Guide for Thymio, Raspberry and Python

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1 Thymio, Raspberry, and Python

This is what you need to follow this manual:

- Thymio II with cable
- Raspberry Pi 2
- External battery with cable
- Empty Micro SD
- Dongle WI-FI or Ethernet Cable

Figure 1: Requested object

2 Connect Thymio to a computer

This wiki page aggregates the configurations needed to use Raspberry 3 to control Thymio II robot. First of all you need to install Raspberry Pi Operating System. You can install NOOBS on the SD card and follow the instructions in order to install Raspbian on the SC card.

Remember the default login username and password:
username: pi
password: raspberry

3 Initial Configuration

After that, launch raspberry configuration tool using sudo raspi-config (in case it is the first boot of the OS, the configuration tool will be shown automatically) and make the following configurations:

- Expand filesystem

- Internationalization Options
  - Locale en_US.UTF-8 UTF-8
  - Time zone: Europe > Amsterdam
  - Keyboard Layout: choose Generic 105-keys (intl) PC>Other> *choose your keyboard language*
- Advanced Options
  - Set the desired hostname (*testthymio* in our case)
  - Enable SSH server
  - Disable the login shell accessibility over serial (by other words, select option "No" on the serial menu)
- enable the camera

Then Reboot Raspberry Pi:
sudoreboot

4 SSH and VNC server Configuration

On file /etc/ssh/sshd_config make the following changes (using an editor like nano or vim. Do not forget to edit as super user - using sudo):

- Uncomment line regarding the use of public keys (AuthorizedKeysFile %h/.ssh/authorized_keys)
- Uncomment line regarding GSSAPI Authentication (GSSAPIAuthentication no) in order to remove lag from ssh login
- Add "UseDNS no" on the end of the file

4.1 ENABLING VNC SERVER GRAPHICALLY

On your Raspberry Pi, boot into the graphical desktop.

Select Menu > Preferences > Raspberry Pi Configuration > Interfaces.

Ensure VNC is Enabled.

4.2 ENABLING SSH SERVER GRAPHICALLY

On your Raspberry Pi, boot into the graphical desktop.

Select Menu > Preferences > Raspberry Pi Configuration > Interfaces.

Ensure SSH is Enabled.

5 Network Configuration

Disable IPv6
To disable, edit a file: sudo nano /etc/sysctl.conf

Add the following line:
$net.ipv6.conf.all.disable_ipv6 = 1$
For the change to take effect without rebooting:
$sudo\ sysctl-p$

6 Connect Raspberry to eduroam University Network

I put this content inside $/Etc/wpa/supplicant/wpa_supplicant.conf$ (make sure you update your password and identity)

country=GB
$ctrl_interface = DIR = /var/run/wpa_supplicantGROUP = netdev$
$update_config = 1$

network= ssid="eduroam"
$key_mgmt = WPA - EAP$
pairwise=CCMP
group=CCMP TKIP
eap=PEAP
identity="<username>@oslomet.no"
$domain_suffix_match =$ "$radius.hioa.no$"
phase2="auth=MSCHAPV2"
password="<your password here>"

I then reloaded the Interface by issuing:
$wpa_cli - iwlan0reconfigure$

7 Installing Thymio's control program

First of all Update and Upgrade everything present inside the Raspberry:
$sudoapt - getupdate$
$sudoapt - getupgrade$

In order to install D-Bus run the following command:

$sudoapt - getinstalldbus - *dev$

8 Controlling Thymio II robot

At this point, you should be able to control the thymio through raspberry. In order to be able to start D-Bus on raspberry with X11 you have to access the Raspberry with the following command (this works for Linux and Mac OS; on Windows you need to download and install Xming)

$ssh - Xpi@PI_ADDRESS$

To start aseba in order to communicate with the thymio II you need to run the command:

$asebamedulla"ser : name = Thymio - II"$

Transfer the code that you want to run to the Raspberry and run it. The example needs to install also gobject library:

$sudoapt - getinstallpython - gobject$

Now you can run the example:

$pythontest.py$

8.1 Control the camera with Python

It is also possible control the camera installed on Raspberry with Python. This code takes a picture and saves it in the Raspberry memory:

$importpicamera$

$camera = picamera.PiCamera()$

$camera.start_preview()$
$time.sleep(2)$
$camera.capture('image.jpg')$

If you press "f" after runs test.py the camera will take a picture.

9 Controlling Thymio II robot from your own laptop

After enabling VNC on the Raspberry PI, download VNC viewer from your laptop. Besides, you have to be connected on the same network. After installing VNV viewer, you have to enter the IP adrress of the Raspberry Pi, VNC will ask you the username and the password of the Raspberry.