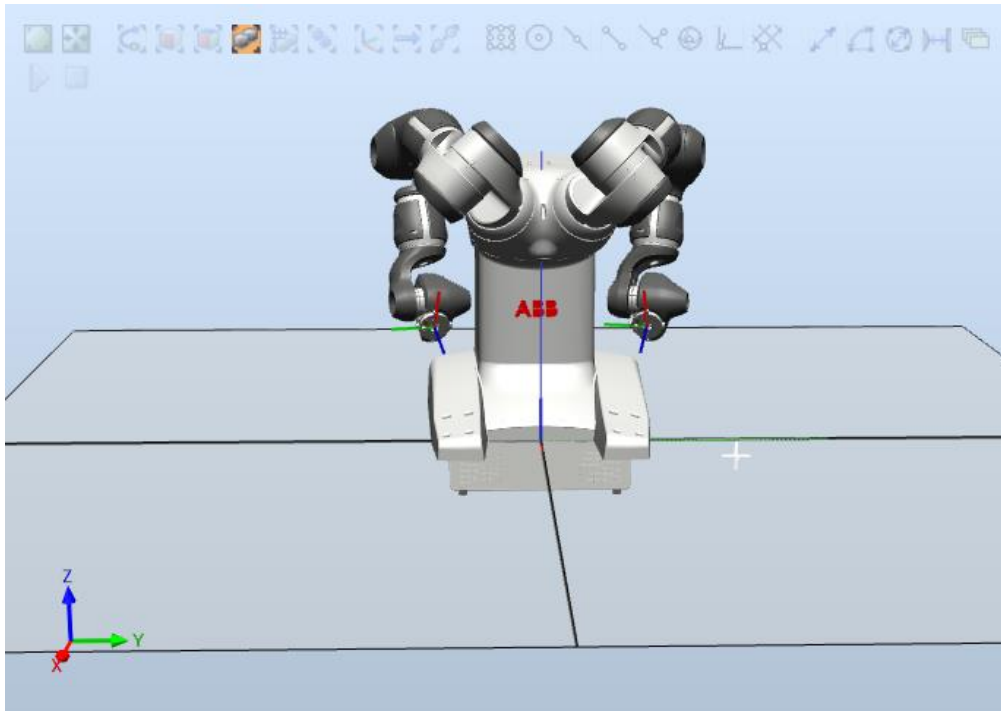


HOW TO MOVE YUMI WITH ROBOTSTUDIO



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Date: 28-06-17



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PART II: REAL ROBOT

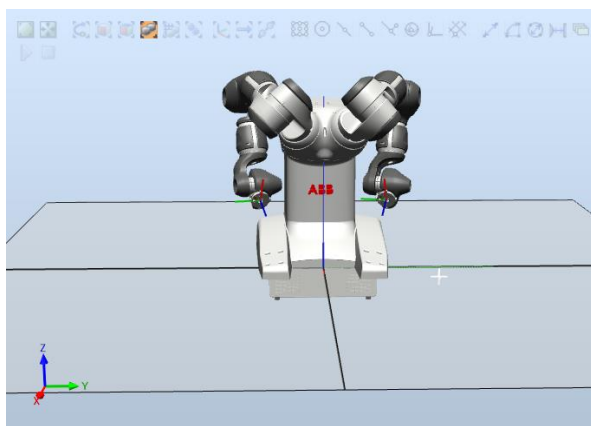
PART I: SIMULATED ROBOT

1. CREATING WORKSTATIONS:

File->Share : Pack & Go helps you to save your station including libraries and robot systems in a single file. This file is easily redistributable, and you are sure that no station components are missing

1.1 Import Yumi:

Home -> ABB Library -> IRB 14000



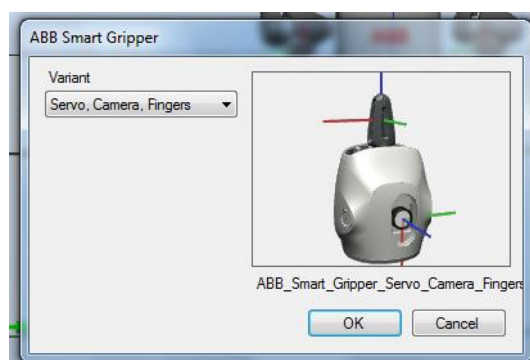
1.2 Set the controllers:

Home -> Robot System-> From layout-> Add PC interface.

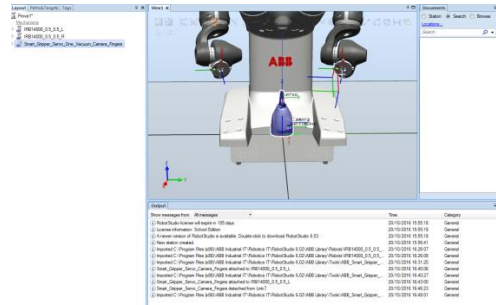
1.3 Import Grippers

- **Left Gripper:**

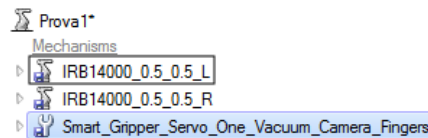
Home -> Import Library -> Equipment -> ABB smart gripper -> Servo, Camera, One vacuum cup, fingers.



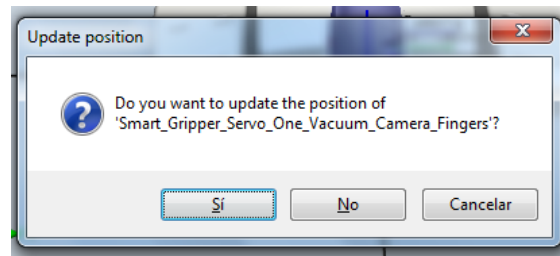
It is going to appear in the workspace.



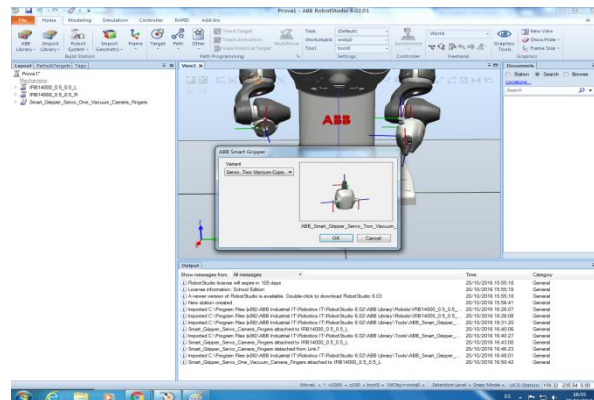
Then, drag it to left arm.



It is going to appear this warning: Accept it.



- **Right Grippers:**
Do the same to the right arm, but selecting the gripper Servo, Two Vacuums cups, Fingers



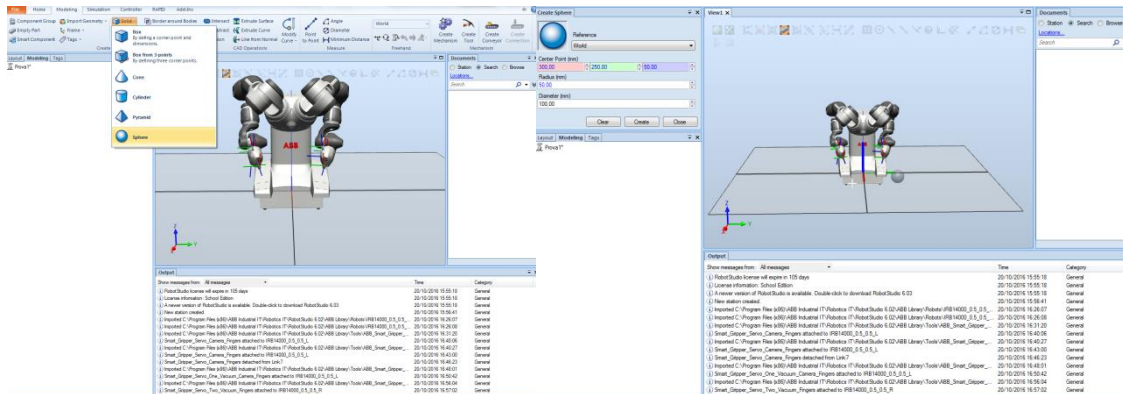
Drag it again to right part of the robot. Take care that is going to appear the same warning as before.

2. MODELLING THE SPACE AND MAKING OBJECTS

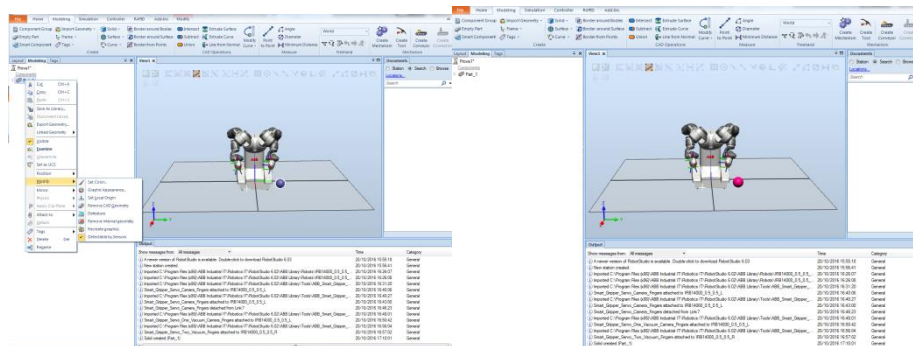
We are going to create different objects in the workspace. First, we are going to create a ball:

2.1 Create a sphere

Modeling->Solid->Sphere->fix it, for example at (300,250,50) with a R=50.

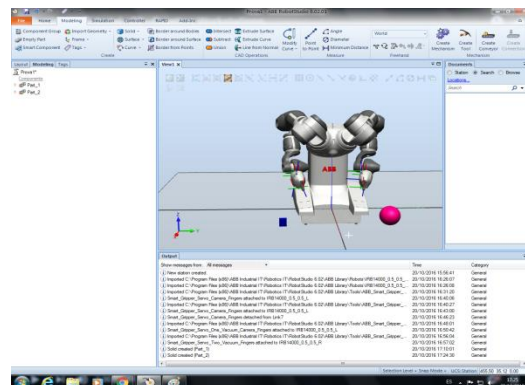


The colour of the ball can be changed picking the ball and the mouse right button .
Part_1->modify-> set color

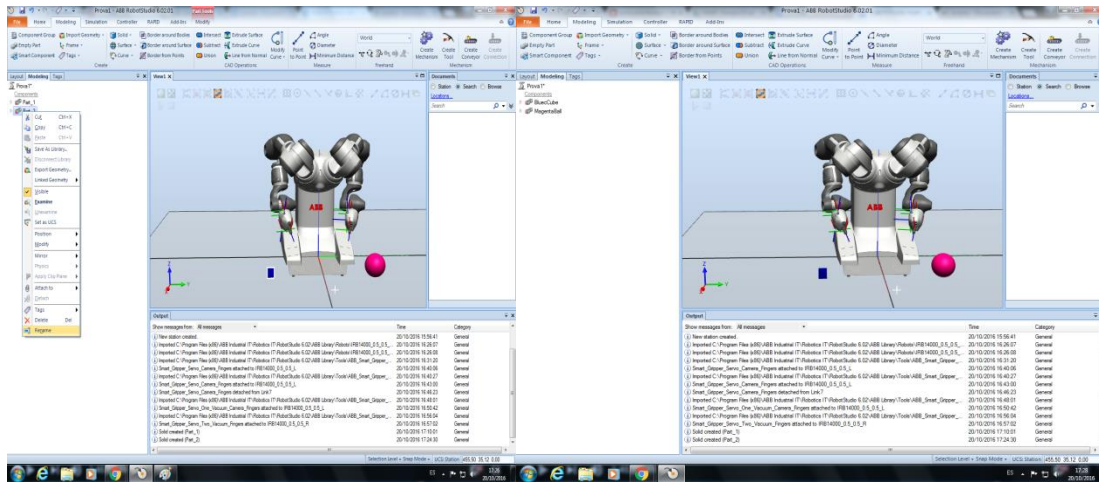


2.2 Create a box

Modeling->Solid->Box-> Corner point (275,-275,50) with a Length 35.



Rename both solids: Part_1->Rename

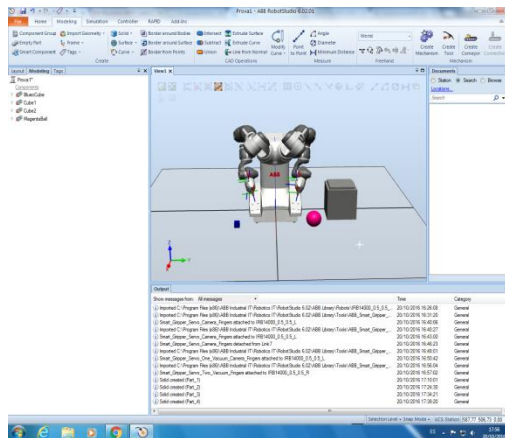


Make two more boxes:

One at the Corner Box (0.0,350,0.0) and Length 200.

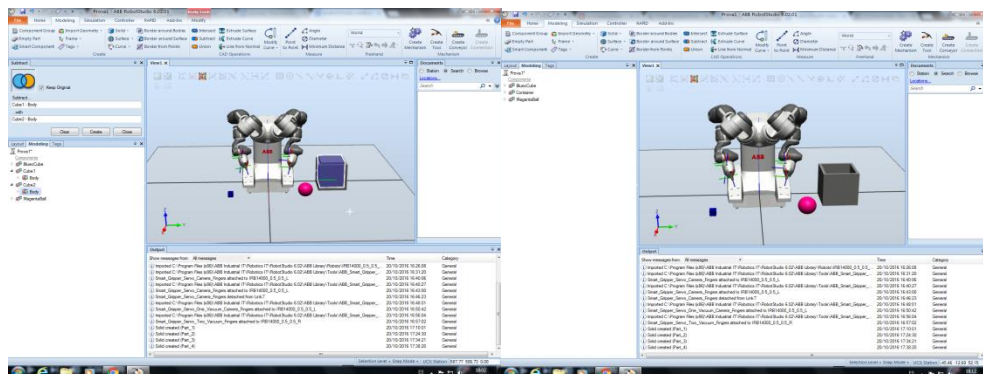
Other at the Corner Box (15,365, 15) Length: 170, Width 170 and Height 200.

And rename it with Cube1 and Cube2 respectively.



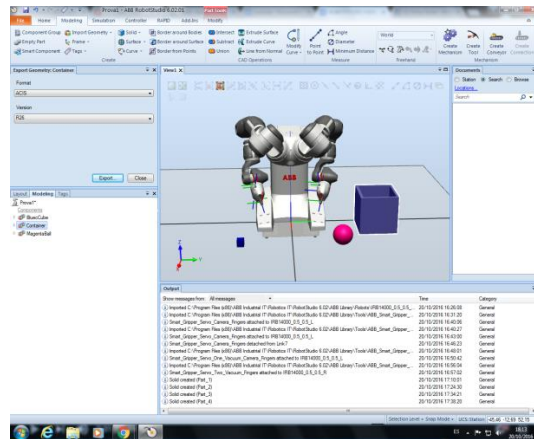
We are going to vacate the box. To do this goes to Modeling->Subtract.

1. Upick keep original.
2. Subtract...:Cube1-> Body with: Cube2->Body.
3. Create and rename it as "container".



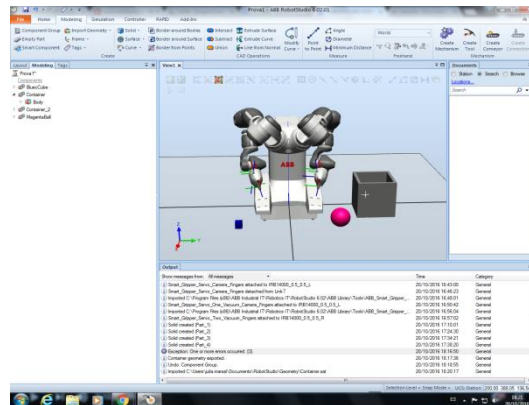
EXPORT GEOMETRY:

Pick with the right button of the mouse on the "container" and select Export Geometry, save it , make sure that it has saved and then close the tab.



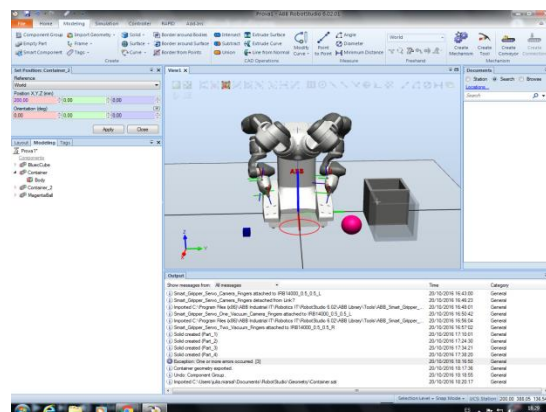
- **Import another container:**

Go to Import geometry-> User geometry-> Container.

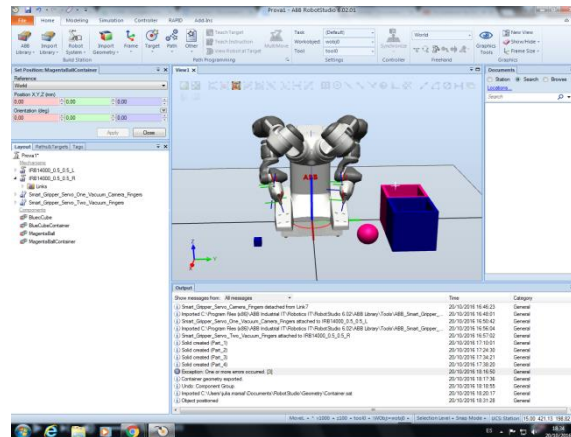


- **Move this new Container**

Pick with the right button of the mouse to the new Container, Container_2-> Position-> Set Positions and set it in (200,0,0).



Then, rename it as “BlueCubeContainer” and modify the colour with blue.
Rename again the “Container” as MagentaBallContainer and modify the colour with Magenta.

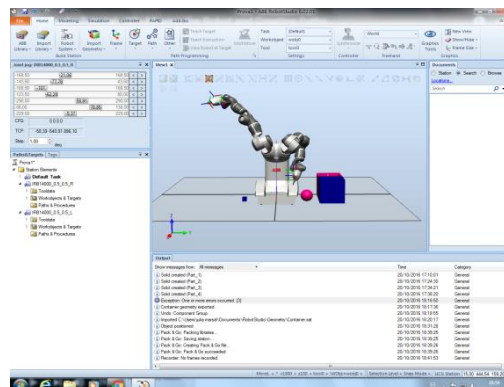


Pack&go helps you to save your station including libraries and robot systems in a single file. This file is easily redistributable, and you are sure that no station components are missing.

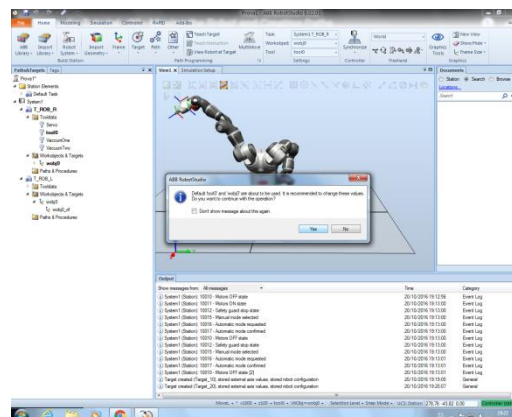
3. MOVING ROBOT AND CREATING PATHS:

3.1 Moving the robots:

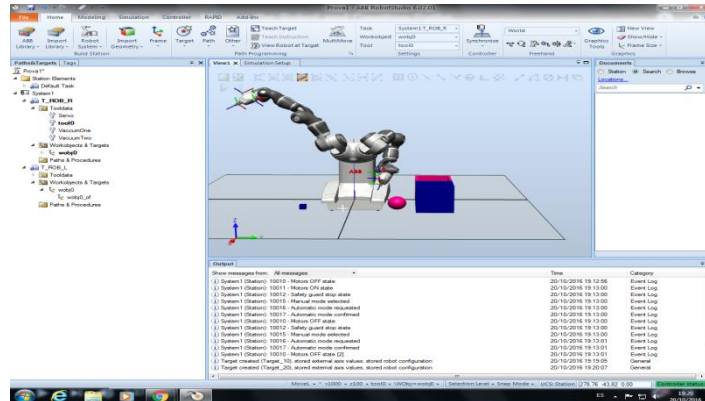
Home-> IRB14000_05_05_L -> right button mouse -> Mechanism Joint Jog



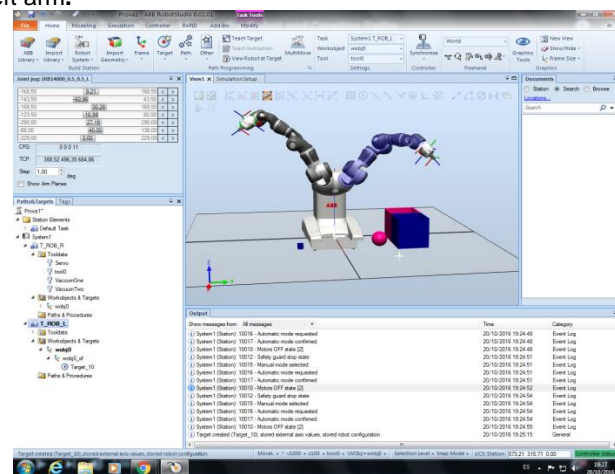
Try to put the right arm in these position moving jogs joints. When you will have the position fixed, Select teach target.



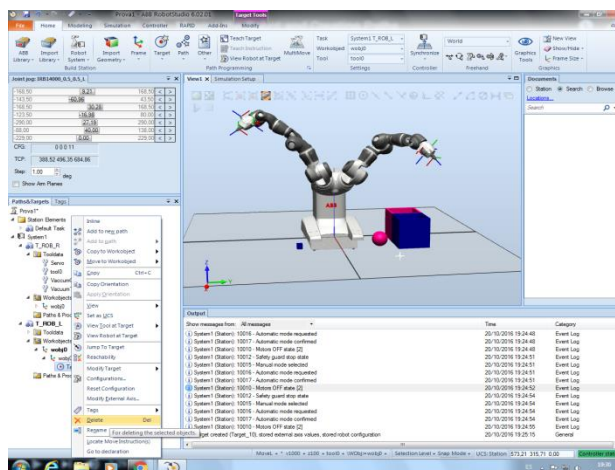
It could appear a Warning message at the top of the page, agree with it. Make sure that in the top is selected the correct arm.



Do the same with the left arm.



Delete all the trajectories that we have done: Pick T_ROB_L-> Workobjects & Targets->wobj0j_of->Target_10 pick with the right button of the mouse and select delete.

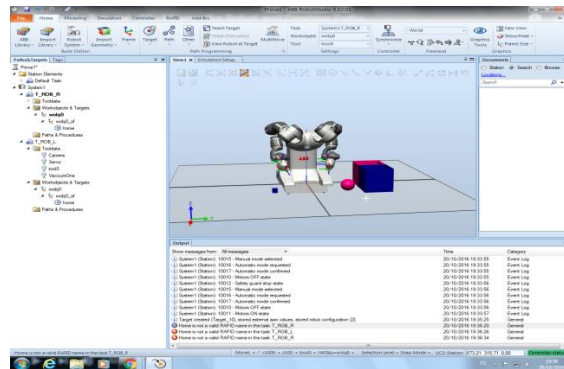


Do the same with the other arm.

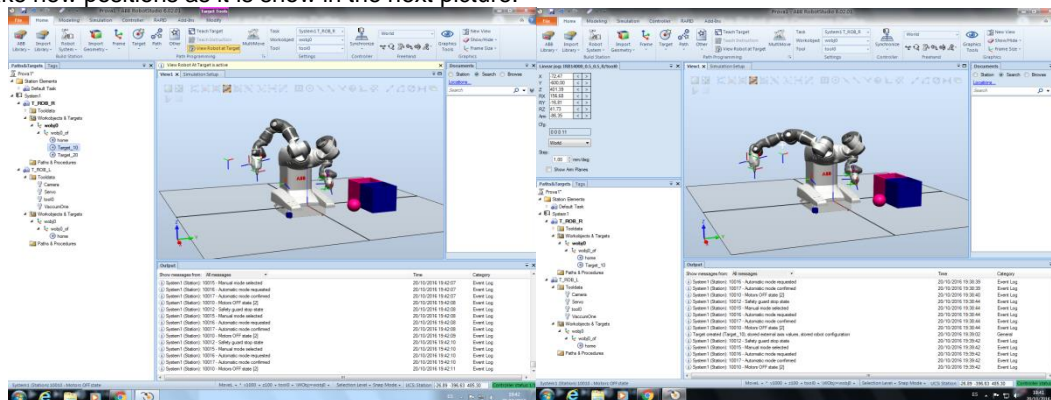
3.2 Get home position quickly:

T_ROB_R-> Jump home

Save this position as home

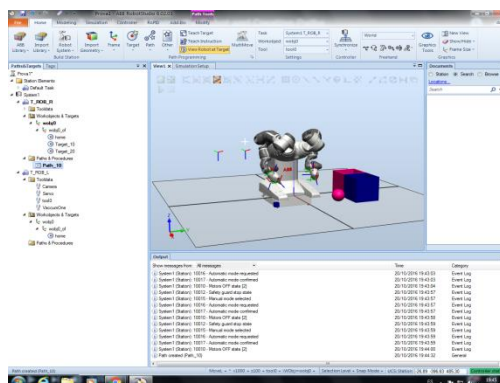


Make new positions as it is show in the next picture:

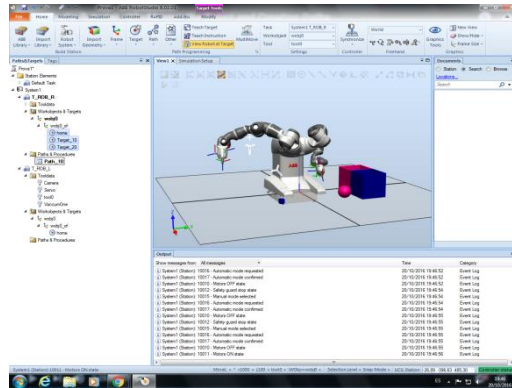


3.3 Set a PATH:

Path ->Empty path



Put inside the Path the targets that you have created (drag to Path_10)

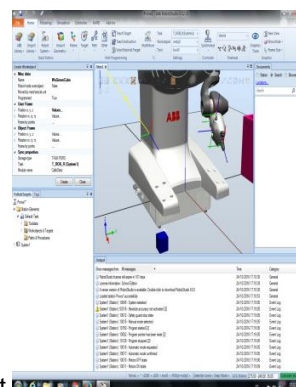
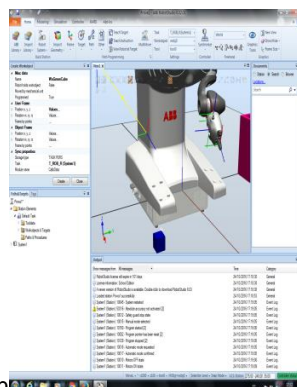
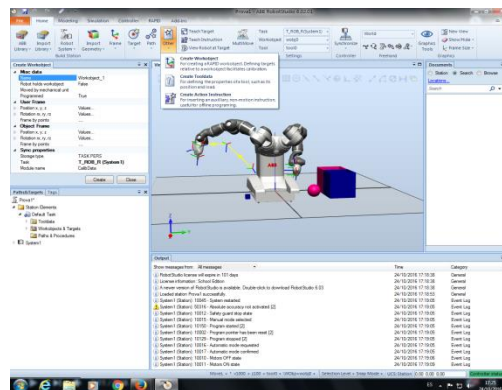


Right button of the mouse -> Move Along Path it will move along the targets that you have created.
If you want to see the trajectory that the robot does go to Simulation->Monitor -> select the arm you want to use and then -> check activated "Trace color" ->OK

share-> pack&go

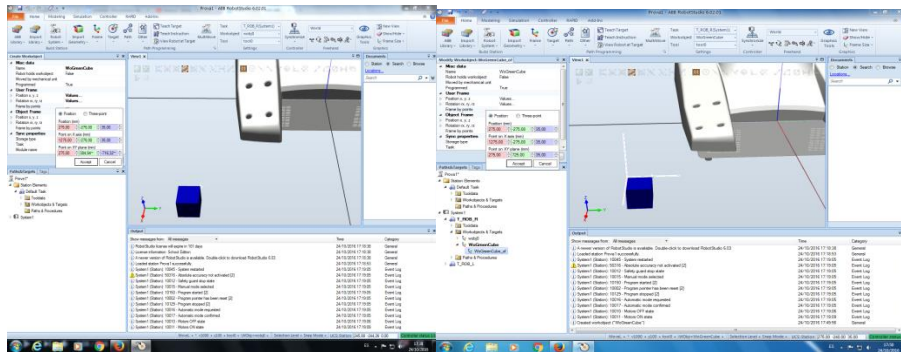
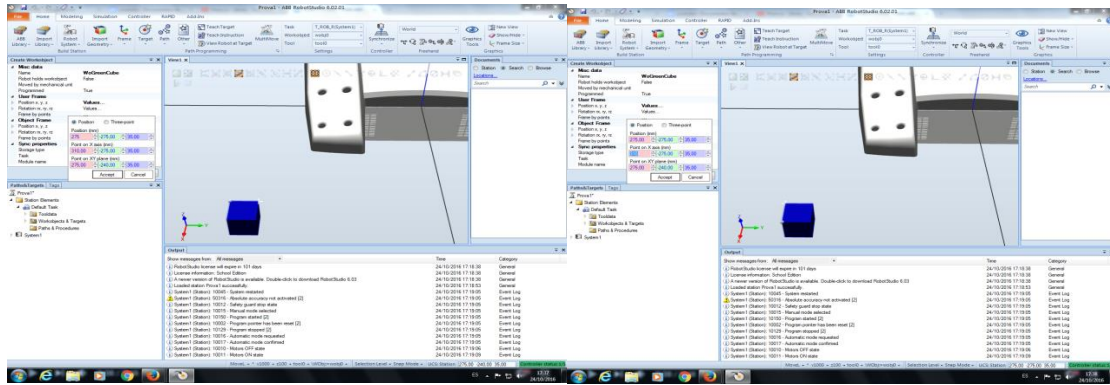
3.4 Using Workobjects:

HOME-> Other->Create Workobject
Name: WoGreenCube

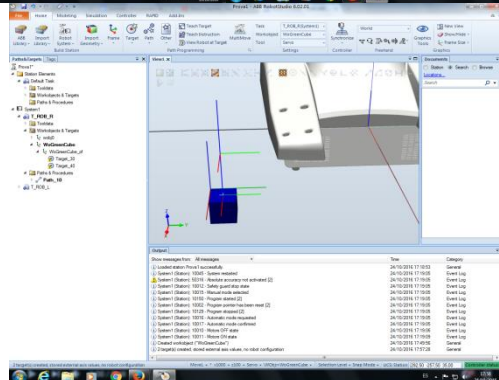
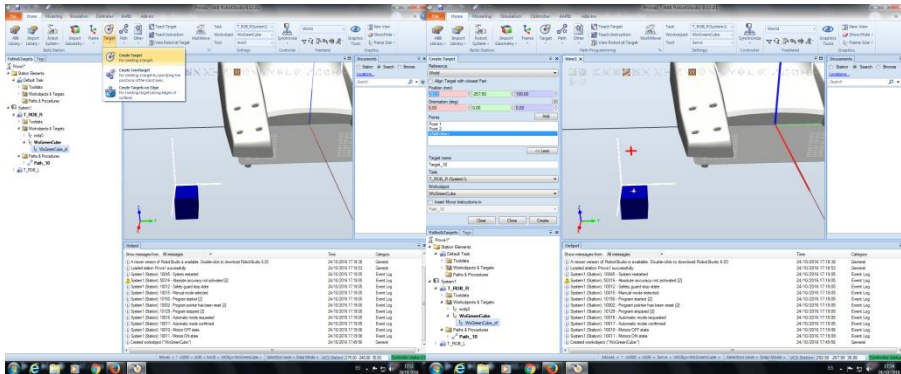


Select : Part selection , snap object

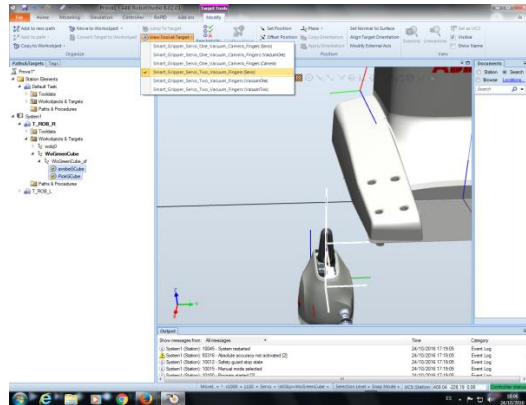
Frame by points : Select:



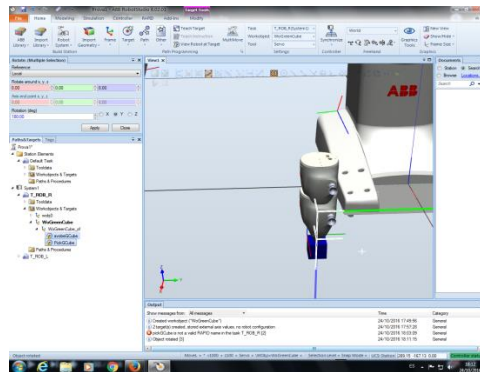
3.5 Create Target:



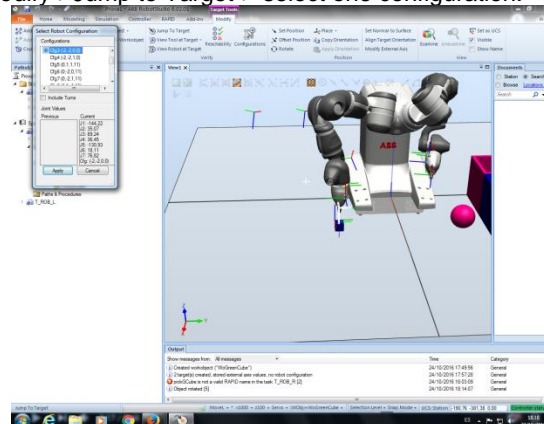
Rename Target30 & 40 : pickGCube & avobeGCube
 Select both targets -> modify -> View Tool at target -> Smart_Gripper_Servo_Two_Vacuums_Fingers (Servo)



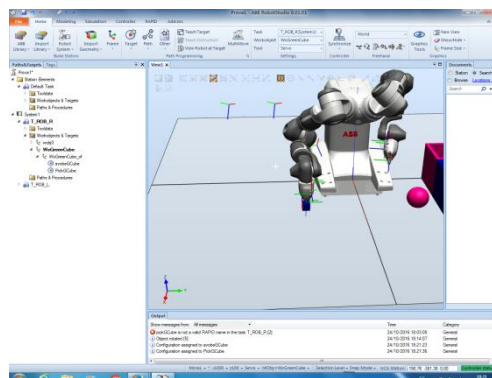
Modify->rotate 180: Y



Pick aboveGCube , pick Modify->Jump to Target-> select one configuration.

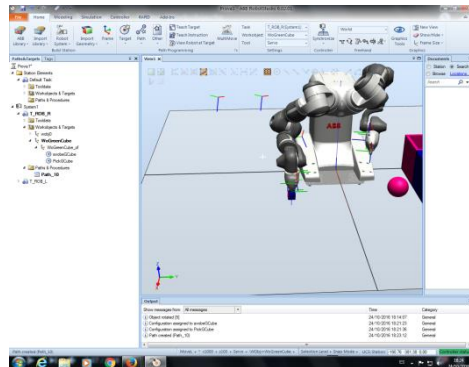


Do the same with the other target.
See that the warnings in the targets has disappeared.

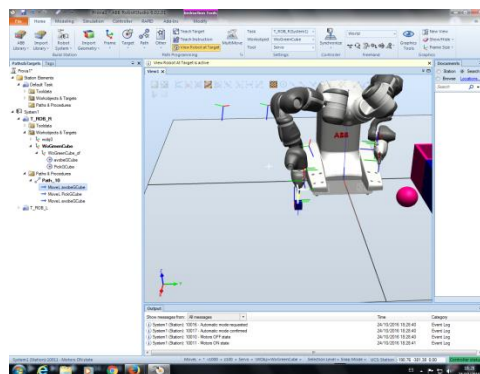


3.6 CREATE A PATH

Path->empty path (see that appears path 10) //if you are conserving the last sesion path this should be path 20



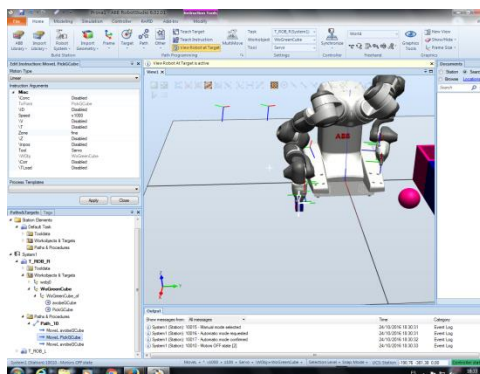
Drag to the Path_10 avobeGCube-PickGCube-avobeGCube in this order it should appear the next instruccions:



Edit PickGCube instruction

Motion Type: Linear

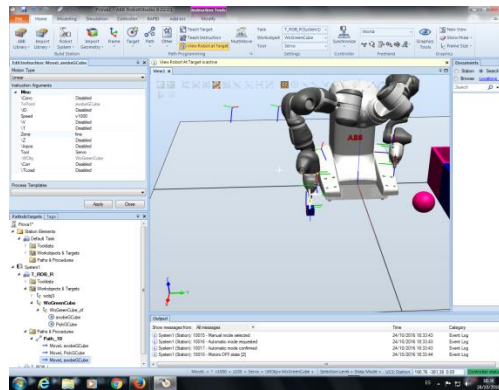
Misc-Zone: fine



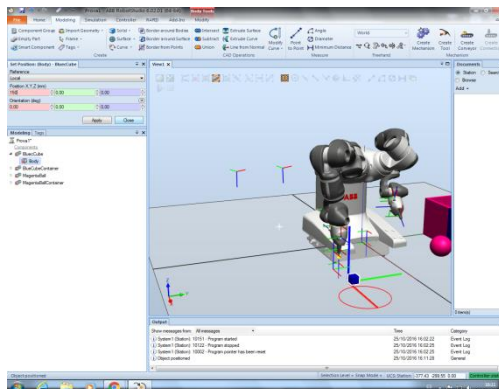
Edit second avobeGCube instruction:

Motion Type: Linear

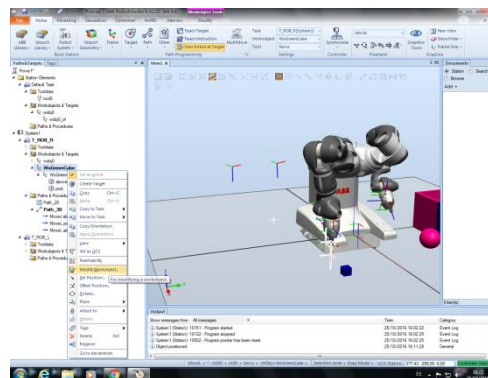
Misc-Zone: fine



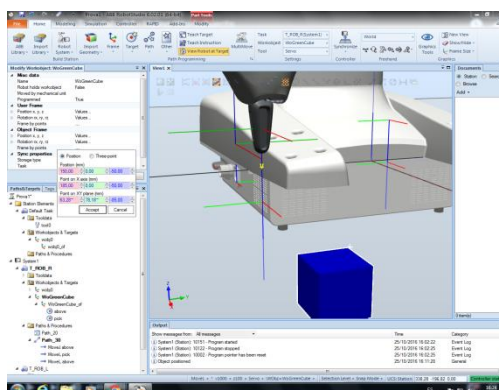
Don't touch the first instruction !!!!!
Go to Modeling->BlueCube-> Body and put it 150 mm forward.



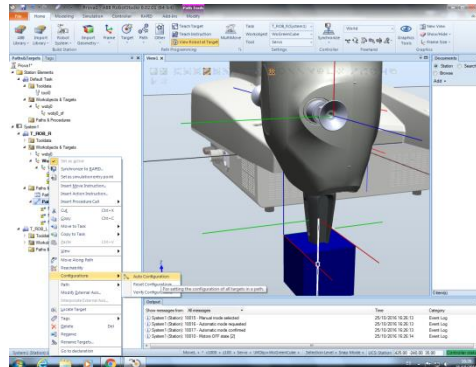
Modify the worktarget.
Go to Home ->paths&targets-> mouse right button -> Modify WorkObject



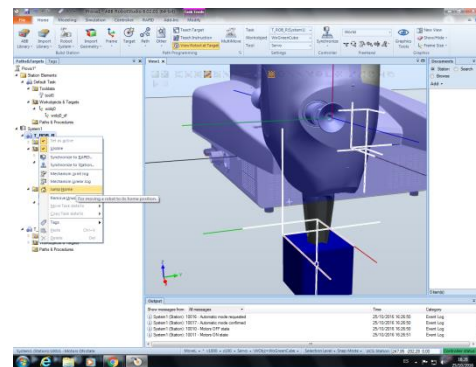
Do de same as before fixing the Workframe



Path_30->Configurations->Auto Configuration



T_ROB_R-> jump home



Path_30->Move along Path **Pack&GO**

PART II: REAL ROBOT

1. MAKING CONNECTION BETWEEN ROBOT AND ROBOTSTUDIO.

1. First of all open the robot and wait until the teach pendant configuration do not finished.
2. When it appears the figure 1 information, acknowledge and open robotstudio (better 32-bit version).

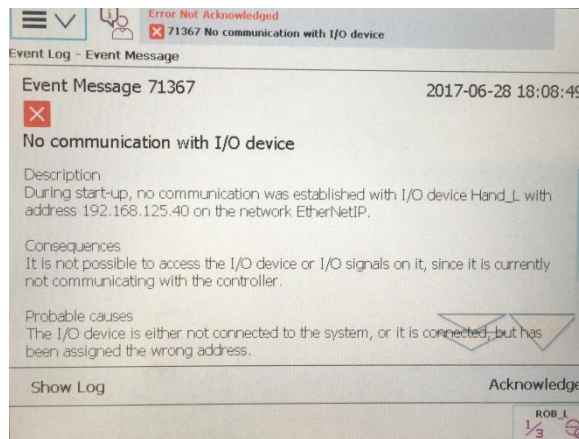


Fig. 1 First event Message in teach pendant.

3. Open a previous station creation, as it shows in figure 2. It has to appear yumi's robot with the grippers, as we explained on the part I- 1, as it shows in figure 3:

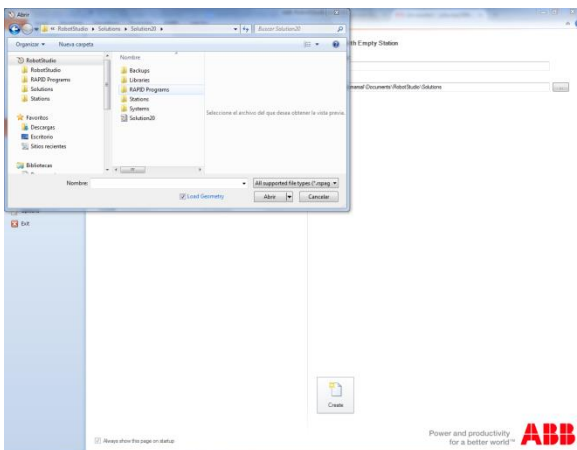


Fig. 2 How to open a previous workstation

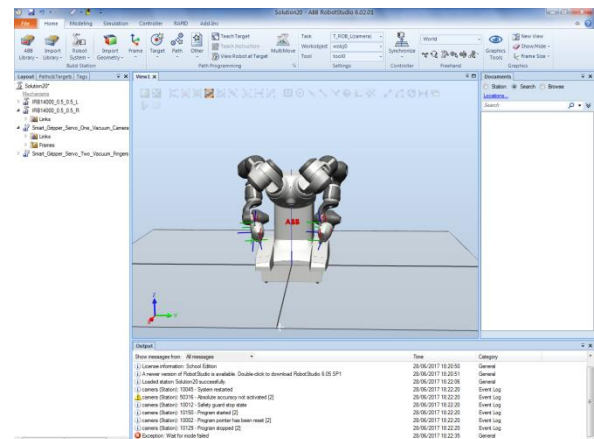


Fig. 3 Workstation

- Next, to connect robotstudio with the robot go to Controller → (click the drop-down) Add controller, as it shows in figure 4, and select the ip of the robot, as it shows in figure5.

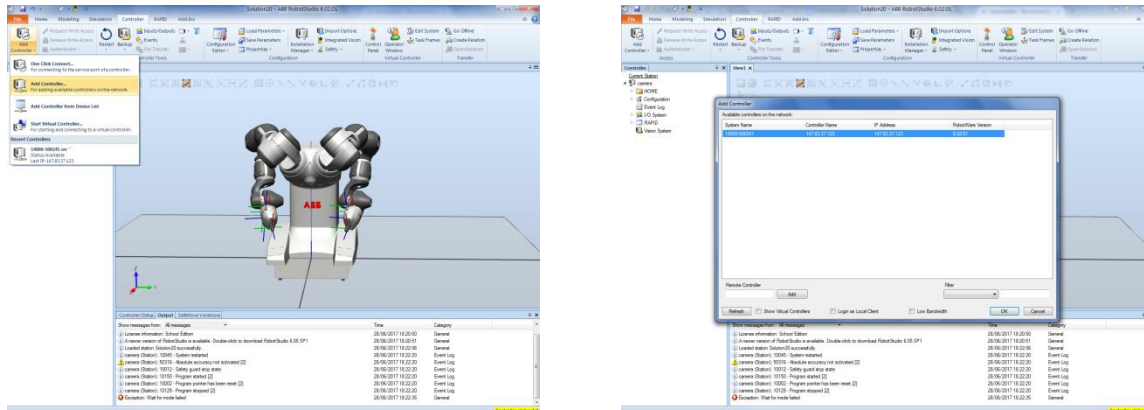


Fig. 3 and 4 Making the connection

5. Now, on the left it has to appear another controller that is call 14000-500241 (147.83.37.123). As it shows in figure 5.

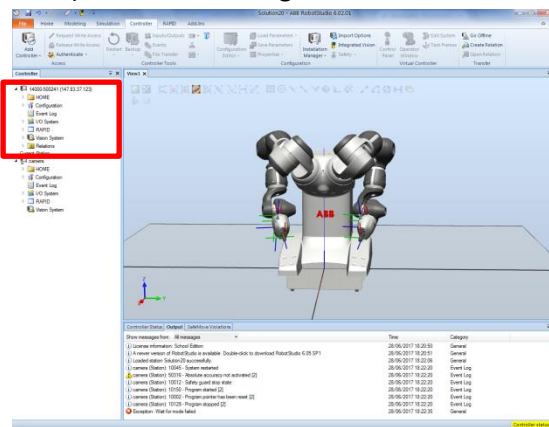


Fig. 5 Connection established

- 6.1 If you have established ROS connection inside the RAPID window it will appear all the tasks that were made in the *Ros_control/Ros_industrial_motion* guide. As it shows in figure 6.

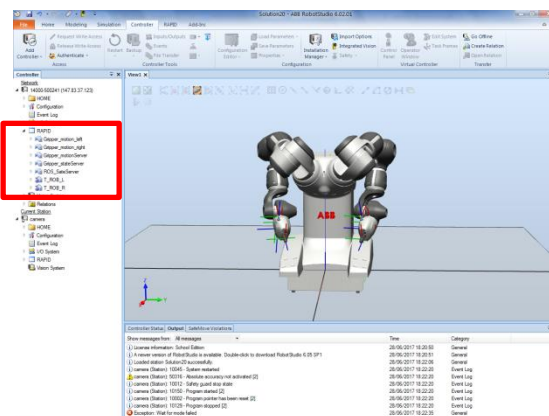


Fig. 6 ROS tasks

- 6.2 If you have not set all the ROS files, it will appear T_ROB_L and T_ROB_R. You can put there any code you want to move the robot. As it was explained in sections 2-3.

2. VISION

If you want to work with vision, make sure that you are working with 32-bits version. 64-bits versions don't have this part finished.

1. With the robot connected, go to Vision System → cam → Integrated Vision.
2. Vision System → cam → connect.

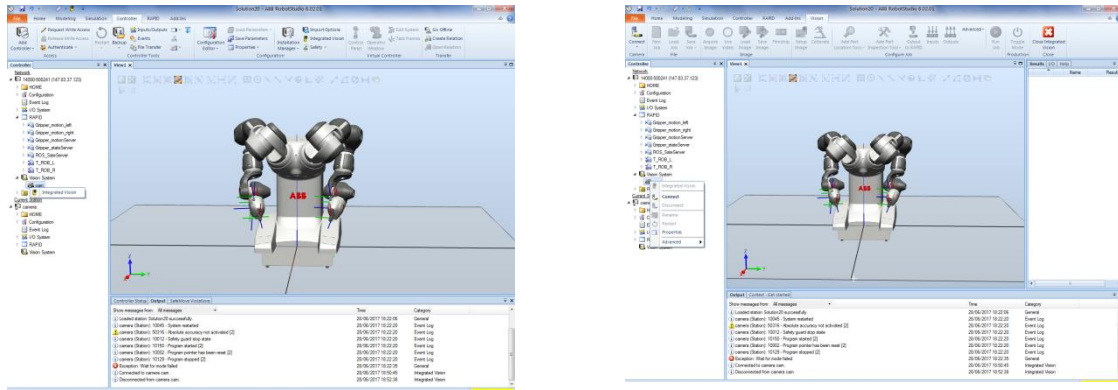


Fig. 7-8 Camera Connection

More information are in *Application manual* → *Integrated Vision*