ARDUINO ROBOTICS

Course Guide

Welcome to the Tech Watt Arduino Robotics Course. This program is designed to provide learners with hands-on experience in electronics, programming, and building functional robots using Arduino. Whether you're a beginner or looking to solidify your foundation, this course takes you from the basics of electronics to advanced robotics applications.

Module 1

Introduction to Arduino and Robotics

- What is Arduino?
- What is a Robot?
- Types of Robots
- Applications of Robotics
- Course Overview & Project Preview

Module 2

Electronics Fundamentals

- Electricity Basics (Voltage, Current, Resistance)
- Ohm's Law
- **Basic Electronic Components:**
  - Resistors
  - Capacitors (Electrolytic, Ceramic)
  - Diodes (Rectifier, Zener)
  - LEDs
  - Inductors
  - Transistors (NPN, PNP)
  - Switches and Push Buttons
  - Potentiometers
  - Buzzers
  - Relays
- Series vs. Parallel Circuits
- Breadboard Basics
- How to Use a Multimeter

Module 3

Arduino Hardware and IDE

- Introduction to Arduino Boards (UNO, Nano, Mega)
- Installing Arduino IDE
- Understanding the Arduino Pinout
- Writing and Uploading Your First Sketch
- Debugging with Serial Monitor

Module 4

Basic Input and Output (I/O)

- Blinking an LED (Digital Output)
- Reading Push Button (Digital Input)
- Using Potentiometers (Analog Input)
- Pulse Width Modulation (PWM) with LEDs
- Controlling a Buzzer
- Debouncing Buttons

Module 5

Sensors and Data

- What is a Sensor?
- Sensor Modules:
  - Temperature Sensor (LM35, DHT11)
  - Light Sensor (LDR)
  - Ultrasonic Sensor (HC-SR04)
  - Infrared Sensor (IR Obstacle Detection)
- Displaying Sensor Data on Serial Monitor
- Interfacing LCD (16x2) to Display Readings

Module 6

Motors and Motion

- Introduction to DC Motors
- Transistor-based Motor Control
- Using L298N Motor Driver Module
- Controlling Servo Motors with PWM
- Introduction to Stepper Motors
- Power Supply for Motors

Module 7

Building Your First Robot

- Robot Chassis Assembly
- Motor Wiring and Integration
- Programming Basic Motion
- Building a Line Follower Robot
- Obstacle Avoidance Robot
- Bluetooth Controlled Robot (Using HC-05)

Module 8

Logic, Control and Smart Behavior

- Introduction to Logic Gates (AND, OR, NOT)
- Writing Control Logic Using If/Else Statements
- Timers and Delays
- Implementing State Machines
- Creating Simple Decision-Making Robots

Module 9

Communication

- Serial Communication (TX/RX)
- Bluetooth Communication (HC-05/HC-06)
- I2C and SPI Protocols Basics
- Communication Between Arduino and Sensors
- Introduction to Wi-Fi Communication (ESP8266/ESP32)

Module 10

Power and Safety

- Battery Types (Li-ion, AA, 9V)
- Voltage Regulators (7805, AMS1117)
- Powering Arduino and External Modules
- Electrical Safety and Precautions
- Using Fuses and Protection Circuits

Module 11

Testing, Debugging and Optimization

- Debugging with Serial Monitor
- Sensor Calibration Techniques
- Reducing Power Consumption
- Optimizing Code Performance
- Diagnosing and Fixing Common Hardware Issues

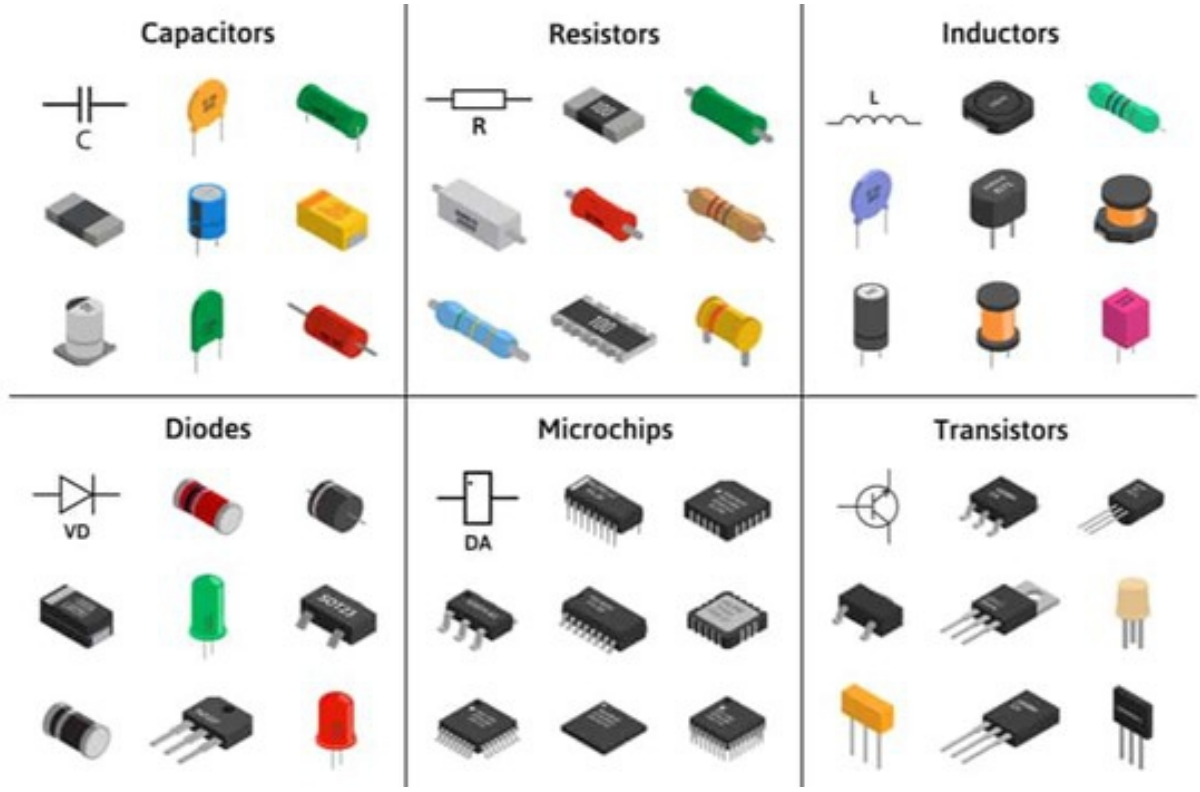
Module 12

Final Project and Presentations

- Project Planning and Proposal
- Prototype Development and Testing
- Project Documentation and Report
- Final Demonstration and Peer Review
- Course Recap and Certificate Presentation

Tools and Components Checklist

- Arduino UNO/Nano Boards
- Breadboards and Jumper Wires
- Resistors, Capacitors, Diodes, Transistors
- LEDs, Buzzers, Switches, Potentiometers
- IR and Ultrasonic Sensors
- Temperature and Light Sensors
- LCD Display (16x2)
- DC Motors, Servo Motors, Stepper Motors
- Motor Driver (L298N)
- Bluetooth Module (HC-05)
- Battery Packs and Holders
- Voltage Regulators
- Multimeter and Screwdrivers

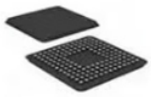


Recommend Products:


Capacitor


Resistors


Mosfet


IC chip


Inductor


Super capacitor


Crystal


Diodes


Switch


Transistors


Relay


Fuse


Ferrite Bead


Buzzer


Sensor


Connector