# Embedded Systems Design - Project

# Hand Gesture Controlled Car Using Arduino

**M V S Navaneeth – EC22B1038**

**P. V. ADITYA VARDHAN - EC22B1045**

## INTRODUCTION AND ABSTRACT:

The hand gesture-controlled car project introduces a novel approach to remote vehicle operation, utilizing gestures for intuitive and hands-free control. In this project, we present a system that enables users to control the movement of a car through simple hand gestures, offering a more natural and immersive interaction experience compared to traditional remote controls.

## Working:

Arduino Uno or Nano serves as the main controller, responsible for processing sensor data and sending commands to the car's motors.

NRF24L01 modules are used for wireless communication between the hand gesture controller and the car. One NRF24L01 module is connected to the Arduino Nano acting as the transmitter, while another is connected to the car's Arduino receiving the commands.

MPU6050 accelerometer and gyroscope sensor is used to detect hand gestures. The sensor measures acceleration and rotation along three axes, providing data about the orientation and movement of the hand.

## Our Main Objectives for this Project are:

- **Develop an Efficient Gesture Recognition Algorithm**
- **Implement Wireless Communication**
- **Integrate Hardware Components**
- **Optimize Performance and Responsiveness**
- **Evaluate and Test in Real-World Scenarios**

# BLOCK DIAGRAM OF THE PROPOSED SYSTEM:
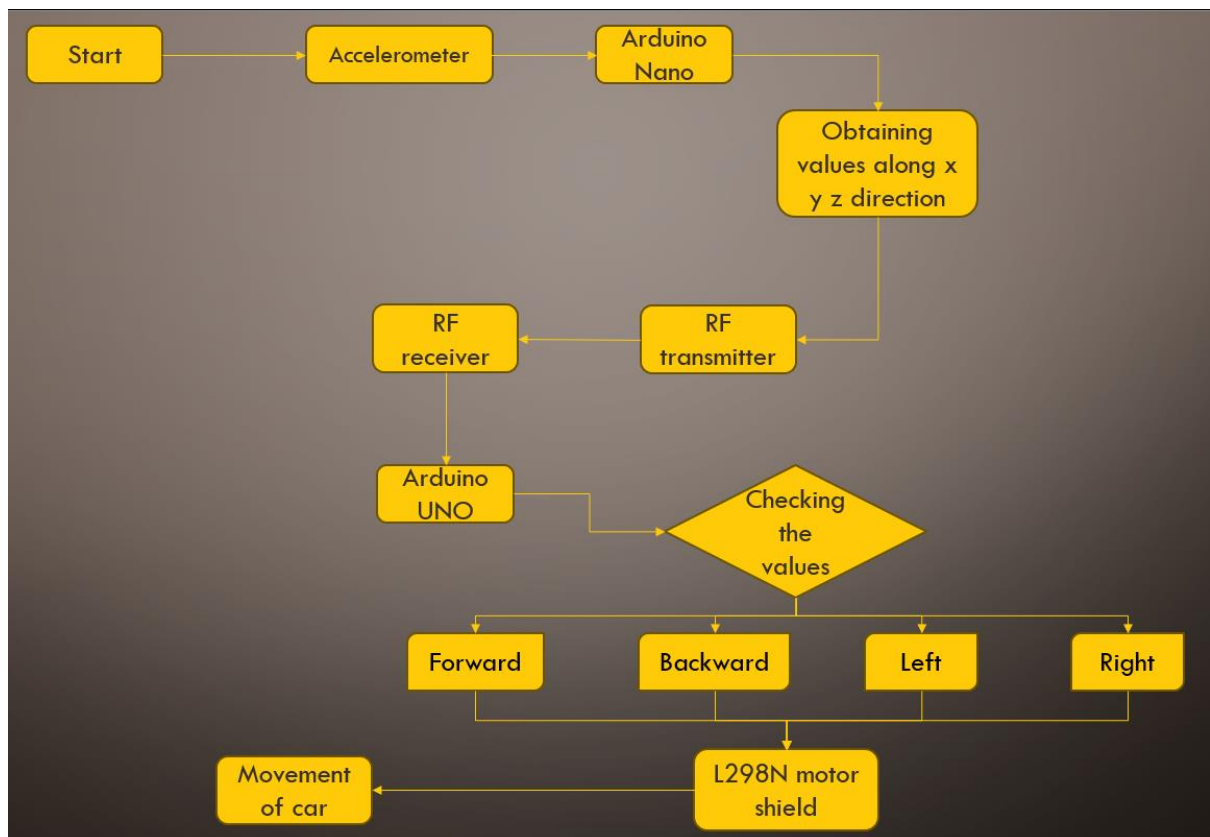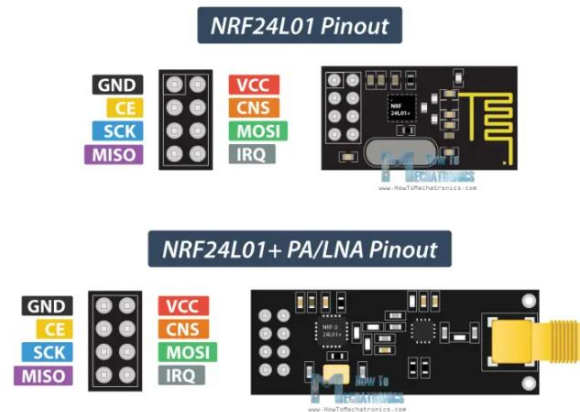


# DESCRPTION OF THE COMPONENTS USED:

## 1.Arduino UNO and Arduino NANO microcontroller



In our project we used Arduino UNO to control the car and Arduino NANO to implement the Hand gesture circuit.

## 2.nRf240L1 MODULES

In our project we used 2 nRf24L01 modules. One to transmit the measured values and the other one to receive the values and put it to use.



## 3.MPU6050 ACCELEROMETER

The MPU6050 is a six-axis motion tracking device that includes a gyro and accelerometer.

It aids in the measurement of velocity, orientation, acceleration, displacement, and other motion-related features.



## 4.L298N MOTOR DRIVER

The L298N is a dual H-Bridge motor driver which allows speed and direction control of two DC motors at the same time. The module can drive DC motors that have voltages between 5 and 35V, with a peak current up to 2A.
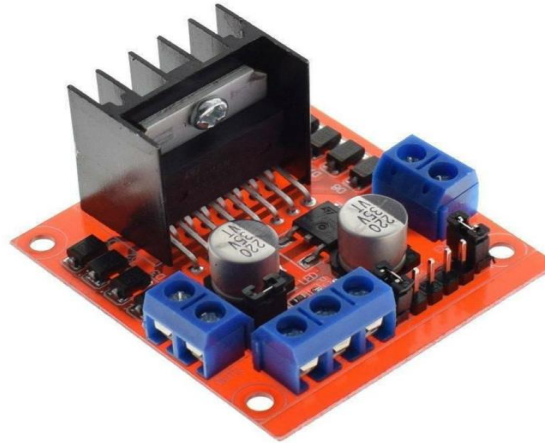
# 5.LITHIUM-ION BATTERIES

We used 2 lithium-ion batteries to power our car and a single lithium-ion battery to power the gesture controller.
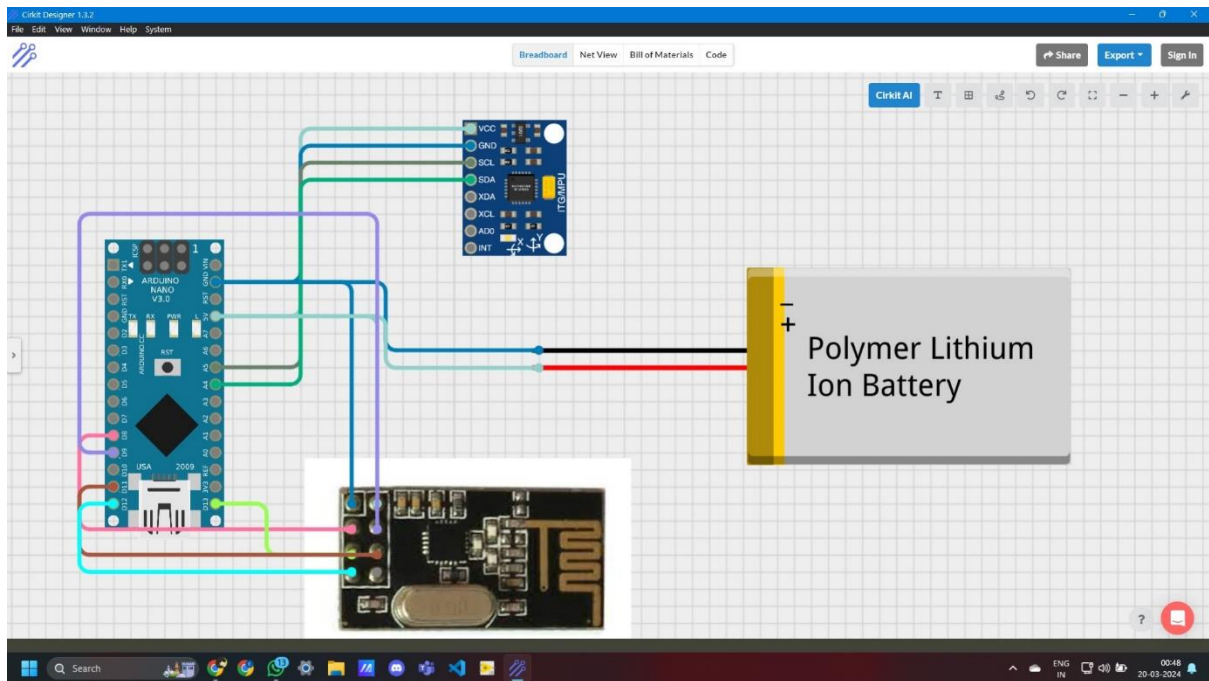
Max. Voltage (single battery) – **3.7V**
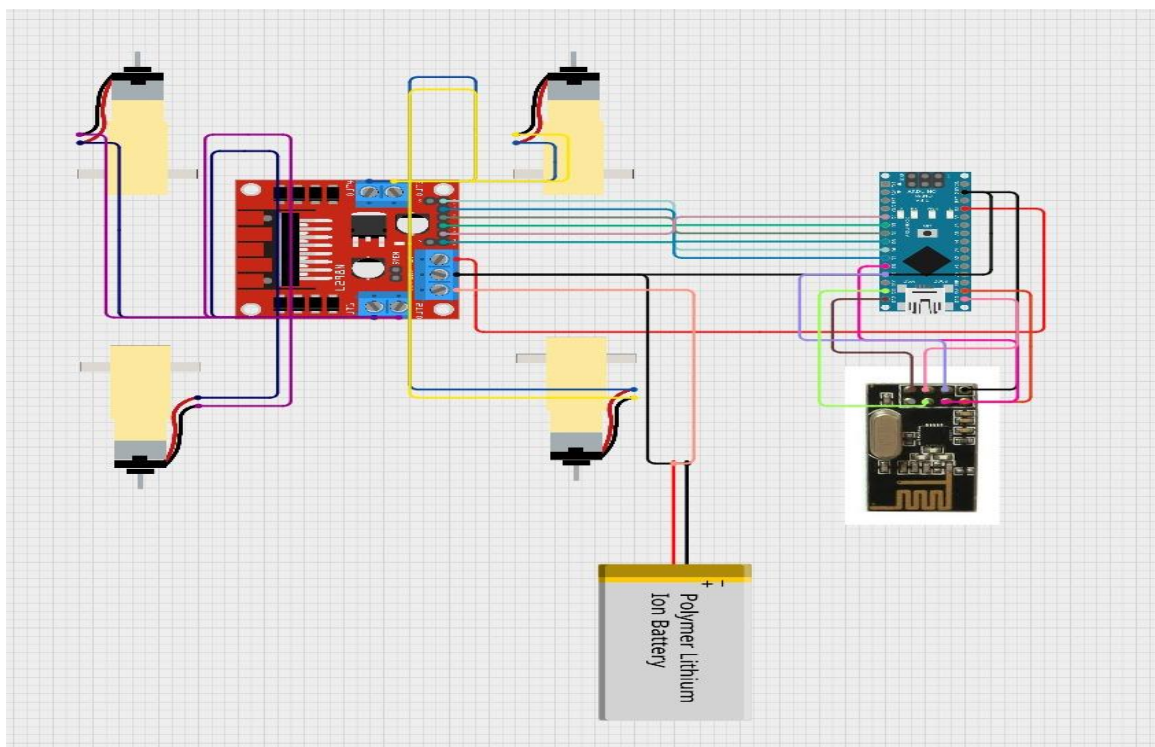
Battery capacity – **3000mAh**

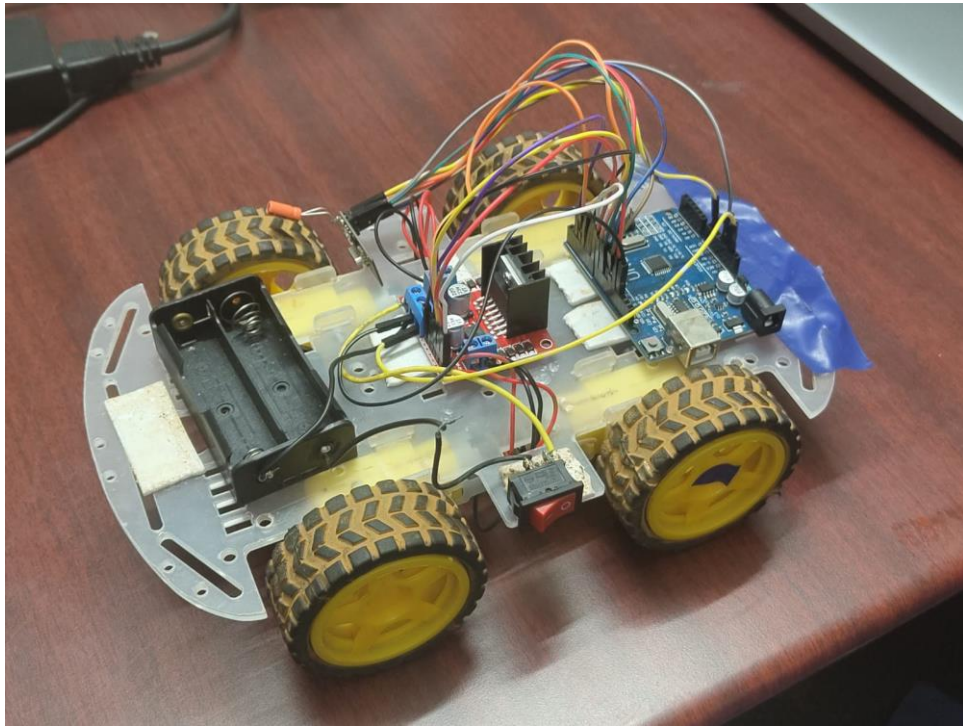# CIRCUIT DIAGRAM OF THE **TRANSMITTER** AND **RECIEVER**
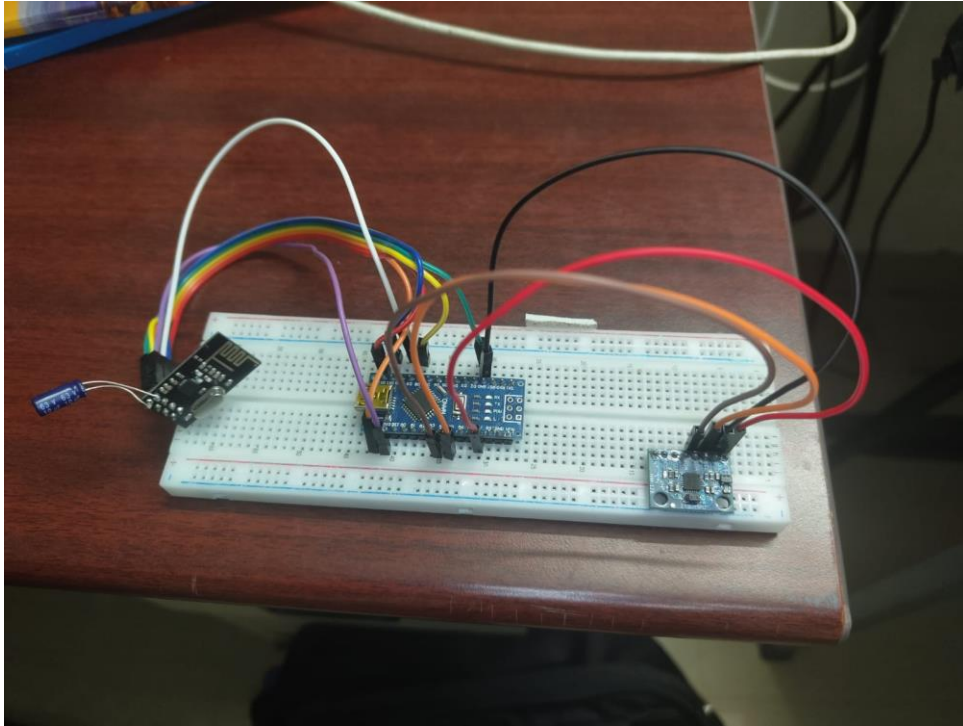
## TRANSMITTER ---



## RECIEVER ---

HARDWARE OUTPUT ---

SOFTWARE OUTPUT ---

ADVANTAGES OF THE PROPOSED SYSTEM:

- The hand gesture-controlled car offers a user-friendly interface that allows users to control the vehicle using intuitive hand gestures. This approach eliminates the need for complex button-based controls, making it accessible to users of all ages and skill levels.

- The proposed system can be adapted for various applications beyond toy cars, including robotic vehicles for surveillance, exploration, or logistics. Its versatility makes it suitable for a wide range of use cases, offering flexibility and scalability in deployment.

- The hand gesture-controlled car system can be integrated with other smart devices and systems, opening possibilities for seamless interaction and automation. Integration with home automation systems, virtual assistants, or IoT devices can further enhance its functionality and utility.

- Overall, the proposed hand gesture-controlled car offers a compelling blend of innovation, usability, and practicality, paving the way for a new generation of interactive and immersive remote vehicle control systems.