PLTW CIM

Activity 3.1.2f Variable Programming

PLTW

VARIABLE PROGRAMMING

Introduction

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Conclusion

Introduction

GOALS | MATERIALS | RESOURCES

- Describe why variables are used in programming languages.
- Improve the efficiency of a program with variables.

GOALS | MATERIALS | RESOURCES

- Computer with intelitek® RoboCell software

GOALS | MATERIALS | RESOURCES

- RoboCell Planning
- Activity 3.1.2f Variable Programming (Downloadable PDF)

Creating a program that contains variables provides flexibility and efficiency options. A variable allows data tracking flexibility within the program to control the logical flow. In this activity you will learn how to improve the efficiency of a program through the use of variables.

Procedure

Set Variable

The Set Variable command provides a way to assign a value or expression to a variable. As a program example, a robot must drop off a part at position 3. Position 3 could be defined as a variable called “DROP” instead of instructing the robot to go to position 3.

Variable Defined as an Unchanging Value

The following is the procedure to set a variable to be an unchanging value.

- Select the **Set Variable** command to open the Set Variable dialog box, as shown in Figure 1.

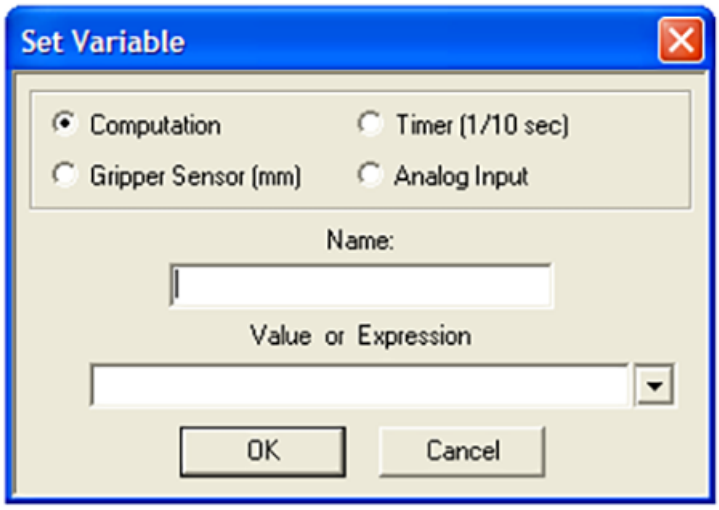


Figure 1. Set Variable Dialog Box

- Enter “DROP” in the Name box.
- Enter “3” in the Value or Expression box to represent position 3.
- Click **OK** to insert the following line into the program:

- Set Variable Drop = 3

Variable Defined as an Incremental Value

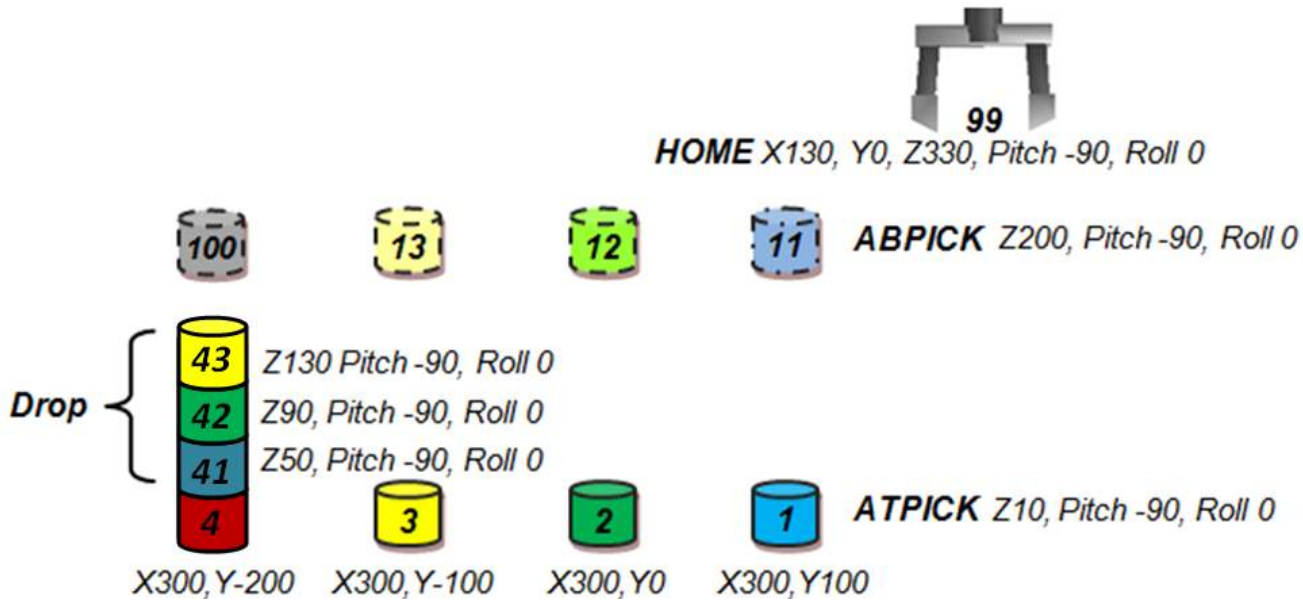
The first execution of a program must be followed by a variable increment to the index to the next position in the sequence. Use the Set Variable dialog box. In this example, the variable Drop is to be incremented by 1, for an updated value of 4. The variable name would again be DROP.

The following is the procedure to set a variable to be an incremental value.

- In the Set Variable dialog box, select **Computation**.
- Change Value or Expression to be DROP = DROP + 1.
- Open CellSetup and create the graphics in CellSetup using the following specifications:
  - Table: 1000 × 1000
  - Robot: Scorbot ER4
  - Cylinder Size: diameter = 40 mm and height = 40 mm
  - Cylinders:
    - C1 300, 100
    - C2 300, 0
    - C3 300, –100
    - C4 300, –200
- Save this graphic file as “LastName_A312f”.
- Exit CellSetup.
- Start the RoboCell software and import the graphics file you created previously.
- Program the positions shown using the following variables in Robot Variables and Positions:
  - ATPICK: The robot is in a position to pick up the cylinder.
  - ABPICK: The robot is in position above the pickup point.

- DROP: The robot is in position to drop off the cylinder.

Robot Variables and Positions												
	1	2	3	11	12	13	4	41	42	43	100	99
X	300	300	300	300	300	300	300	300	300	300	300	130
Y	100	0	-100	100	0	-100	-200	-200	-200	-200	-200	0
Z	10	10	10	200	200	200	10	50	90	130	200	330
Pitch	-90	-90	-90	-90	-90	-90	-90	-90	-90	-90	-90	-90
Roll	0	0	0	0	0	0	0	0	0	0	0	0



Program Operation

1 Create the following program to perform a stacking operation with variables.

- Remark: Your Name
- Remark: Class Period
- Remark: Variable Stack
- Remark: Set Variables
- Set Variable ABPICK = **11**
- Set Variable ATPICK = **1**
- Set Variable DROP = **41**
- Remark: Home
- Open Gripper
- Go to Position 99 Fast
- Remark: Stack
- LOOP:
- Open Gripper
- Go to Position ABPICK Fast
- Go Linear to Position ATPICK Speed 90%
- Close Gripper
- Go Linear to Position ABPICK Speed 90%
- Go to Position 100 Fast
- Go Linear to Position DROP Speed 90%
- Open Gripper
- Go Linear to Position 100 Speed 90%
- Remark: Update Variables
- Set Variable ATPICK = ATPICK+1
- Set Variable ABPICK = ABPICK +1
- Set Variable DROP = DROP +1
- Remark: Looping

- IF ATPICK>3, jump to END
- Jump to LOOP
- END:
- Remark: Home
- Go to Position 99 Fast

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

3. Save this file as “LastName_A312f”.

Conclusion

Question 1

Describe how this program can be applied in the manufacturing setting.