Embedded Systems International

Lab 4 Prelab

Name: Riley Lawson

Lab Partner Name (if you worked together and are submitting the same document or mostly the same answers):

Lab Section: 9

Submit your prelab document as a PDF file in Canvas under the corresponding prelab assignment. Every student submits their own prelab. Lab partners are allowed to work on the prelab together and submit the same document (if there is actual collaboration on the document). For full credit, the prelab must be submitted prior to the start of lab. Text responses should be typed or printed neatly. You can draw a sketch by hand, or you can use a drawing tool. Try to have started a rough draft of the prelab when you come to class on Tuesday.

1. Scan data

Suppose you have a test field as shown in the figure on the next page. The white "T" is the sensor arm on the front of the robot that rotates 180 degrees to complete a scan. The object shown at a distance of 45.4 cm is at an angle of 90 degrees (relative to the 180-degree scan). For this example, assume that the white object has a width of 10 cm, and the red object, 5 cm. Given the figure and this information, make rough estimates for the angles, distances and widths of all objects. Rough, ballpark estimates are okay.

Assume that the function **cyBot_FindObjects()** performs a scan starting at 0 degrees.

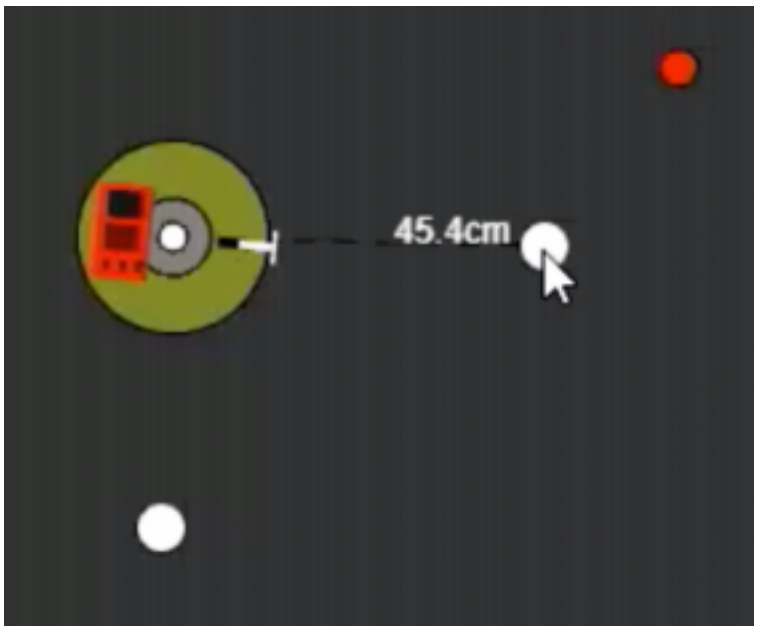

Figure: Test field for Prelab 4

(a) As shown in Part 1 of the lab, what would be displayed in PuTTY by your program after the function is called? Use your estimates.

45°, 91°, 180°

(b) Draw or describe the getObjects[] array that would be returned by the function.

The getObject array would return the amount of elements that it finds.

2. Program behavior

Without writing code, briefly explain what happens in the figure above and what steps your program will take to accomplish the mission in Part 2 of the lab.

First it starts in a straight line facing upwards. From here it then turns left and starts scanning for objects once an object is found it continues scanning but also starts measuring the object as it rotates. It does this for every object within its “seeing” distance until it reaches 180 degrees.

3. System sketch

For this system sketch, think about the data transfers that are happening in the system between the microcontroller, the PC, the iRobot, and other components on the CyBot such as sensors. Similar to the prelab 2 sketch, sketch a block diagram that illustrates the main components in the system in some way that makes sense to you. There is no single right sketch. Show hardware and/or software components and some connectivity between components. If you choose to include software components, an example of a software component is a library function.