## Snap Assembly Position Controlled Demo Instructions

Currently, these are instructions are for a position-controller run without proper visual calibration. This means that many steps are dong manually, but we hope to change this soon.

1. **Set up Baxter and Workstation**<http://sdk.rethinkrobotics.com/wiki/Baxter_Setup>   
   <http://sdk.rethinkrobotics.com/wiki/Workstation_Setup>   
     
   Note: I have not yet tested version 1.2.0 of the software. When you use the wstool command from above, all your repositories will be set to the latest code. You will need to open the .rosinstall file provide and change the version to: release-1.1.1, except for the simulator. Run catkin\_make again.  
     
   Note: the latest code for Baxter is at version 1.2.0, but I have not had time to test under the new software version. So, you have to go back a few commits
2. **Install our code**Install the birl\_baxter repo by following the wiki: <https://github.com/birlrobotics/birl_baxter/wiki>   
     
   **Note**: you might still get some compilation errors when you run catkin\_make. Try to see if you are not missing any dependencies. If you see the problem is coming from a package inside our demo folder, ignore that package by creating a file called CATKIN\_IGNORE
3. **Untuck arms**
   1. Run the baxter script:   
      >> cd ~/ros/indigo/baxter\_ws  
      >>./baxter.sh
   2. Run the untuck node  
      >> rosrun baxter\_tools tuck\_arms.py -u
4. **Baxter Base**Make sure the Baxter base is centered. Use level marker on the back of robot to see if balanced or not.
5. **Calibrate the arms**
   1. Remove Grippers  
      1. Disconnect the electric connection between the gripper and the arm.  
      2. Carefully unscrew gripper from wrist.
   2. Perform both tare and calibration from baxter\_tools:  
      rosrun baxter\_tools calibrate\_arm.py -l right  
      rosrun baxter\_tools calibrate\_arm.py -l left  
      rosrun baxter\_tools tare.py -l right  
      rosrun baxter\_tools tare.py -l left
   3. Placing Grippers Back On  
      For the right hand, when you place the gripper again, make sure the gripper allows the male part camera mold’s front part to face in the right direction.
6. **Set up Experimental Table**Make sure it is as parallel to the floor as possible and very stable – rotate the legs to extend/contract. Make sure that the top surface of the table (it can be moved) is aligned with the lower base.   
   **Note**: this table can fall over very easily so be careful.
7. **Place the camera molds**
   1. Female part:   
      There are 2 black dots marked on the experimental side on each side. Place the plastic camera mold there along with 4 screws in the holes to fix the part and make it rigid. Make sure that the female’s part front side is in fact facing to the front.
   2. **Male part:**Use your hand to place the male part inside the male gripper. Make sure to hold the camera part rigidly until it has been fully gripped.   
        
      Run the following scripts to **close** the gripper to the appropriate position (85% of the way):  
      >> cd ~/ros/indigo/baxter\_ws  
      >> ./baxter.sh  
      >> rosrun baxter\_interface gripper\_action\_server.py   
        
      // In a new window, start the baxter script again and run  
      >> rosrun baxter\_examples pa\_closeHand.py –g right
   3. Verification  
      Make sure the male gripper is properly held.
8. Running the code
   1. Requirements
      1. gripper\_action\_server
   2. Keyboard Teleoperaion  
      We will use the trac-ik node to command the motion of the arm in very small steps to get it as close as possible. Run:  
      >> roslaunch baxter\_end\_effector\_control end\_effector\_control.launch keyboard:=true  
        
      - When the node starts it will give you a keyboard map, copy it and paste it, into gedit.   
      - When you get close, change the rotation speed to 0.001m using:  
       l ---> move speed decrease  
       o ---> rotation speed decrease  
        
      - The easiest way is to approach the part at an angle between 20-50 degrees.   
      - Try to get some contact at the front. A
   3. Run the Pivot Approach State Machine  
      >> rosrun baxter\_examples\_pa\_jtc\_rightArm.py