

## Proposal Evaluation Two-page summary

### Group 11 - Sentinals

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#### Overall Strategy

- First robot is placed in the checkpoint number 1. Then the robot will recognize that it is in the checkpoint with the help of the line following sensor panel (Aptinex Raykha S8 – Reflective Sensor Array) and the counter will start counting onwards the number of checkpoints. The robot will go forward until a line meets. Then the line following will be done and reach checkpoint 2.
- After the checkpoint 2 distance sensors (ST GY-VL53L0XV2 Time of-Flight Distance Sensor) will be activated and search for the walls. When the walls are detected, robot will do wall following and reach checkpoint 3.
- Junctions like 90 degrees, T junctions and cross junctions will be detected using the line following sensor panel. 90 degrees junction can be detected as half of the sensor array reads white color while the other half reads black color. In a 180-degree junction all the sensors in the array detect white color. As there can be a four-way junction the robot moves a little bit forward and checks whether there is a white line. If so, it is detected as a four-way junction and unless it is detected as a T junction. Then the robot will go across the ramp at a constant speed and reach checkpoint 4.
- Then the robot will go along the line and grab the small black box attached to the big box and pull until the path is free for the robot to move by line following under the ramp.
- After reaching the checkpoint 5 color sensor (TCS34725 RGB Color Recognition Sensor) will be activated and after the robot goes and picks up the box it will recognize the color of the box. Then according to the color, it will choose the side to turn. When the colored line is detected, the robot will do another calibration and start to move. The maze will be solved by using the left-hand algorithm (The robot will turn left at every junction if there is a path when the robot turns left) and reach checkpoint 6.
- Next the robot will sense the sound with the microphone module (Uxcell Sound Microphone Sensor Detection Module) and move accordingly and reach checkpoint 7.
- Then the robot will analyze the movement of the guard robot by using the 5 distance sensors (ST GY-VL53L0XV2 Time of-Flight Distance Sensor). Then the robot will navigate accordingly to the end. Then the robot will stop after reaching checkpoint 8.

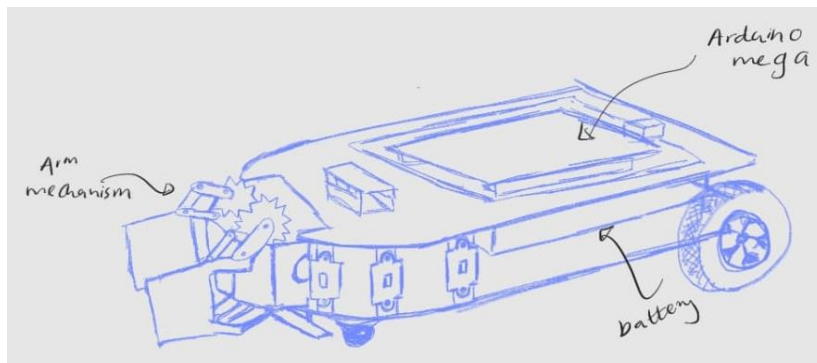
#### Sensors

- Aptinex Raykha S8 – Reflective Sensor Array – Line following.
- ST GY-VL53L0XV2 Time of-Flight Distance Sensor – Wall following and guard robot detection.
- 48 CPR Encoder – measuring the travelled distance.
- TCS34725 RGB Color Recognition Sensor – Recognize the color of the box.
- Uxcell Sound Microphone Sensor Detection Module – Detect the sound.

#### Actuators

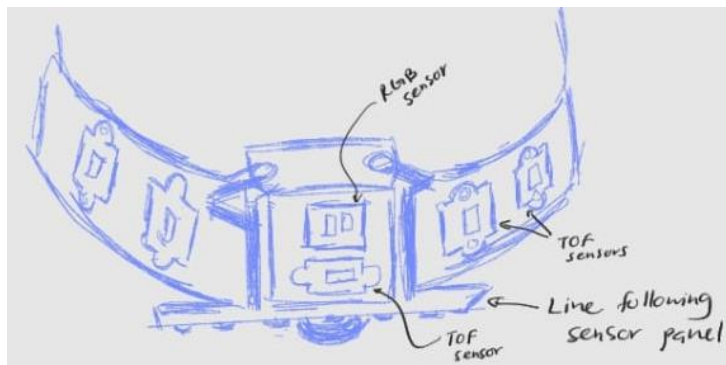
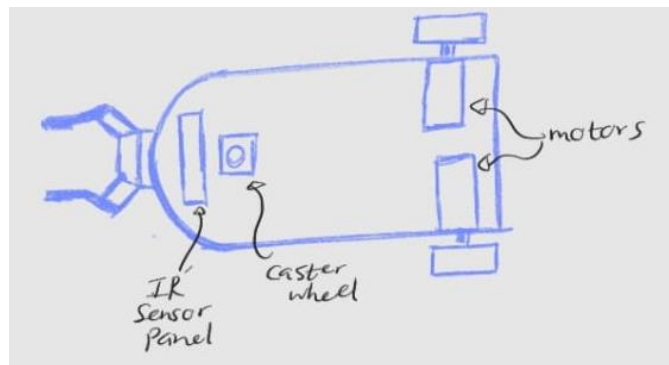
- Wheels: 9.7:1 Metal Gearmotor 25Dx63L mm HP 12V with 48 CPR Encoder
- Robot Arm:
  - Continuous Rotation SG90 Servo Motor Plastic Wheel Full Set Normal (360 degrees)
  - Standard 6 Volt with Metal Gear Servo Motor - 13kg (CAT.NO: YM2763)

## Robot Mechanical Design



Side View

Bottom View



Front View

### Algorithms:

- PID algorithm
- Left hand rule

### Task Delegation:

- Nadil: Algorithm Development
- Nidula: Mechanical Design, Sensor implementation and navigation
- Uvindu: Troubleshooting and Debugging, Reporting
- Raveen: PCB design and Circuit implementation
- Mihiruth: Power Management