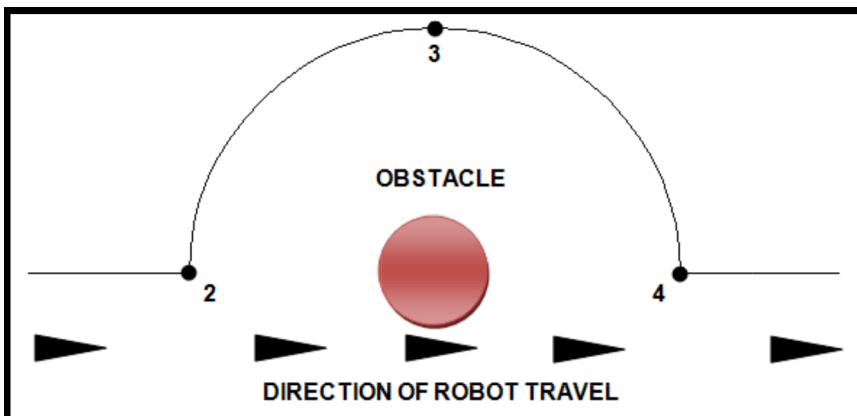


W14: [E] CIM 3.1.2E RoboCell [ER-4u] Go Circular

Introduction

There are several basic patterns in which a **robot** can move between positions. The decision of which pattern to use should be based on the operational objectives and constraints.

In this activity you will learn how to select and apply robot movement patterns.



Equipment

Computer with intelitek® RoboCell software

Robot Movement

There are three basic robot patterns available for a robot to move from one position to another.

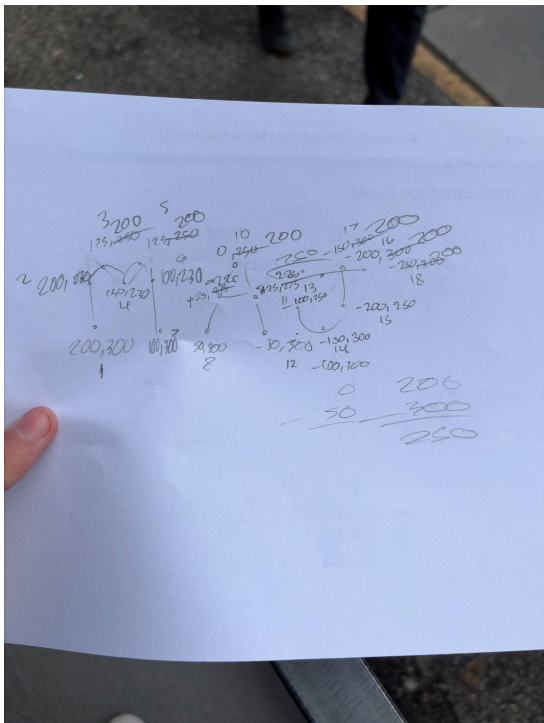
1. **Go to Position.** This command sends the robot (TCP) to a predetermined position along a path that is calculated by the controller. The controller calculates the trajectory and moves the TCP accordingly. The resulting motion will not be a straight line. Although the robot will go directly to the programmed point, there will be a slight arc in the robot path. This is called a continuous path (CP) movement.
2. **Go Linear.** This command sends the robot (TCP) to a predetermined point on a straight line. The robot controller calculates a perfectly straight path for the robot to follow. This is called a point-to-point (PTP) movement.

3. **Go Circular.** This command will send the robot (TCP) to a predetermined point along an arched path. To define the designated arc, a third position must be programmed. The robot will then be programmed to move through this point on its way to the final destination. The robot will not stop at this intermediate position. This type of programming method is used to maneuver around an obstacle. This intermediate point must lie on the arc; it is not the center point of the arc as in CNC programming.

Procedure

1. Review [Robot Movement Information](#).
2. On a sheet of Scorbots work envelope paper, mark the robot origin as 0,0,0.
3. Plot the coordinates of your letters before you program the robot.
4. Create a cell setup containing the robot arm and a table.

Draft of RoboCell Work Envelope on the handout provided



5. Create a program using a combination of Go to Position, Go Linear, and Go Circular for a robot to write the initials of your first and last name using the guidelines below.

Remark: 3.1.2 [E] Go Circular

Remark: Student Name

Remark: Date

- a. Use the Show Robot **Path command**.
- b. The program must contain **at least two arcs**.
- c. Based on the robot work envelope, the **maximum practical X-value is 400**.
- d. Based on the robot work envelope, the maximum practical **Y-value is between 150 and 400**.
- e. **Maintain a Z height of 20 mm**.

RoboCell Code with the Work Envelope and initials

Remark: Jeide, Matthew

Remark: CIM Period 2

Remark: 11/18/25

Remark: M

Go to Position 1 Fast

Go to Position 2 Fast

Go Circular to Position 4 through 3 Fast

Go Circular to Position 6 through 5 Fast

Go Linear to Position 7 Fast

Remark: A

Go to Position 8 Fast

Go Linear to Position 10 Fast

Go Linear to Position 12 Fast

Go Linear to Position 11 Fast

Go Linear to Position 9 Fast

Remark: transition

Go Linear to Position 11 Fast

Go Linear to Position 12 Fast

Remark: J

Go Linear to Position 13 Fast

Go Circular to Position 15 through 14 Fast

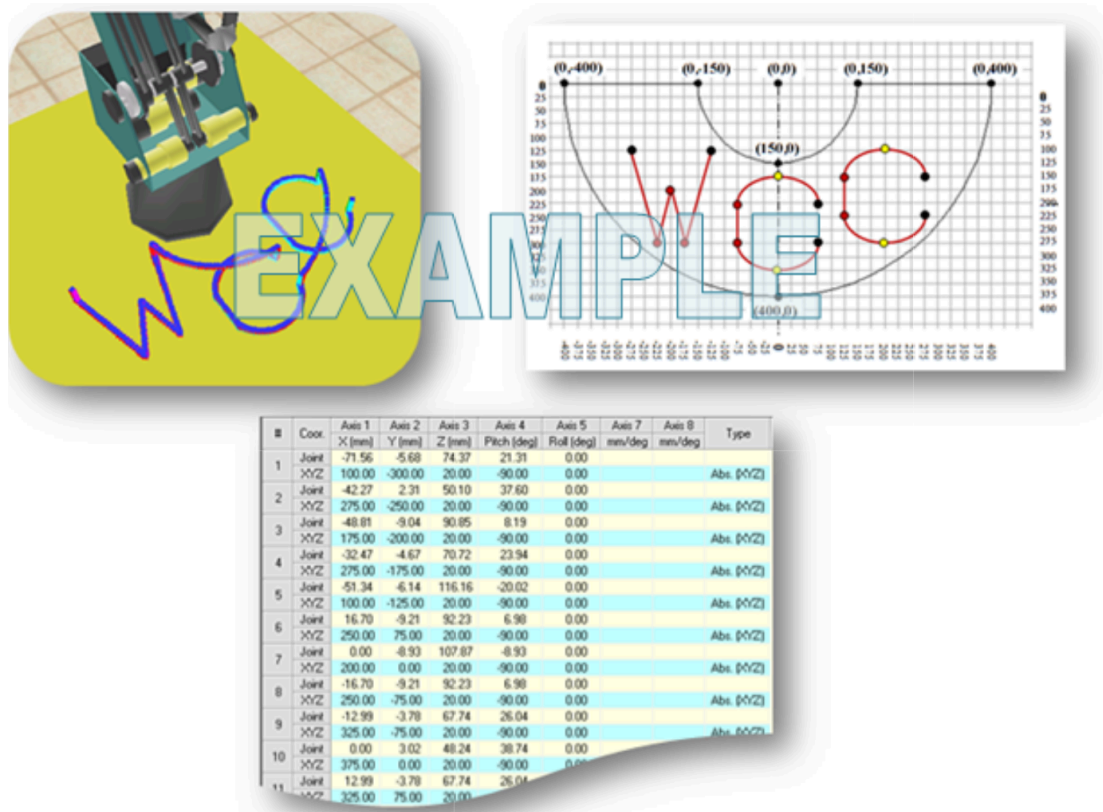
Go Linear to Position 16 Fast

Go Linear to Position 17 Fast

Go Linear to Position 18 Fast

Go to Position 99 Fast

#	Coord.	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 7	Axis 8	Type
		X (mm)	Y (mm)	Z (mm)	Pitch (deg)	Roll (deg)	mm/deg	mm/deg	
1	Joint	56.31	0.20	55.81	33.99	0.00			Abs. (XYZ)
	XYZ	200.00	300.00	20.00	-90.00	0.00			
2	Joint	48.99	-6.72	78.44	18.28	0.00			Abs. (XYZ)
	XYZ	200.00	230.00	20.00	-90.00	0.00			
3	Joint	48.81	-9.04	90.85	8.19	0.00			Abs. (XYZ)
	XYZ	175.00	200.00	20.00	-90.00	0.00			
4	Joint	56.89	-8.67	88.21	10.46	0.00			Abs. (XYZ)
	XYZ	150.00	230.00	20.00	-90.00	0.00			
5	Joint	57.99	-9.63	99.13	0.51	0.00			Abs. (XYZ)
	XYZ	125.00	200.00	20.00	-90.00	0.00			
6	Joint	66.50	-9.47	95.11	4.36	0.00			Abs. (XYZ)
	XYZ	100.00	230.00	20.00	-90.00	0.00			
7	Joint	71.56	-5.68	74.37	21.31	0.00			Abs. (XYZ)
	XYZ	100.00	300.00	20.00	-90.00	0.00			
8	Joint	80.54	-6.77	78.67	18.11	0.00			Abs. (XYZ)
	XYZ	50.00	300.00	20.00	-90.00	0.00			
9	Joint	84.29	-9.46	94.98	4.48	0.00			Abs. (XYZ)
	XYZ	25.00	250.00	20.00	-90.00	0.00			
10	Joint	90.00	-8.93	107.87	-8.93	0.00			Abs. (XYZ)
	XYZ	0.00	200.00	20.00	-90.00	0.00			
11	Joint	95.71	-9.46	94.98	4.48	0.00			Abs. (XYZ)
	XYZ	-25.00	250.00	20.00	-90.00	0.00			
12	Joint	99.46	-6.77	78.67	18.11	0.00			Abs. (XYZ)
	XYZ	-50.00	300.00	20.00	-90.00	0.00			
13	Joint	111.80	-8.91	89.81	9.09	0.00			Abs. (XYZ)
	XYZ	-100.00	250.00	20.00	-90.00	0.00			
14	Joint	116.57	-3.55	66.98	26.56	0.00			Abs. (XYZ)
	XYZ	-150.00	300.00	20.00	-90.00	0.00			
15	Joint	128.66	-5.29	72.92	22.37	0.00			Abs. (XYZ)
	XYZ	-200.00	250.00	20.00	-90.00	0.00			
16	Joint	135.00	-8.24	85.67	12.58	0.00			Abs. (XYZ)
	XYZ	-200.00	200.00	20.00	-90.00	0.00			
17	Joint	126.87	-9.48	95.33	4.16	0.00			Abs. (XYZ)
	XYZ	-150.00	200.00	20.00	-90.00	0.00			
18	Joint	141.34	-5.29	72.92	22.37	0.00			Abs. (XYZ)
	XYZ	-250.00	200.00	20.00	-90.00	0.00			
99	Joint	155.43	-62.51	38.73	87.33	0.00			Abs. (XYZ)
	XYZ	-350.00	160.00	504.33	-63.55	0.00			



6. When programming circular paths, program the robot to move to the starting position (2) and then move to the end position (4) by way of the intermediate position (3).

7. Verify that the program performs the operation accurately. Revise the program until it meets the objective.

Save this file as "LastName_A312e".

8. E-Portfolio video with updated code.

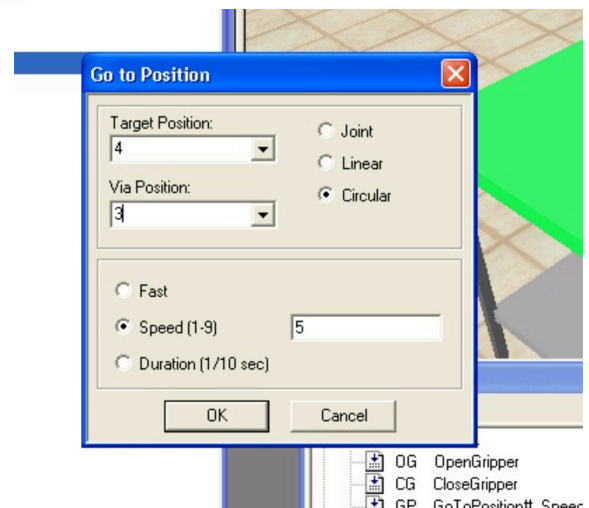


Figure 4. Go To Position Dialog Box

E-Portfolio Published link with video file. Use the Snipping Tool to record. Then upload the file to your Google Drive to upload on your Portfolio. YouTube Videos preferred

<https://m-jeide.github.io/eng-portfolio/CIM/Robocell>

Going Beyond

As directed by your teacher, develop a more advanced program to complete the following operation.

- a. Add your middle initial to the program.
 - a. This was done. Please refer to the code above and the video on the e-portfolio.
- b. Add more arcs to the program.
 - a. This was done, one additional curve than required. Please refer to the code above and the video on the e-portfolio.
- c. Consider a scenario where a robot applies sealant or adhesive onto the path to create initials. Add plunges (such as Z level 20 mm) and retracts (such as Z Level 50 mm) that require the end effector to raise and lower to transition between letters.
 - a. This wasn't done; however, this would be easy to implement by adjusting the positions or adding more with varying Z-s to ensure the transitions between initials wouldn't be visible.

Conclusion

Answer in complete sentences each of the questions below.

1. Explain the advantages and disadvantages of linear and circular paths. Linear paths are quicker and simpler, but for some applications, circular paths are preferable. Suppose the robot must move around a corner, going linearly might cause the robot to collide with the corner, while with the circular pathing, the corner could easily be avoided.
2. Describe applications when linear paths would be more favorable than circular paths. Linear paths are more favorable than circular paths when there aren't any obstructions and complex pathing is not required.
3. Describe applications when circular paths would be more favorable than linear paths. Circular paths are more favorable than linear paths when complexity is required, suppose an obstruction that a linear path might collide with, while a circular path could avoid the obstruction.