



Arduino Course Plan

Level 1 (Pictoblox)

Topics

- Concept of Input & Output signals.
- Controlling LED brightness using PWM.
- Creating events based on time.
- Explaining how to use sensors with external components like Breadboards.
- Serial and parallel circuits.
- Understanding the concept of electrical energy and electronic circuits.
- How to read sensor data.
- Distinguishing between types of sensors (digital and analog).
- How to use basic components like resistors and capacitors.
- Writing codes to display messages on the serial monitor.

Projects

- Designing a simple musical instrument using a sound sensor.
- A mini smart farm project that includes a humidity sensor.
- Designing a button counter (each press increases the number displayed on the serial monitor).
- Creating an anti-theft alarm system using a motion sensor.
- A digital clock project using Arduino.
- Turning a lamp on and off based on a button press.
- Designing a quick reaction game using LEDs and buttons.



New Topics

- Difference between visual and text-based programming: Understanding how drag-and-drop programming works compared to real code.
- Designing simple games using visual programming.
- Understanding the concept of variables and conditional loops.
- Explaining how to handle sounds and effects in projects.

New Projects

- A simple interactive game based on moving characters using arrow keys.
- Playing sound effects when pressing buttons.
- Designing traffic lights that work in sequence.

Level 2 (Tinkercad)

Topics

- Connecting Arduino to a 7 Segment display.
- Understanding PWM (Pulse Width Modulation) to control motor speed.
- Using EEPROM storage units.
- Controlling multiple components using more than one port.
- Using digital and analog sensors.
- Designing simple user interfaces to control Arduino.
- Using DHT11 temperature and humidity sensor.
- Understanding and applying connections on Breadboards.
- Handling stepper motors.
- Recognizing digital pulse signals.

Projects

- A smart lighting control system.



- A robot that moves based on sound signals.
- A simple digital thermometer.
- Designing a distance measuring device using an ultrasonic sensor.
- Designing a small robot that moves based on signals from an IR sensor.
- Building a motor speed control system based on voltage readings.
- Measuring water level in a tank using an ultrasonic sensor.
- Designing a smart control panel that can turn on and off multiple devices.

New Topics

- Designing advanced electronic circuits using Tinkercad.
- Understanding how to read data from multiple sensors simultaneously.
- Programming using advanced conditions and nested loops.
- Creating simulation applications based on analog inputs.

New Projects

- Designing a small car that works using a light sensor.
- A device to measure light intensity and display results on a screen.
- Building a security system using a secret code entered via a numeric keypad.

Level 3 (Arduino IDE)

Topics

- Programming wireless control using Bluetooth or RF.
- Handling smart sensors like fingerprint sensors.
- Communicating between multiple Arduinos using the I2C protocol.
- Programming Arduino to work with databases.
- Advanced programming with sensors like cameras.



- Advanced programming using functions.
- Analyzing collected sensor data.
- Building integrated applications with databases.
- Controlling devices over the internet using ESP8266 or ESP32.
- Working on projects involving simple AI.

Projects

- A line follower robot.
- A smart home monitoring system.
- A remote control project using a smartphone.
- A smart lock system using a fingerprint sensor.
- A smart robot that can recognize and analyze colors.
- Designing a mini weather station that measures temperature and humidity and sends data to a phone.
- Building a complete home control system (lighting, doors, temperature).
- A small surveillance camera project that sends images upon motion detection.

New Topics

- Controlling multiple projects using a Wi-Fi module.
- Working with decision-making algorithms based on sensory inputs.
- Programming robots that work in diverse environments.
- Integrating Arduino with simple AI technologies.

New Projects

- Designing a robot that avoids obstacles using a distance sensor.
- Building a smart system to control room temperature.



- An application to display sensory data on a smartphone app.

Advanced Topics (Added)

1. **Automated Control**:

- Designing systems based on time data (e.g., scheduling device operations).
- Programming robots to perform tasks based on multiple conditions.

2. **Artificial Intelligence**:

- Designing a robot capable of simple learning (e.g., color or sound recognition).
- Using Arduino libraries with simple neural networks (TinyML).

3. **Voice Control**:

- Programming Arduino to receive voice commands using modules like Grove Speech Recognition.

4. **Automation**:

- Designing integrated systems that include lighting, air conditioning, and security control.

5. **Internet of Things (IoT)**:

- Building an online dashboard to monitor data and control devices.
- Sending data to cloud platforms like ThingSpeak or Blynk.

6. **Integration with Smartphones**:

- Creating custom applications for remote control via phones using MIT App Inventor or Blynk.

7. **Complex Control Systems**:

- Designing systems based on PID Control (Proportional-Integral-Derivative).

Detailed Hardware Tools

1. **Arduino Boards**:

- Arduino Uno (for basic experiments).
- ESP8266 or ESP32 (for internet control and IoT).

2. **Sensors**:



- Fingerprint Sensor.
- Distance Sensors (Ultrasonic Sensor like HC-SR04).
- Motion Sensors (PIR Motion Sensor).
- Temperature and Humidity Sensors (DHT11 and DHT22).
- Light Sensors (LDR).
- Cameras (ESP32-CAM or OV7670).

3. **Actuators**:

- Servo Motors, DC Motors.
- Stepper Motors.
- Relays for controlling home devices.

4. **Communication Modules**:

- Bluetooth Module (HC-05, HC-06).
- RF Transceivers (nRF24L01).
- Wi-Fi Module (ESP8266, ESP32).

5. **Display Modules**:

- LCD Screen 16x2 with I2C Module.
- OLED Screen (0.96 or 1.3 inch).

6. **Input Devices**:

- Push Buttons.
- Numeric Keypad (4x4 Matrix Keypad).

7. **Other Components**:

- Resistors, Capacitors, and Diodes.
- Breadboards and Connecting Wires.
- EEPROM Storage Units.

8. **Power Supply**:

- 9V Batteries or USB Power Banks.
- Voltage Regulators.



Duration for Each Level

1. **Level 1 (Pictoblox)**: 30 hours (3 hours/week × 10 weeks).
2. **Level 2 (Tinkercad)**: 30 hours (3 hours/week × 10 weeks).
3. **Level 3 (Arduino IDE)**: 40 hours (4 hours/week × 10 weeks).

Contacts

Phone number: 01090334063

email: cfaacademy21@gmail.com