



E-HOOYIA

Training/Formation Robotics

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|--|-----------|
| Month 1: Introduction to Robotics and Basic Electronics (4 Weeks) | 3 |
| Week 1: Introduction to Robotics..... | 3 |
| Week 2: Advanced Arduino Programming..... | 4 |
| Week 3: Traffic Control Systems..... | 4 |
| Week 4: Advanced Robotics Concepts..... | 5 |
| Month 2: Intermediate Robotics and Project Development (4 Weeks) | 5 |
| Week 5: Enhanced Sensor Integration..... | 6 |
| Week 6: Robotics Control Systems..... | 6 |
| Week 7: Advanced Robotics Applications..... | 7 |
| Week 8: Finalizing Intermediate Projects..... | 7 |
| Month 3: Advanced Robotics and Deployment (4 Weeks) | 8 |
| Week 9: Advanced Robotics Systems..... | 8 |
| Week 10: Robotics in Real-World Applications..... | 8 |
| Week 11: Preparing for Deployment..... | 9 |
| Course Objectives | 10 |

Robotics Program

Course Duration: 3 Months

Month 1: Introduction to Robotics and Basic Electronics (4 Weeks)

Week 1: Introduction to Robotics

- Day 1: Overview of Robotics
 - Understanding robotics as a multidisciplinary field integrating mechanics, electronics, and computer science.

- Day 2: Sensors and Actuators
 - Introduction to various sensors (e.g., light, ultrasonic) and actuators (e.g., motors, servos) used in robotics.

- Day 3: Basic Electronics Concepts
 - Understanding fundamental electronic components such as resistors, LEDs, and motors.

- Day 4: Introduction to Arduino Programming
 - Getting started with Arduino: setup, IDE, and basic programming syntax.

- Day 5: Mini-Project: LED Sequencer
 - Create an LED sequencer using Arduino to understand basic programming and circuit design.

Week 2: Advanced Arduino Programming

- Day 6: Programming with Sensors
 - Learn to interface and program multiple sensors, including ultrasonic and infrared sensors.

- Day 7: Introduction to Raspberry Pi

- Overview of Raspberry Pi and its applications in robotics.
- Day 8: Debugging and Testing Simple Programs
 - Techniques for debugging and testing electronic programs effectively.
- Day 9: Mini-Project: Light-Controlled LED Circuit
 - Design a simple electronic circuit with LEDs controlled by a light sensor (photoresistor).
- Day 10: Review and Assessment
 - Recap of the week's concepts and assessment through a quiz.

Week 3: Traffic Control Systems

- Day 11: Traffic Light Controller with Arduino
 - Learn to design and implement a traffic light control system using Arduino.
- Day 12: Alarm Systems and Sensors
 - Introduction to alarm systems and the use of various sensors for detection.
- Day 13: Creating Simple Alarm Systems
 - Develop a basic alarm system using humidity detection.
- Day 14: Mini-Project: Humidity Detection Alarm
 - Implement a humidity-based alarm system using sensors and Arduino.
- Day 15: Review and Assessment
 - Summary of traffic control systems and alarm projects with a quiz.

Week 4: Advanced Robotics Concepts

- Day 16: Introduction to Advanced Robotics Concepts

- Overview of advanced sensors and their applications in robotics.
- Day 17: Gas Level Detection System Design
 - Learn to design a gas level detection system using sensors and Arduino.
- Day 18: High-Temperature Alert System
 - Develop a system to alert for high temperatures using appropriate sensors.
- Day 19: Motion Detection Alarm System
 - Introduction to motion detection technologies and implementation with Arduino.
- Day 20: Mini-Project: Motion Detection Alarm
 - Build a motion detection alarm system using sensors and Arduino.

Month 2: Intermediate Robotics and Project Development (4 Weeks)

Week 5: Enhanced Sensor Integration

- Day 21: Advanced Sensor Programming
 - Learn to program and integrate multiple sensors for complex tasks.
- Day 22: Data Collection and Analysis
 - Techniques for collecting and analyzing data from sensors in real-time.
- Day 23: Introduction to Actuators
 - Explore various types of actuators and their applications in robotics.
- Day 24: Practical Application: Robot Arm
 - Design and build a simple robotic arm using servos and Arduino.

- Day 25: Review and Assessment
 - Recap sensor integration and actuator concepts with a quiz.

Week 6: Robotics Control Systems

- Day 26: Control Systems in Robotics
 - Introduction to control theory and its applications in robotics.
- Day 27: PID Controllers
 - Understanding Proportional-Integral-Derivative (PID) controllers and tuning.
- Day 28: Mini-Project: PID-Controlled Robot
 - Develop a simple robot that uses PID control for movement.
- Day 29: Introduction to Wireless Communication
 - Learn about wireless communication technologies (e.g., Bluetooth, Wi-Fi).
- Day 30: Review and Assessment
 - Summary of control systems and wireless communication concepts.

Week 7: Advanced Robotics Applications

- Day 31: Introduction to Mobile Robotics
 - Overview of mobile robots and their navigation systems.
- Day 32: Obstacle Avoidance Systems
 - Learn to implement obstacle avoidance techniques using sensors.
- Day 33: Mini-Project: Obstacle-Avoiding Robot
 - Build a robot that can navigate around obstacles using sensors.

- Day 34: Introduction to Computer Vision
 - Overview of computer vision applications in robotics.
- Day 35: Review and Assessment
 - Recap of mobile robotics and computer vision concepts.

Week 8: Finalizing Intermediate Projects

- Day 36: Mini-Project Development
 - Work on team projects integrating learned concepts from the previous weeks.
- Day 37: Project Implementation
 - Continue developing your team project with a focus on troubleshooting.
- Day 38: Project Presentation Skills
 - Learn effective techniques for presenting your project.
- Day 39: Final Project Presentations
 - Present your team projects to peers and instructors for feedback.
- Day 40: Course Review and Reflection
 - Reflect on the learning outcomes and discuss future learning pathways.

Month 3: Advanced Robotics and Deployment (4 Weeks)

Week 9: Advanced Robotics Systems

- Day 41: Introduction to Robotics Software Frameworks
 - Overview of software frameworks used in robotics (e.g., ROS).
- Day 42: Sensor Fusion Techniques
 - Learn about combining data from multiple sensors for improved accuracy.

- Day 43: Mini-Project: Sensor Fusion Application
 - Develop a project that utilizes sensor fusion for a robotic task.
- Day 44: Autonomous Navigation Basics
 - Introduction to algorithms for autonomous navigation and mapping.
- Day 45: Review and Assessment
 - Summary of advanced robotics systems and navigation concepts.

Week 10: Robotics in Real-World Applications

- Day 46: Industry Applications of Robotics
 - Explore various industries using robotics (e.g., healthcare, manufacturing).
- Day 47: Ethics in Robotics
 - Discussion on ethical considerations in robotics and AI.
- Day 48: Mini-Project: Real-World Application
 - Design a project that addresses a real-world problem using robotics.
- Day 49: Prototyping Techniques
 - Learn effective prototyping techniques for rapid development.
- Day 50: Review and Assessment
 - Recap of industry applications and ethics in robotics.

Week 11: Preparing for Deployment

- Day 51: Testing and Validation
 - Techniques for testing and validating robotic systems.

- Day 52: Deployment Strategies
 - Understanding deployment strategies for robotic systems in the field.
- Day 53: Mini-Project: Deployment Simulation
 - Simulate the deployment of a robotic system in a controlled environment.
- Day 54: Maintenance and Troubleshooting
 - Best practices for maintaining and troubleshooting robotic systems.
- Day 55: Review and Assessment
 - Summary of testing, deployment, and maintenance concepts.

Week 12: Capstone Project and Course Wrap-Up

- Day 56: Capstone Project Introduction
 - Overview of capstone project requirements and expectations.
- Day 57-58: Project Development
 - Work on the capstone project, integrating all learned skills.
- Day 59: Final Touches and Presentation Preparation
 - Finalize project details and prepare for presentation.
- Day 60: Capstone Project Presentations
 - Present your capstone project to peers and instructors for feedback.

Course Objectives

- Master the fundamentals of robotics and electronics.
- Develop skills in programming, debugging, and testing robotic systems.
- Gain hands-on experience with projects that integrate multiple technologies.

- Prepare for a career in robotics or related fields through practical applications and project development.