

## Introduction

Households of today are becoming smarter and more automated. Home automation delivers convenience and creates more time for people. Domestic robots are entering the homes and people's daily lives. Several smart vacuum cleaner are available on the market. The purpose of this project is to design and implement a Vacuum Robot Autonomous and Charging base. Vacuum Cleaner Robot is designed to make cleaning process become easier rather than by using manual vacuum. The main objective of this project is to design and implement a smart vacuum cleaner prototype by using Arduino Mega, IR Sensor and limit switches to achieve the goal of this project.

## Methodology

Main concept of this smart vacuum cleaner is limit switches. By using limit switches behind the front bumper, the vacuum cleaner changes direction whenever it hits an obstacle. It consists of four limit switches distributed equally across the front. Whenever the right side of the bumper gets hit, it moves towards the left and vice versa. Another one used is an Infra-red Sensor. This is used as a "cliff sensor" which detects if the distance between the cleaner's floor and the ground has increased (e.g. stairs). The cleaner then rotates 180 degrees, and continues cleaning. The device is also equipped with 2 front sweepers which helps move dust towards the suction part beneath the vacuum cleaner. A number of software and hardware implementation techniques were used to design and develop the system.

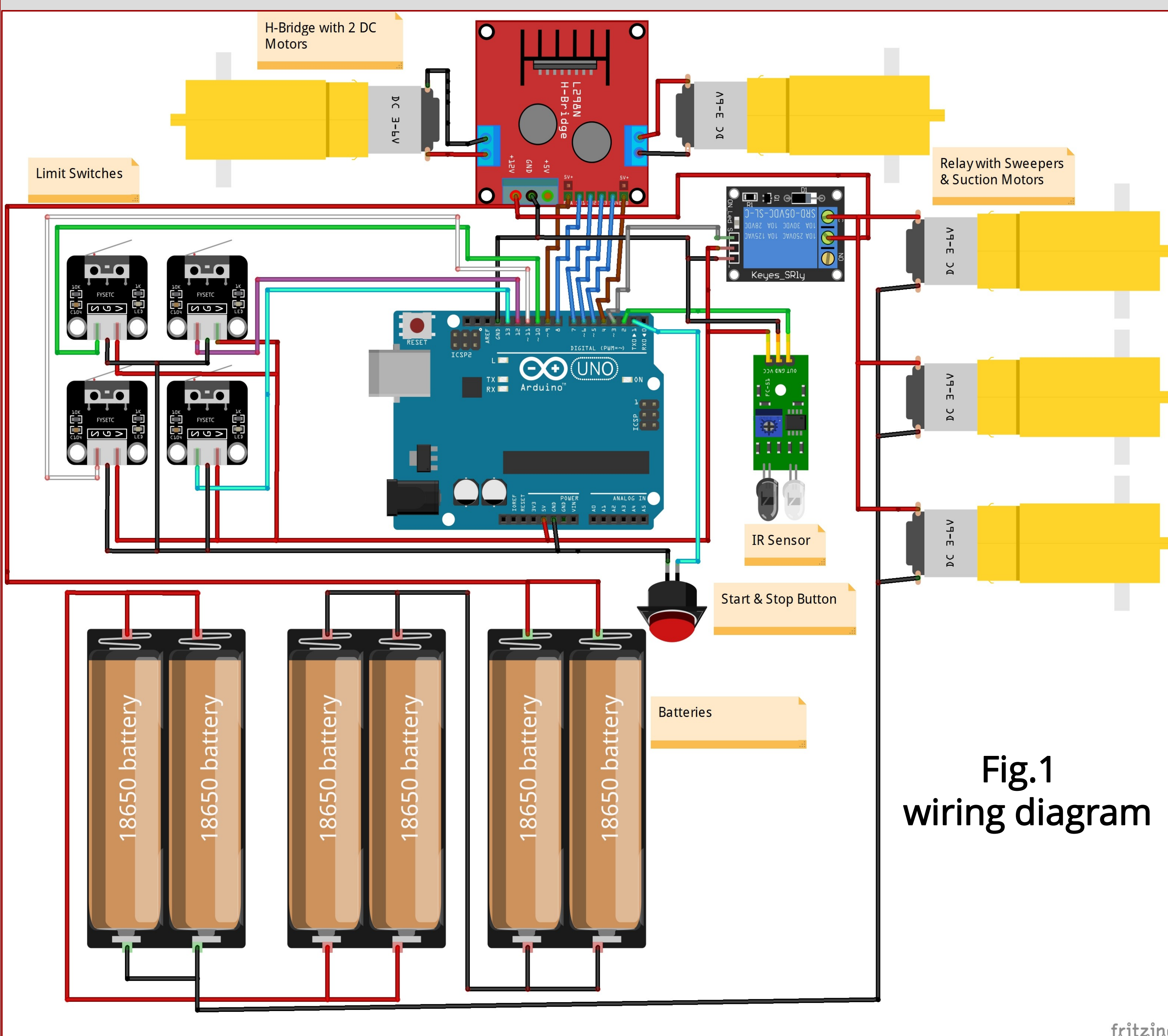


Fig.1  
wiring diagram

For the Chassis construction, we preferred the disk shape and for the materials we used MDF wood and laser cut it, to be durable and more economic. We used 3D printed parts to get accurate dimensions.

In the design we built a second level to maintain the center of gravity of the whole Vacuum cleaner.

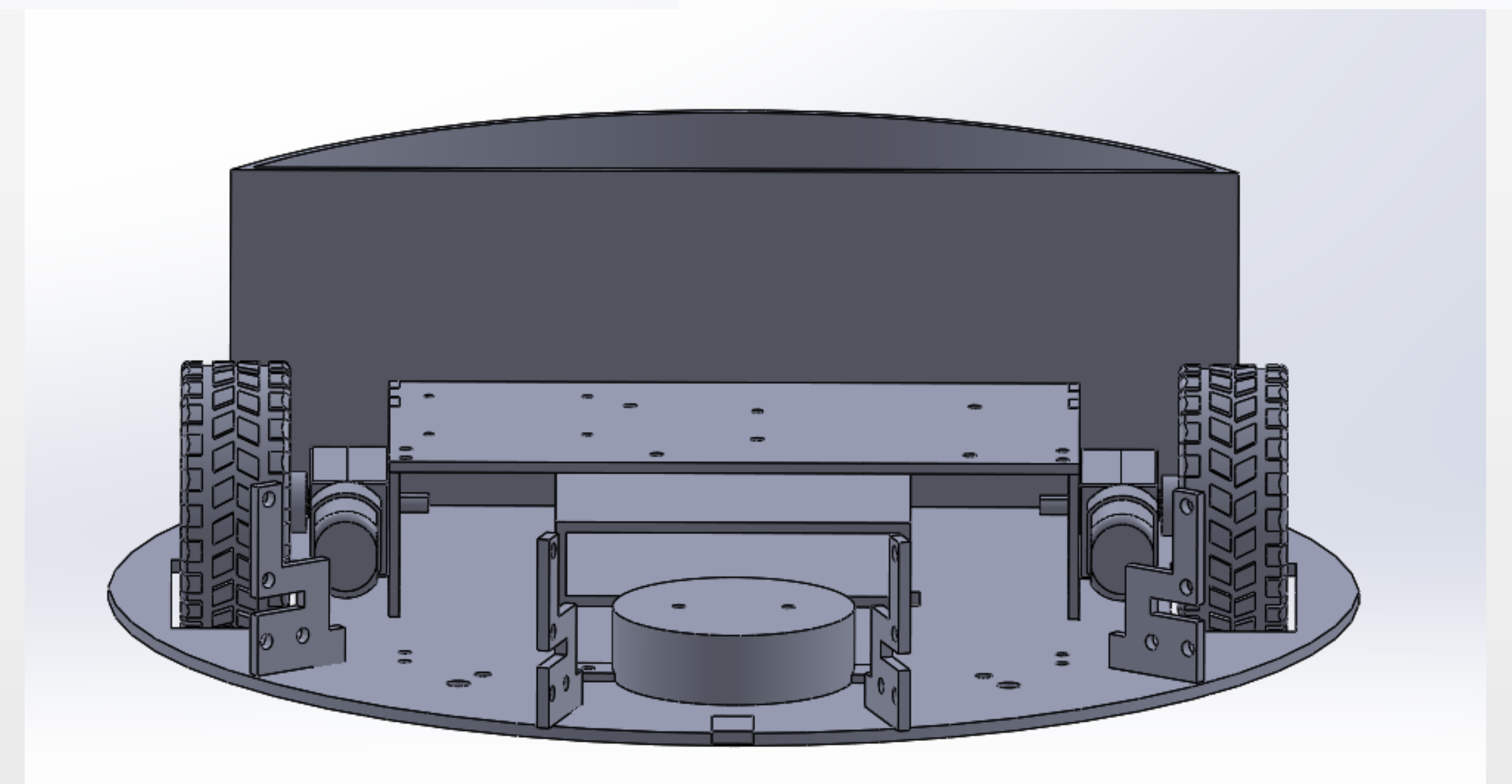
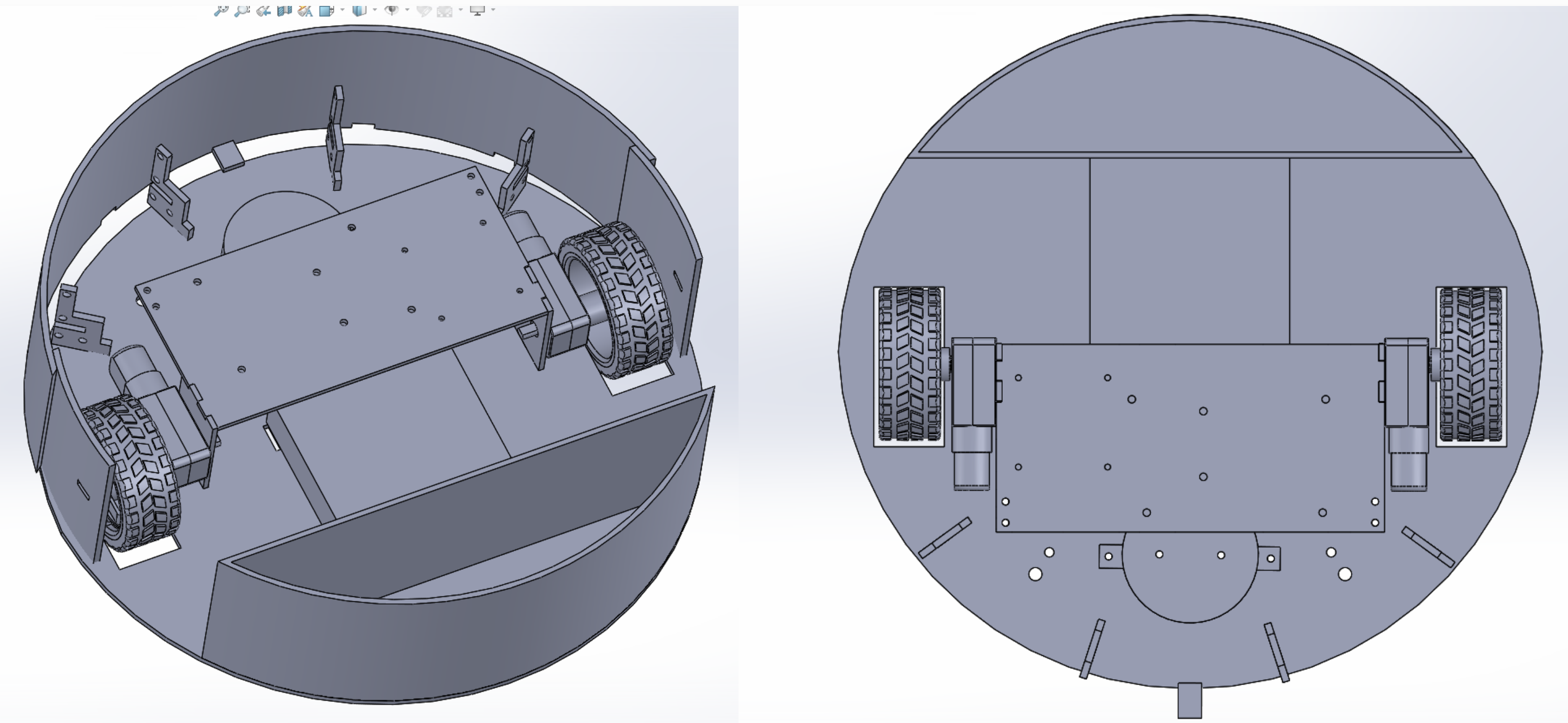


Fig.2 Design of the chassis

## Results

The Smart Vacuum Cleaner robot is able to cover large floor areas as well as it find its way into and out of small corners and change its direction when hitting obstacles. As the robot randomly traverses the room, the sweepers installed underneath manages to pick up a significant amount of dirt. The robot is made automatic that satisfy main objective of cleaning. The testing of the robot showed the functionality which user can operate (on/off) the robot for cleaning process.

## Conclusion

A user friendly Smart Vacuum Cleaner can be developed with Autonomous using an Arduino Board with more electronics functionality. Since robot is wireless device it can navigate to cover the large area. It also makes less human interaction which reduces the human work. Mobile software application to control it, lighter body weight and to set alarm on/off time manually are the future scope of this project.

## Acknowledgements

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