Trinity College Dublin

MSc Computer Science

CS7NS4- 2018/19 Module Report

Submitted By:
Khushboo Goyal(18300852)

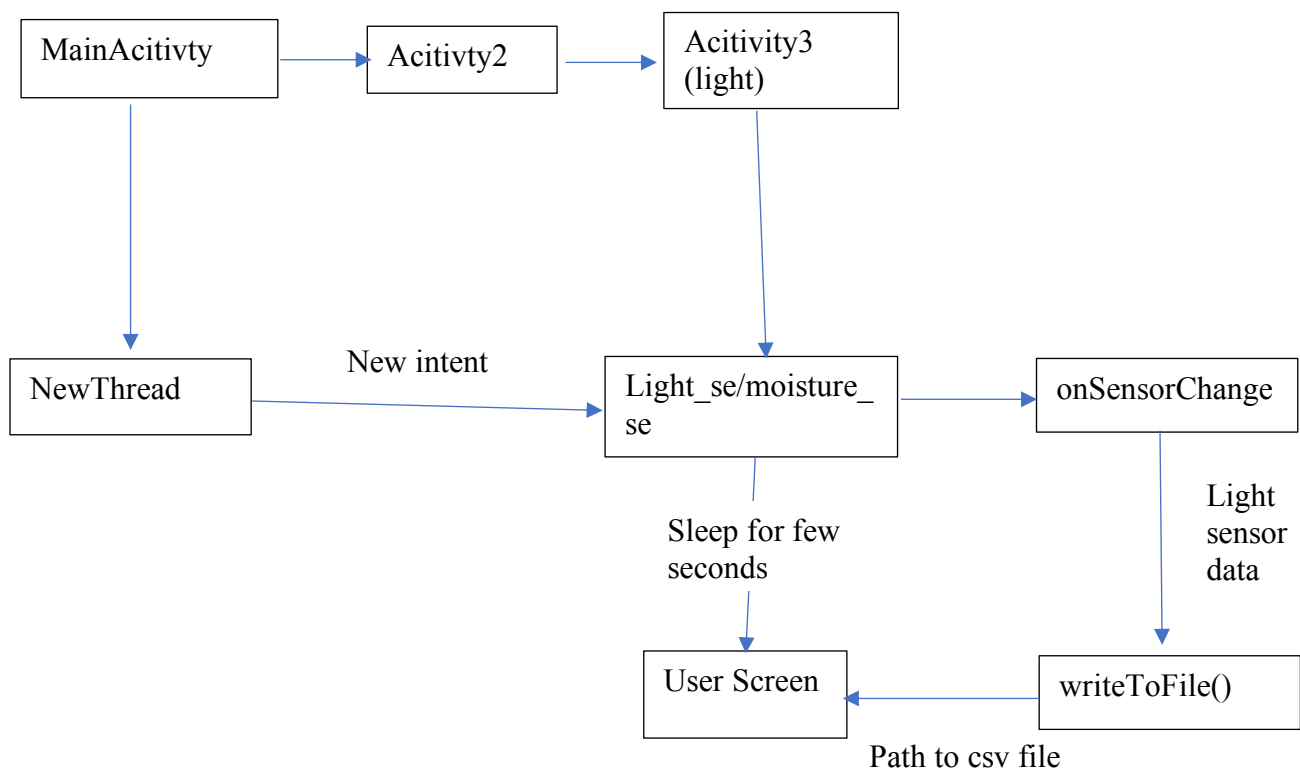**Supervised by**
Dr. Mélanie Bouroche

April 1st , 2019

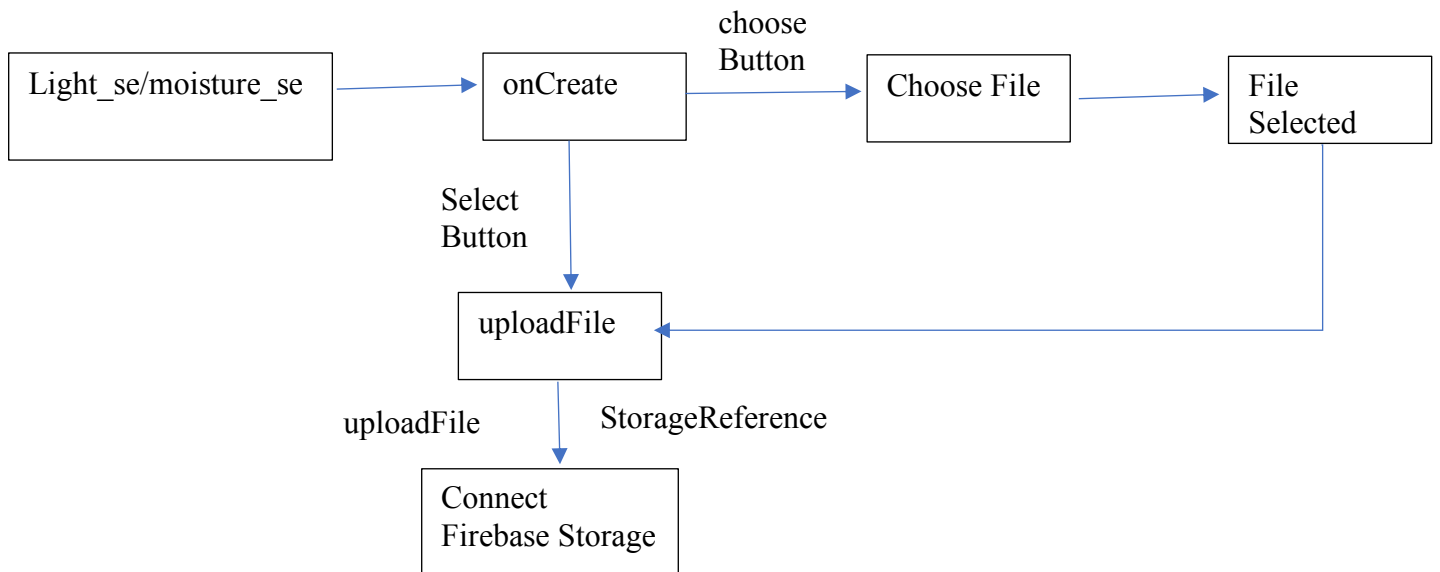# Green IoT - A Green House Metrics Detection System

1. Introduction

Greenhouses allow a person the different view of growing plants by controlling its climate not knowing of what's happening outside. They need systems with all the conditions that are required for a particular plant to grow in that Greenhouse. They need heating and cooling systems, ventilation, lights and shades for their plant. These type of facility will help gardener to provide wide range of plants to grow under single roof by creating different environment on a particular time. There are many kind of greenhouses for example large, small and medium , all require different kind of specialization according to the need of the plant. Some big greenhouse are divided into many parts and allows people to grow different variety of plants under one roof. For example, vegetable and fruits are divided into groups according to the season , where some are winter season fruits and some are summer season vegetables. They all can grow at a same time by providing artificial environment looks like the same kind of environment for them.
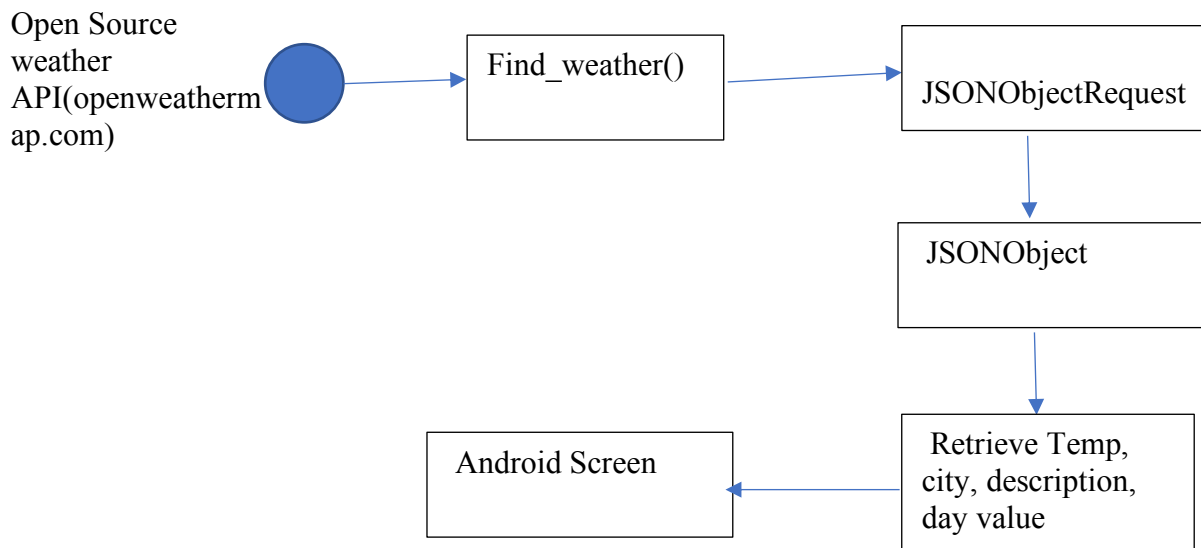
2. Technical Diagram(General Sensor- Light and moisture)

```
MainAcitivty ──────▶ Acitivty2 ──────▶ Acitivity3
    │                                    (light)
    │                                       │
    ▼                                       ▼
NewThread ──New intent──▶ Light_se/moisture_ ──────▶ onSensorChange
                              se                          │
                              │                        Light
                         Sleep for few                 sensor
                           seconds                      data
                              │                           │
                              ▼                           ▼
                         User Screen ◀──────────── writeToFile()
                                      Path to csv file
```

Part-2 (Google Firebase)

```
Light_se/moisture_se  →  onCreate  --choose Button-->  Choose File  →  File Selected
```

onCreate --Select Button--> uploadFile

File Selected → uploadFile

uploadFile --uploadFile / StorageReference--> Connect Firebase Storage

Part 3- Weather data API

```
Open Source weather API(openweathermap.com)  ●  →  Find_weather()  →  JSONObjectRequest
```

JSONObjectRequest → JSONObject

JSONObject → Retrieve Temp, city, description, day value

Retrieve Temp, city, description, day value → Android Screen

3. Screen Shot of App

Figure 1:First shows greenhouse plants, second shows 3 sensors applied & third figure shows the uploading progress Dialogue
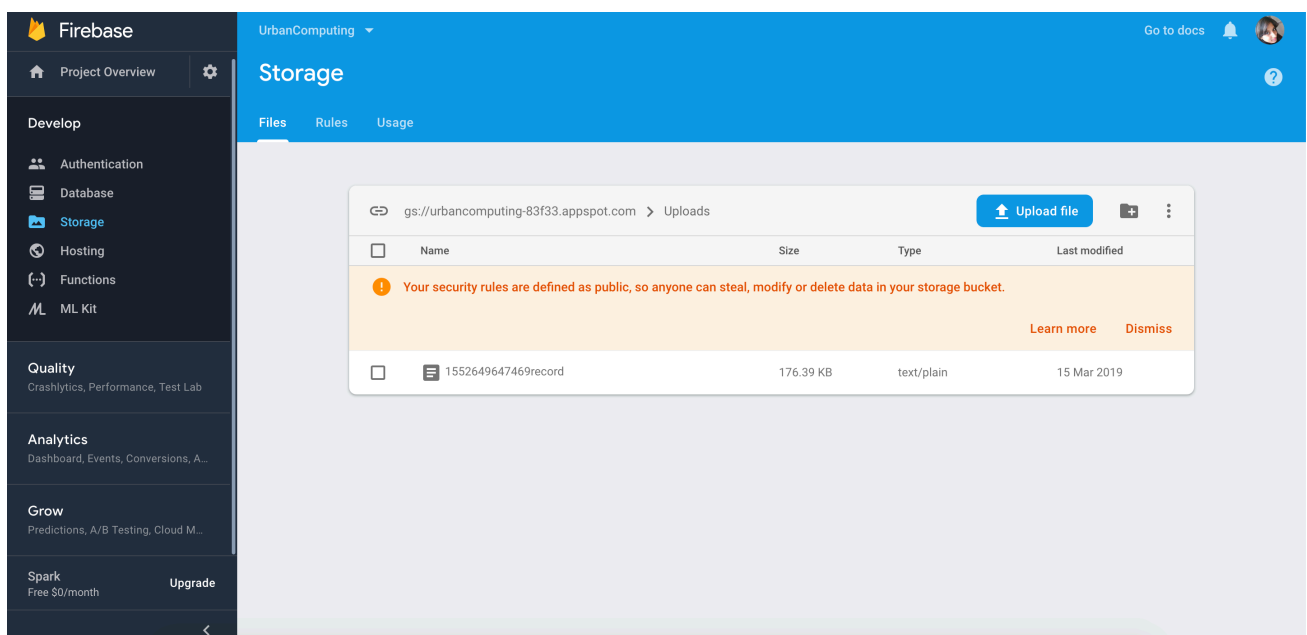

Figure 2:It shows the firebase storage window with uploaded txt file from app.
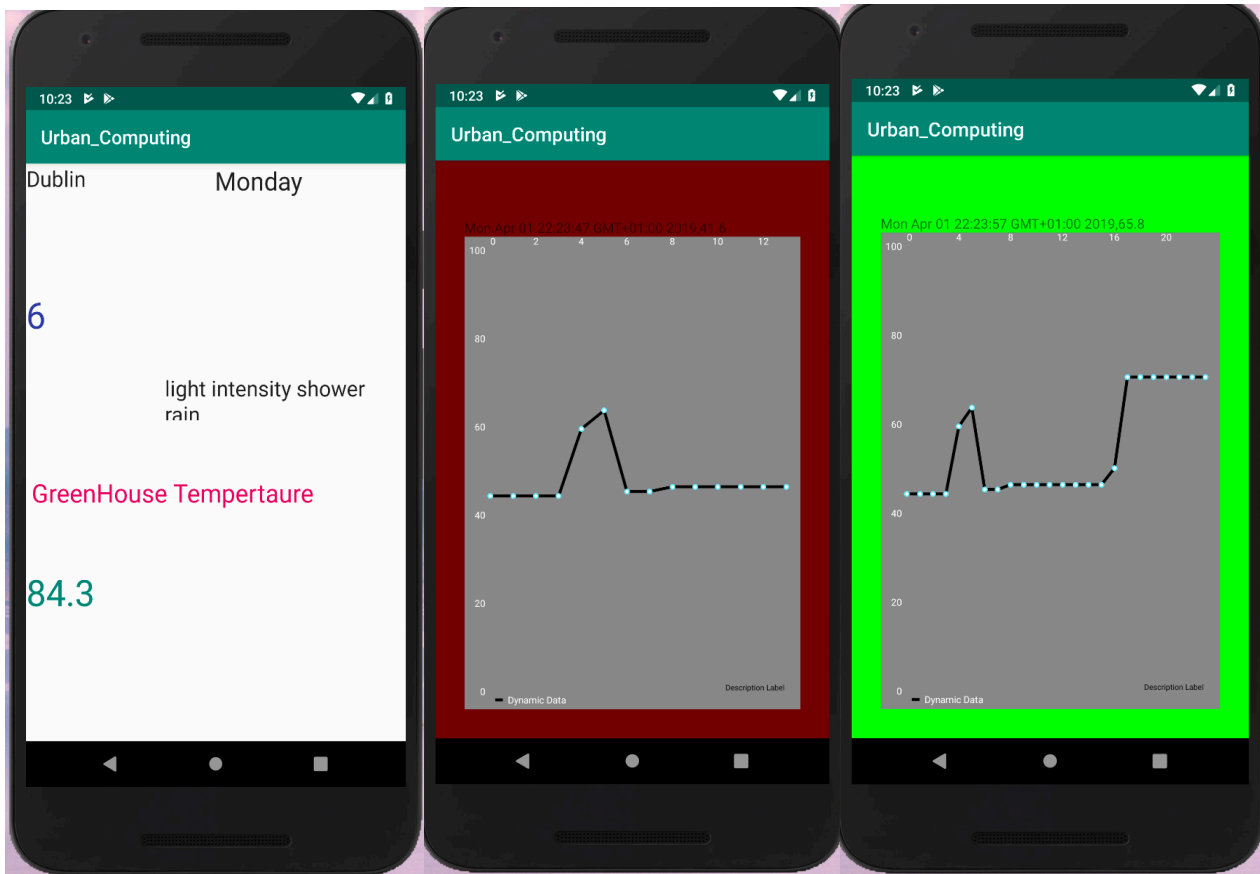
Figure 3: First images shows the outside& inside temperature of greenhouse and other two images shows the sensor when at threshold point(red light) and when the values are correct(greenlight)
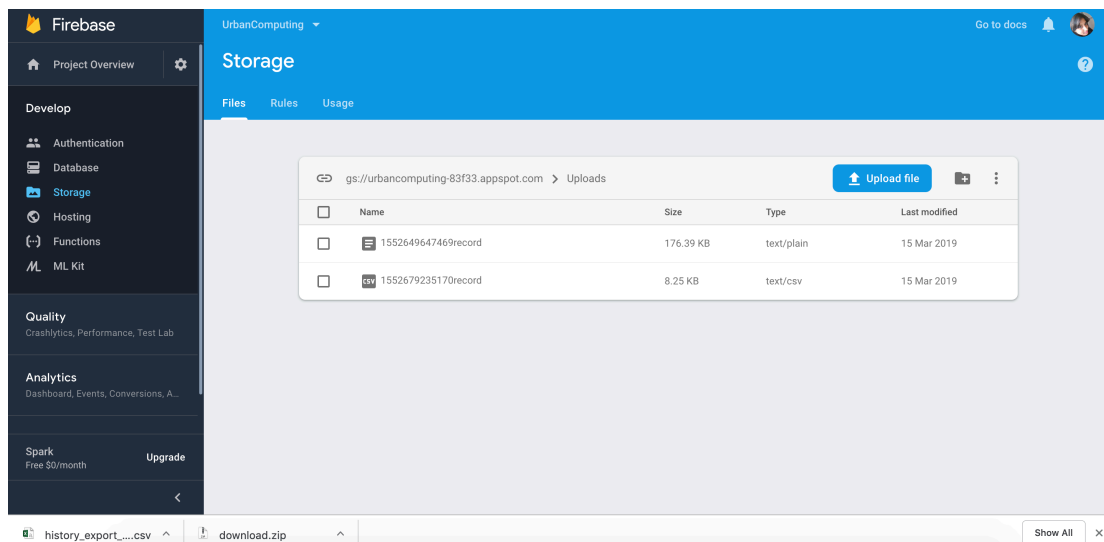

Figure 4:It shows the firebase storage window with uploaded csv file from website.

4. About the application

The application is divided into two parts where in the first part, I am using 2 sensors which detect the light intensity and humid intensity of the green house and in the second part I am taking weather data from the third party API and compare it with the temperature inside the greenhouse. There will be a difference in data as in greenhouse plants need particular amount of temperature to grow and outside temperature is not good enough to grow those special plant.

4.1 Light sensor -

Light sensor is used for all the plants like strawberry, chilli and tomato to check the intensity of light used by plants to grow. The measuring scale is LUX, and for all plants different intensity is needed like for strawberry average of 5-6 hours daylight which has 10,000 LUX intensity at max. In this part, threshold is set according to the plants need and if any of the threshold crosses it will turn app background screen in red color to detect the fault in light intensity or for faulty sensor. Admin or authority will go and check the issue after getting this red notification.

4.2 Humid Sensor -

Humid sensor is same as light sensor where all plants senses the moisture in the soil. It is measured in percentage where 100% means the soil is wet. It will work same as light with all threshold set according to the requirement of the plant.

4.3 Weather Sensor -

Weather is the one condition which is also important for a plant to grow specially when the plants are not planted in specific season. I took open source data for weather to compare my internal greenhouse temperature with outside weather conditions. Openweathermap.com is providing data on city , city id, geo location etc basis, in which I choose city to visualise temperature of Dublin on screen.

4.4 Storing data in Firebase -

Firebase is used for storing the data of the application sensor. As Firebase is compatible with all android application , so I take this service which benefits me in their own way. User will click the upload button and select a file which stores all the sensor value every second from the internal storage of Android phone. By clicking on upload button it will directly go into Firebase storage.