Instruction for Running Motion/Force Control Simulation in RobotStudio

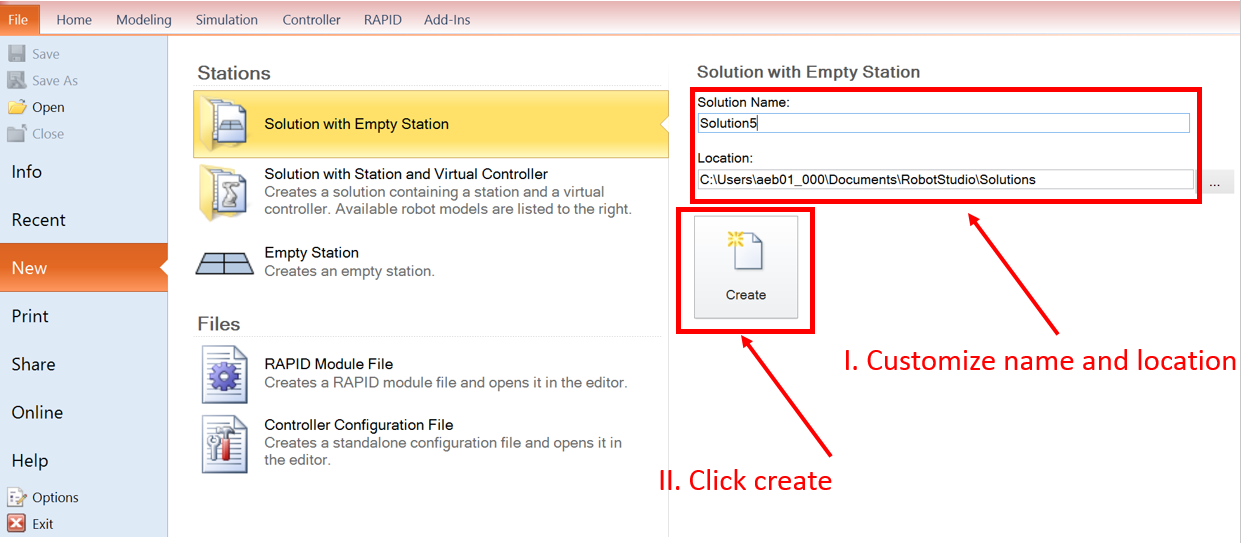
I Introduction

This file aims at providing step-by-step instructions for running the hybrid motion/force control simulation in RobotStudio. The software is self-contained that the entire simulation can be running on one Windows PC.

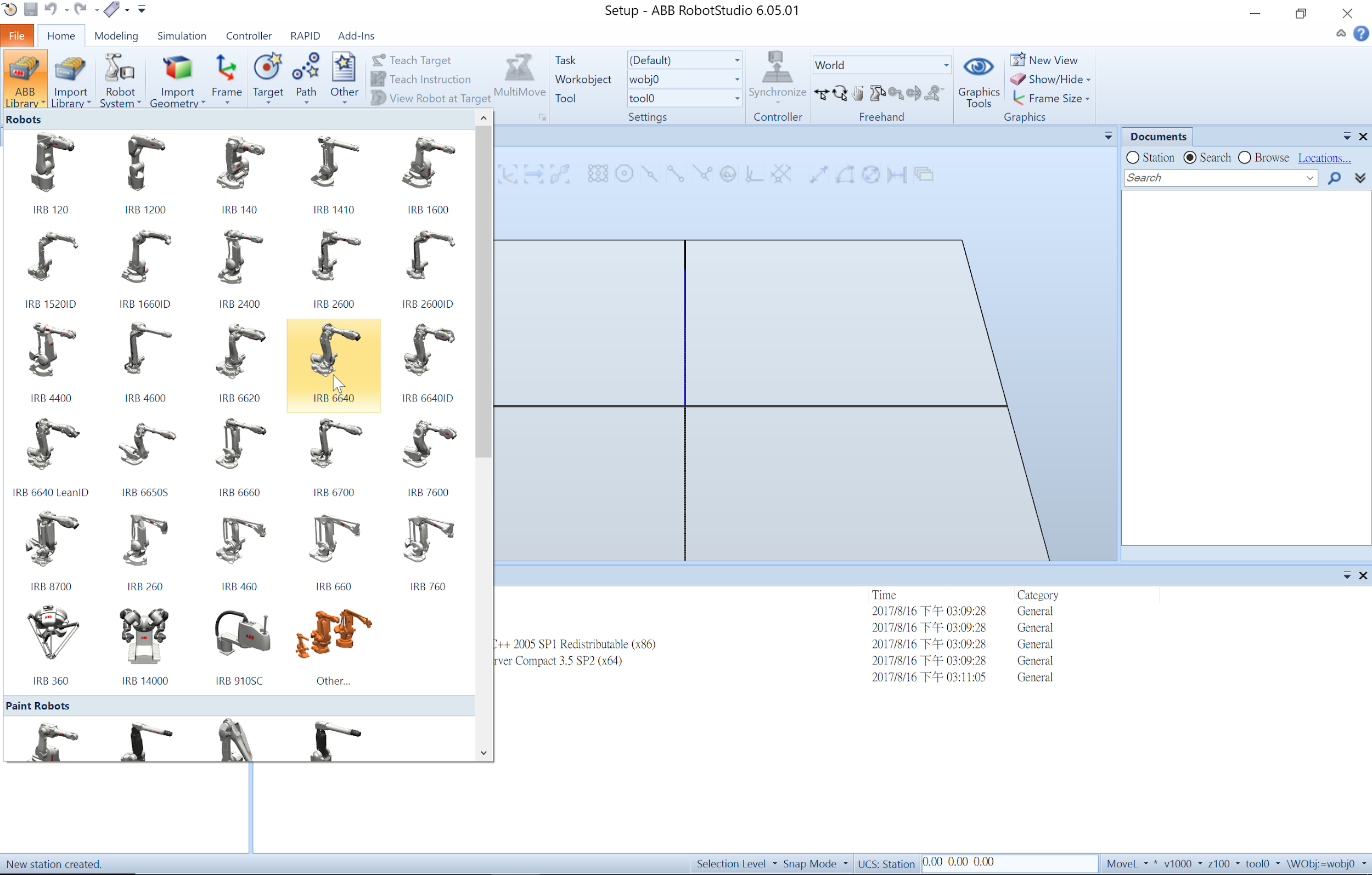
II. RobotStudio Preparation and Software Installation

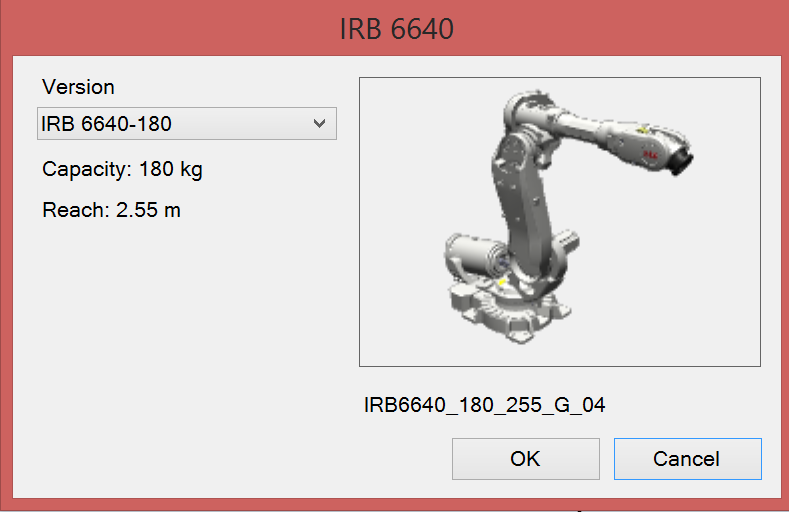
1. Configure RobotStudio Station

Launch RobotStudio and create a new solution file

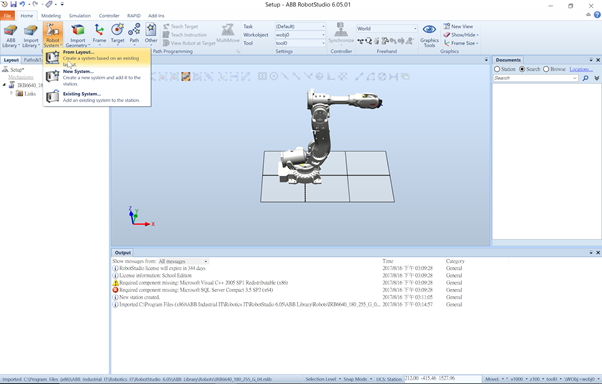


Import robot model

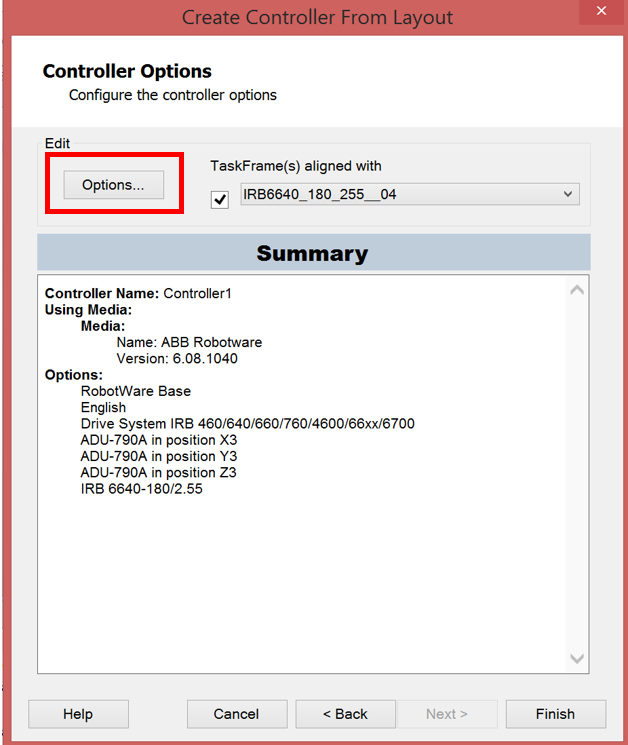




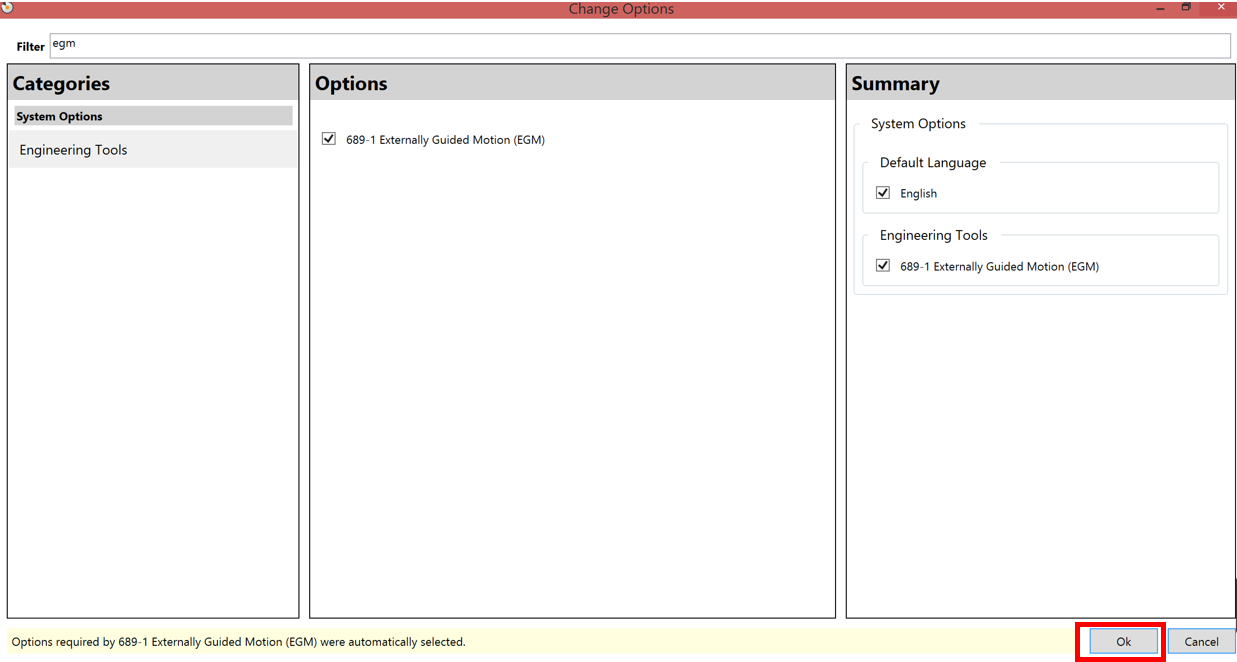
Import controller and add EGM



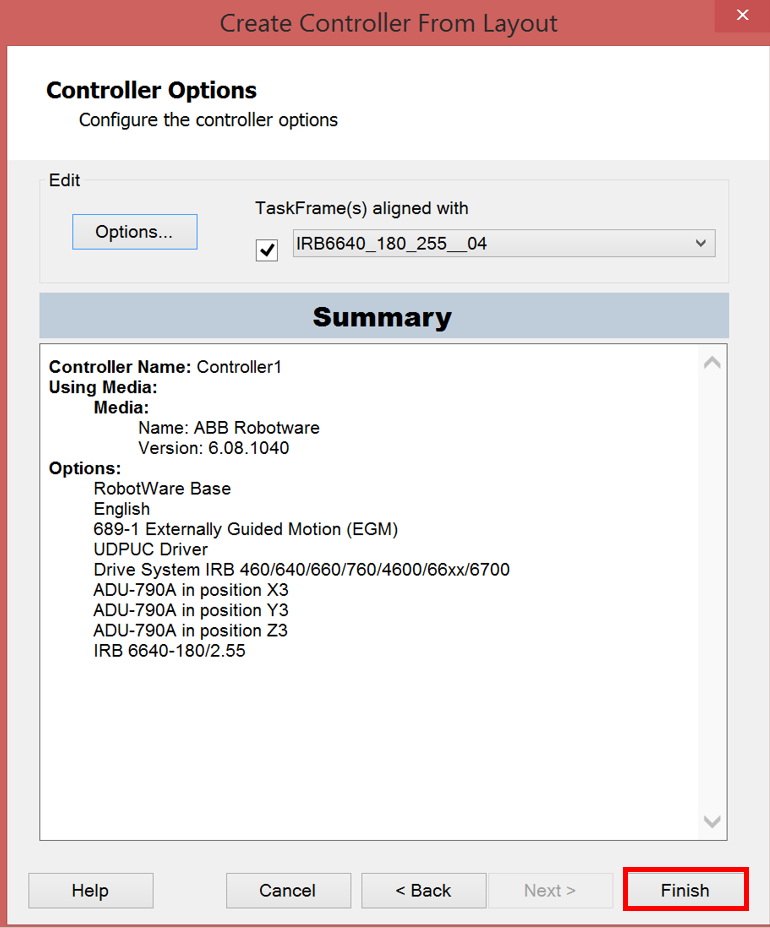
Customize your controller name and location, click next until you see the following window, and click options.



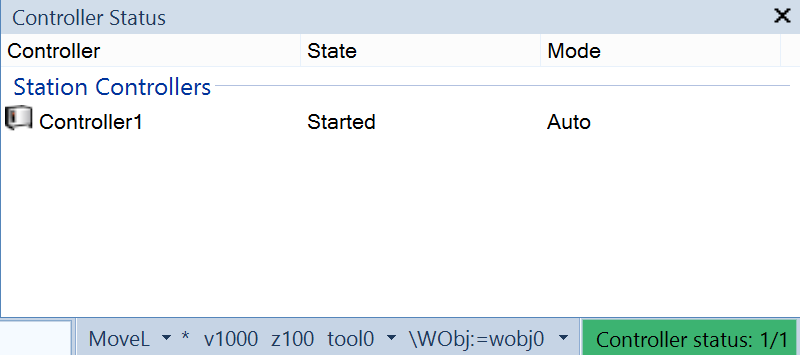
Type EGM in filter to search for EGM and add it



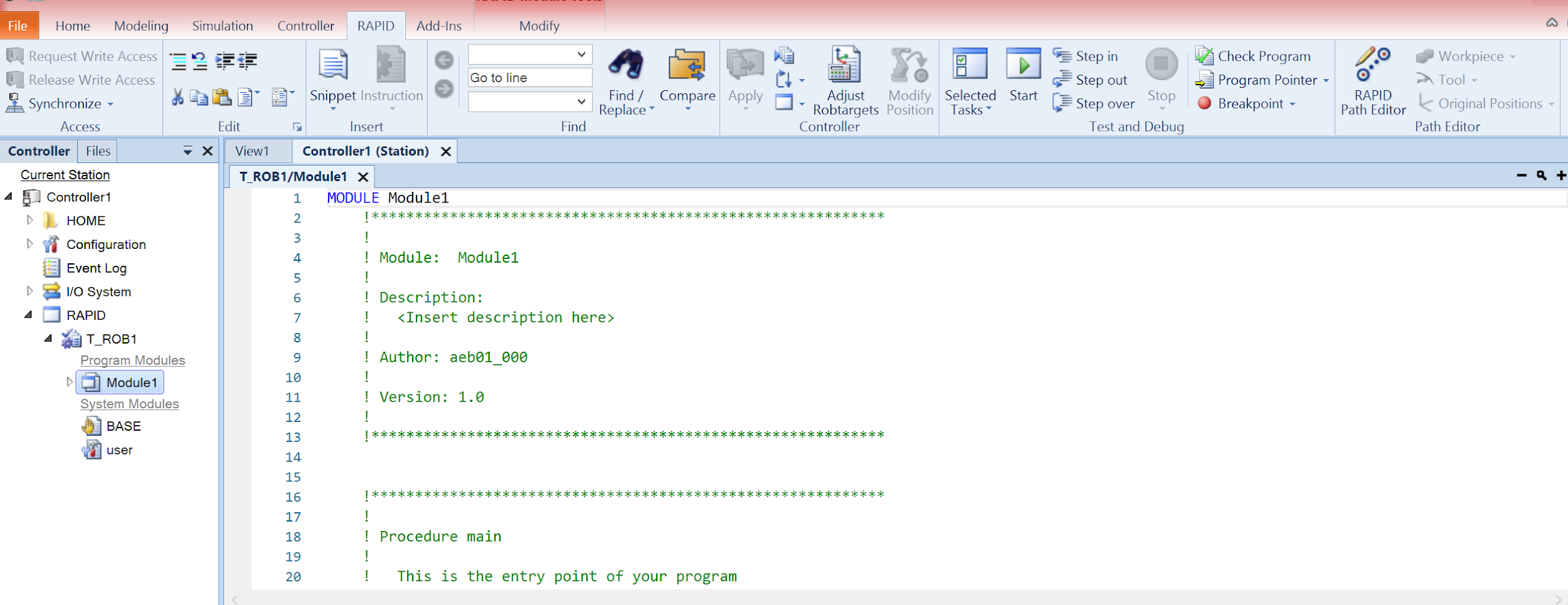
Then click Finish, the controller will restart



It will take a while, wait until the controller status bar turns into green.



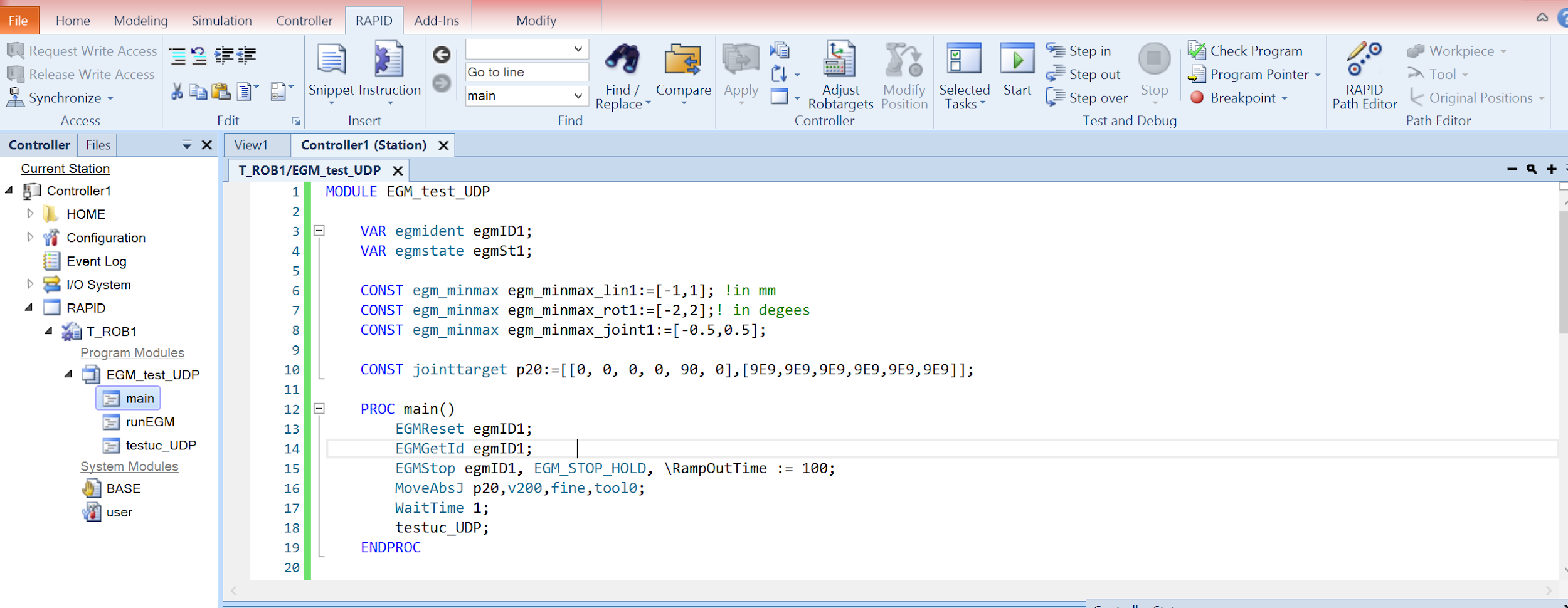
Go to “Rapid”, and double click “Module 1”.



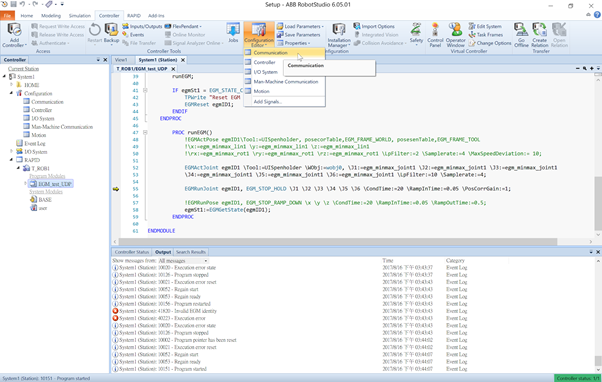
Copy and paste the code into the editor to replace the old one from here:

<https://github.com/ShuyoungChen/force_motion_control_simulation_RS/blob/master/EGM_test_UDP.mod>

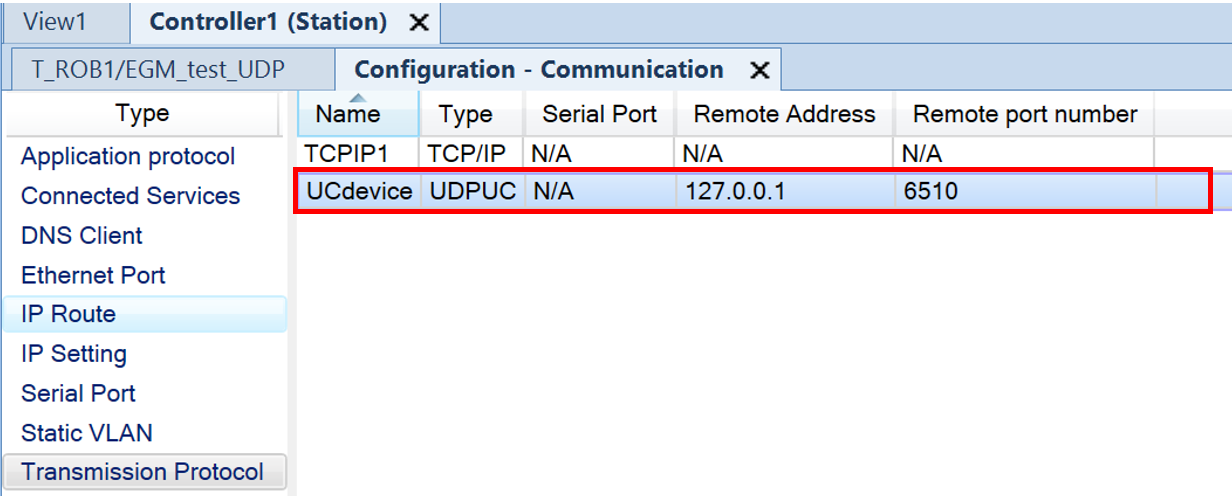
Save the edit by “ctrl+shift+s”



Set UDPUC interface for EGM

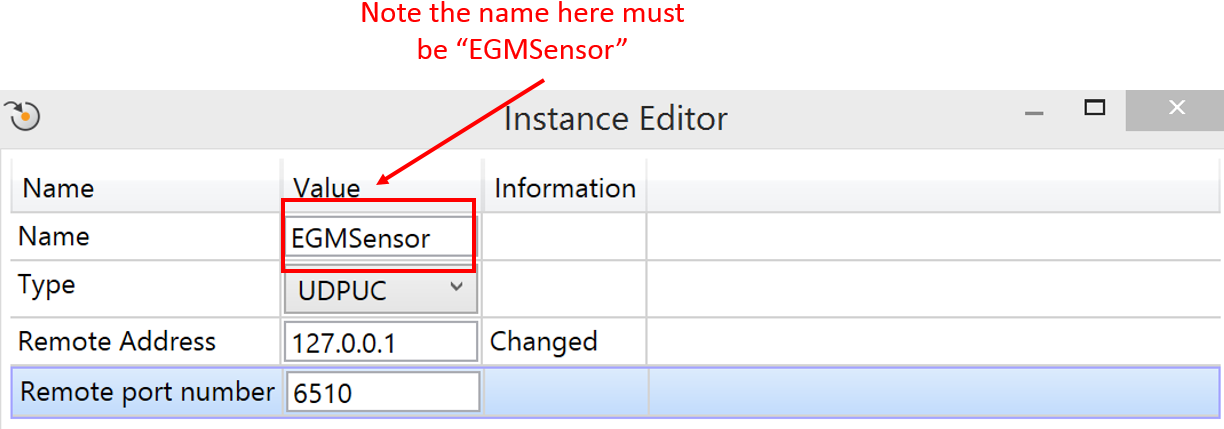


Go to “Transmission protocol” and double click the “UCdevice” protocol



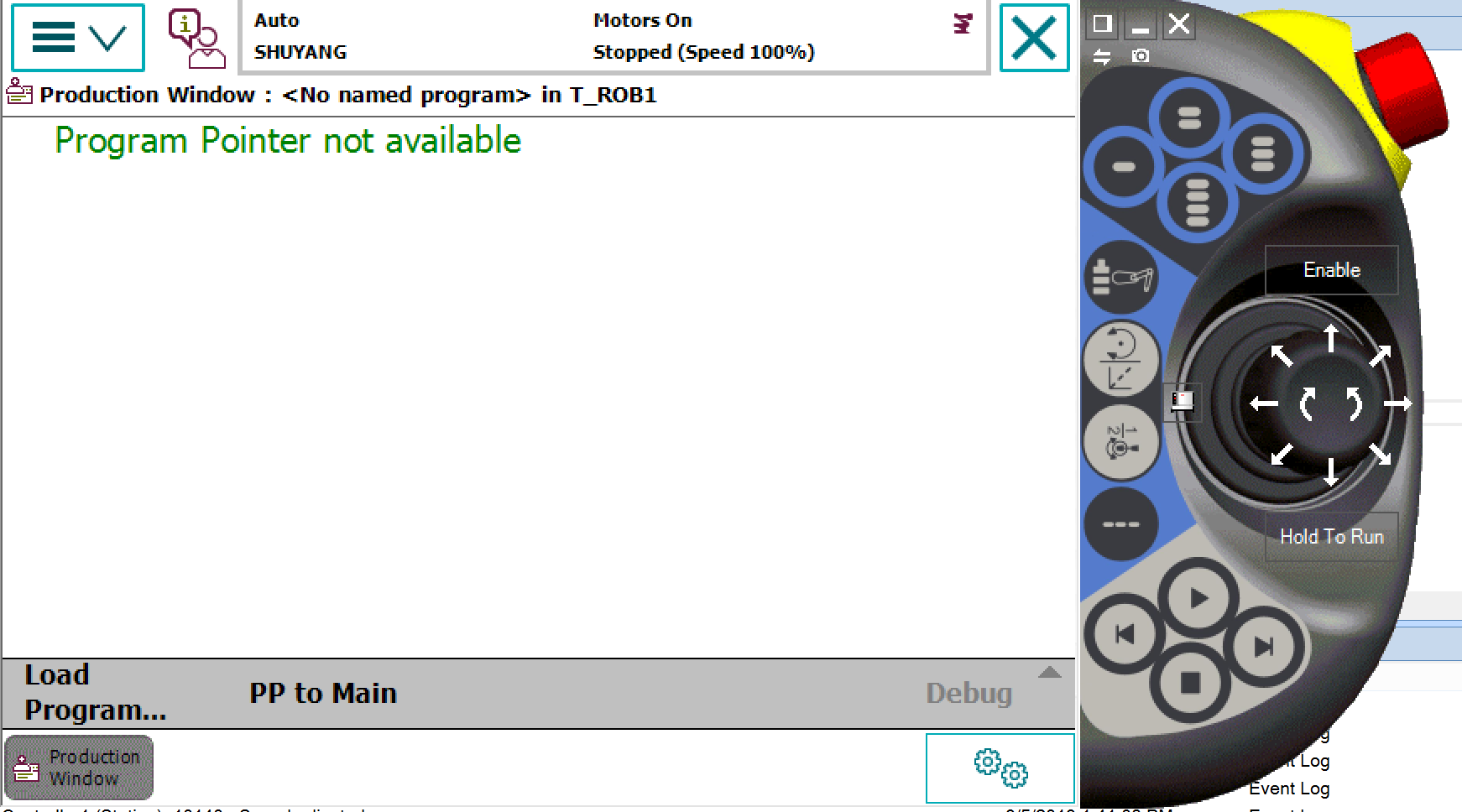
Note: If you only see one protocol “TCPIP1”, then right click in blank space and create a new transmission protocol

Edit the protocol as below:

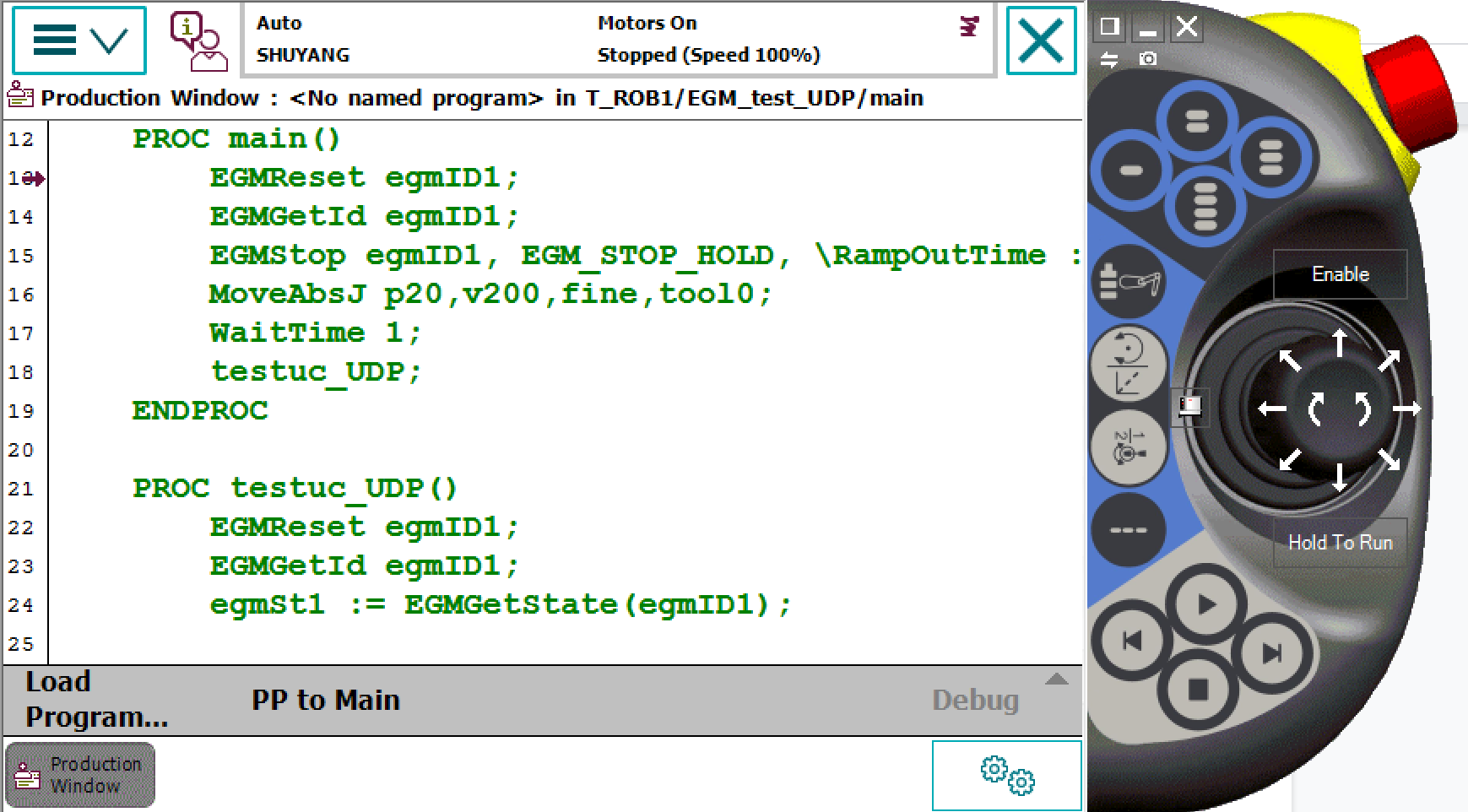


Restart the controller by “Controller -> Restart -> Restart (Warmstart)”

Click on the “Flex Pendant” under Controller to display the virtual pendant



Click “PP to Main” to reset the program pointer to the main function



1. Install the Controller Software and Dependencies

Install dependent Python packages (all for **Python 2.7**), including:

* numpy, protobuf, requests, BeautifulSoup, ws4py, and scipy)
* quadprog (you need to download Microsoft Visual C++ Compiler for Python 2.7 for installation of quadprog)
* general\_robotics\_toolbox by RPI:

<https://github.com/rpiRobotics/rpi_general_robotics_toolbox_py>

(you can use “python -m pip install -e C:\path\to\rpi\_general\_robotics\_toolbox\_py-master” to install, same for rpi\_abb\_irc5 below)

* rpi\_abb\_irc5 by RPI:

<https://github.com/rpiRobotics/rpi_abb_irc5>

* Download the code “force\_motion\_control.py” and “QuadProg.py” here and put them into one directory.

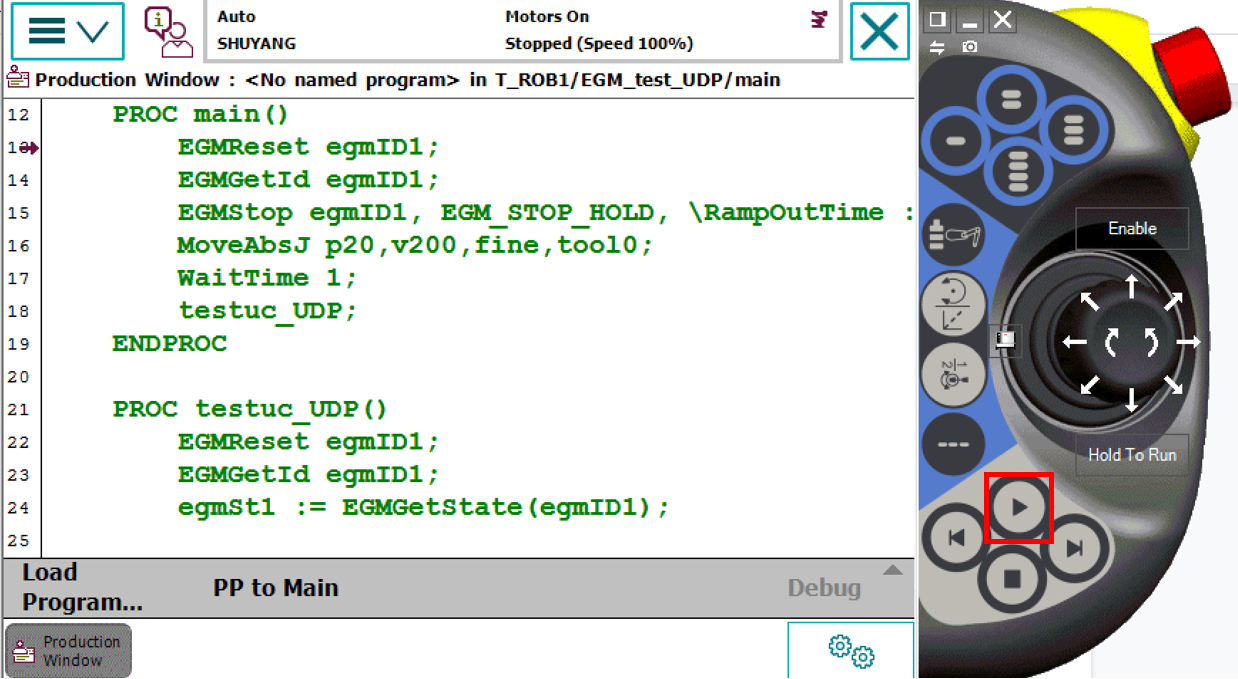
<https://github.com/ShuyoungChen/force_motion_control_simulation_RS>

III. Run the Simulation

First run the python file in a command window by:

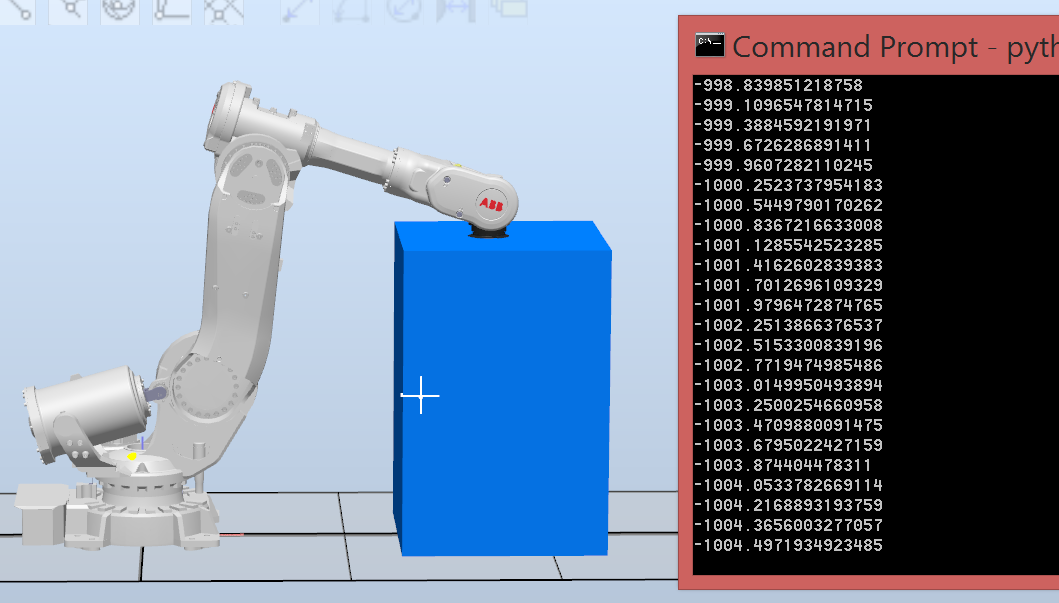
*python force\_motion\_control.py*

Then, click the start button on flex pendant to run the RAPID code in RobotStudio



Note: before running each simulation, you must click “PP to Main” to reset the pointer

You can see the current contact force looping out in the command window where you run the python file:



The blue box is just for visualization, and you can also import a box into RobotStudio by “Modeling -> Solid -> Box” and set the dimension and position of the box.