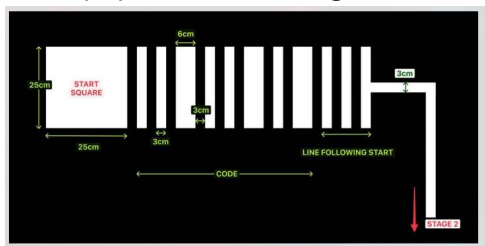


## Team EvoBots Summary

### How to perform each task

#### Task (01) Barcode reading



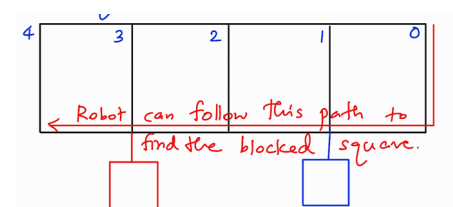
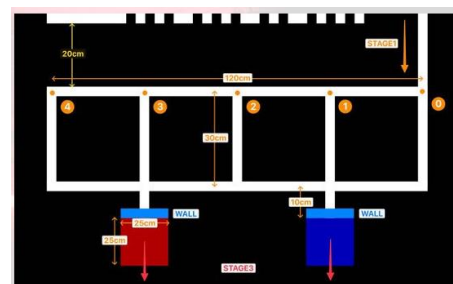
Starting from the square with a low speed. We try to keep the velocity constant throughout the barcode reading. White spaces are detected using an IR array. But if the velocity of the robot can be changed during going through the barcode. So we read the encoder for the time the IR sensor detects the space as white. Then we can avoid the errors that can happen due to the change of velocity of the robot.

#### Task (02): Maze navigation & Box manipulation

After reading the barcode value and dividing it by 5, we can get the remainder as 0, 1, 2, 3, or 4.

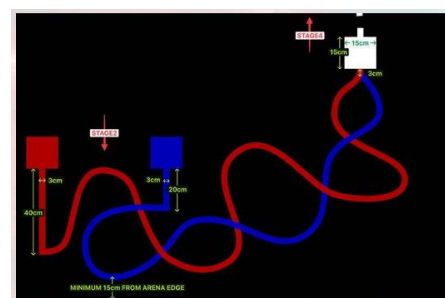
If the remainder is 0, the robot should pick up the box and go. If the remainder is not 0 we can come to the "position and go through that directly. Then we can go through the below line and check whether which square is blocked.

Then after knowing the blocked square, the robot should navigate to the 0 position again. Then go straight to the position where the virtual box is placed. After picking the box, it should be dropped at either "3" or "1," which is in front of the unblocked square. Then again come along the below line to the "3" or "position where the box was previously placed, then pick up the box and come directly to the desired square.



#### Task (03) Color line following.

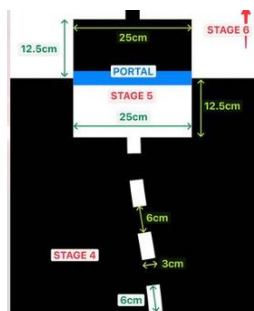
We detect the color as either blue or red using the RGB sensor (TC53200). Then, we follow the line using the IR sensor array. To follow the correct path at a junction, we again make use of the TCS3200 color sensor.



#### Task (04) and (05)

##### Dashed line navigation

In dotted lines, we first follow the first white dashed line and allow the robot to go straight freely. Then, we again have a dashed white line, and through that, we try to get the robot to the correct path as possible.

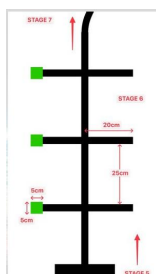


##### Portal Navigation

Here we wish to use motion detector sensors and ultrasonic sensors to detect the gate. First, we wait until the gate is closed after we reach near the gate. Then wait for 5 seconds before passing through the portal.

#### Task (06) Box Arrangement

According to the color line followed, we should arrange the boxes in ascending and descending order. We have ultrasonic sensors to measure the height. For that we will be using an robot arm.



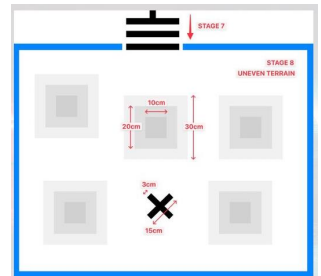
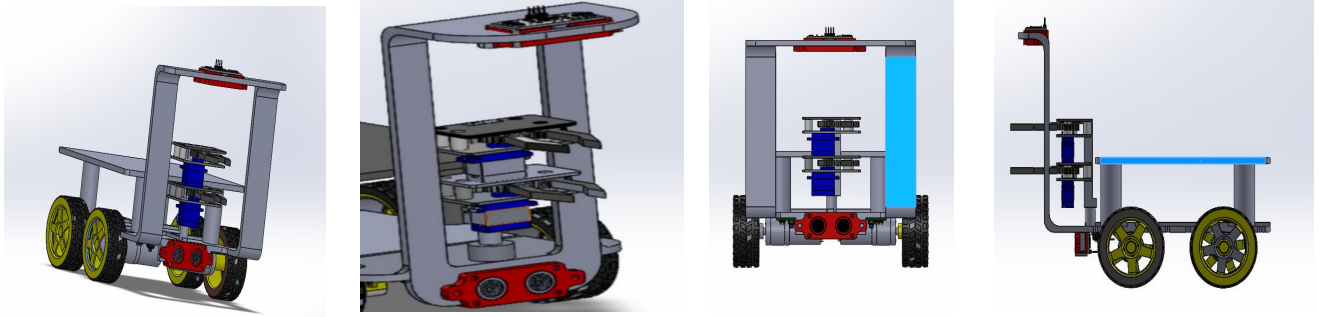
#### Task (07) Chamber Insertion and Hidden Task



Use a similar principle of task 6 for the chamber insertion of the box.

**Task (08) Coin drop**

We are seeking the "X" using the ir array. The method that we follow here is using four ultrasonic sensors in four sides and using them we are follow straight lines and find the mark. The reason for using ultrasonics is we are going to measure distance from each wall and maintain that distances for follow the line. Once we find the "X" mark we will use a servo motor to open the gate to a ramp holding the coin, which will allow it to fall on the "X" mark.

**Cad Drawings****Sensors*****Obstacle Detection:***

Sensor Selected: TOF VL6180V

Ultrasonic sensor

1 Proximity Sensor

Justifications for Selection:

- Delivers high precision in distance measurements
- Operates effectively in varying ambient light conditions
- Compact design facilitates easy integration
- Offers an extended measurement range from 0 to 60 cm

***Line Following:***

Selected Sensor: IR Array

Reasons for Selection:

- Offers a wider coverage area for efficient line following.
- Simplifies the setup process by combining multiple IR sensors in a single package.

***Color Detection:***

Selected Sensor: TCS230 Color Sensor

Reasons for Selection:

- High accuracy in color detection
- Versatile in distinguishing a wide range of colors

**Mechanical Design**

Length = 24 cm , Width = 20cm

Wheelbase = 10cm, Wheel diameter= 6 cm

2 Layers are used.

Arm is possible to move up and down after grabbing boxes

**Actuators**

We plan to use four N20 motors for wheels.

Options - N20 motors, plastic motors Reasons for Selection:

- higher efficiency
- low power consumption
- It has the required rpm value to carry the robot on the ramp.

Metal gear servos are used for the arm

and coin dropping mechanism.

**Task Allocation**

Kuruppuarachchi K.A.R.R.  
Jayatissa M.P.N.V.  
Rathnayake R.M.T.N.B.  
Samaramanna M. A.  
Bandara G.A.M.I.K.

- Robot Arm, Task 6, task 7  
- CAD drawings, Task 4, Task,3  
- Task 8, Task 5  
- Task1, Task 2, Robot Chassis  
- Task 8, Task 1, Task 2