# Robotics Diploma Curriculum

## 1. Introduction to Robotics

This section introduces the basic principles of robotics, including the components of robotic systems, their applications, and the evolution of robotics in modern technology.

## 2. Motors and Motion Control

- Understanding motor types and their characteristics.
- Selection criteria for DC, Servo, and Stepper motors.
- Motor driver integration and control logic.

## 3. Electronics and Electrical Circuits

- Basic electronic components: resistors, capacitors, transistors, and diodes.
- Circuit design and prototyping.
- Power management and protection.

## 4. Arduino Programming and Interfacing

**Arduino Basics:**

- Arduino hardware overview.
- Software setup and IDE usage.

**Programming Concepts:**

- Data types and variable declaration.
- Control structures: if, switch, for, while.
- Timing functions: delay(), millis().
- Functions and modular coding.

- Using external libraries.

  **Signal Types:**

- **Digital Signals:**
  - Digital input and output.
  - Pulse Width Modulation (PWM).
- **Analog Signals:**
  - Analog input readings.
- Serial Communication (UART) using Serial and protocols like **I2C** and **SPI**.

## 5. Sensors and Their Applications

Understanding how to interface and utilize various sensors:

- LCD Display
- Relay Modules
- LM35 Temperature Sensor
- Ultrasonic Distance Sensor
- Password/Keypad Module
- Soil Moisture Sensor (YL-69)
- LDR (Light Dependent Resistor)
- DHT11 (Temperature & Humidity Sensor)
- MQ Gas Sensors
- Flame Sensor
- PIR Motion Sensor

## 6. Actuators and Output Modules

- Motor Driver L298N
- PWM Servo Driver Modules
- ESC (Electronic Speed Controller)

## 7. Wireless Communication Technologies

- NRF24L01

- Wi-Fi Modules (ESP8266 / ESP32)
- Bluetooth Communication

## 8. Navigation and Positioning Systems

An overview of basic navigation techniques used in autonomous robotic systems, including integration with GPS and IMU sensors.

## 9. GUI – Graphical User Interfaces

This section focuses on designing user-friendly interfaces to monitor and control robotic systems in real time using IoT dashboards (e.g., Blynk, ThingSpeak). The GUI displays live sensor readings such as temperature, humidity, gas levels, and object distance, allowing for centralized and intuitive control of the robot's environment.

## 10. Applications

Robotics projects covered in the diploma include:

- Simple Robot Car
- Wireless-Controlled Robot Car
- Multifunctional Robots
- Robotic Arm
- IoT-Based Projects:
    - Smart Home Automation
    - Real-time Monitoring Systems

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