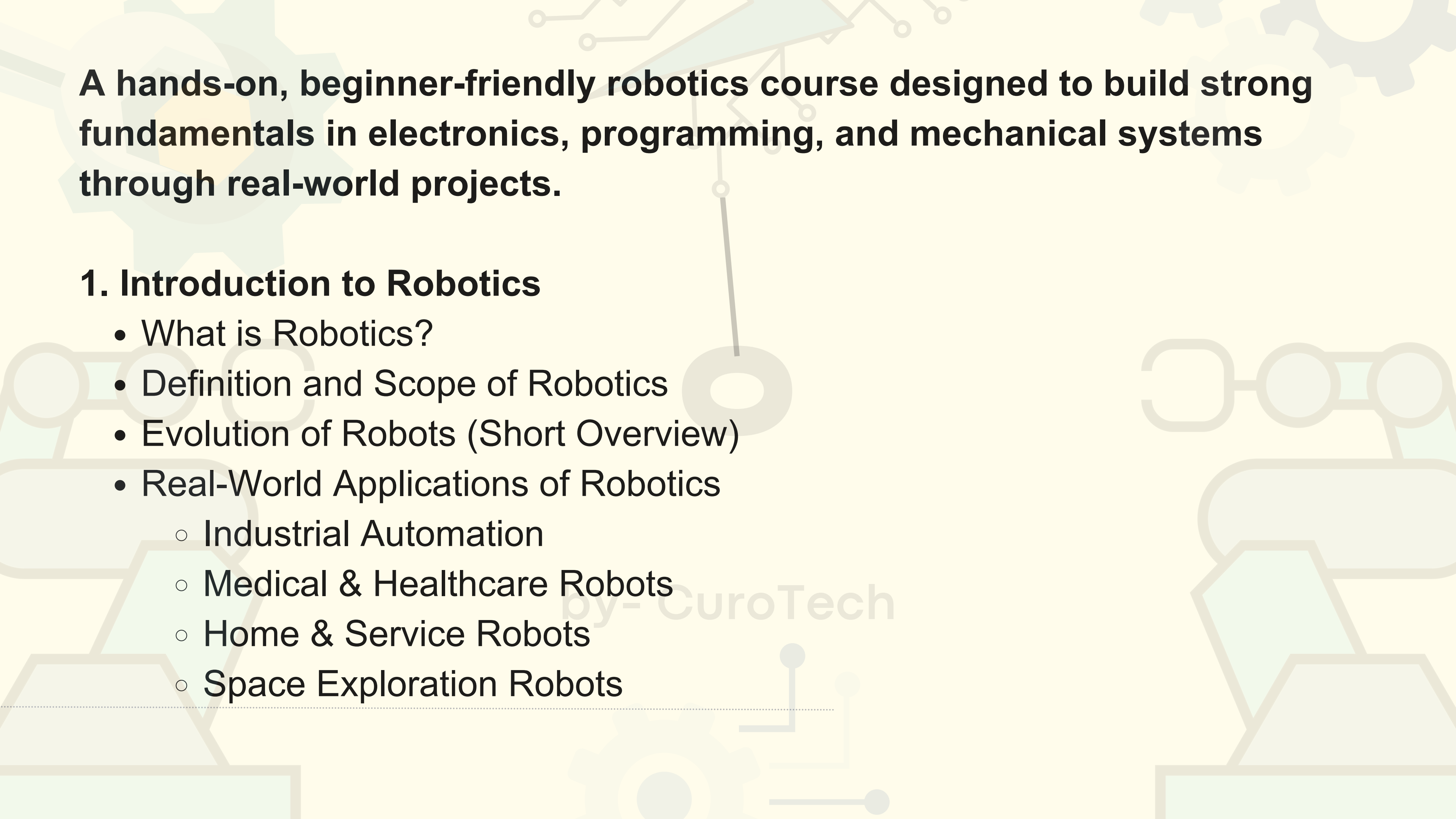# Robotics & Arduino Foundation Course

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A hands-on, beginner-friendly robotics course designed to build strong fundamentals in electronics, programming, and mechanical systems through real-world projects.

1. Introduction to Robotics

- What is Robotics?
- Definition and Scope of Robotics
- Evolution of Robots (Short Overview)
- Real-World Applications of Robotics
  - Industrial Automation
  - Medical & Healthcare Robots
  - Home & Service Robots
  - Space Exploration Robots

2. Understanding Robots
- What is a Robot?
- Types of Robots (Industrial, Service, Educational)
- Characteristics of Robots
- Human-like vs Machine-like Robots
- Intelligence, Automation & Self-Learning Concepts

3. Core Domains of Robotics Knowledge
- Electronics (Brain & Power System)
- Programming (Logic & Intelligence)
- Mechanical & Design (Structure & Motion)
- How These Domains Work Together
- Career Insight: What Makes a Robotics Engineer

4. Important Components of a Robot
- Controller (Arduino UNO)
- Sensors
- Actuators (Motors & Buzzers)
- Power Supply
- Mechanical Structure (Chassis)
- Wiring & Interconnections

5. Basics of Electronics
- What is an LED?
- LED Working Principle
- LED with Resistor vs Without Resistor
- Safety Considerations

6. LED Circuit Connections

- Components Required for LED Circuits
- Series Connection of LEDs
- Parallel Connection of LEDs
- LED Control Using Slide Switch
- LED Control Using Push Button

7. Introduction to Buzzers

- What is a Buzzer?
- Types of Buzzers
- Applications of Buzzers
- Buzzer Circuit Demonstration

8. Introduction to Arduino UNO

- What is a Microcontroller?
- Arduino UNO Overview
- Arduino UNO Board Layout & Pins
- Powering Arduino (USB & External Power)
- Connecting Arduino to Computer

9. Arduino IDE & Software Setup

- What is Arduino IDE?
- Features of Arduino IDE
- Installing Arduino IDE
- Board & Port Selection
- Uploading Your First Program

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10. Arduino Programming Fundamentals

- Structure of an Arduino Program
- setup() Function
- loop() Function
- Digital Input & Output Concepts

11. LED Blinking with Arduino

- Objective of LED Blinking Program
- Circuit Connections (Pin 13 LED)
- Writing the Blink Code
- Uploading & Testing the Program
- Understanding Delay & Timing

12. Multi-LED Control & Traffic Light Project

- Controlling Multiple LEDs
- Traffic Light Logic Explanation
- Circuit Connections
- Arduino Code Explanation
- Real-Life Traffic Signal Concept

13. Introduction to Sensors

- What are Sensors?
- Role of Sensors in Robotics
- Digital vs Analog Sensors
- Real-Life Sensor Examples

14. IR Sensor Fundamentals
- What is an IR Sensor?
- Working Principle of IR Sensors
- Applications of IR Sensors

15. Doorbell Project Using IR Sensor
- Project Overview
- Circuit Connections
- Arduino Code Logic
- Working Demonstration
- Real-Life Applications

16. LDR Sensor Fundamentals
- What is an LDR Sensor?
- Resistance vs Light Intensity
- Applications of LDR Sensors

17. Automatic Light Control Using LDR
- Circuit Diagram Explanation
- Arduino Interfacing with LDR
- Automatic Lamp Project
- Use Cases (Street Lights, Smart Homes)

18. Introduction to Robotics Hardware
- Chassis & Mechanical Structure
- BO Motors & DC Geared Motors
- Motor Specifications & Selection

19. Motor Drivers Explained
- Why Motor Drivers Are Needed
- L298N / L298D Motor Driver Overview
- H-Bridge Concept
- Pin Description & Working
- Direction Control Logic Table

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22. Voice Controlled Robot
- Voice Control Concept
- Voice Command Logic
- Circuit Overview
- Arduino Programming Logic
- Demonstration

23. Final Projects & Practical Learning
- Mini Project Demonstrations
- Debugging Techniques
- Improving Robot Performance

24. Learning Outcomes
- Strong Foundation in Robotics
- Hands-on Arduino Programming Skills
- Sensor & Motor Interfacing Knowledge
- Confidence to Build Real-World Robots

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- **27.Introduction to Artificial Intelligence**
- Basic idea of AI and how machines learn from data.
- Getting Started with PictoBlox
- Overview of PictoBlox interface and webcam setup.
- Introduction to Teachable Machine
- Training an AI model using images and live camera input.
- Training Direction-Based AI Model
- Creating and testing Left / Right / Forward / Stop commands.
- Connecting AI with Robot
- Linking PictoBlox AI output with robot motors.
- Webcam-Controlled AI Robot
- Robot movement based on trained AI model directions.

- Live Testing & Demonstration
- Real-time AI decision making and robot control.
- Learning Outcomes
- Understanding AI basics and building a simple AI-powered robot.

- **26. Course Conclusion**
- Summary of Skills Learned
- Next Steps in Robotics Learning
- Advanced Robotics Roadmap

Thank You
Build • Program • Innovate with Bharat Robotics Lab