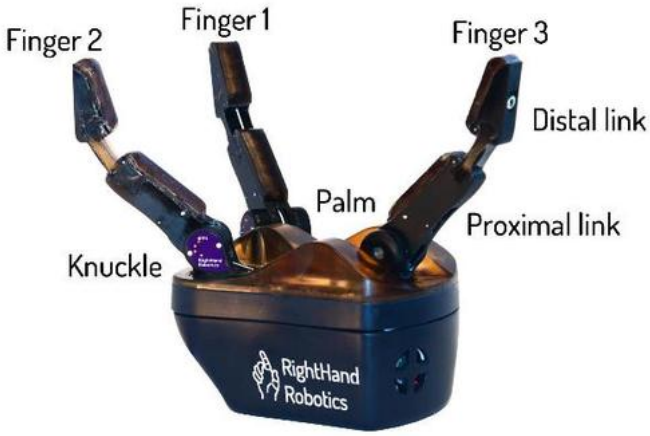
Reflex Takktile Quickstart

Introduction

This page will walk you through the components and capabilities of the Reflex Takktile hand, then go through how to get the basic Hello World functionality working.



The ReFlex Takktile hand is a underactuated hand with tactile sensors and joint feedback. The system is laid out at the hardware breakdown page. The Reflex SF is a separate product, cheaper and without sensors, if you have an SF hand check out the SF quickstart page.

Setting up the software

These instructions assume you are using a fresh install of Ubuntu 14.04
1) Install ROS according to the official ROS instructions for Ubuntu
2) Follow the ROS tutorials to set up your catkin workspace and configure your ROS install

OR

run the following lines to set up a basic workspace quickly.

```
echo 'source /opt/ros/jade/setup.bash'  >> ~/.bashrc
source ~/.bashrc
mkdir -p ~/catkin_ws/src
cd ~/catkin_ws/src
catkin_init_workspace
cd ~/catkin_ws
catkin_make
echo 'source  ~/catkin_ws/devel/setup.bash'  >> ~/.bashrc
source ~/.bashrc
```

If you create your catkin workspace with our code, it's recommended that you check out the ROS tutorials later. They go step by step through the basic abilities of ROS, while at the same time give you ways to check that everything works.

Whether you've created your catkin workspace through the ROS tutorials or through our code pasted from above, it is recommended that you run the following lines. It's important to make sure that your catkin workspace setup document is in your bashrc before any ROS code will run.

```
echo 'source  ~/catkin_ws/devel/setup.bash'  >> ~/.bashrc
source ~/.bashrc
```

Download the ROS package

If you do not have git installed then install it:

```
sudo apt-get install git git-core
```

Clone the RightHand Robotics code

```
cd ~/catkin_ws/src/
git clone https://github.com/RightHandRobotics/reflex-ros-pkg.git
```

It's important to clone the folder into the src/ folder of your catkin workspace, or somewhere downstream of that, so that the code can be compiled with catkin_make.

If necessary, flash the ReFlex Takktile firmware

If you've just received a new ReFlex Takktile, the firmware should be up to date. If it's been a long time since you received the hand, however, or if things aren't working and you'd like to flash the firmware fresh, then just remove the back shell for the hand and follow the instructions found in the README on our github repository. Just scroll down on the main page to see the README with flashing instructions.

Run the basic driver code

1) Make the host-side driver code
If you have problems getting catkin_make to work it's recommended to go through the ROS tutorials from the beginning. You might have missed a small step somewhere, and they lay it all out clearly. You can also visit our installing and building a package page for tips.

```
cd ~/catkin_ws/
catkin_make
```

Ignore any errors you see about tf and deprecated Quaternion usage. The tf code is from an older tutorial (hence the warning) but still works.

Check that all the necessary packages are available by trying to find the ReFlex ROS packages:

```
rospack find reflex_driver
rospack find reflex_msgs
rospack find reflex
```

If catkin_make worked, each rospack call should return the folder location of the package.

2) Power the hand!
As laid out in the hardware breakdown page, the hand uses a 12V power supply. If all the motors are stalling the hand could draw up to 5A (worst case) but for light testing we've been using power supplies that supply as low as 1.5A with no problems. The ReFlex hands (both SF and Takktile) take a simple barrel jack for power.

3) Now plug the ethernet cable from the hand into your computer.
In Ubuntu you should see a notification pop up in the upper right saying 'Wired Connection 1'. **IMPORTANT: THE FIRST THING TO DO is check that your hand is connected on eth0 (as opposed to other ethernet enumerations, like eth1, eth2, etc.).** When the hand is plugged in with power and ethernet, run

```
ifconfig
```

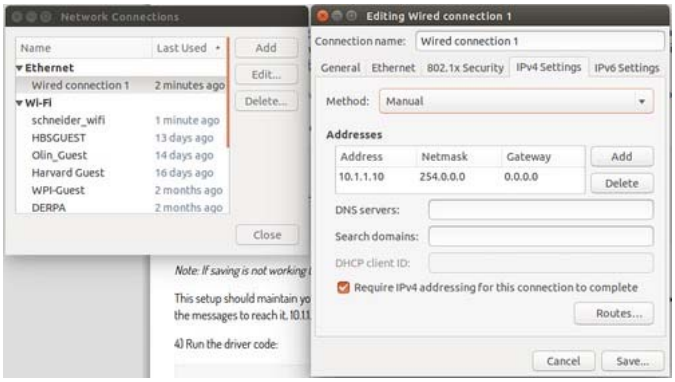
and check that the ethernet connection shows up as eth0.

```
~ $ ifconfig
eth0      Link encap:Ethernet  HWaddr 5c:26:0a:82:f0:7b
          inet addr:10.1.1.10  Bcast:11.255.255.255  Mask:254.0.0.0
          inet6 addr: fe80::5e26:aff:fe82:f07b/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:321844 errors:112 dropped:0 overruns:0 frame:66
          TX packets:6999 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:79813696 (79.8 MB)  TX bytes:799082 (799.0 KB)
          Interrupt:20 Memory:e6e00000-e6e20000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:2639435 errors:0 dropped:0 overruns:0 frame:0
          TX packets:2639435 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:777107562 (777.1 MB)  TX bytes:777107562 (777.1 MB)

wlan0     Link encap:Ethernet  HWaddr a0:88:b4:69:cd:e8
          inet addr:192.168.0.15  Bcast:192.168.0.255  Mask:255.255.255.0
          inet6 addr: fe80::a288:b4ff:fe69:cde8/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:751778 errors:0 dropped:0 overruns:0 frame:0
          TX packets:350716 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:699732943 (699.7 MB)  TX bytes:54642663 (54.6 MB)

~ $
```

If you're having trouble telling which part of ifconfig is the hand, try running the command, unplugging the hand, running it again, replugging the hand and running it, etc. If your hand is something than eth0, the fix is fairly simple and can be found on the troubleshooting page.

Go into the start menu and search for Network Connections. Click 'Wired Connection 1' and hit Edit, then go to the IPv4 Settings tab.
Network Connections -> Wired Connection 1 -> Edit

Set the address to 10.1.1.10, the netmask to 254.0.0.0, and the gateway to 0.0.0.0, as shown here. Also, check the "Require IPv4 addressing" button".

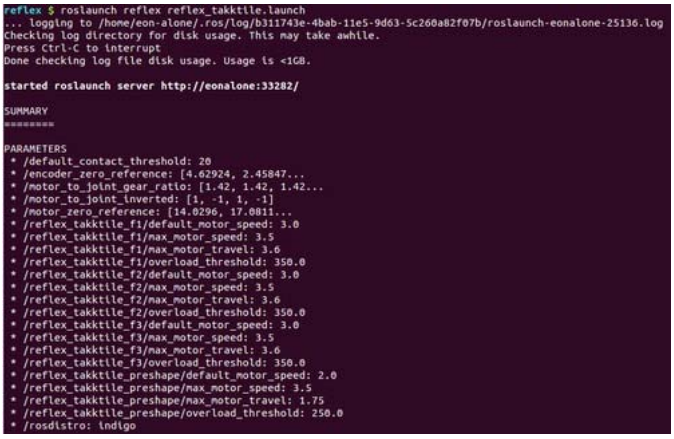


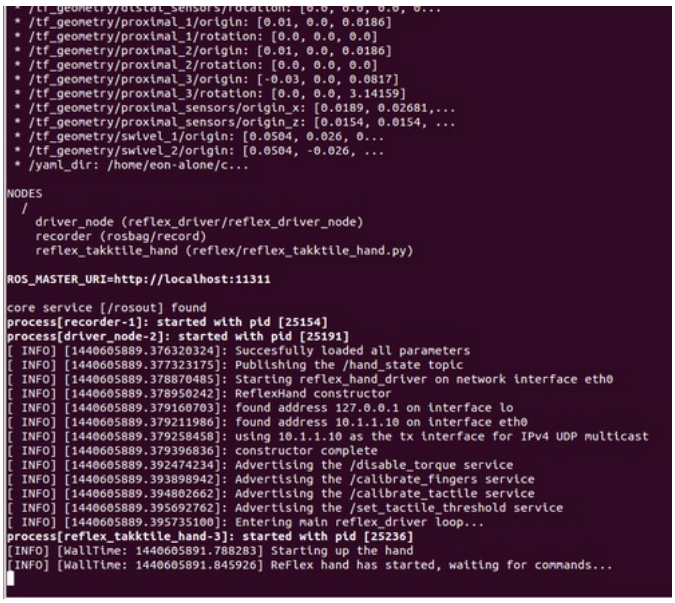
Note: If saving is not working then delete the configuration and add a new one.

This setup should maintain your wireless capabilities. Your ethernet connection really only needs to be 10.x.x.x for the messages to reach it, 10.1.1.10 is just our safe default.

4) Run the driver code:

```
roslaunch reflex reflex_takktile.launch
```





The code should be running at this point! The point of these drivers is to catch the ethernet traffic from the hand and bundle it into a formatted reflex_msgs/Hand message. You can check that the message is publishing by echoing the topic:

```
rostopic echo /reflex_takktile/hand_state
```

If the topic is not published, then check the basic things - that the hand is plugged in, that the ethernet cord is well seated, etc. You can also check that the two board indicator LEDs are flickering quickly. Please check the troubleshooting page if the problem is not resolved.

There is a particularly frustrating issue that happens when the hand is not on eth0. If it connects as eth1, eth2, etc. the code will need to be informed of this. Check the troubleshooting page and go to section [2) Connect to hand — C) Ethernet Port] to see how to identify and fix this issue. You can also contact us at support@righthandrobotics.com.

Explore with our tutorials!

Visit our documentation page for a full list of available code, tutorials, and other information. We recommend you run through some of the basic tutorials to check all the parts of your system and get up to speed on the ReFlex hand.

The first tutorial is calibrating the pressure sensors. Enjoy!

Mounting the hand on a robot

Instructions on how to mount the ReFlex on a robot are provided here.

Troubleshooting

For common problems and the related fixes, visit out troubleshooting page.

If any item of the tutorial took additional debugging beyond what's written, please send us a quick line at support@righthandrobotics.com so we can update the tutorial for the next users!

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