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
  + Must use batteries to power the entire system using batteries.
* 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

* Power
  + Uses 2x 18650 3.7V batteries in series.
  + Must output a max of 5V.
  + Outputs 3.3V and 5V.
* Microcontroller
  + Jack
* Sensing
  + Jack

Inter-Subsystem interactions

* Jake

UML/OP Diagrams

Jack

Acceptence Test Procedure

Jake

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

Kush

References

Circuit design KICAD

Kush