EN2533 Robot Design and Competition

Team Pulztrones

Homework 2

Sensors

In this report, we include different sensors that can be used for various tasks such as line following, color line following, distance measuring, obstacle detection, and motion on uneven terrain. We justify the selection of these sensors for our robot by comparing them with alternative options.

1. Line Following

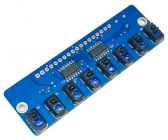
Options available:

- IR Array
- Separate IR sensors

Selected Sensor: IR Array

Reasons for selection:

- High form factor in comparison to the single sensor.
- Simple in usage due to reduced wiring and have multiple IR sensors in a single packing which is suitable for efficient line following.
- Larger distance sensing and accurate readings and ease of calibration.



2. Obstacle Detection

Options available:

- Ultrasonic Sensor

- TOF(Time-of-Flight)
- Sharp IR Sensor

Selected Sensor: ST GY-VL53L0XV2 (Time of-Flight Distance Sensor)



Reasons for Selection:

- Offers high accuracy in measuring distances, making it suitable for precise obstacle detection.
- No Effects from Light: Unlike sharp IR sensors, this TOF sensor is less affected by ambient light, which ensures reliable performance in various lighting conditions.
- Offers a higher range than other sensors(Ranging from 0 to 62cm).

3. Color Line Following

Options available:

- TCS230 RGB color sensor
- TCS34725 color sensor


Selected Sensor: TCS230 Colour Recognition Sensor Module

Reasons for Selection:

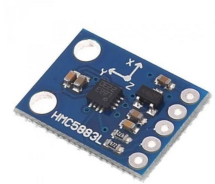
- It provides a frequency output that can be easily read by microcontrollers using analog-to-digital converters or pulse-width modulation (PWM) inputs.
- The TCS230 is recognized for its effective color detection, making it well-suited for distinguishing a variety of colors

.

4. Uneven Terrain Navigation

Options Available:

- Accelerometer
- MPU6500 Accelerometer and Gyroscope Module
- Magnetometers (Compass Sensors)



Selected Sensor: MPU6500 Accelerometer and Gyroscope Module

Reasons for Selection

- Accurately measuring rotational velocity and providing stable performance in various conditions.
- Unlike accelerometers and magnetometers, gyroscopes are less affected by external factors such as gravity or magnetic interference, providing more stable and reliable measurements of rotational motion.

Team Members:

- Balasooriya B A P I 220054N
- Liyanage D L B B 220362G
- Pathirana P D R O 220448C
- Fernando A R D 220161N
- Dineshara M C 220128V