switch
- **PROJECT 11 : CONTROLLING THE SPEED OF MOTOR USING POTENTIOMETER**

Module 08

- Introduction to Analog to digital conversion
- Why ADC is important
- Introduction to LM35 Temperature sensor
- Introduction to IR Sensor
- **PROJECT 12 : HOME TEMPERATURE CONTROLLING**
- **PROJECT 13 : CHECKING THE COUNTER DATA USING IR SENSOR ON SERIAL MONITOR**

Module 9

- Introduction to Ultrasonic Sensor
- Introduction to Relay Systems
- Interfacing Different Sensor Modules with Arduino UNO
- **PROJECT 14 : MOTION DETECTION SYSTEM TO PREVENT THEFT CASES**
- **PROJECT 15 : SMART HOME DEVICE CONTROLLING USING RELAY**
- **PROJECT 16 : PROTOTYPING OF SMART AGRICULTURE SYSTEM USING VARIOUS SENSOR MODULES**

Module 10

- Introduction to H-Bridge
- Setting up H-Bridge
- Introduction to Robots
- Different Types of Robots
- Robot Assembly
- Robot Motion Control

- **PROJECT 17: MAKING A LINE FOLLOWER ROBOT**
- **PROJECT 18: MAKING OBSTACLE DETECTOR ROBOT**
- **PROJECT 19 : COLLISION AVOIDANCE ROBOT**
- **PROJECT 20: EXCLUSIVE STUDENT'S CHOICE PROJECT**

Project Discussion:

1. Water Level Controller using Arduino
2. LPG Leakage Detector
3. Cough Detection System using Arduino BLE Sense and Edge Impulse
4. Fingerprint based Car Ignition System using Arduino and RFID
5. Women Safety Device with GPS Tracking and Alerts Using Arduino
6. Coin Sorting Machine using Arduino
7. Smart Restaurant Menu Ordering System using Arduino
8. AC Fan Speed Control using Arduino and TRIAC

Bonus Discussion on Internet of things:

1. Introduction to Internet of Things
2. Introduction to Open Source platforms
3. Life Cycle of IoT Product & Services
4. Introduction to IoT Architecture
5. Case Studies on Internet Of Things
6. Concept of Smart Cities
7. Wires-less dustbins for smart cities
8. How IoT will revolutionize the entire agriculture industry
9. Why the next boom is IoT 4.0
10. How machine learning and IoT can be integrated
11. Which tools are required to get into Internet of things
12. Our Internet of things course :)