Gesture Controlled Car – Project Report

# Introduction

The Gesture Controlled Car is an innovative project that demonstrates the integration of human-machine interaction, embedded systems, and wireless communication. This project enables the user to control a robotic car using hand gestures detected by an Accelerometer sensor (e.g., ADXL335/ADXL345), offering an intuitive and contactless method of control. It’s particularly applicable in assistive technologies, robotics, and smart vehicles.

# Objective

To design and implement a wirelessly controlled robotic vehicle that responds to hand gestures using an accelerometer, microcontroller, and RF communication modules.

# System Components

• Accelerometer Sensor (ADXL335/ADXL345): Detects tilt or motion along the X, Y, and Z axes.

• Microcontroller (Arduino UNO / Nano): Reads sensor data and determines gesture orientation.

• RF Transmitter and Receiver (433 MHz RF modules): Wireless communication of gesture commands.

• Motor Driver Module (L298N or L293D): Drives the DC motors based on received commands.

• Chassis with DC Motors: Car base that moves in response to control signals.

• Power Supply: Battery (9V/12V) and regulated 5V supply.

# Working Principle

The accelerometer worn on the user's hand detects tilt direction. These readings are interpreted by an Arduino on the transmitter side. Based on the gesture, the Arduino transmits encoded signals using the RF transmitter. The receiver Arduino reads these commands and drives the motor driver to move the car accordingly.

Gesture-to-Direction Mapping:  
- Forward Tilt → Move Forward  
- Backward Tilt → Move Backward  
- Left Tilt → Turn Left  
- Right Tilt → Turn Right  
- Hand Flat → Stop

# Features

• Wireless gesture control

• Real-time response

• Direction control using hand movements

• Extendable for IoT or Bluetooth

• Upgradeable with sensors or camera modules

# Circuit Diagrams

Include diagrams for transmitter and receiver circuits using Fritzing or KiCad.

# Software Flow

Transmitter (Hand Controller):

1. 1. Read accelerometer values  
   2. Compare with thresholds  
   3. Send command over RF

Receiver (Car):

1. 1. Listen for RF data  
   2. Decode command  
   3. Drive motors via L298N

# Code Files

• transmitter.ino – Interprets gestures and sends commands  
• receiver.ino – Decodes commands and controls motors

# Testing and Validation

The system was tested over a 15–20 meter range in open space. Response time was consistent with minimal latency. The battery supports 30–40 minutes of continuous operation.

# Future Enhancements

• Bluetooth/Wi-Fi for extended range

• MPU6050 for better gesture recognition

• Obstacle avoidance using ultrasonic sensors

• Mobile app integration

• Camera module for remote view

# Project Media

Attach prototype photos, wiring setup, gesture demo, and test videos.

# Files Included

• Circuit Schematics  
• Arduino Code  
• Bill of Materials (BOM)  
• Test Results and Media

# References

• Arduino Documentation  
• ADXL335 Datasheet  
• RF Module (433 MHz) Application Notes  
• Online tutorials and open-source projects

# Project Demonstration Video

Watch the project demonstration here: https://youtu.be/C38M3hR6-94?si=N6FIKWKUtdAEnKJx