

cdrocamStep 2.1 Joystick + camera output in remote laptop

Make sure that your robot `<duckiebot>` Duckiebot and your laptop `<laptop>` are connected to the same network.

t

```
laptop $ ping <duckiebot>.local
```

and on your duckiebot:

```
duckiebot $ ping <laptop>.local
```

If one or the other does not work, it is very unlikely that the following will work. Fix before proceeding.ros

In case you rebooted the duckiebot, please execute:

```
duckiebot $ sudo ntpdate -u us.pool.ntp.org
duckiebot $ ss s
duckiebot $ source environment.sh
duckiebot $ source set_ros_master.sh <robot-name>
```

Launch the joystick remotely using the same procedure in Step 2.05.

```
laptop $ roslaunch duckietown joystick.launch veh:=duckiebot
```

You should be able to drive the vehicle with joystick at this point.

Second, let's launch the camera on your vehicle remotely. Open a new terminal on your laptop.

Byobu tips: don't forget F2 (or ctrl-a C) in byobu will open a terminal in a new tab. Alternatively, you can also Shift+F2 to split the current tab into two horizontally. Shift+<arrow keys> switches between panes. Shift+Alt+<arrow keys> changes the current pane size.

In the new terminal write

```
laptop $ roslaunch duckietown camera.launch veh:=duckiebot
```

You should see the red led on the camera light up.

View the image via rviz

Open a third terminal on the laptop.

You can see a list of topics currently on the ROS_MASTER with the command:

```
laptop $ rostopic list
```

You should see the following

```
/diagnostics  
/<duckiebot>/camera_node/camera_info  
/<duckiebot>/camera_node/image/compressed  
/<duckiebot>/camera_node/image/raw  
/<duckiebot>/joy  
/<duckiebot>/wheels_driver_node/wheels_cmd  
/rosout  
/rosout_agg
```

You can use “rostopic hz” to have statistics about the data:

```
laptop $ rostopic hz /<duckiebot>/camera_node/image/compressed
```

You should see at least:

```
average rate: 24.105  
min: 0.000s max: 0.262s std dev: 0.02629s window: 135
```

You can view the messages in real time with the command:

```
laptop $ rostopic echo /<duckiebot>/camera_node/image/compressed
```

You should see a large sequence of numbers being printed to your terminal. That’s the “image”.

If you are Neo, then this all makes sense.

If you are not Neo, it is helpful to visualize the data as image.

That’s where rviz can help.

Open a new terminal on the laptop. (Note, this must be on the actual laptop, not ssh into the duckiebot.) Launch rviz by

```
laptop $ rviz
```

In the rviz interface, click “Add” on the lower left, then the “By topic” tag, then select the “Image” under `/duckiebot/camera_node/image/compressed`. Then click ok. You should be able to see a live stream of the image from the PiCamera.

Proper shutdown procedure

To stop the nodes: You can stop the node by pressing Ctrl-C on the terminal where the roslaunch was executed. In this case, you can Ctrl-C in the terminal where you launched the camera.launch. You should see the red light on the camera turn off in a few seconds.

Note that the joystick.launch is still up and running, so you can still drive the vehicle with joystick.