Baxter Manual for Simple Demo: Contents

Notes: This manual assumes you will use the Baxter robot set-up at Halmstad University. If you use a different set-up, your steps might look slightly different, but you can probably still get some basic ideas from this manual... Also it is assumed you have the basic demo code (if you do not, you can download it from https://github.com/martincooney, place files (images, sounds, and speech rec.) appropriately, compile with catkin_make, and change the paths in the python file, etc.)

Baxter power button

Preparations

- *Safety.* Make sure the environment with the robot is safe (e.g. there is some space so it will not hit people when it moves).
- *Power.* Turn on power to everything. If you are using a router to connect the robot and desktop, ensure it is turned on, with ethernet cables firmly inserted. Plug in the robot's power cable into some AC socket, and turn on the robot by pressing the power button on its back left side. Turn on the desktop by pressing its power button, and turn on the screen.
- *Desktop.* Log in with id: Turtlebot (ask Martin for password if you don't know).
  Open four terminals with Ctrl-Alt-T or by right-clicking.
  In each terminal, connect to robot:
  ```
  cd ~/ros_ws
  ./baxter.sh
  ```
- *Wait.* Until the robot has finished booting up. It will take about five minutes.
  You will know when it is ready because it will make an irritating clicking noise from the sonar sensors; also the lights on its head will be green and the default Rethink logo will be shown on its screen.
- *Check.* That everything is good by turning off the annoying crackling sonar sensors:
  ```
  rostopic pub -1 /robot/sonar/head_sonar/set_sonars_enabled std_msgs/UInt16 0
  ```
  The robot should now be quieter.
  Also it can be a good idea to check the sound level.
  If you have problems, check the troubleshooting section at the end of this manual.

Demo: Getting the robot to interact

- *Start up* the demo by entering a command into each terminal (order doesn't matter)
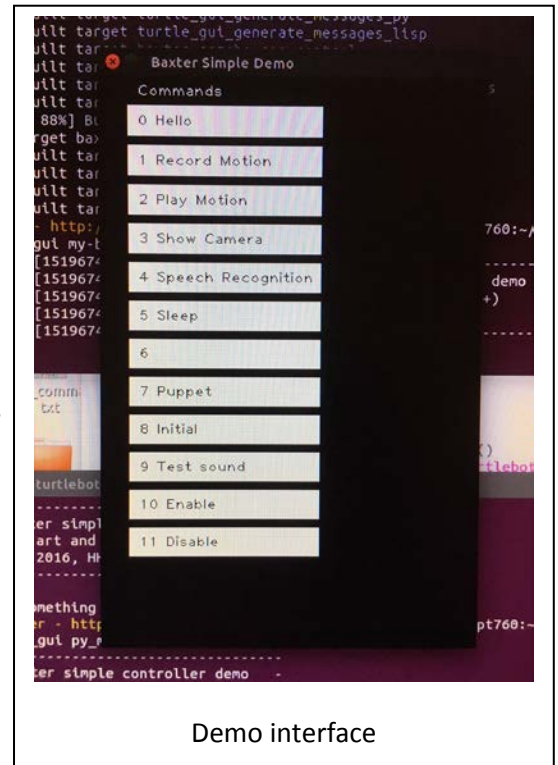 Terminal 1: Start up the soundplay node which will handle requests to play sounds:
  ```
  rosrun sound_play soundplay_node.py
  ```
  Terminal 2: Start up speech recognition (an example recognizing some names of parts):
  ```
  roslaunch pocketsphinx martin_voice_cmd.launch
  ```
  Terminal 3: Start up the python backend:
  ```
  rosrun turtle_gui py_my_simple_baxter_demo
  ```
  Terminal 4: Start up the C++ frontend:
  ```
  rosrun turtle_gui my-baxter-gui-demo
  ```
  You should see a user interface pop up.

- Then *press buttons* on the frontend as you want.
  Basically you can use this code to show a simple
  demo to visitors, like the robot painting, or how the
  robot could help as a teaching assistant.
  Press 0 to make the robot say hello (with speech,
  head/arm movements, and showing a face in its
  display).
  Press 1 and 2 to record and play motions (like for
  painting). To end recording press Ctrl-C in the
  python window then restart the code.
  Press 3 to show/hide camera. You will see images
  from robot's left arm camera in the robot's display.
  Press 4 to start/stop speech recognition. Say "diode"
  and "switch". What does the robot do?
  Press 5 to get the robot to go to sleep at the end of
  the demo.
  Button 6 is empty for you to add a new behavior
  easily.
  Press 7 to get Baxter to show a "puppet" demo
  where you move the robot's right arm and its left
  arm will imitate.
  Button 8 will let you restore the robot to its initial
  pose any time.

Demo interface

  Press 9 to adjust the robot's sound; if you are developing it should probably be pretty quiet,
  but for a real demo it should probably be loud enough to be heard.
  10 and 11 allow you to turn on or off power to the robot's motors at any time.

Closing down
- Make sure you have turned off power to the robot's actuators; if the actuators are still on,
  you can turn them on by pressing the 11 button on the user interface or using the following
  command in a terminal:

  rosrun baxter_tools enable_robot.py –d
- Turn off the computer. Press ctrl-c to stop running nodes, close the terminals, and shutdown.
- Turn off the robot. Press the robot's power button and wait. It takes a few minutes to turn
  off.
- When everything is fully shut-down, you can remove the robot's power plug from the wall,
  and turn off the power strip for the router/desktop.

Congratulations.
You are done!
Hope you had a good demo.

Trouble-shooting:

- An emergency has occurred; the robot is somehow hurting someone or itself.
  Try hit the red emergency button to shut off the robot, ctrl-c programs, call for help, and try to help if you think you will be safe doing so (the robot's actuators are spring-based so you should be able to stop them fairly easily)

- The sonar sensors do not turn off.
  (This is probably because the desktop is not properly connected to the robot.)
  You can also check by running the following command:
    rostopic list
  Which should show much writing if you are properly connected.
  If you are not connected, usually the cause is either (1) that the robot is not finished booting yet or (2) that your computer or the robot has been assigned a different or invalid ip address.
  For (2): check the desktop IP address with ifconfig. Make sure the network is correct.
  Check the robot's IP address by pinging.
  If you don't get through, to find the ip address, you can do various things.
  For example, if you have an idea what the IP address might be you can just ping around until you find something which works, or you can log in to the router (ask martin for password).
  When you know what the IP address should be:
  ```
  sudo nano ~/.baxter.sh
  ```
  and change the ip address
  then try again: close the current terminal, open a _new_ terminal, then cd ros_ws, ./baxter.sh, rostopic list
  If you change /etc/network/interfaces, you can reboot.
  Also check the physical ethernet connections. When the robot moves sometimes cables can come loose.
  Other things to try: Close the terminal you are using and open a new one, and/or rebooting the robot/your computer, trying a different computer, etc.

- The sound doesn't work.
  Try the usual suspects:
  Check the volume knob on the speaker.
  Open alsamixer and make sure that nothing is mute/everything is on high level.
  Check on gnome the sound icon on the upper right, make sure the sound is not on mute.
  You can also try in a terminal to play a wav file, e.g.:
  ```
  sudo aplay ~/sounds/yawn.wav
  ```

- Other advice:
  Please check that the robot does not fall on anyone as it is very heavy (~200kg)!
  Please take care not to damage the robot's actuators: damage might occur if powering the robot's motors in one position for a long time, moving the motors fast or wildly, or during transport if it falls or catches on something. So when the robot is no longer in use please disable the motors and if possible shutdown.
  If moving the Ridgeback base with the playstation controller, make sure both base and controller are well-charged!
  Do you want to know some other command?
  There might be a file with helpful commands on the the Desktop of the desktop called baxter_commands.txt.

Good luck!