

**Project Title:** Chandrayaan-3 Inspired Rover Model with Obstacle Detection

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## 1. Introduction

This project is a working model inspired by ISRO's Chandrayaan-3 lunar rover mission. The purpose of the project is to help students understand the basics of robotics, obstacle detection, and wireless control using Arduino and ESP8266. The rover model replicates the concept of terrain navigation and autonomous obstacle avoidance.

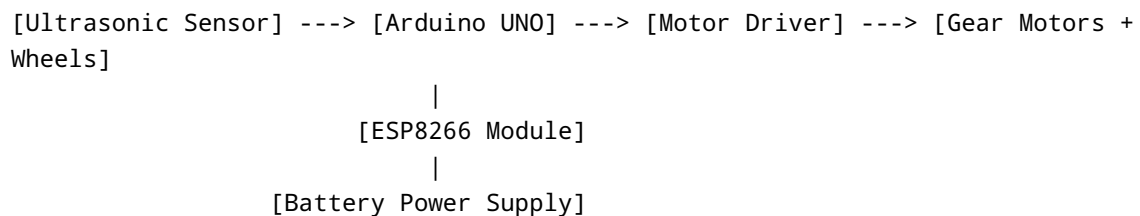
## 2. Features

- Wireless control capability using Wi-Fi (ESP8266)
- Obstacle detection using ultrasonic sensor
- Autonomous navigation logic
- Compact, lightweight rover design
- Rechargeable battery-powered mobility

## 3. Components Used

1. Arduino Uno
2. ESP8266 Wi-Fi Module
3. Ultrasonic Sensor
4. Motor Driver (L298N)
5. 4 Gear Motors
6. 4 Wheels
7. Jumper Wires
8. Rechargeable Battery with Case
9. 3ft x 3ft Platform (for demo)

## 4. Block Diagram



## 5. Circuit Schematic

(Refer to the attached schematic diagram image showing connection of components with Arduino UNO)

## 6. Working

- The ultrasonic sensor measures the distance from obstacles.
- Arduino processes the distance data and decides movement direction.
- If an obstacle is within 20 cm, it stops or changes direction.
- ESP8266 allows the rover to be monitored or controlled remotely.

## 7. Arduino Code Overview

```
#define trigPin 9
#define echoPin 10
#define motor1 3
#define motor2 4
#define motor3 5
#define motor4 6

void setup() {
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
  pinMode(motor1, OUTPUT);
  pinMode(motor2, OUTPUT);
  pinMode(motor3, OUTPUT);
  pinMode(motor4, OUTPUT);
  Serial.begin(9600);
}

void loop() {
  long duration, distance;
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);

  duration = pulseIn(echoPin, HIGH);
  distance = (duration / 2) / 29.1;
  Serial.println(distance);

  if(distance < 20) {
    digitalWrite(motor1, LOW);
    digitalWrite(motor2, LOW);
    digitalWrite(motor3, LOW);
    digitalWrite(motor4, LOW);
  } else {
    digitalWrite(motor1, HIGH);
    digitalWrite(motor2, LOW);
    digitalWrite(motor3, HIGH);
  }
}
```

```
    digitalWrite(motor4, LOW);  
  }  
  delay(100);  
}
```

## 8. Applications

- Educational demonstrations
- Robotics workshops
- Model exhibitions based on space missions
- STEM learning enhancement

## 9. Learning Outcome

Students learned practical applications of:

- Embedded systems
- Wireless communication (IoT)
- Robotic movement and obstacle avoidance
- Circuit integration and Arduino programming

## 10. Conclusion

This Chandrayaan-3 rover model provides an engaging and innovative way for students to learn robotics and embedded systems. It bridges theoretical knowledge and real-world engineering through a hands-on project.

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**Note:** Project guided by Pratibha Gahlot (Technical Assistant), Electronics & Communication Engineering Dept. Suitable for submission in national-level electronics design competitions.