

Learning KIT

Copilot Pick & Place



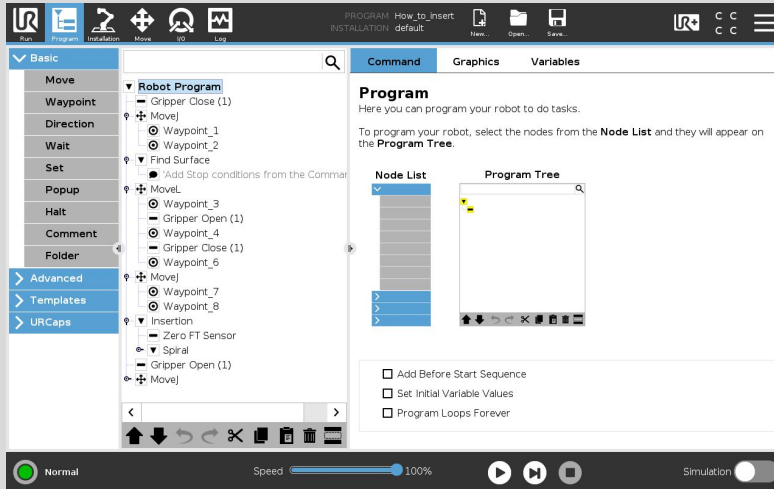
PROGRAM TEMPLATE USING COPILOT





Description

Use this document to help you program your application using the template for the **Copilot**. You can learn more about the steps on how to program your first Copilot application using the available video for this course. Visit support.robotiq.com for more details.



What you will need

- Robotiq Copilot
- Robotiq Adaptive Gripper
- Latest URcap - Copilot
- Universal Robot UR3, UR5, UR10 or UR16
- Parts to perform the insertion
- Program Template: How_to_insert.urp



The screenshot displays the Robotiq software interface. On the left, a tree view shows a program structure under 'Robot Program'. Two red circles with numbers '1' and '2' highlight specific nodes: 'Gripper Close (1)' and 'Waypoint_2'. The main area is titled 'Program' and contains instructions: 'Here you can program your robot to do tasks. To program your robot, select the nodes from the Node List and they will appear on the Program Tree.' Below this, there are two panels: 'Node List' and 'Program Tree'. The 'Node List' shows a list of nodes, and the 'Program Tree' shows a tree view with a yellow node. At the bottom, there are three checkboxes: 'Add Before Start Sequence', 'Set Initial Variable Values', and 'Program Loops Forever'. A toolbar with various icons is visible at the bottom left.

1 Closing the Gripper
Closing the gripper in order to use it to detect the part.

2 Approach Point
Move the end effector over the part that has to be picked.



3 Find Surface

Use the Force Torque Sensor's data to detect a surface during a robot motion in a given tool axis.

Motion

Direction (A) Tool Z+

Hold to test

Zero Sensor Before Execution

Advanced parameters

Motion speed 10 mm/s

Wait until sensor reading is steady before zero sensor

Stop condition

Maximum distance traveled (C) 100 mm

Insert a program instruction if this condition occurs.

Force threshold (B) 10 N

Insert a program instruction if this condition occurs.

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3 Find Surface
Select the **Find Surface** program line and enter the values for the following parameters (*speed, maximum travel distance, force threshold*).

4 Move Robot and Open Gripper
Execute a **Relative Move** command to move the gripper away from the part, then open it.



The screenshot displays the Robotiq software interface. On the left, a tree view shows the program structure under 'Robot Program'. The tree includes nodes for 'Gripper Close (1)', 'MoveJ', 'Waypoint_1', 'Waypoint_2', 'Find Surface', 'Add Stop conditions from the Command', 'MoveL', 'Waypoint_3', 'Gripper Open (1)', 'Waypoint_4', 'Gripper Close (1)', 'Waypoint_6', 'MoveJ', 'Waypoint_7', 'Waypoint_8', 'Insertion', 'Zero FT Sensor', 'Spiral', 'Gripper Open (1)', and 'MoveJ'. Two callouts, '5' and '6', point to 'Waypoint_6' and 'Waypoint_8' respectively. The main panel is titled 'Program' and contains the text: 'Here you can program your robot to do tasks. To program your robot, select the nodes from the **Node List** and they will appear on the **Program Tree**.' Below this text are two panels: 'Node List' and 'Program Tree'. The 'Node List' shows a list of nodes with a search bar and a search icon. The 'Program Tree' shows a tree view with a search bar and a search icon. At the bottom of the main panel, there are three checkboxes: 'Add Before Start Sequence', 'Set Initial Variable Values', and 'Program Loops Forever'. The bottom of the interface features a toolbar with various icons for navigation and editing.

5 Move and Grip the Part
Use **Relative Motions** to move the gripper in position to pick the part and close the gripper.

6 Move the Part Over the Insertion
Move the part just over the insertion point



7 **Spiral**

Function used to insert an object in a hole and to perform a spiral search if an obstacle is found.

Motion

Destination (A)

Direction (B)

Advanced parameters

Speed (C) mm/s

Force initiating spiral move (D) N

Force initiating insertion (G) N

Radius increment per turn (E) mm

Enable peck mode
Tool retraction between points of contact

Error condition

Maximum radius (F) mm

7 **Spiral Search**
First, teach the **Final Position** of the insertion by pressing **Teach Position** and moving the robot.

Then, enter the values for the various parameters (*speed, size of the spiral and forces*).

Depending on the surface, you can use the **Peck Mode***.

**Touch and Retrack mode.*



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Robot Program

- [-] Gripper Close (1)
- [+] MoveJ
 - Waypoint_1
 - Waypoint_2
- [-] Find Surface
 - *Add Stop conditions from the Command
- [+] MoveL
 - Waypoint_3
 - [-] Gripper Open (1)
 - Waypoint_4
 - [-] Gripper Close (1)
 - Waypoint_6
- [+] MoveJ
 - Waypoint_7
 - Waypoint_8
- [-] Insertion
 - [-] Zero FT Sensor
 - [-] Spiral
 - [-] Gripper Open (1)
- [+] MoveJ

Program

Here you can program your robot to do tasks.

To program your robot, select the nodes from the **Node List** and they will appear on the **Program Tree**.

Node List

Program Tree

- Add Before Start Sequence
- Set Initial Variable Values
- Program Loops Forever

8 **Open the gripper and move away from the part**
Open the gripper with a **Gripper Open** command and move away from the part.



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DoF

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