Greenwatch v2
User Manual

Revision 1

Prepared by

Sharome Burton
Delton Hughes
Victor Marchesi
Calvin Walmer

May 2, 2024

Table of Contents ---------- **2**

1. Introduction/Overview ---------- **3**
1.1 Purpose of Document 3
1.2 Users 3
1.3 Accessibility 3
1.4 Disclaimer 3
2. System Overview ---------- **4**
2.1 Getting Started 4
2.2 Login Page 4
2.3 Home Page 6
2.3.1 Modifying Rooms 8
2.3.2 Editing and Deleting Rooms 15
2.3.3 Notes Overview 17
2.4 Room Page 19
2.5 Exporting Data 24
2.6 Experiments 31
2.7 Messages Overview 36
2.8 Agent Overview (Admin Only) 38
3. User Management ---------- **39**
3.1 Admin Privileges 39
3.2 Add, Editing, and Deleting Users (Admin Only) 39
3.3 Add and Deleting Rooms 44
3.4 Non-Admin Privileges 44
3.5 Monitoring Data and Chat Messages 44
4. Hardware Setup ---------- **48**
4.1 Credentials 48
4.2 Installing Raspbian on Agents 49
4.3 Setting up Software and Automation on Agents 49
4.3.1 Enabling IC2 and SPI Interfaces 49
4.3.2 Installing Teamviewer on Agents 51
4.3.3 Adding Programs to autostart 52
4.3.4 Creating GreenWatch Directory 53
4.4 Setting up Teamviewer Account and Linking Agents 54
4.4.1 Opening Teamviewer 55
4.4.2 Advanced Menu (Personal Password) 56
4.4.3 Security Menu 57
4.4.4 General Menu (Easy Access) 57
4.5 Adding agent.py Files to Agents 58
4.5.1 Getting Agent Files from Web Application 58
4.5.2 Method 1: USB (Local Access) 60
4.5.3 Method 2: Teamviewer (Remote Access) 61
4.5.4 Making an Agent File Executable on the Agent 63
4.6 Wiring Diagrams 64
5. Server Setup ---------- **67**
6. IMPORTANT ---------- **68**

1. Introduction/Overview

1.1 Purpose of Document

This software is designed to monitor and record the environmental conditions within a greenhouse, including temperature, humidity, air pressure, and light levels over time. It utilizes Raspberry Pi devices equipped with Raspberry Pi Sense HATs and additional light sensors on breadboards to gather data. This system is intended for use by the Biology department at Midwestern State University in their greenhouse.

1.2 Users

The primary users of this system include students, professors, and research staff from the Biology department. Users are categorized as either admins or non-admins. Admins have comprehensive control over the Greenwatch system, allowing them to configure settings, create rooms, agents, users, and experiments. Non-admins, on the other hand, have limited access; they are only permitted to view recorded data from all rooms, experiments, and messages without any administrative rights.

1.3 Accessibility

To access the application the user will simply go to the **IP of where the application is hosted** (We will get into more detail on this in the server setup section) and login through the login page once an existing admin has created a username/password for the user to access the dashboard. The server currently running Greenwatch can change and all users of the application will be notified of the changes. A bit down the road we plan on proposing a new iteration with more money to fund a better server and a domain name like greenwat.ch or something along those lines.

1.4 Disclaimer

After this document has been produced specific details regarding instructions, IP addresses, and domain names may change at later stages of the project. If these changes do occur then contact the current team or Catherine Stringfellow (catherine.stringfellow@msutexas.edu) to get the details of the up to date information.

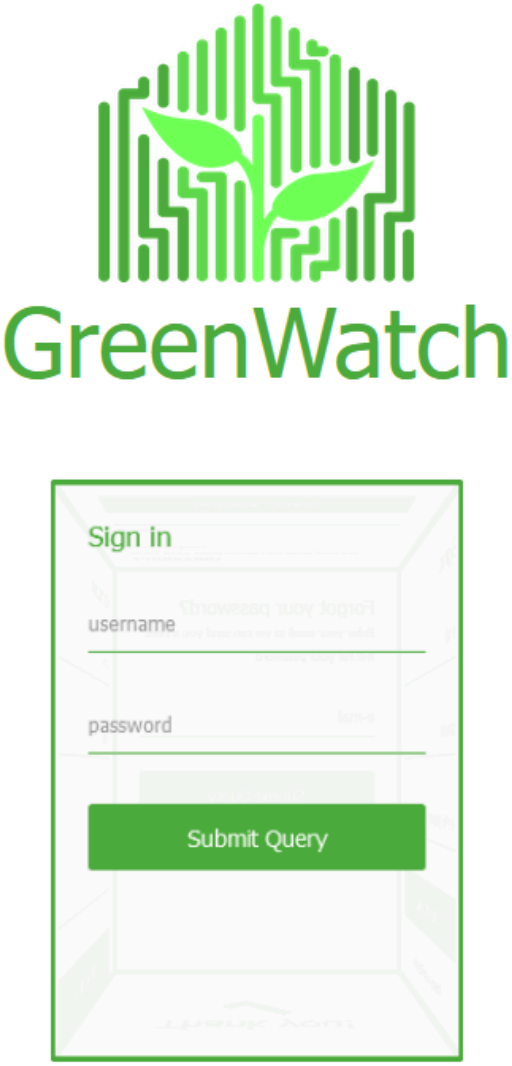
2. System Overview

2.1 Getting Started

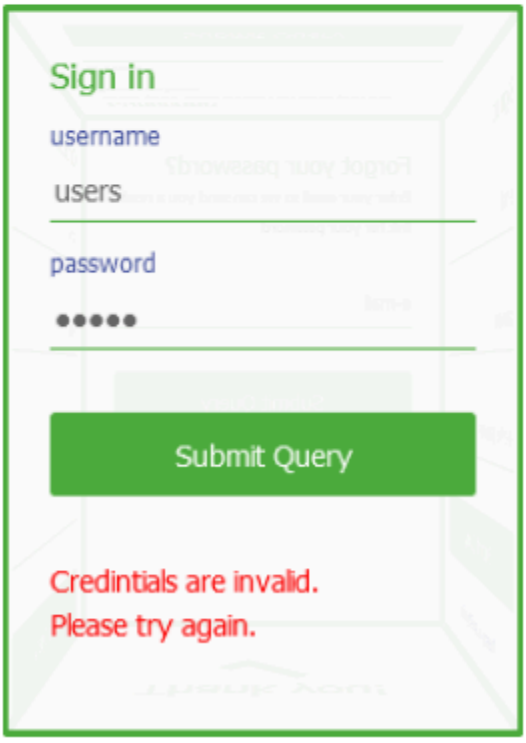
Once the system is functional with a public IP address. All we will need to do is go to that IP address/domain on a public browser and it will redirect you to the login page.

2.2 Login Page

Once a user or admin has arrived at the login screen through a browser they must enter their username and password.



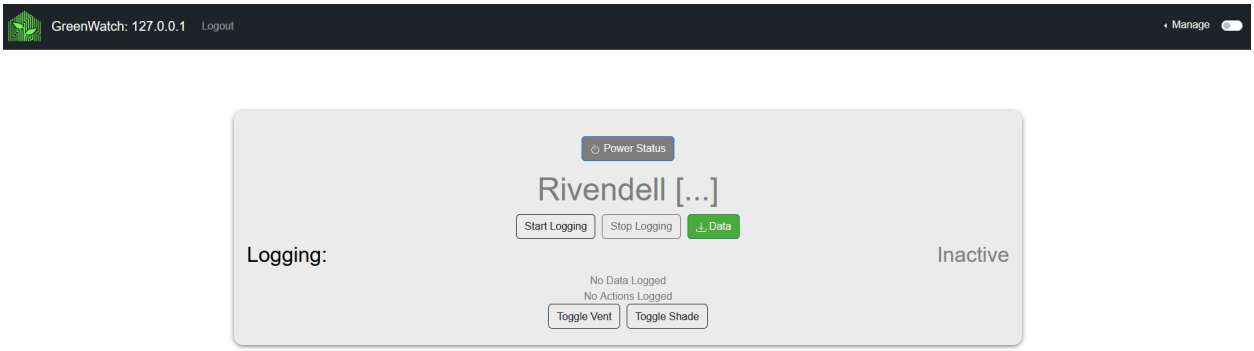
Should the user enter invalid credentials an error message will appear below until valid credentials are used.



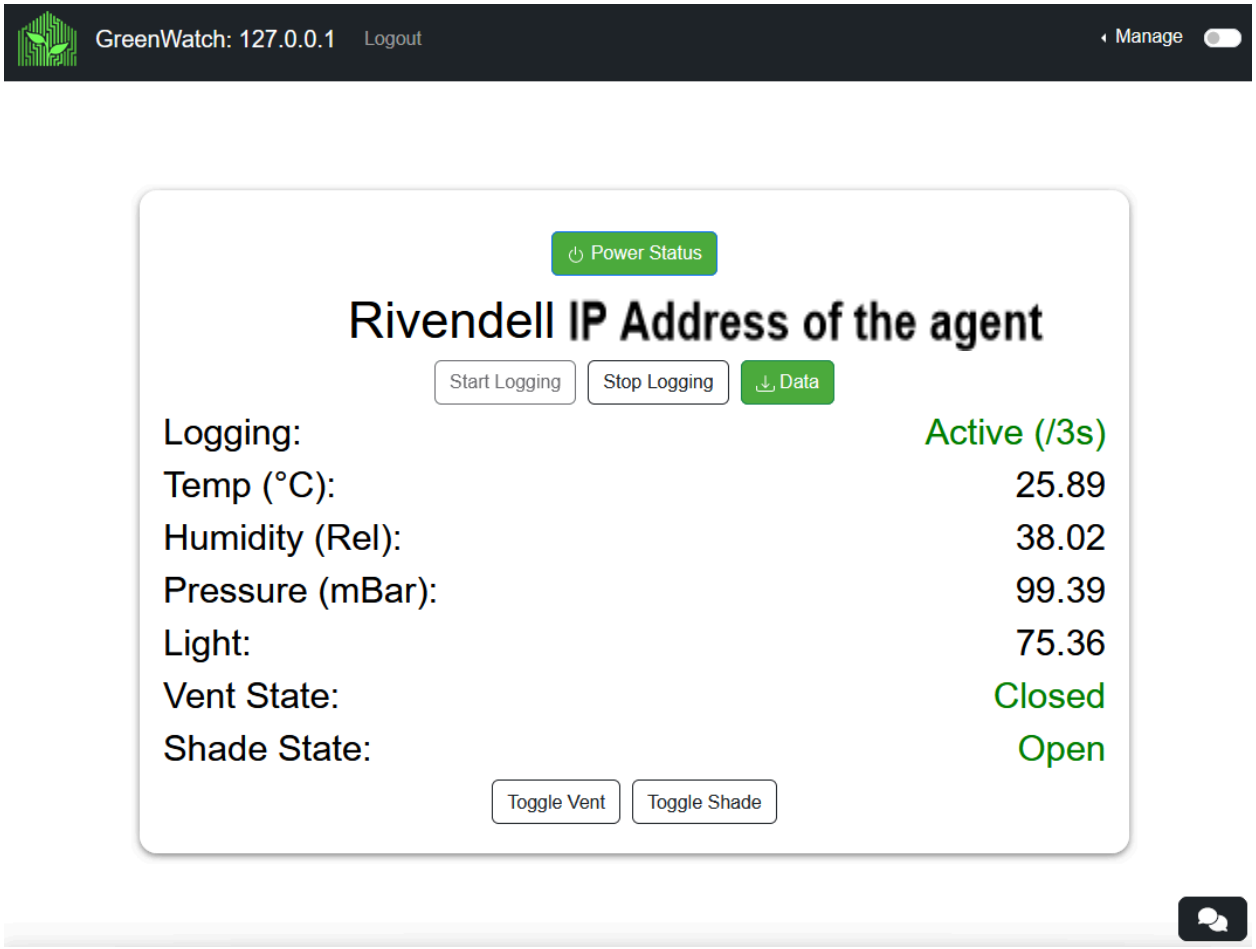
2.3 Home Page

Once logged in, the user will be brought to the rooms page which will display all rooms within that have been added to the system and there is also the messages button in the bottom right. Should the system be newly set up, it is very likely to see a sparsely populated page like so:

Note: I have covered up the IP with the message “IP address of the agent” to protect my personal IP address. When the app runs, you will see the IP of where the application is being hosted on,



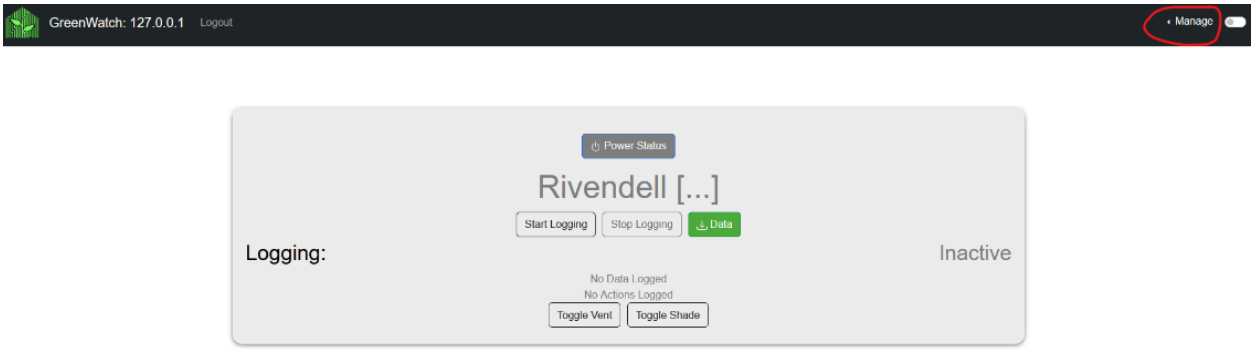
A more developed Home page with rooms containing measurement data may appear like so, displaying 4 relevant environmental conditions per connected room at a glance



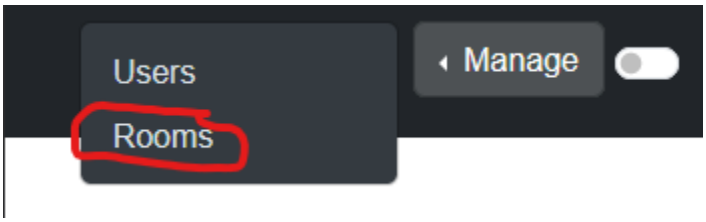
It should be noted that logging out or returning to the Home page is always achievable through pressing the buttons in the top Left corner of the screen. Clicking the logo takes you to the homepage, and logout takes you to the login screen and logs you out.

2.3.1 Modifying Rooms

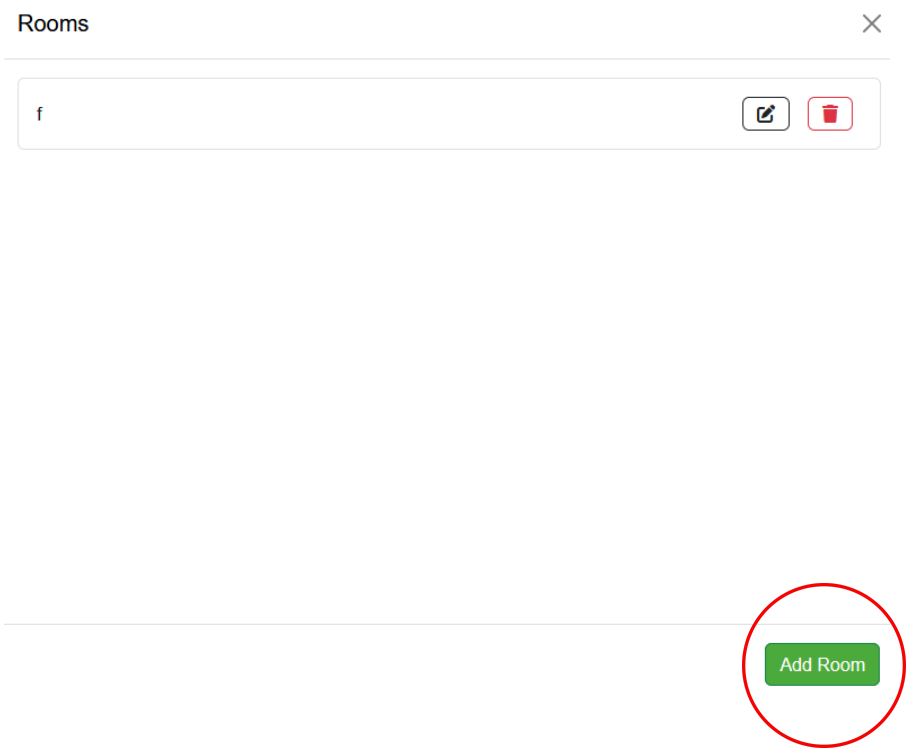
Example 1: In order to add a room, first click on the settings button on the top right corner of the screen to display a dropdown and select rooms, circled in **RED**



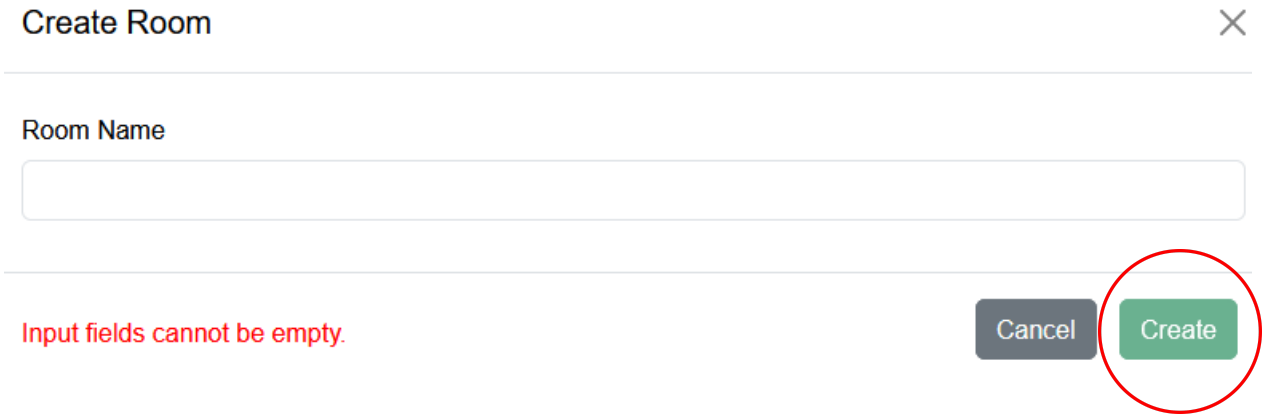
Example 2: Then click Rooms, circled in **RED**



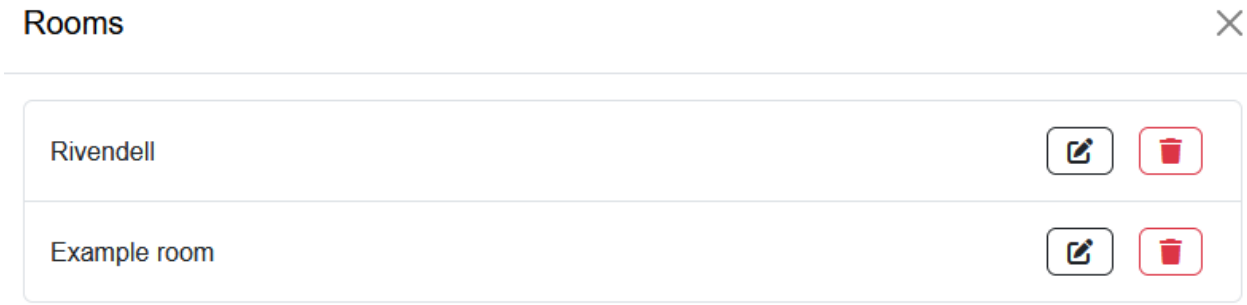
Example 3: This will bring up the list of Rooms within the system. This list will be empty starting out. In order to create a new room, simply click on the "**Add Room**" button in the lower right corner of the pop up.



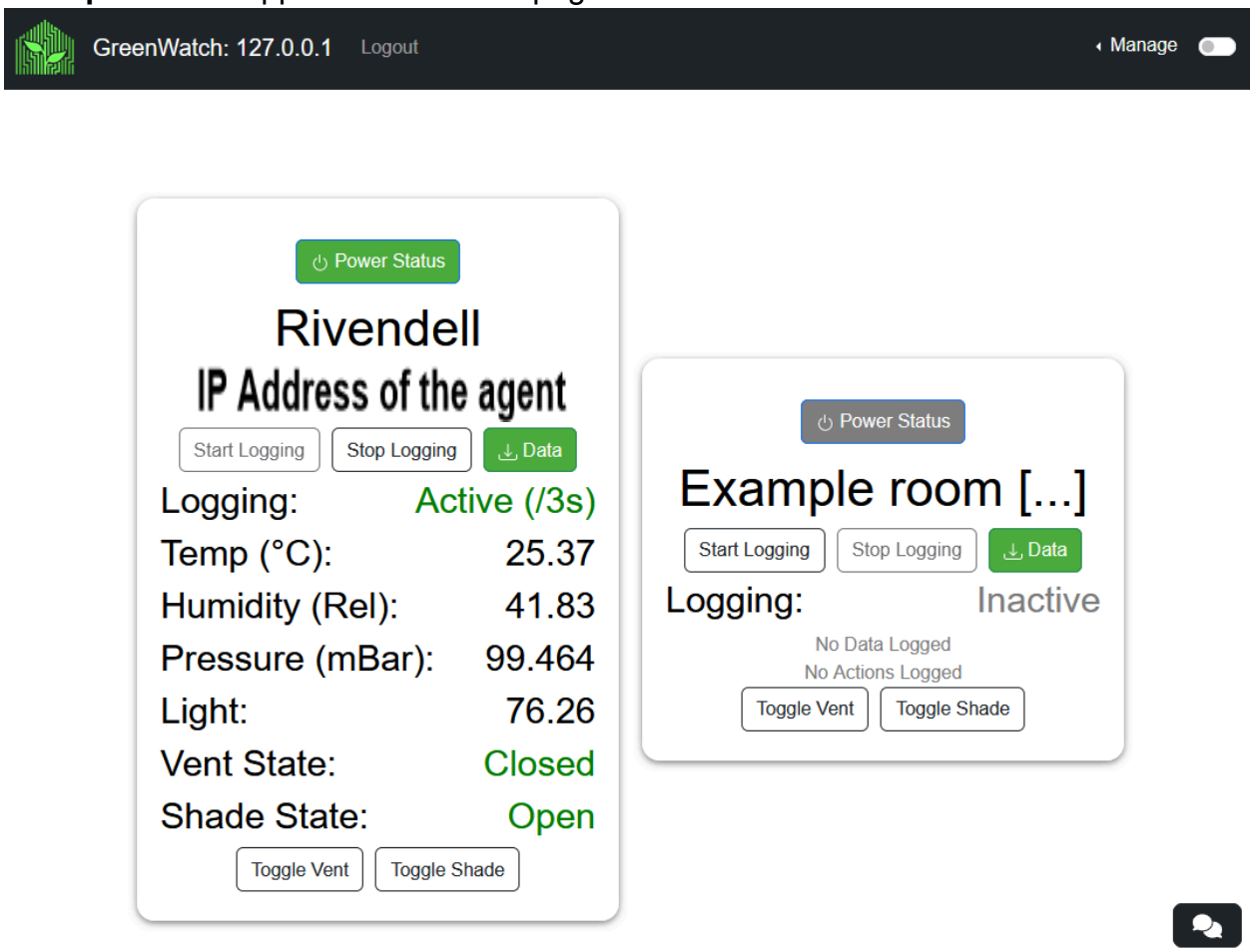
Example 4: Once clicked, you now may create a room by simply entering what you would like to name it. The system will not accept an empty entry. Once you have the name, simply click create in the lower right hand corner of the pop-up.



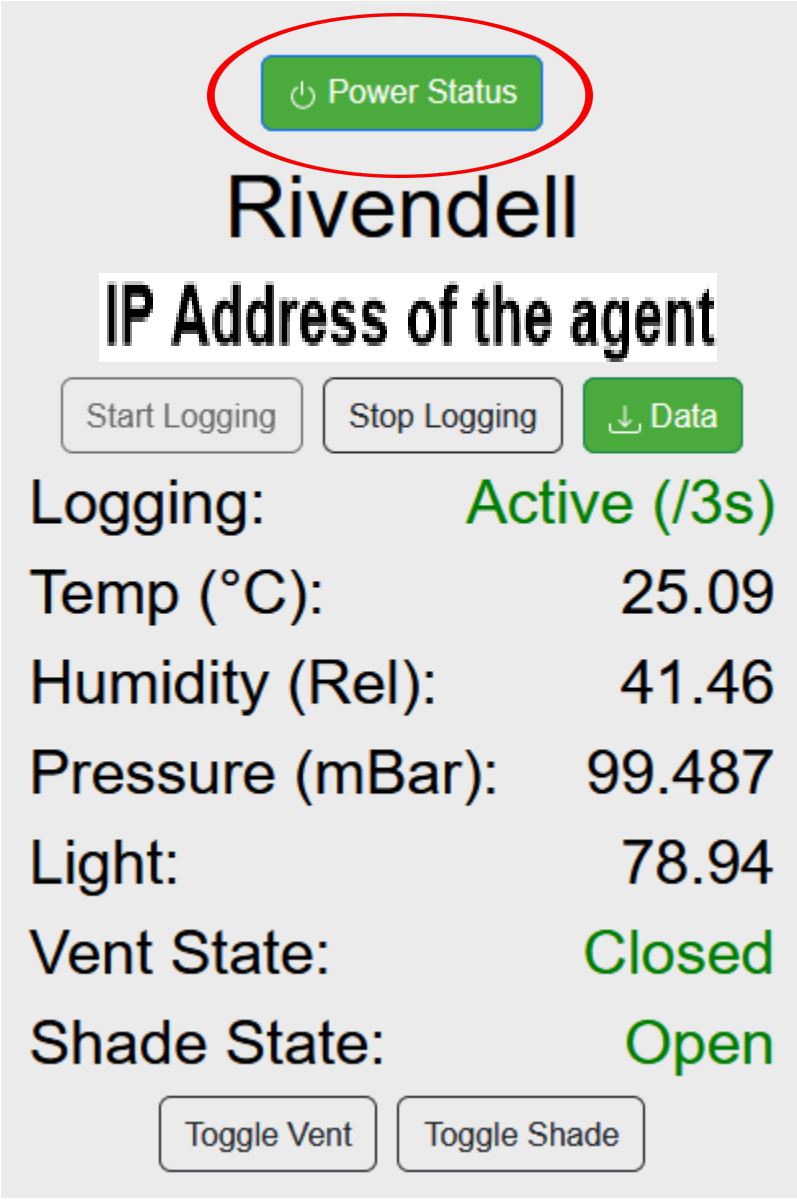
Example 5: Once created, the new room should show in the popup like so:



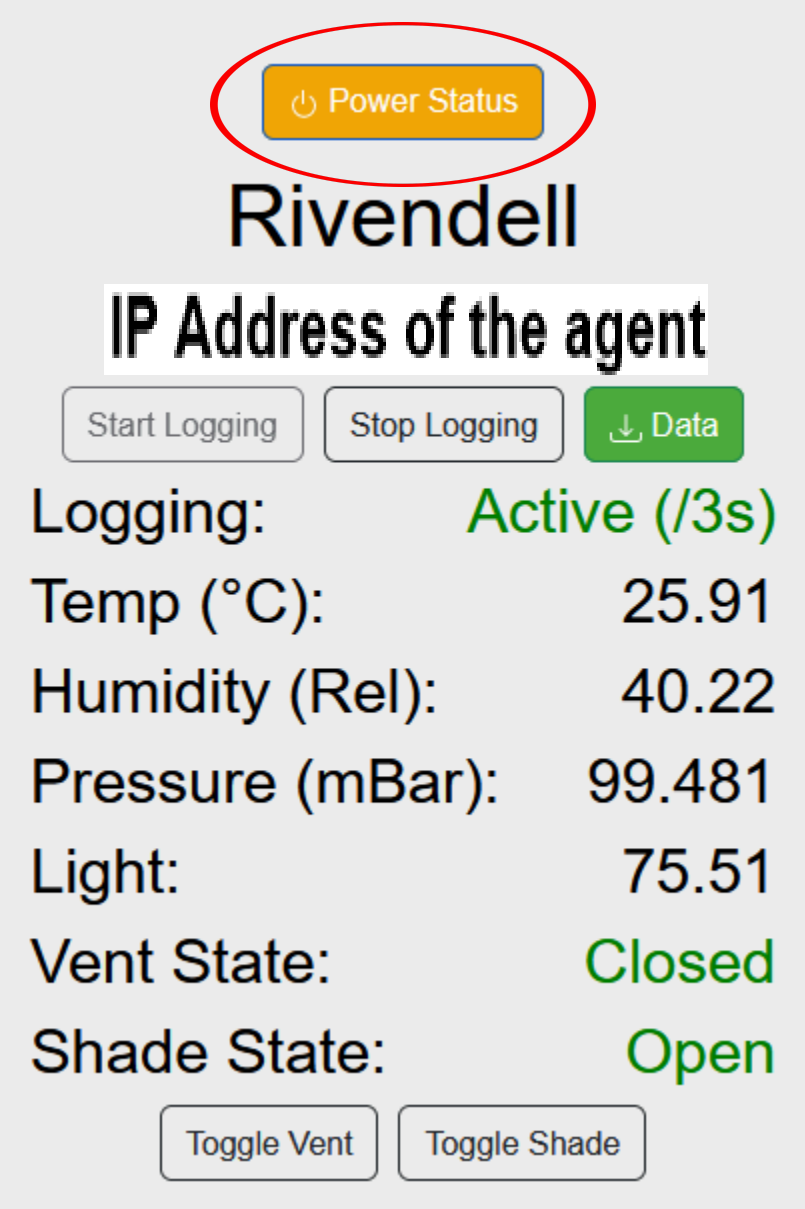
Example 6: And appear in the Home page like so:



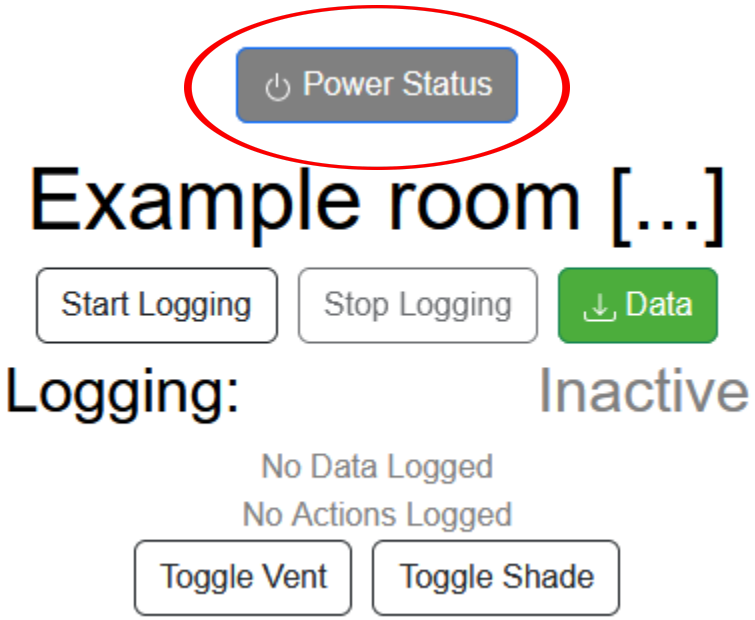
Example 7: On the room page on the room card you will see the **Power Status** button. This enables the user to turn on and off to reset the Raspberry Pi. It will be **green** when powered on like so:



Example 8: Once you click the **Power Status** button it will flash green and yellow for a reset and looks like so:

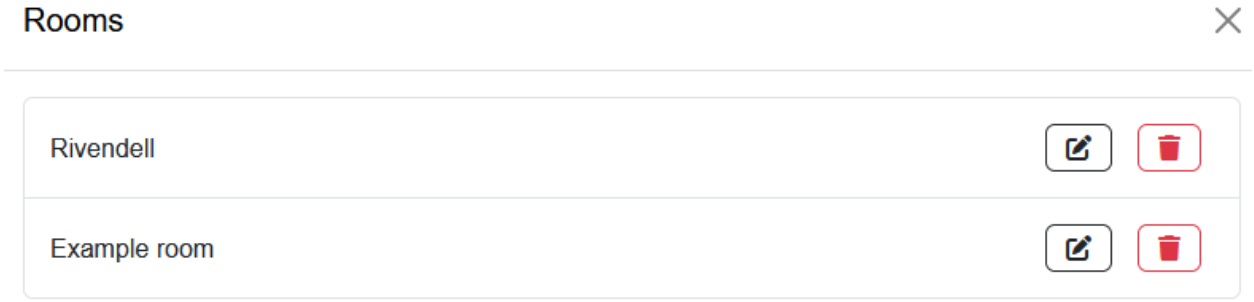


Example 9: An inactive room which means that it is not connected to a Raspberry Pi will look gray like so:

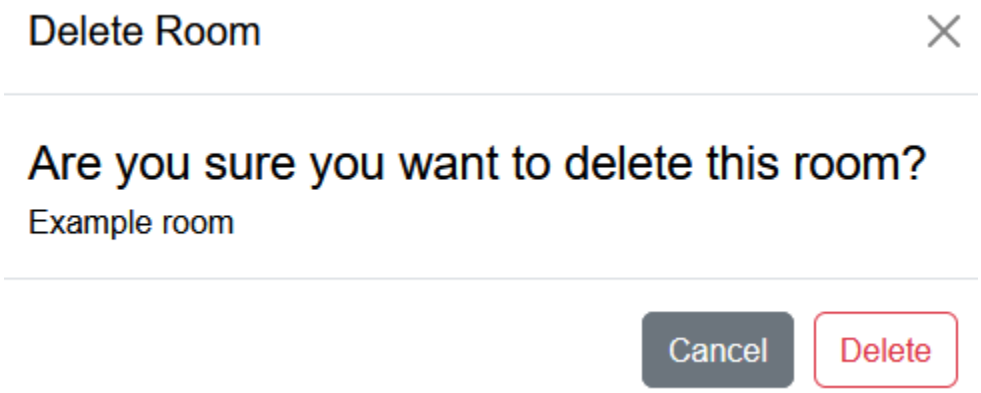


2.3.2 Editing and Deleting Rooms

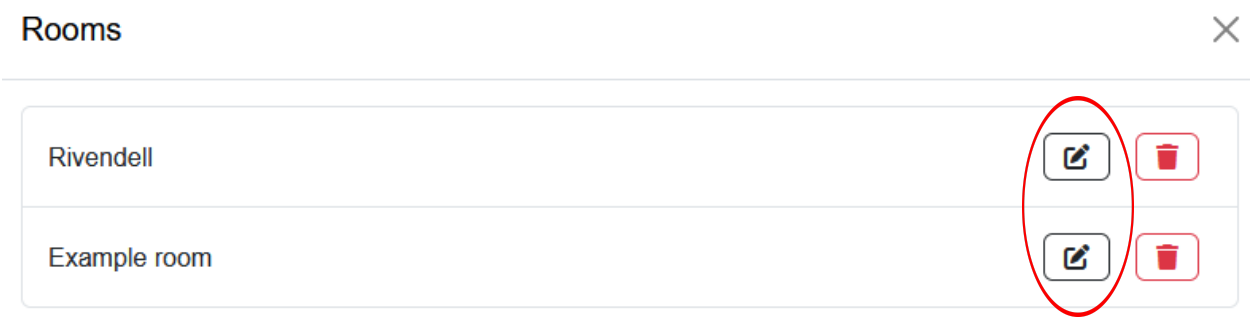
Example 1: To edit or delete a room, return to the room list pop-up by clicking on the settings button in the top right corner to bring back the Room list. Here on a room entry are two icons a pen-paper icon and a trashcan icon which represent editing and deleting the room page respectively.



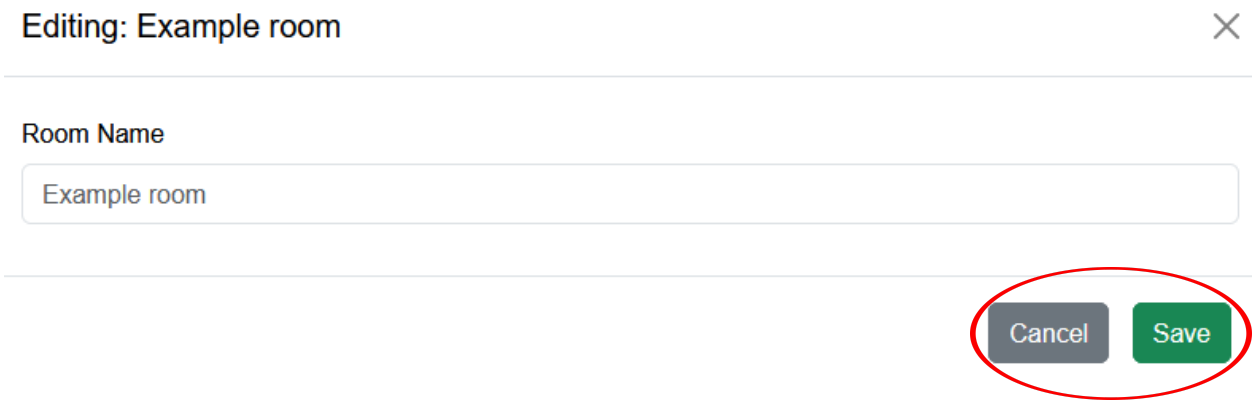
Example 2: A pop will be shown to display the confirmation of the specific room deletion.



Example 3: Should the user decided to instead edit the room, they would click edit button which looks like a pent on paper like so:

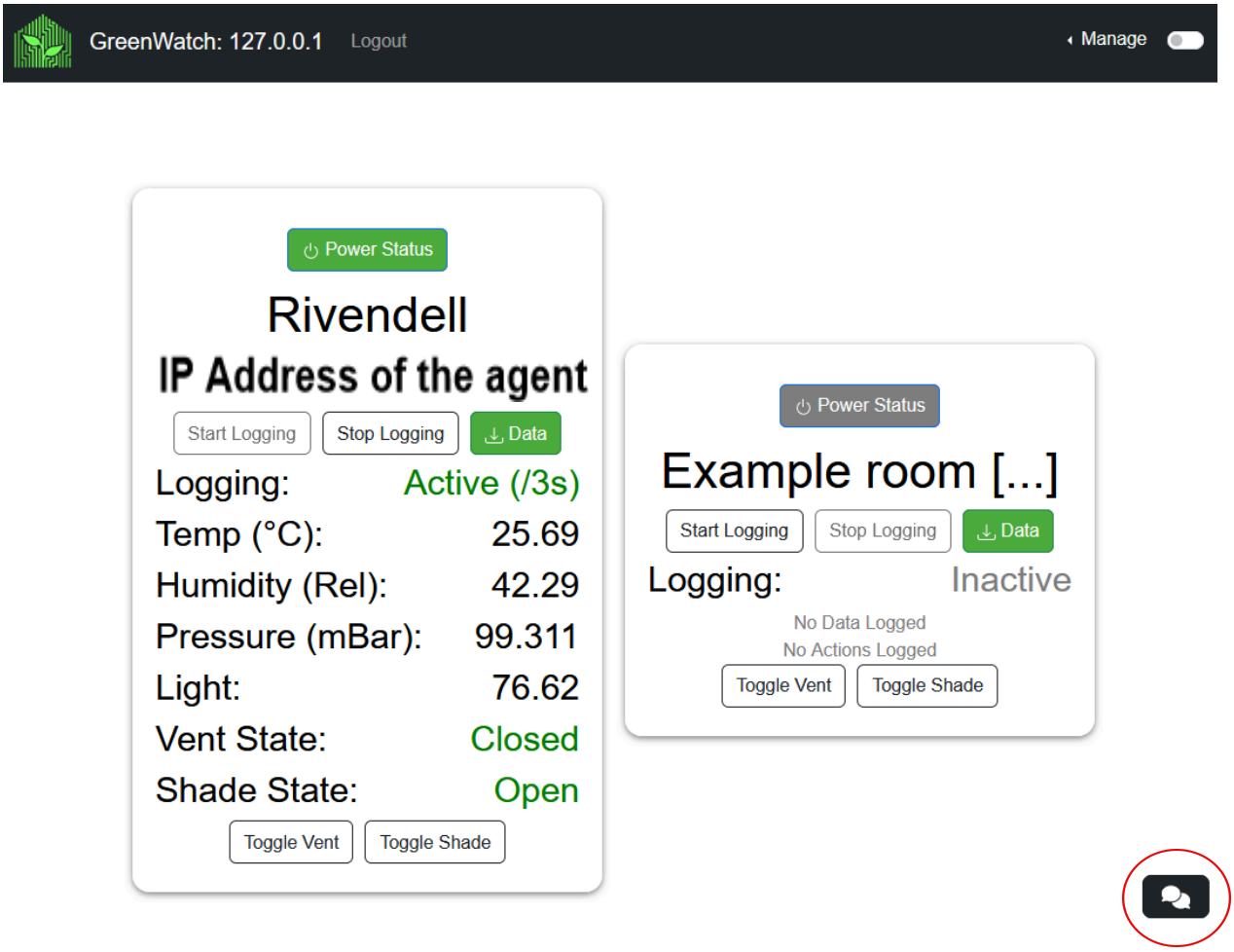


Example 4: A window pops up for the user to change the room name if they wish to do so. You can hit the save button to save the changes to the room name or cancel button to not make any changes in the bottom right of the popup.

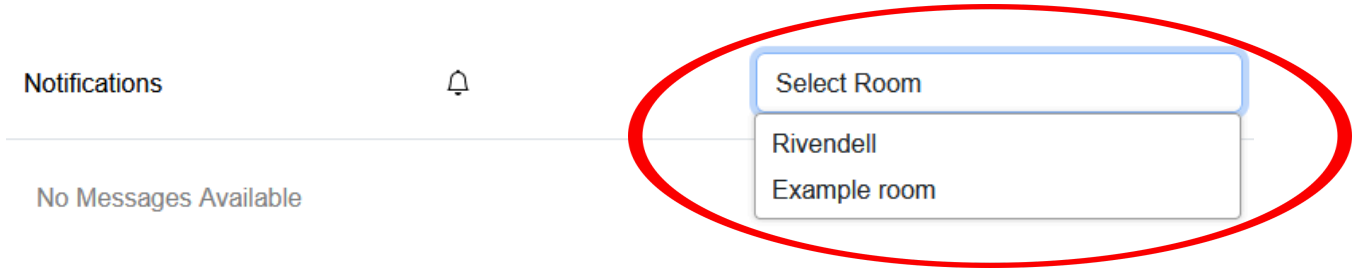


2.3.3 Notes Overview

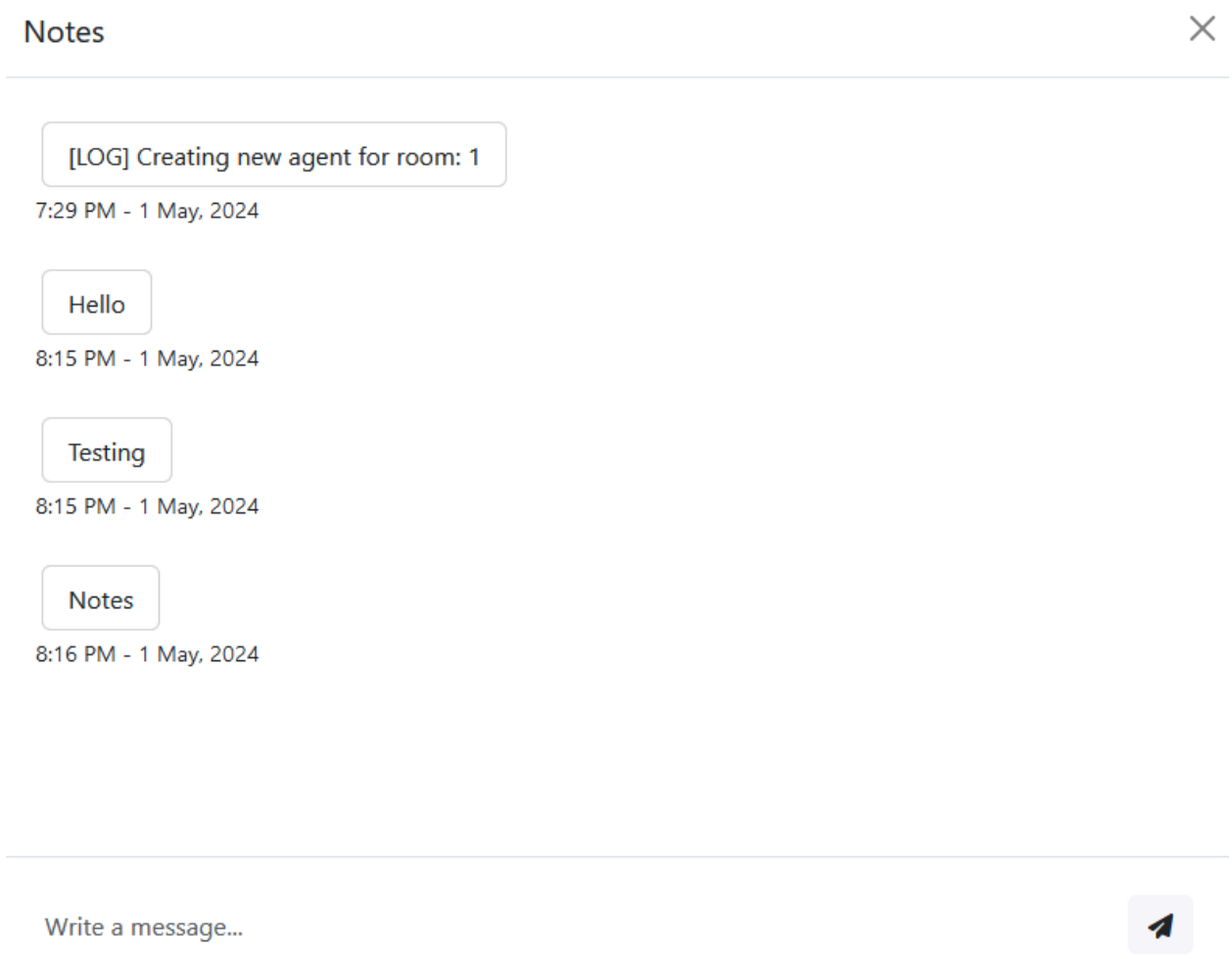
Example 1: If the user clicks on the notes button a popup will show up where you can set notes for specific rooms. Here is the notes button on the home page circled in **RED**.



Example 2: This message card pops up and you can view the messages based on the room that you select from the top right drop down menu. I've circled it in **RED**

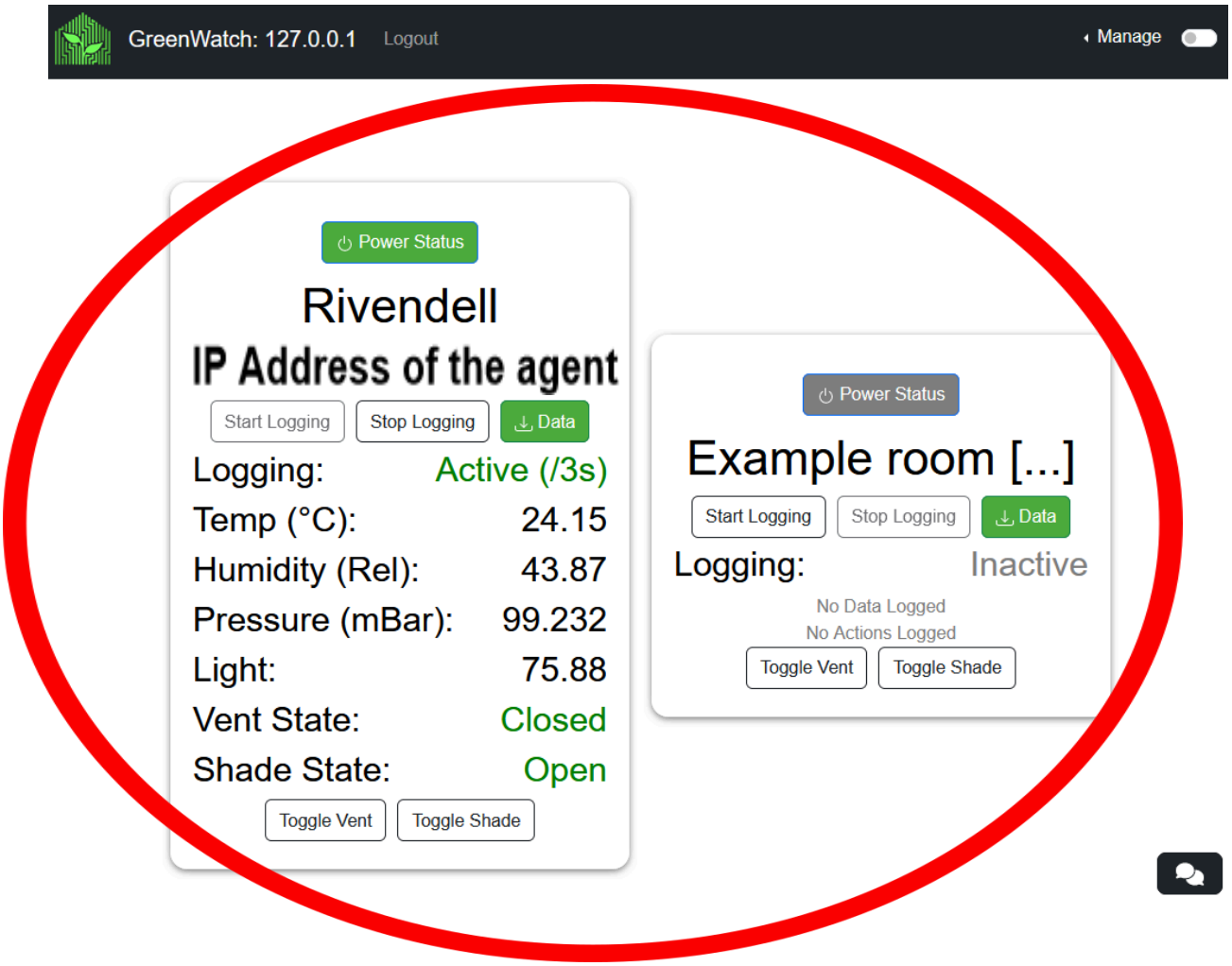


Example 2: Here is the message menu with some example messages.

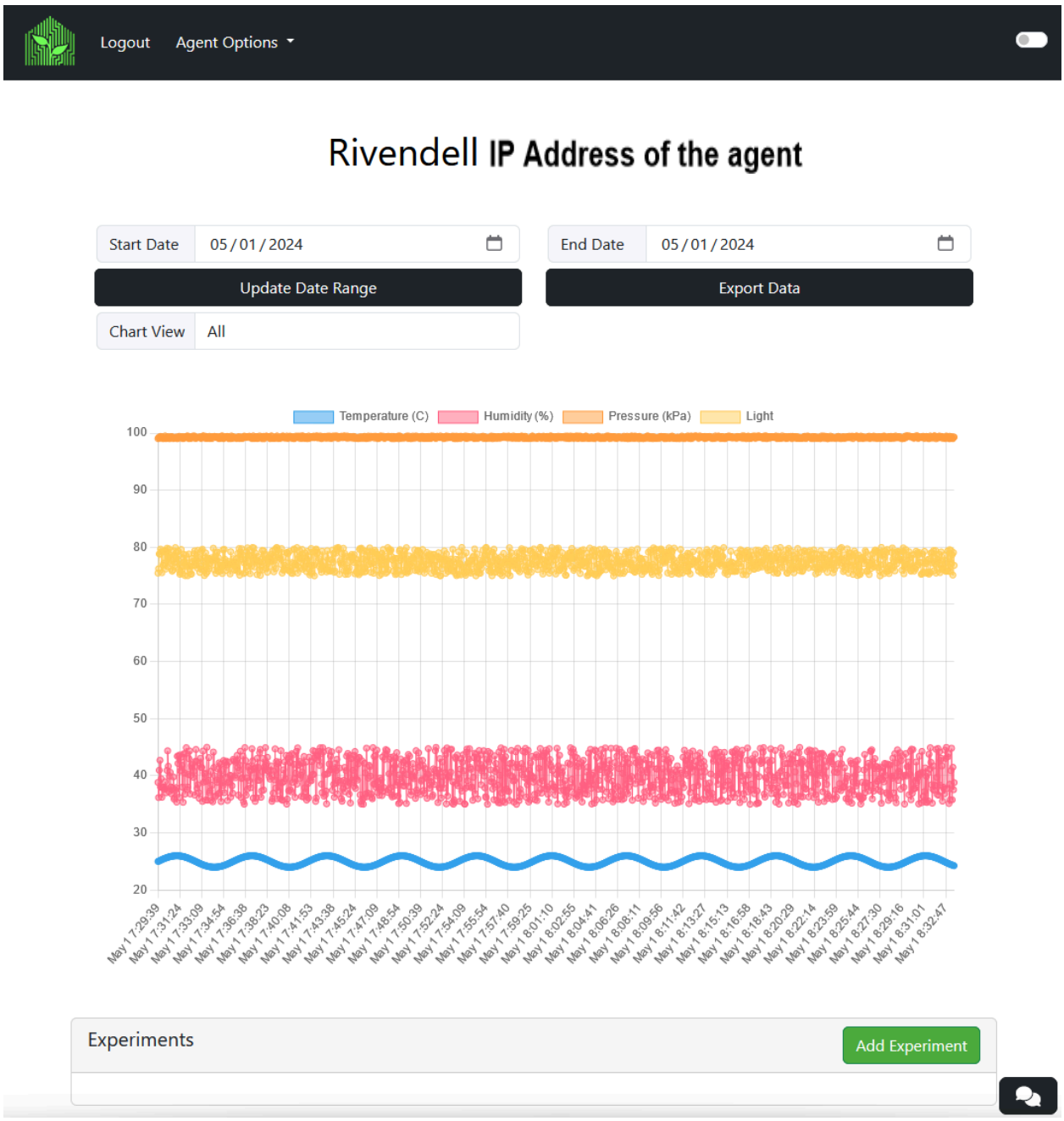


2.4 Room Page

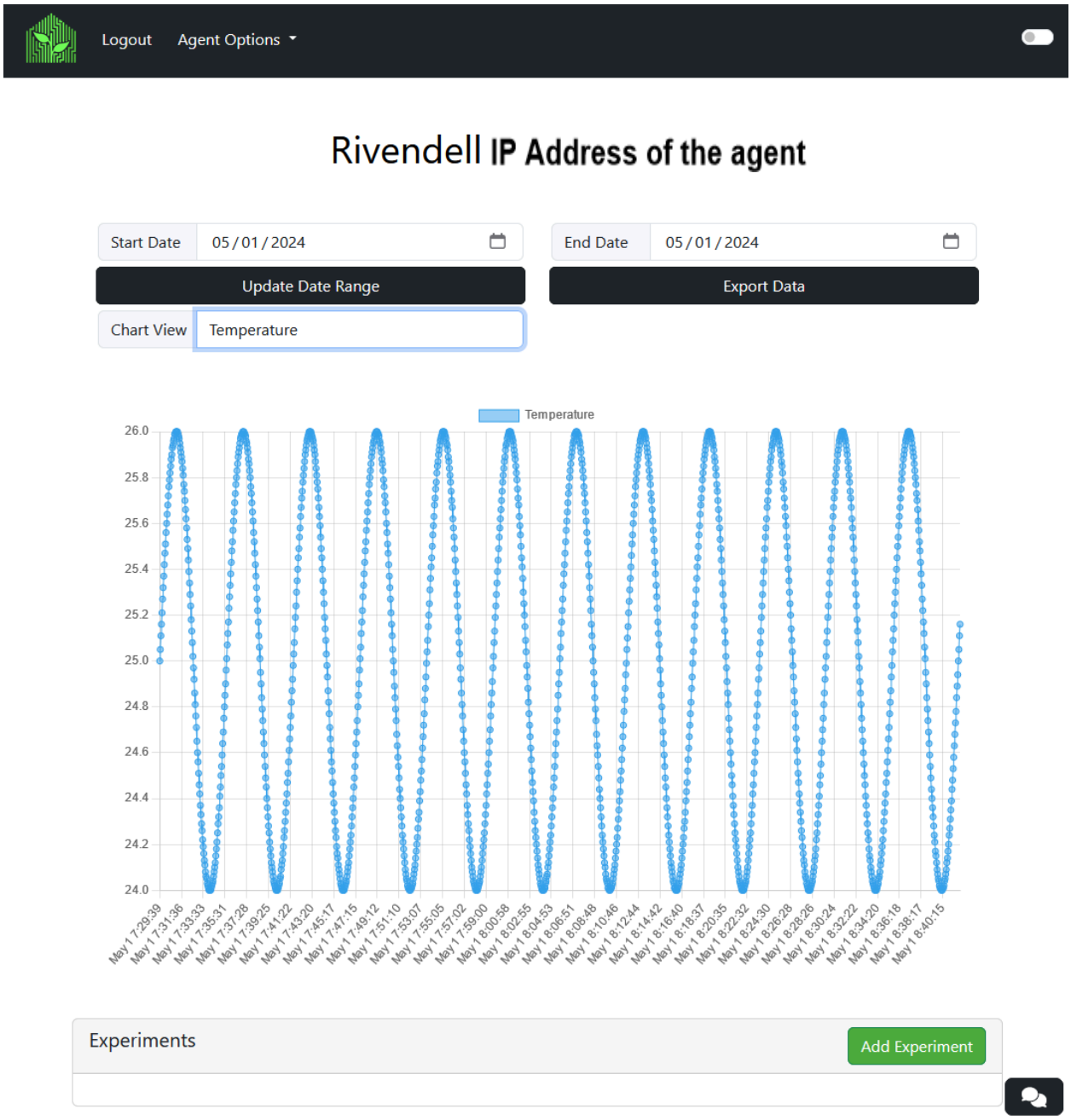
To have an in depth look of the data over time, and access the agents that handle the measurements, simply click on a room itself to take you to its room page. Click anywhere **on** the room page card that is **not** a **button** to go to the room page.



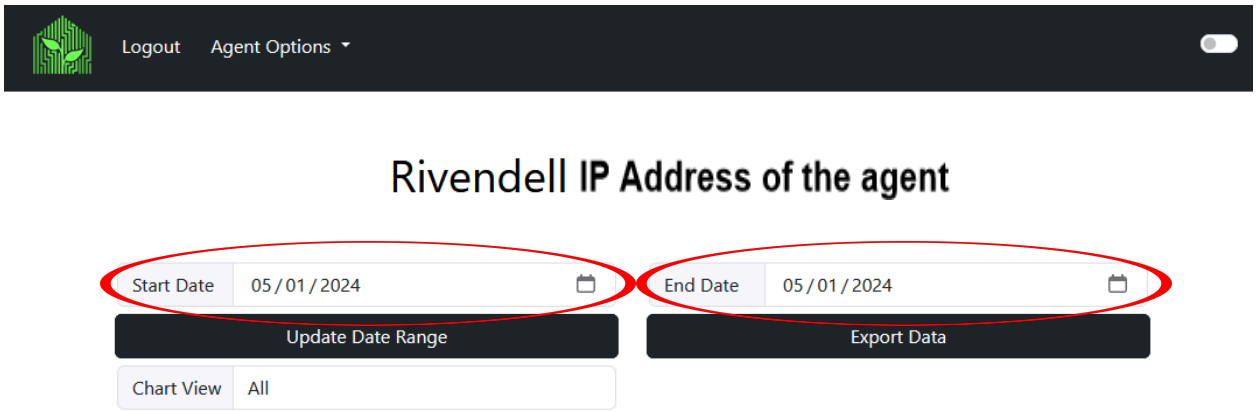
Example 1: Now the user is in the roompage that contains all the data with a nice chart for the user to view. This is dummy data that we used for testing, but when it is deployed you will see data in realtime from the Raspberry Pi.



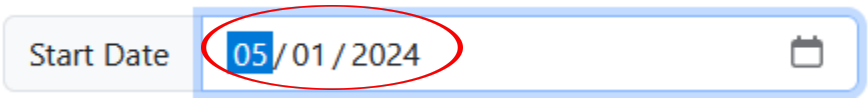
Example 2: The user can choose to change the chartview by selecting the chart view button above the graph, and here is an example of the temperature chart selected.



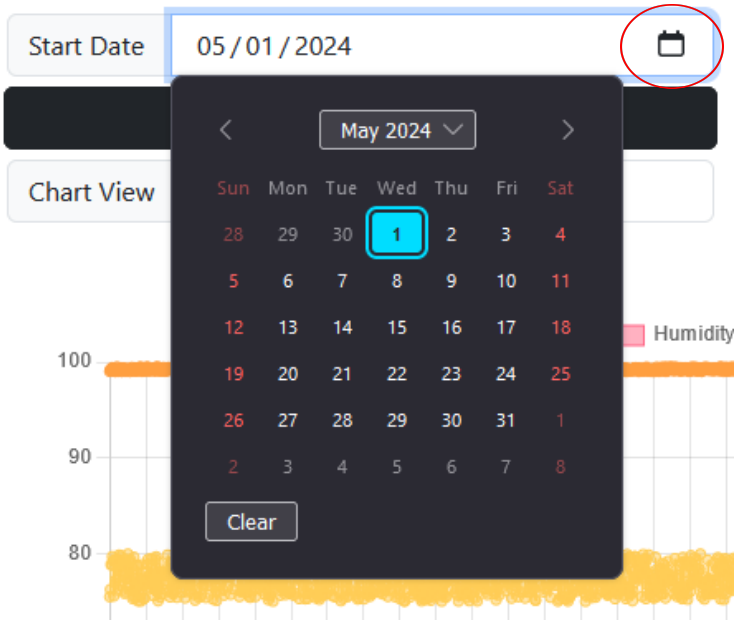
Example 3: The user can update the date ranges by clicking on the **start date** and **end date** buttons. Then to update the data by clicking the **update chart** button. All of the buttons are above the graph like so:



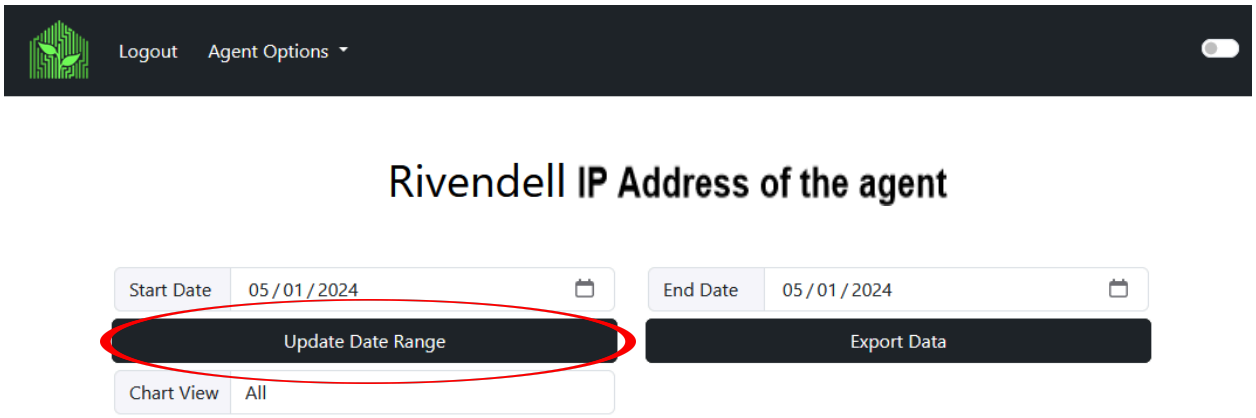
Example 4: When the user wants to change either the start date or the end date they can manually change the numbers for the date by clicking on numbers like so:



Or they can click the little calendar icon to change the exact date with a calendar like so:



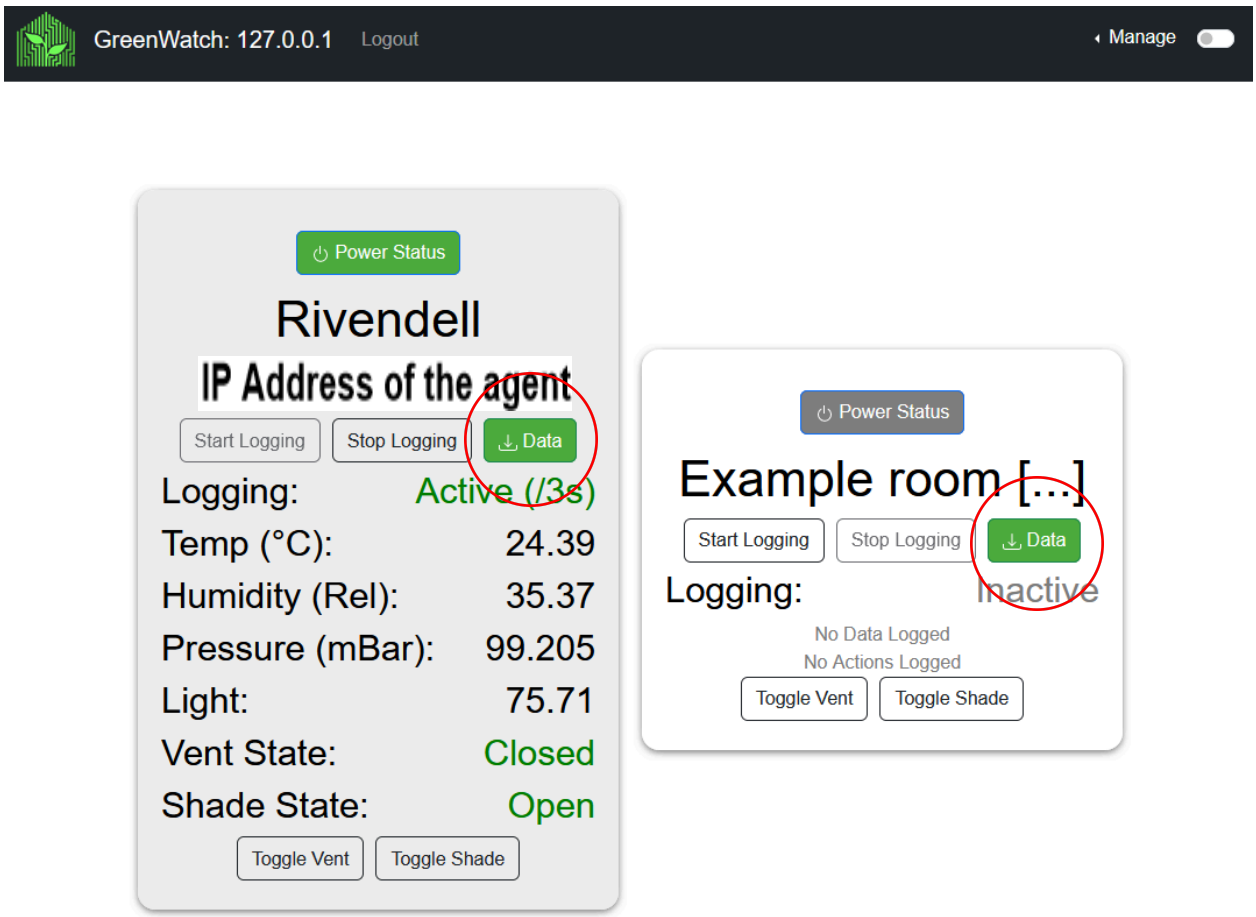
Example 4: Then to make changes once your date range is set you can click the **Update Date Range** button like so:



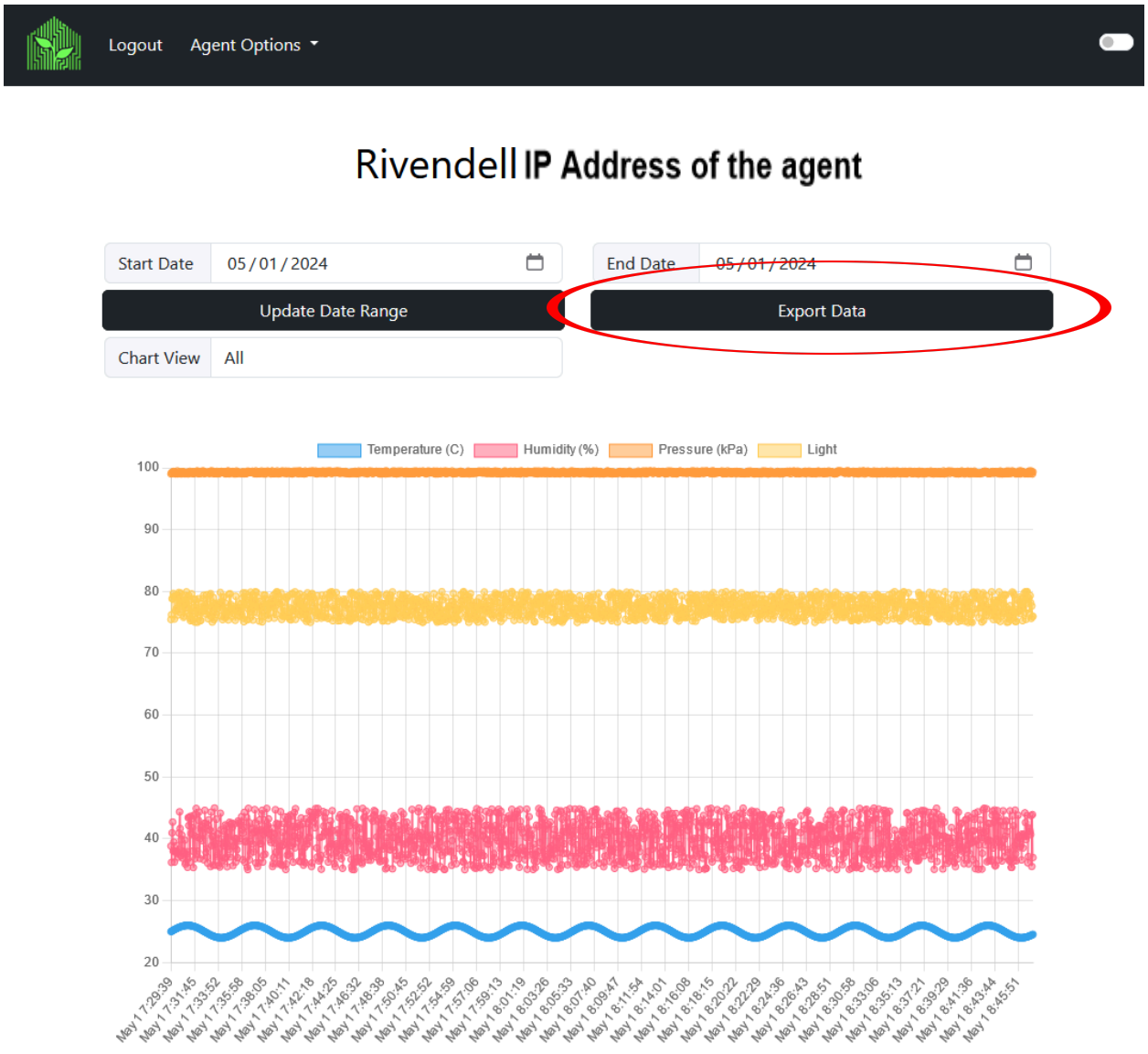
2.5 Exporting Data

There are two ways to export the data from the database. There is one option on home page button called data which is green like so:

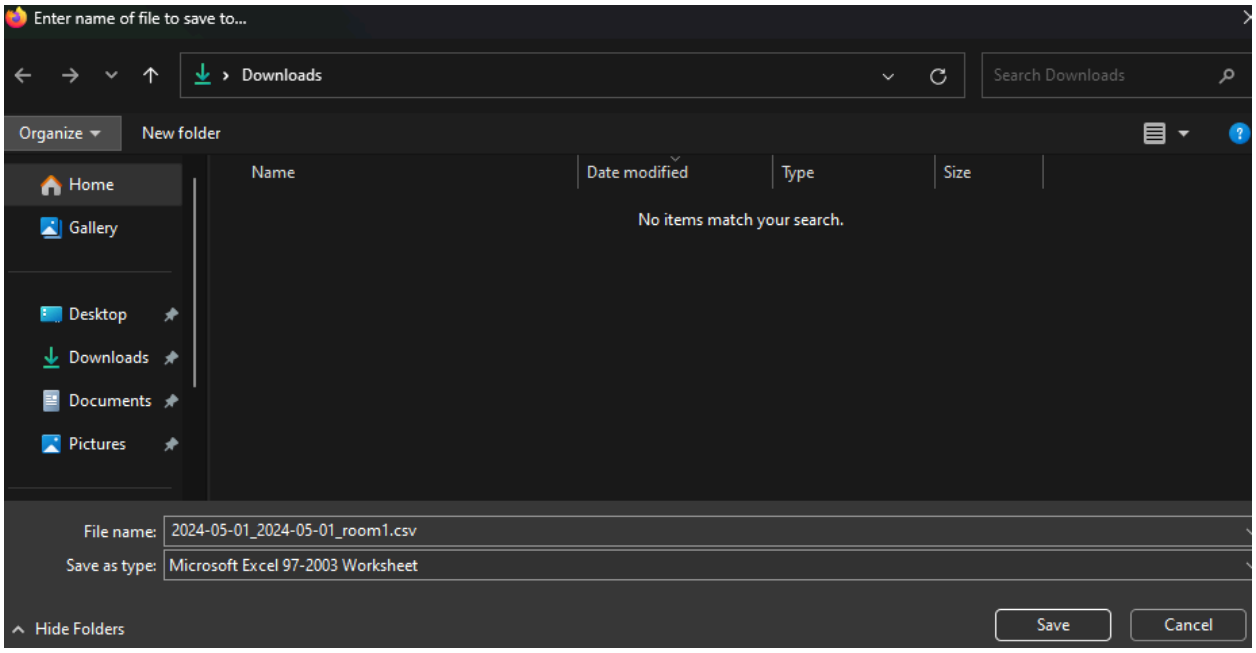
Note: The .csv timestamp is converted to CST timezone but will update the .csv with GMT at the end, but it is incorrect. Just ignore it.



Or on the room page there is **black** button called **Export Data** that will export the data like so:

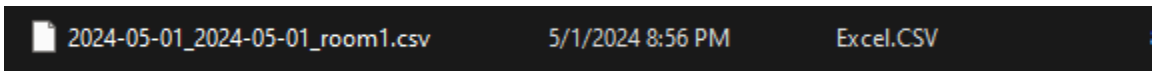


Once the user clicks on either download data button on the home page or the room page button a window will pop up asking were they want to download the data like so:

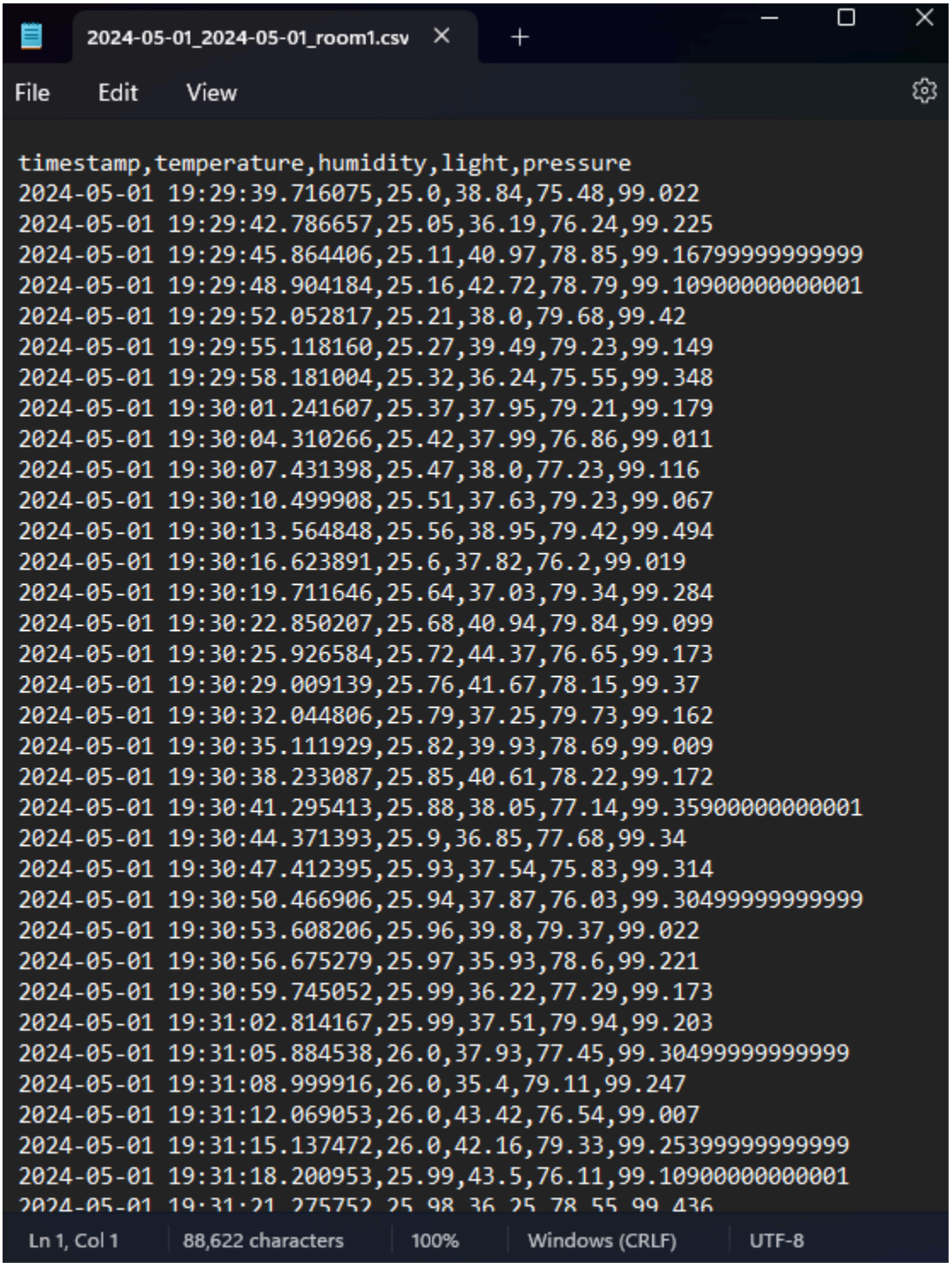


Note: I'm on windows 11 and that is what my window looks like, but if the user is on a different operating system the window will look different.

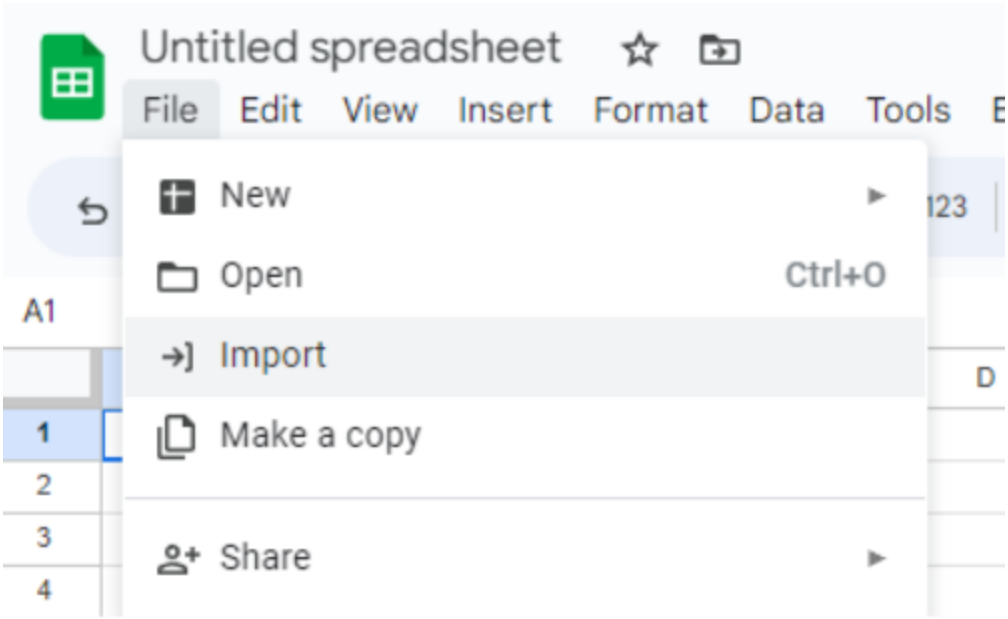
Once the data is downloaded, go to the location that you downloaded the file, and the file will be saved in .csv format like so:



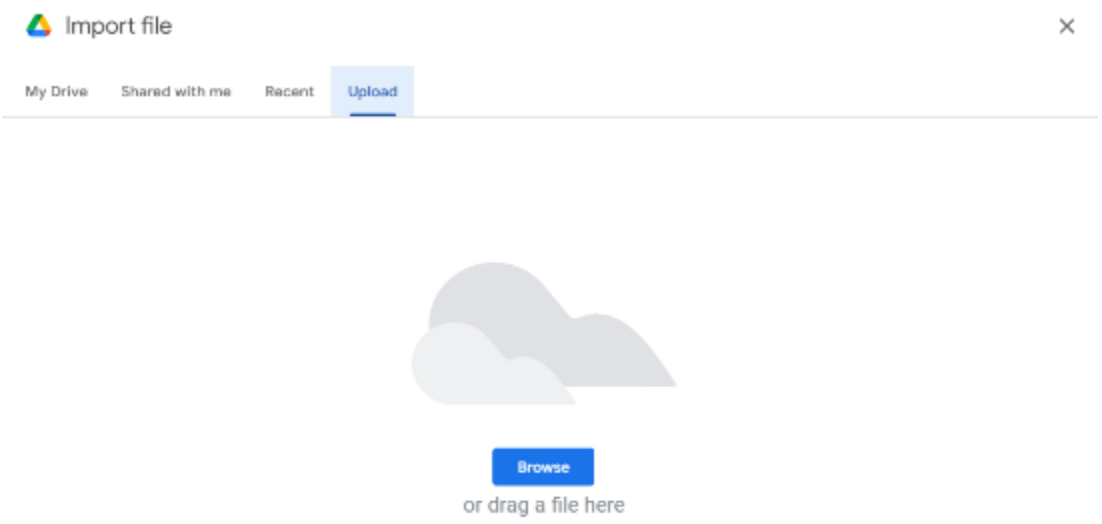
We open in the file with notepad to show the data, and the .csv data looks like so:



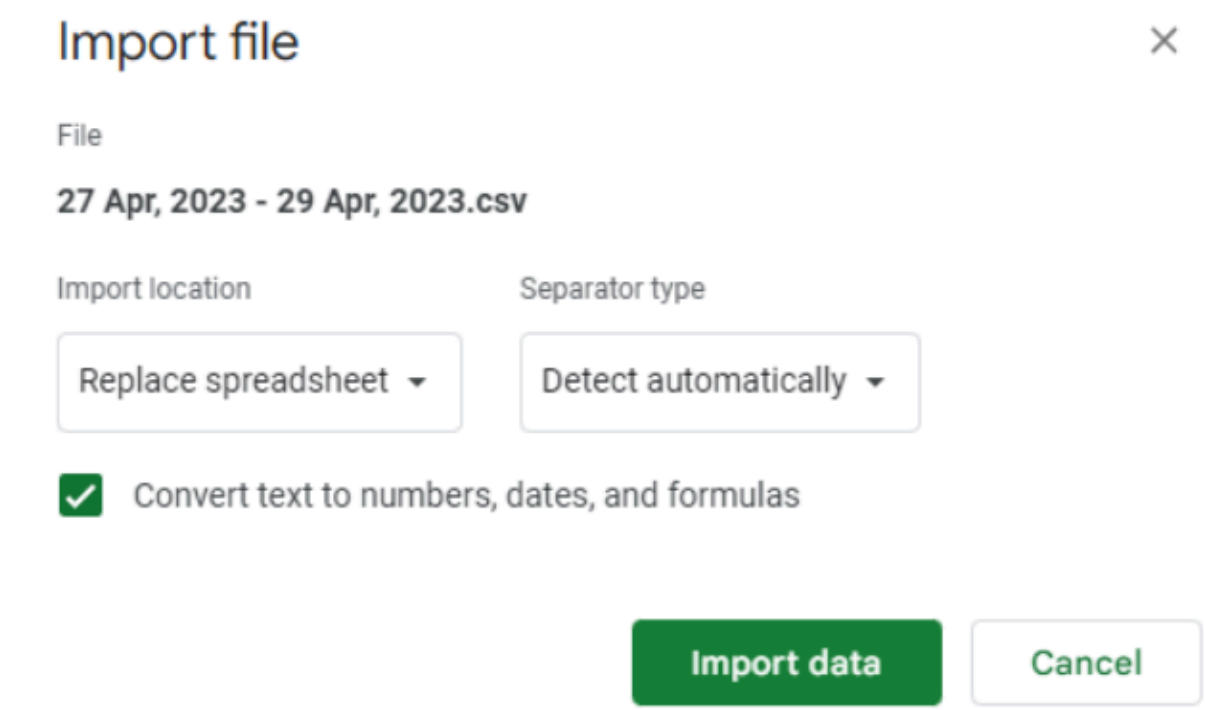
If you wish to view the .csv file in your spreadsheet application, simply select the import option on your spreadsheet application.



Browse your computer to were you downloaded the .csv file and select it



And once you start importing the .csv file, set the separator type to “Detect automatically” and check the “Convert text to numbers, dates, and formulas” box then select finally click on “Import Data”.



Your spreadsheet should display like so:

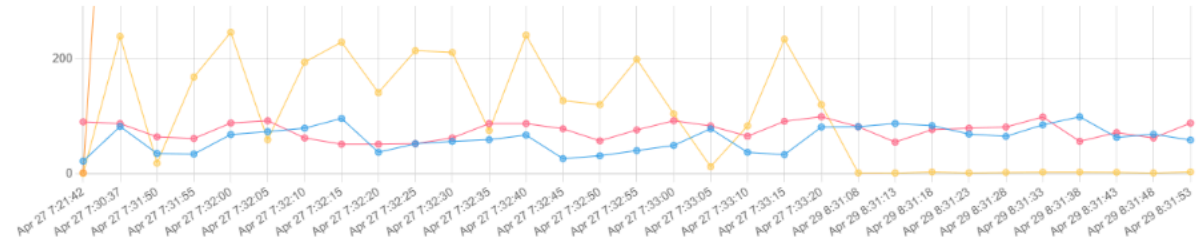
A1 | humidity

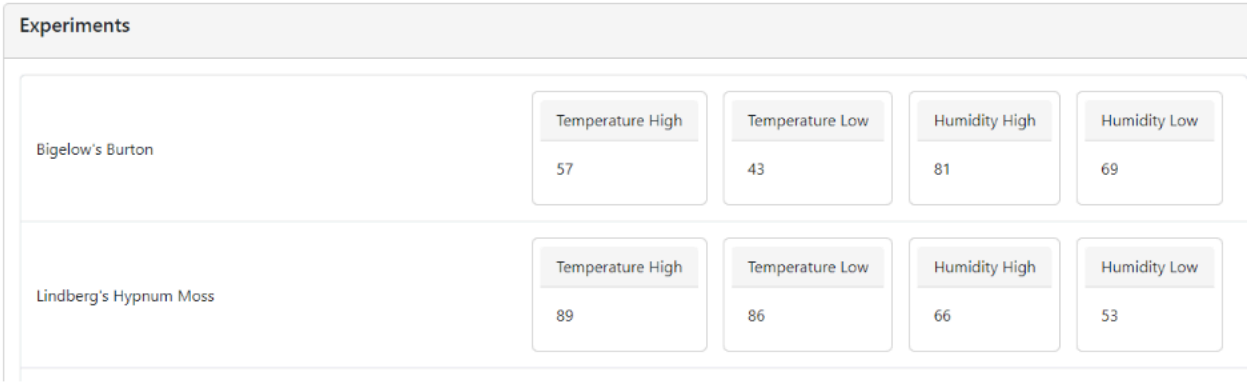
	A	B	C	D	E	F
1	humidity	light	pressure	temperature	timestamp	
2	91	1.3	2.34	22.6	Thu, 27 Apr 2023 19:21:42 GMT	
3	88	240	1014.17	83	Thu, 27 Apr 2023 19:30:37 GMT	
4	65	19	1009.95	36	Thu, 27 Apr 2023 19:31:50 GMT	
5	62	169	1014.13	35	Thu, 27 Apr 2023 19:31:55 GMT	
6	89	247	1011.32	69	Thu, 27 Apr 2023 19:32:00 GMT	
7	93	60	1018.41	74	Thu, 27 Apr 2023 19:32:05 GMT	
8	63	195	1010.96	80	Thu, 27 Apr 2023 19:32:10 GMT	
9	52	230	1015.26	97	Thu, 27 Apr 2023 19:32:15 GMT	
10	52	142	1015.76	38	Thu, 27 Apr 2023 19:32:20 GMT	
11	53	215	1005.65	53	Thu, 27 Apr 2023 19:32:25 GMT	
12	63	212	1009.46	57	Thu, 27 Apr 2023 19:32:30 GMT	
13	88	76	1017.95	60	Thu, 27 Apr 2023 19:32:35 GMT	
14	88	242	1018.35	68	Thu, 27 Apr 2023 19:32:40 GMT	
15	79	128	1007.16	27	Thu, 27 Apr 2023 19:32:45 GMT	
16	58	121	1016.42	32	Thu, 27 Apr 2023 19:32:50 GMT	
17	77	200	1018.28	41	Thu, 27 Apr 2023 19:32:55 GMT	
18	93	105	1002.8	50	Thu, 27 Apr 2023 19:33:00 GMT	
19	84	13	1017.5	79	Thu, 27 Apr 2023 19:33:05 GMT	
20	66	84	1009.73	38	Thu, 27 Apr 2023 19:33:10 GMT	
21	92	235	1000.99	34	Thu, 27 Apr 2023 19:33:15 GMT	
22	100	121	1008.22	82	Thu, 27 Apr 2023 19:33:20 GMT	
23	82.53	2.25	1002.97	82.64	Sat, 29 Apr 2023 20:31:08 GMT	
24	55.73	1.94	1013.17	88.08	Sat, 29 Apr 2023 20:31:13 GMT	
25	77.48	3.7	1014.88	84.41	Sat, 29 Apr 2023 20:31:18 GMT	
26	79.99	2.25	1015.53	69.77	Sat, 29 Apr 2023 20:31:23 GMT	
27	81.97	2.9	1013.77	65.72	Sat, 29 Apr 2023 20:31:28 GMT	
28	99.53	3.39	1015.94	85.84	Sat, 29 Apr 2023 20:31:33 GMT	
29	57.08	3.45	1016.65	99.89	Sat, 29 Apr 2023 20:31:38 GMT	
30	72.4	3.13	1014.05	63.97	Sat, 29 Apr 2023 20:31:43 GMT	
31	62.97	2.09	1009.75	69.55	Sat, 29 Apr 2023 20:31:48 GMT	
32	88.87	3.85	1014.63	59.34	Sat, 29 Apr 2023 20:31:53 GMT	

2.6 Experiments

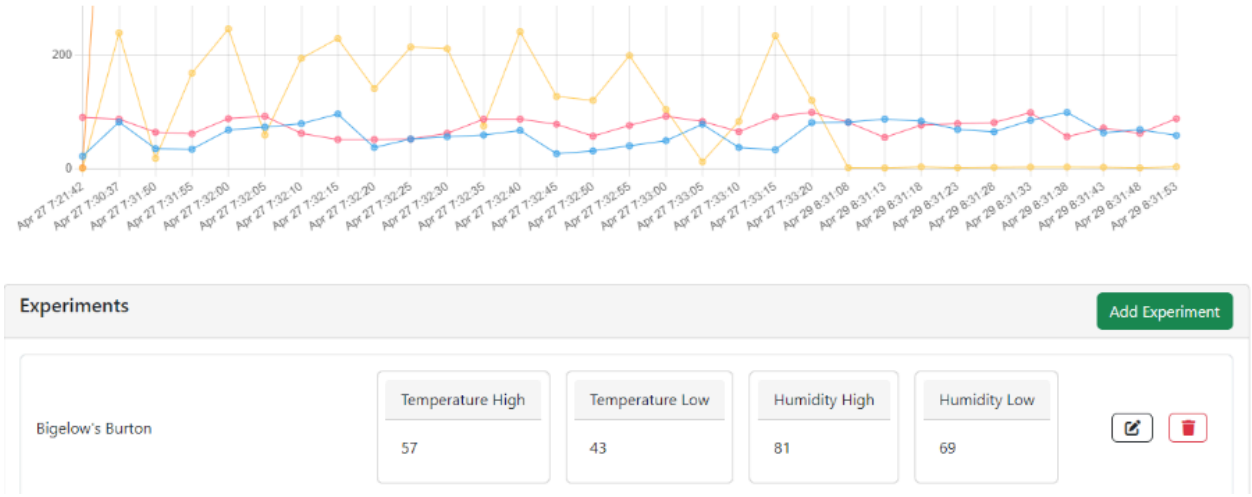
Underneath the graph of the Room Page, there is a section dedicated to experiments. Here different experiments with their own lows/highs for temperature and humidity are displayed at a glance. It should be noted this section appears different depending on privileges of the user depending on if they are an Admin account or not. An admin account will have the added option to add experiments, edit experiments, and delete them as represented by their respective buttons as shown below.

Here is how the experiments section appears to a non-admin account:

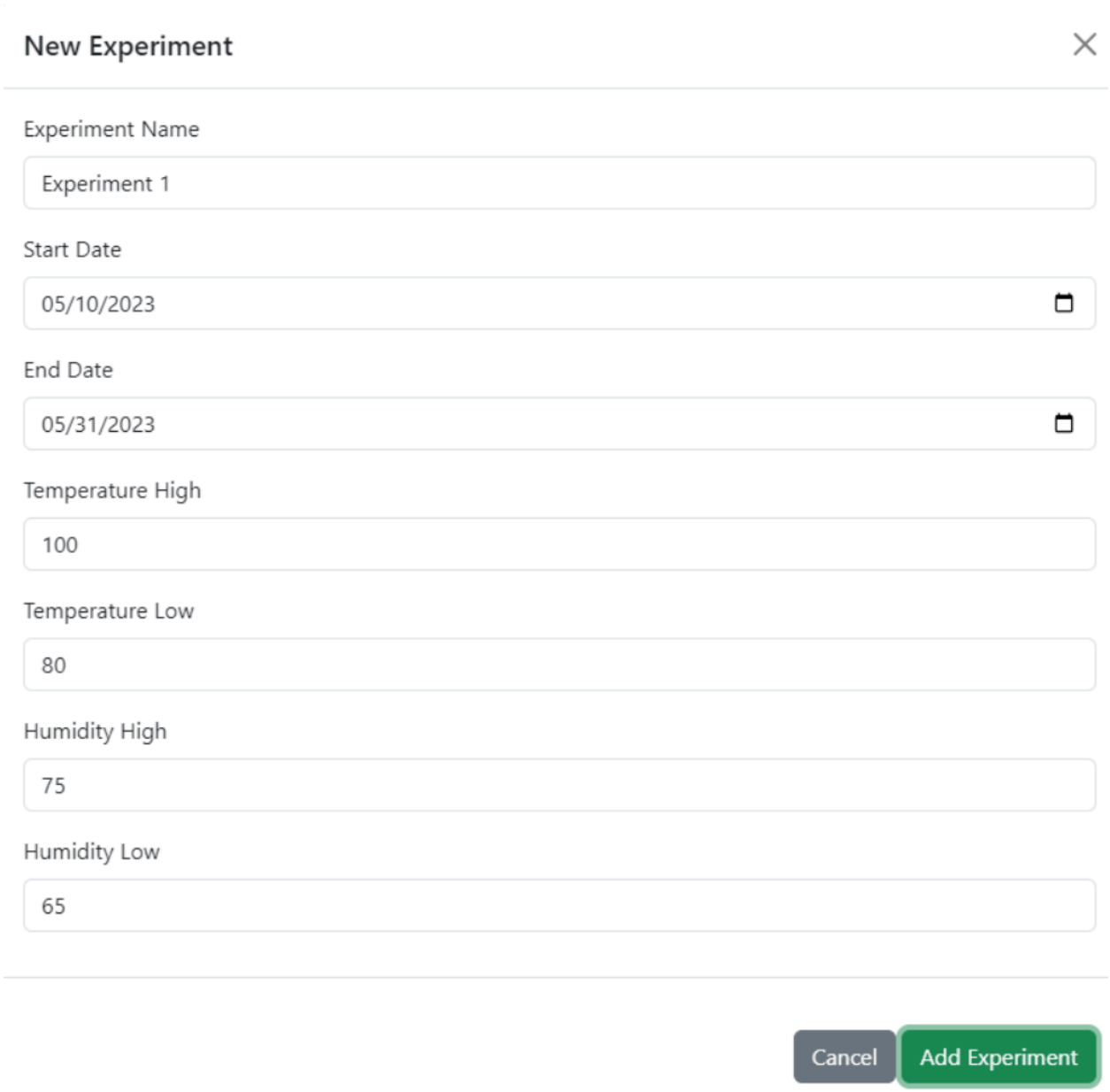




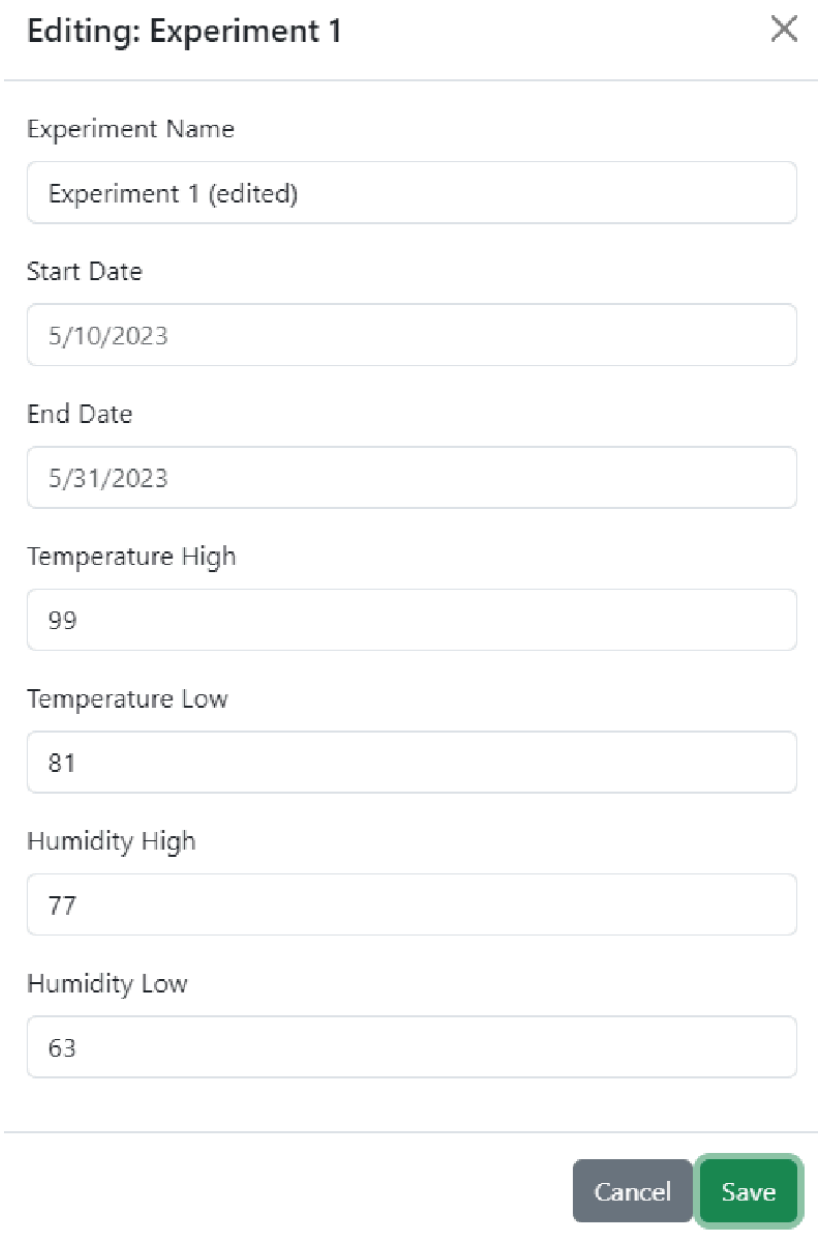
To create an experiment, an admin must click on a the add experiment button on the top right corner of the experiments section (This button will not appear for non-admin users)



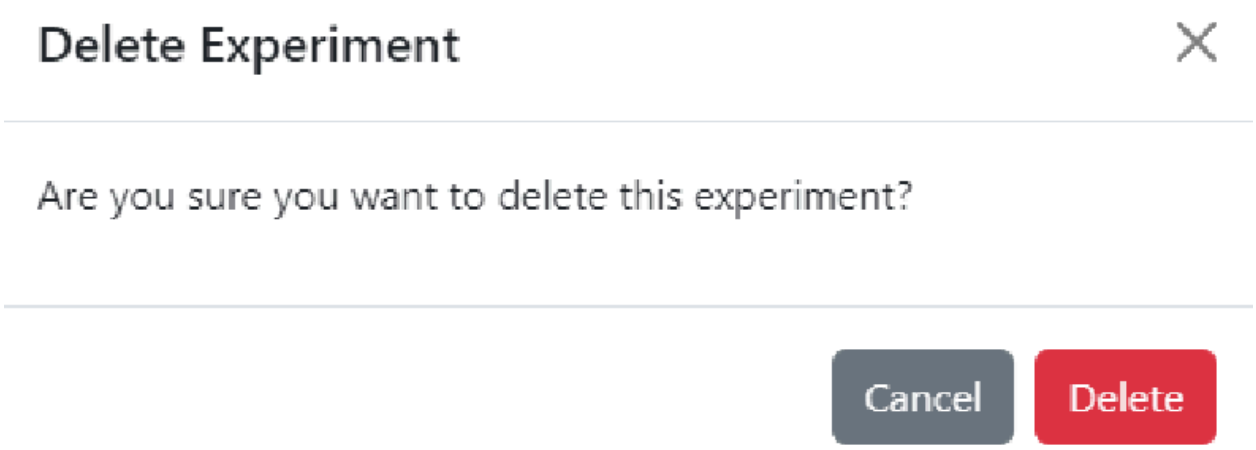
This will bring up a new pop-up with fields that allow the user to create an experiment under their specifications. Click on “Add Experiments” to finalize it.



Should an Admin wish to edit an experiment, they simply need to click on the pen-paper icon of the experiment section of the room page. To bring up the edit dropdown and click save to confirm changes.

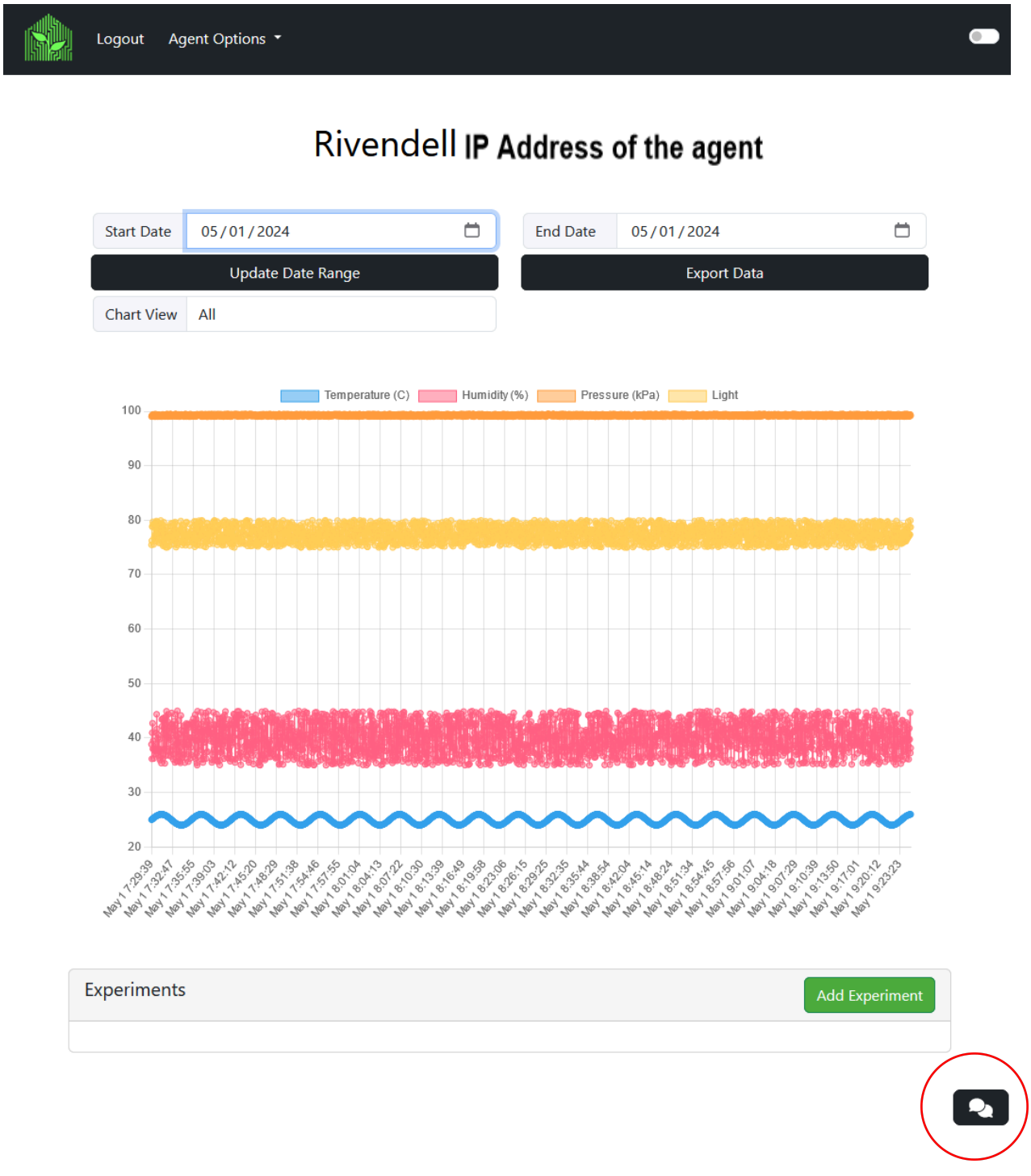


Should an Admin wish to delete an experiment, they would need to click on the delete button of the experiments section in the room page to delete the experiment. This will bring up a popup asking the Admin to confirm deletion of the experiment.

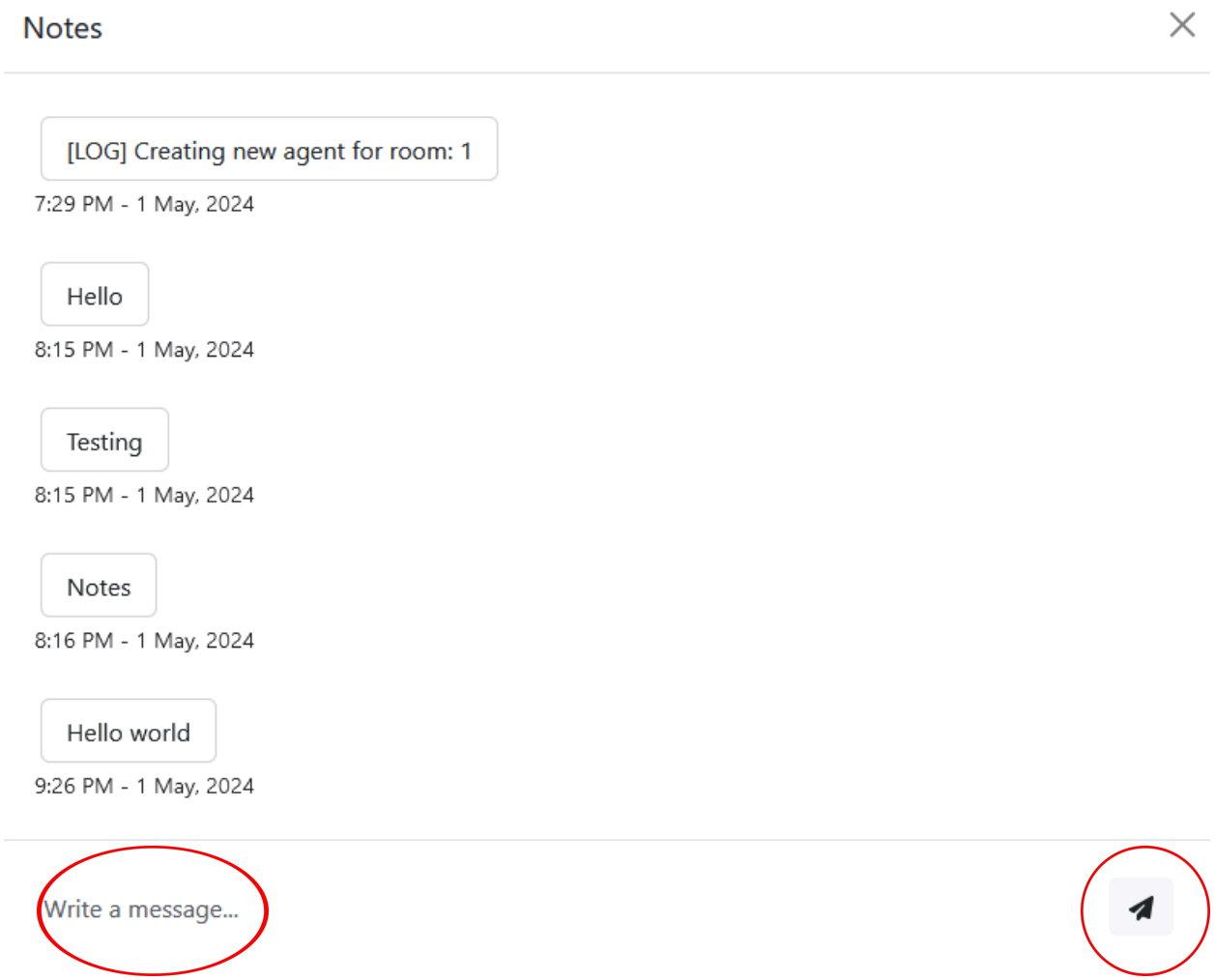


2.7 Messages Overview

On the room page, at the bottom right of the Room page, there is button that looks like a message button that will bring up the text chat related to the room:



A pop-up will appear as such with the ability for any user to write and submit message related to the room by clicking on the “Write a message…” section, writing a message and then **pressing** the paper airplane button to send the message. The message sent will display the user who wrote it and the timestamp of when they did.

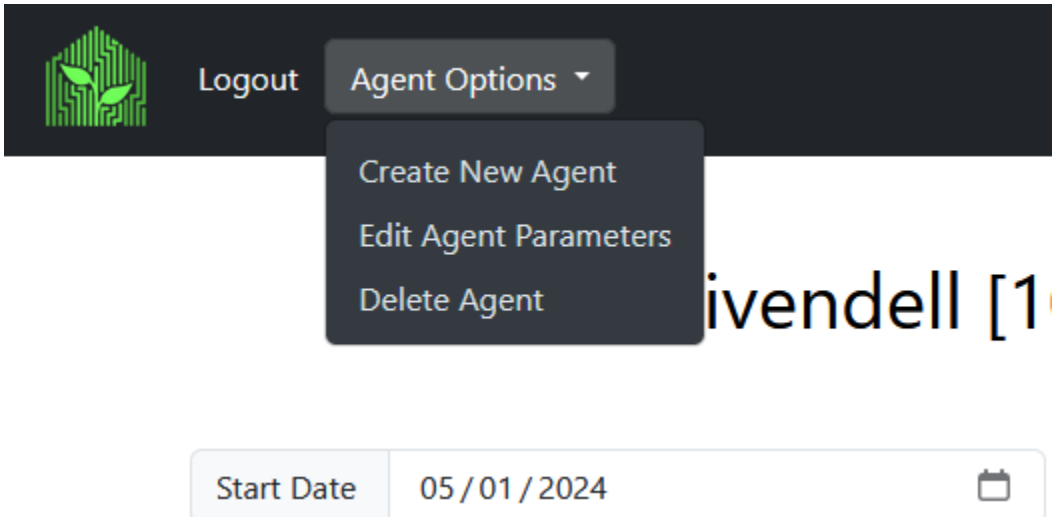


2.8 Agent Overview (Admin Only)

In the top right corner of the Room page, a button will appear for Admin accounts that will allow them to edit, delete, or download a new Agent related to the room. An agent, as detailed in this document, is a process that automatically gathers the sensor data from the rooms to display them into the Greenwatch application. Clicking on this button will give a dropdown of the options an Admin may be able to interact with the agent with. Selecting “Delete” will delete the agent from the room and cease it from gathering any new data. Selecting “Download New Agent” will automatically download a version of the agent that is connected to the Room it was downloaded from. As detailed later in this document, an downloaded agent on a USB is able to be transferred to a Raspberry Pi to collect sensor information from it. Clicking “Edit” will allow the Admin to modify the duration of the measurements taken and the ip address of the agent itself. This will get covered more in section **4. Hardware Section.**

NOTE: Agents must be created in order, that is an agent for room 4 cannot be created before an agent has been created for room 3 and so on.

Example 1: Here is where an admin can make these changes in the top left of the roompage. A drop down menu to create, edit, and delete agent pops up



3. User Management

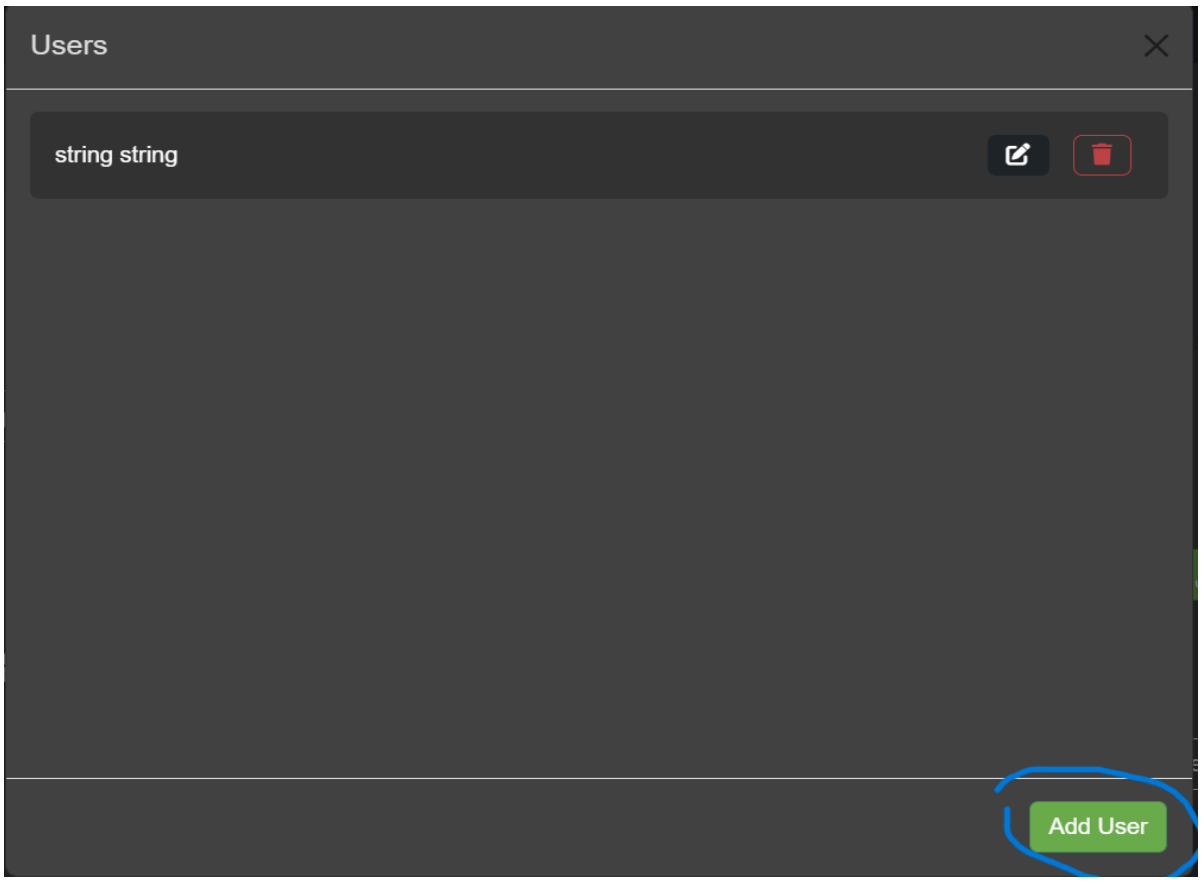
3.1 Admin Privileges

Admin users possess a wide range of privileges and capabilities that exceed those of regular users. Specifically, admins have the exclusive ability to add new rooms and users from the homepage, interact with the Agent on the Room page, and alter experiments on that page. On the other hand, regular users are limited to merely viewing information, engaging with graphs, observing experiments, and contributing comments in the notes section of a room page. Additionally, interface elements related to admin privileges are not visible to regular users.

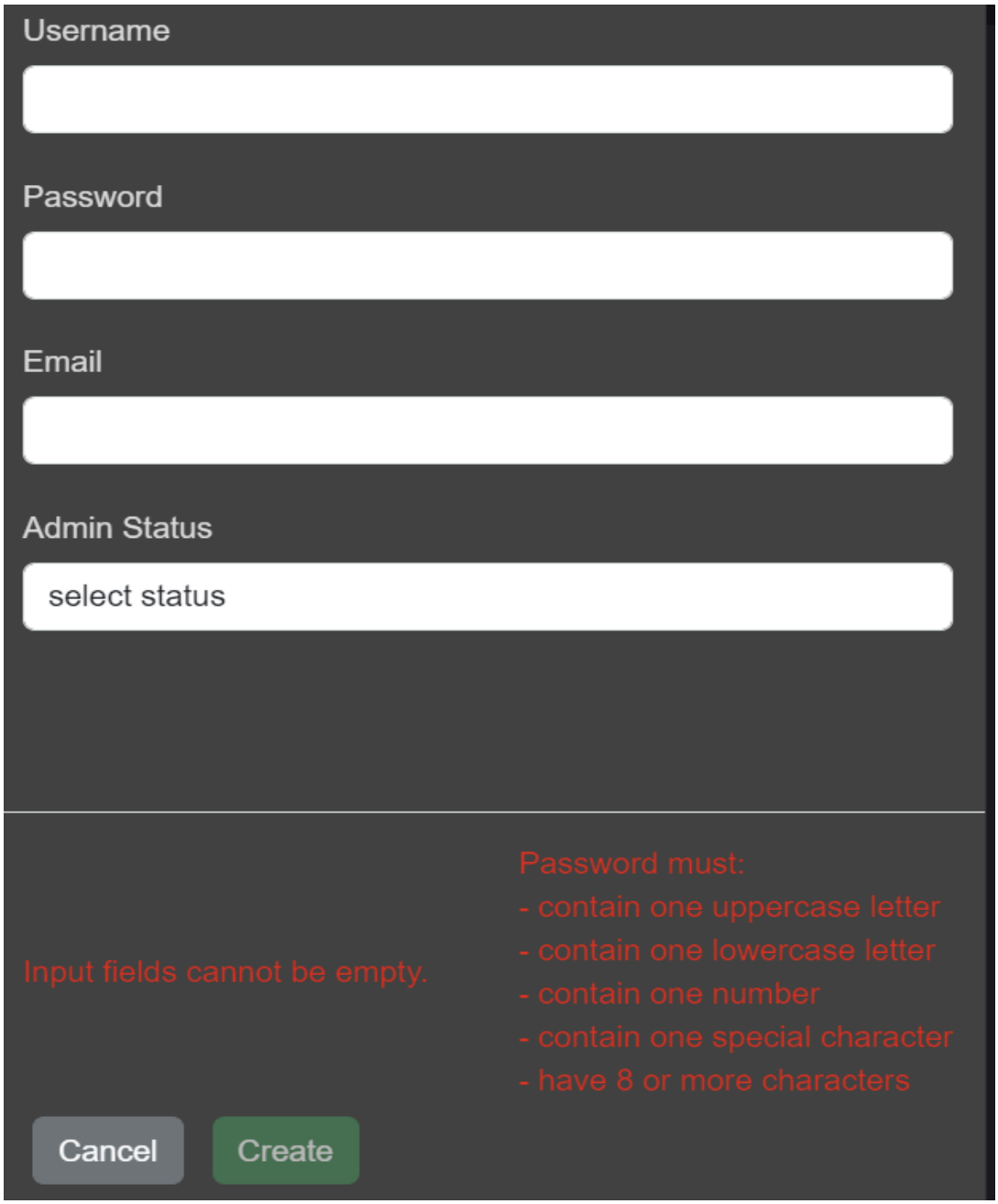
3.2 Add, Editing, and Deleting Users (Admin Only)

From the Homepage, there is a dropdown menu accessible via the settings button located in the top right corner. This menu allows an Admin to add new users, including other Admins, to the system and provides options for editing or deleting them.

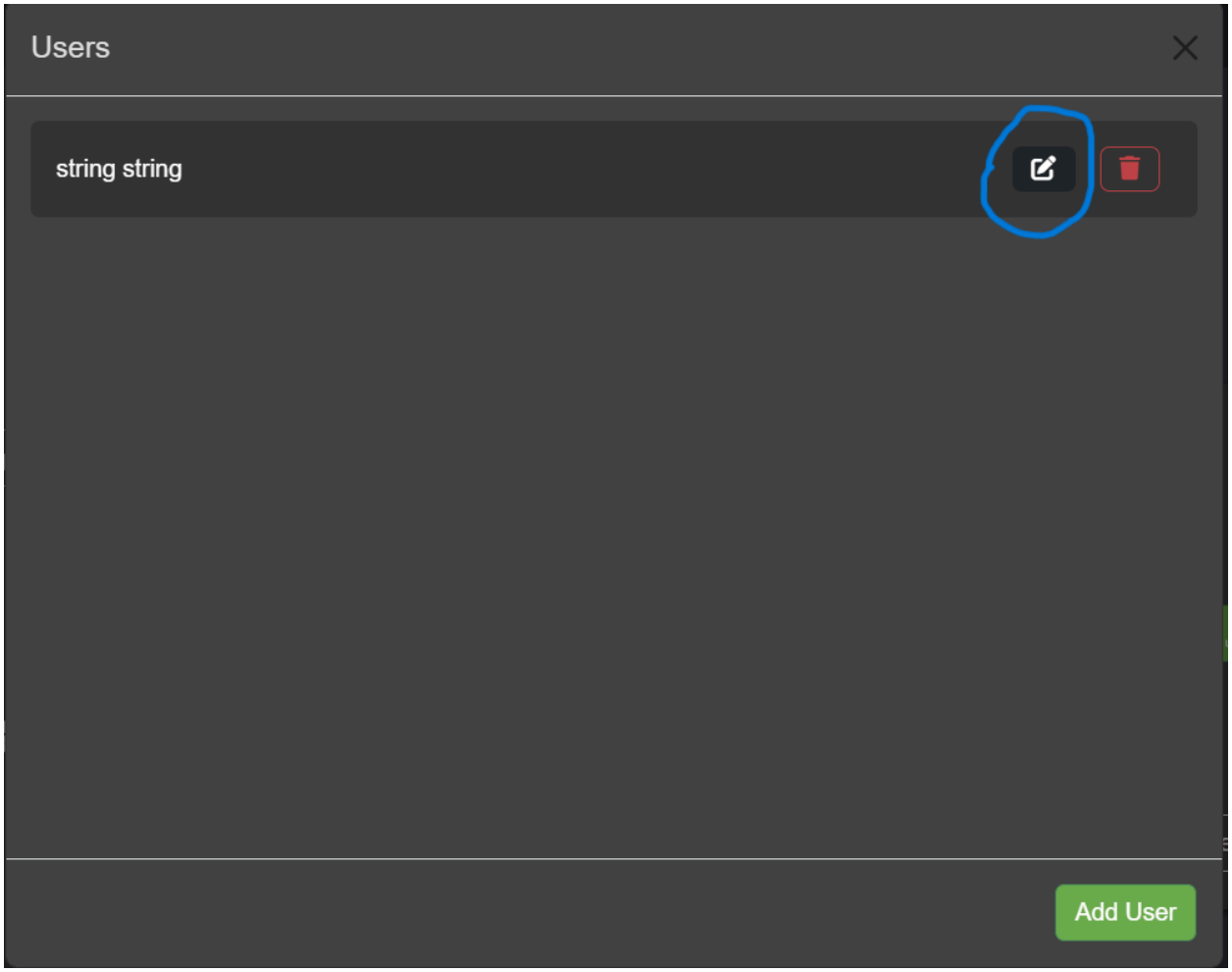
Selecting "Users" will open a pop-up displaying the user list. To add a new user, simply click the “Add User” button.



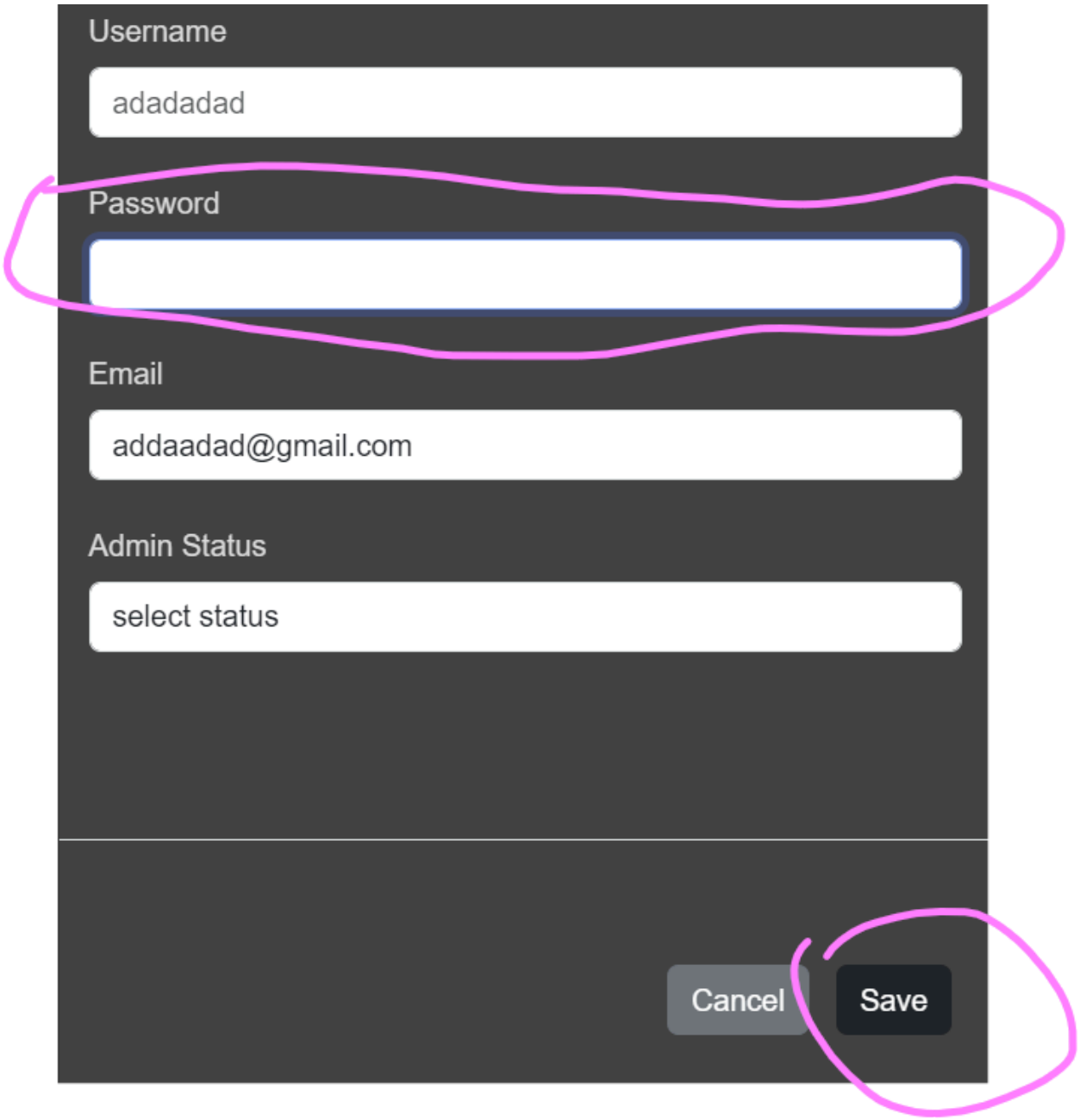
Clicking this will open a new pop-up, prompting the Admin to input the user's details and decide if they should receive Admin Status. All fields must be completed, and passwords are required to include one uppercase letter, one lowercase letter, one number, one special character, and be at least 8 characters long. The user account can only be created once all requirements are met. To finalize, simply click the “Create” button located in the lower right-hand corner of the pop-up.



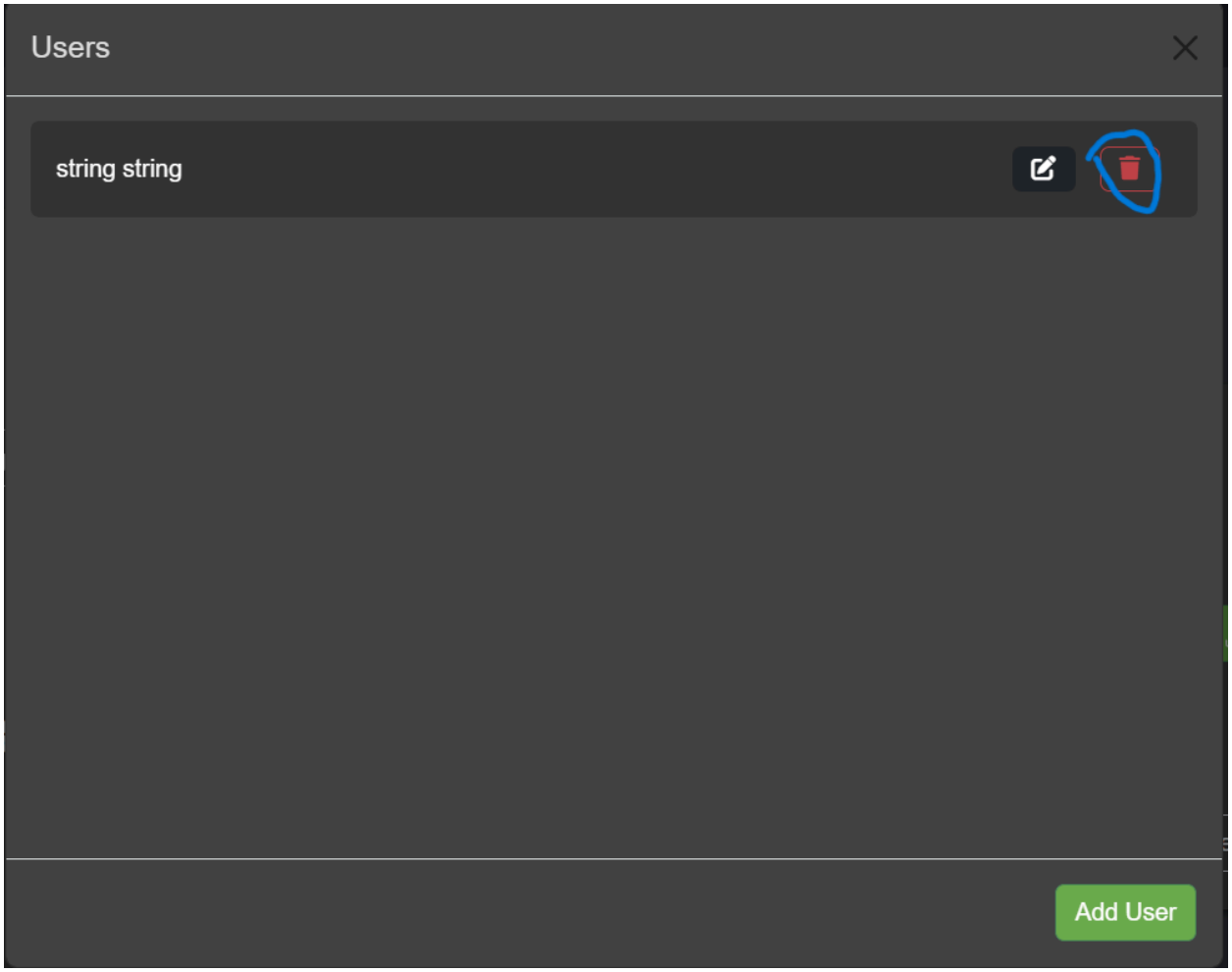
Clicking the pen-paper icon in the user list pop-up enables an admin to edit a user's information, opening a similar pop-up screen as used for user creation. Make any necessary changes and then save them by clicking the button in the lower right-hand corner of the screen.



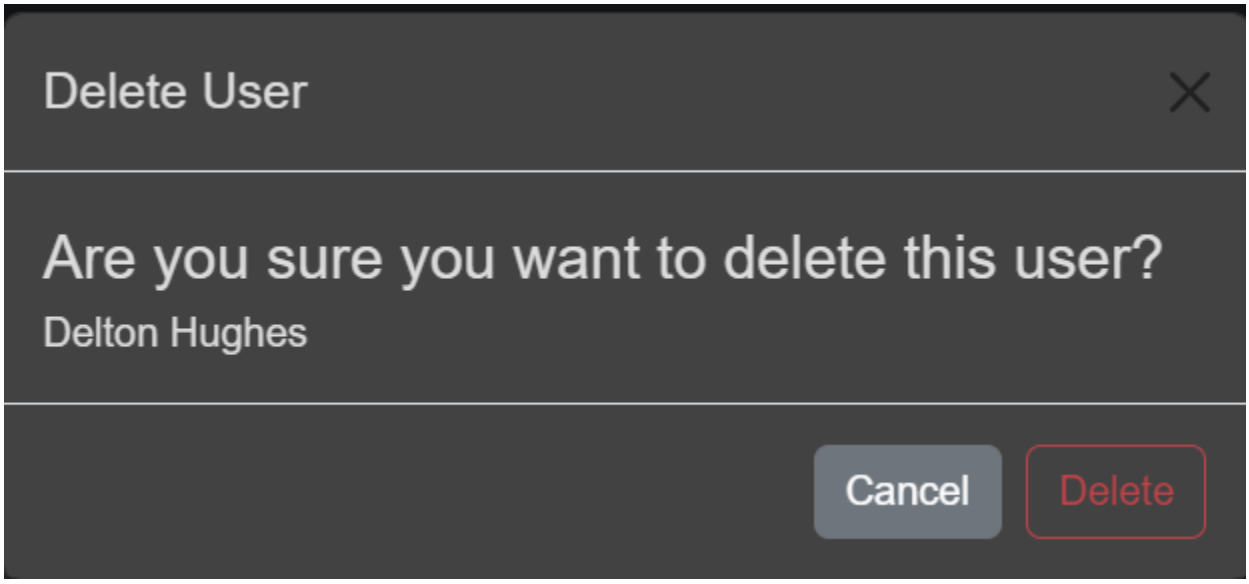
In order to edit a user all that is needed is after clicking the edit button, the Admin will be shown all the users data excluding the user's password. In order to change the password all that is needed is to type in a new password in the password box and click save.



To delete a user, an Admin should navigate to the User list pop-up and click the trashcan icon next to the user they intend to remove.



This will provide a pop-up double checking if the Admin wants to delete the user, if we are to delete the user click the delete button, otherwise click cancel.



3.3 Add and Deleting Rooms

As an Admin, from the homepage, you can delete or create rooms, as previously mentioned in section 2.3.1.

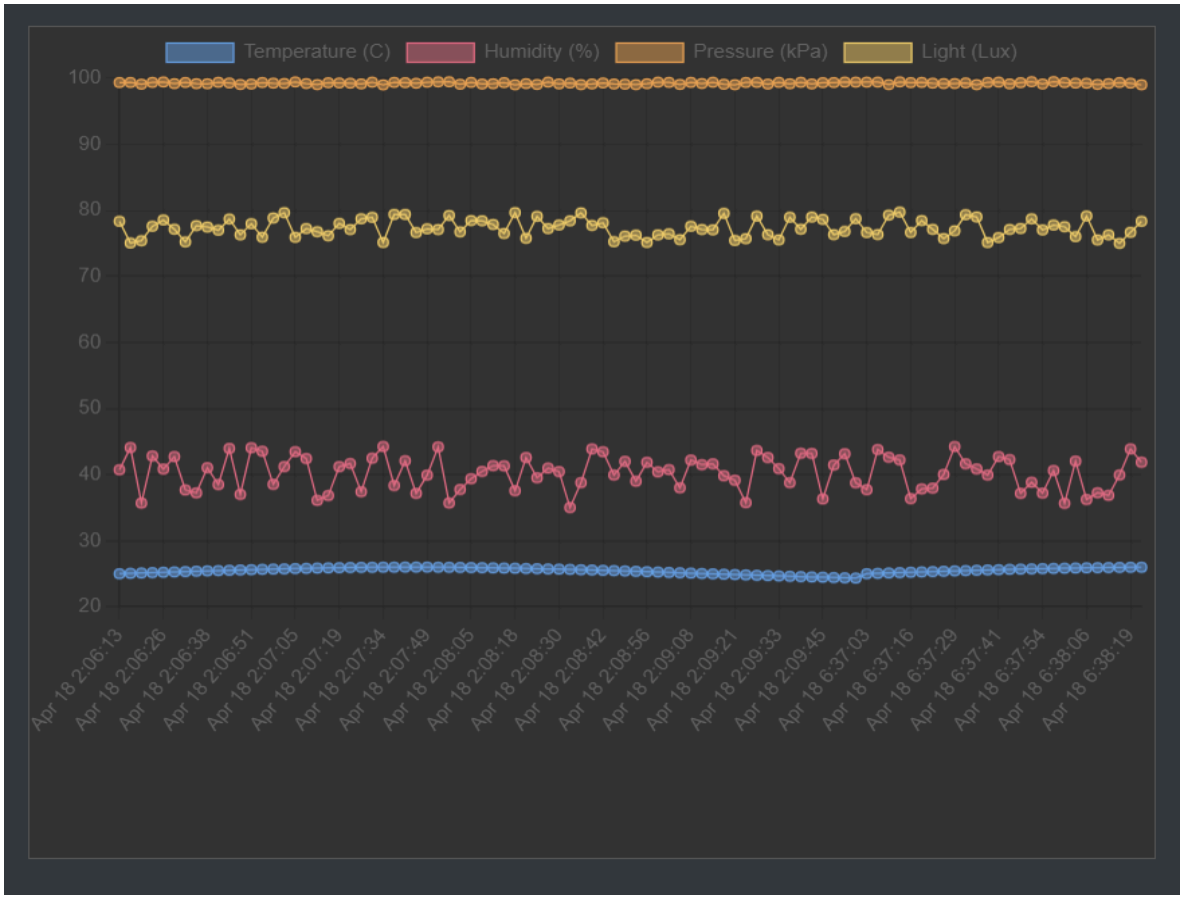
3.4 Non-Admin Privileges

As a non-admin user, your access to the system's capabilities is limited. Your primary activities will include viewing data for rooms and accessing messages or notes on either the room or home page.

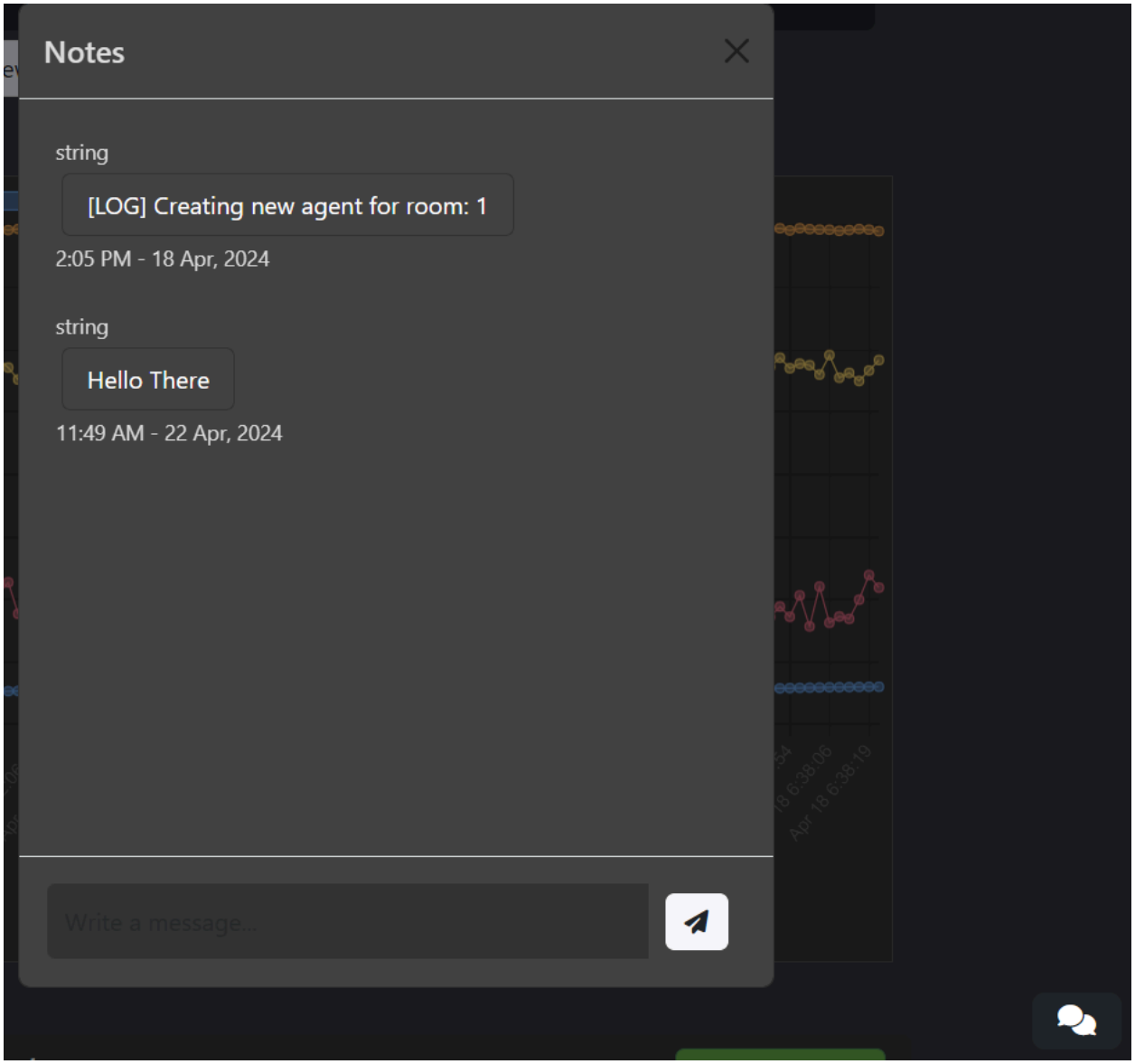
3.5 Monitoring Data and Chat messages

As a non-admin user, accessing room data follows the same procedure as it does for admin users. On the homepage, you will see room cards that display real-time measurements with numerical values.

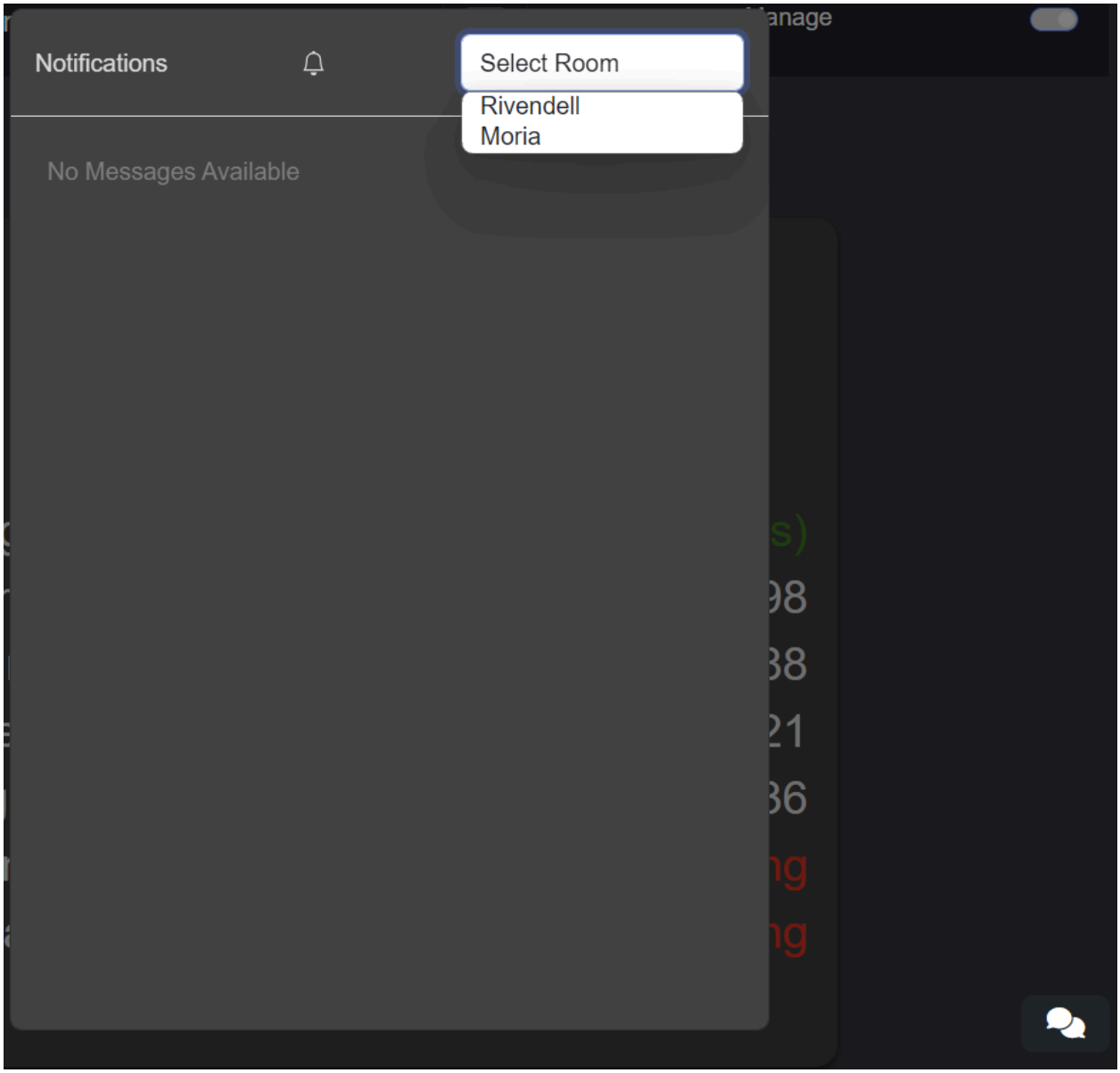
On the room page, after selecting a specific room card on the homepage, you will be presented with a graph displaying the data for that room inside of the roompage.



If the user wants to see or send messages in the room all you need to do is click the chat bubble button at the bottom right of the page.



While on the homepage, to view a message (note that sending messages is not possible from this page), you must click on the chat bubble icon at the bottom right, open the dropdown menu, and select the appropriate room.



4. Hardware Setup

4.1 Credentials

Accounts for Teamviewer as well as each of the agents had to be set up in order for easy access to take place between the agents. The following are the accounts, usernames, and passwords that were used during this project to set up the agents as well as teamviewer:

Service	Type of Credential	Credential	Password
Gmail	Email Address	msugreenwatch@gmail.com	Putmeinagreenhouse!
Teamviewer	Username/Email Address	msugreenwatch@gmail.com	Putmeinagreenhouse!
ALL AGENTS - OS user profile	Username	user	greenwatch
Agent ALPHA - Teamviewer	Teamviewer ID	149 736 955	Putmeinagreenhouse!
Agent BRAVO - Teamviewer	Teamviewer ID	548 186 329	Putmeinagreenhouse!
Agent CHARLIE - Teamviewer	Teamviewer ID	549 774 125	Putmeinagreenhouse!
Agent DELTA - Teamviewer	Teamviewer ID	494 597 011	Putmeinagreenhouse!

At the time of writing this document all agents have been set up and linked with the teamviewer account outlined above so that accessing the agents can be done remotely. Alternatively, the agents can be removed and plugged into a keyboard mouse and monitor for direct access. In the event that another agent is to be made and used with the system, the following steps must be taken to ensure smooth operation

It is recommended that passwords be changed after the system is fully installed and operational

4.2 Installing Raspbian on Agents

Need micro sd card of suitable size, micro sd card reader (32 Gb), computer with internet access

1. Go to https://www.raspberrypi.com/software/ and download appropriate version for your operating system
1. Insert microSD card into reader
2. Insert reader into USB port on computer
3. Open up the imager and select the version of the Pi you are getting the OS for as well as the proper storage device you are installing it on.
4. Follow the prompts
5. After the process is complete, remove the microSD card and insert it into the slot on the Pi
6. Plug the Pi into a keyboard, mouse, and monitor to begin initial setup of the Pi, follow the instructions on screen until the desktop is reached

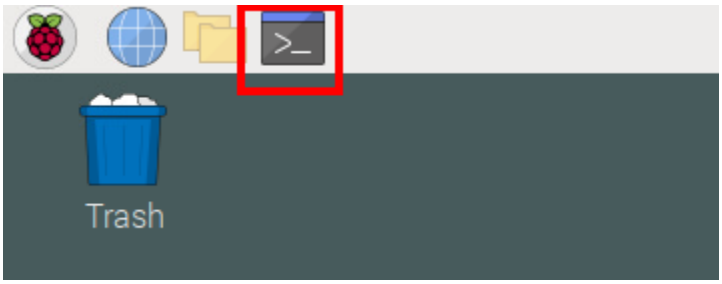
4.3 Setting up Software and Automation on Agents

Because the agents use additional auxiliary sensor arrays, special settings must be enabled in order for the agents to function properly. Additionally, several programs need to be installed and added to autostart so that they will be able to run just by turning the agent on.

4.3.1 Enabling IC2 and SPI Interfaces

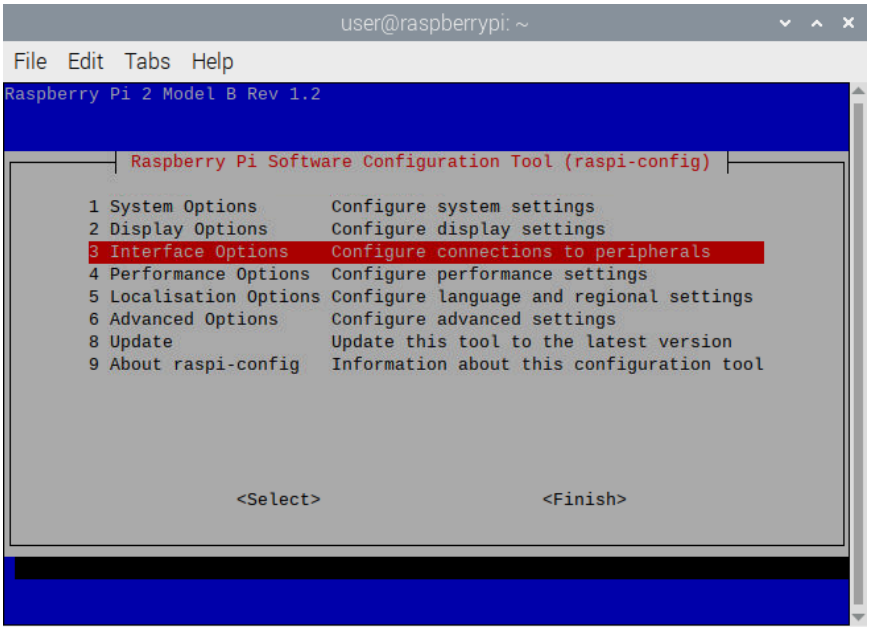
The IC2 and SPI interfaces are what allow the senseHAT and photoresistor to be read through the GPIO pins respectively.

1. Once the agent is set up, open a terminal window by clicking on the terminal icon in the top left corner

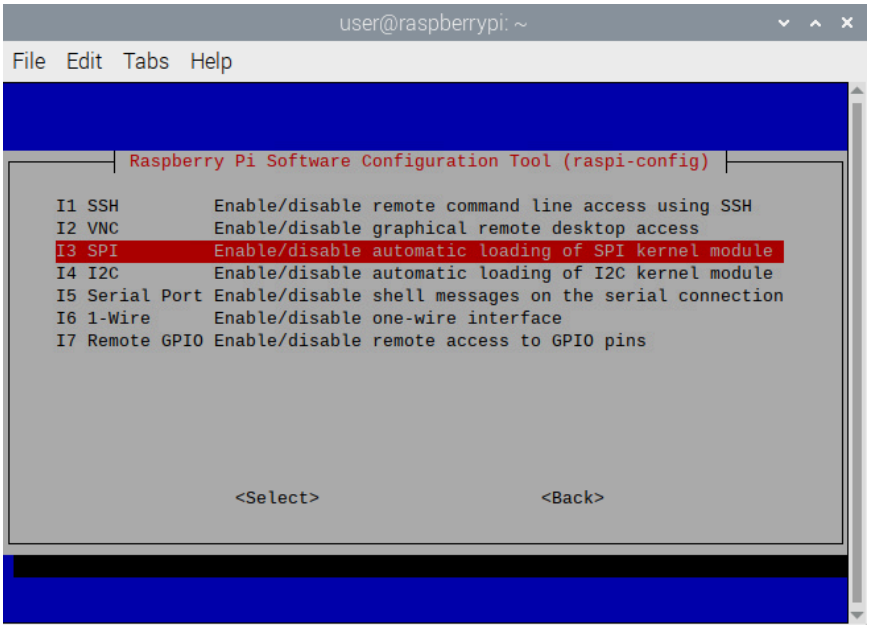


2. Once inside the terminal enter the following command:

```
sudo raspi-config
```



3. Next, use the arrow keys to navigate to option 3 “Interface Options” and press the enter key to select it.



4. Navigate to “I3 SPI” and press the enter key to select it

5. Select yes on this menu. The system will take a few seconds to enable this option.

6. You will be brought back to the Raspberry Pi Software Configuration tool. Select option 3 “Interface Options” again and then on the submenu select “I4 I2C” and enable it using the same procedure as before for enabling the SPI interface.

7. After you have enabled the IC2 interface and are brought back once again to the Raspberry Pi Software Configuration tool, you may close the terminal.

4.3.2 Installing Teamviewer on Agents

The teamviewer client can be installed directly from the terminal.

1. Open a terminal (See 4.3.1)
2. Enter the following commands into the terminal and let them run:

```
cd
sudo apt-get update
sudo apt-get upgrade
sudo wget https://download.teamviewer.com/download/linux/teamviewer-host_armhf.deb
sudo dpkg -i teamviewer-host_armhf.deb
```

NOTE If an error is encountered after running the previous command, run the following:

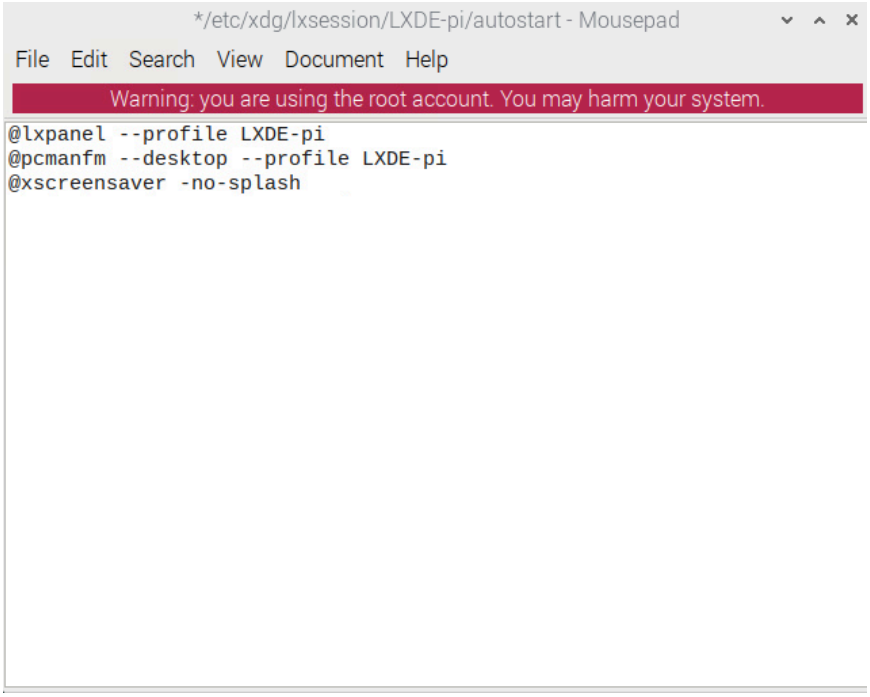
```
sudo apt  --fix-broken  install
```

3. Teamviewer should be successfully installed after this is done, you may close the terminal window

4.3.3 Adding programs to autostart

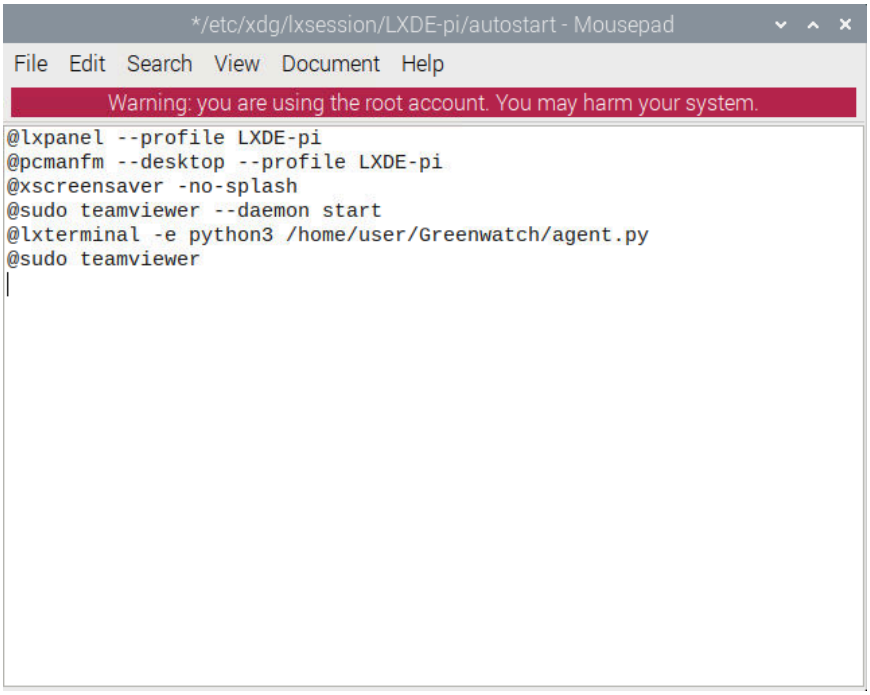
Two programs need to be added to the autostart script. The autostart script is run at the start each time the Pi boots up. We will use this functionality in order to start teamviewer and to start the agent.py file that allows the agent to take measurements and send the measurements to the server.

1. Start by opening the terminal (See 4.3.1)
2. Enter the command: `sudo mousepad /etc/xdg/lxsession/LXDE-pi/autostart`



A file that looks like this should pop up. We will be adding a few lines to this file.

3. Add the following lines to the end of the file:
   @sudo teamviewer --daemon start
   @lxterminal -e python3 /home/user/Greenwatch/agent.py
   @sudo teamviewer



The file should now look like the image above.

NOTE: If you plan on putting your agent.py file at a different location other than the one specified above and in section 4.3.4, replace the path in the previous line to wherever you have placed the file.

4. Once you have finished, save the file and you may close the terminal window.

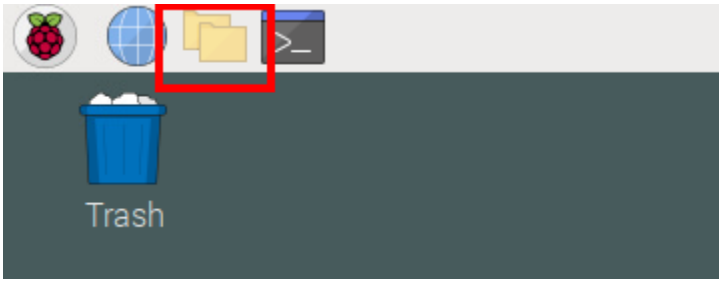
4.3.4 Creating GreenWatch Directory

Following from 4.3.3, we have pointed autostart to an agent.py file located at:

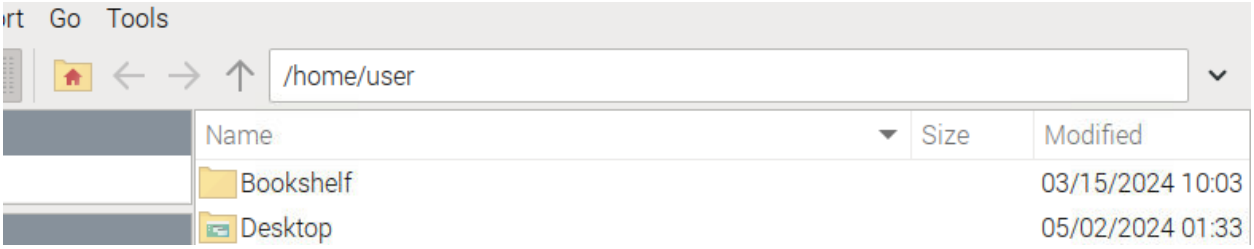
/home/user/Greenwatch/

We will now create this directory so that the autostart command will run the agent.py file.

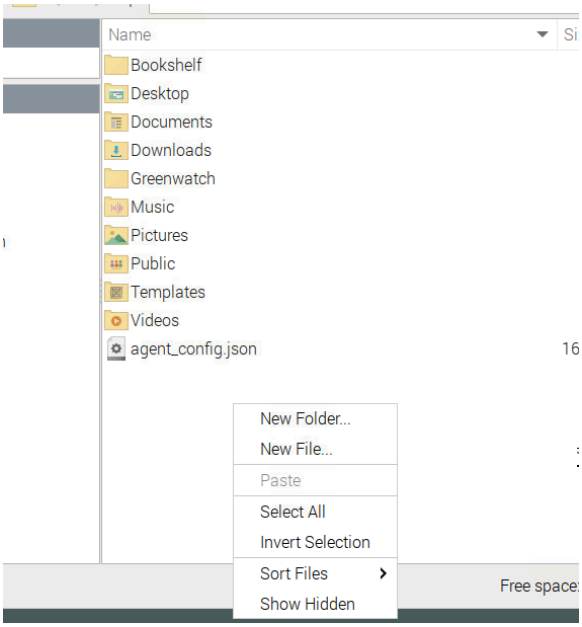
1. Open a File Explorer window from the top left of the screen



2. Type “/home/user” into the address bar at the top and hit enter if you are not already in that directory.



3. Right click on a blank section inside the File Explorer window and select “New Folder”



4. Name the folder “Greenwatch”
5. Drag the folder on to the desktop to create a shortcut for easy access

4.4 Setting up Teamviewer Account and Linking Agents

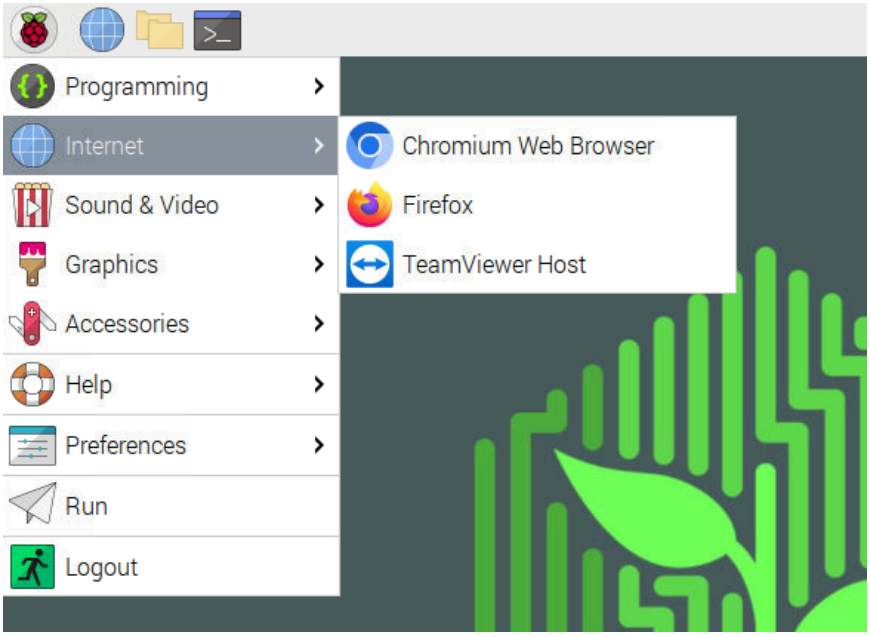
Teamviewer is being used for remote access to the agents. There are two methods of getting in contact with the agents, either by the agent’s Teamviewer ID, or by setting up easy access through teamviewer. Easy Access is preferable in this situation because it does not require the memorization of a Teamviewer ID.

In this section we will also show how to set a persistent password for teamviewer up so that it does not change every time a new connection is made.

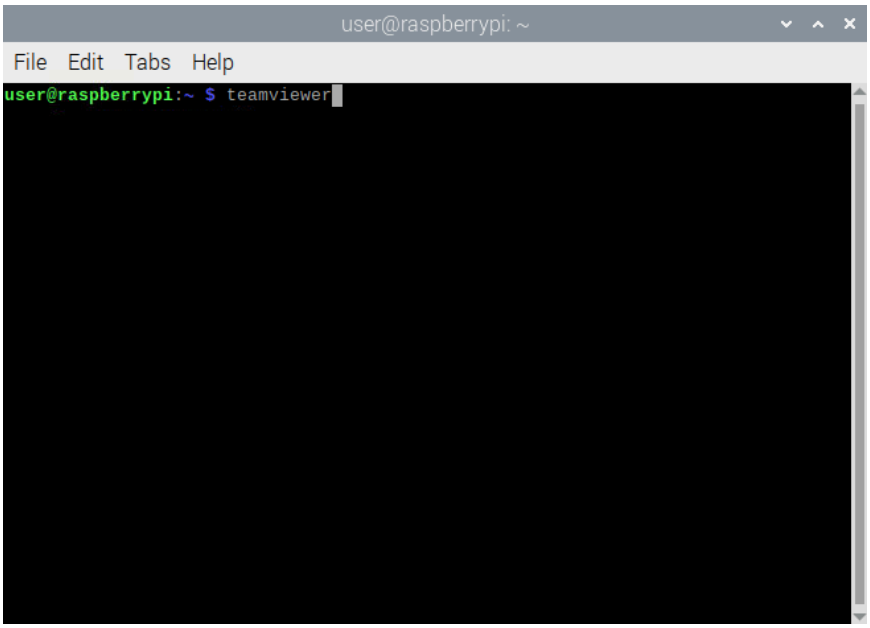
4.4.1 Opening Teamviewer

If you have not already added teamviewer to the autostart script (Section 4.3.3) you may use the following methods to open it up.

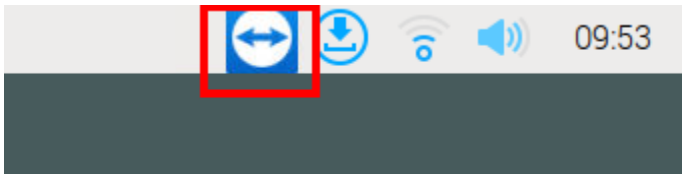
Method 1. Menu navigation (Select TeeamViewer Host from the menu in the top left)



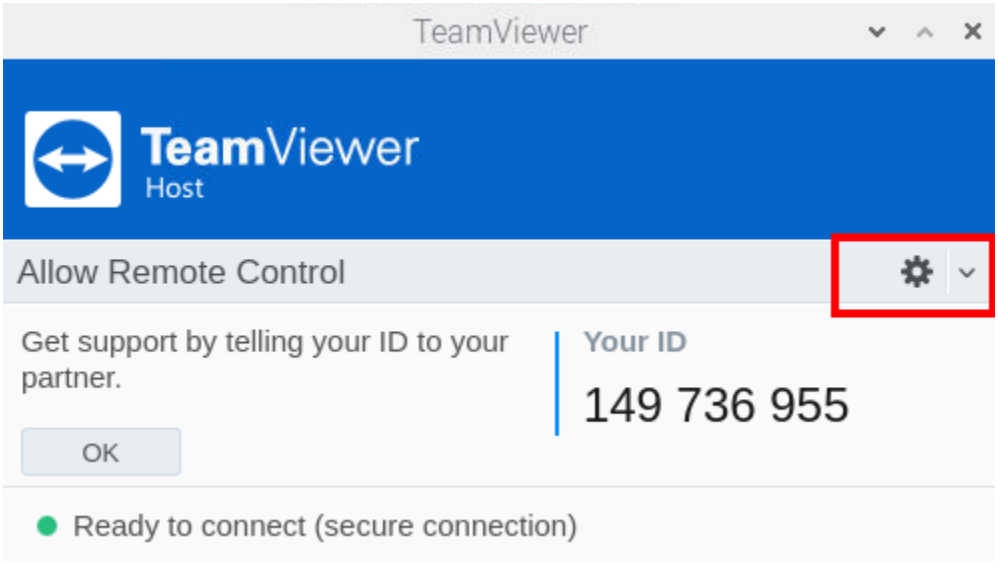
Method 2. Terminal (Enter the command “teamviewer” into the terminal)



Once Teamviewer is open, A teamviewer logo should appear in the top right corner of the screen.



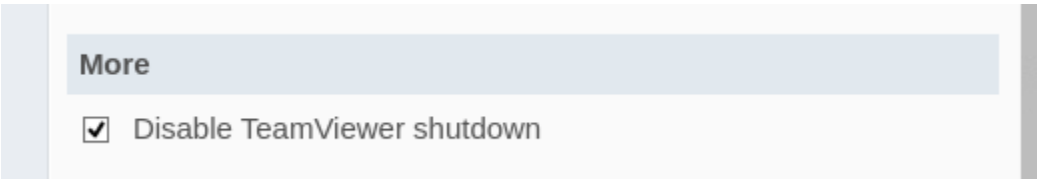
Simply click on this icon to open the teamviewer window



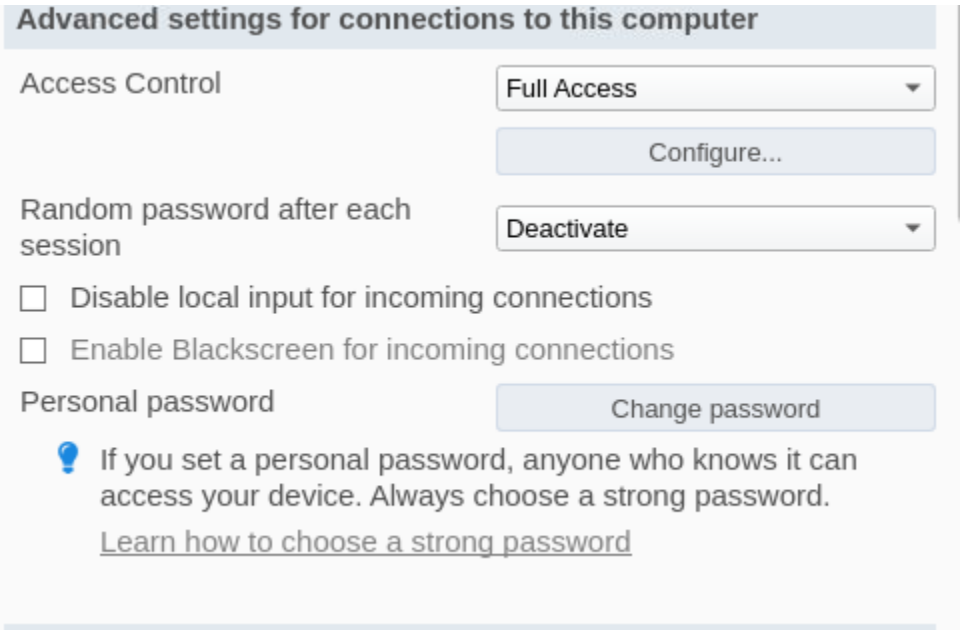
From here, click on the settings icon on the right of the teamviewer window.

4.4.2 Advanced Menu (Personal Password)

1. Tick the Disable TeamViewer shutdown option

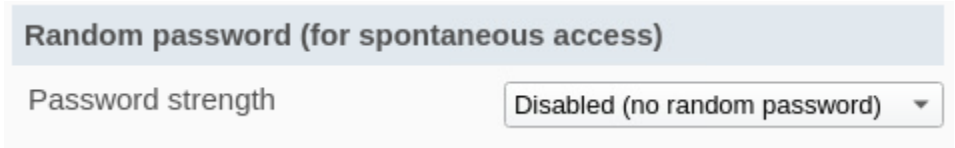


2. Set the Random password after each session to Deactivate
3. Change the Personal Password option to a personal password of your choice. At the time of writing this document, all personal passwords for all agents are the same. The password is outlined in section 4.1



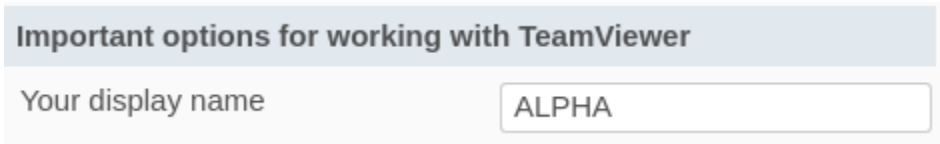
4.4.3 Security Menu

1. Set Password strength to Disabled (no random password)

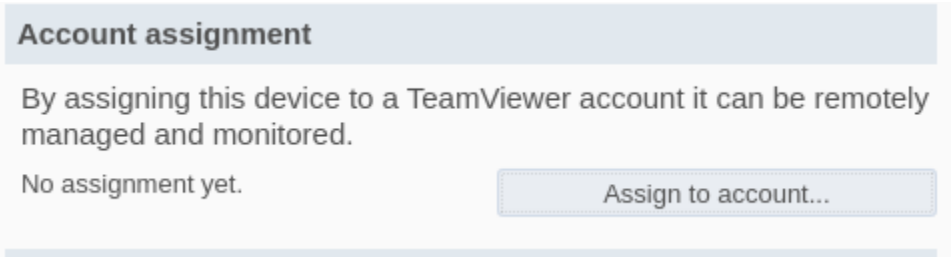


4.4.4 General Menu (Easy Access)

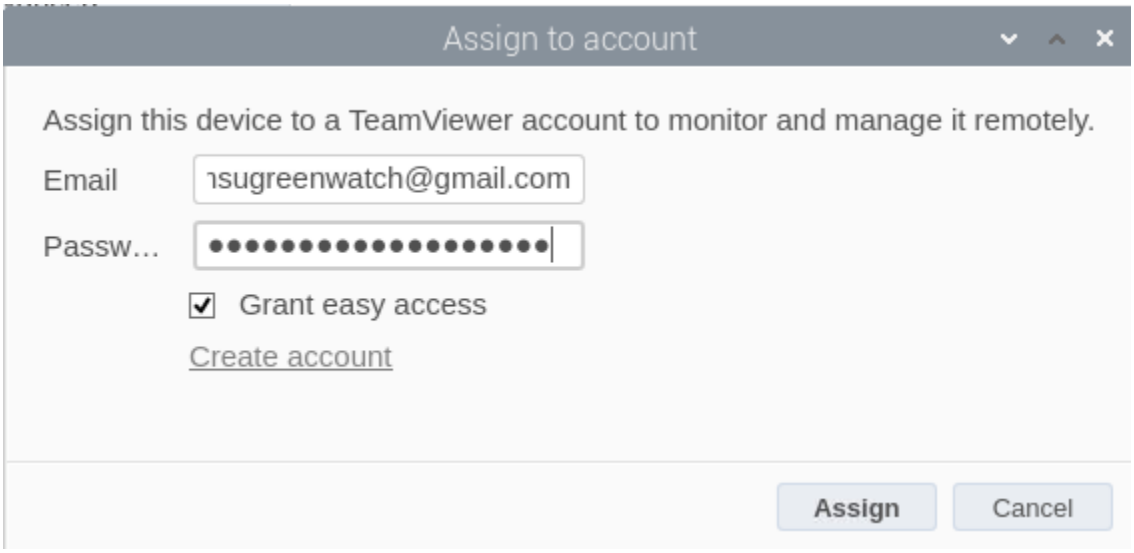
1. Set the display name



2. Assign the agent to your teamviewer account



3. Tick Grant easy access when prompted



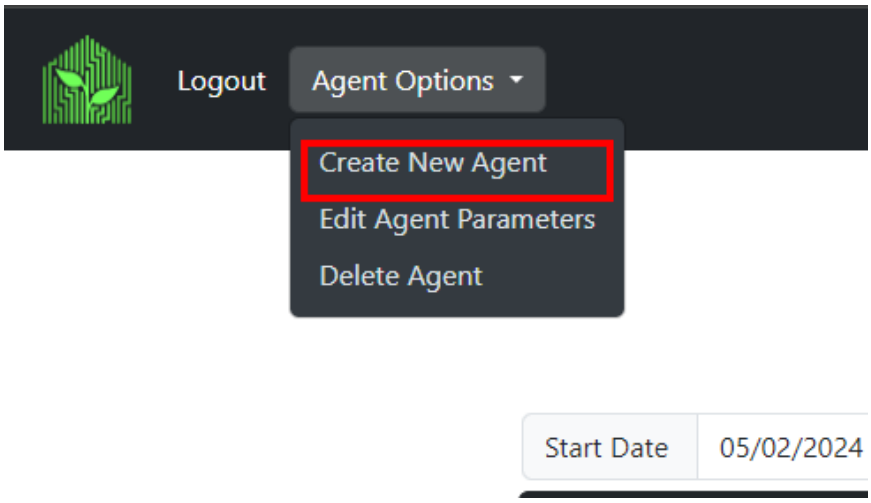
4. Follow the prompts to complete the process

4.5 Adding agent.py Files to Agents

This section will outline how to get the agent files from the web interface as well as how to add them onto an agent. The following steps assume that the server has been set up and a room has already been created.

4.5.1 Getting Agent Files from Web Application

1. Log in to the GreenWatch web application
2. Navigate to the room page for which you wish to generate an agent fo
3. Select the Create Agent option from the Agent Options menu



NOTE: Agents must be created in order, that is an agent for room 4 cannot be created before an agent has been created for room 3 and so on.

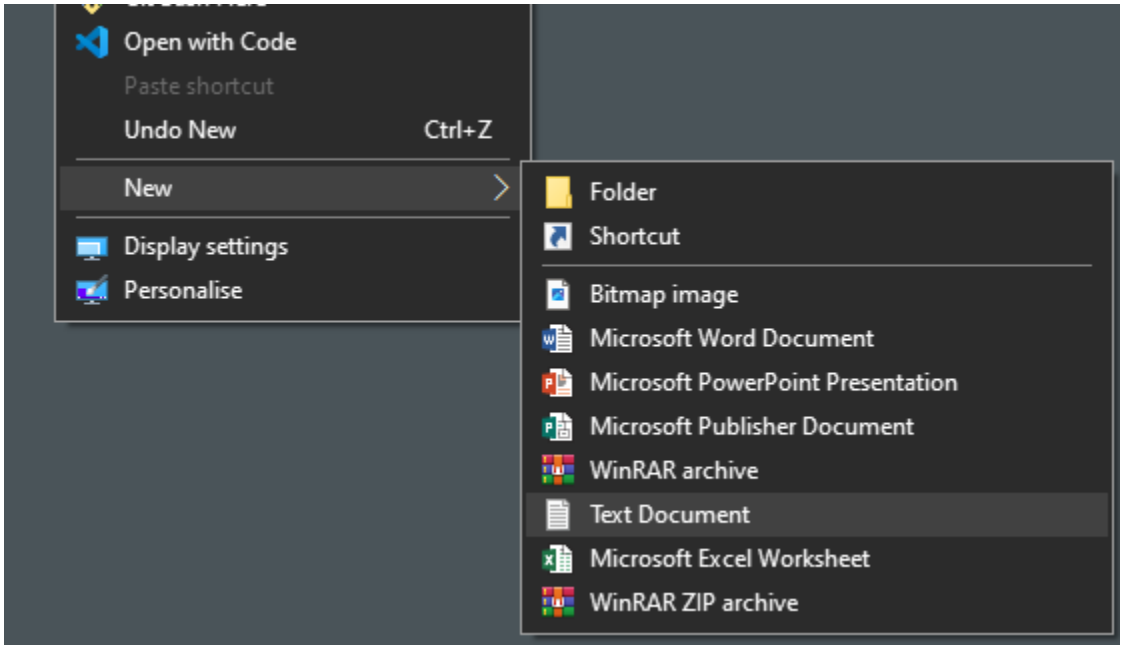
A webpage that looks like this should pop up:

```
#!/usr/bin/env python
import requests
import json
from time import sleep, time
import datetime
from sense_hat import SenseHat
from spidev import SpiDev
import random
import socket
import subprocess
import math
import os

roomID = 1
ServerIP='167.71.191.55'
duration = 59
private_key = 'TM623Q7YPP09SFJK827I569XK1PYBE0RDOFMRCMC57GIP8WT0029PJFZH5

req_headers = {
    "Key": private_key
}

server_data = None
start_time = time()
retryTime = 5

server_url = f"http://{ServerIP}/rooms/{roomID}/measurement"
action_url = f"http://{ServerIP}/rooms/{roomID}/action"
agent_url = f"http://{ServerIP}/servers/agents/{roomID}"

# Actions.
last_action_timestamp = ''
vent_state = 3
shade_state = 3
reboot = 0
```

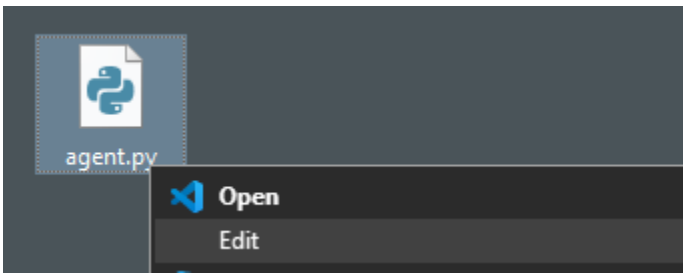
This is the agent.py code for whatever room you have generated and agent for. This code needs to be placed in the agent.py file on an agent. There are two methods:

4.5.2 Method 1: USB (Local Access)

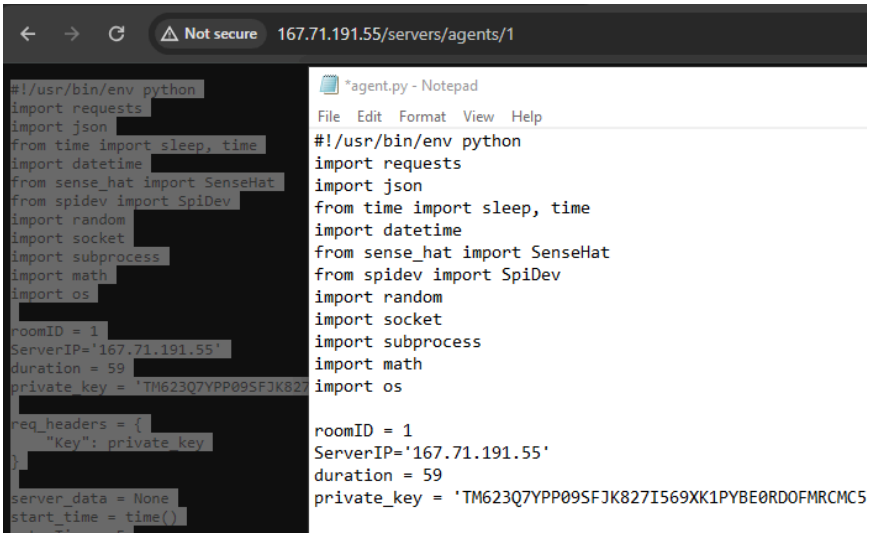
1. Create a new file on your computer



2. Name the file agent.py
3. Right click and select edit from the menu



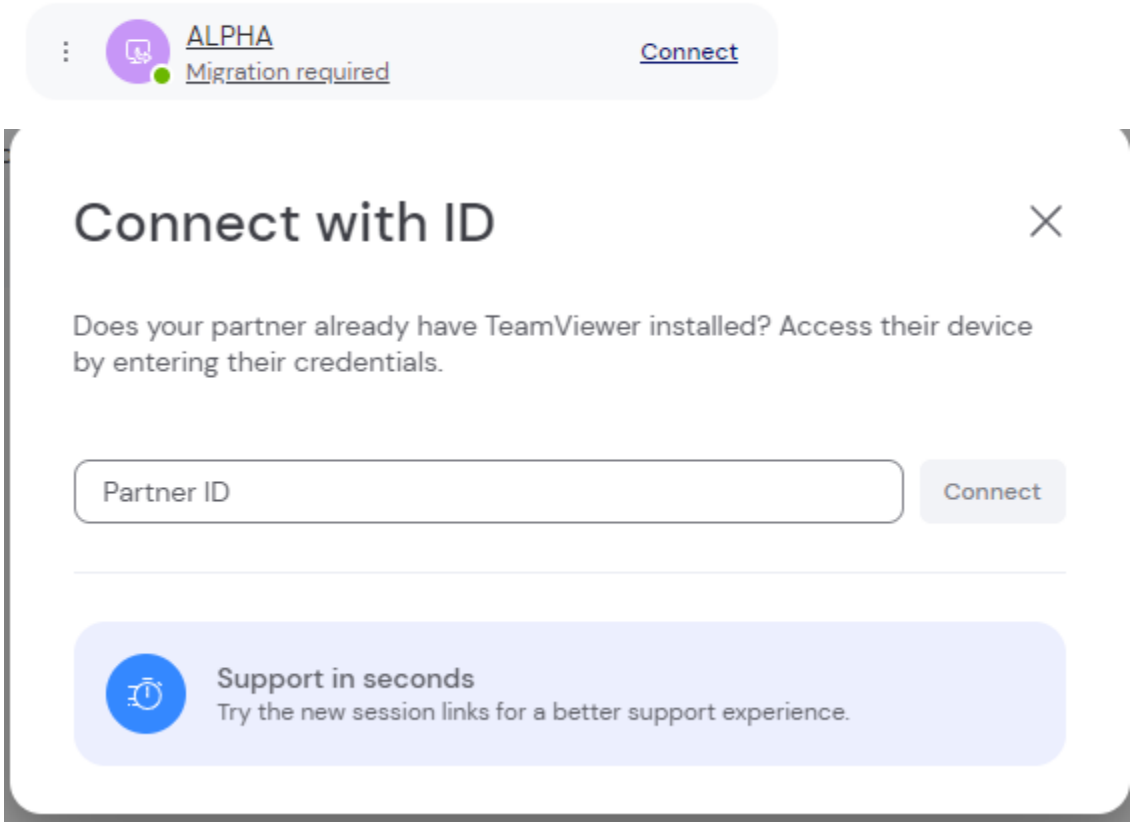
4. Copy all the code from the agent code page and paste it into this file



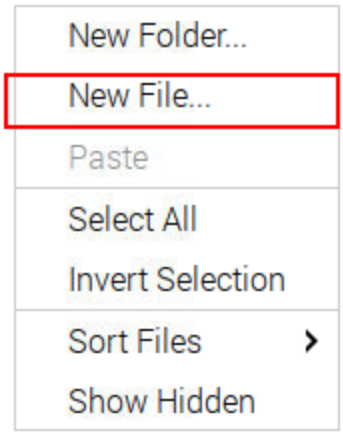
5. Save the agent.py file
6. Put the file onto a USB drive
7. Plug the USB drive into the agent you want to add to the room
8. Put the agent.py file into the home/user/Greenwatch directory
9. Go to section 4.5.4 to ensure the agent.py file is executable

4.5.3 Method 2: Teamviewer (Remote Access)

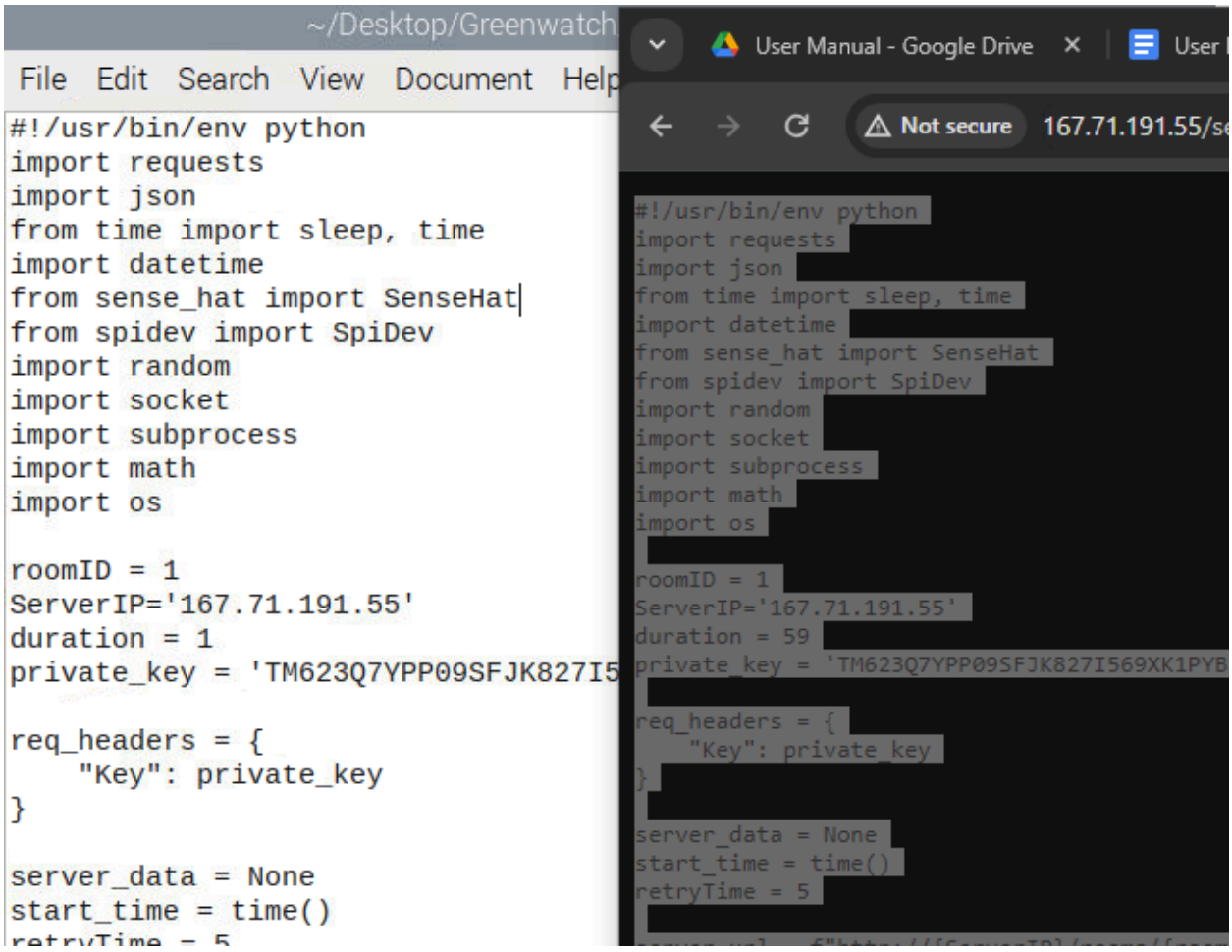
1. In the teamviewer desktop client connect to the agent either with easy access or by using the agent's Teamviewer ID



2. Once you are connected, navigate to the home/user/Greenwatch directory
3. Create a new file in the directory by right clicking and selecting New File



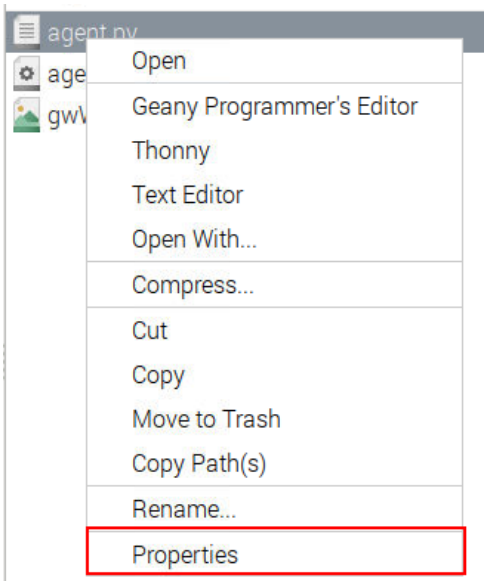
4. Name the file agent.py
5. Open the file and paste all the code from the web application into the file



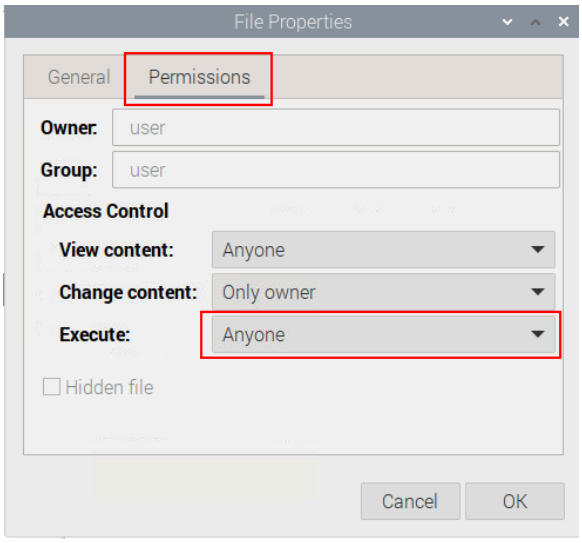
6. Save the file and close it
7. Go to section 4.5.4 to ensure the agent.py file is executable

4.5.4 Making an Agent File Executable on the Agent

1. Open a file explorer window
2. Navigate to the agent.py file
3. Right click on the file and select properties



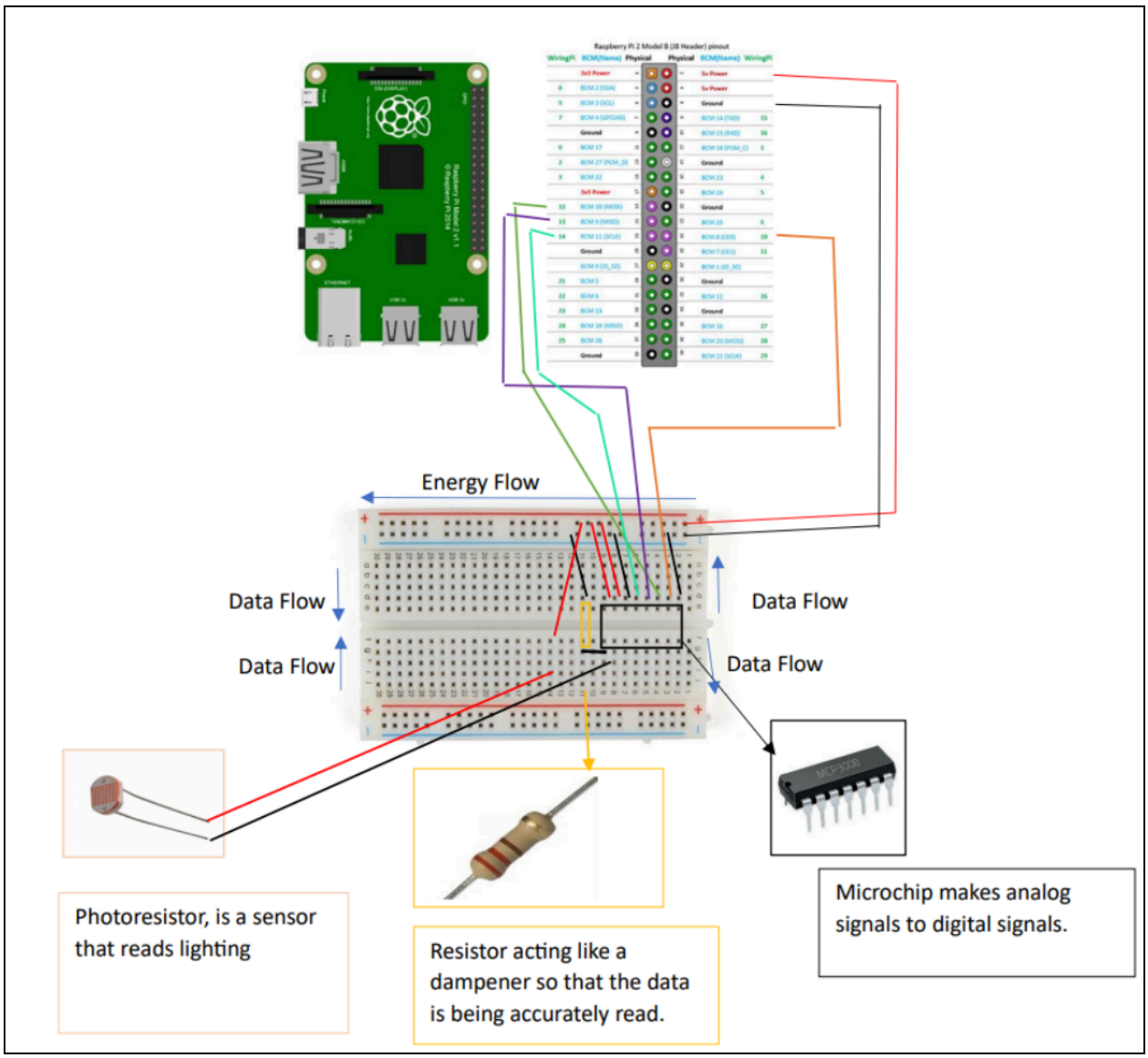
4. Under the permissions tab change the Execute field to say “Anyone”



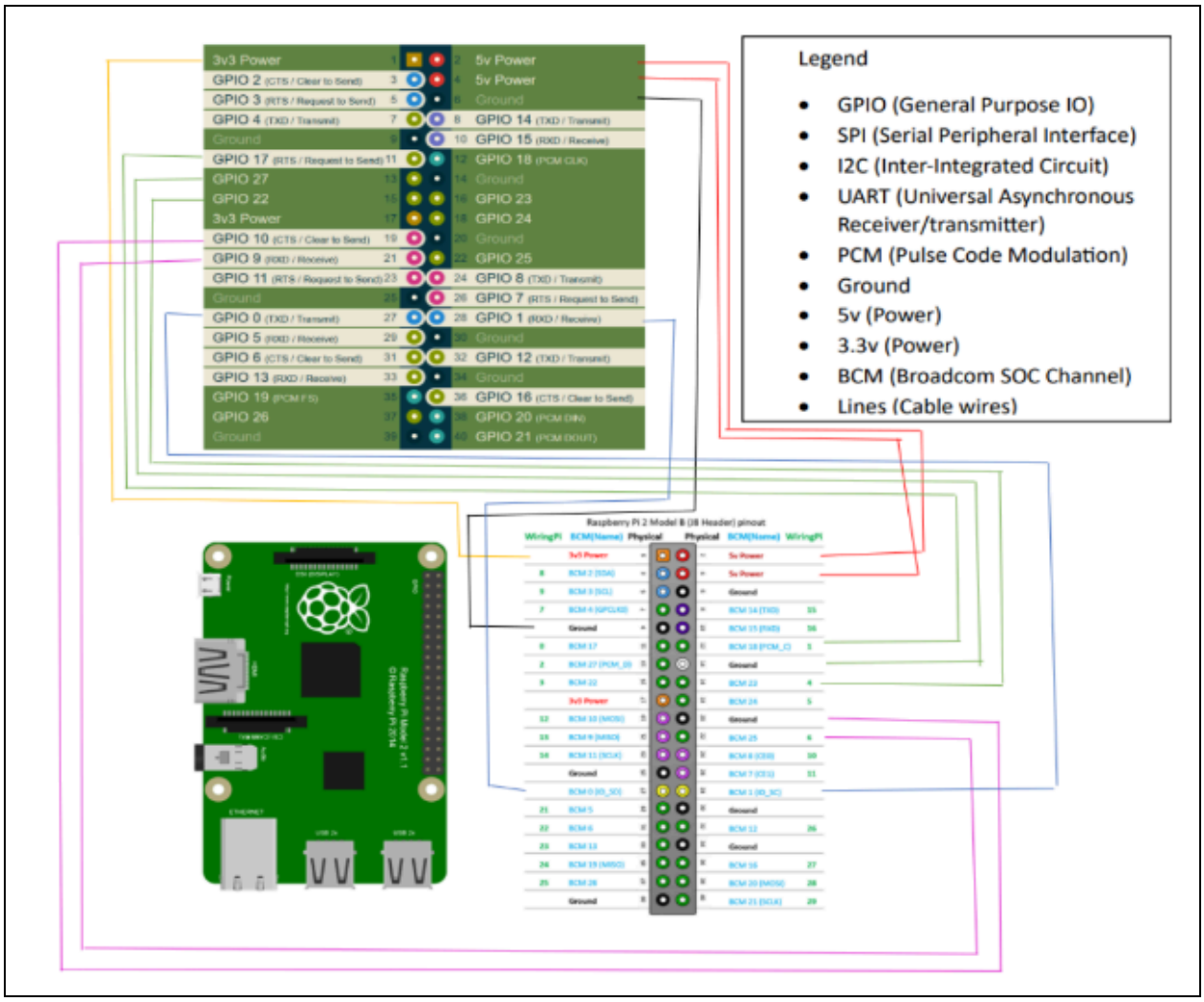
5. Select OK to close menu
6. Check to make sure the agent.py file runs correctly by double clicking it and selecting “Execute in Terminal”

4.6 Wiring Diagrams

The following figures show how the components need to be wired for the Photoresistor and the SenseHAT.



Photoresistor wiring diagram



SenseHAT wiring diagram

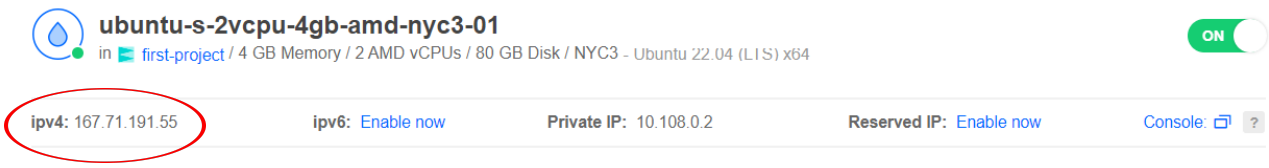
5. Server Setup

I will list the exact steps for a user to set up a server to be hosted so you can access the data from any internet browser. We hosted on digitalocean, so I will provide a server setup guide for that process.

Important Notes: The application is not secure because we ran out of time and did not get to implement a https service with a domain name because it requires getting SSL certification from a domain hosting website.
When choosing the pricing of the digital ocean droplet we chose **Ubuntu** and the pricing package of **$28/month**. You can go lower, but we have not tested the application at the lowest priced package. Using the lowest priced package may cause the application to operate very slowly and might even crash the droplet.

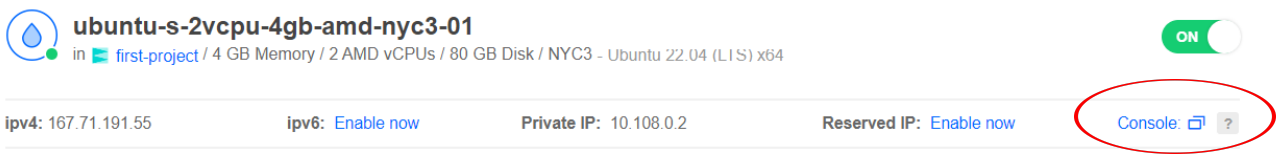
Step1: We hosted our application on the server hosting website digitalocean, here is the link: https://www.digitalocean.com/

Step 2: Once you create your digitalocean account you want to create a droplet. **A droplet** is basically the virtual machine where the GreenWatch project will run on, and you will access the app based on the **IP of your droplet**. This was our droplet that we used for testing. Below we have circled were the IP address is located, like so:



To set up a droplet go to this link:
https://docs.digitalocean.com/products/droplets/how-to/create/

Step 3: Once your droplet is setup you navigate to your droplet page and go your console, like so:



Step 4: Once the console is up you are going to enter in these commands in order exactly as they are shown. There will be no numbering, but assume that they are executed in the order provided top to bottom. You can copy from here and paste into the console for the command to execute. Let each of these commands finish before running the others.

sudo apt update && apt upgrade -y

sudo apt install docker.io docker-compose python3-pip virtualenv -y

git clone -b production https://github.com/Vizemo/GreenWatch

cd GreenWatch

pip install -r requirements.txt

virtualenv venv

source venv/bin/activate

docker-compose -f docker-compose.prod.yml up --build -d
Note: If your application is not running run this command again

Step 5: Your application should be running on digitalocean, and you can now access it with the **IP of your digital ocean droplet**.

The default admin login is:
Username: admin
Password: changeme

The default admin of the system is not able to be deleted as to provide at least one access point if all users are deleted. The owner of the system should operate the default admin and change the name, email, and password accordingly. When the system is passed on to a new owner, the new owner should take over this account and set themselves up with new credentials.

6. IMPORTANT

Because the application is not secured with https encryption, **DO NOT** use one of your **commonly used passwords**. Additionally, you might not want to use an actual email address. We did not implement any features that rely on an email address.

If you are the owner admin of the system and have performed a first time setup, please change the username and password of the initially created admin account (See Section 4.1)

If you are running out of room in you virtual machine/hosting service, you can rerun the docker-compose -f docker-compose.prod.yml up --build -d
Command and it will set everything back to default and recreate the database, which will free disk space

The wifi network currently setup on the agents is the MSU guest wifi. This WILL need to be changed over to the secure wifi network within 30 days or each agent will have to be plugged into a computer and the wifi changed that way which is cumbersome.