

Lab 5: Searching for Objects
ECSE 211-Design Principals and Methods
Group Number 62
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Data/Analysis:

Object Recognition:

Trial	Not Styrofoam	Styrofoam
1	0	0
2	0	0
3	0	1
4	0	1
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	1

Searching:

Trial	Localization	Find Block	Travel To Destination
1	33.77	1.33	N/A
2	26.08	2.11	N/A
3	36.74	1.43	N/A
4	25.48	3.01	N/A
5	26.26	2.64	N/A
6	29.33	2.76	N/A
7	27.13	3.15	N/A
8	36.58	1.49	N/A
9	25.68	2.08	N/A
10	36.93	2.54	N/A

*Destination time N/A; robot unable to complete task.

Observations and Conclusions:

1. In general all earlier code worked as expected with some minor differences. Localization worked with less precision as we are not implementing line sensor correction. We were able to work around this using the ultrasonic sensor to get a high precision localization without line

detection. Navigation had threading issues with the motors. Identification was attempting to move close to bricks to get better color sensor reading while navigation was trying to move to the next destination as assigned by the search algorithm. This resulted in a jerking motion of robot. The odometer functioned exactly as it has in the past.

2. The Object detection was flawless. Whenever a block comes with 10cm of ultrasonic sensor object is detected. Object identification however was flawed. Object identification tends to identify Not a Block over Block. Because of overlap in sensor reading values for Styrofoam vs Wooden there is a very small window where the Styrofoam and Wooden are differentiable. At a distance of approx. one 2cm from the light sensor there is about a half centimetre range where objects are differentiable. To make object detection more robust a reading from a closer distance may be used, however this increases the potential for collisions. The main difference we could have implemented is the use of the ultrasonic sensor. We decided to use solely the light sensor to increase simplicity of the of the code and decrease potential for errors. Using the light sensor and ultrasonic sensor in parallel would allow for more robust object detection.

3. The most difficult part of this lab was robust object identification. The lack of precision in the color sensor created problems with object identification. Ideally we would have had both light and ultrasonic detection of block. Writing code to implement both in unison very complex, therefore that became an issue. The most unexpected challenge was the hardware design. We quickly discovered the difficulty that arose when trying to push the Styrofoam block to the end zone. The basic design problem occurred after picking up the block, the ultrasonic sensor would be blocked. Therefore, a claw had to be designed that allowed the ultrasonic sensor to remain exposed for object avoidance.