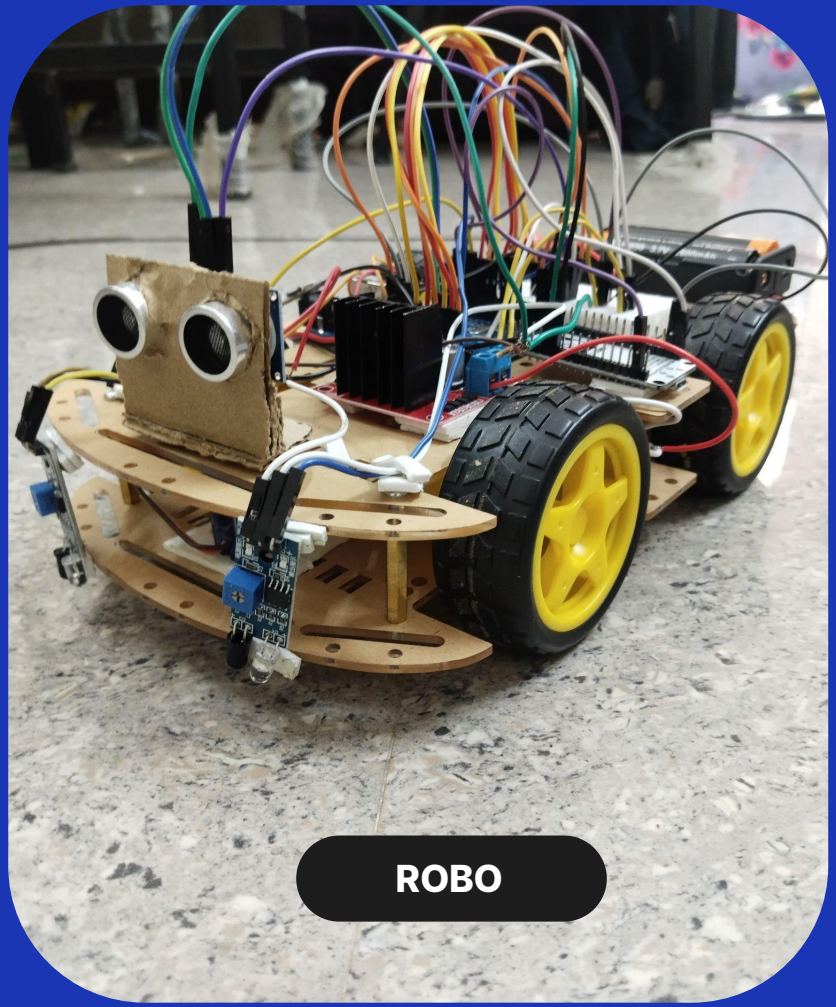
ROBO

AUTONOMOUS/ REMOTE / HUMAN FOLLOW ARDUINO VEHICLE

SHIVAM KUMAR
GOGRAJ DADARWAL
ARNAV JAISWAL
MANISH KUMAR



What’s Inside ....

Introduction

Autonomous & Remote-Controlled / Human Flow Arduino Car
A Smart Miniature Vehicle

Features:

🚗 Tripal-mode operation (Automatic/Manual)

🛑 Ultrasonic obstacle avoidance

📟 IR Line and Human follow

Core Components:
Arduino • **L298 Motor Driver** • IR Sensor • ESP8266

Components Used

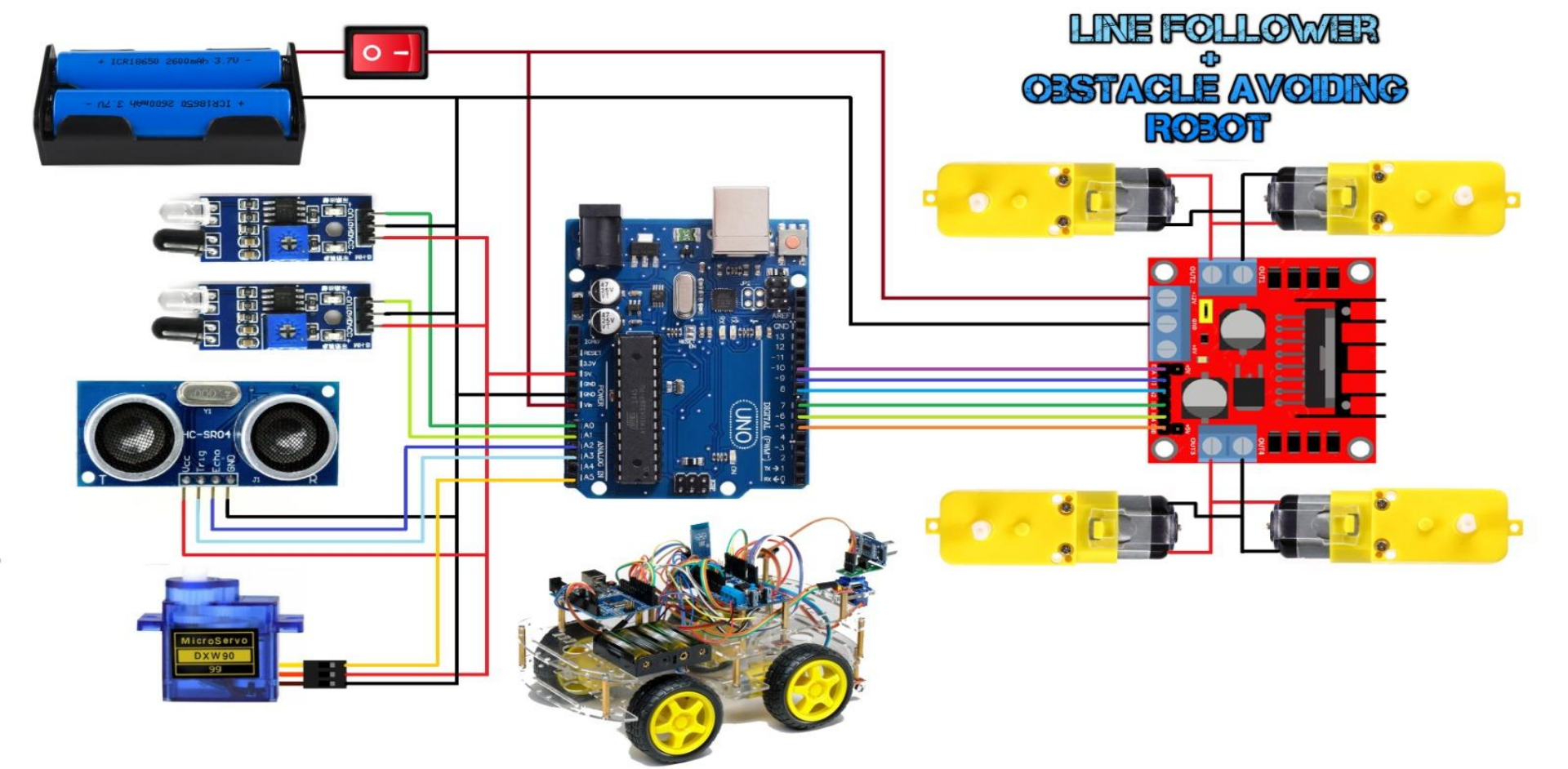
1. Breadboard
2. Robot Car Kit
3. Arduino Uno
4. IR Sensors x4
5. L298 Motor Driver
6. Mini Servo Motor SG90
7. Ultrasonic Sensor HC-SR04
8. ON/OFF Switch
9. 18650 Battery Cell 3.7v x2

🔌 Pin Mapping Summary:

Component:	Arduino Pin:	Notes:
L298N ENA	D6	Motor A speed control (PWM)
L298N IN1	D7	Motor A direction
L298N IN2	D8	Motor A direction
L298N IN3	D9	Motor B direction
L298N IN4	D10	Motor B direction
L298N ENB	D5	Motor B speed control (PWM)
Ultrasonic Trigger	A3	Output pin for distance sensing
Ultrasonic Echo	A2	Input pin for distance sensing
Left IR Sensor	A0	Used in human follow mode
Right IR Sensor	A1	Used in human follow mode
Line Sensor Left	D12	For line detection
Line Sensor Right	D11	For line detection
Servo Motor	A5	Rotate Ultrasonic Sensor
ESP8266 D2(RX)	D1 (TX)	TX of Arduino UNO
ESP8266 D3(TX)	D0 (RX)	RX of Arduino UNO

💡 Note: SoftwareSerial uses pins D0 and D1, which are also the default hardware serial pins (used for uploading code). You must disconnect ESP during uploads.

CIRCUIT DIAGRAM :-



WORKING PRINCIPLE

Autonomous Mode

Working Principle:

Ultrasonic Sensor (HC-SR04) continuously measures distance to obstacles.

Arduino Logic:

If distance ≤ adjustable threshold:

Stops motors → Calculates safe direction (left/right) → Turns away.

Else: Moves forward.

Flow:
Measure → Decide → Act (repeats in real-time).

Remote Controlled Mode

Working Principle:

WiFi Module (ESP8266) connects to:

Local hotspot or Direct phone-vehicle network.

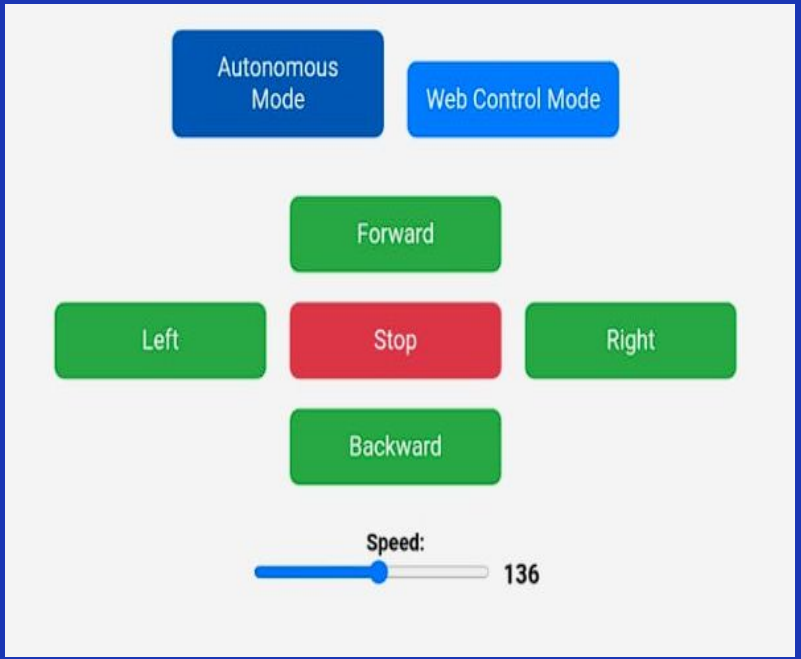
Mobile Interface:

Custom app (e.g., Blynk) or Web-based joystick (HTML/JavaScript).

Control Flow:

Phone sends commands → WiFi module → Arduino → Motor driver (L298N).

Example actions:



Human Follow Mode

Working Principle:

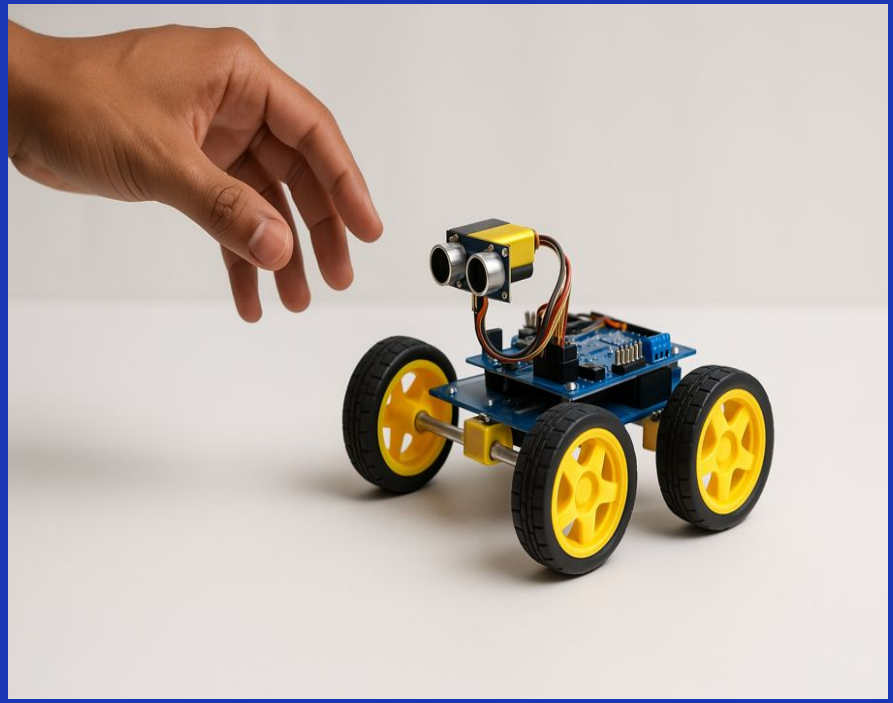
Ultrasonic Sensor (HC-SR04) continuously measures distance to obstacles and **IR sensor** detect human direction.

Arduino Logic:

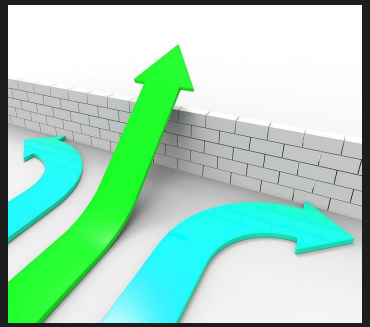
If distance < 8 cm → moves backward.

Follow human when distance is in between 15-35 cm.

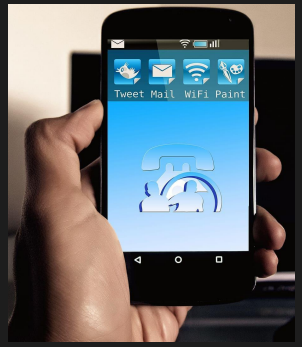
Else Stop.



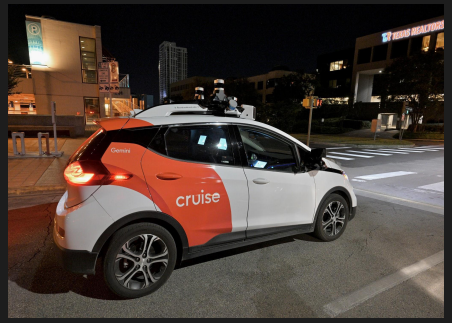
FEATURES and FUNCTIONALITIES



Obstacle Detection and Avoidance



Remote Controllable



Autonomous

Human Follow

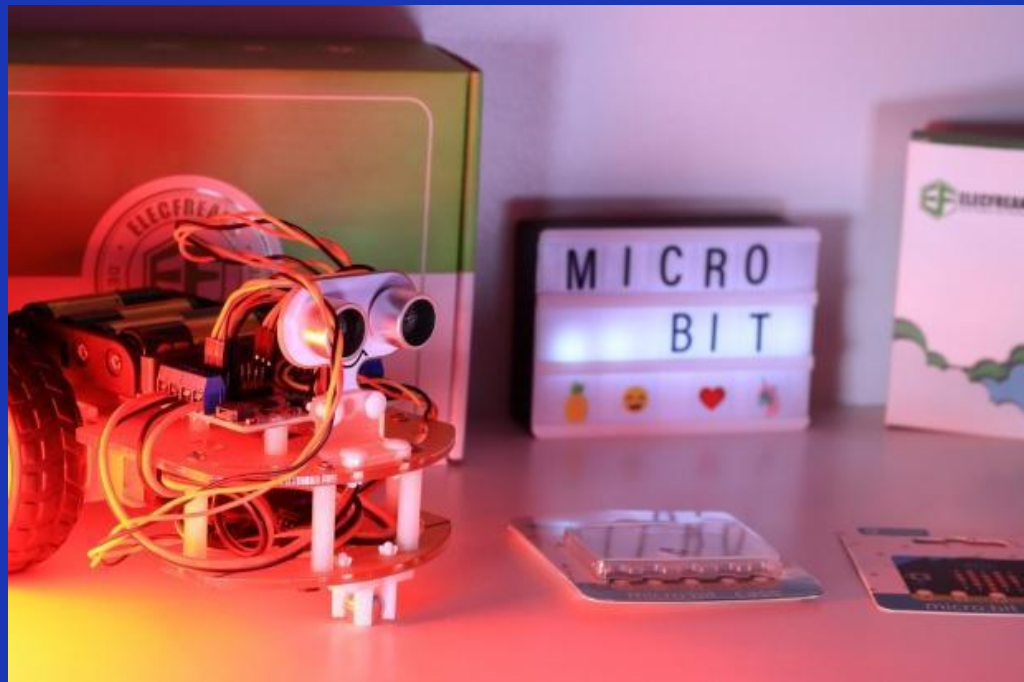
CHALLENGES & SOLUTIONS

Challenges Faced

1. Sensor Inaccuracies
2. Power Consumption
3. Speed and Distance Calculation
4. Coding
5. Sensor Positioning
6. Weight Balancing

APPLICATIONS

1. Smart Parking
2. Pedestrian Crossing
3. Nearby Vehicles and Obstacle Detection
4. Collision Avoidance
5. Delivery Bot
6. Search and Rescue
7. Shopping Assistance



CONCLUSION

Conclusion & Achievements

✅ Successfully Built a dual-mode car combining:

Autonomous navigation (ultrasonic obstacle avoidance)

Remote control via WiFi/mobile app

✅ Overcame Key Challenges in sensors, power, and connectivity with practical solutions.

✅ Proved Scalability – Demonstrates potential for real-world applications (logistics, education, smart homes).

Future Vision:

"Upgrading with AI pathfinding, swarm robotics, or computer vision for smarter automation."

THANK YOU!