Physical Task

Tasks

1. Line Maze
2. Curved Wall
3. Blind Box
4. Line following

Sensors per Task

IR Sensors

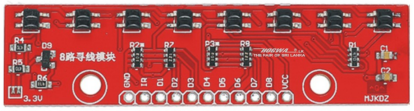
In order to tackle the line maze and line following task, it was decided to use IR sensors.

An alternative considered was to use a colour sensor. However, the biggest disadvantage of using colour sensors is its cost. A single colour sensor would cost Rs 1050 but to increase accuracy we would be needing a large number of sensors. An 8-array IR sensor would cost Rs 1050 in total. Using 8 colour sensors would amount to a total of Rs 8,400.

Since IR sensors are the most commonly used sensors for line following, no other alternatives were considered.

In order to increase the accuracy of the readings, it was decided to use a higher number of IR sensor pairs. The main factors taken into consideration when selecting the best IR sensor was the accuracy, line dimensions and the cost.

8-channel IR tracking sensor module:



- Length - 6.7cm
- Width - 1.7cm
- IR sensor pairs - 8
- Cost - Rs 1090.00

5-channel IR tracking sensor module:

- Length - 9.7 cm
- Width - 2 cm
- IR sensor pairs - 5
- Cost - Rs 890.00

3-channel IR tracking sensor modules:

- Length - 3 cm
- Width - 2 cm
- IR sensor pairs - 3
- Cost - Rs 740.00

The 3-channel IR tracking sensor was immediately discarded as the length of the sensor is 3 cm and the width of the line to be detected is 3 cm. The final decision came between the 8-channel and 5-channel IR sensor. Though the 5-channel sensor is cheaper and has sufficient dimensions, on the basis of higher accuracy, the 8-channel IR sensor was selected.

Ultrasonic Sensor module

It was decided to use ultrasonic sensing modules for the wall following task and to traverse through the blind box without colliding. The Ultrasonic sensor module considered was,

HC-SR04

- Length - 45mm
- Width - 20mm
- Height - 15mm
- Range - 2cm - 4m
- Cost - Rs 650.00

We have another option to use an IR sensor instead of an Ultrasonic sensor. Since it is a black box most of the emitted rays from the IR sensor will be absorbed by the material, so it won't detect that there is a wall near to that. There is a higher possibility of colliding on the wall.

RGB Sensor

To avoid passing the red line when following the wall, it was decided that an RGB sensor should be used in order to differentiate between colours. The RGB sensor module selected was TCS230.

- Length - 31.6mm
- Width - 24.4mm
- Range - 10mm
- Cost - Rs 1050.00

Instead of the RGB sensor, we had an option to use an IR sensor. But the IR sensor reading will be affected by environmental IR rays, so the readings won't be much accurate to differentiate the colours.