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See the commands from the textbook.

## 1\_2 BAXTER IN SIMULATION

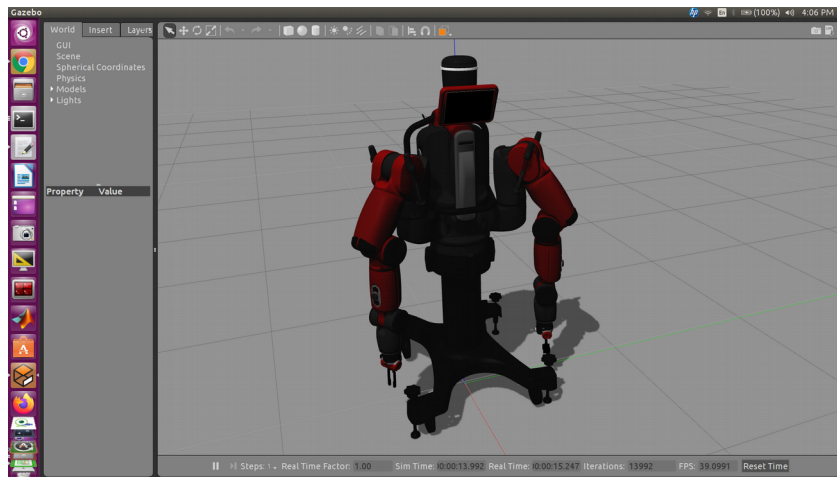
```
$ cd ~/baxter1_ws      (New Workspace with Baxter Sim loaded)
```

```
$ ./baxter.sh sim
```

```
[baxter - http://localhost:11311] harman@D104-45931:~/baxter1_ws$
```

Next, call the roslaunch command to start the simulation with controllers:

```
[baxter - http://localhost:11311] harman@D104-45931:~/baxter1_ws$ roslaunch baxter_gazebo  
baxter_world.launch
```



```
[ERROR] [1603947664.049395031, 0.277000000]: GazeboRosControlPlugin missing  
<legacyModeNS> while using DefaultRobotHWSim, defaults to true.
```

This setting assumes you have an old package with an old implementation of DefaultRobotHWSim, where the robotNamespace is disregarded and absolute paths are used instead.

If you do not want to fix this issue in an old package just set <legacyModeNS> to true.

## 3. Baxter's State Page 259

NEW TERMINAL

```
harman@D104-45931:~$ cd ~/baxter1_ws
```

```
harman@D104-45931:~/baxter1_ws$ ./baxter.sh sim
```

```
[baxter - http://localhost:11311] harman@D104-45931:~/baxter1_ws$ ls
```

```
    baxter    baxter_examples  baxter.sh  build  install  src  
    baxter_common  baxter_interface  baxter_tools  devel  run_baxter
```

```
[baxter - http://localhost:11311] harman@D104-45931:~/baxter1_ws$ roslaunch baxter_tools enable_robot.py -s
```

```
ready: False  
enabled: False  
stopped: False  
error: False  
estop_button: 0  
estop_source: 0  
    error: False  
    estop_button: 0  
    estop_source: 0
```

## 4. Find his arm positions

```
[baxter - http://localhost:11311] harman@D104-45931:~/baxter1_ws$ rostopic echo robot/joint_states -n1
```

```
header:
```

```
seq: 23929
```

```
stamp:
```

```
secs: 479
```

```
nsecs: 548000000
```

```
frame_id: "
```

```
name: [head_pan, l_gripper_l_finger_joint, l_gripper_r_finger_joint, left_e0, left_e1, left_s0,  
left_s1, left_w0, left_w1, left_w2, r_gripper_l_finger_joint, r_gripper_r_finger_joint,
```

right\_e0, right\_e1, right\_s0, right\_s1, right\_w0, right\_w1, right\_w2]

position: [-0.0009335270190584666, 0.020833026868756897, 1.2010626134479094e-08, -  
0.016252742256074093, 0.4943815549947823, 0.19149181934080417, 1.0470000327234716, -  
0.19125605747408603, 0.026775588515266513, -0.015017704311564906, 0.020833201710436372,  
8.267010246712226e-08, 0.025472301414604992, 0.5060669876906543, -0.2795598204085685,  
1.0470028612357662, -1.2162078320468739, -0.032339895565351995, -0.09660742368954267]

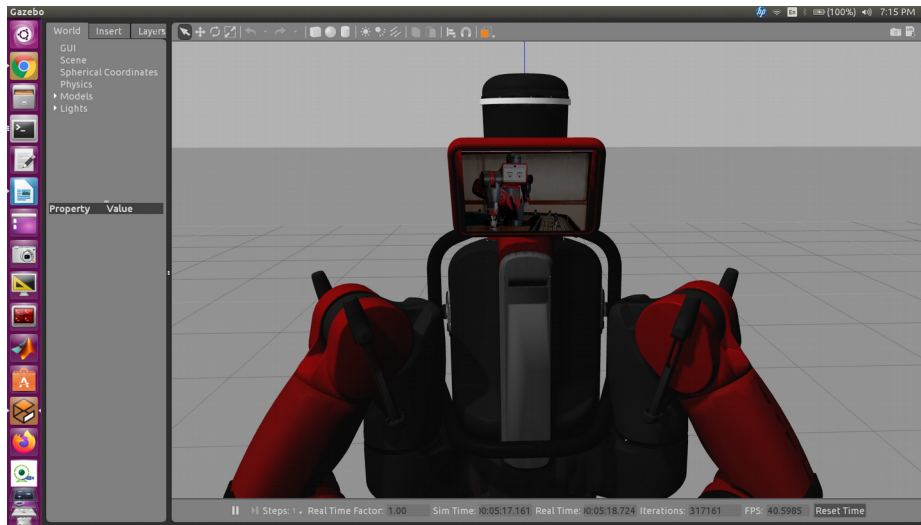
velocity: [2.2132382729385826e-06, -5.240509711108296e-06, -2.1537021986883756e-06, -  
2.341357501855139e-06, 9.213317368263427e-05, 3.978647211622016e-06, -3.563207213496975e-  
05, -2.730225969462923e-05, -5.631360818049907e-05, 3.4026759989996048e-06,  
8.883528294842498e-05, -4.1876013522479005e-05, 1.7142911716787593e-05,  
6.030440822985509e-06, -6.497403438270421e-06, 1.021293223975311e-07, -  
0.0008398244802868503, -4.120000117143587e-06, -7.147412880028508e-05]

effort: [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0]

---

## 5. Face Picture baxterworking working Image Pg 261

```
$ rosrund baxter_examples xdisplay_image.py --file=`rospack find  
baxter_examples`/share/images/baxterworking.png
```



[https://github.com/RethinkRobotics/baxter\\_examples/blob/master/scripts/xdisplay\\_image.py](https://github.com/RethinkRobotics/baxter_examples/blob/master/scripts/xdisplay_image.py)

```
import rospy cv2 cv_bridge; from sensor_msgs.msg import (image)
```



## 6 HEAD WOBLER Page262

```
[baxter - http://localhost:11311] harman@D104-45931:~/baxter1_ws$ rosrun  
baxter_examples head_wobbler.py
```

```
Initializing node...  
Getting robot state...  
Enabling robot...  
[INFO] [1635451450.544511, 861.505000]: Robot Enabled  
Running. Ctrl-c to quit  
Wobbling...  
^C
```

## 7. . run\_baxter <Option – enable, untuck, etc.

```
[baxter - http://localhost:11311] harman@D104-45931:~/baxter1_ws$ . run_baxter
```

```
Today is Thu Oct 28 15:06:15 CDT 2021
```

```
run_baxter commands:
```

```
enable, disable, state, reset, stop
```

```
tuck, untuck
```

```
arms_keyboard, record <filename>, playback <filename>
```

```
springs <right or left>, arms_wobbler, puppet <right or left>
```

```
ik <right or left>, joint_trajectory <right or left>
```

```
camera open <right, left or head> res <wide, medium or narrow>
```

```
camera close <right, left or head>
```

```
head_wobbler, gripper_keyboard, head_display <filename>
```

```
digital_io, analog_io
```

## Untucked or Home position for Baxter's Limbs

```
[baxter - http://localhost:11311] harman@D104-45931:~/baxter1_ws$ . run_baxter untuck
```

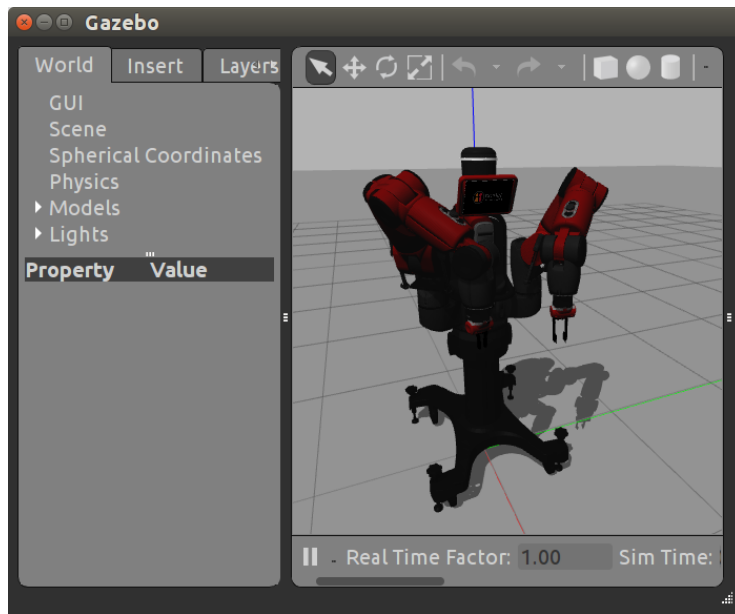
```
Today is Thu Oct 28 15:07:19 CDT 2021
```

```
[INFO] [1635451639.877921, 0.000000]: Untucking arms
```

```
[INFO] [1635451640.003910, 1049.929000]: Moving head to neutral position
```

```
[INFO] [1635451640.703485, 1050.620000]: Untucking: Arms already Untucked; Moving to neutral position.
```

```
[INFO] [1635451642.174628, 1052.070000]: Finished tuck
```



## 7a. Pg 264 `roslaunch baxter_tools tuck_arms.py -u` (The same)

Look on Page 274-275 for the positions of the head, grippers, and limbs. Suppose we want the endpoint states. (Page 300)

```
[baxter - http://localhost:11311] harman@D104-45931:~/baxter1_ws$ rostopic list | grep endpoint_state
```

```
  /robot/limb/left/endpoint_state
```

```
  /robot/limb/right/endpoint_state
```

## 7b CHECK ENDPOINT STATES - NEED TOPICS

```
$ rostopic echo /robot/limb/left/endpoint_state/pose -n1
```

```
[baxter - http://localhost:11311] harman@D104-45931:~/baxter1_ws$ rostopic echo /robot/limb/left/endpoint_state/pose -n1
```

```
position:
```

```
  x: 0.579687638461
```

```
  y: 0.183309445328
```

```
  z: 0.113681798132
```

```
orientation:
  x: 0.140765807416
  y: 0.989646583146
  z: 0.0116585937126
  w: 0.0254696902617
```

---

So Baxter's left gripper endpoint is out about 0.6 meters in x and to the left about 0.2 meters. The z position is raised about 0.1 meter from z=0.

TO FIX BAXTER'S POSE (UNTUCK ARMS)

```
[baxter - http://localhost:11311] harman@D104-45931:~/baxter1_ws$ roslaunch baxter_tools  
tuck_arms.py -u
```

```
[INFO] [1604273740.992647, 0.000000]: Untucking arms
```

```
[INFO] [1604273741.165170, 1153.118000]: Moving head to neutral position
```

```
[INFO] [1604273741.165766, 1153.119000]: Untucking: Arms already Untucked; Moving to  
neutral position.
```

```
[INFO] [1604273742.068967, 1153.964000]: Finished tuck
```

## 8. Wobbling Arms Page 265

```
[baxter - http://localhost:11311] harman@D104-45931:~/baxter1_ws$ roslaunch baxter_examples  
joint_velocity_wobbler.py
```

```
Initializing node...
```

```
Getting robot state...
```

```
Enabling robot...
```

```
[INFO] [1635453337.201106, 2738.384000]: Robot Enabled
```

```
Moving to neutral pose...
```

```
Wobbling. Press Ctrl-C to stop...
```

```
^C
```



```
[baxter - http://localhost:11311] harman@D104-45931:~/baxter1_ws$ rosrun baxter_tools  
tuck_arms.py -u
```

```
[INFO] [1635453396.249578, 0.000000]: Untucking arms
```

```
[INFO] [1635453396.441329, 2797.128000]: Moving head to neutral position
```

```
[INFO] [1635453397.033493, 2797.715000]: Untucking: Arms already Untucked; Moving to neutral  
position.
```

```
[INFO] [1635453397.738868, 2798.415000]: Finished tuck
```

## 9. Keyboard Control of arms and gripper Page 266

```
[baxter - http://localhost:11311] harman@D104-45931:~/baxter1_ws$ rosrun baxter_examples  
joint_position_keyboard.py
```

```
Initializing node...
```

```
Getting robot state...
```

```
Enabling robot...
```

```
[INFO] [1635453602.819556, 3002.176000]: Robot Enabled
```

```
Controlling joints. Press ? for help, Esc to quit.
```

```
key bindings:
```

```
Esc: Quit
```

```
?: Help
```

```
/: left: gripper calibrate
```

```
,: left: gripper close
```

```
m: left: gripper open
```

```
y: left_e0 decrease
```

```
o: left_e0 increase
```

```
u: left_e1 decrease
```

```
i: left_e1 increase
```

```
6: left_s0 decrease
```

```
9: left_s0 increase
```

```
7: left_s1 decrease
```

```
8: left_s1 increase
```

```
h: left_w0 decrease
```

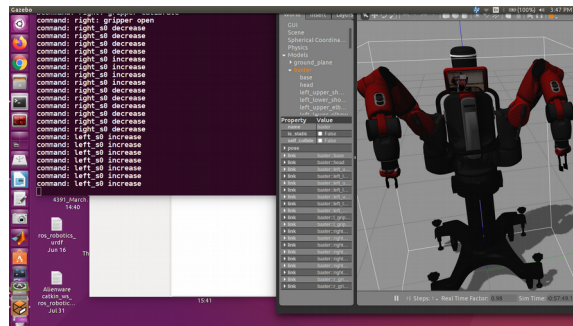
```
l: left_w0 increase
```

```
j: left_w1 decrease
```

k: left\_w1 increase  
 n: left\_w2 decrease  
 .: left\_w2 increase  
 b: right: gripper calibrate  
 c: right: gripper close  
 x: right: gripper open  
 q: right\_e0 decrease  
 r: right\_e0 increase  
 w: right\_e1 decrease  
 e: right\_e1 increase  
 1: right\_s0 decrease  
 4: right\_s0 increase  
 2: right\_s1 decrease  
 3: right\_s1 increase  
 a: right\_w0 decrease  
 f: right\_w0 increase  
 s: right\_w1 decrease  
 d: right\_w1 increase  
 z: right\_w2 decrease  
 v: right\_w2 increase

## Play a bit

bcommand: right: gripper calibrate    b  
 command: right: gripper open        c, x  
 command: right\_s0 decrease         1  
 command: right\_s0 decrease  
 command: right\_s0 decrease  
 command: right\_s0 decrease  
 command: right\_s0 increase         4  
 command: right\_s0 increase  
 command: right\_s0 increase  
 command: right\_s0 increase  
 command: right\_s0 decrease



## 10. JOYSTICK CONTROL Page 267

Terminal 1

```
[baxter - http://localhost:11311] harman@D104-45931:~/baxter1_ws$ rospack find joy
```

```
/opt/ros/kinetic/share/joy
```

```
harman@D104-45931:~$ cd /home/harman/baxter1_ws
```

```
harman@D104-45931:~/baxter1_ws$ ./baxter.sh sim
```

```
Baxter Simulator cd /home/harman/baxter1_ws ./baxter.sh sim
```

Terminal 2

```
$ cd ~/baxter1_ws
```

```
$ ./baxter.sh sim
```

```
[baxter - http://localhost:11311] harman@D104-45931:~/baxter1_ws$ roslaunch baxter_gazebo baxter_world.launch
```

Terminal 1 Again

```
[baxter - http://localhost:11311] harman@D104-45931:~/baxter1_ws$ roslaunch baxter_examples joint_position_joystick.launch joystick:=xbox
```

```
... logging to /home/harman/.ros/log/67192136-1c88-11eb-a6cd-9cb6d00f6f89/roslaunch-D104-45931-27459.log
```

```
Checking log directory for disk usage. This may take awhile.
```

```
Press Ctrl-C to interrupt
```

```
Done checking log file disk usage. Usage is <1GB.
```

```
started roslaunch server http://localhost:34852/
```

Terminal 3: harman@D104-45931:~\$ **lsusb**

```
Bus 002 Device 002: ID 05e3:0626 Genesys Logic, Inc.
```

```
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
```

```
Bus 001 Device 006: ID 046d:c52b Logitech, Inc. Unifying Receiver
```

```
Bus 001 Device 005: ID 1bcf:2b8c Sunplus Innovation Technology Inc.
```

```
Bus 001 Device 004: ID 0cf3:e301 Atheros Communications, Inc.
```

```
Bus 001 Device 003: ID 187c:0528 Alienware Corporation
```

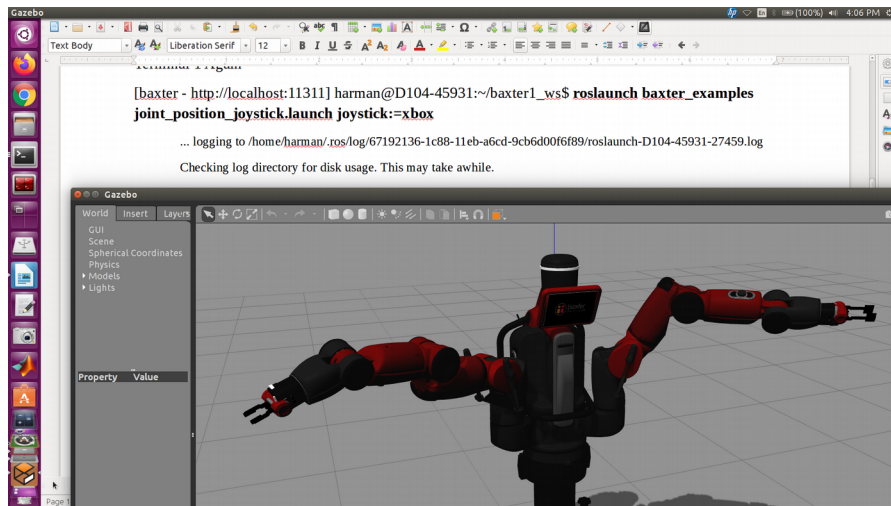
```
Bus 001 Device 007: ID 0781:55a5 SanDisk Corp.
```

```
Bus 001 Device 008: ID 045e:028e Microsoft Corp. Xbox360 Controller
```

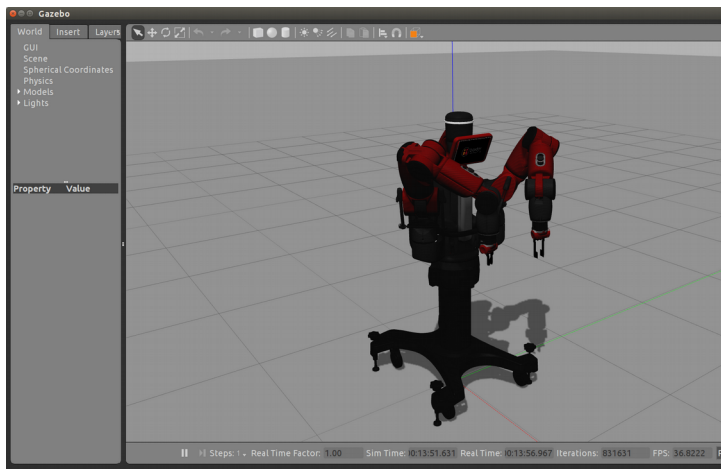
```
Bus 001 Device 002: ID 05e3:0610 Genesys Logic, Inc. 4-port hub
```

```
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub .
```

NOTE: joystick mapping left = robot right! Page 269



## 11. PYTHON HOME ARMS Page 270



```
$ cd ~/baxter1_ws    $ ./baxter.sh sim
```

```
[baxter - http://localhost:11311] harman@D104-45931:~/baxter1_ws$ roslaunch baxter_gazebo
baxter_world.launch
```

**Python home\_arms.py code – values from joint\_states.**

```
[baxter - http://localhost:11311] harman@D104-45931:~/baxter1_ws$ ls -la
```

```
total 88
```

```
-rwxr-xr-x 1 harman harman 899 Sep 22 2017 home_arms.py ($ chmod +x home_arms.py if not executable)
```

```
[baxter - http://localhost:11311] harman@D104-45931:~/baxter1_ws$ python home_arms.py
```

## SOMETIMES AN ERROR: KEEP TRYING: Traceback (most recent call last):

```
File "home_arms.py", line 17, in <module>
    limb_right = baxter_interface.Limb('right')
File "/home/harman/baxter1_ws/src/baxter_interface/src/baxter_interface/limb.py", line 121, in __init__
    timeout_msg=err_msg)
File "/home/harman/baxter1_ws/src/baxter_interface/src/baxter_dataflow/wait_for.py", line 55, in wait_for
    raise OSError(errno.ETIMEDOUT, timeout_msg)
OSError: [Errno 110] Right limb init failed to get current joint_states from robot/joint_states
[baxter - http://localhost:11311] harman@D104-45931:~/baxter1_ws$ python home_arms.py
-----
```

## #!/usr/bin/env python

```
"""
```

```
Script to return Baxter's arms to a "home" position
```

```
"""
```

```
# rospy - ROS Python API
```

```
import rospy
```

```
# baxter_interface - Baxter Python API
```

```
import baxter_interface
```

```
# initialize our ROS node, registering it with the Master
```

```
rospy.init_node('Home_Arms')
```

```
# create instances of baxter_interface's Limb class
```

```
limb_right = baxter_interface.Limb('right')
```

```
limb_left = baxter_interface.Limb('left')
```

```
# store the home position of the arms (Page 275 in Textbook)
```

```
home_right = {'right_s0': 0.08, 'right_s1': -1.00, 'right_w0': -0.67, 'right_w1': 1.03, 'right_w2': 0.50,
'right_e0': 1.18, 'right_e1': 1.94}
```

```
home_left = {'left_s0': -0.08, 'left_s1': -1.00, 'left_w0': 0.67, 'left_w1': 1.03, 'left_w2': -0.50, 'left_e0': -
1.18, 'left_e1': 1.94}
```

```
# move both arms to home position
```

```
limb_right.move_to_joint_positions(home_right)
limb_left.move_to_joint_positions(home_left)
quit()
```

## PYTHONPATH

```
[baxter - http://localhost:11311] harman@D104-45931:~/baxter1_ws$ echo $PYTHONPATH
```

```
/home/harman/baxter1_ws/devel/lib/python2.7/dist-packages:/opt/baxter_ws/devel/lib/python2.7/dist-packages:/
home/harman/crazyflie_ws/devel/lib/python2.7/dist-packages:/home/harman/bebop_ws/devel/lib/python2.7/dist-
packages:/home/harman/catkin_ws/devel/lib/python2.7/dist-packages:/opt/ros/kinetic/lib/python2.7/dist-packages
```

## See text Pages 273-277 for joint\_states and gazebo pose

```
[baxter - http://localhost:11311] harman@D104-45931:~/baxter1_ws$ rostopic echo
robot/joint_states -n1
```

```
header:
```

```
seq: 55901
```

```
stamp:
```

```
secs: 1118
```

```
nsecs: 938000000
```

```
frame_id: "
```

```
name: [head_pan, l_gripper_l_finger_joint, l_gripper_r_finger_joint, left_e0, left_e1, left_s0,
```

```
left_s1, left_w0, left_w1, left_w2, r_gripper_l_finger_joint, r_gripper_r_finger_joint,
```

```
right_e0, right_e1, right_s0, right_s1, right_w0, right_w1, right_w2] (Check with Python value 0.08)
```

```
position: [-0.00017412642409198043, -9.417495390555265e-09, -0.0208330074779536, -1.1750379092243133,
1.934584384361985, -0.07904961056608073, -0.9913576316593868, 0.6662768593171995,
1.0264268813087734, -0.4981715150271997, 0.020833007190887216, 1.9351244856751757e-09,
1.1743668013689694, 1.9373915775489419, 0.07893089013766819, -0.9914137213894332, -
0.6716549857362981, 1.02664705685911, 0.49816465159121837]
```

```
velocity: [1.0827040497440407e-07, 2.4002445132859748e-06, 1.99945001739601e-06, -5.290571670067413e-
07, 1.4472517506731495e-07, 6.215613340624417e-08, 2.9064254221816755e-07, 9.73520988666444e-07, -
2.66869246839575e-09, -1.7641713941301299e-06, -9.227707631954905e-07, -7.930258285815091e-07,
5.780854469511871e-07, 3.2466356538602204e-07, -1.1420763122988756e-07, 1.1662726631094307e-07, -
2.2264951356084183e-06, 3.7105486397083866e-07, 3.31130444973210522e-06]
```

```
effort: [0.0, 0.0, 0.0, -1.0576898450502803, -0.5194896595530629, -1.0298792929575029e-05, -
12.34229306770196, 0.001757365825074686, -0.007707012517279566, -0.0002722120387943505, 0.0, 0.0,
9.272990854980456, -10.481103250217227, -2.541699091196392e-05, -24.23523810001882,
0.07530838333376977, 0.06524344081625166, -0.00028653984681881184]
```

## 12. Arms\_to\_zero\_angles.py Page 279

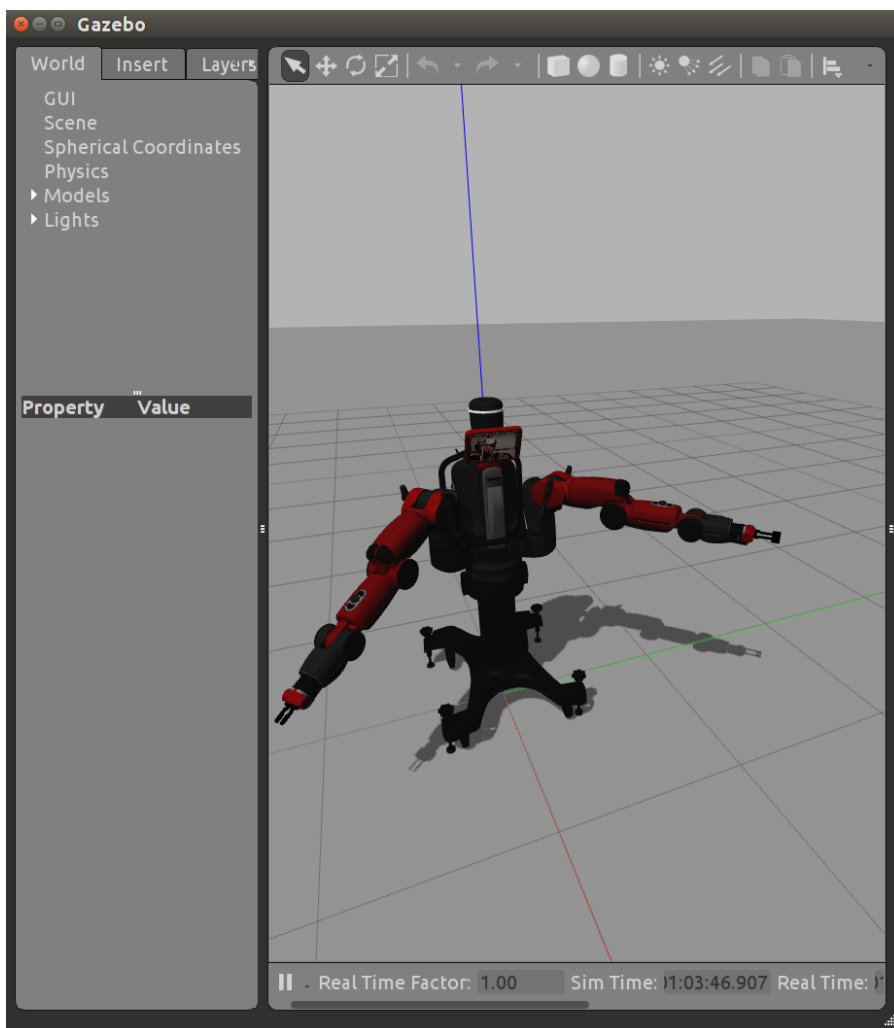
Be sure Baxter is enabled and Gazebo shows Baxter. My arms\_to\_zero\_angles.py is on my Desktop. Note ~/Desktop is home/harman/Desktop.

```
harman@D104-45931:~/Desktop$ ls -la | grep .py
```

```
-rw-r--r-- 1 harman harman 936 Aug 1 2017 arms_to_zero_angles.py
-rw-rw-r-- 1 harman harman 179450 Oct 27 2019 HappyHalloween_from 2019-10-27 13-45-45.png
-rwxr-xr-x 1 harman harman 899 Sep 22 2017 home_arms.py
```

Executing a python script that is not part of a package. It finds the code and links to the baxter modules because of the PYTHONPATH variable.

```
[baxter - http://localhost:11311] harman@D104-45931:~/baxter1_ws$ python
~/Desktop/arms_to_zero_angles.py (TRY, TRY Again!!)
```



```
[baxter - http://localhost:11311] harman@D104-45931:~/baxter1_ws$ rostopic echo /robot/joint_states -n1
```

**See Page 280-281 All about zero.**

```
name: [head_pan, l_gripper_l_finger_joint, l_gripper_r_finger_joint, left_e0, left_e1, left_s0,
left_s1, left_w0, left_w1, left_w2, r_gripper_l_finger_joint, r_gripper_r_finger_joint,
right_e0, right_e1, right_s0, right_s1, right_w0, right_w1, right_w2]
position: [0.00113280043242181, 0.020833024545425512, 4.1047238018625864e-08, -
0.005049486247003188, 0.008546329146239096, -0.0003422574838536363, -0.0020230202
```

## Find position of left gripper endpoint

```
[baxter - http://localhost:11311] harman@D104-45931:~/baxter1_ws$ rostopic echo /robot/limb/left/endpoint_state/pose -n1:
```

```
x: 0.907118578233
y: 1.10470525424
z: 0.308067221664
orientation:
x: -0.273506200049
y: 0.657059772773
z: 0.268700922538
w: 0.649050558713
```

---

**From the Desktop – because of the Environment variables:**

```
harman@D104-45931:~/Desktop$ rostopic echo /robot/limb/left/endpoint_state/pose -n1
```

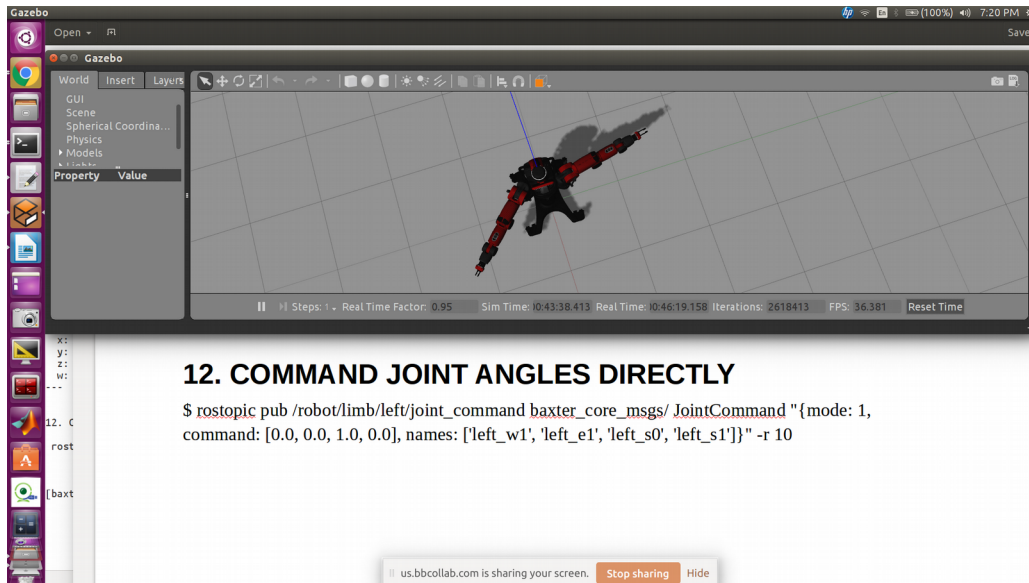
```
position:
x: 0.90957844695
y: 1.10342782955
z: 0.31494711398
orientation:
x: -0.273399045461
y: 0.656382989787
z: 0.267545960205
w: 0.65025648158
```

(About the same – run a year later)



## 13. COMMAND JOINT ANGLES DIRECTLY (281)

```
$ rostopic pub /robot/limb/left/joint_command baxter_core_msgs/JointCommand "{mode: 1, command: [0.0, 0.0, 1.0, 0.0], names: ['left_w1', 'left_e1', 'left_s0', 'left_s1']}" -r 10
```



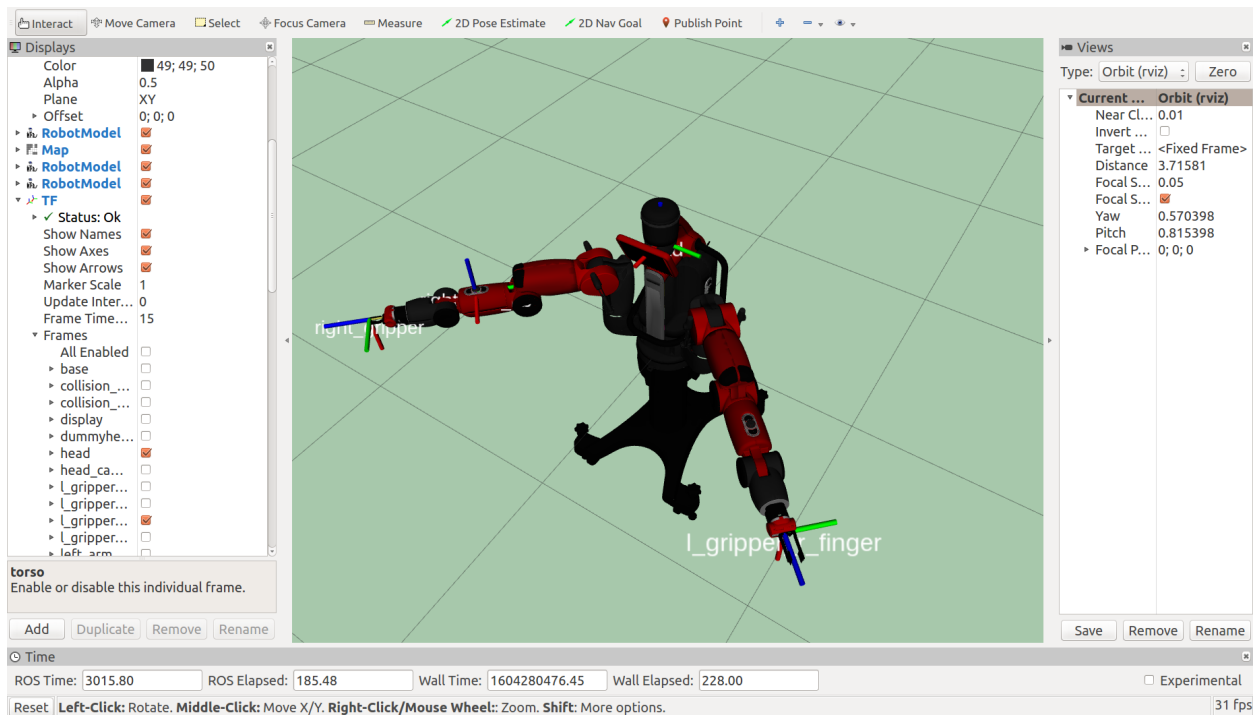
## 14. RVIZ and TF frames Page 282, 283

```
harman@D104-45931:~/Desktop$ rosrund rviz rviz
```

```
[ INFO ] [1635532754.293416536]: rviz version 1.12.17
[ INFO ] [1635532754.293467185]: compiled against Qt version 5.5.1
[ INFO ] [1635532754.293479292]: compiled against OGRE version 1.9.0 (Ghadamon)
[ INFO ] [1635532754.901613662, 2249.922000000]: Stereo is NOT SUPPORTED
[ INFO ] [1635532754.901826658, 2249.922000000]: OpenGL version: 3 (GLSL 1.3).
```

ADD TO RVIZ: Fixed Frame: base; Displays > Robot Model and TF

IN LEFT PANEL: CHANGE TF AND FRAMES TO JUST SHOW A FEW AXES.



```
harman@D104-45931:~/Desktop$ rosrn tf view_frames
```

```
Listening to /tf for 5.000000 seconds
```

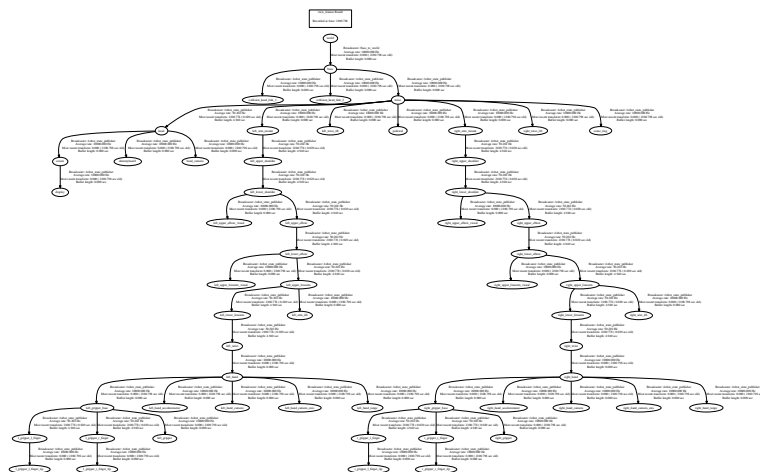
```
Done Listening
```

```
dot - graphviz version 2.38.0 (20140413.2041)
```

```
Detected dot version 2.38
```

```
frames.pdf generated
```

```
harman@D104-45931:~/Desktop$ evince frames.pdf
```



## 15 COMMANDING JOINT TORQUE SPRINGS Page 295

```
roslaunch baxter_examples joint_torque_springs.py -l <right or left>
```

```
roslaunch rqt_reconfigure rqt_reconfigure [baxter - http://localhost:11311]
```

```
harman@D104-45931:~/baxter1_ws$ roslaunch baxter_examples int_torque_springs.py -l right
```

```
  Initializing node...
```

```
  Getting robot state...
```

```
  Enabling robot...
```

```
[INFO] [1604281050.426459, 3496.004000]: Robot Enabled
```

```
  Running. Ctrl-c to quit
```

```
NEW TERMINAL
```

# APPENDIX

## The Launch of Baxter Sim - Output

### harman@D104-45931:~\$ roslaunch baxter\_gazebo baxter\_world.launch

```
... logging to /home/harman/.ros/log/416bb606-13e1-11eb-92ab-9cb6d00f6f89/roslaunch-D104-45931-24590.log
Checking log directory for disk usage. This may take awhile.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.
```

```
started roslaunch server http://D104-45931:34675/
```

#### SUMMARY

```
=====
```

#### PARAMETERS

```
* /baxter_emulator/left_gripper_type: ELECTRIC_GRIPPER
* /baxter_emulator/right_gripper_type: ELECTRIC_GRIPPER
* /grav_left_name: left_gripper
* /grav_right_name: right_gripper
* /left_tip_name: left_gripper
* /rethink/software_version: 1.2.0
* /right_tip_name: right_gripper
* /robot/head_position_controller/joints/head_controller/joint: head_pan
* /robot/head_position_controller/joints/head_controller/pid/d: 5.0
* /robot/head_position_controller/joints/head_controller/pid/i: 0.01
* /robot/head_position_controller/joints/head_controller/pid/p: 10.0
* /robot/head_position_controller/topic: /robot/head/comma...
* /robot/head_position_controller/type: baxter_sim_contro...
* /robot/joint_state_controller/publish_rate: 50
* /robot/joint_state_controller/type: joint_state_contr...
* /robot/left_e0_position_controller/joint: left_e0
* /robot/left_e0_position_controller/pid/d: 1
* /robot/left_e0_position_controller/pid/i: 35
* /robot/left_e0_position_controller/pid/p: 4500
* /robot/left_e0_position_controller/type: effort_controller...
* /robot/left_e1_position_controller/joint: left_e1
* /robot/left_e1_position_controller/pid/d: 2
* /robot/left_e1_position_controller/pid/i: 60
* /robot/left_e1_position_controller/pid/p: 5500
* /robot/left_e1_position_controller/type: effort_controller...
* /robot/left_gripper_controller/joints/l_gripper_l_finger_controller/joint: l_gripper_l_finge...
* /robot/left_gripper_controller/joints/l_gripper_l_finger_controller/pid/d: 0.01
* /robot/left_gripper_controller/joints/l_gripper_l_finger_controller/pid/i: 0.1
* /robot/left_gripper_controller/joints/l_gripper_l_finger_controller/pid/p: 1000
* /robot/left_gripper_controller/joints/l_gripper_r_finger_controller/joint: l_gripper_r_finge...
* /robot/left_gripper_controller/joints/l_gripper_r_finger_controller/pid/d: 0.01
* /robot/left_gripper_controller/joints/l_gripper_r_finger_controller/pid/i: 0.1
```

```

* /robot/left_gripper_controller/joints/l_gripper_r_finger_controller/pid/p: 1000
* /robot/left_gripper_controller/properties: /robot/end_effect...
* /robot/left_gripper_controller/topic: /robot/end_effect...
* /robot/left_gripper_controller/type: baxter_sim_contro...
* /robot/left_joint_effort_controller/joints/left_e0_controller/joint: left_e0
* /robot/left_joint_effort_controller/joints/left_e1_controller/joint: left_e1
* /robot/left_joint_effort_controller/joints/left_s0_controller/joint: left_s0
* /robot/left_joint_effort_controller/joints/left_s1_controller/joint: left_s1
* /robot/left_joint_effort_controller/joints/left_w0_controller/joint: left_w0
* /robot/left_joint_effort_controller/joints/left_w1_controller/joint: left_w1
* /robot/left_joint_effort_controller/joints/left_w2_controller/joint: left_w2
* /robot/left_joint_effort_controller/topic: /robot/limb/left/...
* /robot/left_joint_effort_controller/type: baxter_sim_contro...
* /robot/left_joint_position_controller/joints/left_e0_controller/joint: left_e0
* /robot/left_joint_position_controller/joints/left_e0_controller/pid/d: 1
* /robot/left_joint_position_controller/joints/left_e0_controller/pid/i: 35
* /robot/left_joint_position_controller/joints/left_e0_controller/pid/p: 4500
* /robot/left_joint_position_controller/joints/left_e1_controller/joint: left_e1
* /robot/left_joint_position_controller/joints/left_e1_controller/pid/d: 2
* /robot/left_joint_position_controller/joints/left_e1_controller/pid/i: 60
* /robot/left_joint_position_controller/joints/left_e1_controller/pid/p: 5500
* /robot/left_joint_position_controller/joints/left_s0_controller/joint: left_s0
* /robot/left_joint_position_controller/joints/left_s0_controller/pid/d: 25
* /robot/left_joint_position_controller/joints/left_s0_controller/pid/i: 0.01
* /robot/left_joint_position_controller/joints/left_s0_controller/pid/p: 700
* /robot/left_joint_position_controller/joints/left_s1_controller/joint: left_s1
* /robot/left_joint_position_controller/joints/left_s1_controller/pid/d: 100
* /robot/left_joint_position_controller/joints/left_s1_controller/pid/i: 100
* /robot/left_joint_position_controller/joints/left_s1_controller/pid/p: 10000
* /robot/left_joint_position_controller/joints/left_w0_controller/joint: left_w0
* /robot/left_joint_position_controller/joints/left_w0_controller/pid/d: 0.01
* /robot/left_joint_position_controller/joints/left_w0_controller/pid/i: 30
* /robot/left_joint_position_controller/joints/left_w0_controller/pid/p: 1000
* /robot/left_joint_position_controller/joints/left_w1_controller/joint: left_w1
* /robot/left_joint_position_controller/joints/left_w1_controller/pid/d: 0.01
* /robot/left_joint_position_controller/joints/left_w1_controller/pid/i: 0.1
* /robot/left_joint_position_controller/joints/left_w1_controller/pid/p: 900
* /robot/left_joint_position_controller/joints/left_w2_controller/joint: left_w2
* /robot/left_joint_position_controller/joints/left_w2_controller/pid/d: 0.01
* /robot/left_joint_position_controller/joints/left_w2_controller/pid/i: 0.1
* /robot/left_joint_position_controller/joints/left_w2_controller/pid/p: 1000
* /robot/left_joint_position_controller/topic: /robot/limb/left/...
* /robot/left_joint_position_controller/type: baxter_sim_contro...
* /robot/left_joint_velocity_controller/joints/left_e0_controller/joint: left_e0
* /robot/left_joint_velocity_controller/joints/left_e0_controller/pid/d: 0.1
* /robot/left_joint_velocity_controller/joints/left_e0_controller/pid/i: 0.01
* /robot/left_joint_velocity_controller/joints/left_e0_controller/pid/p: 300.0
* /robot/left_joint_velocity_controller/joints/left_e1_controller/joint: left_e1
* /robot/left_joint_velocity_controller/joints/left_e1_controller/pid/d: 0.1
* /robot/left_joint_velocity_controller/joints/left_e1_controller/pid/i: 0.01
* /robot/left_joint_velocity_controller/joints/left_e1_controller/pid/p: 500.0
* /robot/left_joint_velocity_controller/joints/left_s0_controller/joint: left_s0
* /robot/left_joint_velocity_controller/joints/left_s0_controller/pid/d: 0.1
* /robot/left_joint_velocity_controller/joints/left_s0_controller/pid/i: 0.01
* /robot/left_joint_velocity_controller/joints/left_s0_controller/pid/p: 200.0
* /robot/left_joint_velocity_controller/joints/left_s1_controller/joint: left_s1

```

```

* /robot/left_joint_velocity_controller/joints/left_s1_controller/pid/d: 0.1
* /robot/left_joint_velocity_controller/joints/left_s1_controller/pid/i: 0.01
* /robot/left_joint_velocity_controller/joints/left_s1_controller/pid/p: 800.0
* /robot/left_joint_velocity_controller/joints/left_w0_controller/joint: left_w0
* /robot/left_joint_velocity_controller/joints/left_w0_controller/pid/d: 0.1
* /robot/left_joint_velocity_controller/joints/left_w0_controller/pid/i: 0.01
* /robot/left_joint_velocity_controller/joints/left_w0_controller/pid/p: 200.0
* /robot/left_joint_velocity_controller/joints/left_w1_controller/joint: left_w1
* /robot/left_joint_velocity_controller/joints/left_w1_controller/pid/d: 0.1
* /robot/left_joint_velocity_controller/joints/left_w1_controller/pid/i: 0.01
* /robot/left_joint_velocity_controller/joints/left_w1_controller/pid/p: 100.0
* /robot/left_joint_velocity_controller/joints/left_w2_controller/joint: left_w2
* /robot/left_joint_velocity_controller/joints/left_w2_controller/pid/d: 0.1
* /robot/left_joint_velocity_controller/joints/left_w2_controller/pid/i: 0.01
* /robot/left_joint_velocity_controller/joints/left_w2_controller/pid/p: 100.0
* /robot/left_joint_velocity_controller/topic: /robot/limb/left/...
* /robot/left_joint_velocity_controller/type: baxter_sim_contro...
* /robot/left_s0_position_controller/joint: left_s0
* /robot/left_s0_position_controller/pid/d: 25
* /robot/left_s0_position_controller/pid/i: 0.01
* /robot/left_s0_position_controller/pid/p: 700
* /robot/left_s0_position_controller/type: effort_controller...
* /robot/left_s1_position_controller/joint: left_s1
* /robot/left_s1_position_controller/pid/d: 100
* /robot/left_s1_position_controller/pid/i: 100
* /robot/left_s1_position_controller/pid/p: 10000
* /robot/left_s1_position_controller/type: effort_controller...
* /robot/left_w0_position_controller/joint: left_w0
* /robot/left_w0_position_controller/pid/d: 0.01
* /robot/left_w0_position_controller/pid/i: 30
* /robot/left_w0_position_controller/pid/p: 1000
* /robot/left_w0_position_controller/type: effort_controller...
* /robot/left_w1_position_controller/joint: left_w1
* /robot/left_w1_position_controller/pid/d: 0.01
* /robot/left_w1_position_controller/pid/i: 0.1
* /robot/left_w1_position_controller/pid/p: 900
* /robot/left_w1_position_controller/type: effort_controller...
* /robot/left_w2_position_controller/joint: left_w2
* /robot/left_w2_position_controller/pid/d: 0.01
* /robot/left_w2_position_controller/pid/i: 0.1
* /robot/left_w2_position_controller/pid/p: 1000
* /robot/left_w2_position_controller/type: effort_controller...
* /robot/right_e0_position_controller/joint: right_e0
* /robot/right_e0_position_controller/pid/d: 1
* /robot/right_e0_position_controller/pid/i: 35
* /robot/right_e0_position_controller/pid/p: 4500
* /robot/right_e0_position_controller/type: effort_controller...
* /robot/right_e1_position_controller/joint: right_e1
* /robot/right_e1_position_controller/pid/d: 2
* /robot/right_e1_position_controller/pid/i: 60
* /robot/right_e1_position_controller/pid/p: 5500
* /robot/right_e1_position_controller/type: effort_controller...
* /robot/right_gripper_controller/joints/r_gripper_l_finger_controller/joint: r_gripper_l_finge...
* /robot/right_gripper_controller/joints/r_gripper_l_finger_controller/pid/d: 0.01
* /robot/right_gripper_controller/joints/r_gripper_l_finger_controller/pid/i: 0.1
* /robot/right_gripper_controller/joints/r_gripper_l_finger_controller/pid/p: 1000

```

```

* /robot/right_gripper_controller/joints/r_gripper_r_finger_controller/joint: r_gripper_r_finge...
* /robot/right_gripper_controller/joints/r_gripper_r_finger_controller/pid/d: 0.01
* /robot/right_gripper_controller/joints/r_gripper_r_finger_controller/pid/i: 0.1
* /robot/right_gripper_controller/joints/r_gripper_r_finger_controller/pid/p: 1000
* /robot/right_gripper_controller/properties: /robot/end_effect...
* /robot/right_gripper_controller/topic: /robot/end_effect...
* /robot/right_gripper_controller/type: baxter_sim_contro...
* /robot/right_joint_effort_controller/joints/right_e0_controller/joint: right_e0
* /robot/right_joint_effort_controller/joints/right_e1_controller/joint: right_e1
* /robot/right_joint_effort_controller/joints/right_s0_controller/joint: right_s0
* /robot/right_joint_effort_controller/joints/right_s1_controller/joint: right_s1
* /robot/right_joint_effort_controller/joints/right_w0_controller/joint: right_w0
* /robot/right_joint_effort_controller/joints/right_w1_controller/joint: right_w1
* /robot/right_joint_effort_controller/joints/right_w2_controller/joint: right_w2
* /robot/right_joint_effort_controller/topic: /robot/limb/right...
* /robot/right_joint_effort_controller/type: baxter_sim_contro...
* /robot/right_joint_position_controller/joints/right_e0_controller/joint: right_e0
* /robot/right_joint_position_controller/joints/right_e0_controller/pid/d: 1
* /robot/right_joint_position_controller/joints/right_e0_controller/pid/i: 35
* /robot/right_joint_position_controller/joints/right_e0_controller/pid/p: 4500
* /robot/right_joint_position_controller/joints/right_e1_controller/joint: right_e1
* /robot/right_joint_position_controller/joints/right_e1_controller/pid/d: 2
* /robot/right_joint_position_controller/joints/right_e1_controller/pid/i: 60
* /robot/right_joint_position_controller/joints/right_e1_controller/pid/p: 5500
* /robot/right_joint_position_controller/joints/right_s0_controller/joint: right_s0
* /robot/right_joint_position_controller/joints/right_s0_controller/pid/d: 100
* /robot/right_joint_position_controller/joints/right_s0_controller/pid/i: 0.01
* /robot/right_joint_position_controller/joints/right_s0_controller/pid/p: 700
* /robot/right_joint_position_controller/joints/right_s1_controller/joint: right_s1
* /robot/right_joint_position_controller/joints/right_s1_controller/pid/d: 100
* /robot/right_joint_position_controller/joints/right_s1_controller/pid/i: 100
* /robot/right_joint_position_controller/joints/right_s1_controller/pid/p: 10000
* /robot/right_joint_position_controller/joints/right_w0_controller/joint: right_w0
* /robot/right_joint_position_controller/joints/right_w0_controller/pid/d: 0.01
* /robot/right_joint_position_controller/joints/right_w0_controller/pid/i: 30
* /robot/right_joint_position_controller/joints/right_w0_controller/pid/p: 1000
* /robot/right_joint_position_controller/joints/right_w1_controller/joint: right_w1
* /robot/right_joint_position_controller/joints/right_w1_controller/pid/d: 0.01
* /robot/right_joint_position_controller/joints/right_w1_controller/pid/i: 0.1
* /robot/right_joint_position_controller/joints/right_w1_controller/pid/p: 900
* /robot/right_joint_position_controller/joints/right_w2_controller/joint: right_w2
* /robot/right_joint_position_controller/joints/right_w2_controller/pid/d: 0.01
* /robot/right_joint_position_controller/joints/right_w2_controller/pid/i: 0.1
* /robot/right_joint_position_controller/joints/right_w2_controller/pid/p: 1000
* /robot/right_joint_position_controller/topic: /robot/limb/right...
* /robot/right_joint_position_controller/type: baxter_sim_contro...
* /robot/right_joint_velocity_controller/joints/right_e0_controller/joint: right_e0
* /robot/right_joint_velocity_controller/joints/right_e0_controller/pid/d: 0.1
* /robot/right_joint_velocity_controller/joints/right_e0_controller/pid/i: 0.01
* /robot/right_joint_velocity_controller/joints/right_e0_controller/pid/p: 300.0
* /robot/right_joint_velocity_controller/joints/right_e1_controller/joint: right_e1
* /robot/right_joint_velocity_controller/joints/right_e1_controller/pid/d: 0.1
* /robot/right_joint_velocity_controller/joints/right_e1_controller/pid/i: 0.01
* /robot/right_joint_velocity_controller/joints/right_e1_controller/pid/p: 500.0
* /robot/right_joint_velocity_controller/joints/right_s0_controller/joint: right_s0
* /robot/right_joint_velocity_controller/joints/right_s0_controller/pid/d: 0.1

```

```

* /robot/right_joint_velocity_controller/joints/right_s0_controller/pid/i: 0.01
* /robot/right_joint_velocity_controller/joints/right_s0_controller/pid/p: 200.0
* /robot/right_joint_velocity_controller/joints/right_s1_controller/joint: right_s1
* /robot/right_joint_velocity_controller/joints/right_s1_controller/pid/d: 0.1
* /robot/right_joint_velocity_controller/joints/right_s1_controller/pid/i: 0.01
* /robot/right_joint_velocity_controller/joints/right_s1_controller/pid/p: 800.0
* /robot/right_joint_velocity_controller/joints/right_w0_controller/joint: right_w0
* /robot/right_joint_velocity_controller/joints/right_w0_controller/pid/d: 0.1
* /robot/right_joint_velocity_controller/joints/right_w0_controller/pid/i: 0.01
* /robot/right_joint_velocity_controller/joints/right_w0_controller/pid/p: 200.0
* /robot/right_joint_velocity_controller/joints/right_w1_controller/joint: right_w1
* /robot/right_joint_velocity_controller/joints/right_w1_controller/pid/d: 0.1
* /robot/right_joint_velocity_controller/joints/right_w1_controller/pid/i: 0.01
* /robot/right_joint_velocity_controller/joints/right_w1_controller/pid/p: 100.0
* /robot/right_joint_velocity_controller/joints/right_w2_controller/joint: right_w2
* /robot/right_joint_velocity_controller/joints/right_w2_controller/pid/d: 0.1
* /robot/right_joint_velocity_controller/joints/right_w2_controller/pid/i: 0.01
* /robot/right_joint_velocity_controller/joints/right_w2_controller/pid/p: 100.0
* /robot/right_joint_velocity_controller/topic: /robot/limb/right...
* /robot/right_joint_velocity_controller/type: baxter_sim_contro...
* /robot/right_s0_position_controller/joint: right_s0
* /robot/right_s0_position_controller/pid/d: 100
* /robot/right_s0_position_controller/pid/i: 0.01
* /robot/right_s0_position_controller/pid/p: 700
* /robot/right_s0_position_controller/type: effort_controller...
* /robot/right_s1_position_controller/joint: right_s1
* /robot/right_s1_position_controller/pid/d: 100
* /robot/right_s1_position_controller/pid/i: 100
* /robot/right_s1_position_controller/pid/p: 10000
* /robot/right_s1_position_controller/type: effort_controller...
* /robot/right_w0_position_controller/joint: right_w0
* /robot/right_w0_position_controller/pid/d: 0.01
* /robot/right_w0_position_controller/pid/i: 30
* /robot/right_w0_position_controller/pid/p: 1000
* /robot/right_w0_position_controller/type: effort_controller...
* /robot/right_w1_position_controller/joint: right_w1
* /robot/right_w1_position_controller/pid/d: 0.01
* /robot/right_w1_position_controller/pid/i: 0.1
* /robot/right_w1_position_controller/pid/p: 900
* /robot/right_w1_position_controller/type: effort_controller...
* /robot/right_w2_position_controller/joint: right_w2
* /robot/right_w2_position_controller/pid/d: 0.01
* /robot/right_w2_position_controller/pid/i: 0.1
* /robot/right_w2_position_controller/pid/p: 1000
* /robot/right_w2_position_controller/type: effort_controller...
* /robot_config/left_config/joint_names: ['left_s0', 'left...
* /robot_config/right_config/joint_names: ['right_s0', 'rig...
* /robot_description: <?xml version="1....
* /root_name: base
* /rostdistro: kinetic
* /rosversion: 1.12.16
* /use_sim_time: True

```

## NODES

```

/
  base_to_world (tf2_ros/static_transform_publisher)

```



```

baxter_emulator (baxter_sim_hardware/baxter_emulator)
baxter_sim_io (baxter_sim_io/baxter_sim_io)
baxter_sim_kinematics_left (baxter_sim_kinematics/kinematics)
baxter_sim_kinematics_right (baxter_sim_kinematics/kinematics)
gazebo (gazebo_ros/gzserver)
gazebo_gui (gazebo_ros/gzclient)
robot_state_publisher (robot_state_publisher/robot_state_publisher)
urdf_spawner (gazebo_ros/spawn_model)
/robot/
controller_spawner (controller_manager/controller_manager)
controller_spawner_stopped (controller_manager/controller_manager)
left_gripper_controller_spawner_stopped (controller_manager/controller_manager)
right_gripper_controller_spawner_stopped (controller_manager/controller_manager)

auto-starting new master
process[master]: started with pid [24606]
ROS_MASTER_URI=http://localhost:11311

setting /run_id to 416bb606-13e1-11eb-92ab-9cb6d00f6f89
process[rosout-1]: started with pid [24619]
started core service [/rosout]
process[gazebo-2]: started with pid [24622]
process[gazebo_gui-3]: started with pid [24624]
process[base_to_world-4]: started with pid [24632]
process[urdf_spawner-5]: started with pid [24633]
ERROR: cannot launch node of type [baxter_sim_kinematics/kinematics]: can't locate node [kinematics] in
package [baxter_sim_kinematics]
ERROR: cannot launch node of type [baxter_sim_kinematics/kinematics]: can't locate node [kinematics] in
package [baxter_sim_kinematics]
ERROR: cannot launch node of type [baxter_sim_hardware/baxter_emulator]: can't locate node [baxter_emulator]
in package [baxter_sim_hardware]
process[robot/controller_spawner-9]: started with pid [24634]
process[robot/controller_spawner_stopped-10]: started with pid [24635]
process[robot/left_gripper_controller_spawner_stopped-11]: started with pid [24636]
process[robot/right_gripper_controller_spawner_stopped-12]: started with pid [24637]
process[robot_state_publisher-13]: started with pid [24638]
ERROR: cannot launch node of type [baxter_sim_io/baxter_sim_io]: can't locate node [baxter_sim_io] in package
[baxter_sim_io]
INFO: cannot create a symlink to latest log directory: [Errno 2] No such file or directory:
'/home/harman/.ros/log/latest'
[ INFO] [1603314383.041511420]: Finished loading Gazebo ROS API Plugin.
[ INFO] [1603314383.042031522]: waitForService: Service [/gazebo/set_physics_properties] has not been
advertised, waiting...
[ INFO] [1603314383.056191280]: Finished loading Gazebo ROS API Plugin.
[ INFO] [1603314383.056870155]: waitForService: Service [/gazebo/set_physics_properties] has not been
advertised, waiting...
SpawnModel script started
[INFO] [1603314383.861011, 0.000000]: Loading model XML from ros parameter
[INFO] [1603314383.866493, 0.000000]: Waiting for service /gazebo/spawn_urdf_model
[INFO] [1603314384.472249, 0.000000]: Calling service /gazebo/spawn_urdf_model
[ INFO] [1603314384.487040518]: waitForService: Service [/gazebo/set_physics_properties] is now available.
[ INFO] [1603314384.487333417]: waitForService: Service [/gazebo/set_physics_properties] is now available.
Warning [parser_urdf.cc:1232] multiple inconsistent <self_collide> exists due to fixed joint reduction overwriting
previous value [true] with [false].
[ INFO] [1603314385.029967779, 0.193000000]: Block laser plugin missing <hokuyoMinIntensity>, defaults to
101

```

```
[ INFO] [1603314385.411488578, 0.193000000]: Camera Plugin: Using the 'robotNamespace' param: '/cameras'
[ INFO] [1603314385.414721943, 0.193000000]: Camera Plugin: Using the 'robotNamespace' param: '/cameras'
[ INFO] [1603314385.491201832, 0.193000000]: Camera Plugin (ns = /cameras) <tf_prefix_>, set to "/cameras"
[ INFO] [1603314385.491940625, 0.193000000]: Camera Plugin (ns = /cameras) <tf_prefix_>, set to "/cameras"
[ INFO] [1603314385.519694373, 0.193000000]: Laser Plugin: Using the 'robotNamespace' param: '/'
[ INFO] [1603314385.519817469, 0.193000000]: Starting Laser Plugin (ns = /)
[ INFO] [1603314385.562244261, 0.193000000]: Laser Plugin (ns = /) <tf_prefix_>, set to ""
[ INFO] [1603314385.859133287, 0.193000000]: Camera Plugin: Using the 'robotNamespace' param: '/cameras'
[ INFO] [1603314385.860583515, 0.193000000]: Laser Plugin: Using the 'robotNamespace' param: '/'
[ INFO] [1603314385.860664008, 0.193000000]: Starting Laser Plugin (ns = /)
[ INFO] [1603314385.862365914, 0.193000000]: Laser Plugin (ns = /) <tf_prefix_>, set to ""
[ INFO] [1603314385.865374412, 0.193000000]: Camera Plugin (ns = /cameras) <tf_prefix_>, set to "/cameras"
[INFO] [1603314385.874638, 0.193000]: Spawn status: SpawnModel: Successfully spawned entity
[INFO] [1603314385.874974, 0.193000]: Waiting for service /gazebo/set_model_configuration
[INFO] [1603314385.877799, 0.193000]: temporary hack to fix the -J joint position option (issue #93),
sleeping for 1 second to avoid race condition.
[ INFO] [1603314385.898709399]: Physics dynamic reconfigure ready.
[ INFO] [1603314385.907457054, 0.193000000]: Physics dynamic reconfigure ready.
Warning [parser.cc:437] Converting a deprecated SDF source[data-string].
[ INFO] [1603314386.329767997, 0.582000000]: GazeboRosVideo (gzserver, ns = /) has started
Warning [parser.cc:437] Converting a deprecated SDF source[data-string].
[ INFO] [1603314386.606410850, 0.859000000]: GazeboRosVideo (gzserver, ns = /) has started
[INFO] [1603314386.879052, 1.130000]: Calling service /gazebo/set_model_configuration
[INFO] [1603314386.883214, 1.134000]: Set model configuration status: SetModelConfiguration: success
[urdf_spawner-5] process has finished cleanly
log file: /home/harman/.ros/log/416bb606-13e1-11eb-92ab-9cb6d00f6f89/urdf_spawner-5*.log
```

## run\_baxter Code

**# This script combines all of the Baxter examples into equivalent python files**

# run\_baxter commands.

#!/bin/bash

echo "Today is `date`"

case "\$1" in

# enable\_robot from baxter\_tools

enable | Enable | ENABLE )

rosrun baxter\_tools enable\_robot.py -e

;;

disable | Disable | DISABLE )

rosrun baxter\_tools enable\_robot.py -d

;;

state | State | STATE )

rosrun baxter\_tools enable\_robot.py -s

;;

reset | Reset | RESET )

rosrun baxter\_tools enable\_robot.py -r

;;

stop | Stop | STOP )

rosrun baxter\_tools enable\_robot.py -S

;;

# The following options will open a new terminal window and execute the command.

# tuck\_arms from baxter\_tools

tuck | Tuck | TUCK )

rosrun baxter\_tools tuck\_arms.py -t

# xterm -hold -e "rosrun baxter\_tools tuck\_arms.py -t"

;;

untuck | Untuck | UNTUCK )

rosrun baxter\_tools tuck\_arms.py -u

```

# xterm -hold -e "roslaunch baxter_tools tuck_arms.py -u"
#gnome-terminal -e "roslaunch baxter_tools tuck_arms.py -u" -- did not work
;;

# joint commands from baxter_examples
arms_keyboard | ARMS_KEYBOARD )
    xterm -hold -e "roslaunch baxter_examples joint_position_keyboard.py"
    ;;

record | RECORD )
    if [ -n "$2" ]; then      # check if second argument is passed
        xterm -hold -e "roslaunch baxter_examples joint_recorder.py -f $2"
    else
        echo "No Filename given."
    fi
    ;;

playback | PLAYBACK )
    if [ -r "$2" ]; then      # check that file exists and is readable
        xterm -hold -e "roslaunch baxter_examples joint_position_file_playback.py -f $2"
    else
        echo "No Filename given or file does not exist."
    fi
    ;;

# joint torque command from baxter_examples
springs | Springs | SPRINGS )
    if [ "$2" == left -o "$2" == right ]; then
        xterm -hold -e "roslaunch baxter_examples joint_torque_springs.py -l $2"
    else
        echo "Specify right or left."
    fi

```

```

;;

arms_wobbler | Arms_Wobbler | ARMS_WOBBLER | \
arm_wobbler | Arm_Wobbler | ARM_WOBBLER | wobbler )
    xterm -hold -e "roslaunch baxter_examples joint_velocity_wobbler.py"
;;

puppet | Puppet | PUPPET )
    if [ "$2" == left -o "$2" == right ]; then
        xterm -hold -e "roslaunch baxter_examples joint_velocity_puppet.py -l $2"
    else
        echo "Specify right or left."
    fi
;;

# call on-board Inverse Kinematics (IK) service to obtain joint angle solution
# for a given endpoint Cartesian point & orientation
ik | IK )
    if [ "$2" == left -o "$2" == right ]; then
        xterm -hold -e "roslaunch baxter_examples ik_service_client.py -l $2"
    else
        echo "Specify right or left."
    fi
;;

# enable robot joint trajectory interface using joint trajectory controller
# another terminal session can execute a client to send a joint trajectory
# to the right or left arm
joint_traj* | Joint_Traj* | JOINT_TRAJ* )
    if [ "$2" == left -o "$2" == right ]; then
        xterm -hold -e "roslaunch baxter_interface joint_trajectory_action_server.py" &
        roslaunch baxter_examples joint_trajectory_client.py -l $2
    fi
;;

```

```

else
    echo "Specify right or left."
fi
;;

# head_wobbler randomly nods and tilts head
head_wobbler | Head_Wobbler | HEAD_WOBBLER )
    xterm -hold -e "roslaunch baxter_examples head_wobbler.py"
;;

# gripper_keyboard uses keyboard to control grippers
gripper_keyboard | Gripper_Keyboard | GRIPPER_KEYBOARD )
    xterm -hold -e "roslaunch baxter_examples gripper_keyboard.py"
;;

#-----
# camera control tool
camera | Camera | CAMERA )

    roslaunch baxter_tools camera_control.py -c right_hand_camera
    roslaunch baxter_tools camera_control.py -c left_hand_camera
    roslaunch baxter_tools camera_control.py -c head_camera

shift

key="$1"

case $key in
    open | Open | OPEN )

        shift
        roslaunch baxter_tools camera_control.py -c right_hand_camera
        roslaunch baxter_tools camera_control.py -c left_hand_camera

```

```

rosrun baxter_tools camera_control.py -c head_camera
RESOLUTION=1280x800          # default resolution

case "$1" in
    right | Right | RIGHT )
        CAMERA=right_hand_camera
        ;;
    left | Left | LEFT )
        CAMERA=left_hand_camera
        ;;
    head | Head | HEAD )
        CAMERA=head_camera
        ;;
    * )
        echo "Camera not specified."
        echo "open <right, left or head>"
        exit
        ;;
esac
shift

# if there are more parameters on the command line do the next steps
while [[ $# > 1 ]];
do

case "$1" in
    res | Res | RES )

        shift

        case "$1" in
            wide | Wide | WIDE )

```

```

        RESOLUTION=1280x800
    ;;
    medium | Medium | MEDIUM )
        RESOLUTION=480x300
    ;;
    narrow | Narrow | NARROW )
        RESOLUTION=320x200
    ;;
    * )
        echo "Resolution not specified."
        echo "res <wide, medium or narrow>"
        exit
    ;;    # for case *
esac

;;    # for case res
esac

done    # end of while loop

roslaunch baxter_tools camera_control.py -o "${CAMERA}" -r "${RESOLUTION}"

# camera image can be displayed on image_view or rviz
# comment out the option you do not want
roslaunch image_view image_view image:=/cameras/"${CAMERA}"/image
#    xterm -hold -e "roslaunch rviz rviz"

;;    # for case open

# close camera
close | Close | CLOSE )

    shift

```



```

case "$1" in
    right | Right | RIGHT )
        CAMERA=right_hand_camera
        ;;
    left | Left | LEFT )
        CAMERA=left_hand_camera
        ;;
    head | Head | HEAD )
        CAMERA=head_camera
        ;;
    * )
        echo "Camera not specified."
        echo "close <right, left or head>"
        exit
        ;;          # for case *
esac

roslaunch baxter_tools camera_control.py -c "${CAMERA}"
;;          # for case close

* ) echo "camera commands:"
    echo "open <right, left or head> res <wide, medium or narrow>"
    echo "close <right, left or head>"
    ;;          # for case *
esac

;;          # for case camera

#-----

# No new terminal window to execute these commands:

# xdisplay_image
# Display an image (e.g. .png or .jpg) to Baxter's head display. Baxter

```

```

# display resolution is 1024 x 600 pixels.
head_display | Head_Display | HEAD_DISPLAY )
  if [ -n "${2}" ]; then
    rosrun baxter_examples xdisplay_image.py --f $2
  else
    echo "No Filename given."
  fi
;;

# digital_io
# This will blink the LED on the Left Navigator on and then off while
# printing the status before and after.
digital_io | Digital_IO | DIGITAL_IO )
  rosrun baxter_examples digital_io_blink.py
;;

# analog_io
# This will run the robot's fans from 0 to 100 and back down again in
# increments of 10.
analog_io | Analog_IO | ANALOG_IO )
  rosrun baxter_examples analog_io_rampup.py
;;

* ) echo "run_baxter commands:"
    echo "enable, disable, state, reset, stop"
    echo "tuck, untuck"

    echo "arms_keyboard, record <filename>, playback <filename>"
    echo "springs <right or left>, arms_wobbler, puppet <right or left>"
    echo "ik <right or left>, joint_trajectory <right or left>"

    echo "camera open <right, left or head> res <wide, medium or narrow>"

```

```
echo "camera close <right, left or head>"

echo "head_wobbler, gripper_keyboard, head_display <filename>"
echo "digital_io, analog_io"
;;
esac

#exit 0 -- using exit will end communication with Baxter –
```

## Baxter Python Code

[https://github.com/RethinkRobotics/baxter\\_examples](https://github.com/RethinkRobotics/baxter_examples)

[https://github.com/RethinkRobotics/baxter\\_examples/tree/master/scripts](https://github.com/RethinkRobotics/baxter_examples/tree/master/scripts)

All the python Scripts

### Example: joint\_velocity wobbler

[https://github.com/RethinkRobotics/baxter\\_examples/blob/master/scripts/joint\\_velocity\\_wobbler.py](https://github.com/RethinkRobotics/baxter_examples/blob/master/scripts/joint_velocity_wobbler.py)

□