

EGR 545 - Spring 2023 - Lab 4

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March 27, 2023

1 Question 3: What is wrong with the placement of the objects? Why is this so?

The issue when placing the objects is that it is not precise at dropping them off. This could be due to the robot arm not being parallel to paper or vice versa, which means that precise measurements/programming is needed to fix this problem.

2 Question 5: In the space provided below the diagrams, calculate the correct roll angle for positions 1 & 5 relative to the X axis. Show your work even though you are using a calculator.

$$\text{Angle for Position 1: } \theta_1 = \tan^{-1}\left(\frac{35mm}{215mm}\right) = 9.24611274^\circ$$

3 Question 6: In the space provided above, calculate the correct roll angle for position 4. Show your work even though you are using a calculator.

$$\text{Angle for Position 5: } \theta_5 = \tan^{-1}\left(\frac{-35mm}{215mm}\right) = -9.24611274^\circ$$

4 Question 7: In the space provided above, calculate the roll angle for position 4. Show your work even though you are using a calculator.

$$\text{Angle for Position 4: } \theta_4 = \tan^{-1}\left(\frac{-35mm}{180mm}\right) = -11.00354085^\circ$$

5 Conclusion

5 Question 1: Pick another position off of the pallet, sketch the diagram in your notebook or on the field diagram and calculate the roll angle if the robot were to move a part there from position #1. Be sure to show your work.

New Position: 180mm and 35mm

$$\text{Angle for New Position: } \theta_{New} = \tan^{-1}\left(\frac{35mm}{180mm}\right) = 11.00354085^\circ$$

5 Question 2: If you stacked another layer on top of the layer that is already on the pallet, would the roll angles change? Why or why not? Justify your answer.

The roll angle will not change when we stack another layer on top of the layer that is already on the pallet because there will not be any changes on the y position for each position. The only changes are to the z positions which the angles in the XZ plane will be changed.

5 Question 3: If you swapped to the mechanical gripper, and touched up the points, would the roll angles still be correct? Why or why not? Justify your answer.

The roll angle would still be correct because the mechanical gripper will still behave the same way as the suction gripper. The only changes to the mechanical gripper would be the z coordinates when picking up the blocks at Position 1.

5 Question 4: What is an advantage to a vacuum or suction gripper, when palletizing, over a mechanical gripper? Justify your answer.

An advantage to the suction gripper is that it will not accidentally move the blocks in the other positions. The mechanical gripper has a high probability of moving the other blocks when it goes to drop off a block at a position when it opens its gripper. This will require one to change the distances between each pallet position in order to prevent this from happening. The suction gripper only needs to grip the block from above, preventing from needing any extra touch ups.