Design of Embedded and Intelligent Systems, Lab 2

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1 Introduction

This is a report for the second lab in the course Design of Embedded and Intelligent Systems, conducted in the autumn of 2019 at Halmstad university. The lab is consists of 4 parts that are to be completed in order to pass the assignment. The following hardware is used in the lab:

- Raspberry pi 3
- SparkFun RedBot Mainboard - Arduino microcontroller
- Raspberry pi camera V2
- Host machine - Dell XPS15 running ubuntu 19.04

The lab was divided into the following parts:

Part 1 Connect to the raspberry pi from the host machine using ssh

Part 2 Write a program and run it on the arduino microcontroller

Part 3 Send and receive messages using ROS on the raspberry pi

Part 4 Take a picture using the camera on the raspberry pi

2 Connecting to the raspberry

In order to connect to the raspberry using ssh a mobile hotspot was setup using a mobile phone. The host device and the raspberry were then connected to the access point and a successful ssh connection could be established, shown in Figure 1.

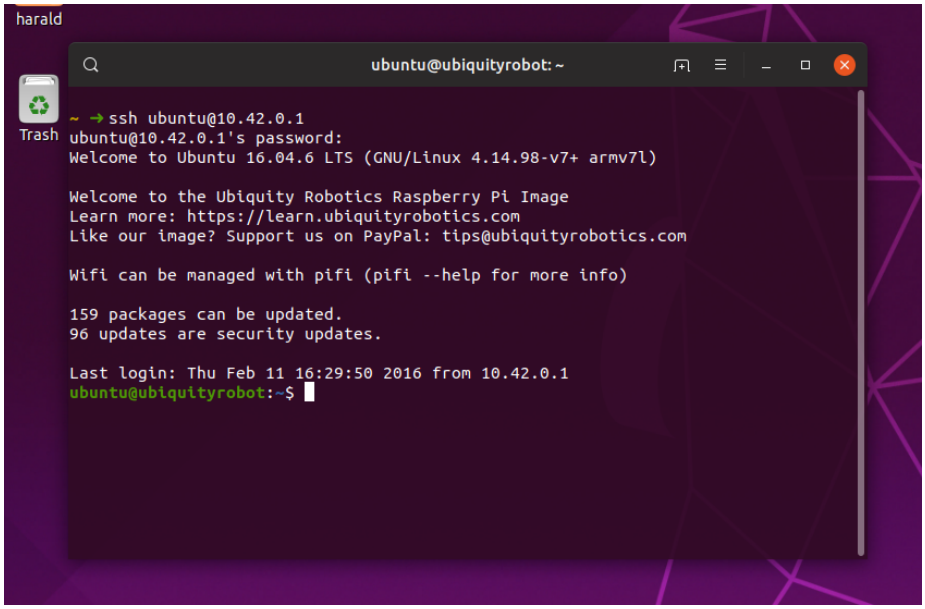

Figure 1: Established ssh connection

3 Arduino program

For the second task the arduino IDE was installed which is a development environment for arduino hardware. There was a library for the sparkFun redbot package that could be installed with prebuilt sketches for the microcontroller. One of these were a basic blink program which simply makes the LED on the controller to blink. This program was compiled and flashed to the controller.

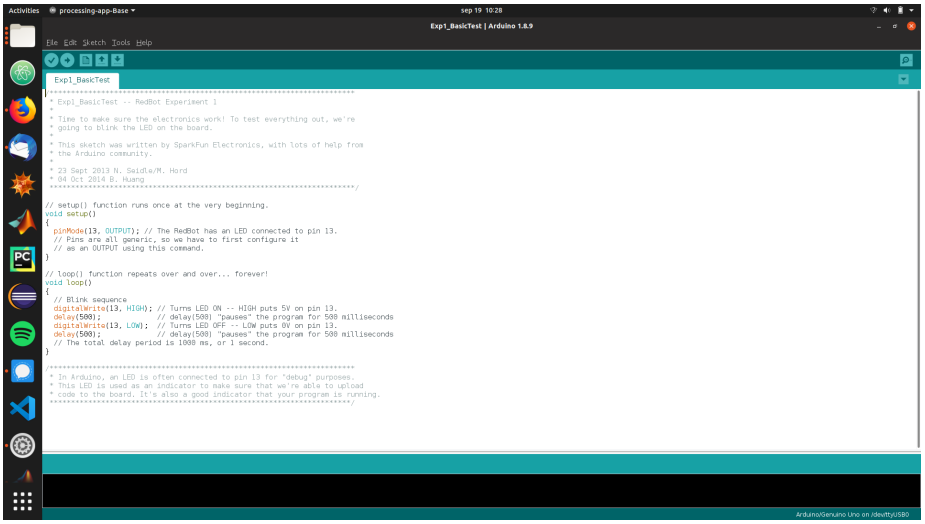

Figure 2: The source code of the arduino program

4 Sender and receiver

For this task we created a ROS project on the raspberry. We then created a python script for publishing and subscribing to a topic within ROS. We then ran the scripts simultaneously in order to achieve a communication between the nodes. The exact steps of this task is described in great detail on the Wiki-ROS webpage [1].

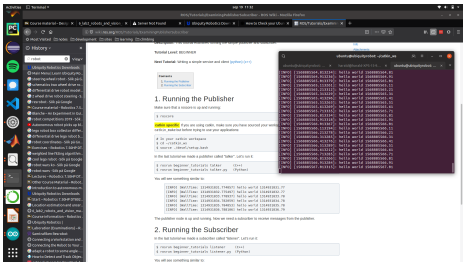

Figure 3: Caption

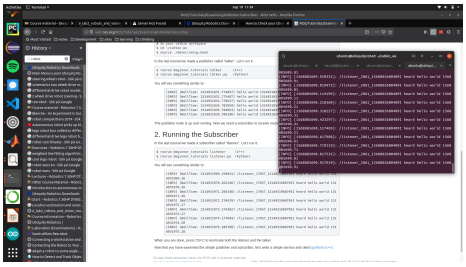

Figure 4: Caption

[1] http://wiki.ros.org/ROS/Tutorials/WritingPublisherSubscriber%28python%29

5 Take a picture

The final task for this lab consisted of using the RPI-camera to take a simple picture. The picture was then moved from the RPI to another computer. The picture is shown below in Figure 5.

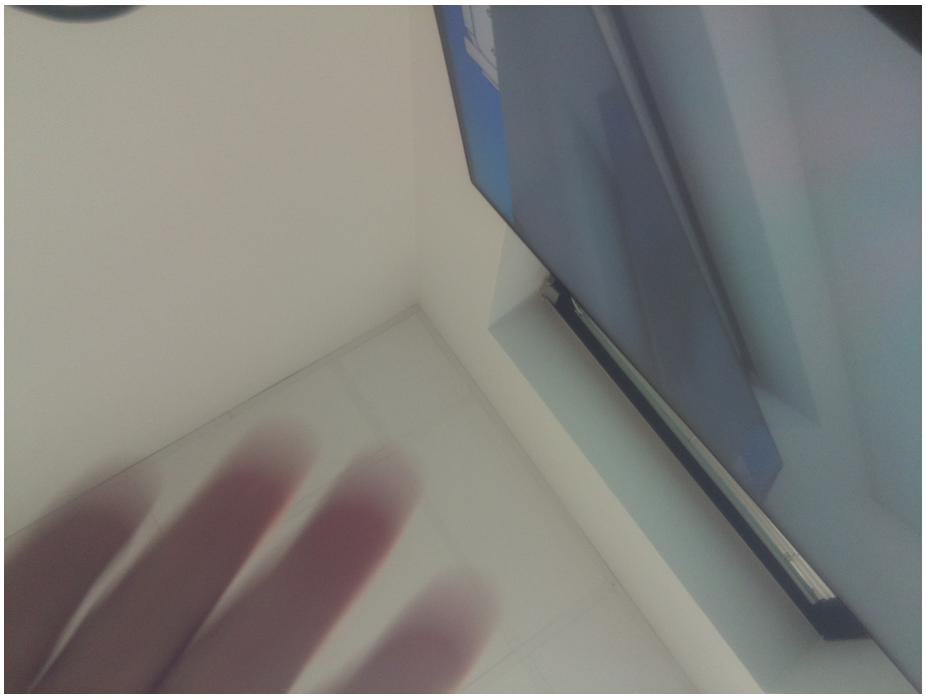

Figure 5: The picture taken by the RPI-camera for the final task