

## 3) Calibrate Takktile fingers

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*DISCLAIMER: It's not easy to do, but it's possible that driving a hand past where it's supposed to be driven can cause damage. It's recommended that while your hand is uncalibrated and you are moving the fingers you should be ready to pull the plug or flip the switch if the motors drive too far and start jamming.*

### Position the hand

Start up by disconnecting the hand from power. You can manipulate the motors easily now.

1. Align the preshape joint so that the hand is in a cylindrical grasp, with all three fingers parallel.
2. Make sure all fingers are fully open. You can push the tip of each finger down a bit to drive the motor past the zero point, it will wind back to zero during the calibration process.

*NOTE: You need to make sure that you adjust both the preshape joint and the opened/closed state of the fingers because both of them are saved during calibration.*



### Capture that position

Power the hand and connect the ethernet cable. Next the code needs to be run and the finger calibration code needs to be run (/calibrate\_fingers service)

```
roslaunch reflex reflex_takktile.launch
(in a new terminal)
rosservice call /reflex_takktile/calibrate_fingers
```

You should see hear the motors slowly contracting. If any tendons are out of their tracks, realign them. The fingers should contract slightly, then halt. In the terminal where you ran the launch file, you should see a ROS\_INFO message saying that calibration is complete, like so:

```
[INFO] [1440618084.406134531]: Found address: 192.168.1.1 on interface: lo
[INFO]
[INFO]
[INFO] - $ rosservice call /reflex_takktile/calibrate_fingers
[INFO]
[INFO] - $
[INFO] - $
[INFO] [1440618084.506048973]: Advertising the /set_tactile_threshold service
[INFO] [1440618084.506102067]: Entering main reflex_driver loop...
process[reflex_takktile_hand-3]: started with pid [25028]
[INFO] [Walltime: 1440618086.906767] Starting up the hand
[INFO] [Walltime: 1440618086.970852] Reflex hand has started, waiting for commands...
[INFO] [1440618105.413535431]: Beginning finger calibration sequence...
[INFO] [1440618105.431629082]: Step fingers Inwards: 14012+6 13175+6 13011+6 13604+0
[INFO] [1440618105.506810428]: Step fingers Inwards: 14014+6 13173+6 13012+6 13604+0
[INFO] [1440618105.581657775]: Step fingers Inwards: 14018+6 13169+6 13016+6 13604+0
[INFO] [1440618105.656935289]: Step fingers Inwards: 14020+6 13167+6 13018+6 13604+0
[INFO] [1440618105.731866866]: Step fingers Inwards: 14024+6 13163+6 13021+6 13604+0
[INFO] [1440618105.806656865]: Step fingers Inwards: 13003+6 13161+6 13024+6 13604+0
[INFO] [1440618105.881877228]: Step fingers Inwards: 13030+6 13157+6 13026+6 13604+0
[INFO] [1440618105.956913356]: Step fingers Inwards: 13013+6 13155+6 13029+6 13604+0
[INFO] [1440618106.031749694]: Step fingers Inwards: 13030+6 13151+6 13032+6 13604+0
[INFO] [1440618106.106783104]: Step fingers Inwards: 13022+6 13149+6 13034+6 13604+0
[INFO] [1440618106.181933081]: Step fingers Inwards: 13032+6 13145+6 13037+6 13604+0
[INFO] [1440618106.256953283]: Step fingers Inwards: 13030+6 13143+6 13039+6 13604+0
[INFO] [1440618106.331839783]: Step fingers Inwards: 13036+6 13139+6 13042+6 13604+0
[INFO] [1440618106.406887312]: Step fingers Inwards: 13037+6 13137+6 13044+6 13604+0
[INFO] [1440618106.481932631]: Step fingers Inwards: 13041+6 13135+6 13047+6 13604+0
[INFO] [1440618106.557133113]: Step fingers Inwards: 13041+6 13136+6 13049+6 13604+0
[INFO] [1440618106.631945835]: Step fingers Inwards: 13041+6 13136+6 13052+6 13604+0
[INFO] [1440618106.706974681]: Step fingers Inwards: 13041+6 13136+6 13054+6 13604+0
[INFO] [1440618106.781959860]: Step fingers Inwards: 13041+6 13136+6 13057+6 13604+0
[INFO] [1440618106.857044278]: FINISHED FINGER CALIBRATION: Encoder movement detected
```

## What's actually happening

There are two things that need to be calibrated. First, the encoders (purple plate on the side of the knuckles) immediately have their position saved as the "zero" location. That's why it's important that the fingers are flat and open when the service is called. Next the motors need to be calibrated. The motors wind in the tendons until a finger twitch is detected on the encoders, then that spot is saved as the "zero" location on the motor. The preshape motor position is saved without moving the motor.

These values are saved in the `reflex_driver/yaml/calibrate_finger.yaml` file when you run the `/calibrate_fingers` service. That means calibration doesn't need to happen often (the values are saved) but should be done if you detach the finger tendons/spools or if the tendons stretch.

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