Robot Programming Lab #2 Tool Frame JD Jones and John Nelson

Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Point Value = \_\_\_\_\_\_\_\_\_/100 points

In this lab you will be creating a tool frame. A tool frame is where the work is being done. For example, if you plan to grab something then you would be using the gripper. You would teach the TCP (Tool Center Point) of the gripper. If you were to pick up a piece of paper with the vacuum cup then the vacuum cup would be the TCP. This will provide you a strong foundation of how robot programming works. We have you do this for several reasons. First is to get you to move the robot around manually and to reinforce the first lab. Also, it is to help you understand how the robot is thinking and why it moves as it does.

To program the tool frame. You will have to use something to point at. This will have to be elevated from the floor and is best to have a point on it. You will need to access 3 sides of the pointer. You will teach the tool frame in the 3 point method. You will need access from the top, 90 degrees to the side and 90 degrees to the other 2 points. What you are doing is creating an X, Y and Z. It is VERY important all 3 points MUST be 90 degrees from each other.

**Before you start programming the tool frame, make sure your ACTIVE tool frame is the tool frame you are programming.** To check this press SHIFT and COORD. A little yellow window in the top right of the screen will pop up. It will say,

Tool #

Jog #

User #

To change it, move the cursor to TOOL and press the number on the tp for the frame you are going to program. The screen will automatically disappear. Verify you made the correct selection by bringing up the yellow screen. Now you should be ready to program.

On the teach pendant

Press Menu

Setup

Frames press enter

If the top left doesn’t say Tool Frame then press other (F3)

Choose Tool.

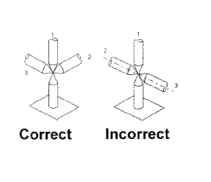
The screen should say Tool Frame on the top left. Move the cursor to the tool frame given to you by the instructor. PLEASE DON’T CHANGE ANY OTHER TOOL FRAMES. Press detail or enter to go into programming the frame.

You should have a screen with “comment” and approach 1, 2 and 3. If not, choose: method and select 3 point method. Modify the comment by having the cursor on it and press enter. Now the F keys will give you letters of the alphabet. Put in a description for the tool frame. For example, gripper or vacuum cup, dry erase marker.

1) Move your cursor to approach point 1. Move the robot directly above the point. Make sure the tool is vertical as possible by visual inspection. Record (F5) this position. The bottom of the screen should say: point recorded.

2) Move your cursor to approach point 2. Move the robot 90 degrees to the side of the point. Be square to the surroundings of the robot. This is needed for the 3rd point. Again make sure the tool is level as possible by visual inspection. Record (F5) this position. The bottom of the screen should say: point recorded.

3) Move your cursor to approach point 3. Move the robot 90 degrees to the previous points. Again make sure the tool is level as possible by visual inspection. Record (F5) this position. The bottom of the screen should say something about new calculations.



Now move the robot away from the pointer. Place the cursor on approach point 1. Press Shift & Move To. BE READY TO STOP THE ROBOT by letting go of the deadman or shift button, the robot may crash into the pointer.

Do this for each of the approach points. It should go back to where you programmed it. The robot will go in a straight line from where it is at to where you are telling it to go. It doesn’t know the pointer is in the way.

If it repeats all 3 positions then place it at approach point 1. Now move the robot in the secondary X, Y and Z otherwise known as the Roll, Pitch and Yaw. The TCP should rotate around the pointer. I think this is the coolest thing the robot can do.

Figure out what all the calculations are for the tool frame. All would include X, Y, Z, W, P and R. Write down those values.

Tool frame number \_\_\_\_\_\_\_\_\_

X \_\_\_\_\_\_ Y\_\_\_\_\_\_\_\_ Z\_\_\_\_\_\_\_\_\_

W\_\_\_\_\_\_ P\_\_\_\_\_\_\_\_ R\_\_\_\_\_\_\_\_\_

Be ready to demonstrate the following to the instructor.

Points for

A) Change the mode from joint to world and verbally explain the difference. 20 pts

B) Change the speed of the robot. 5 pts

C) Be able to show the ACTIVE User frame (little yellow window). 5 pts

D) Programming the tool frame. 40 pts

E) Changing the comment of the tool frame. 10 pts

F) Figuring out how to see all 6 tool frame values. 10 pts

G) Writing down the tool frame values. 10 pts

INSTRUCTOR’S INITIAL\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_