

GUIDE TO ME133A LAB 2

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Friday 11/10/2017

This guide describes how to setup the hardware and software for Lab 2. It assumes a basic knowledge with Optitrack, ROS and the turtlebot. Please refer to Lab 1 Guide for a more detail description of the OptiTrack System inside CAST.

1 Preliminaries

To execute before any session. You will need a computer to publish the OptiTrack node. A common practice is to use your own laptop, simply referred as laptop in the following, but you can run the node in the turtlebot.

- Install the vrpn package in your laptop computer. It can be found at https://github.com/ros-drivers/vrpn_client_ros.git. Install it using catkin:

```
1 (laptop)$ cd ~/catkin_ws/src
  (laptop)$ git clone https://github.com/ros-drivers/vrpn_client_ros.git
3 (laptop)$ cd ..
  (laptop)$ catkin_make
```

- Install the turtlebot packages. Follow the instructions <http://wiki.ros.org/turtlebot/Tutorials/indigo/PC%20Installation>. Then continue to the next tutorial to check network connectivity.

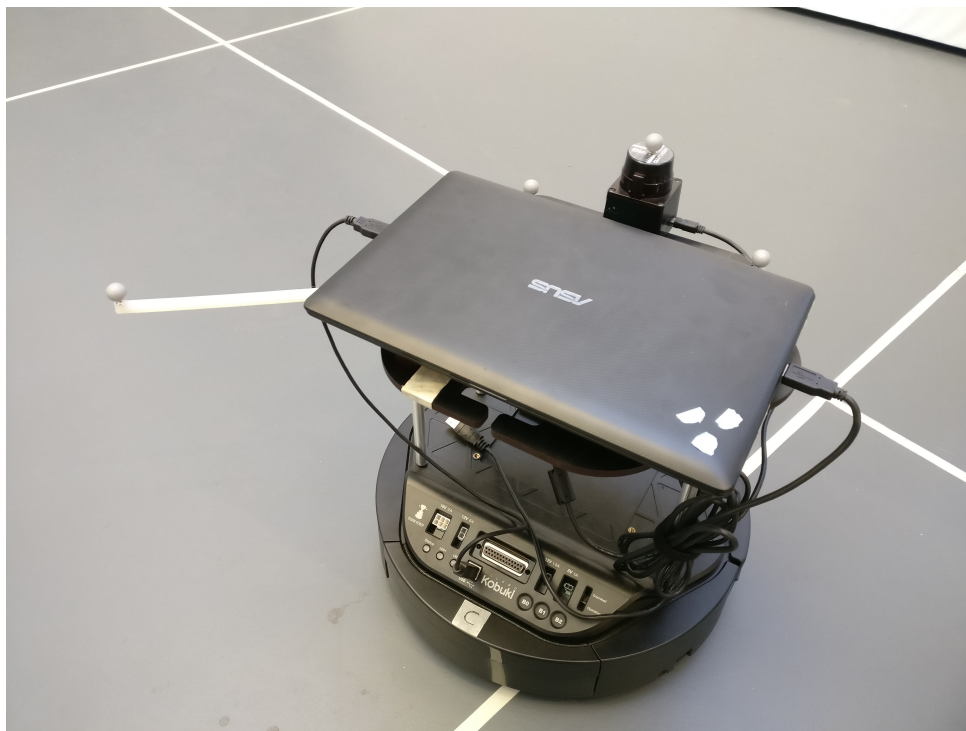


Figure 1: Picture of the turtlebot. The white spheres are the markers to be detected by the OptiTrack cameras.

Remember that the turtlebot can be accessed using ssh. The format is `ssh user@IP`, for example

```
(laptop)$ ssh me133a@192.168.1.3
```

check the correct user names and ip for your turtlebot. Configure the laptop to be used in network configuration:

```
1 (laptop)$ export ROS_MASTER_URI=http://192.168.1.?:11311 (modified for the correct IP)
(laptop)$ export ROS_HOSTNAME=192.168.1.? (modify to the IP address of laptop being used for control)
```

To know the IP type 192.168.1.1 (user:admin, pass:admin) in a internet browser to connect to the router administration page. See Figure for

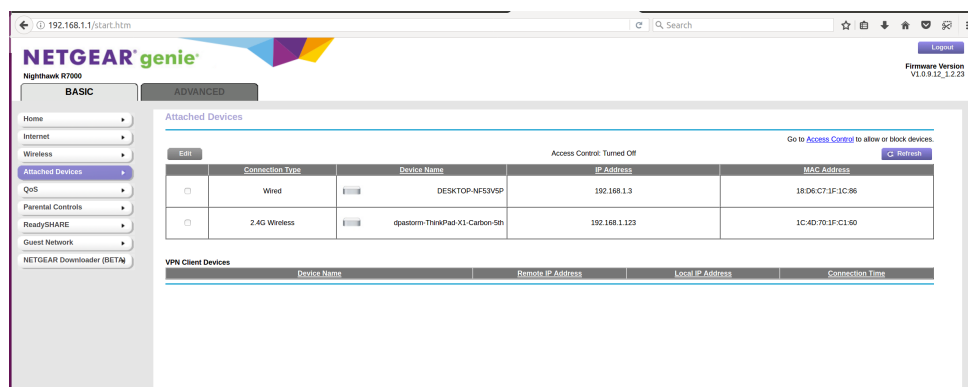


Figure 2: Screen shoot of the router administration page.

2 Setup

To execute before every session. Connect the elements according to Figure. The numbers of the ports may vary depending of the configuration of the optitrack computer. For normal operation check that port L3 is connected to the optitrack computer. Once everything is connected, wait until the router



Figure 3: Connection Diagram.

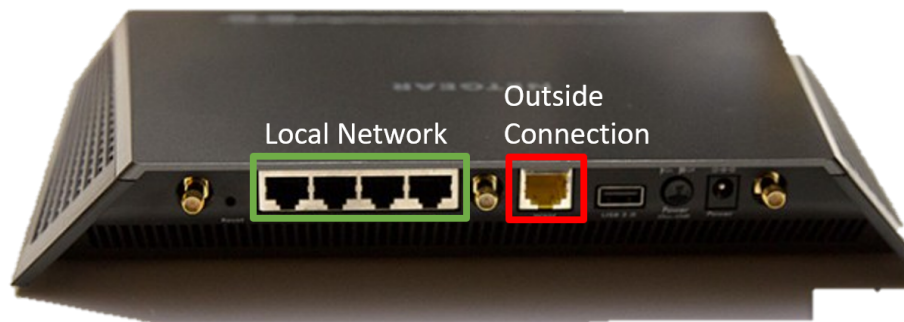


Figure 4: Router back detail. Connect an ethernet cable from the wall (port L3 or 51) to the local network ethernet ports in the router. Do not connect to the outside ethernet connection port.

wifi light turns on. Then connect the laptop and the turtlebot to the router: SSID: *CAST_ARENA*, Password: *aerialrobot* On the laptop computer run the *vrpn* node to publish the OptiTrack messages:

```
(laptop)$ $ roslaunch vrpn_client_ros sample.launch server:=192.168.1.X
```

X has to be modified to be the optitrack server, often 192.168.1.2. For the turtlebot, first turn on the turtlebot base and it will beep. Then execute the following to publish the all turtlebot topics:

```
1 (turtlebot)$ $ roslaunch turtlebot_bringup minimal.launch
```

Common troubleshooting to check the each system:

1. Check that OptiTrack is working properly on the motive program on the optitrack computer:
 - (a) Check that there aren't any markers when no tracking object is inside the arena. Mask the space otherwise.
 - (b) Introduce the turtlebot inside the arena and check the number of tracker.
 - (c) Check that the markers are fixed when the vehicle is not moving. If they flicker, it means the calibration is wrong.
2. Check the laptop receives the correct OptiTrack data. Open rviz and plot the frame of the vehicle to check it moves as expected.
3. Check the turtlebot can see nodes executed in the laptop. Command the laptop using the keyboard:

```
1 (laptop)$ roslaunch turtlebot_teleop keyboard_teleop.launch
```

4. Check the laptop can see the topics from the turtlebot. Echo the base sensors:

```
1 (laptop)$ rostopic echo /mobile_base/sensors/core
```

3 Running the lab

Open the python script, either on the laptop or on the turtlebot. If you run it on the turtlebot you have to close the lid immediately so the OptiTrack markers are not occluded.

```
1 (laptop)$ python me133a_lab2
```

Check the contents of the .csv file generated. Common errors are zeros or constant values in some of the columns.

Save both the python script and the .csv file in the laptop.

4 Common Errors

Check the laptop base is on.

- **Error:** Unable to contact my own server:
Cause: the ip in the turtlebot is wrong. Check that $\$ROS_HOSTNAME$ matches the IP given in ipconfig or in the router admin page.