EEE3099S

Milestone 1

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Table Listing Individual Contributions

Requirement Analysis

Functional Requirements

* Needs to be an autonomous mobile robot.
* Robot must be switch activated.
* Must be able to navigate along a line on the ground.
* Must be able to detect objects and measure the object’s distance from a reference point.
* Must be able to store distances to objects in the maze.
* Must store directions to the closest object in memory, and be able to navigate back to it.

Constraints

* Limited to the use of the following equipment: HC-SR04 Ultrasonic Sensor, Adruino nano 33I0T, 2X 18650 3.7V batteries, 2x logic level convertor bidirectional/microbotics, 1x motor driver dual H-Bridge module L28N, 1x Turtle(2WD mobile robot platform, axle length 13.6cm, wheel diameter, 6.2cm, digital line tracking sensor, 2x gravity TT motor encoder kit)
* Project completion date set at 13th of October 2023.
* All electronics must occupy a vero board of size 10cm x 5cm.
* Circuitry must be made entirely of digital and analogue circuitry.
* Must operate at most 5V logic level.

Possible Bottlenecks

* Line following
* Distance detection
* Integration of components
* Errors in line following logic in code
* Motors not functionin

Others

Subsystem Design

Subsystem and Sub-subsystems Requirements

* Power
  + Uses 2x 18650 3.7V batteries in series.
  + Must output a max of 5V.
  + Outputs 3.3V and 5V.
* Microcontroller
  + Must interface between power and sensing.
  + Must operate between 5V and 3.3V
  + Must have a fast response time to accurately follow the mase
  + Must be able to store data about the mase
* Sensing
  + Line-Following
    - It must be able to detect a line
    - Orientation with respect to a line
  + Ultrasonic
    - Must detect distance to an object
  + Rotation sensor
    - Must detect number of rotations of the wheel.

Subsystem and Sub-subsystems Specifications

Inter-Subsystem interactions

UML/OP Diagrams

Acceptence Test Procedure

Figures of merit based on which you would validate your final design

Experiment design to test these figures of merit

Acceptible performance definition

Development Timeline

References