

Activity 3.1.2e Go Circular

PLTW

GO CIRCULAR

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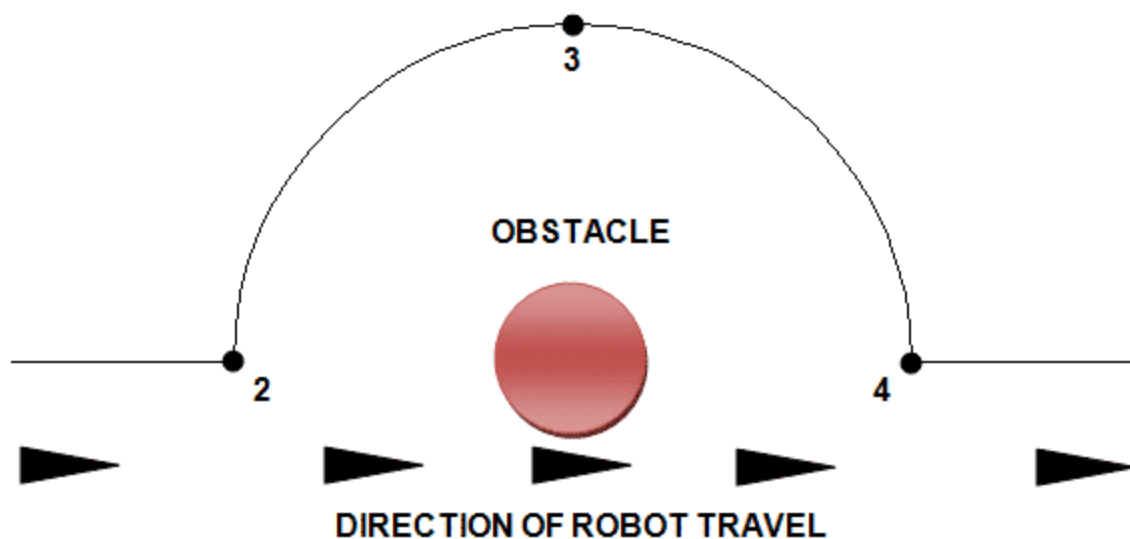
Introduction

GOALS	MATERIALS	RESOURCES
<ul style="list-style-type: none">• Program a circular movement pattern for a robot.• Explain the advantages and disadvantages of linear and circular paths.• Compare applications for linear and circular paths.		
GOALS	MATERIALS	RESOURCES
<ul style="list-style-type: none">• Computer with intelitek® RoboCell software		

GOALS	MATERIALS	RESOURCES
<ul style="list-style-type: none">• RoboCell Planning• Activity 3.1.2e Go Circular (Downloadable PDF)		

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.



Procedure

Robot Movement

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

Pattern	Explanation
Go to Position	<p>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.</p>

<p>Go Linear</p>	<p>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.</p>
<p>Go Circular</p>	<p>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.</p>

1

On a sheet of Scorbot work envelope paper, mark the robot origin as 0,0,0.



2

Plot the coordinates of your letters before you program the robot.

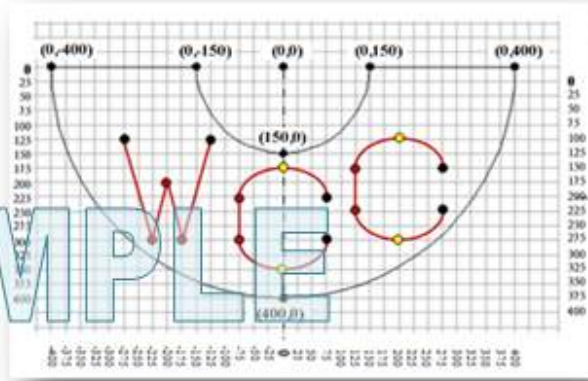
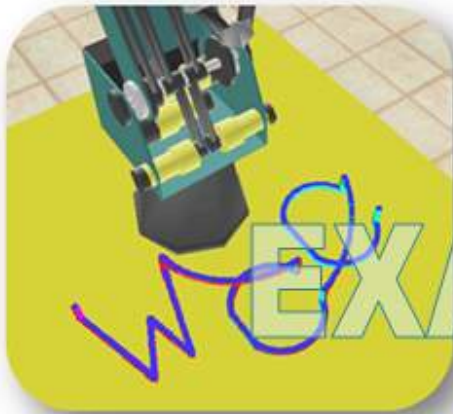
3

Create a cell setup containing the robot arm and a table.

4

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 following guidelines.

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



#	Coord	Axis 1 X (mm)	Axis 2 Y (mm)	Axis 3 Z (mm)	Axis 4 Pitch (deg)	Axis 5 Roll (deg)	Axis 7 mm/deg	Axis 8 mm/deg	Type
1	Joint	-71.56	-5.68	74.37	21.31	0.00			
	XYZ	100.00	-300.00	20.00	-90.00	0.00			Abs. P(0Z)
2	Joint	-42.27	2.31	50.10	37.60	0.00			
	XYZ	275.00	-250.00	20.00	-90.00	0.00			Abs. P(0Z)
3	Joint	-48.81	-9.04	90.85	8.19	0.00			
	XYZ	175.00	-200.00	20.00	-90.00	0.00			Abs. P(0Z)
4	Joint	-32.47	-4.67	70.72	23.94	0.00			
	XYZ	275.00	-175.00	20.00	-90.00	0.00			Abs. P(0Z)
5	Joint	-51.34	6.14	116.16	-20.02	0.00			
	XYZ	100.00	-125.00	20.00	-90.00	0.00			Abs. P(0Z)
6	Joint	16.70	-9.21	92.23	6.98	0.00			
	XYZ	250.00	75.00	20.00	-90.00	0.00			Abs. P(0Z)
7	Joint	0.00	-8.93	107.67	-8.93	0.00			
	XYZ	200.00	0.00	20.00	-90.00	0.00			Abs. P(0Z)
8	Joint	16.70	-9.21	92.23	6.98	0.00			
	XYZ	250.00	-75.00	20.00	-90.00	0.00			Abs. P(0Z)
9	Joint	-12.99	-3.78	67.74	26.04	0.00			
	XYZ	325.00	-75.00	20.00	-90.00	0.00			Abs. P(0Z)
10	Joint	0.00	3.02	48.24	38.74	0.00			
	XYZ	375.00	0.00	20.00	-90.00	0.00			Abs. P(0Z)
11	Joint	-12.99	-3.78	67.74	26.04	0.00			
	XYZ	325.00	75.00	20.00	-90.00	0.00			Abs. P(0Z)

5

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).

6

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

7

Save this file as "LastName_A312e".

Conclusion

Question 1

Explain the advantages and disadvantages of linear and circular paths.

Question 2

Describe applications when linear paths would be more favorable than circular paths.

Question 3

Describe applications when circular paths would be more favorable than linear paths.

Optional Extension



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

- Add your middle initial to the program.
- Add more arcs to the program.
- 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.