PIMA Project Documentation

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I. Computer functioning

There are 2 computers in the experimental lab dedicated to the students.working on the Thymio and Kilobot projects.

The first one run under Ubuntu Mate 16.04 and the second one run with Ubuntu 14.04.

The archives of the previous years work could be find on the Ubuntu 14.04 computer and on the github : https://github.com/nekonaute/thymioPYPI. All the require dependencies to run student softwares is installed.

Computer configuration (**Ubuntu 14.04**) :

- Connected in ethernet to the router to control Thymios
- Connected in WI-FI to AMAC J01
- Following softwares are installed :
    - OctoPy
    - Elias Project (Aerial View Tracking)
    - Mario Project (Embedded Recognition on Raspberry Pi)
    - Python 2.7, OpenCV2, Numpy, Matplotlib ....
- Logins : pi / pi

Computer configuration (**Ubuntu Mate 16.04**) :

- Connected in WI-FI thanks to a dongle to AMAC J01
- Logins : pi / PIProjet

II. Router functioning

Official documentation :
http://www.downloads.netgear.com/files/GDC/WN604/WN604_UM_2Nov2015.pdf

To access the router, the computer should be connected directly at the router in ethernet.
If you want internet, you have to connect in WI-FI (to AMAC J01).

Check that the configuration is correct with trying to connect to : 192.168.0.100

The logins are registered under the router, still the default ones.
Logins are : admin / password

Router is set up to give and IP into the range of : 192.168.0.111 - 150.

The informations to connect the raspberry pi at the router are :
- **SSID :** NETGEAR_11ng
- **Protocol :** WPA1/2 - passphrase
- **Passphrase :** rpiaccesspoint

Content of file /etc/network/interfaces to make router functioning :

```
auto lo
iface lo inet loopback

iface eth1 inet static
address 192.168.0.210
netmask 255.255.255.0
#gateway 134.157.249.254
```

To get more informations (use of the router, OctoPY functioning …), please refer to the following PDF :
https://github.com/nekonaute/thymioPYPI/blob/master/Robocologie_manual.pdf

III. Raspberry Pi 3 + Thymio 2 functioning

Configuration of a robot :

- 1 thymio 2 : https://www.thymio.org/fr:thymio
- 1 raspberry pi 3 : https://www.raspberrypi.org/products/raspberry-pi-3-model-b/
- 1 Camera Module V2.1 : https://www.raspberrypi.org/products/camera-module-v2/

A. Prerequisite :

OpenCV & OpenCV-contrib, 2 ways to install it :

```
pip install opencv-python
pip install opencv-contrib-python
```

or follow this procedure (longer and harder but that was this one which works for me) :
https://www.pyimagesearch.com/2016/10/24/ubuntu-16-04-how-to-install-opencv/

Enable the camera, again, 2 ways to install it :
Visually with raspi-config :
Run sudo raspi-config and select in the menu “activate pi camera”, then reboot, or use the following command (proposed solution in the PDF https://github.com/nekonaute/thymioPYPI/blob/master/Robocologie_manual.pdf) :

```
sudo modprobe bcm2835-v4l2
v4l2-ctl -l
v4l2-ctl --set-ctrl (...)
```

Then check if it works :

```
raspistill -o image.jpg
```

More informations :
https://www.raspberrypi.org/documentation/usage/camera/python/README.md

Python libraries installed :

- matplotlib
- numpy
- svgwrite (écrire les SVG)

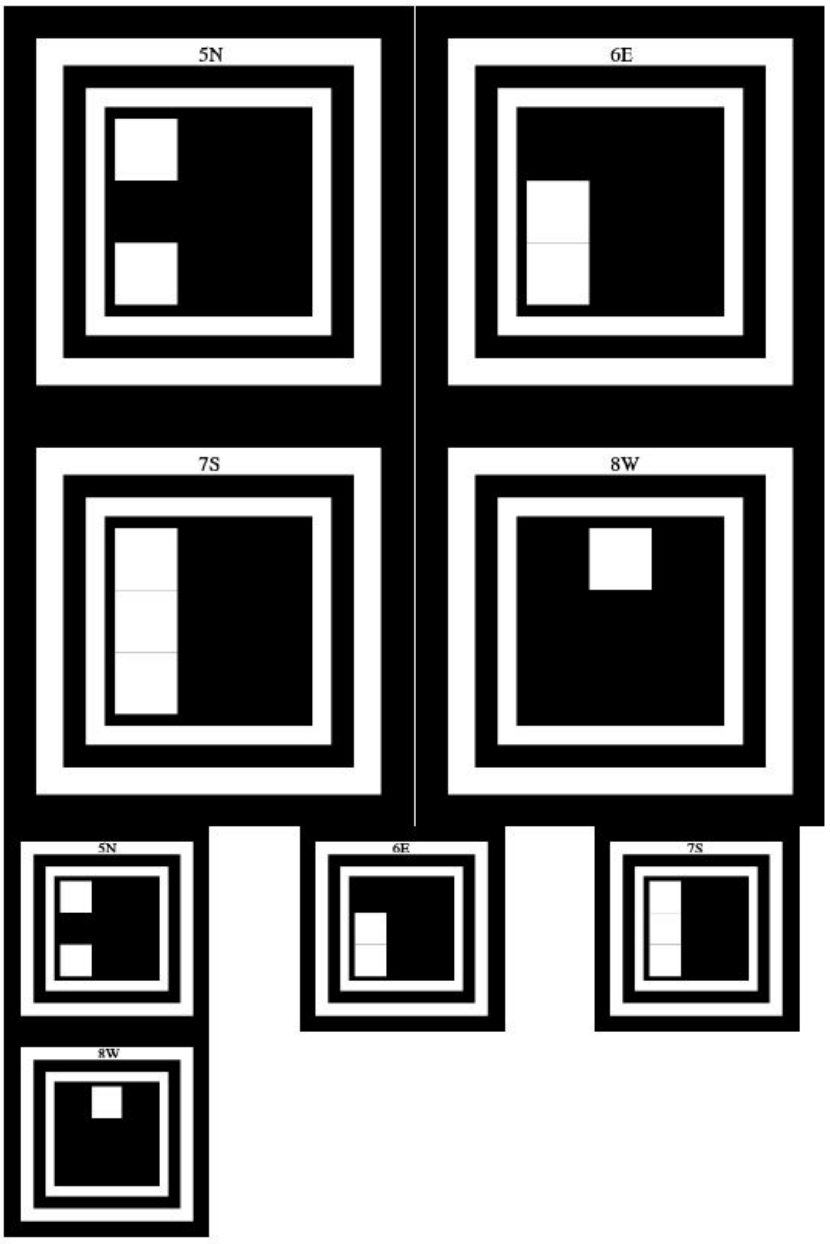
Software installed :

- htop
- imagemagick (convert SVG into png)
- texlive (make pdf from latex file)

B. Project explanation :

I. Generation of the visual code

You need to have **texlive** and **imagemagick** installed on the computer to generate the code. You don't need to do it on the raspberry pi. The result will look something like that, it's all the code for one robot. The letter are for **N**orth, **E**ast, **W**est and **S**outh (In front, right, left, and on the back of the robot).
To generate it, you have to write **python generate_tag.py [X]** where [X] is the number of the robot.



II.Functioning of the software

Use the **standalone_test.py** if you want to use without the visualisation (useful in a bigger software) or **standalone_test2.py** if you want to watch what the software while it runs.

If you want to watch the Canny Edge Detector, uncomment on line 229 and 230 of the **tag_recognition.py** file.

V. F.A.Q Raspberry/Thymio

Q: Rasperry Pi 3 default login/password with raspbian?
A: pi / pi -- if you change password of your pi, please say it on the Slack.

Q: Keyboard is english/french layout, I want the other way around.
A: setxkbmap us (or: setxkbmap fr)

Q: what are the IP around?
A: arp -a or nmap -T4 -sP 192.168.0.100/24

Q: my IP address?
A: hostname -I (upper-case "i")