FACULDADE DE CIÊNCIAS E TECNOLOGIA
UNIVERSIDADE D COIMBRA

Assignment 4: IoT SmartHome Controller

Sistemas de Comunicação Móvel - Departamento de Engenharia Informática

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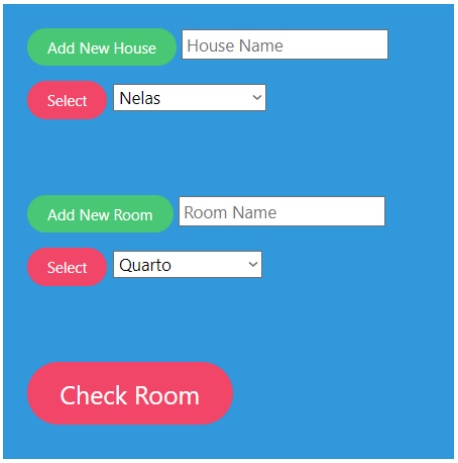
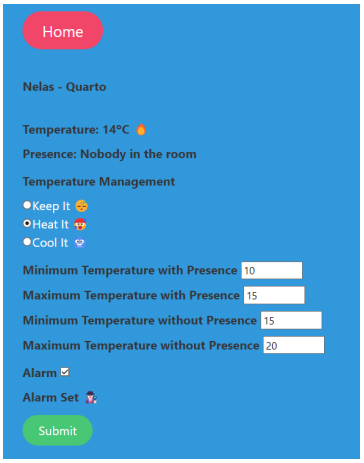
1. System

- 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

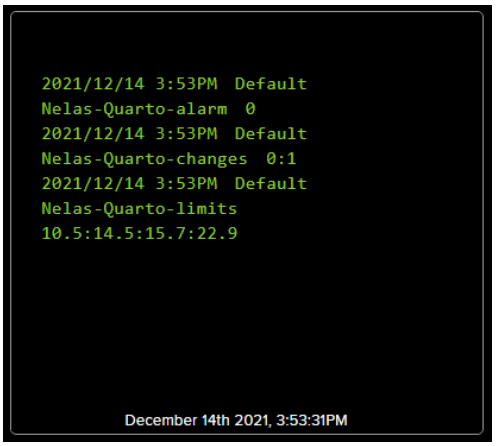
- 1 Web App (*Python*)
  - Adds Houses and Rooms
  - Manage each room
    - Check Temperature and its state (heating or cooling)
    - Check Human Presence in the room
    - Define the temperature state
    - Define Temperature Limits
    - Set an Alarm





- 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



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

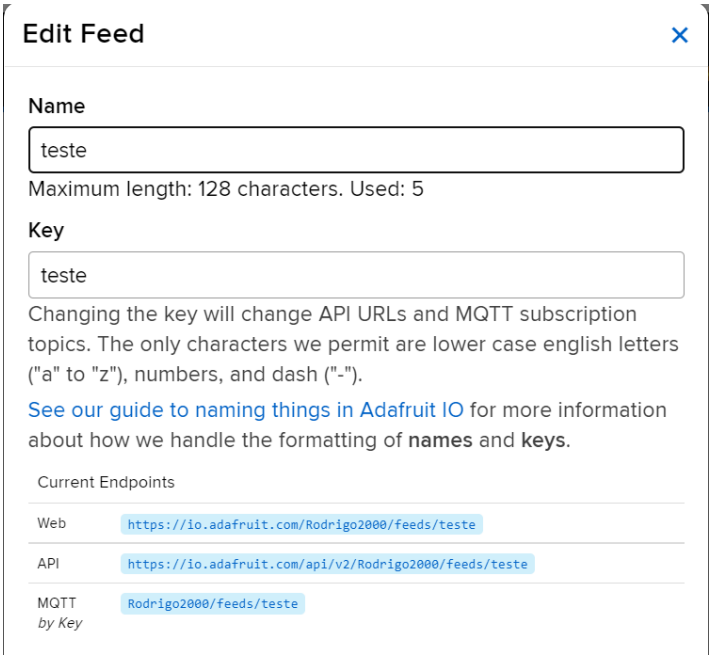
- In MQTT Broker:
    - house_name-room_name-<?>
        - alarm 1 or 0
        - changes 1 or 0:1 or 0
        - hp 1 or 0
        - limits MIN1:MAX1:MIN2:MAX2
        - temp ?

- 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



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