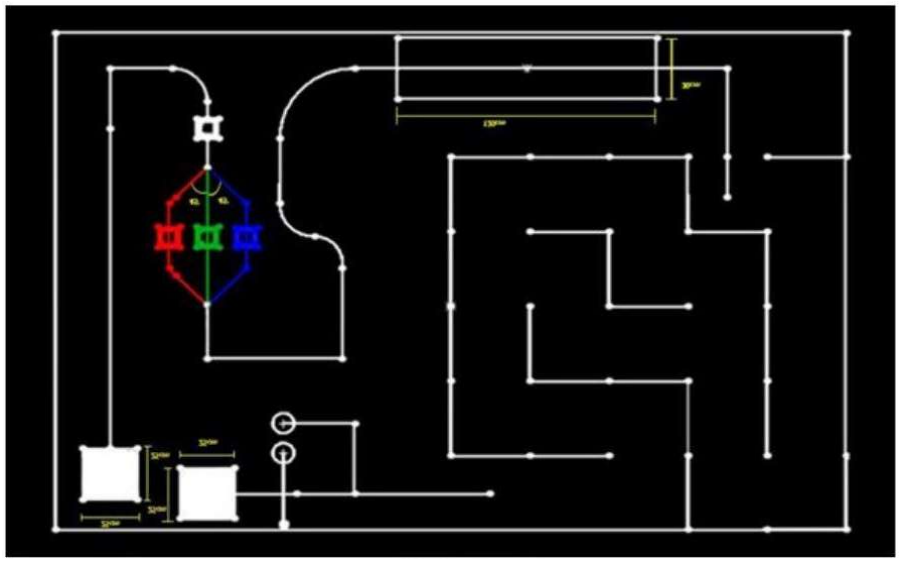
Robotics Design And Competition
EN2532

Strategic Approach

Group 15

Overall Strategy

01. Line Following
02. Wall Following and Maze solving
03. Coin collecting and unloading
04. Water transfer



Robot Brain

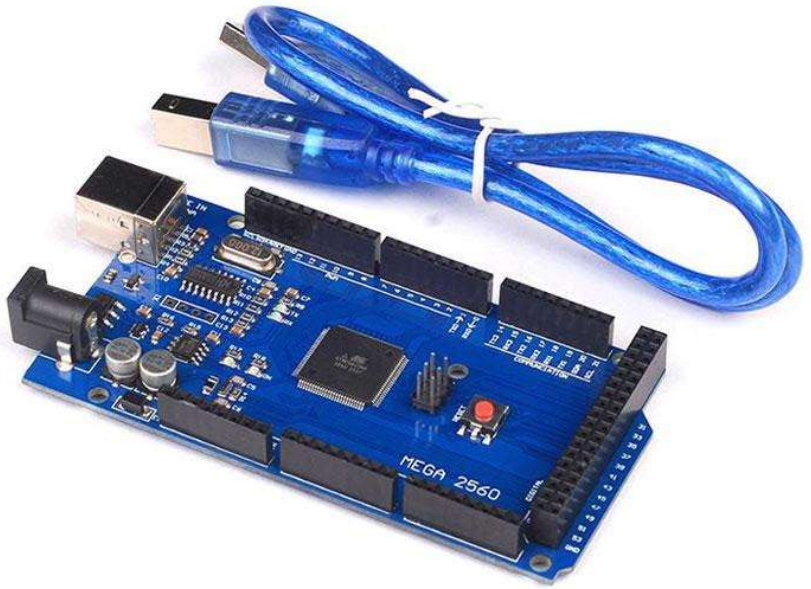
Arduino Mega - Atmega2560 Microcontroller

Pin allocation

- Analog pins - IR sensors, Tilt sensors, Colour sensor
- Digital pins - servo motors
- PWM pins - Motor driver, ultrasonic sensor
- RX-TX pins - Bluetooth module
- SCL,SDA pins - lcd display

Bluetooth communication with computer to reprogram

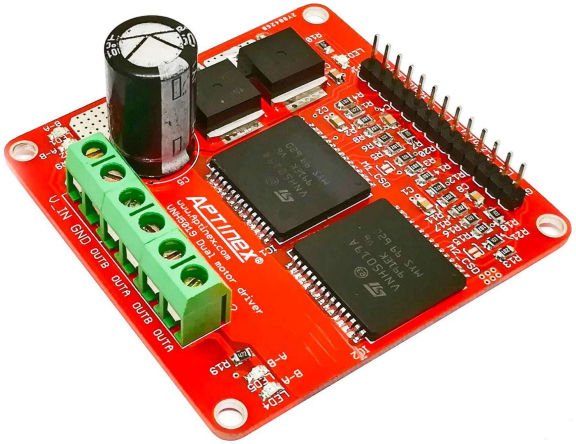
(using HC05 bluetooth module)

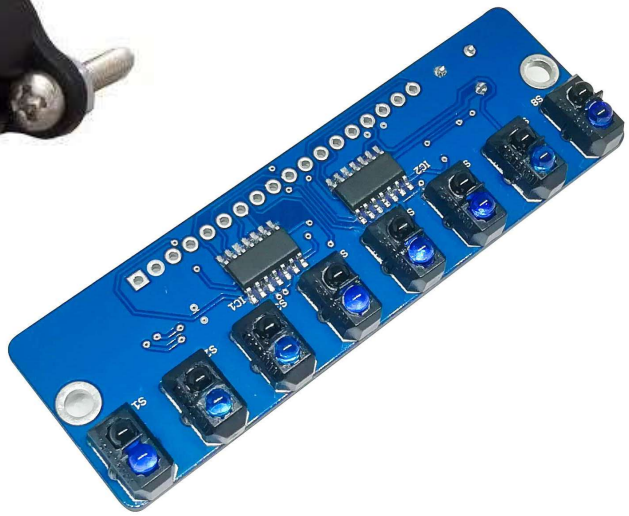


Line Following

Components

- IR sensor panel - TCRT5000 based 8 channel Reflective Sensor Array
- Two motors with encoders
- Motor driver - VNH5019 Based Dual Motor Driver
- Wheels - 50mm
- Caster wheel





PID controlled

Tilt sensor to identify the ramp

Right hand rule as the line following strategy

Analog inputs - easy to follow a coloured line

Wall following and maze solving

Components

- Sonar sensors - three HCSR04 Ultrasonic range finder

** this will be the only difference from line following in component aspect

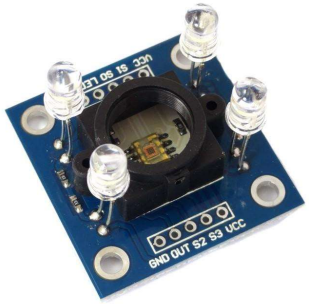
Sonar sensor inputs will used strategically in place of IR sensor panel inputs

Left hand rule/ Right hand rule to solve the maze

Coin collecting and unloading

Components

- Permanent Magnets for coin collecting
- Colour recognition sensor TCS3200 module (GY-31)
- 2 Servo Motors - Standard size(SG5010)
- SG90 Tower Pro Micro Servo Motor



TCS3200 colour sensor module

Strategy

- collect the coin using a robot arm
- unload the coin to a chamber to detect the colour
- detect the colour using colour sensor in a closed room
- unload the coin moving the base

Water Transfer

Components

- Pump
- Servo Motor - Standard size(SG5010)
- Water tubes

SG5010 servo motor

Strategy

- An servo motor controlled arm is used to place the inlet and outlet of the pump

- Pump water to the vessel using pump

**water volume is a pre-calculated water volume

Power System

Main power supply - 11.4 V LiPo rechargeable battery

11.3 V -5 V regulator module

Power supply panel - 5V, 11.4V, GND

On/Off switch for robot

User Interface

LCD screen

- Mode of the robot
- Task completion

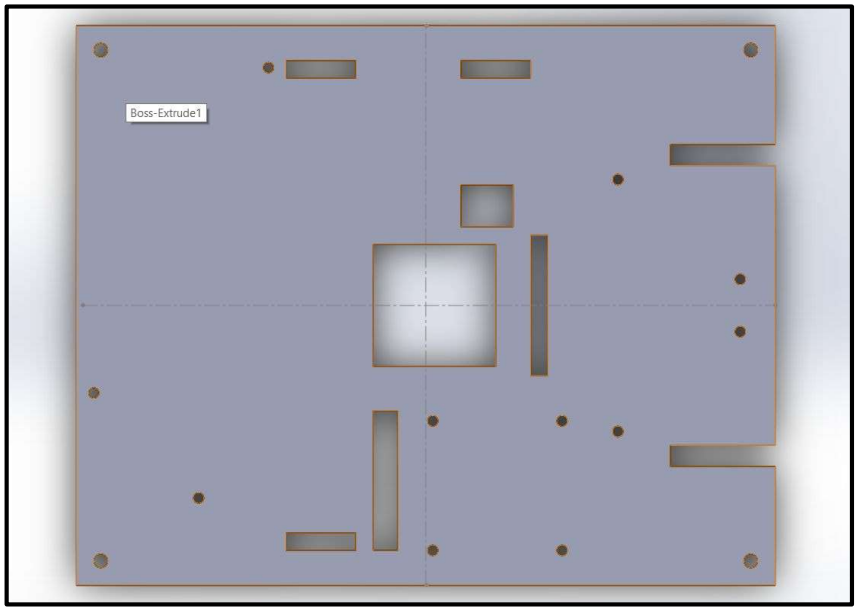
Push buttons

- Mode selection

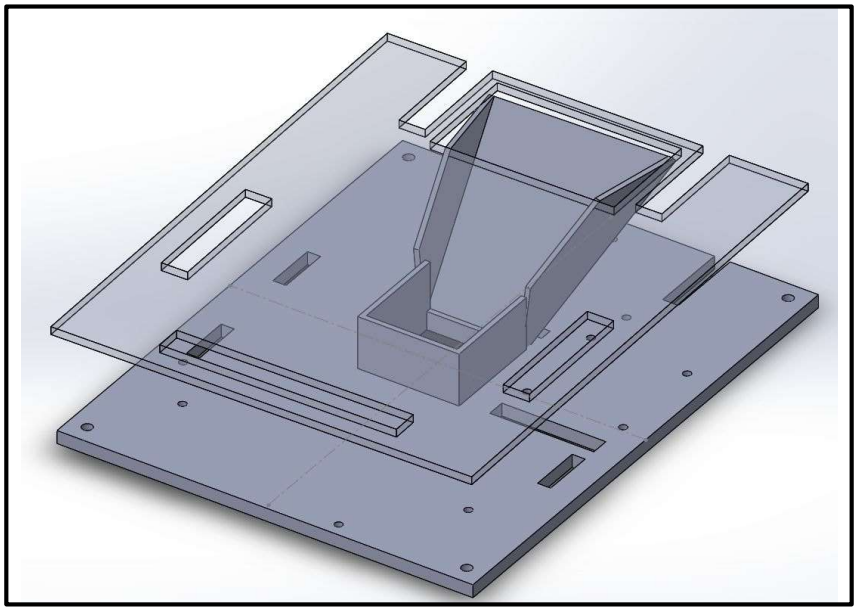
LED lights

- Indicators

Robot Structure



Base layer



Overall view

Task Delegation

1. Asitha - wall following, maze solving, overall robot functionality
2. Isuru - line following, robot design
3. Kavinda - coin collecting and colour sensing,
4. Dedunu - water transferring, solid work designing, PCB designing
5. Madubhashana - coin collecting and water transferring, user interface