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MEE 623 Project 3 Write-Up

Answer these questions in no more than 100 words each

1. Draw a classical control loop to describe the robot operation. Clearly label the controller, plant, and sensor and how the desired output is compared with the current output.
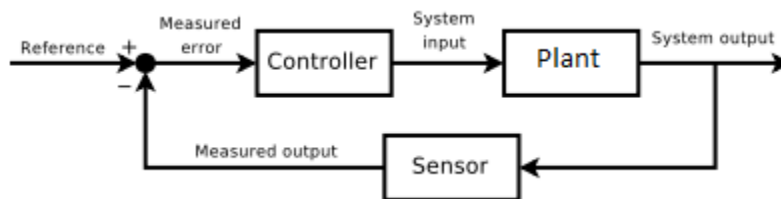

Figure 1 – Classical Control Loop

2. Using the format below to write the pseudocode for Task 1. Even though your team may have the same program, pseudocode is your interpretation of the general approach (or a first stab at it); so this should be your own version.

Task 1	Approach an object in the field of view
Input:	Image frame at time step k
Output:	Process the frame by HSV filtered to extract the bat
	Draw a bounding box around it and calculate centroid and area
	If there is no bat, send command to spin until the bat is found
	Compare the location of the bat relative to the center of the frame
	Calculate the offset from center (left, right, none, etc.)
	Send velocity commands to left/right wheels to turn
	Stop when the bat is centered in the robots field of view
	Compare width of bounding box to reference taken at 1 ft away
	If the box is smaller, move forward
	If the box is larger move backwards
	Issue stop command when the robot has found and approached object

3. Using the format below to write the pseudocode for Task 2. Even though your team may have the same program, pseudocode is your interpretation of the general approach (or a first stab at it); so this should be your own version.

Task 2	Follow an object in the field of view
Input:	Image frame at time step k
Output:	Find location of object in frame
	Compare current frame to previous frame
	Identify change in bounding box parameters
	If (width < previous frame)
	Bat is moving away, move forward
	Send command to move left and right wheel speeds v_l and v_r in cm/s
	If (width > previous frame)
	Bat is moving closer, move backwards
	Send command to move left and right wheel speeds v_l and v_r in cm/s
	If (centroid location is left of previous frame)
	Bat is moving left, turn left
	Right wheel should move faster than left
	If (centroid location is right of previous frame)
	Bat is moving right, turn right
	Send command to move left and right wheel speeds v_l and v_r in cm/s
	Left wheel should move faster than right
	Repeat until stop command is given

4. Within your team, who contributed the most to your project? What will you do next time to contribute more?

   I personally contributed the most by creating the general pseudocode in addition to performing the actual coding of the python code. Will and Rob contributed significantly in assisting with the thresholding and fine tuning of the code as well as assisting in the testing and error checking while operating the Roomba. I do not believe there is more I could have done to contribute for next time, and that our teamwork was ideal.