

Aplicações Avançadas de Instrumentação MIEF/MIEB

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Universidade Nova de Lisboa - Faculdade de Ciências e Tecnologia

Lab 4 - MQTT

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Previous Requirements

Learn about MQTT

You can find a good MQTT tutorial in: <http://www.steves-internet-guide.com/mqtt-basics-course/>

In this course, we are going to use the mosquitto implementation of the MQTT protocol. More details in: <https://mosquitto.org/>

In the laboratory it is installed a MQTT broker, in the following addresses. No password is required.

- 192.168.1.97 & 192.168.1.98

Install MQTT services in the RPI

To install the MQTT services in you RPI, from its command prompt, do:

- `sudo apt install -y mosquitto mosquitto-clients`
- `sudo systemctl enable mosquitto.service`

Test if the services are running by doing:

- `sudo systemctl status mosquitto`

Send and receive the first MQTT message.

The MQTT is a publish/subscribe messaging protocol to share data between machines. Two actions are possible, send your data to a broker, by publishing it in a topic or receive it by subscribing a topic. So, to test your MQTT service you need, at least the following information:

- broker address – in the lab: 192.168.1.97 or 192.168.1.98
- topic to be published or subscribed – Your choice, but it must be unique.
- data load – could any data but binary data must be serialized in a string. For more information see json formats

Example:

Let's assume the following parameters:

- Broker: 192.168.1.98
 - Topic: AAI/mytest (you must change this)
 - Data: "Hello World"
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1. Open a terminal console and subscribe the topic, by doing:
 - a. `mosquitto_sub -h 192.168.1.98 -v -t "AAI/g0/mytest/#"`
 - i. Note: # means any message in this topic
 - ii. Note: to terminate the subscription, do Ctrl-C
 2. Open another terminal console and publish a message by doing:
 - a. `mosquitto_pub -h 192.168.1.98 -t "AAI/g0/mytest" -m "Hello World"`
 3. If you want you can see messages that are being generated by the other groups, if they are kind enough to give you the topic where they are publishing.

Install paho-mqtt library for python.

To integrate the MQTT functionalities in the python programs, it is necessary to install the appropriated library, that is the paho-mqtt:

- In the RPI (<https://pypi.org/project/paho-mqtt/>)
 - From the RPI command prompt, do:
 - `sudo pip3 install paho-mqtt`
- In the PC anaconda (<https://anaconda.org/conda-forge/paho-mqtt>)
 - Open an QT terminal (or anaconda prompt) and execute the following command:
 - `conda install -c conda-forge paho-mqtt`

The first python program with MQTT

Let's assume a scenario where the RPI acquires data and publish it in a specific topic. The PC subscribe that topic and displays the data. To do that, in the github it is available two python programs that have the essential to accomplish the task:

- AAI_Lab4_pub.py – Publish data to a specific topic – to run the in RPI
- AAI_Lab4_sub.py – subscribes a specific topic and print the data – to run in PC (use spyder (or equivalent) to execute it).

Run the subscription program and publish some data.

Send data through MQTT

Modify the previous programs, so you can publish the ecg data (cleanecg.txt) that you previously used in Lab 1. The requirements are:

In the RPI:

1. Read the ecg file and split into subsets of one second.
2. Publish the first subset for a specific topic.
 - Tip: create a list and convert to a json format
3. Wait a second
4. Repeat 2 and 3 until all data has been transmitted.

In the PC (use spyder or equivalent):

1. Subscribed the ecg topic
2. Every time that data is received, print how many samples have been received.
 - a. Tip: convert from json to a list.
3. Plot the data received.
4. Write the data in a file in append mode.