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19 September 2021

Topics in Internet of Things

**Lab 1 Report**

**Part 1**

**Part 2**

**2.1 More Advanced Mapping**

The car can effectively use the ultrasonic sensor to populate a 2d numpy array with 1’s and 0’s as a means of mapping its environment. The following images are matplotlib visualizations of the 2d numpy array (with y-axis reversed) that demonstrate the car after each of its 4 scans taken directly from the same trial as shown in the demonstration video:

Chart, histogram

Description automatically generated

Figure

Chart, histogram

Description automatically generated

Figure

Chart

Description automatically generated

Figure

Chart

Description automatically generated

E

D

C

B

A

Figure

In these diagrams, the yellow square represents the goal area (where the sandal was located in the ‘room’), while the green dot represents the car’s current belief state for its position. If you examine these photos closely while watching the video, you can see exactly what each of these obstacles are. In figure 4, I’ve labeled each detected obstacle with its corresponding real-world analog. A is the small packaged board game. B is the white board (propped against the mattress). C is the chipmunk. D is the mattress (note that because of the sensor range, it never actually connects the whiteboard with the mattress, though if it had turned and scanned that area it would have filled that part in). E is simply a small part of the wall that was detected in the second scan. Note that immediately following the last scan in Fig 4, the car drove forward to get to the goal state as shown in the video.

**2.2 Object Detection**