UWC ISAK JAPAN

WEATHER STATIONS

BY KRISH AND THUMULA

INTRODUCTION

A teacher at a local highschool wants farm marijuana and store them in his room. The temperature of the farm and storage rooms are controlled so that the temperature range will always be between 0° and 50°C and the humidity will always be between 20% and 90%. He wants a program that once it is run is able to collect temperature and humidity for 48 hours and able to visually represnt them and give the predictions for the next 12 hours.

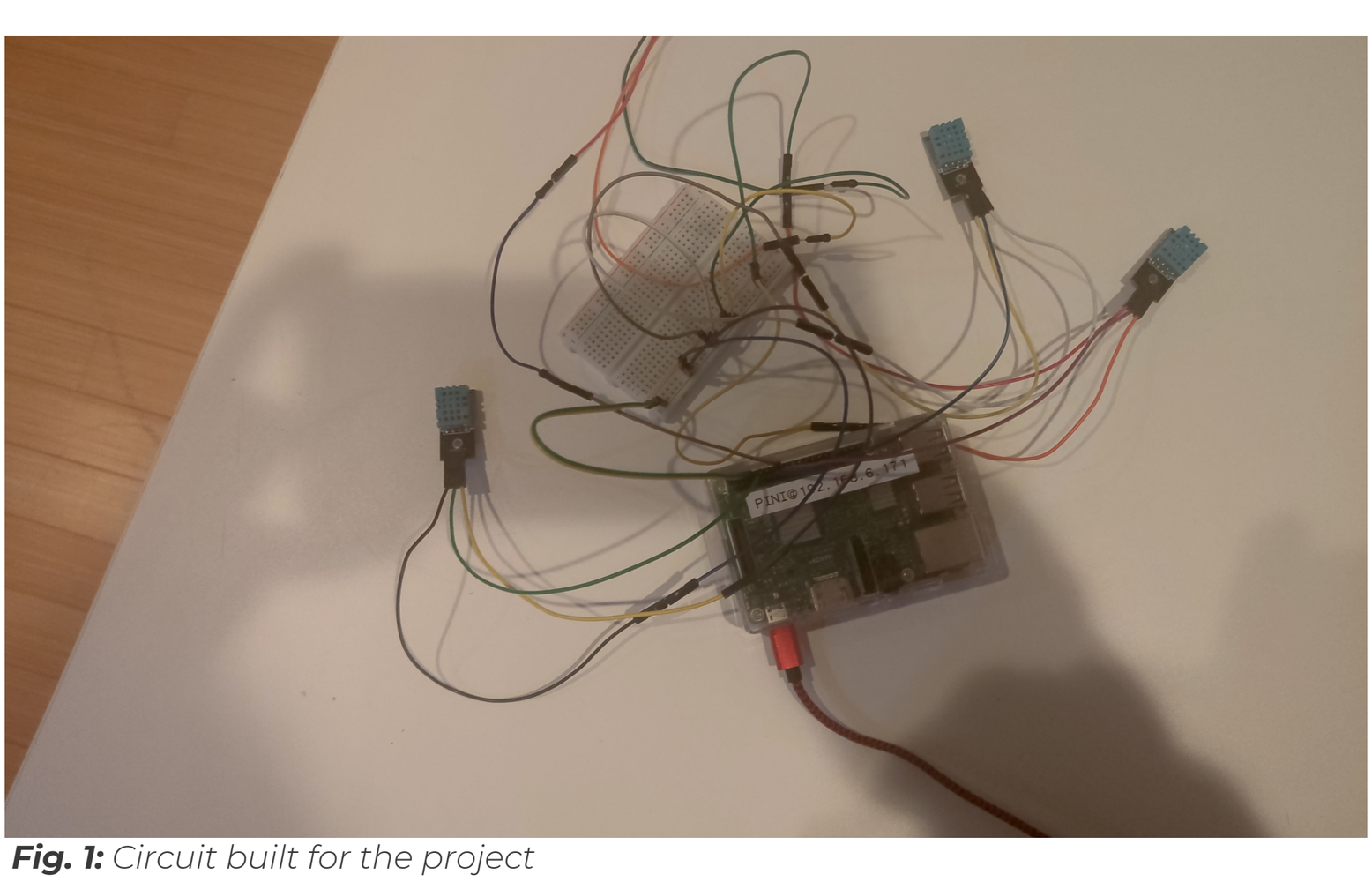

Fig. 1: *Circuit built for the project*

METHODS

- First, we had to create a new user in the server.
- Then, using that user's details we registered our sensors to the server.
- Then we took data for every five minutes for fourty-eight hours and stored them in a CSV file in the Raspberry Pi 4.
- Then we uploaded them to the server from the CSV file in Raspberry Pi 4.
- After uploading the data to the server we plotted non-linear graphs according to the data that we submitted and also the data that was given from the sensors outside.
- Finally we predicted the next 12 hours of temperature and humidity.

MATERIALS

- 4 DHT 11 Sensors
- Breadboard
- 2 Raspberry Pi 4s
- Jumper wires
- MacOS running python 3.10.6

HARDWARE OF RASPBERRY PI 4

CPU: Quad-core ARM 64bit 1.5GHz
Primary memory: 8GB LPDDR4
Secondary memory:32GB microSD
Wi-Fi:2.4 GHz wireless LAN

RAW DATA

*Aflter conducting the temperature and humidity study for 48 hours we were able to obtain the following graphs(**Fig.2**). Which resulted in proving that the temperature and the humidity in the farm is below the optimum temperature and humidity levels for growing marijuana as the temperature is not in range of 28 - 18 °C while the humidity level required is 80 - 90%. As for storing the marijuana the room has the optimal condition as the temperature is below 21°C. However the humiditiy level is not in the optimal range(55% - 65%).* Thus, we came to the conclusion that the farm temperature and humidity levels need to manipulated while the room humidity level also needs to be manipulated

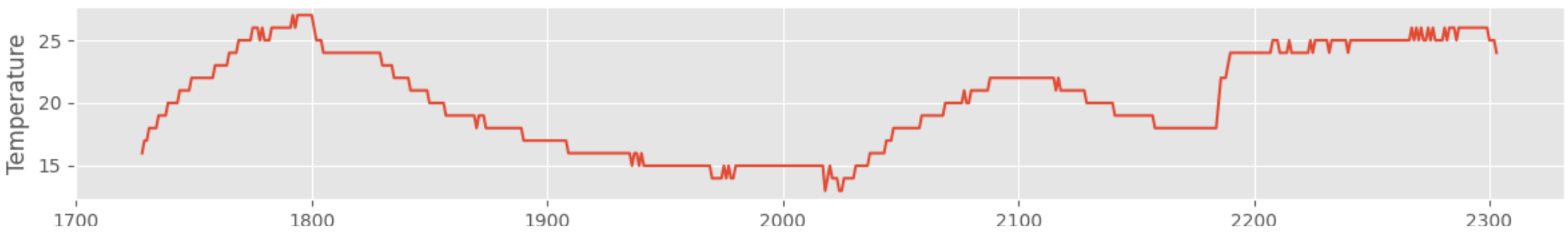

Fig. 2.1: *Raw data graph for remote temperature*

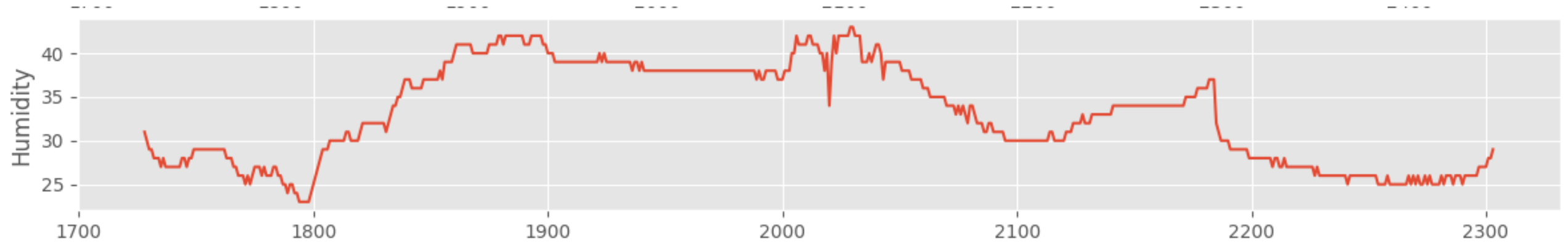

Fig. 2.2: *Raw data graph for remote humidity*

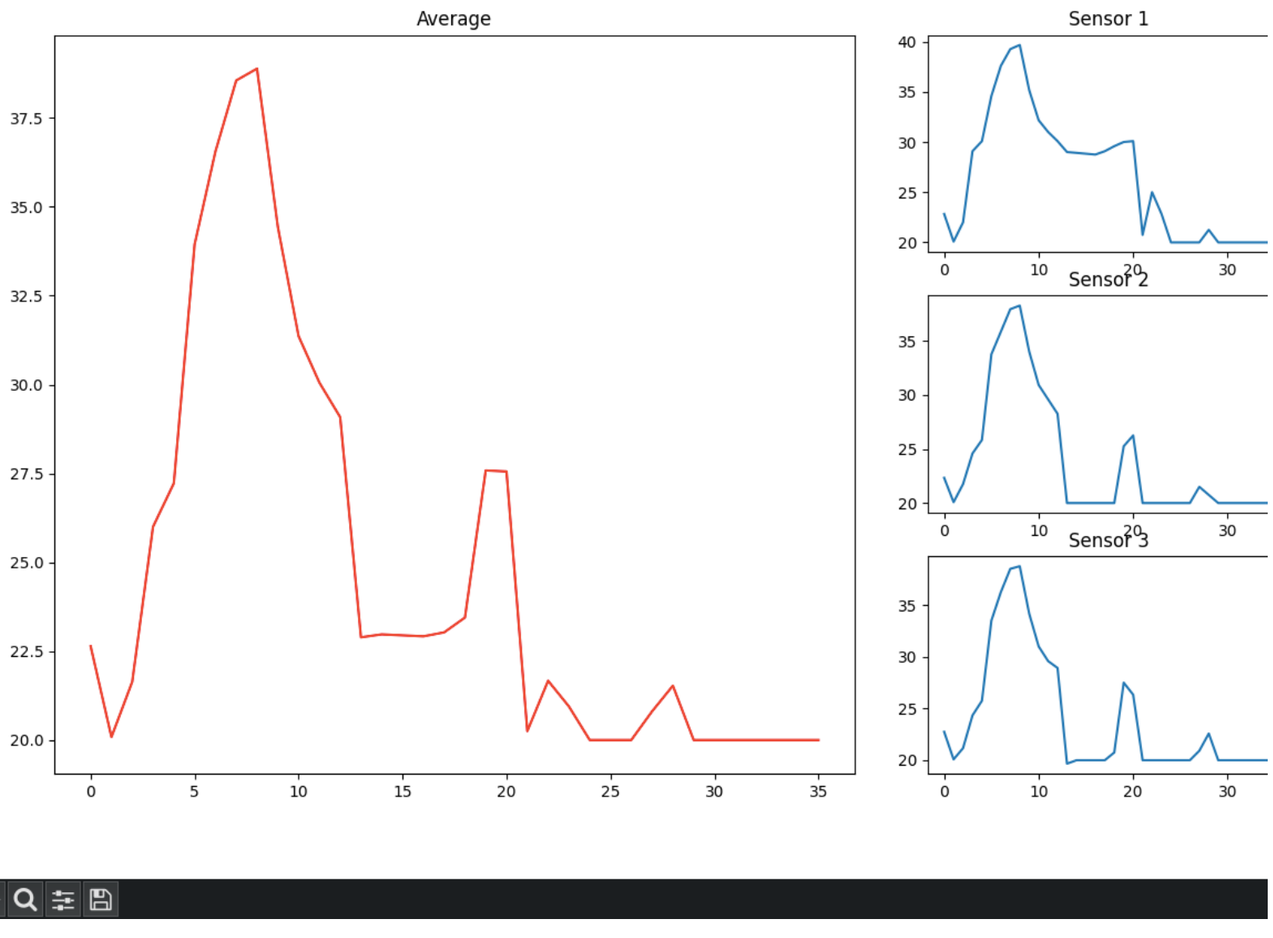

Fig. 2.3: *Raw data graphs for local temperature*

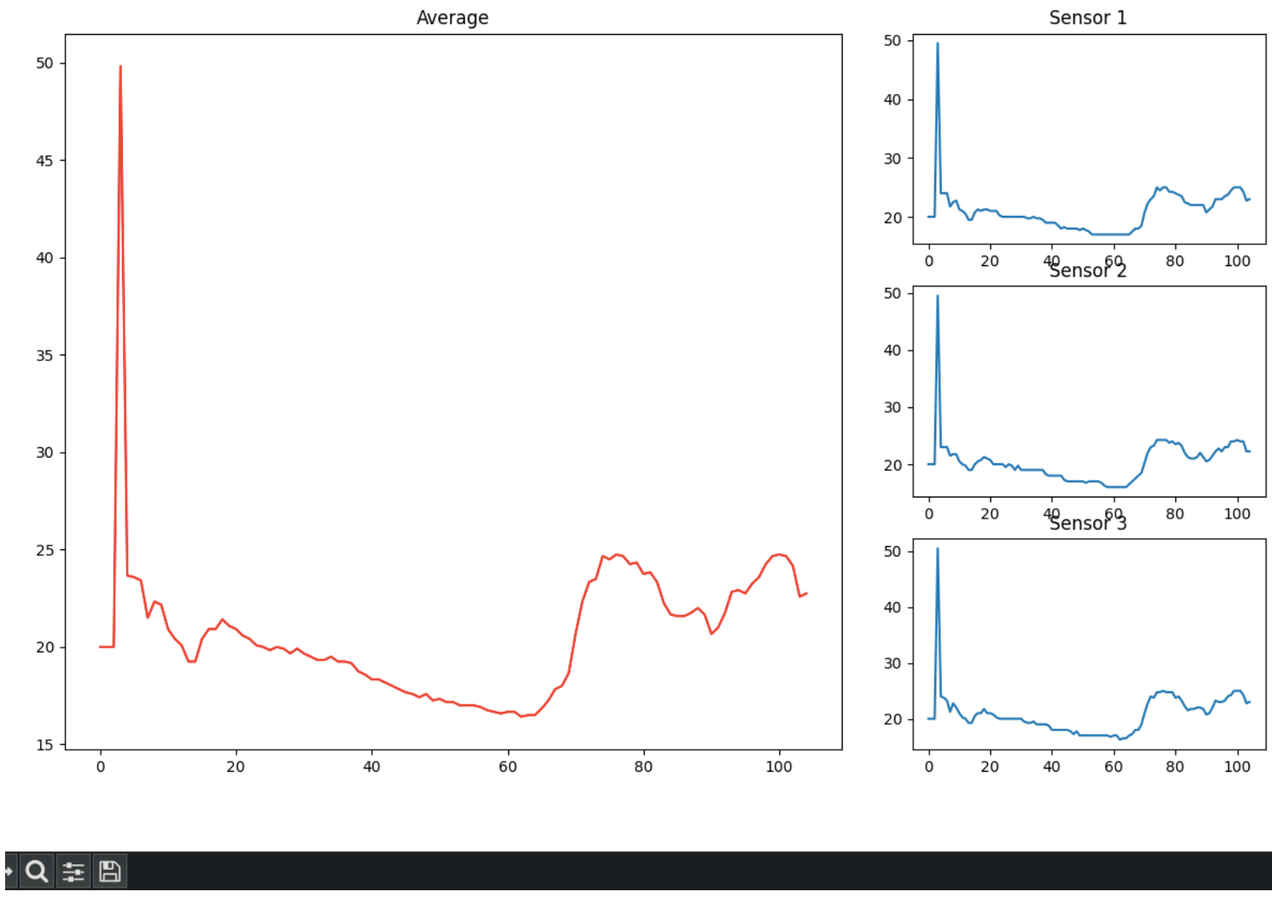

Fig. 2.4: *Raw data graph for Local Humidity*

COMPARISON

After plotting the graphs from the data that we obtained from the sensors we smoothed the data and managed to create a cubic equation for the graphs. After getting the equation we extended the graph for another 12 hours. From which we got the predictions for the next 12 hours(Shown in ***Fig.3****).*

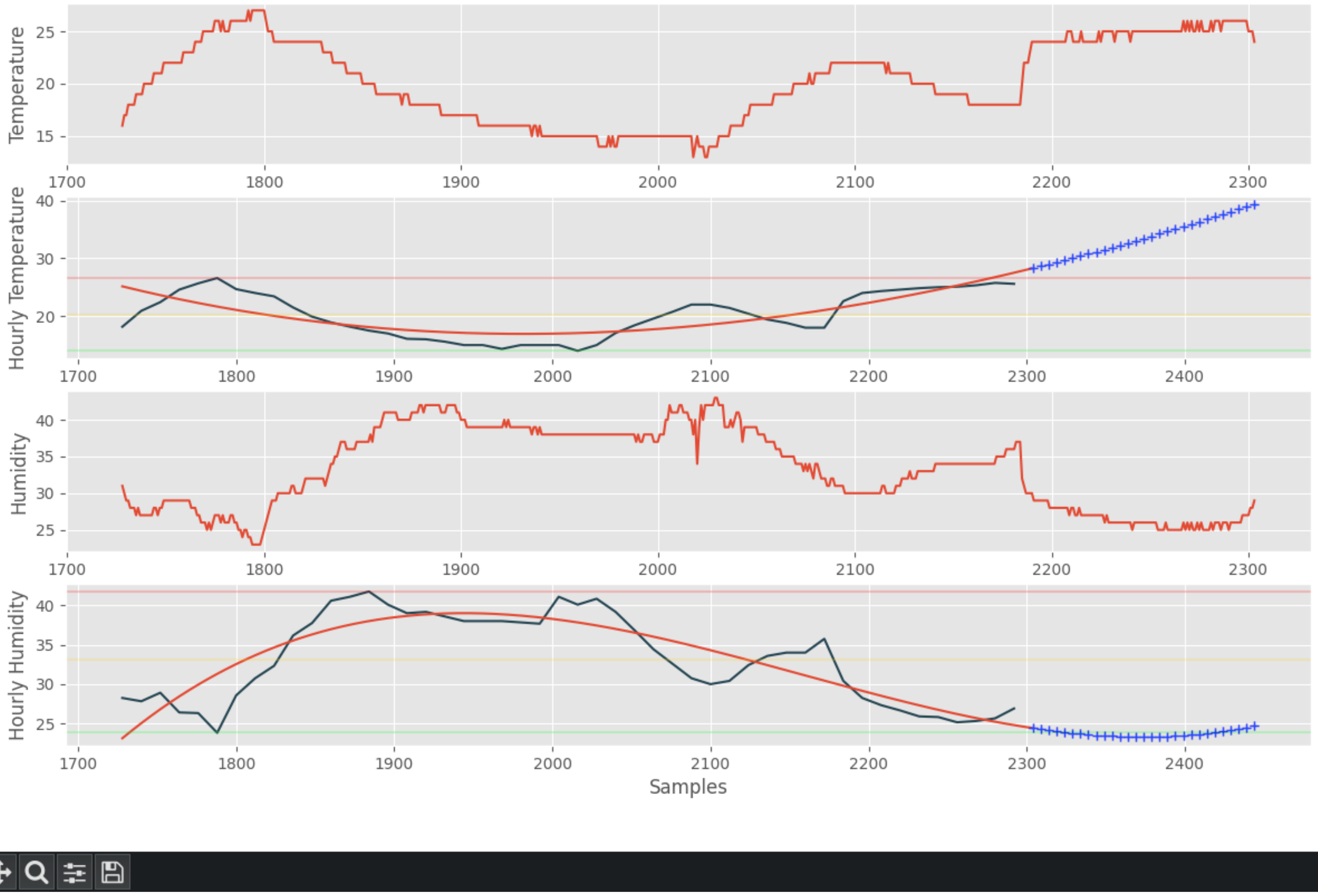

Fig. 3.1: *Raw Remote Data and smoothed remote data with non-linear model, extrapolation, min, max, mean of temperature (top) and humidity (bottom)*

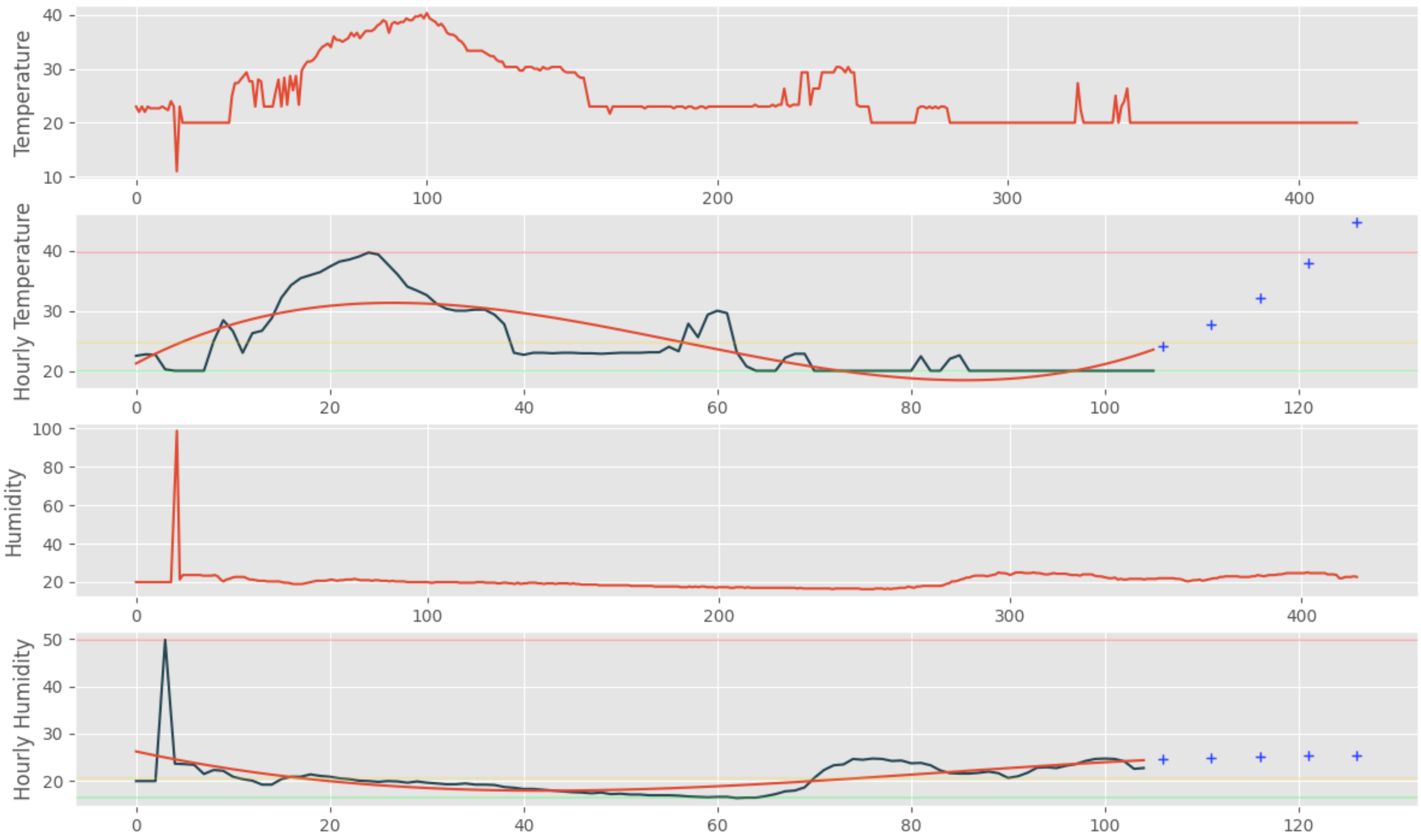

Fig. 3.2: *Raw Local Data and smoothed local data with non-linear model, extrapolation, min, max, mean of temperature (top) and humidity (bottom)*

CONCLUSION AND ANALYSIS

We can clearly see from the graphs that the minimum temperature and humidity on campus in light green in the graph(Fig.3.1). Also we can see that the maximum temperature and humidity on campus by the orange line. Also the predictions are visible by the blue crosses in the same graph.
We can clearly see from the graphs that the minimum temperature and humidity on campus in light green in the graph(Fig.3.2). Also we can see that the maximum temperature and humidity in the room by the orange line. Also the predictions are visible by the blue crosses in the same graph. Thus we can conclude that the maximum room temperature and the room humidity have a higher value than the on-campus temperature humidity.
Also according to our predictions for on campus data we can see that on-campus temperature is going to be around 40°C while the humidity is going to be around 25%. Finally the predcitions made for the room shows that the temperature will be higher than 40°C while the humidity will be between 30% and 20%.