



## Title: Obstacle-Avoiding Vehicle AKA CarryMate

**Team name:** Team noNERDS

**Team Leader:** Sanim Yousuf Fahim

### **Team member 1**

**Name :** Sanim Yousuf Fahim

**Id :** 024231000534 1092

### **Team member 2**

**Name :** Sohan Ahemed

**Id :** 024231000534 1266

### **Team member 3**

**Name :** Niher Ronjon Pramanik

**Id :** 024231000534 1102

### **Team member 4**

**Name :** Samiul Islam Saikat

**Id :** 024231000534 1131

### **Team member 5**

**Name :** Md. Humayun Kabir

**Id :** 024231000534 1085

**Project Supervisor:** Md Hafizul Imran

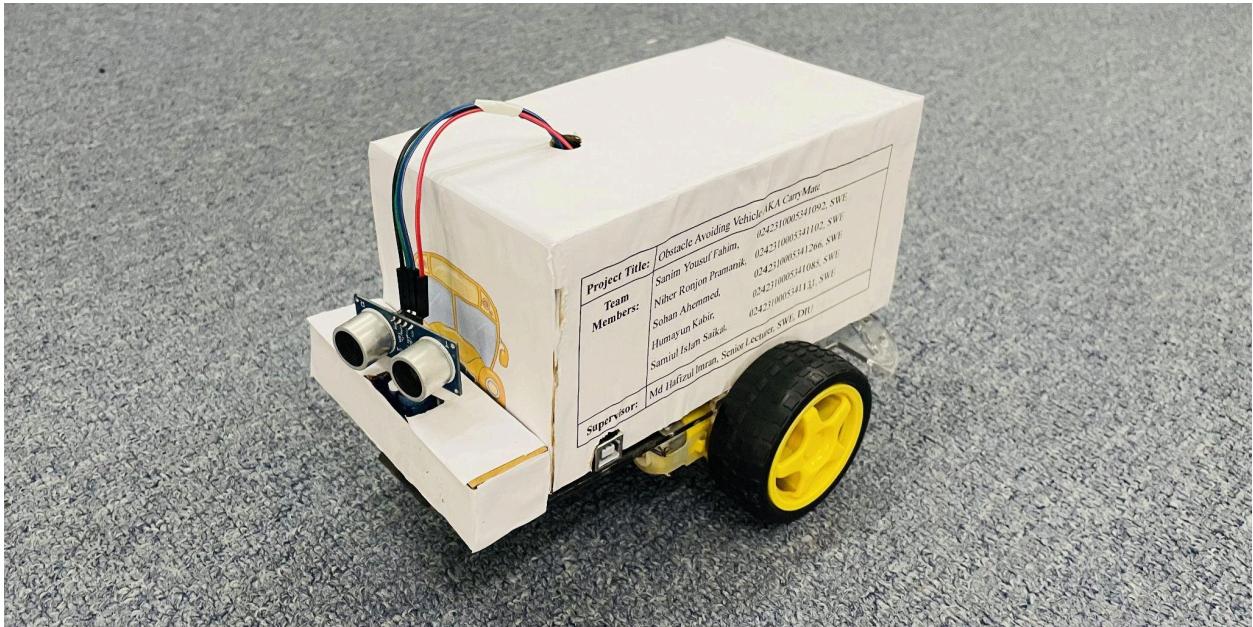
**Designation:** Lecturer (Senior Scale)

**Lab In-charge, Daffodil Robotics Lab.**

**Convener, DIU Robotics Club.**

**Date:** 04-12-2024

# 1. Cover Picture



## 2. Objectives

- Demonstrate the operation of an obstacle-avoiding vehicle.
- Teach users how to operate and utilize the vehicle for navigation.
- Showcase the integration of components like Arduino Uno, ultrasonic sensors, and servo motors.
- Highlight the vehicle's functionality for carrying lightweight equipment.

## 3. Component List

Component	Quantity
Arduino Uno	1
Breadboard Mini	1
Motor Driver Module (L298N)	1
Ultrasonic Sensor (HC-SR04)	1
Servo Motor	1

Jumper Wires	~ 20
Chassis	1
Wheels	3
Battery Pack (9V)	1
Switch	1
DC Motors	2
Buzzer	1

## 4. Description

This tutorial explains how to operate an obstacle-avoiding vehicle powered by Arduino Uno. The vehicle uses an ultrasonic sensor mounted on a servo motor to detect obstacles within a 60-degree range (Left or Right). When an obstacle is detected, it stops, sounds a buzzer, and adjusts its direction. Designed for flexibility, the vehicle can navigate any path and carry lightweight objects on its tray. By using the tray anyone can use the vehicle as a service assistant.

Follow the guide given below to understand its functionality and replicate the operations effectively.

## 5. Operation

### Part 1: Vehicle Overview

Explain the features of the vehicle:

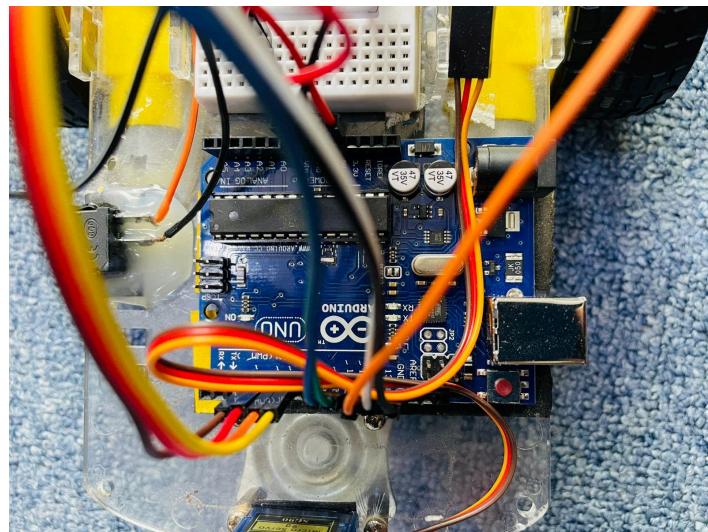
- **Movement:** The vehicle moves forward, turns left or right based on ultrasonic readings.
- **Obstacle Detection:** Ultrasonic sensor scans the front within a 60° range.
- **Alert Mechanism:** A buzzer activates when an obstacle is detected.
- **Utility:** Equipped with a tray for carrying items.



## Part 2: Component used in the Vehicle

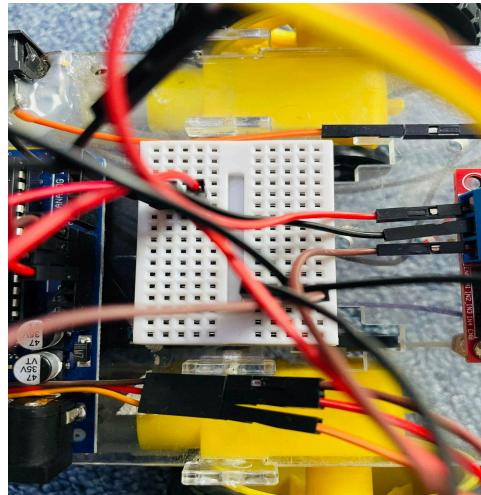
### 1. Arduino Uno

The Arduino Uno is a microcontroller board that serves as the brain of the vehicle. It processes sensor inputs and controls the motors and buzzer through programming.



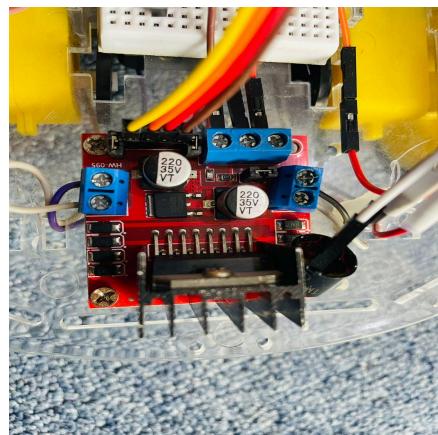
## **2. Breadboard Mini**

The mini breadboard is used to create temporary connections between components without soldering, making the circuit easy to modify or debug.



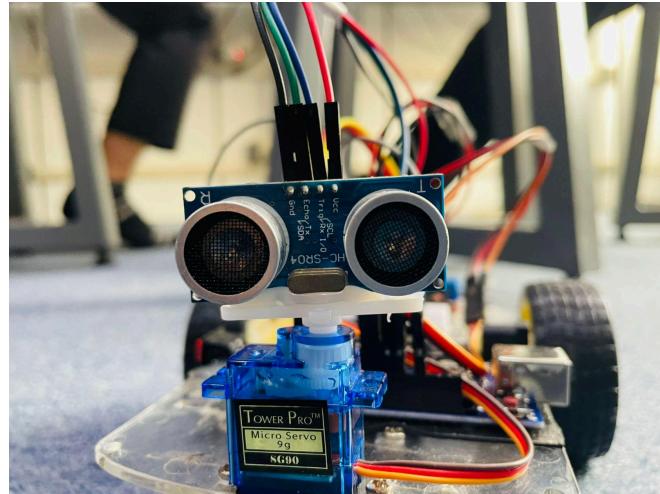
## **3. Motor Driver Module (L298N)**

The L298N motor driver controls the speed and direction of the DC motors. It acts as an interface between the Arduino and the motors, providing the required power and control signals.



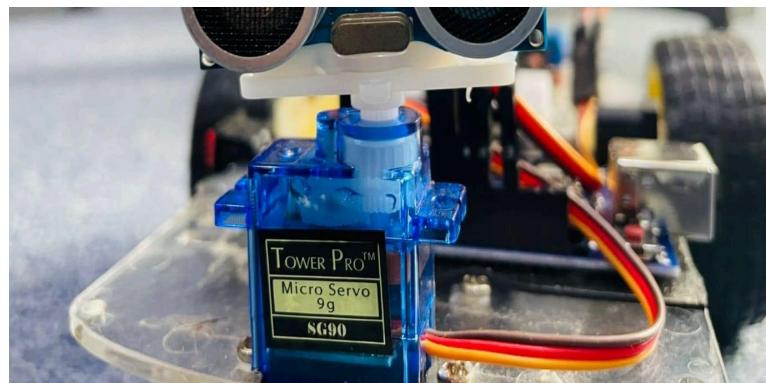
## **4. Ultrasonic Sensor (HC-SR04)**

This sensor measures the distance to obstacles by emitting ultrasonic waves and detecting their reflection. It enables the vehicle to sense obstacles and avoid collisions.



## 5. Servo Motor

The servo motor is used to rotate the ultrasonic sensor, allowing it to scan a 60-degree range to detect obstacles on the left, right, and front.



## 6. Jumper Wires

Jumper wires are used to connect components such as the Arduino, breadboard, motor driver, and sensors. They allow for flexible and reliable electrical connections.



## **7. Chassis with 2 Wheels**

The chassis forms the base structure of the vehicle, housing all components. The two wheels attached to DC motors enable the vehicle to move.



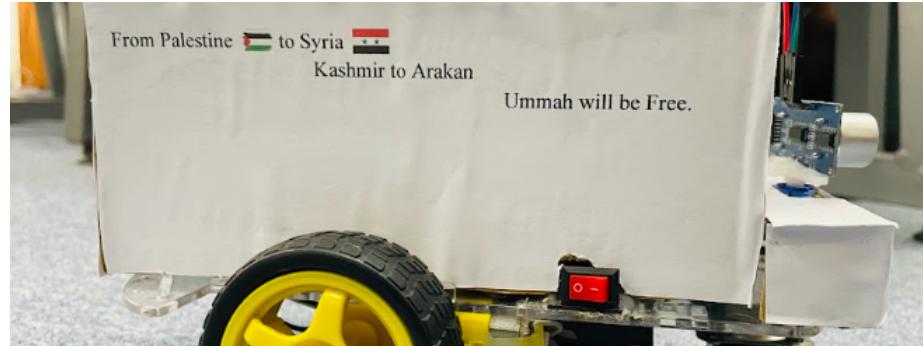
## **8. Battery Pack**

The battery pack supplies power to the entire system, including the Arduino, motors, and sensors, ensuring portability and uninterrupted operation.



## **9. Switch**

The switch allows the user to turn the vehicle on or off, providing control over its operation without disconnecting the power source.



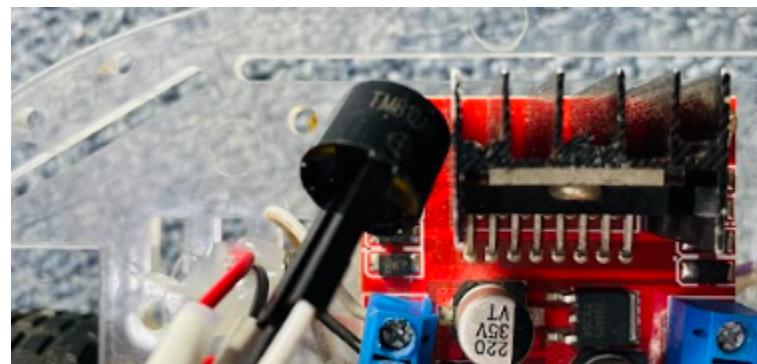
## 10. DC Motors

The DC motors drive the wheels, enabling forward and turning movements. Their speed and direction are controlled by the motor driver module.



## 11. Buzzer

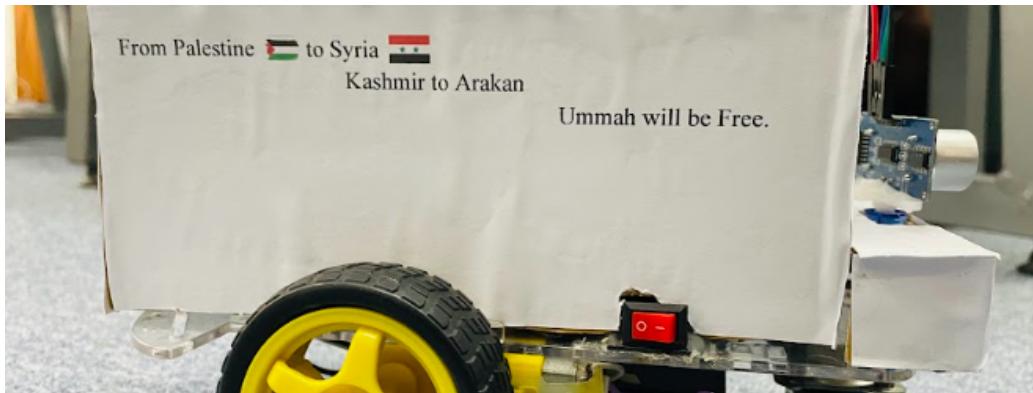
The buzzer is used to alert users when an obstacle is detected, providing an audio signal for enhanced functionality.



## Part 3: Operating the Vehicle

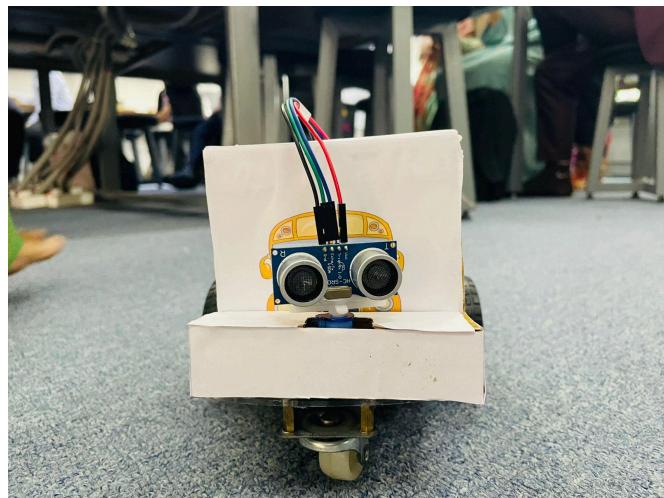
### 1. Power Up:

- Make sure that the battery packs are connected to the Arduino Uno and switch it on.



### 2. Movement Control:

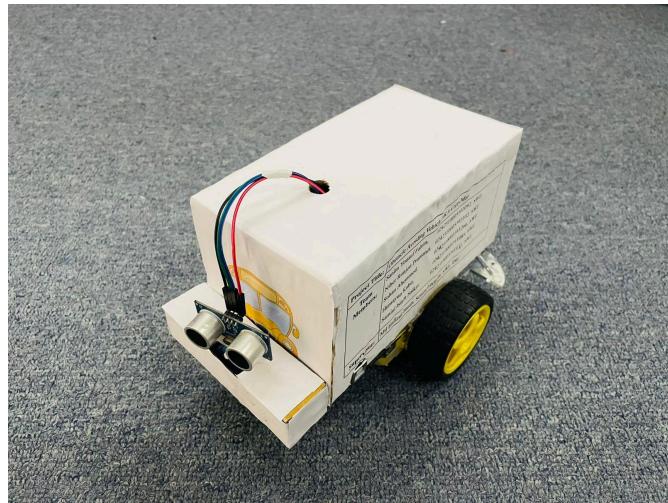
- Once powered, the vehicle automatically starts moving forward.





### 3. Obstacle Avoidance:

- The ultrasonic sensor scans for obstacles.
- If an object is detected within 15 cm:
  - The buzzer sounds.
  - The vehicle halts momentarily and turns in left or right direction.



### 4. Cargo Loading:

- Place lightweight items (e.g., up to 300g) on the tray without disrupting the sensor or motor functions.



## Part 4: Code Integration

Full code that is used in the vehicle. [Click here.](#)

## Part 5: Visual Demonstration

Video demonstration of the vehicle. [Click here.](#)

## 8. Conclusion

This tutorial explained the features and operation of an Arduino-based obstacle-avoiding vehicle. With its ability to navigate paths and avoid obstacles, this project demonstrates practical applications of microcontroller programming, sensors, and motors. The design's adaptability allows for further enhancements, such as additional sensors or payload capabilities which is one of the main purposes of the vehicle.