

Swachh Rover

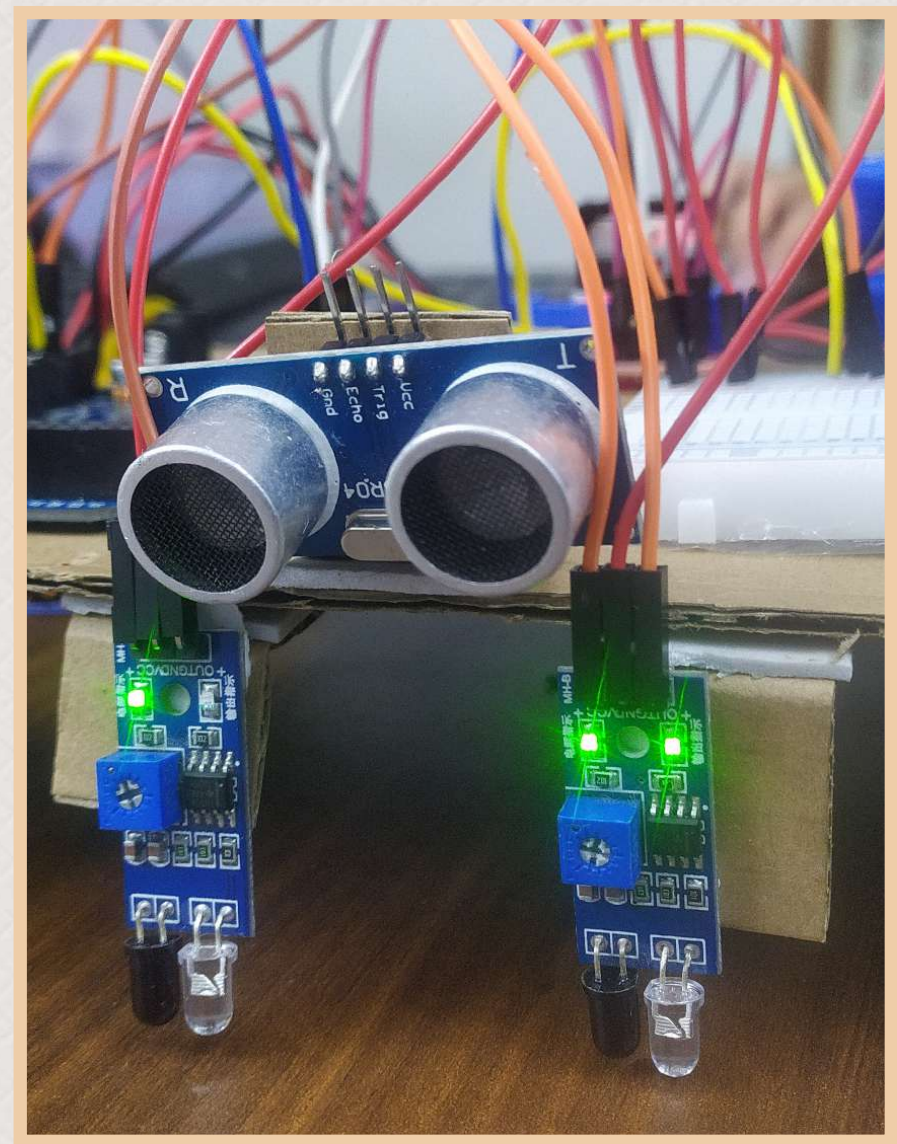
Tinkering Lab

Group A , Team II

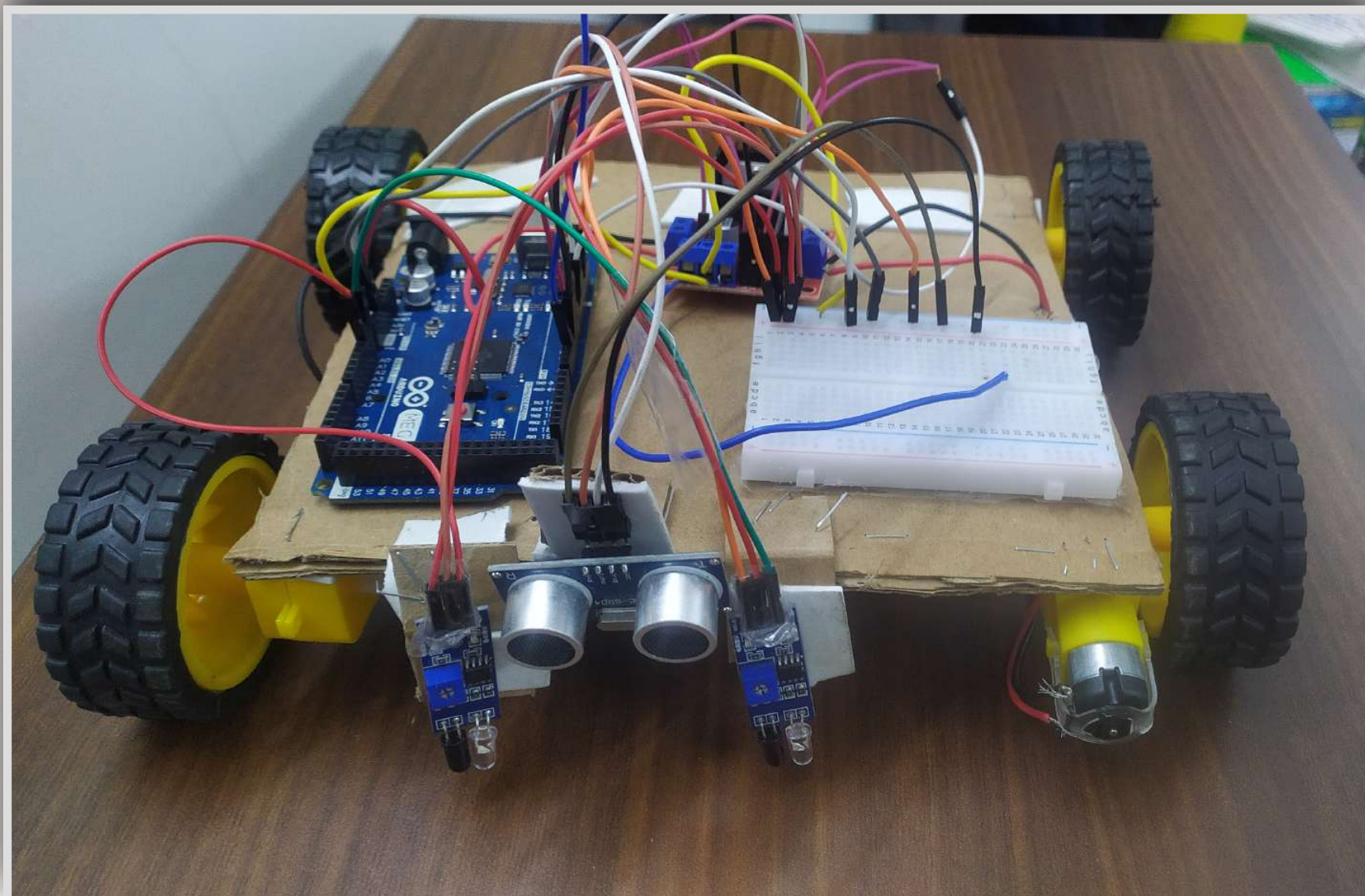
Instructor - Shashi Shekhar Jha Sir

Team

- ✦ *Aman Bilaiya 2018csb1069*
- ✦ *Aman Dharwan 2018csb1070*
- ✦ *Akshat Goel 2018csb1067*
- ✦ *B Mahidhar Varma
2018csb1079*
- ✦ *Abhinav Kumar 2018csb1064*
- ✦ *Deepak Kumar 2018csb1083*



Introduction



Introduction

- ✿ *Garbage is the major problem not only in cities but also in rural areas of India. It is a major source of pollution.*
- ✿ *Our project is swachh rover which aims at collection and segregation of waste.*
- ✿ *There are already different type of garbage collection robots like Robo-dumpster and Roomba 980 which mainly aims at collecting garbage from full cans and dispose it designated area and Dust cart which is designed to navigate through urban areas avoiding static and dynamic obstacle and waste door to door. These robots which are in use have various disadvantages like high implementation cost, not user friendly and aims at only collecting filled dustbins but not on collecting mechanism, etc.*
- ✿ *Hence to overcome this major problem of waste collection Autonomous Garbage Collection robot is developed. It aims at providing automatic control to collect the garbage. It differentiates between types of waste and move accordingly as it programmed.*

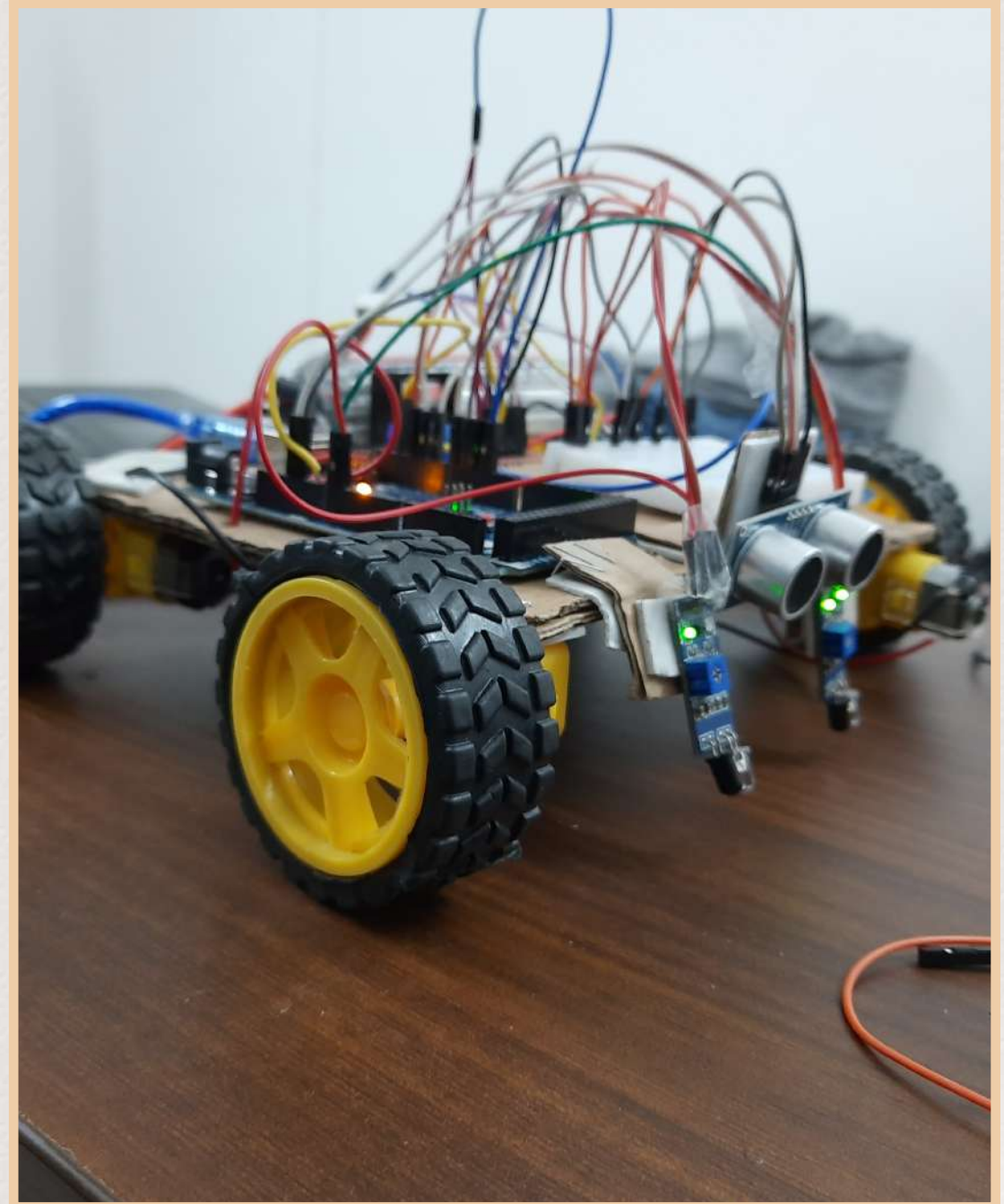
Problem Statement



Problem Statement

- ✿ *India is turning into one big garbage dump. The problem is assuming gigantic proportions and the numbers are staggering. Urban India is the world's 3rd largest garbage generator and by 2050 waste is expected to rise to 436 million tons up.*
- ✿ *The present tried and tested methods of garbage collection have so far been proven ineffective. And the world today is looking at smarter ways of overcoming the garbage collection problem.*
- ✿ *Today, solid waste segregation is the biggest challenge faced by urban areas and metropolitan cities across the world. Especially, in a country like India which has weak environmental regulations, the situation is becoming worse.*
- ✿ *Municipal solid waste workers, universally expose too many work related health hazards and safety risks, notably allergic and other diseases of the respiratory system.*
- ✿ *Time and Manpower needed to bifurcate/segregate the waste is enormous. Proper processing of Solid waste and management(segregation).*

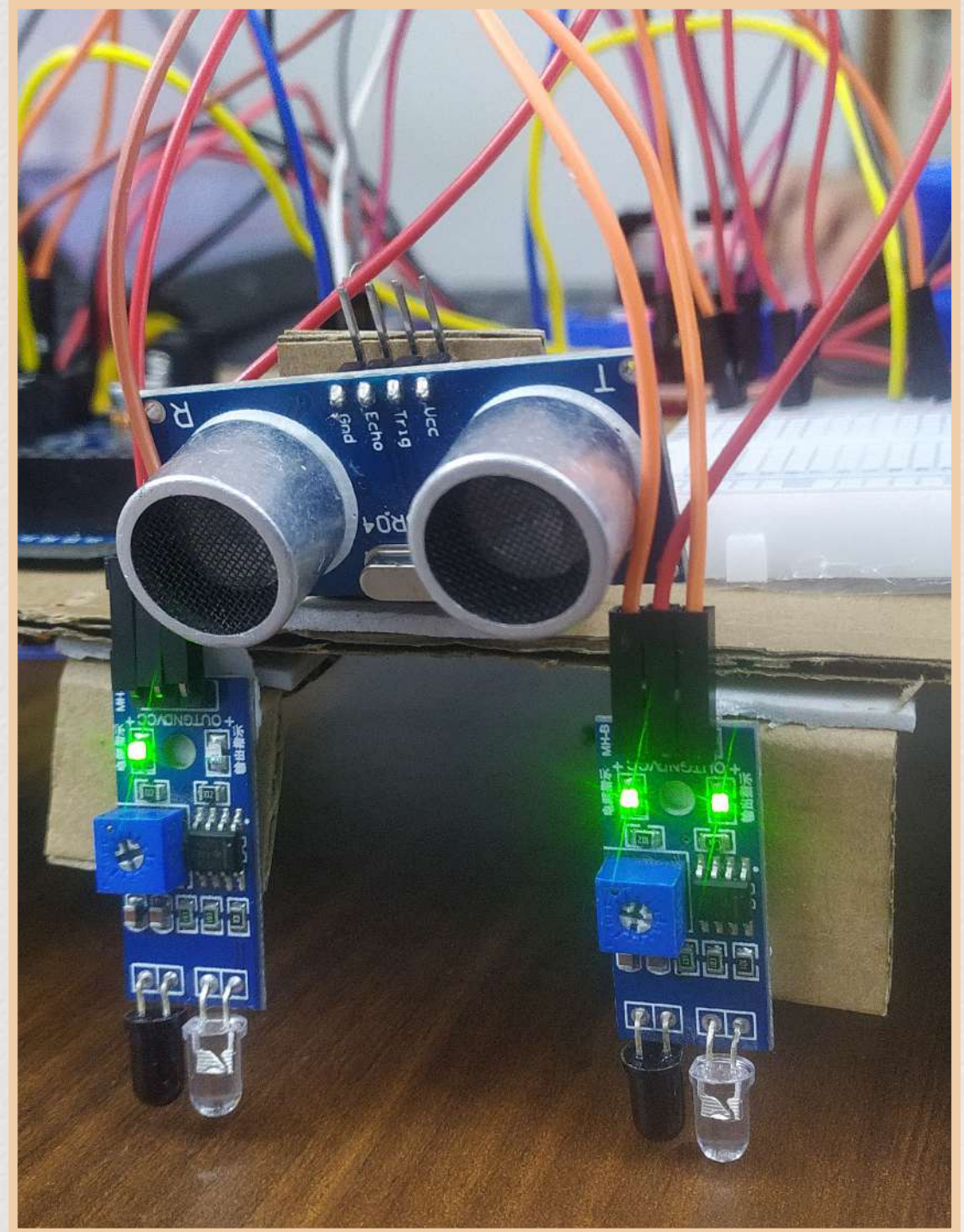
Proposed solution



Proposed Solution

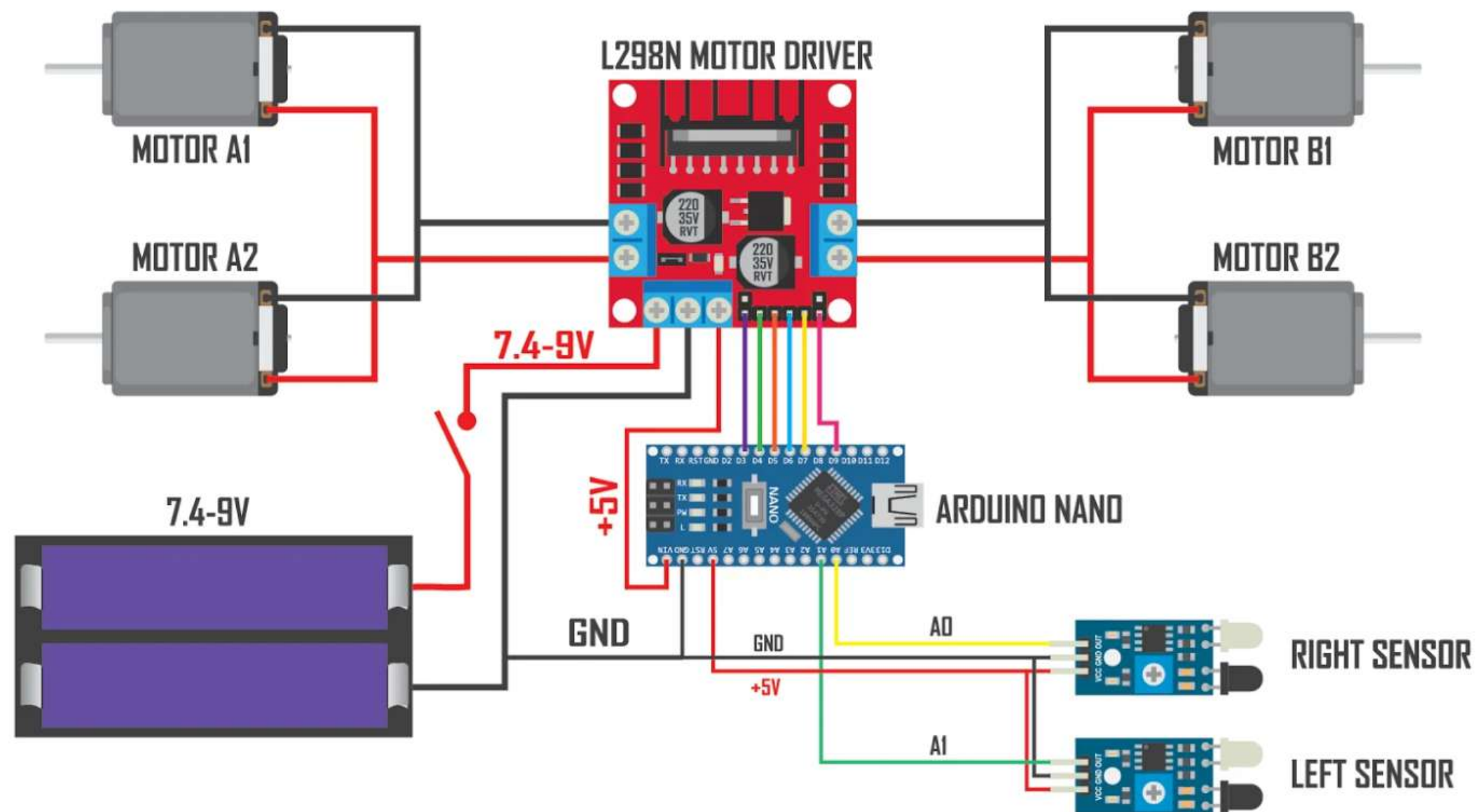
- ✿ *Swachh rover segregates waste at the time of collection, which helps us in easy waste management and recycling.*
- ✿ *These can be use at public places.*

Solution Overview



Solution Overview

- ✿ *We have created Swachh Rover which aims of providing effective, cheap solution to collection and segregation of waste.*
- ✿ *Our rover uses different types of sensor namely ultrasonic sensor, colour sensor for classification of the waste.*
- ✿ *Rover's locomotion is based on line follower bot.*



Line Follower



Use of Proximity Sensor

**Line Follower with
Obstacle Detection**

Work Flow

Use of Ultrasonic sensor

**Line Follower with
Obstacle avoidance**



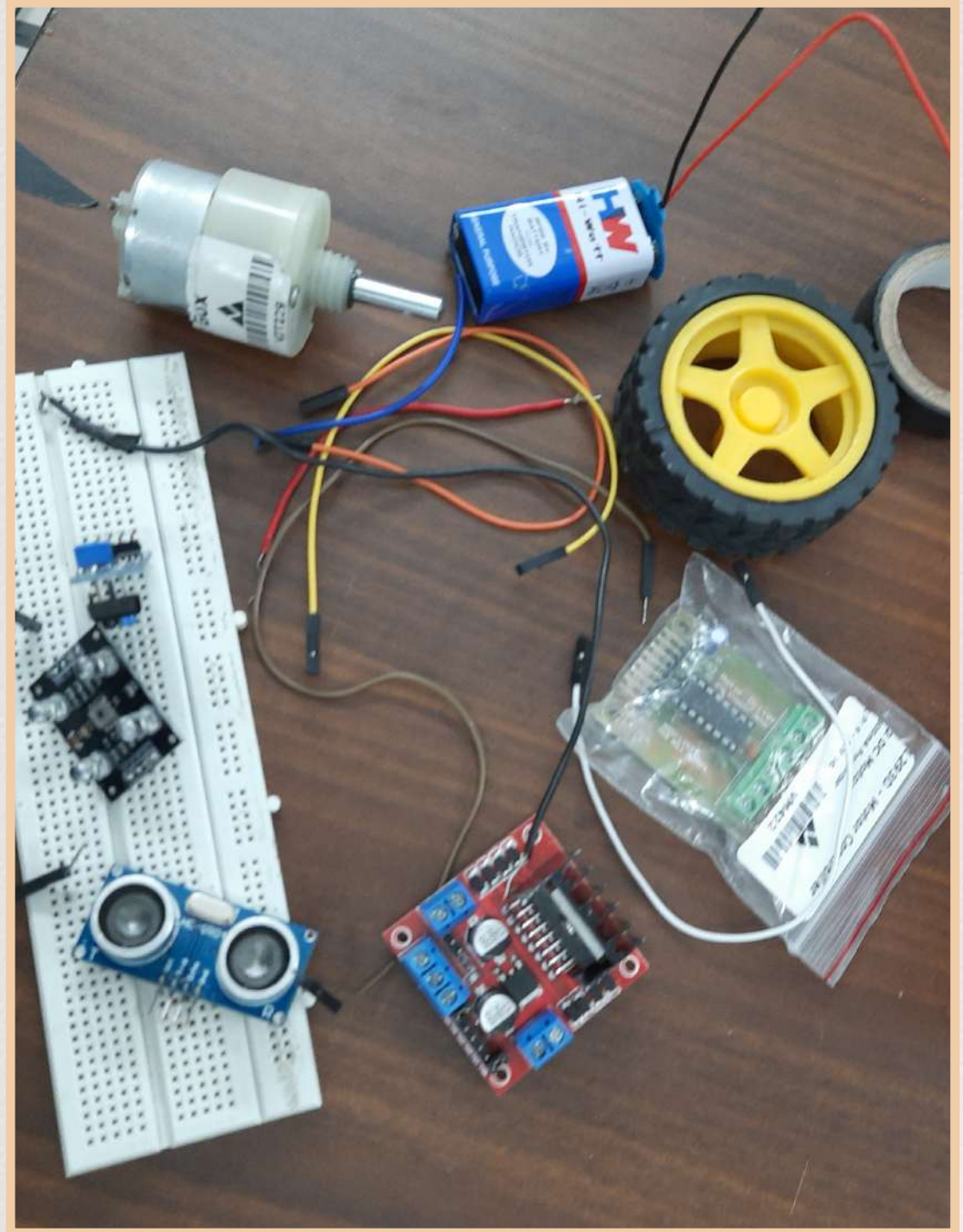
Role of delays at obstacle detection

Use of Proximity Sensor

Use of Ultrasonic sensor

Role of delays at obstacle detection

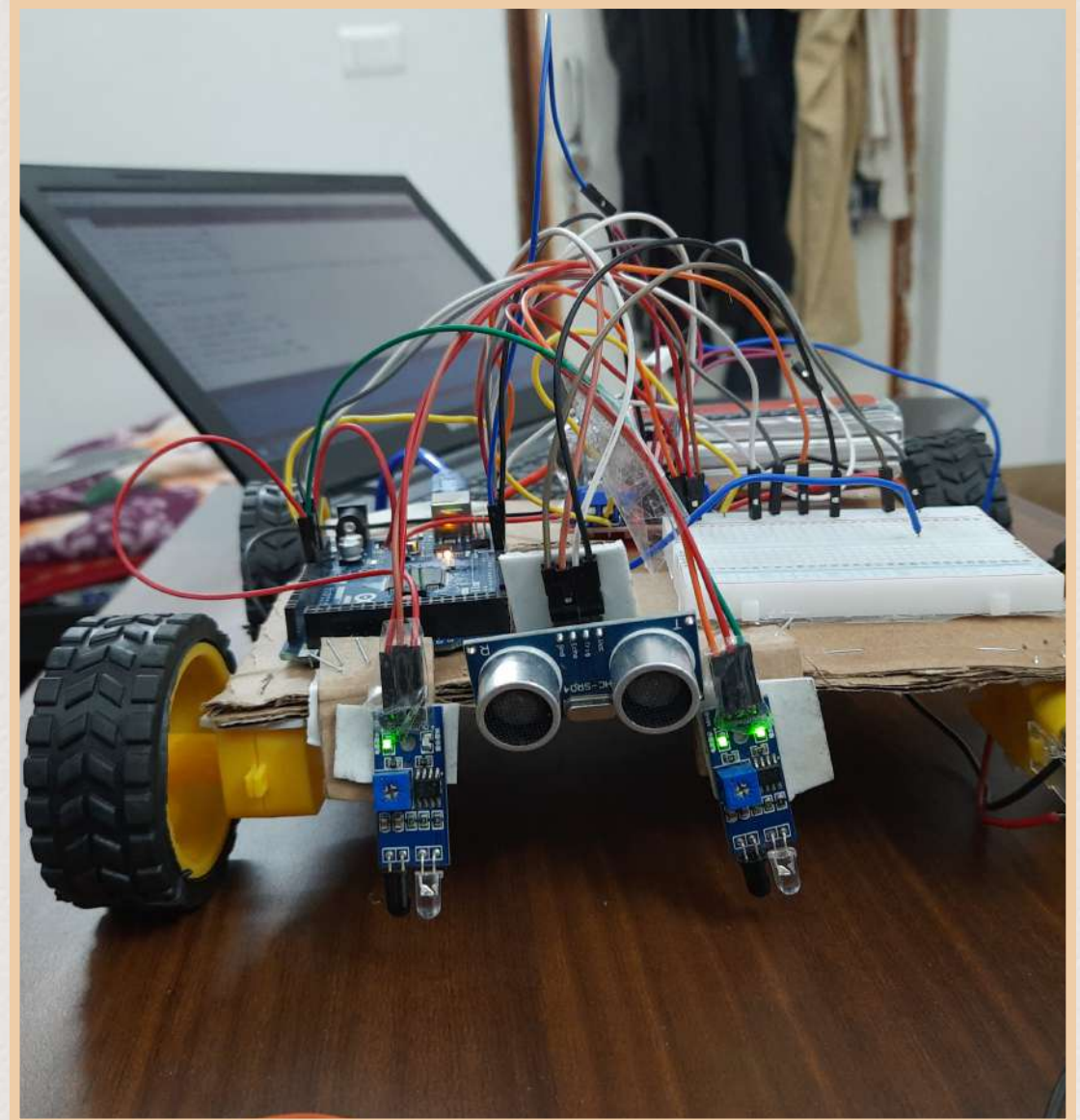
List of Components



List of Components

- ✿ *Arduino Mega 2560 R3 Board*
- ✿ *9 v battery*
- ✿ *2 WD robot chassis*
- ✿ *L298N H bridge*
- ✿ *7.4 v 2200 Mah lipo battery*
- ✿ *Ultrasonic sensor*
- ✿ *TCRT5000 IR sensor module*
- ✿ *2 geared motors and wheels*
- ✿ *Color sensor*
- ✿ *TCS 230 TCS 3200 color sensor*
- ✿ *Breadboard, Glue gun, Jumper wires*

Methodology



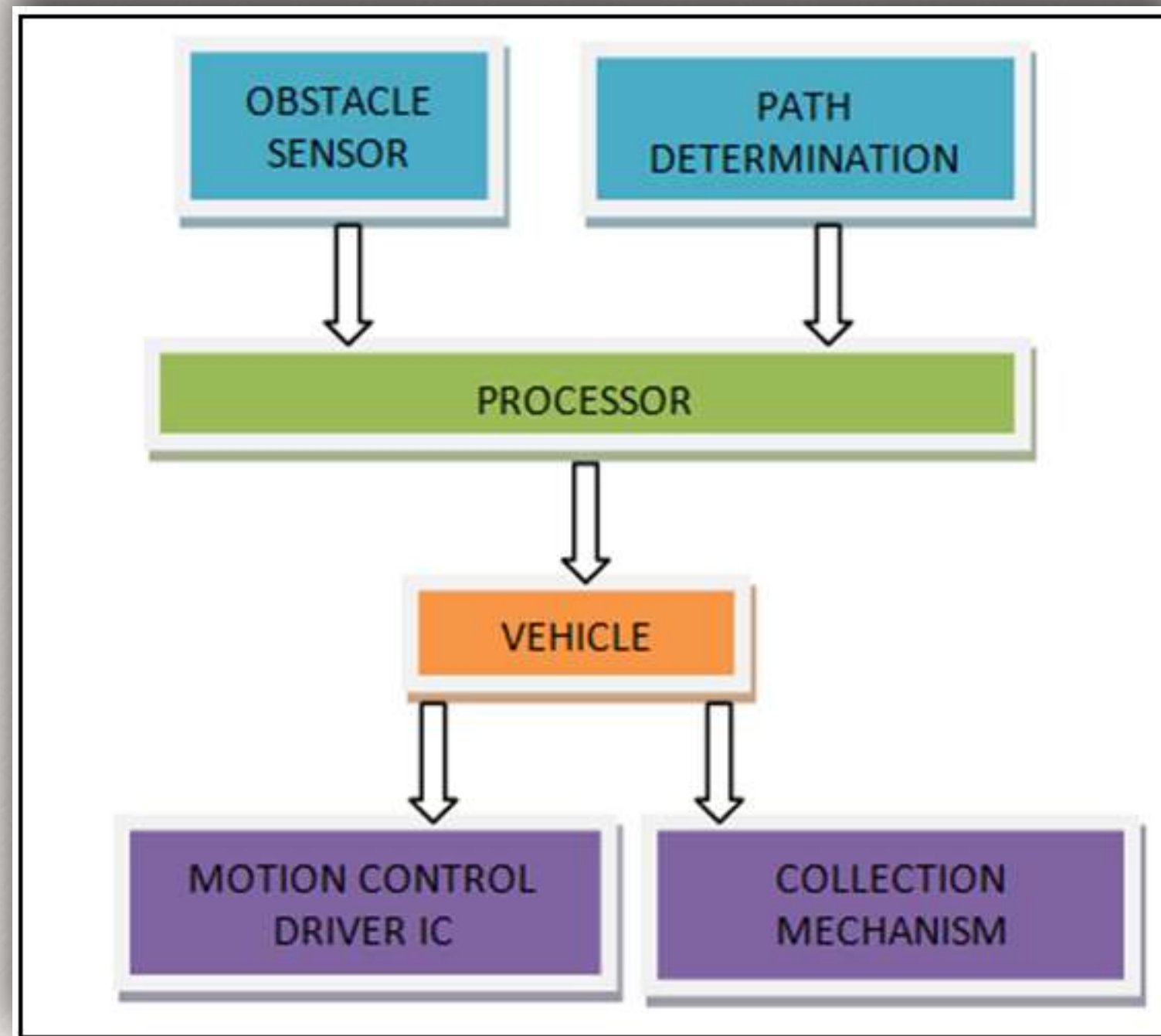
Methodology

✿ Locomotion of the Rover :

- ✿ *The robot can travel in the predetermined path(Black strip) by using a combination of motors, drivers, and sensors connected to the Arduino. This system consists of four geared motors , motor drivers and one ultrasonic sensors and Two proximity sensor. The ultrasonic, proximity and colour sensors act as input to the Arduino. The motors are connected to the output of the Arduino through the drivers. The sensors detect the obstacles and the motors are made to rotate based on the pre-programmed instructions in the Arduino.*
- ✿ *The line follower follows the predefined path and when encountering the obstacle it avoids the obstacle by turning either left or right and then returning back to the path. It is done by adjusting the delays in the code.*

✿ Garbage Collection:

- ✿ *We were unable to get the dataset of inorganic and organic waste, so we are classifying waste based on there colour that is if the obstacle is yellow in colour than we classify it as organic else inorganic.*
- ✿ *Rover is programmed as such that it segregates organic waste on right side and inorganic on left side.*



Swachh Rover

Ultrasonic Sensor

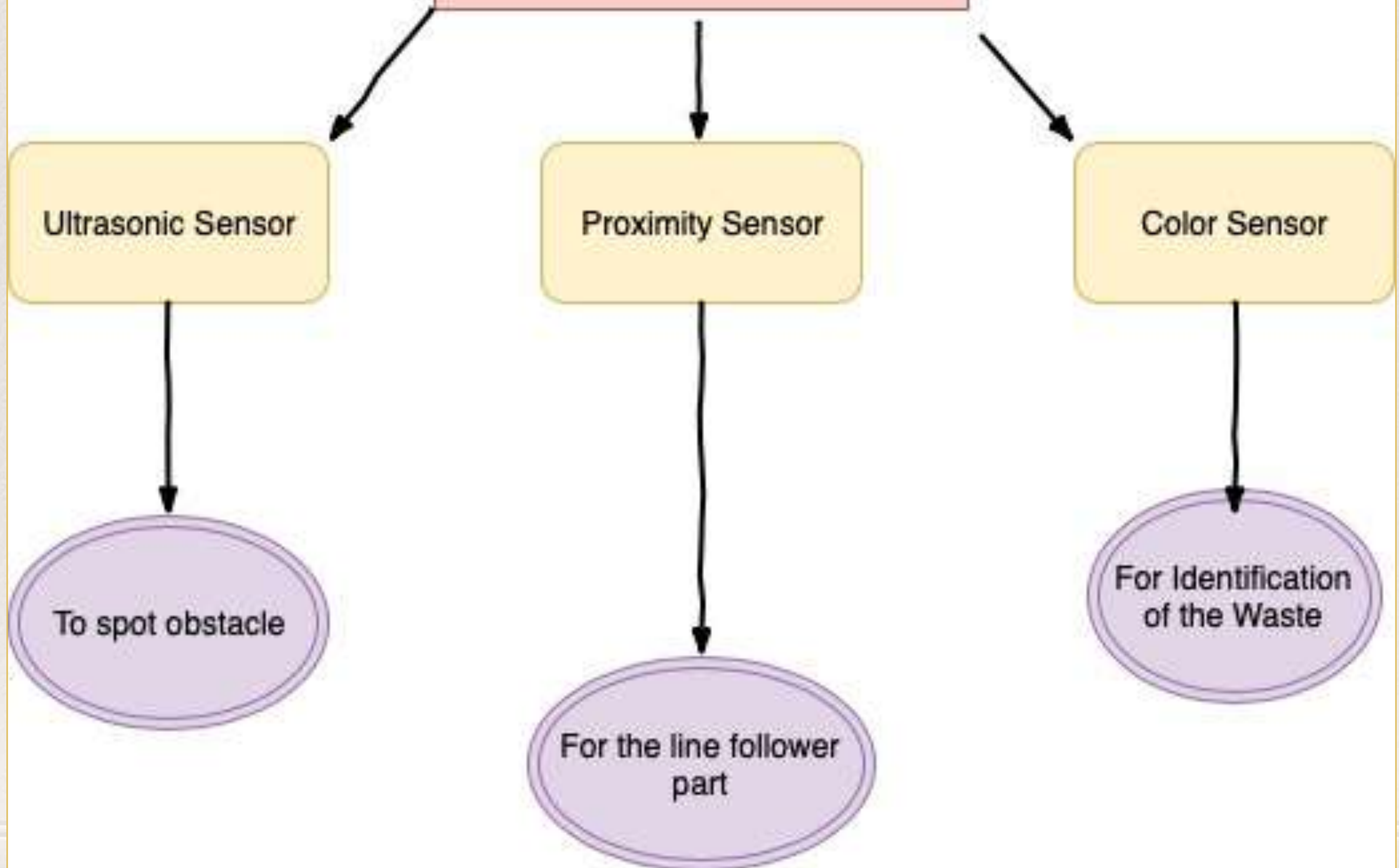
Proximity Sensor

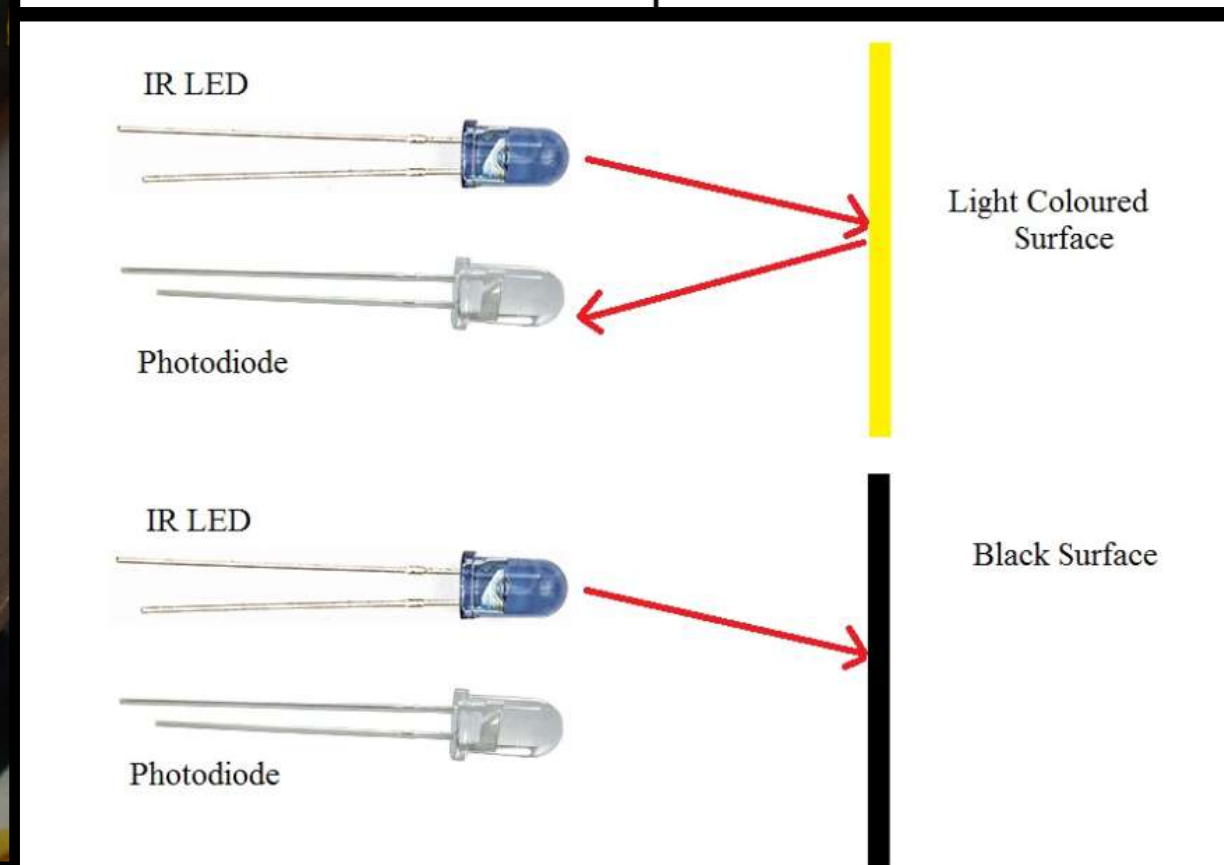
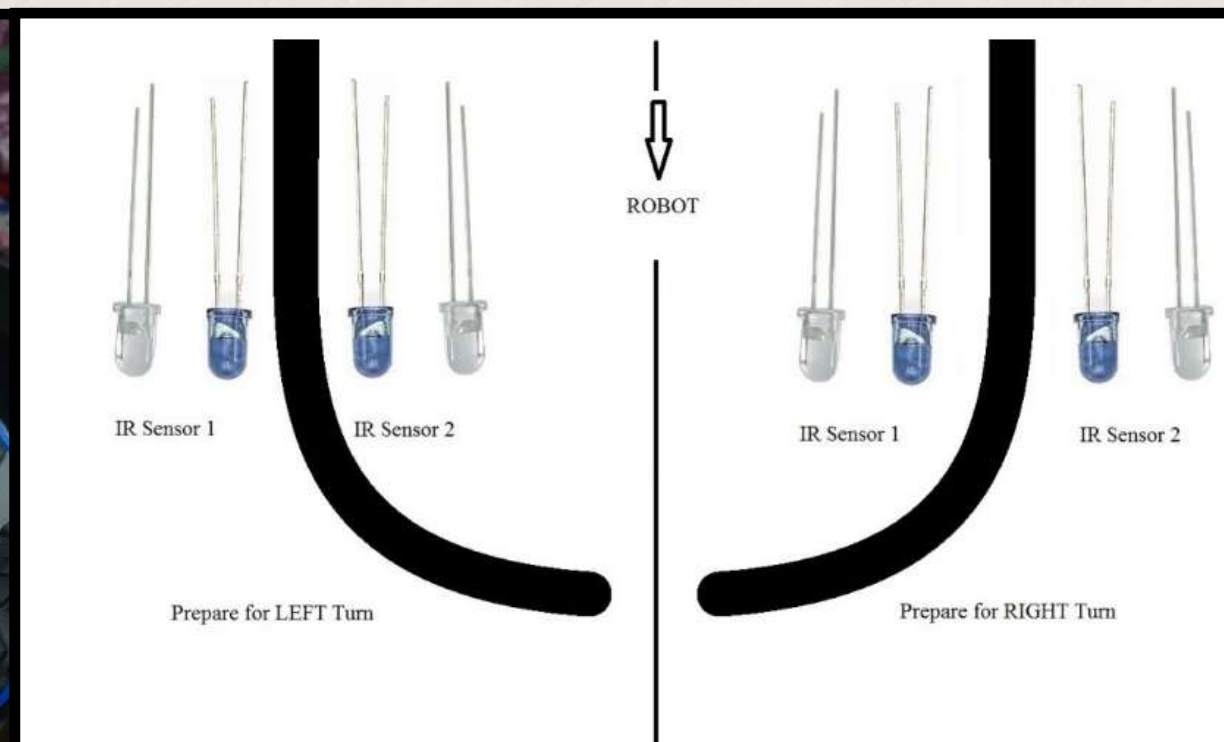
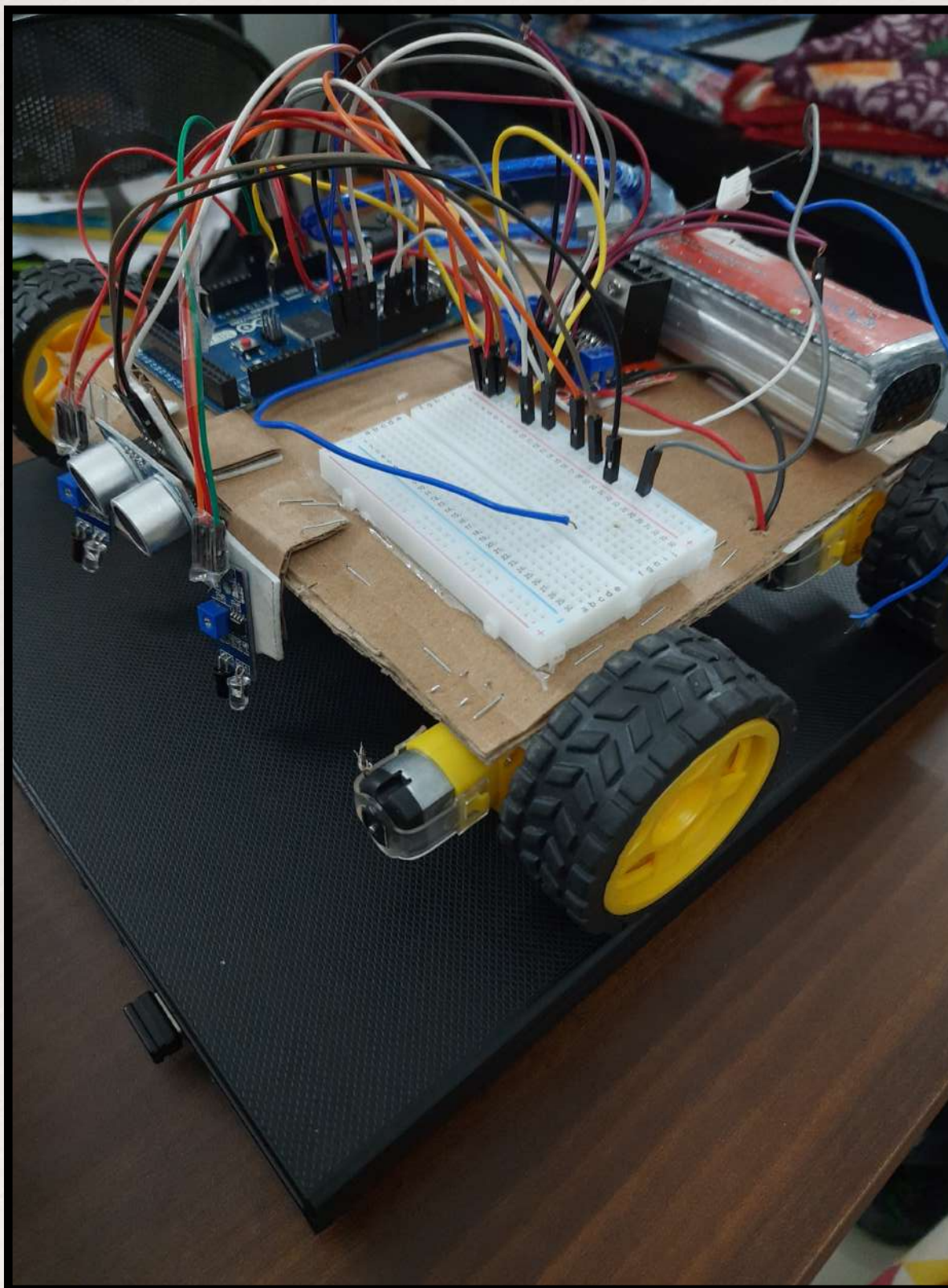
Color Sensor

To spot obstacle

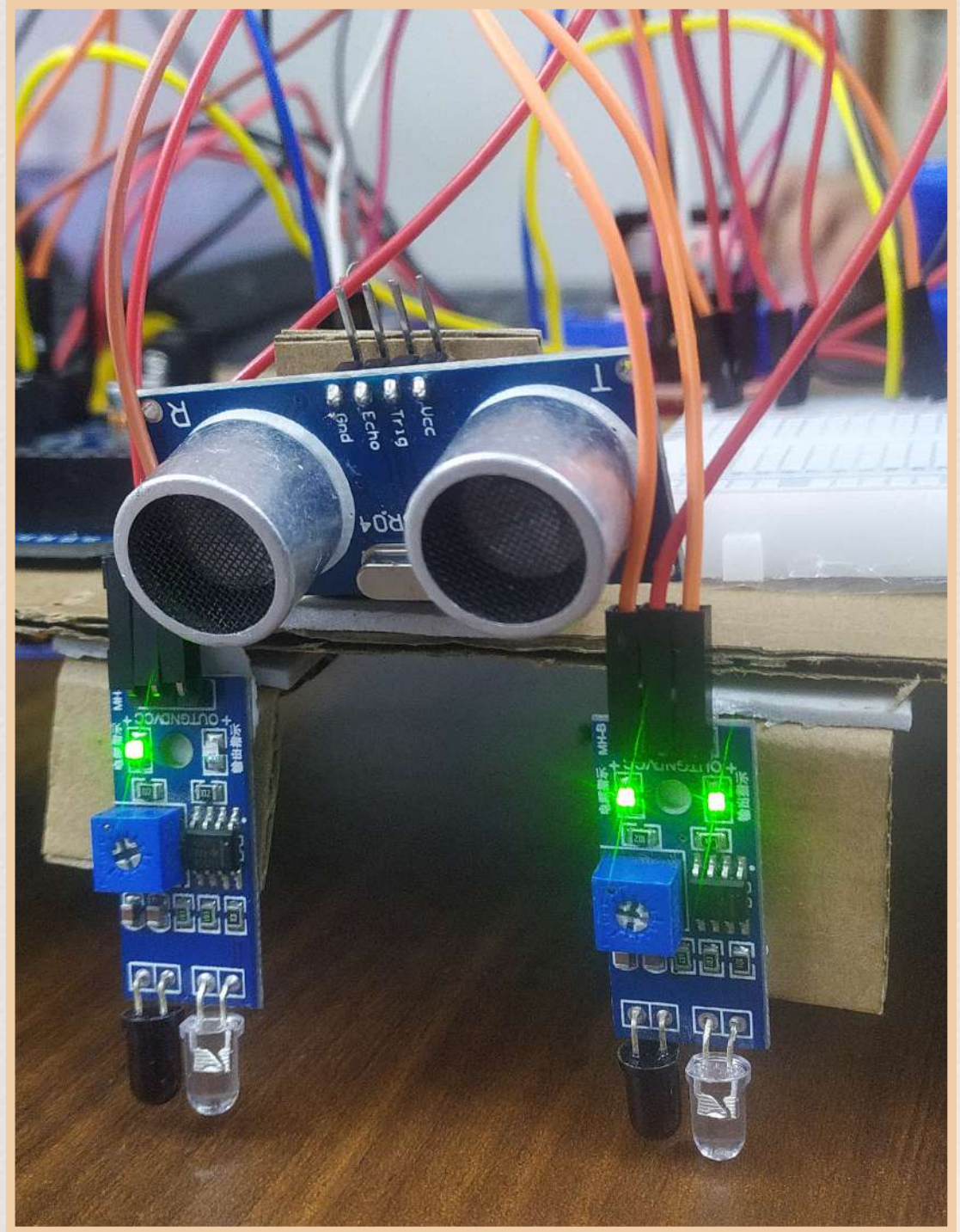
For the line follower
part

For Identification
of the Waste





System Evaluation



System Evaluation

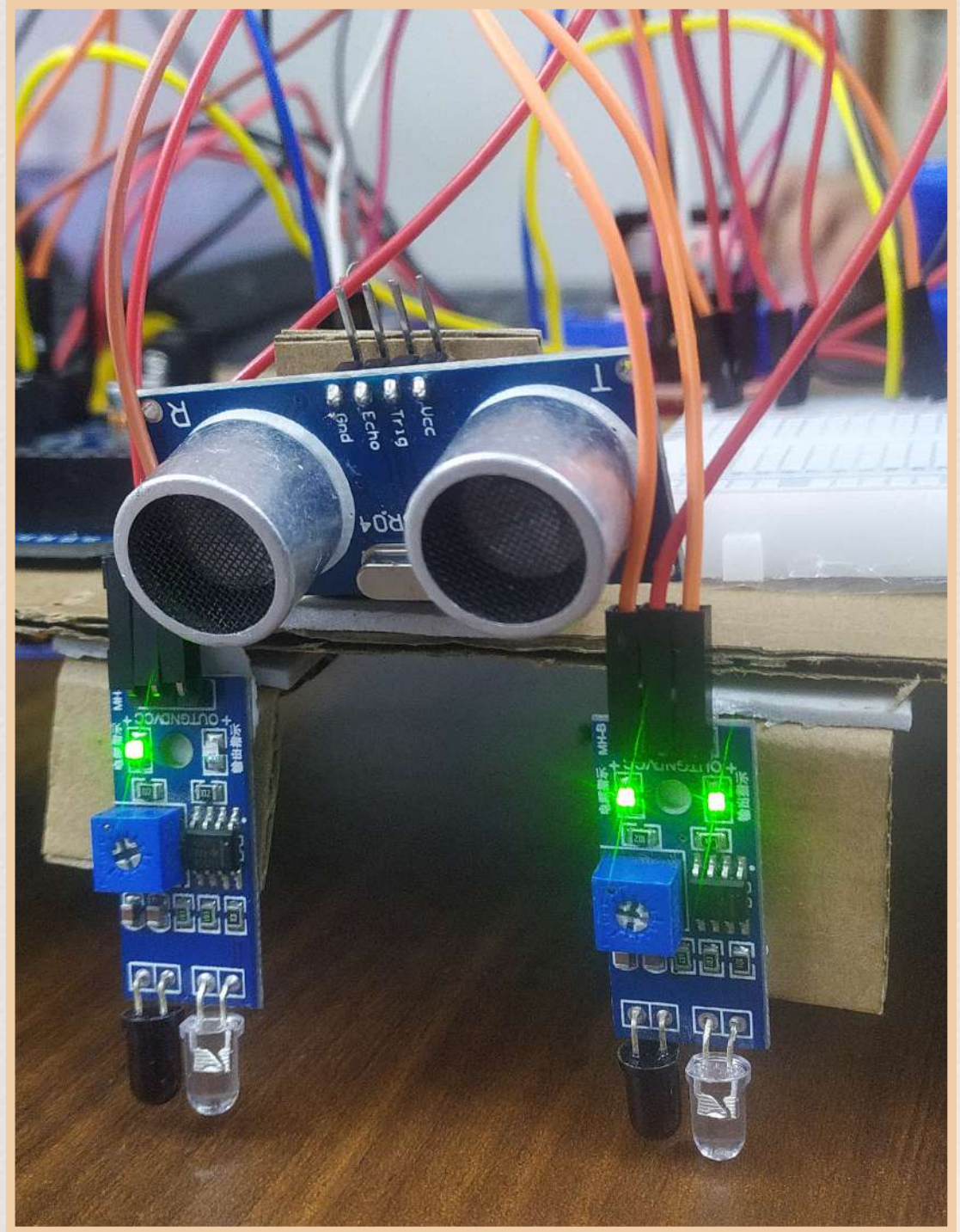
- ✿ Testing:
- ✿ *We tested and ran different sensor namely colour sensor, proximity sensor, ultrasonic sensor running them separately in Arduino.*
- ✿ *After assembling them into the line follower tested it on predefined path.*
- ✿ *After integrating ultrasonic sensor into our prototype, we tested it on obstacle in the path and also evading it from.*

✿ Observation:

- ✿ *We observe the working of various sensor used in our rover like proximity, ultrasonic and colour sensor.*
- ✿ *We observed the working of proximity sensors in the turning of the rover.*
- ✿ *Rover will turn either left or right depending on the colour of obstacle.*
- ✿ *Correctness of the line follower can be increased by using more proximity sensors.*
- ✿ *High power battery may damage the motor driver and other parts of the rover.*
- ✿ *Delays in the code should be adjusted properly for passing the obstacle.*

- ✿ *Future possibilities and suggested modification:*
- ✿ *Solar power panel can be used for powering the rover which can make it viable in use.*
- ✿ *AI and CV can be used for identification and classification of the waste.*

Conclusion

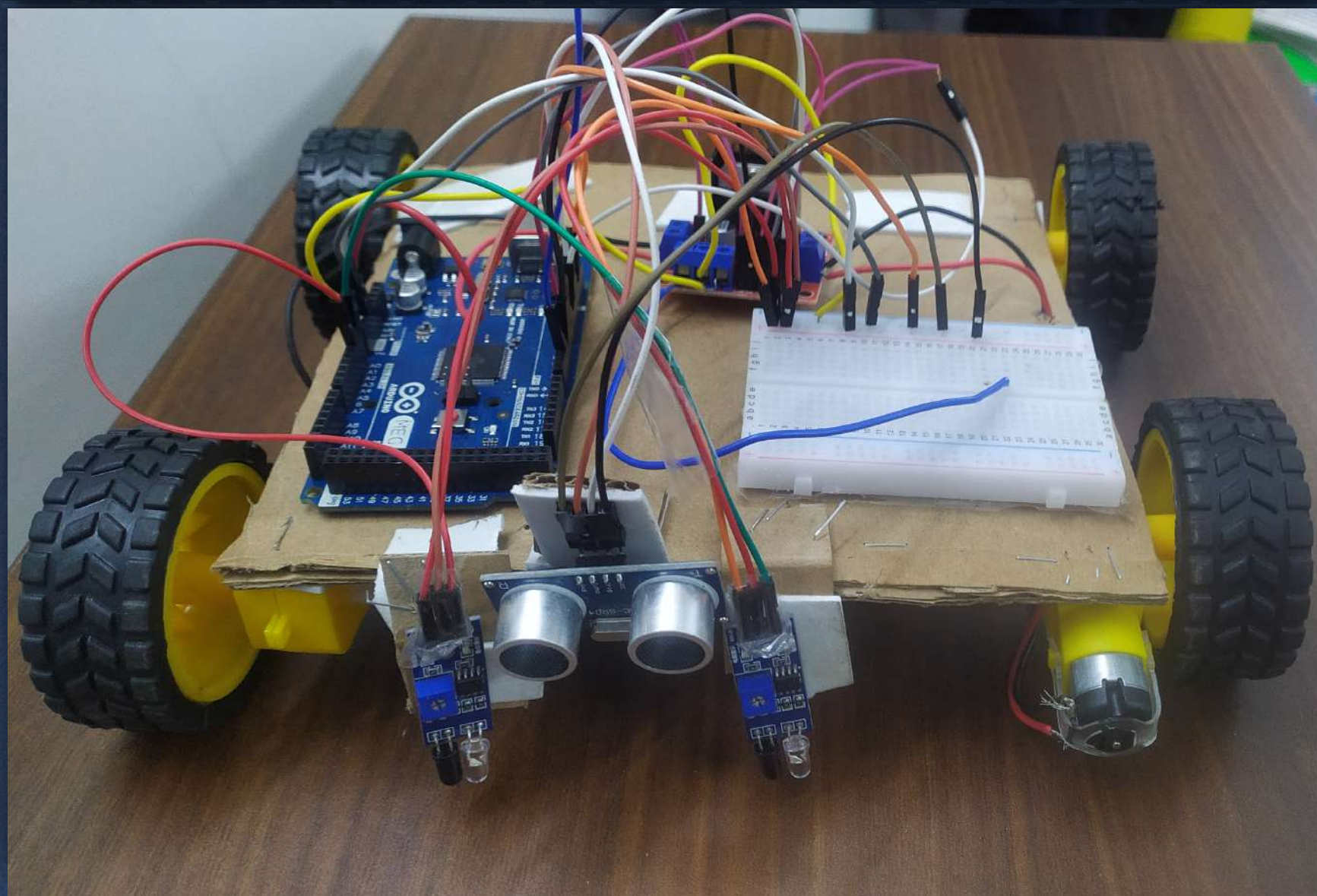


Conclusion

- ✿ *The objective of the project was achieved to some extent. The Line follower obstacle detection works efficiently and effectively. Ultrasonic sensor worked successfully in encountering the obstacle and avoiding it to get back to the path. Colour sensors to some extent distinguished between different colour object(assumed Yellow to biodegradable and else trash is non-biodegradable). The garbage gets detected when it is at 14 cm from the swachh rover. The project is still in progress to achieve the optimised results with few more modifications.*

Bibliography

- ✿ *<http://article.sapub.org/10.5923.j.ijit.20170602.06.html>*
- ✿ *<https://www.youtube.com/watch?v=Py2lBehF9rA>*
- ✿ *<https://circuitdigest.com>*
- ✿ *hackster.io*



Thank You