

Homework 5

Group No: 7

Group name: Team Decepticons

Index No: 200027R, 200041E, 200262G, 200285E, 200289U

Physical Task

We have designed a line-following robot to achieve this task. This robot consists of,

- Arduino UNO board
- DC motors x2
- IR sensors x3
- Ultrasonic sensors x2
- Motor driver
- Wheels x2
- Caster wheel
- 18650 Li-ion batteries x3

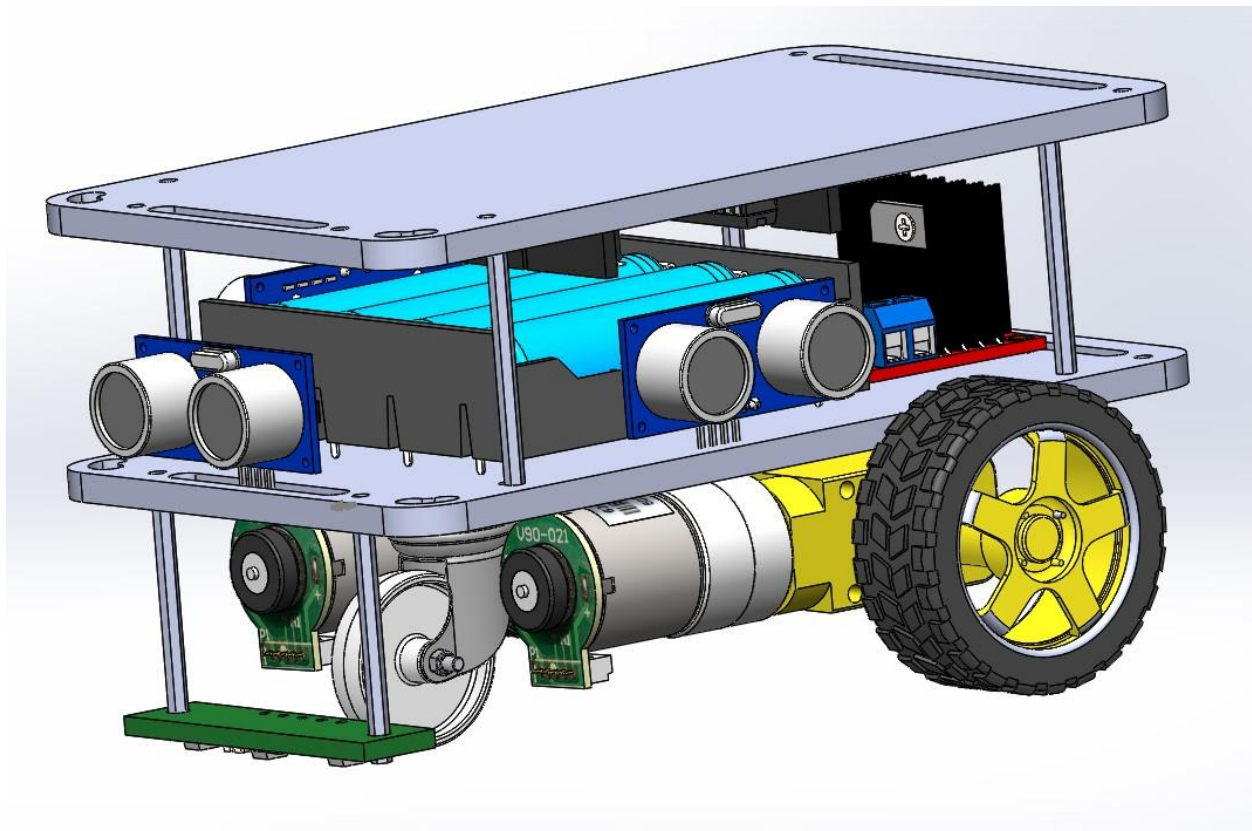


Figure 1 - Isometric view

Sensors, actuators, battery

1. IR sensors

We used IR Line sensor to detect line colors (black and white) Since Black surfaces absorb infrared light, but white surfaces reflect it. This process can be used to travel in the maze and to find the correct exit of the blind box. They are mounted such that sensors are pointing downward.

2. Ultrasonic sensors

We used two ultrasonic sensors. One sensor is mounted at the front side of the chassis. It is used to detect the walls of the blind box. Another sensor is mounted on the left side of the robot. This is used to follow the curved wall. This sensor is also used to keep the robot at a constant distance from the wall.

3. DC motors

We used two DC motors with encoders to control the wheels. They are mounted at the bottom of the chassis as shown in the figure. Encoders give feedback on the motor speed and direction to the Microcontroller, and they are controlled separately to turn the robot in different directions.

4. Battery

We used three li-ion batteries parallel to the drive seven motors, sensors, drivers, and Arduino UNO board. We want to drive two 30:1 12V DC motors. For this, it requires more current. So, we used li-ion batteries (maximum current is 2A) instead of 9V alkaline batteries (maximum current is 500mA).

5. Caster wheel.

We used a caster wheel at the rear side of the robot. This wheel makes it easier to steer the robot instead of using two wheels at the rear side. This wheel helps to balance the robot. So, it increases the stability of the robot. This wheel does not require a motor to rotate. It is made free to rotate.

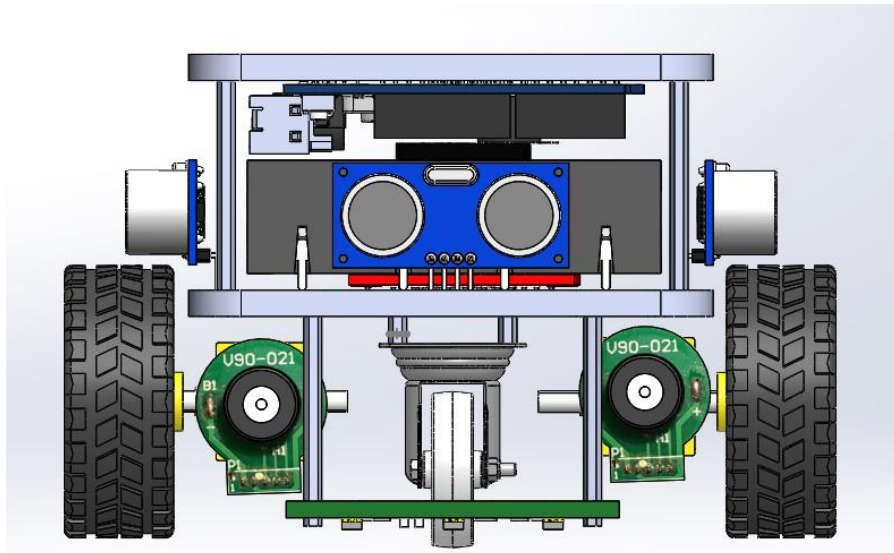


Figure 2 - front view

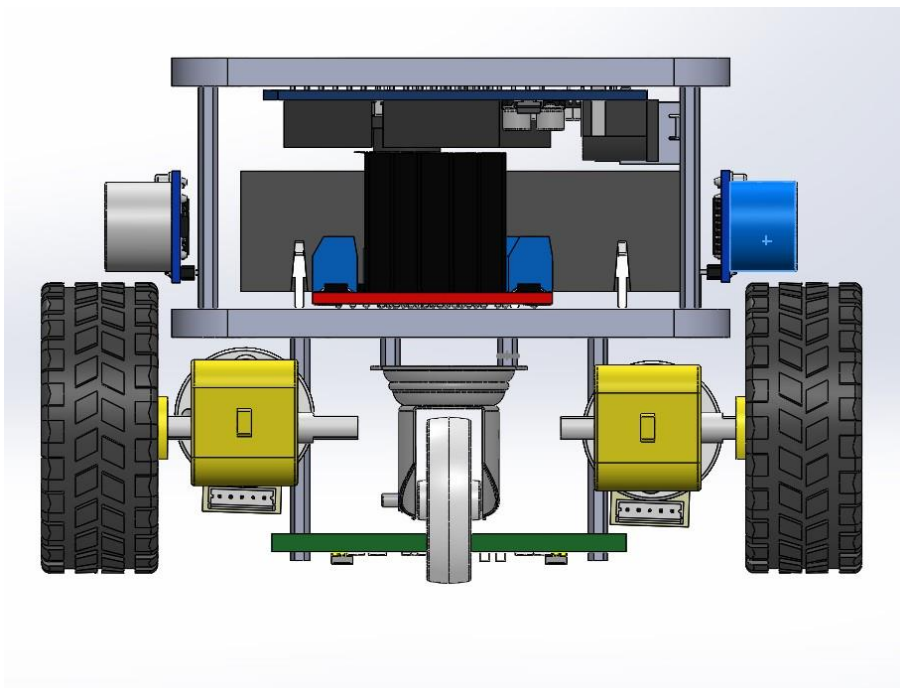


Figure 3 - rear view

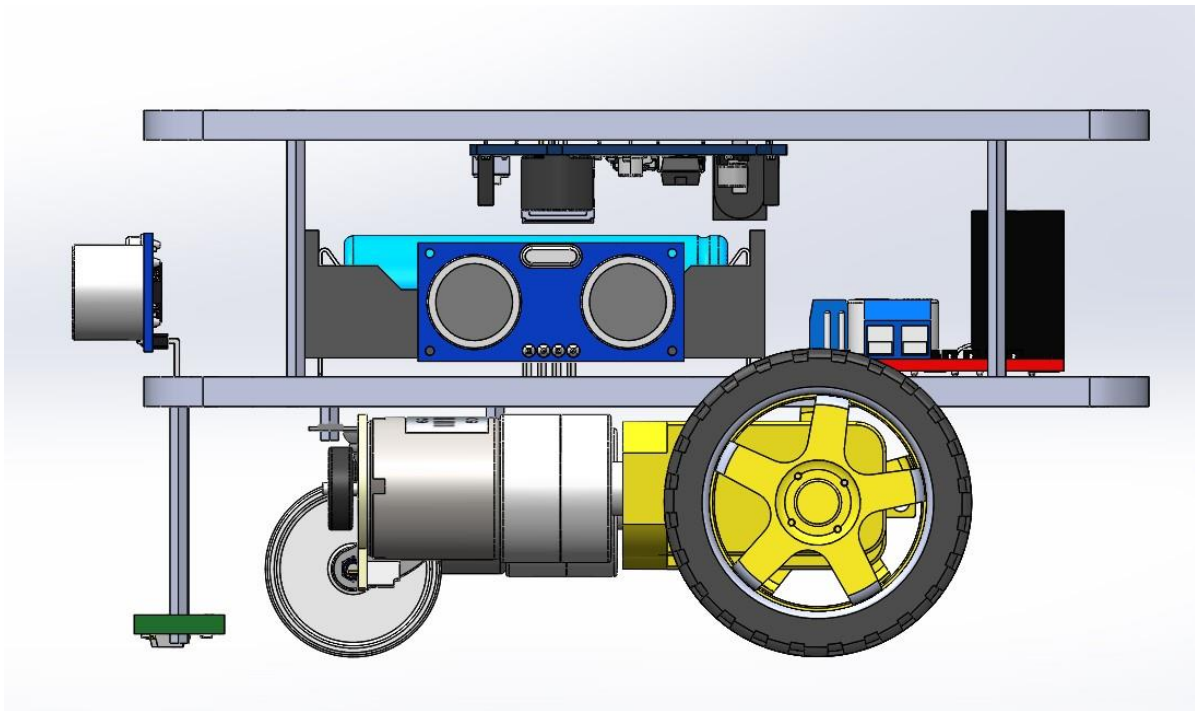


Figure 4 - side view

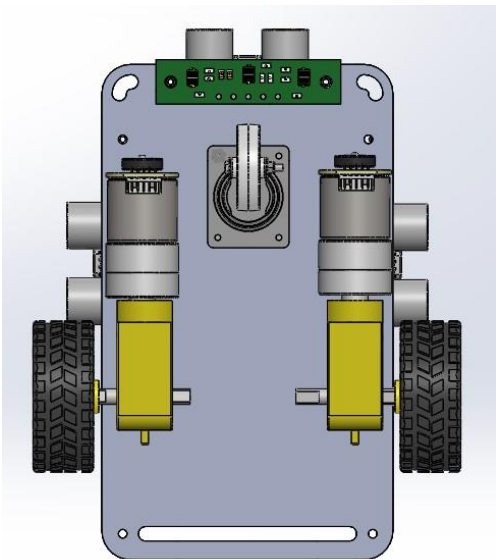


Figure 5 - bottom view

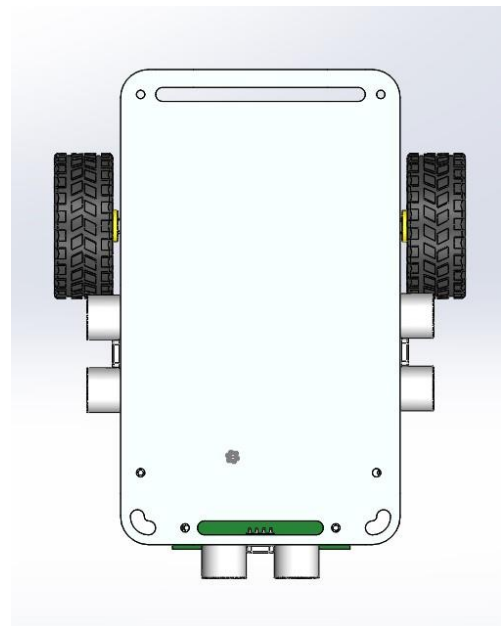


Figure 6 - Top view