Using RoboDK for Universal Robots

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This document does not contain technical data subject to EAR, ITAR or ECL.

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Using RoboDK for Universal Robots

The Universal Robot (UR) can be programmed using two different methods:

1. The Graphical User-Interface Level (URP files):
   The URP programs are taught through the teach pendant's touch screen of the robot. All programs made through the UR's GUI are transformed into script programs behind the scenes (script files). An URP program can have one or more SCRIPT files as subprograms. URP programs are transformed into SCRIPT programs behind the scenes before execution.

2. Script Level (SCRIPT files):
   Script programs use the UR Script programming language. Like any other programming language UR Script has variables, types, flow of control statements, function etc. In addition, UR Script has a number of built-in variables and functions which controls the I/O and the movements of the robot.

RoboDK is a simulator for industrial robots. RoboDK simulator makes it easy to program any robot from any brand and generate brand-specific robot programs. RoboDK can generate SCRIPT files that can be executed by a UR robot. Additionally, it is possible to run any program from the simulator directly to the robot if the robot is connected to the computer. Finally, RoboDK can also import SCRIPT files to the simulator.

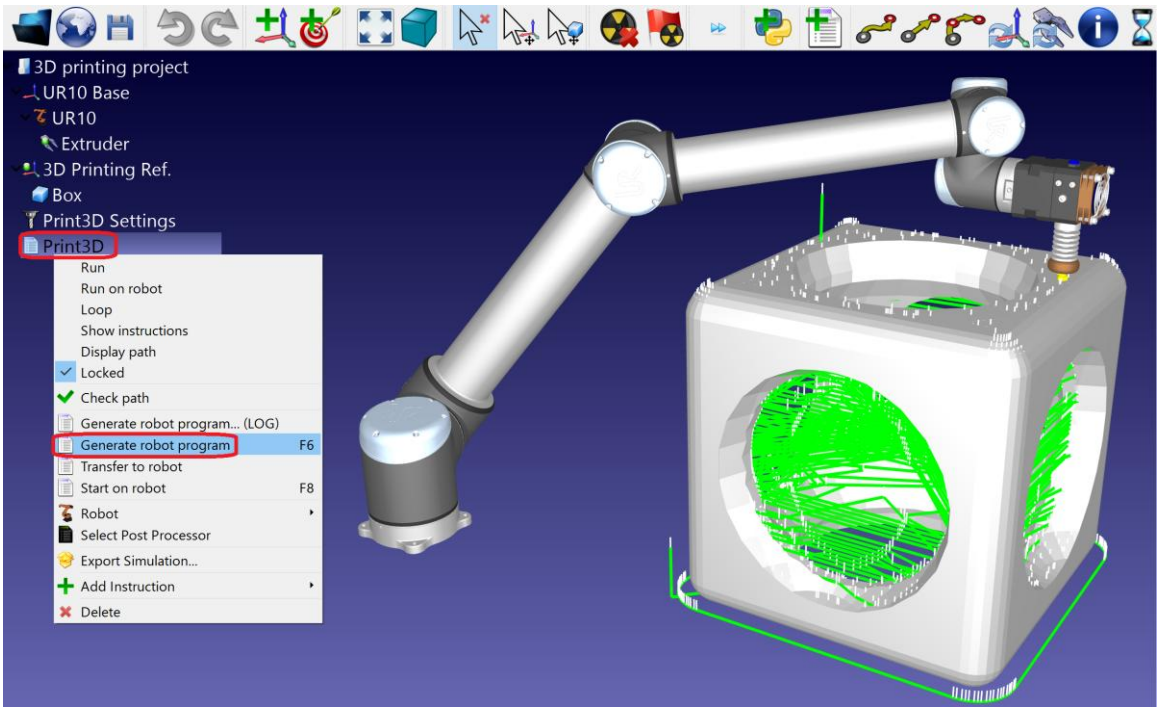
The UR's teach pendant Graphical User Interface is called PolyScope (as shown in the following image). Refer to the "URScript Programming Language" manual for more information.

1. Execute a RoboDK program on the robot

Once a simulation is ready in RoboDK we can easily generate the SCRIPT program that can be executed by the robot. Follow these steps to generate the SCRIPT program from RoboDK:

1. Right click a program (such as the "Print3D" shown in the example)
2. Select "Generate robot program"

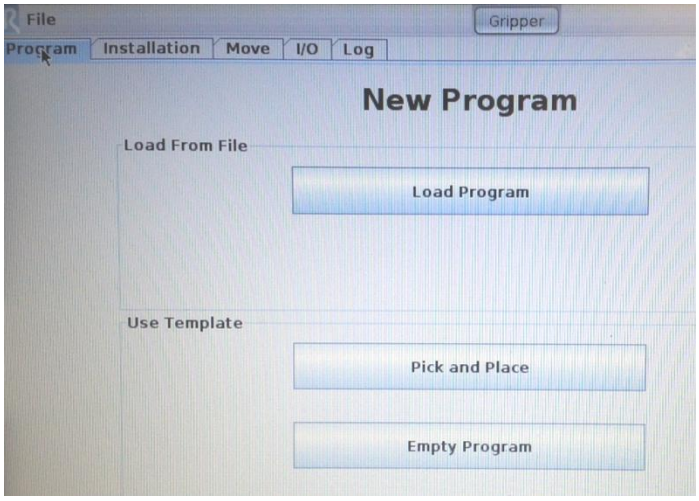
Alternatively, when a program is selected in RoboDK we can press F6 to obtain the SCRIPT program.

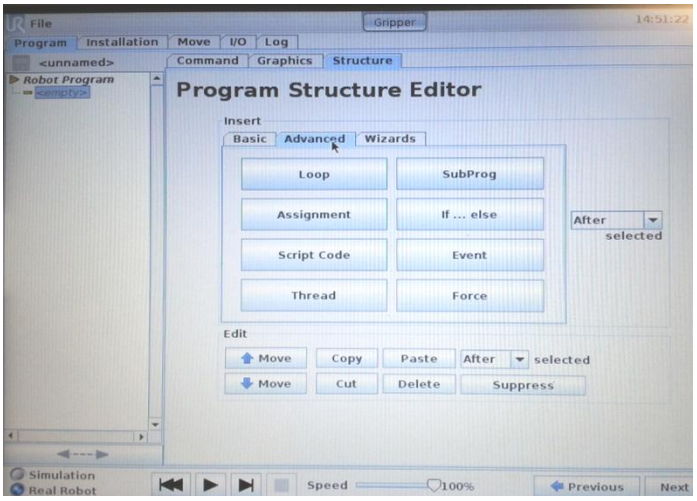


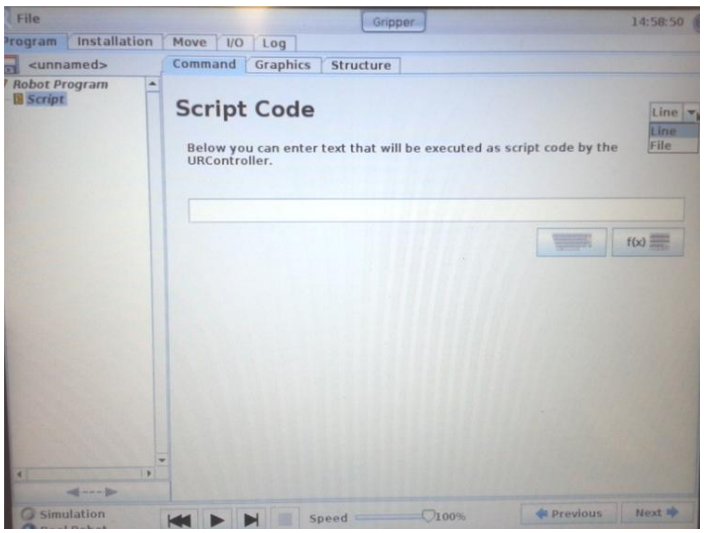
Transferring the SCRIPT file can be done through FTP or USB disk. Follow the next steps to execute a SCRIPT program on the robot:

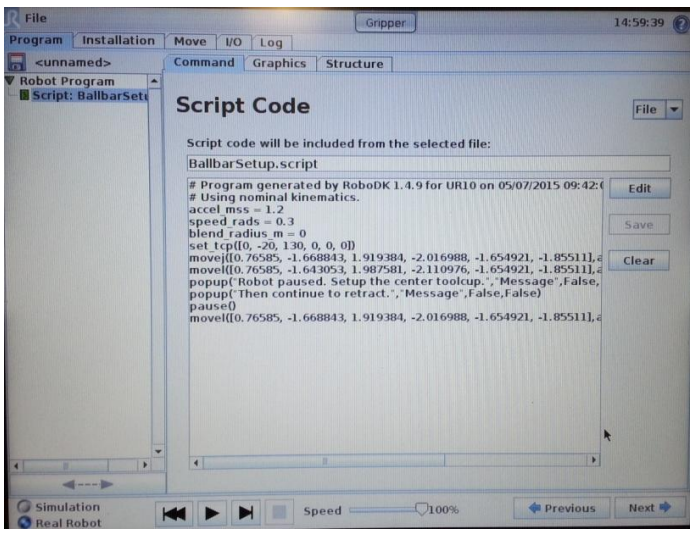
1. Select PROGRAM robot in the main screen of the teach pendant.
2. Select Empty Program.
3. Select the "Structure" tab.
4. Select the "Advanced" tab.
5. Select "Script code".
6. Select "File" (as shown in the image).
7. Select the ".script" file generated by RoboDK.
8. Select the play icon to run the program.
9. We can select "File→Save" to save the changes.
10. Finally, we can run the program.

The following images summarize this procedure.


File
Gripper
Program
Installation
Move
I/O
Log
New Program
Load From File
Load Program
Use Template
Pick and Place
Empty Program


File
Gripper
Program
Installation
Move
I/O
Log
<unnamed>
Command
Graphics
Structure
Robot Program
Program Structure Editor
Insert
Basic
Advanced
Wizards
Loop
SubProg
Assignment
If ... else
Script Code
Event
Thread
Force
After
selected
Edit
Move
Copy
Paste
After
selected
Move
Cut
Delete
Suppress
Simulation
Real Robot
Speed
100%
Previous
Next


File
Gripper
Program
Installation
Move
I/O
Log
<unnamed>
Command
Graphics
Structure
Robot Program
Script
Script Code
Below you can enter text that will be executed as script code by the URController.
Line
File
f(x)
Simulation
Speed
100%
Previous
Next


File
Gripper
Program
Installation
Move
I/O
Log
<unnamed>
Command
Graphics
Structure
Robot Program
Script: BallbarSet
Script Code
File
Script code will be included from the selected file:
BallbarSetup.script
# Program generated by RoboDK 1.4.9 for UR10 on 05/07/2015 09:42:
# Using nominal kinematics.
accel_mss = 1.2
speed_rads = 0.3
blend_radius_m = 0
set_tcp([0, -20, 130, 0, 0, 0])
movej([0.76585, -1.668843, 1.919384, -2.016988, -1.654921, -1.85511],
movel([0.76585, -1.643053, 1.987581, -2.110976, -1.654921, -1.85511],
popup("Robot paused. Setup the center toolcup.","Message",False,
popup("Then continue to retract.","Message",False,False)
pause()
movel([0.76585, -1.668843, 1.919384, -2.016988, -1.654921, -1.85511],
Edit
Save
Clear
Simulation
Real Robot
Speed
100%
Previous
Next

2. Execute a RoboDK program from the computer

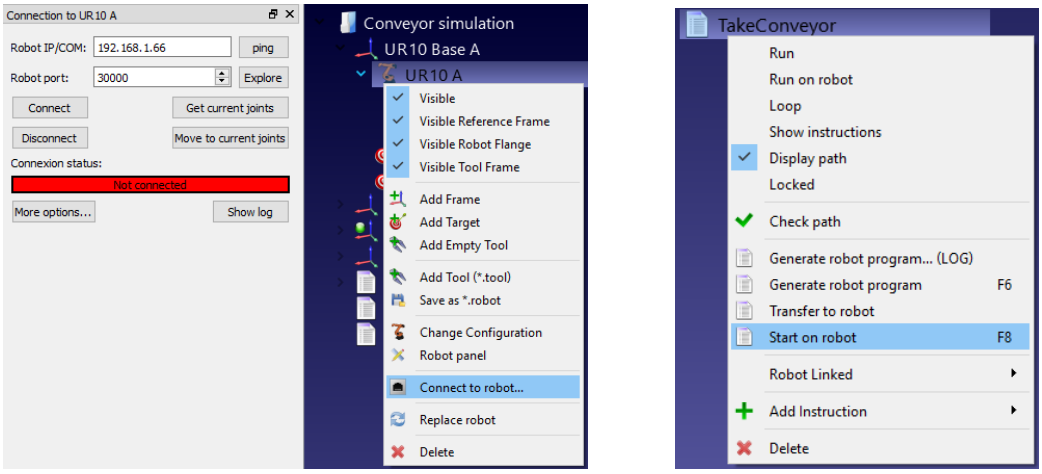
Programs can be executed directly from RoboDK to the real robot. To do so, we must first connect the robot to the computer through an Ethernet connection (direct connection or through a network). The IP of the robot must be known (refer to Section 3). We can then follow these steps:

1. Right click a robot.
2. Select “Connect to robot...”.
3. Insert the IP of the robot (in this example: 192.168.1.66).
4. Select “Connect”. We should see the message “Ready” in green if the connection succeeded.
5. A program can be automatically started by selecting “Start on robot” (as shown in the image). Additionally a program can be executed sequentially with RoboDK by selecting “Run on robot”.

Furthermore, the robot can be moved by selecting “Get current joints” and “Move to current joints”.

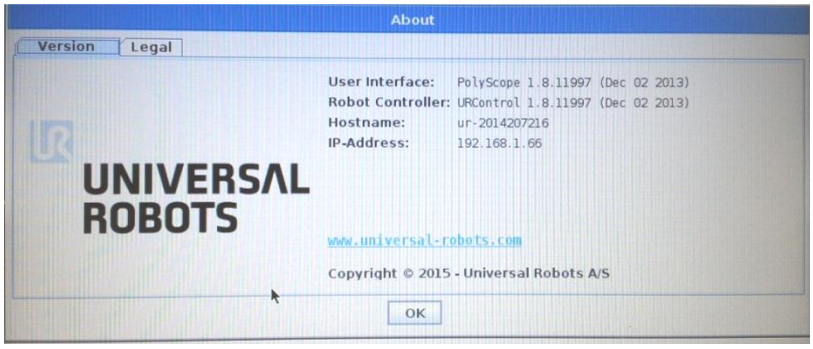
These operations are also available from the API and it allows integrating RoboDK into other applications. The API is available in Python and C#.

Note: Refer to the “Appendix I – Connect your robot with RoboDK” in the manual “Getting started with RoboDK” for more information.



3. Retrieve the UR robot IP

The IP of the robot can be retrieved from the “About” menu in the UR’s teach pendant main screen.

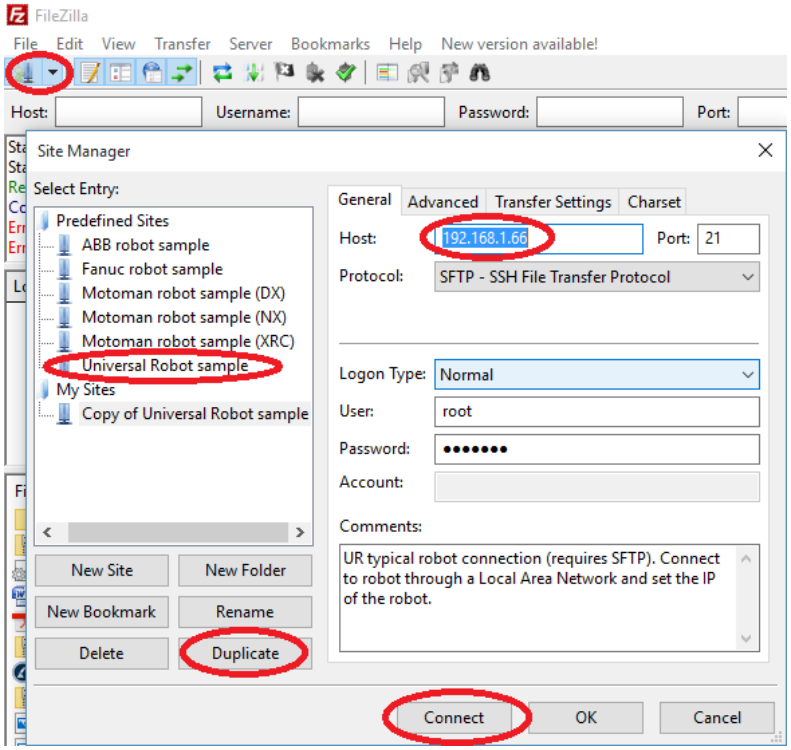


The IP of the robot is required to transfer program files through FTP or to execute programs directly from the RoboDK simulator.

4. Transfer a program to the robot

A SCRIPT program generated by RoboDK (such as by pressing F6) can be transferred to the robot using a USB disk or by FTP transfer if the robot and the computer are connected through a Local Area Network (LAN).

Note: Refer to the "Appendix I – Connect your robot with RoboDK" from the manual "Getting started with RoboDK" for more information.

Follow these steps to transfer the file through FTP:

1. Right click a robot.
2. Select "Connect to robot...".
3. Select "Explore". FileZilla will open (software for FTP transfer).
4. Select "File→Site Manager...".
5. Select "Universal Robot sample", in "Predefined Sites".
6. Select "Duplicate". A copy of the Universal Robot setting will be created.
7. Inter the IP of the robot (192.168.1.66 in this example).
8. Select "Connect".
9. Transfer the SCRIPT file previously generated to the robot.
   The SCRIPT programs are usually stored in the folder "/Programs/" on the robot controller.