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Assignment 4: IoT SmartHome Controller

Sistemas de Comunicação Móvel - Departamento de Engenharia Informática

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1. System

- 1 MQTT Broker (<https://io.adafruit.com>)
 - Stores Data
 - Format: *house_name-room_name-data_name* (e.g. *lisbonapartment-bathroom-alarm*)
 - Constraints: only lowercase english characters, numbers and dashes
- 1 Web App (*Python*)
 - Adds Houses and Rooms
 - Manage each room
 - Check Temperature and its state (heating or cooling)
 - Check Human Presence in the room
 - Define the temperature state
 - Define Temperature Limits
 - Set an Alarm

The screenshot shows a web application interface with a blue background. On the left, there are two forms: 'Add New House' with a text input for 'House Name' and a 'Select' dropdown menu showing 'Nelas'; and 'Add New Room' with a text input for 'Room Name' and a 'Select' dropdown menu showing 'Quarto'. Below these is a large red button labeled 'Check Room'. On the right, there is a 'Home' button and a section for 'Nelas - Quarto'. This section displays 'Temperature: 14°C' with a sun icon, 'Presence: Nobody in the room', and 'Temperature Management' options: 'Keep It' (selected), 'Heat It', and 'Cool It'. Below these are four input fields for temperature limits: 'Minimum Temperature with Presence' (10), 'Maximum Temperature with Presence' (15), 'Minimum Temperature without Presence' (15), and 'Maximum Temperature without Presence' (20). At the bottom right, there is an 'Alarm' checkbox (checked), an 'Alarm Set' button with a bell icon, and a green 'Submit' button.

- 2 esp8266:
 - 1 AC that subscribes the following topics to regulate the temperature
 - Temperature
 - Human Presence
 - Temperature Limits
 - Temperature State (heating or cooling)
 - Turns on LED while it's heating/cooling
 - 1 Sensor that gets
 - Temperature input
 - Human Presence input
 - Alarm data from MQTT
 - Blinks the LED when Human Presence and Alarm are both on
- 1 Debugger (embedded in MQTT Broker)
 - Logs all the data transferred to/from MQTT Broker
 - A new Debugger is created each time a new Room is created

```
2021/12/14 3:53PM Default
Nelas-Quarto-alarm 0
2021/12/14 3:53PM Default
Nelas-Quarto-changes 0:1
2021/12/14 3:53PM Default
Nelas-Quarto-limits
10.5:14.5:15.7:22.9

December 14th 2021, 3:53:31PM
```

Libraries

1. In esp8266:
 - a. Arduino.h
 - b. ESP8266WiFi.h
 - c. Adafruit_MQTT.h
 - d. Adafruit_MQTT_Client.h
2. In Web App:
 - a. flask & flask.templating
 - b. Adafruit_IO
 - c. os & time
 - d. Appearance & Styles
 - i. <https://cdn.jsdelivr.net/npm/bulma@0.8.0/css/bulma.min.css>
 - ii. <https://use.fontawesome.com/releases/v5.3.1/js/all.js>

Data Naming and Structuring

- In esp8266:
 - selected_house & selected_room: must be inputted in the Serial Monitor before anything
 - any data getted from Serial Monitor or MQTT Broker
- In MQTT Broker:
 - house_name-room_name-<?>
 - alarm 1 or 0
 - changes 1 or 0:1 or 0
 - hp 1 or 0
 - limits MIN1:MAX1:MIN2:MAX2
 - temp ?
- In Web Application:
 - houses= {}

- 'house_name': {}
 - 'room_name': {}
 - 'alarm': 1 or 0
 - 'changes': 1 or 0:1 or 0
 - 'hp': 1 or 0
 - 'limits': MIN1:MAX1:MIN2:MAX2
 - 'temp': ?
 - ...

Constraints

- Adafruit MQTT Broker has a limit of 10 feeds in each group
- Adafruit MQTT Broker doesn't accept a considerable diversity of characters

Edit Feed

Name

teste

Maximum length: 128 characters. Used: 5

Key

teste

Changing the key will change API URLs and MQTT subscription topics. The only characters we permit are lower case english letters ("a" to "z"), numbers, and dash ("-").
[See our guide to naming things in Adafruit IO](#) for more information about how we handle the formatting of **names** and **keys**.

Current Endpoints

Web

https://io.adafruit.com/Rodrigo2000/feeds/teste

API

https://io.adafruit.com/api/v2/Rodrigo2000/feeds/teste

MQTT

Rodrigo2000/feeds/teste

by Key

- Adafruit library to Arduino cannot properly get data from MQTT Broker