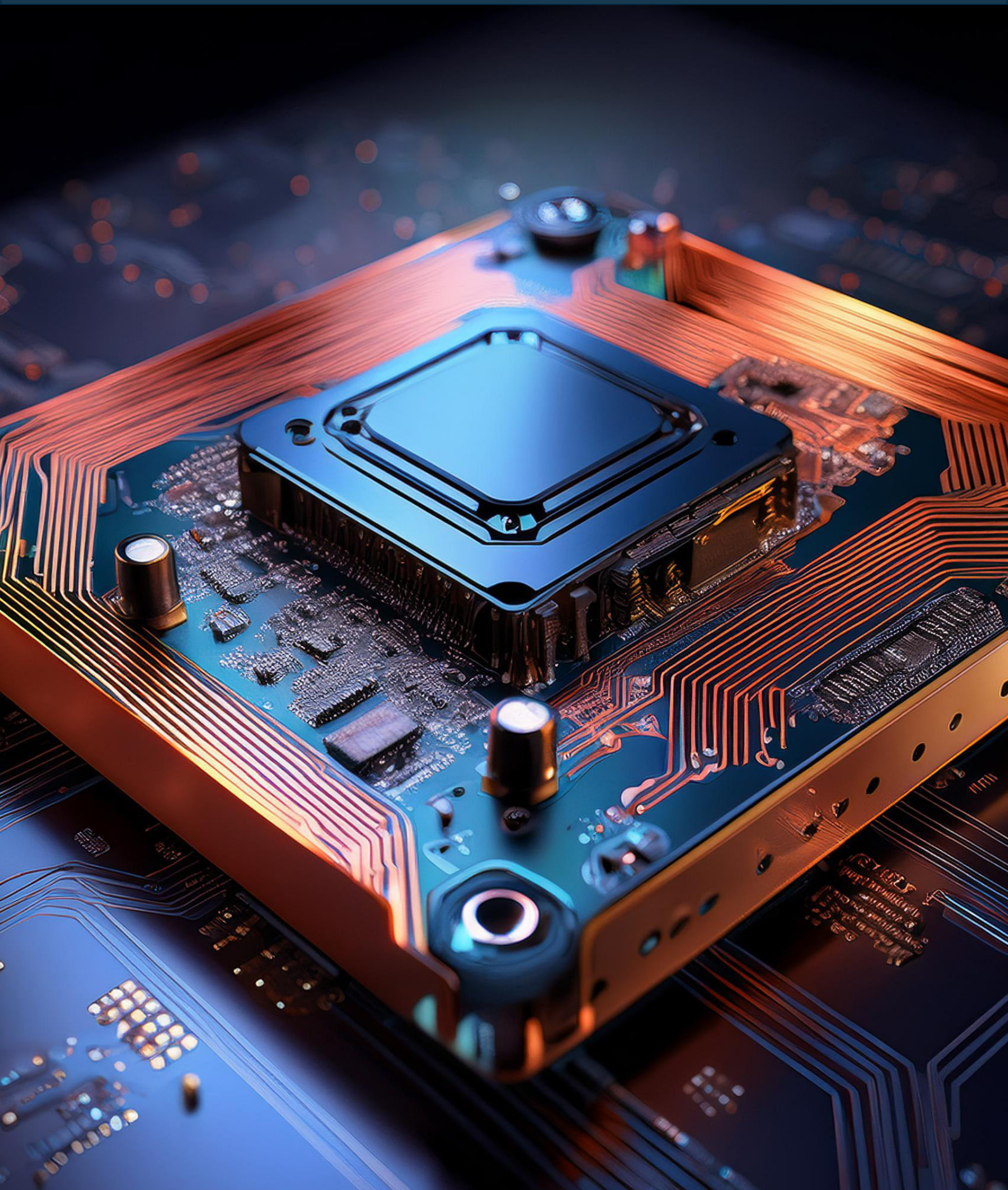
iMSD

Arduino Course Core Components



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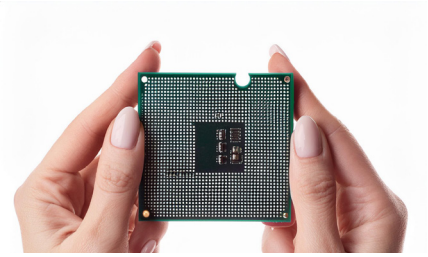

Arduino Course Outline

Duration: 3 Days

Related Courses:
Phython, C++, MATLAB, Java, C#, Lisp, Pascal, Scratch,

Course Overview and Objectives

This introductory Arduino course is designed to provide students with a comprehensive understanding of microcontroller-based programming and electronics.

Through hands-on projects and practical exercises, students will learn how to create interactive electronic systems using Arduino boards.

The course covers fundamental concepts of electronics, programming, and hardware interfacing, and prepares students to design and build their own projects.

Pre-requisites:

Basic knowledge of mathematics (calculus and linear algebra) and programming (e.g., Python or C++) is recommended but not required.

Course Format:

Lectures, hands-on labs, assignments, and a final project.

Introduction to arduino

- Overview of Arduino and its applications.
- Different types of Arduino boards.
- Setting Up the Arduino IDE
- Installing the Arduino IDE.
- Overview of the IDE interface.
- Basic Electronics
- Introduction to basic electronic components
- resistors
- LEDs
- buttons.
- Understanding circuits and breadboards.

Digital I/O

- Blinking an LED
- Understanding digital pins.
- Writing your first Arduino sketch (code).
- Using a Push Button
- Reading digital input.
- Controlling an LED with a button

Analog I/O

- Analog vs. Digital
- Understanding the difference between analog and digital signals.
- Reading Analog Sensors
- Using potentiometers and photoresistors.
- Controlling LED Brightness
- Pulse Width Modulation (PWM).
- Fading an LED.

Sensors and Modules

- Using Temperature and Humidity Sensors
- Reading data from DHT11/DHT22 sensors.
- Motion Detection
- Using PIR sensors for motion detection.
- Ultrasonic Distance Measurement
- Using HC-SR04 ultrasonic sensor.

Communication Protocols

- Serial Communication
- Introduction to UART, SPI.
- I2C protocols.
- Sending and receiving data via Serial Monitor.
- Interfacing with Displays
- Using 16x2 LCD.
- OLED displays.
- Displaying sensor data.

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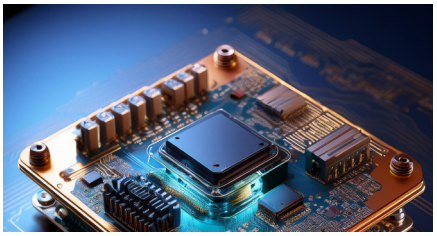
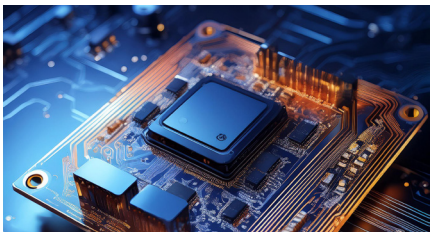


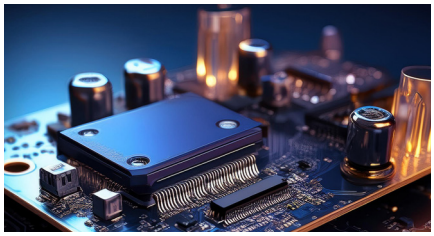
Control Motors and Actuators::

Understand the principles of motor control and how to use H-bridges to control DC motors.



Programming

Roubleshoot and debug Arduino projects effectively.
Develop critical thinking and problem-solving skills through practical challenges and exercises.



Interface

Connect and use various sensors such as temperature, humidity, and motion sensors.

Motor Control

- DC Motors
- Controlling a DC motor with an H-Bridge (L298N).
- Servo Motors
- Basics of controlling a servo motor.
- Stepper Motors
- Introduction to stepper motors and control.

Wireless Communication

- Bluetooth Communication
- Using HC-05 or HC-06 modules for Bluetooth communication.
- Wi-Fi Communication
- Introduction to ESP8266/ESP32 for Wi-Fi projects.
- Sending data to the cloud.

Project Development

- Project Planning
- Choosing a final project idea.
- Planning the project.
- creating a schematic.
- gathering components.
- Building the Project
- Writing the code.
- Assembling the hardware.
- Project Presentation
- Presenting the final project.
- Discussing challenges.
- solutions.

We offer online support to clients on content covered on our courses.