

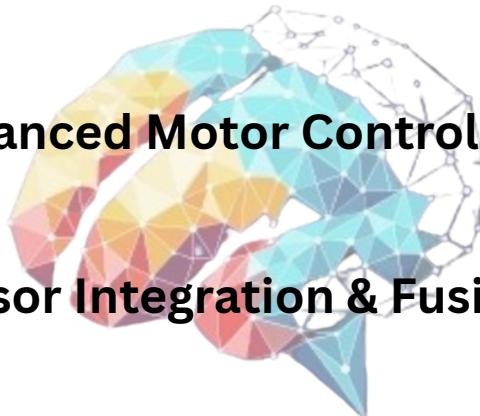


# Robotics Intermediate level

## Curriculum

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**Module 2: Advanced Motor Control**

**Module 3: Sensor Integration & Fusion**

**Module 4: Embedded Programming for Robotics**

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**Module 5: Autonomous Navigation Logic**

**Module 6: Human–Robot Interaction**

**Module 7: Displays & Feedback Systems**

**Module 8: Automation & Control Logic**

**Module 9: Mini Projects (Intermediate Level)**

## Module 1: Robotics System Architecture

- Review of beginner concepts
- Robot subsystems (mechanical, electrical, control)
- Control flow in robotic systems
- Real-world robot design examples

 **Activity:** Robot block-diagram design

## Module 2: Advanced Motor Control

- Motor speed control using PWM
- Smooth acceleration & braking
- Turning algorithms
- Power management basics

 **Hands-on:** Speed-controlled robot



## Module 3: Sensor Integration & Fusion

- Using multiple sensors together
- Ultrasonic + IR combination
- Sensor accuracy & noise handling
- Decision logic using sensor data

 **Hands-on:** Smart obstacle avoidance robot

## Module 4: Embedded Programming for Robotics

- Modular coding
- Functions & libraries
- Timing and delays vs millis()
- Debugging strategies

 **Hands-on: Optimized robot control code**

## Module 5: Autonomous Navigation Logic

- Rule-based navigation
- Path decision making
- Line follower optimization
- Basic maze-solving logic

 **Hands-on: Advanced line follower robot**



## Module 6: Human–Robot Interaction

- Bluetooth / mobile control
- Joystick control
- Manual vs autonomous switching
- Safety handling

 **Hands-on: Mobile-controlled robot**

## Module 7: Displays & Feedback Systems

- LCD / OLED display usage
- Status indicators
- Debug information display
- User interaction basics

**Hands-on: Robot status display system**

## Module 8: Automation & Control Logic

- Event-based robot behavior
- Time-based actions
- Emergency stop logic
- Fail-safe mechanisms

**Hands-on: Intelligent robot behavior system**



## Module 9: Mini Projects (Intermediate Level)

**Students build real-world robotics applications such as:**

- Advanced Obstacle Avoiding Robot
- Maze Solving Robot
- Smart Line Follower Robot
- Bluetooth-Controlled Robot
- Automated Delivery Robot Prototype

## Core Skills Developed

- Robotics system design
- Advanced motor & sensor control
- Structured embedded programming
- Logical decision making
- Debugging & optimization
- Team collaboration

## Learning Outcomes

By the end of the program, students will:

- Design semi-autonomous robots
- Integrate multiple sensors effectively
- Implement intelligent navigation logic
- Control robots wirelessly
- Prepare for robotics competitions

## Certification

- BotNest IoT Beginner Program Certificate
- Project-based assessment