Testing Hardware

This file contains instructions for testing hardware and preparing video for submission.

1. First, make sure that all components(camera and wifi dongle) are connected to Raspberry Pi. Insert SD card containing OS image into Raspberry Pi. Follow the instruction given "creating_bootable_SD_card.pdf" to create bootable SD card
2. Setup SSH connection between Raspberry Pi and PC/Laptop; follow the instruction given in WIFI Network connection and SSH.pdf to setup SSH connection.
3. Go to **catkin_ws/src** folder in Raspberry Pi and type the following command in terminal to clone the packages from git:
   - ***a)*** *git clone* ***https://github.com/bosch-ros-pkg/usb_cam.git***
   - ***b)*** *git clone* ***https://github.com/ros-perception/image_common.git***

   If above commands give any verification error, run the following command in terminal

   export GIT_SSL_NO_VERIFY=1
4. After successful cloning of package, build the package using "catkin_make".
5. Navigate to usb_cam package to edit launch file:

   roscd usb_cam/launch

   gedit usb_cam-test.launch

Comment the image_raw node in launch file. After adding comment, launch file will be as:

```
<launch>
  <node name="usb_cam" pkg="usb_cam" type="usb_cam_node" output="screen" >
    <param name="video_device" value="/dev/video0" />
    <param name="image_width" value="640" />
    <param name="image_height" value="480" />
    <param name="pixel_format" value="yuyv" />
    <param name="camera_frame_id" value="usb_cam" />
    <param name="io_method" value="mmap"/>
  </node>
<!--
  <node name="image_view" pkg="image_view" type="image_view"
respawn="false" output="screen">
    <remap from="image" to="/usb_cam/image_raw"/>
    <param name="autosize" value="true" />
  </node>
-->
</launch>
```

The comment node in usb_cam-test.launch actually launches a window on which camera output will be shown. In SSH, we don't have the permission to access any GUI of Raspberry Pi. So we have to setup a ROS connection between Raspberry Pi and PC/laptop to see camera image. We will launch **usb_cam node in R_PI** and **access this node data on PC** by converting it into the image.

Connection setup on ROS between Raspberry Pi and PC/Laptop:

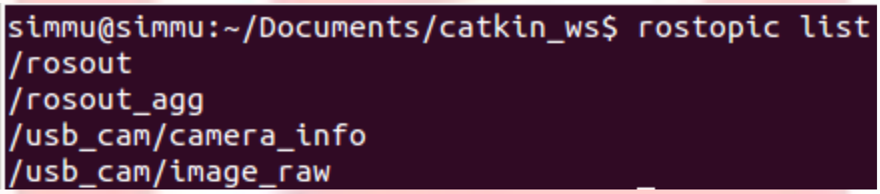
Setup connection such that Raspberry Pi will be ROS master and PC/Laptop will be a client. Follow the ROS_interfacing_R-PI_PC.pdf to setup connection.

NOTE: In **ROS_interfacing_R-PI_PC.pdf,** master of ROS was PC and client was R-PI.

6. **Camera test:** After successful connection of master and client. Launch the "usb_cam-test.launch" file in Raspberry Pi. Now check the topic published on ROS by typing following command in PC terminal:

   rostopic list

The output of above command is shown in Figure 1.1. The following output shows that your PC/Laptop and R-PI are connected on ROS.



```
simmu@simmu:~/Documents/catkin_ws$ rostopic list
/rosout
/rosout_agg
/usb_cam/camera_info
/usb_cam/image_raw
```

Figure 1.1: Output of rostopic list

7. Type following command to check the output of camera.

   rosrun image_view image_view image:=/usb_cam/image_raw

   This command will open a new window and show the image captured by camera. Image output is shown in Figure 1.2.

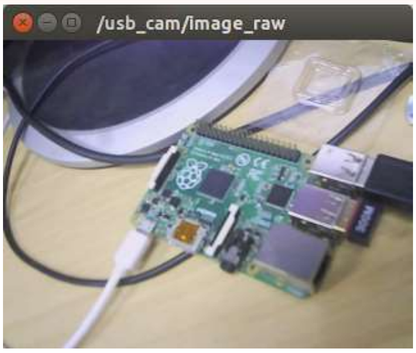


Figure 1.2: Camera output

NOTE: There might be lag in video, don't worry about it

<u>Submission preparations:</u>

- Record the video of PC showing output of camera connected to Raspbery Pi. Save the video as <Team_ID>_Hardware_Testing.mp4. Upload it in your YouTube account as unlisted video. Upload the YouTube link in Video Submission: Hardware Testing submission box in the Task 2 tab.

Further, instructions for uploading the video link are provided on portal.