

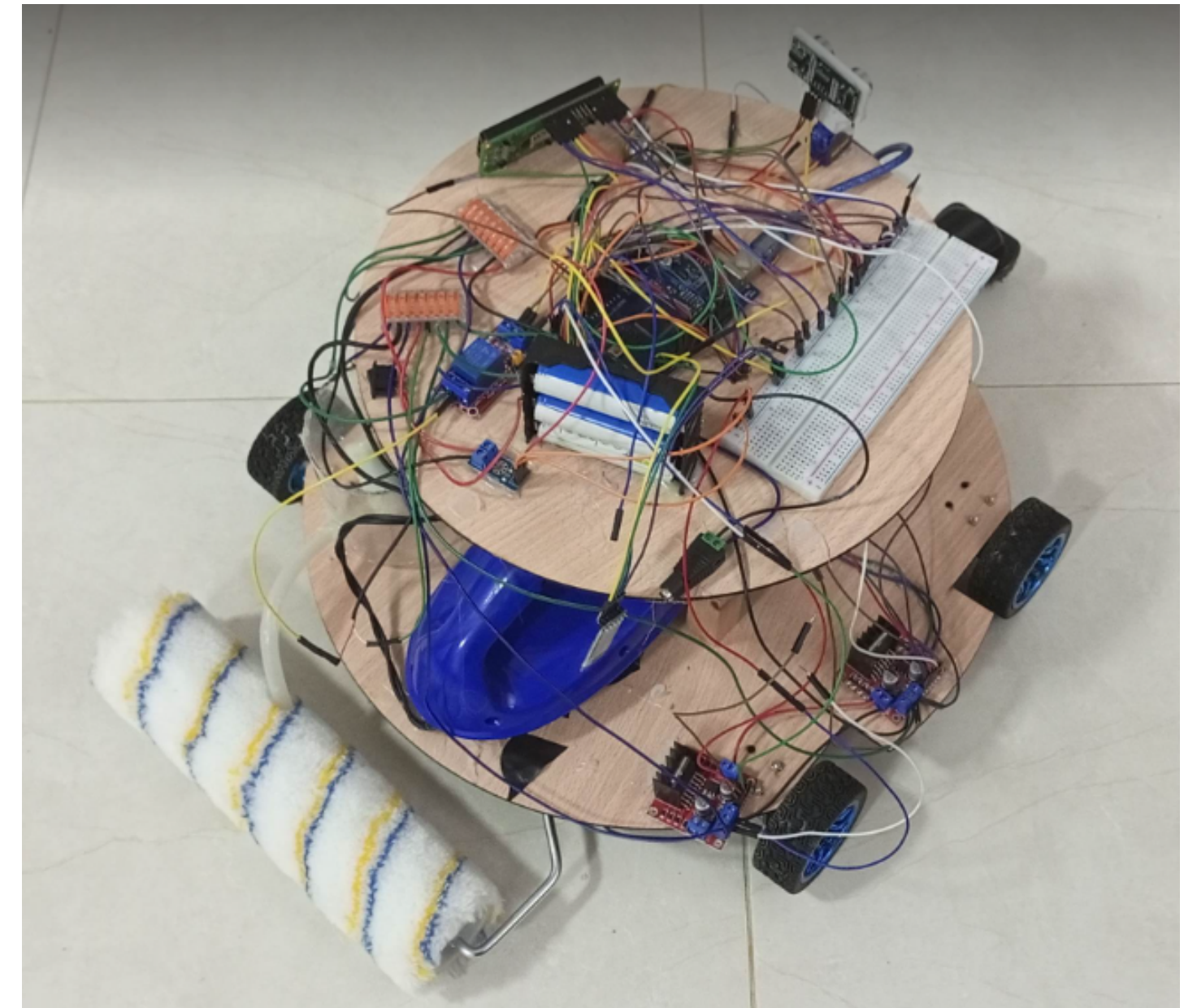


**AN-NAJAH UNIVERSITY**

# **SMART CLEANER ROBOT**

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**PARTICIPANTS : YAZAN ALSADE & EHAB DWEKAT**



# TABLE OF CONTENTS

**introduction**

**project overview**

**Hardware  
Components**

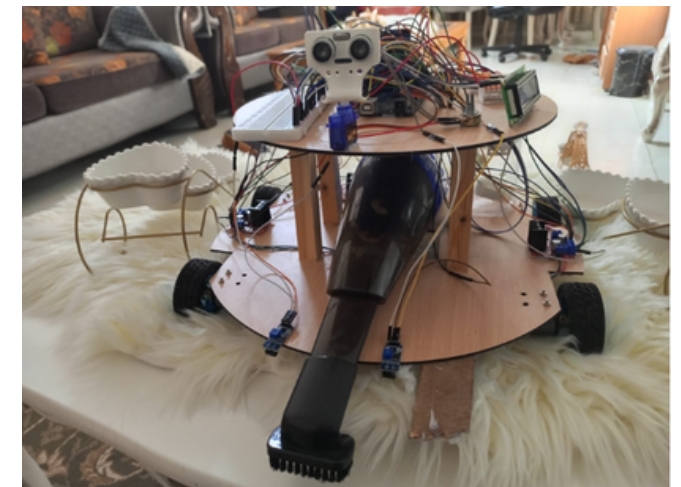
**Working  
Principle**

**problems**

**Conclusion**

# INTRODUCTION

Cleaning robots are becoming one of the most popular new home appliances, a trusted little cleaning partner in many households. Unlike the traditional vacuum cleaner, this robot is able to clean your room by navigating across the floor and avoiding obstacles. It also charges itself, all without using human help. The Smart Cleaner Robot uses more advanced technology to solve the issue and is built to automate the cleaning process. The robot is started via the program. The robot navigates using Automatic movement. The Smart cleaner Robot helps to clean the floor surface without the need for human interaction, saving time for the user.



# PROJECT OVERVIEW

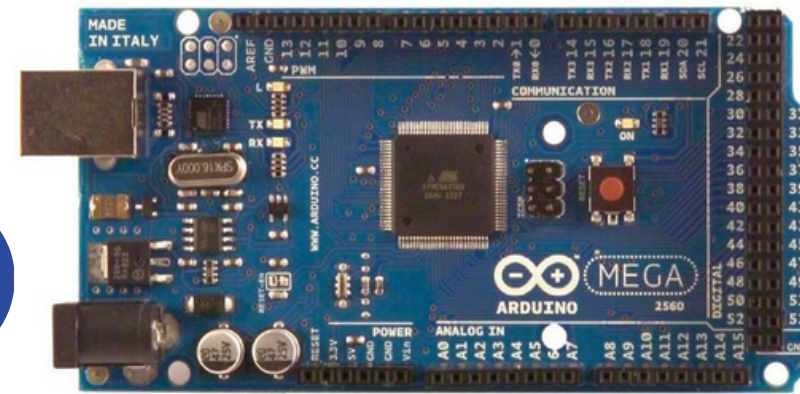
Basically, the robot that we built on an application on the mobile phone, so that the user chooses the cleaning method that he prefers, so that it contains two basic options for cleaning, which are manual cleaning using Bluetooth, so that the robot's movement is controlled by commands or buttons, or the user chooses the path of automatic cleaning without assistance. It is based mainly on the ultrasonic sensor and the servo motor so that the motor moves, and the ultrasonic scans the room and chooses the appropriate path for the robot in order to avoid obstacles that can be encountered.

## Features:

1. Automatically recognize and avoid obstacles.
2. Use a fan to suck out the dust particles from the smooth tiles.
3. Showing the battery charge percentage of the robot, as it is transported. to the charging point by the black line using IR sensors.
4. Use the app to control the robot using Bluetooth Module.
5. Show the percentage of water remaining in the tank.
6. The robot uses a pump to pump water and then cleans with a roll.

# Hardware Components

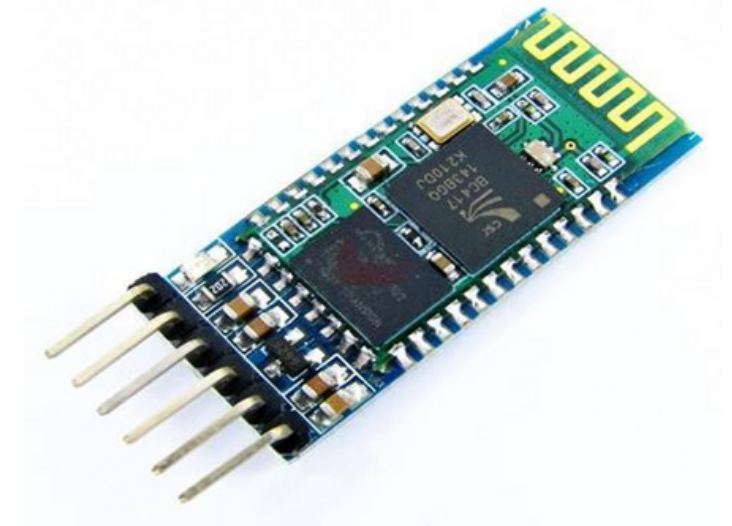
**ARDUINO MEGA**



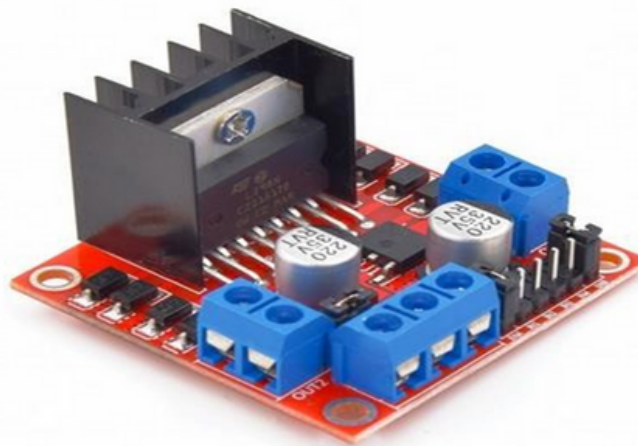
**DC MOTOR**



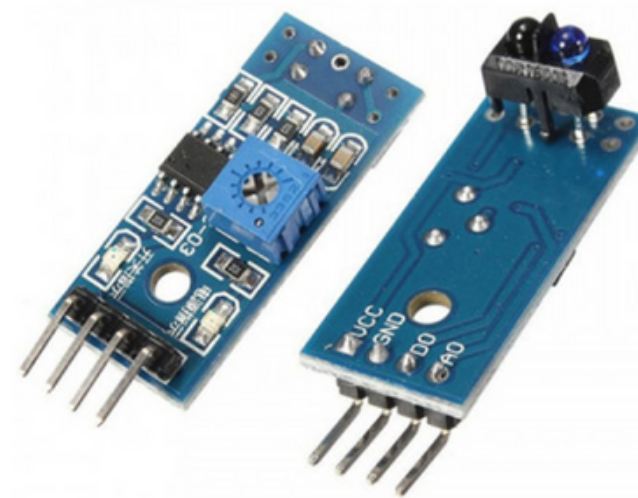
**BLUETOOTH MODULE HC-05**



**L298N DRIVER**



**TCRT5000 IR SENSOR**



**WATER PUMP**



# Hardware Components

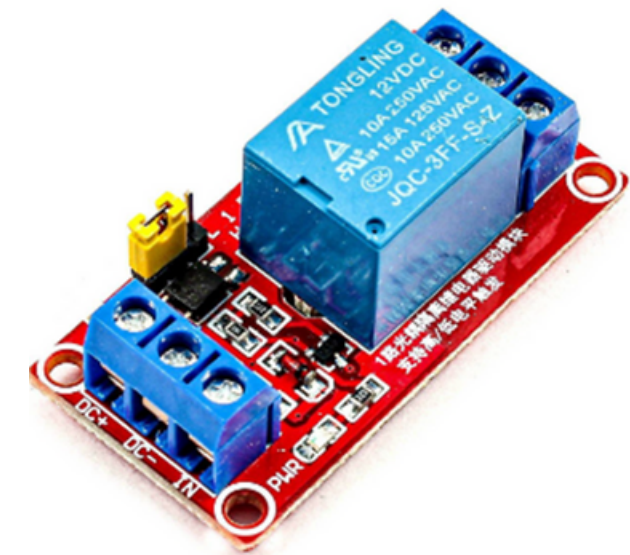
SERVO MOTOR



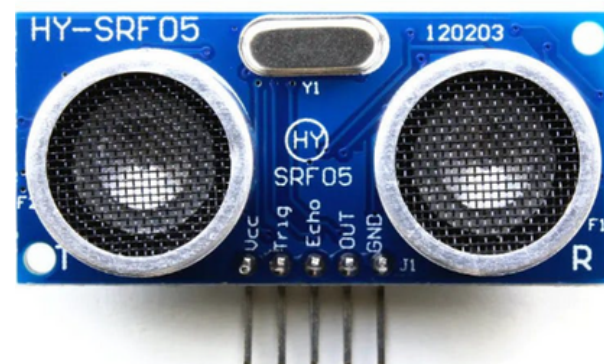
VOLTAGE SENSOR



RELAY MODULE



ULTRASONIC SENSOR



SINGLE CELL LITHIUM-ION BATTERIES

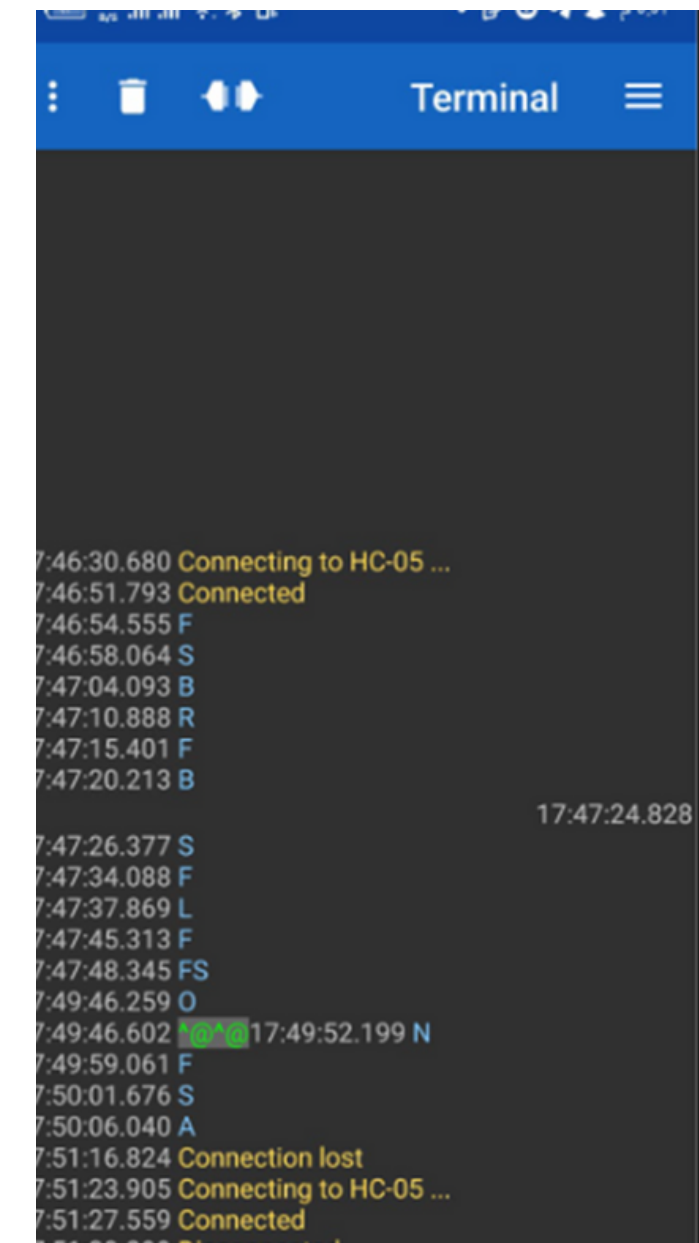
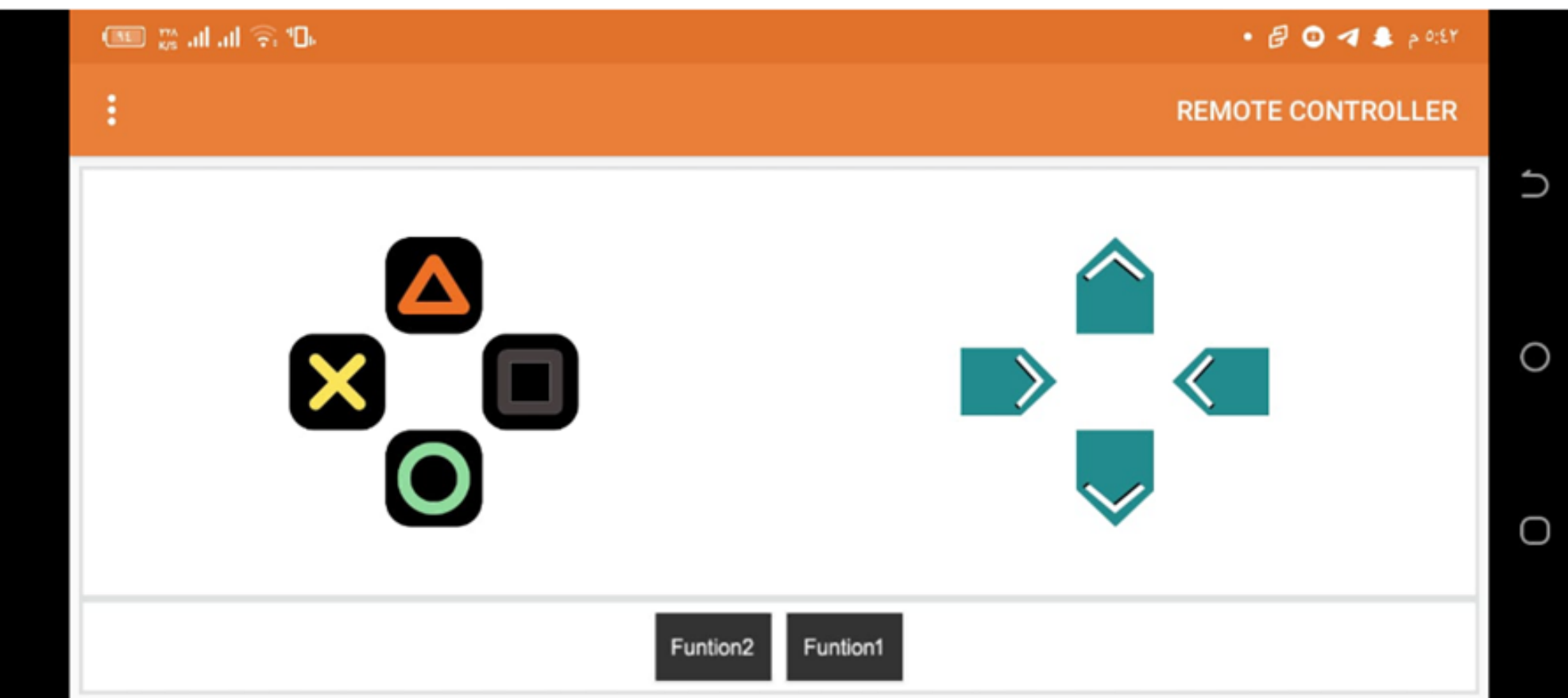


# WORKING PRINCIPLE

In the beginning, the robot that we built relies on a mobile application so that the user chooses the cleaning method he wants.

Below are pictures of the two applications that we used

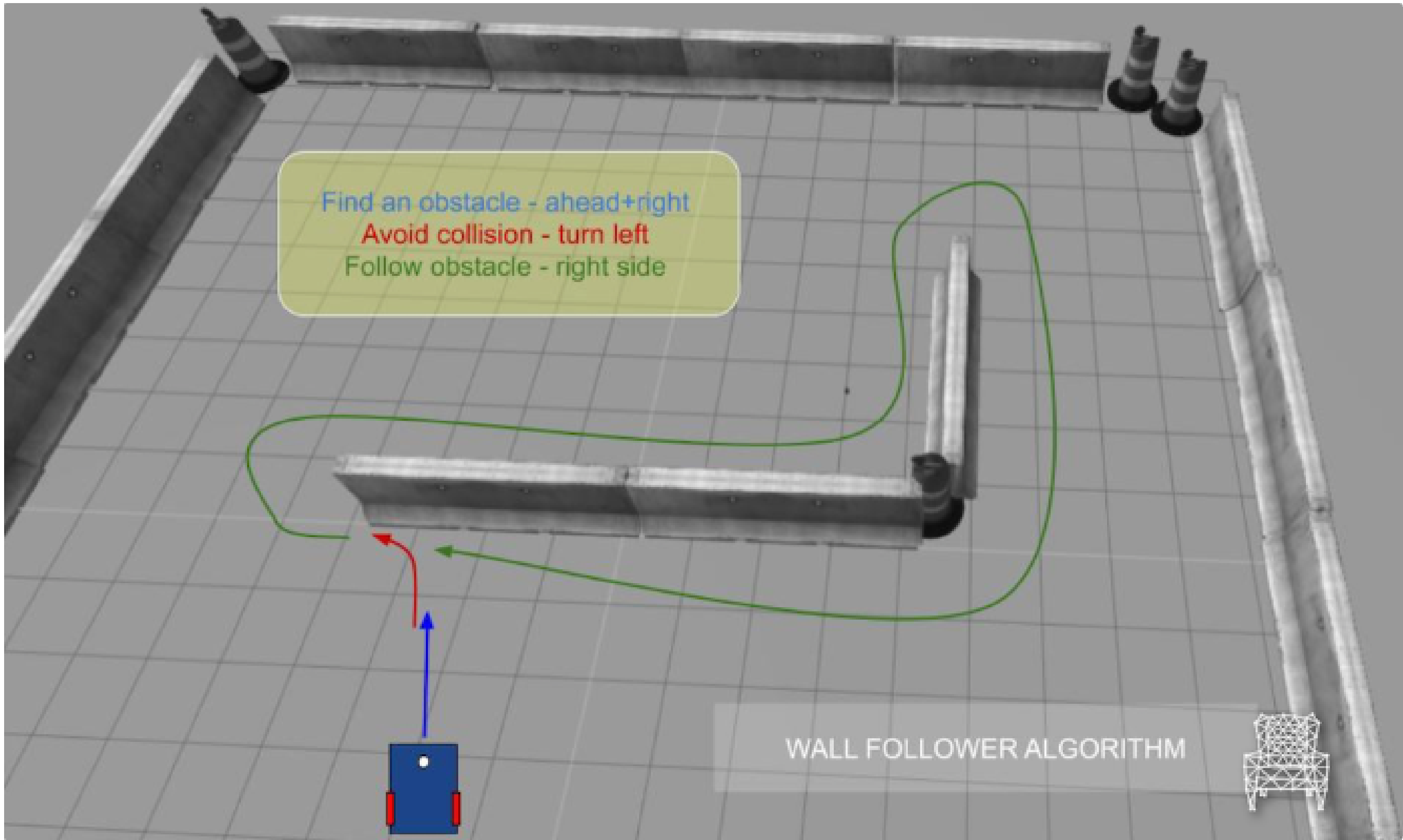
One of the applications is controlled by buttons, and the other application is controlled by commands



# THE ALGORITHM WE USED

## Wall Following:

This algorithm depends on reading the distances using the ultrasonic sensor, so that it initially stores the distances to the right, left, and forward. After that, the robot starts working so that if there are no barriers or obstacles in front of the robot, it continues to move forward, but if it encounters any obstacles, it will stop and go back a little backwards, then it measures and reads the distances on the right and on the left, and compares them, and the side that gives a greater distance, the robot moves in its direction, but if there is an obstacle on the right, left, and forward, When the paths are closed in all directions, the robot goes into a dead end state and then rotates 180 degrees to find an alternative path. In addition, it is controlled via Bluetooth. And based on our observation of huge robots in large factories that do cleaning, these robots are directed by the user to paths at the end of which are designated places for unloading dirt, so we represented these paths using the black line.



# PROBLEMS

1

UNAVAILABILITY OF THE RASPBERRY PI

2

PROBLEM OF THE ASPIRATOR

3

SOFTWARE SERIAL LIBRARY

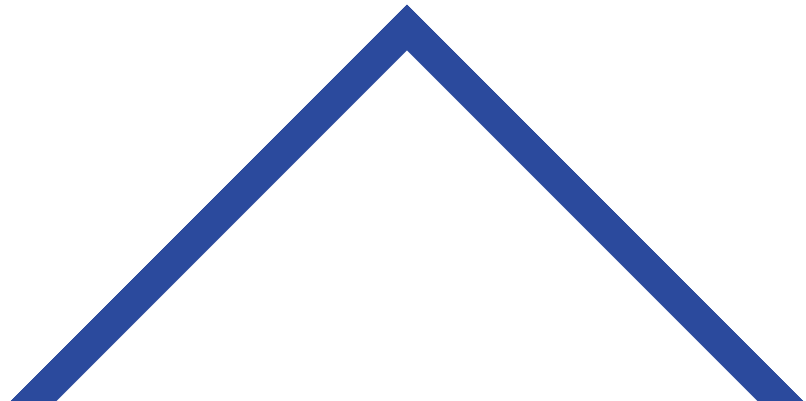
# FUTURE WORK

- Replacing household cleaning devices with robots dedicated to carrying out the same tasks in order to save the price of these devices and save energy and electricity.
- Adding hardware pieces so that it is able to deal with dirt of large sizes and be able to carry it and distinguish the objects in front of it.
- The ability of the robot to charge automatically instead of being charged with the help of humans.



# CONCLUSION

**The created bot is fully functional and follows logical navigation rules. It is turned on in order to more effectively clean dry dust particles. Robots are wireless devices, and therefore they can move around a vast area. Plus, less human interaction means less human labor. The robot can be upgraded with additional features to improve cleaning, including self-charging, self-dusting, and the ability to detect a whole room using the grid algorithm.**



**THANK YOU**

