



IOT LAB PROJECT

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CONTENT



THEORETICAL PART



PRACTICAL PART



USAGE

SETTING UP PREFERENCES

- 5 : Y is strongly preferred over X.
- 3 : Y is slightly preferred over X.
- 1 : X (Row) and Y (Column) are 1 equally preferred.
- 3 : X is slightly preferred over Y.
- 5 : X is strongly preferred over Y.

	Temperature	Humidity	CO ₂	Noise	Light
Temperature	1	-5 ▾	-5 ▾	-5 ▾	-5 ▾
Humidity		1	-5 ▾	-5 ▾	-5 ▾
CO ₂			1	-5 ▾	-5 ▾
Noise				1	-5 ▾
Light					1

Submit

Clear

Calculating priority:

For each column:

calculate sum (k) of the elements (j) in that column.

divide j by k.

For each row:

calculate average of that row.

	Temp	Humidity	CO2	Noise	Light
Temp	1	3	3	5	5
Humidity	0.33	1	1	3	3
CO2	0.33	1	1	3	3
Noise	0.2	0.33	0.33	1	3
Light	0.2	0.33	0.33	0.33	1
Sum of columns	2.06	5.66	5.66	12.33	15

	Temp	Humidity	CO2	Noise	Light	Priority
Temp	0.48	0.53	0.53	0.41	0.33	0.456
Humidity	0.16	0.177	0.177	0.24	0.2	0.1908
CO2	0.16	0.177	0.177	0.24	0.2	0.1908
Noise	0.097	0.058	0.058	0.081	0.2	0.0988
Light	0.097	0.058	0.058	0.027	0.067	0.0614
	2.06	5.66	5.66	12.33	15	-1

1. G=100, Y=50, R=0 (Green, Yellow, Red)
2. Read sensors' value and assign G/Y/R according to the set ranges to the sensors.
3. Priority=[0.456, 0.1908, 0.1908, 0.0988, 0.0614] (From the above table)
4. Sensor_val=[G,G,Y,R,G] (An example)
5. FOR Sensors in Room:

$$\text{Cosiness} += \text{Priority}_i * \text{Sensor_val}_i$$
6. IF Cosiness >= 70: Cosy
 ELIF Cosiness >= 40 AND Cosiness < 70: Somewhat Cosy
 Else : Not Cosy

EXAMPLES:

Scenario 1:

Temp = Green , Humidity = Yellow, CO2 = Green , Noise = Yellow, Sound= Green

$$0.456*100 + 0.1908* 50 + 0.1908* 100 + 0.0988* 50 + 0.0614* 100$$
$$=85.304$$

Scenario 2:

Temp = Green , Humidity = Red, CO2 = Green , Noise = Red, Sound= Yellow

$$0.456*100+0.1908*0+0.1908*100+0.098*0+0.0614*50$$
$$=67.75$$

Scenario 3:

Temp = Red , Humidity = Yellow, CO2 = Yellow , Noise = Green, Sound= Green

$$0.456*0+0.1908*50+0.1908*50+0.098*100+0.0614*100$$
$$=35.02$$

CONTENT



THEORETICAL PART

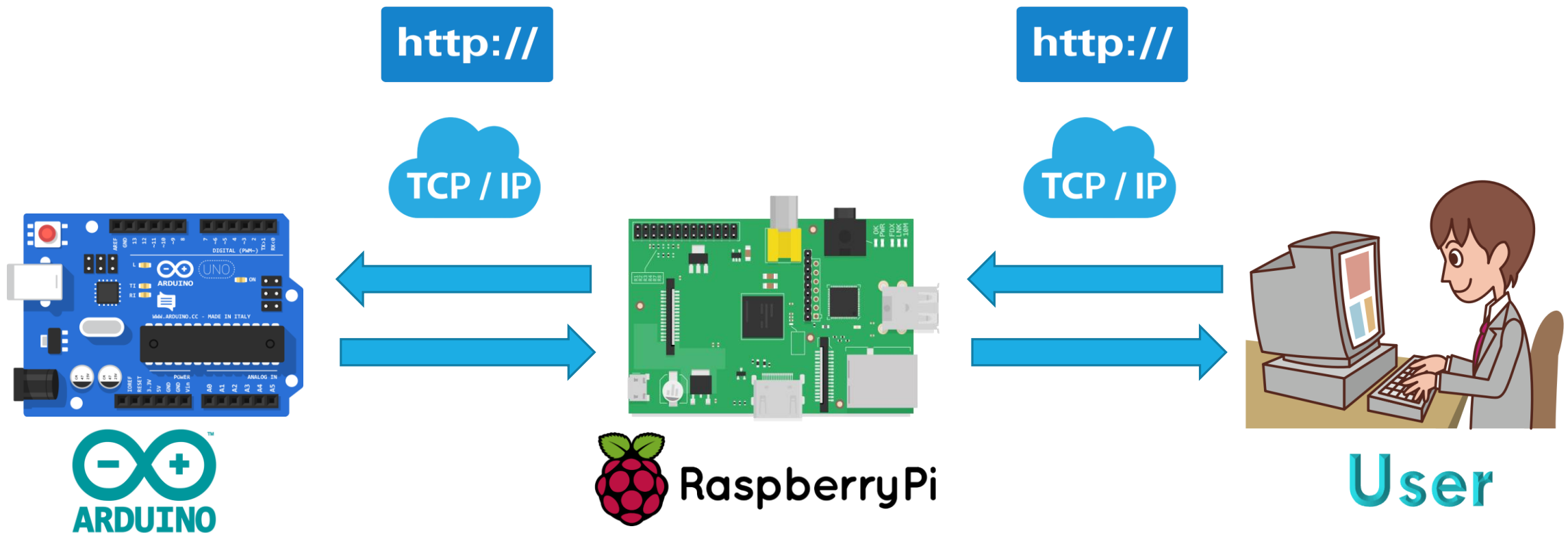


PRACTICAL PART



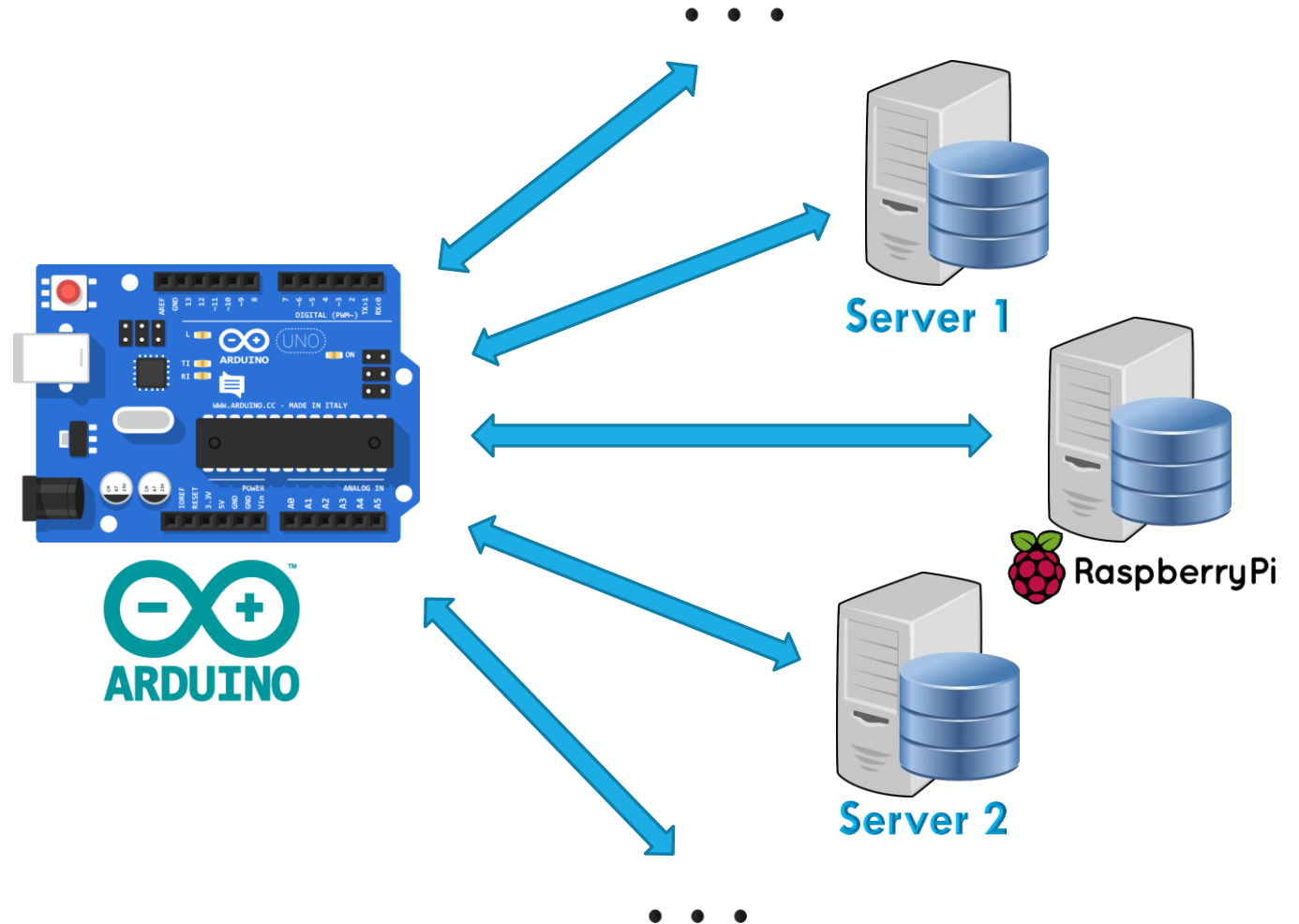
USAGE

ARCHITECTURE OF THE SYSTEM

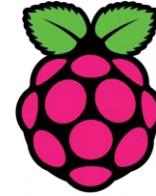


ARDUINO (DEVICES LEVEL)

- ❖ TCP Server Communication
- ❖ Reading Sensor Values
- ❖ Secure & Reliable Communication
- ❖ Dynamic connectivity
- ❖ HTTP efficient usage



RASPBERRY PI (DATABASE)



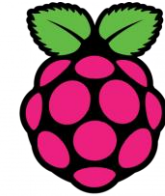
RaspberryPi



Why SQLite DB

- ❖ Easy to use for the development purposes
- ❖ Lite and more compatible
- ❖ Supports Relational DataBase
- ❖ Uses less memory and CPU power
- ❖ Run nearly everywhere

RASPBERRY PI (WEB SERVER)



RaspberryPi



Flask



pythonTM

Why Python and Flask

- ❖ Python: studied in the class, useful for fast development
- ❖ Flask: Light-weight/micro framework
- ❖ Communication with DataBase
- ❖ Little dependency to update
- ❖ Can work on almost all platforms
- ❖ Useful for Development purposes

COMMUNICATION (HTTP/TCP)



Why HTTP/TCP

- ❖ Arduino/RaspberryPi – TCP communication
- ❖ Secure, Reliable, More Server, Unique API format on Arduino (HTTP without additional data)
- ❖ Our model is more of a Client-Sever model, not Device to Device Model
- ❖ HTTP can provide all the CRUD methods
- ❖ User-friendly interface with HTTP
- ❖ Compatible with all types of user

CONTENT



THEORETICAL PART

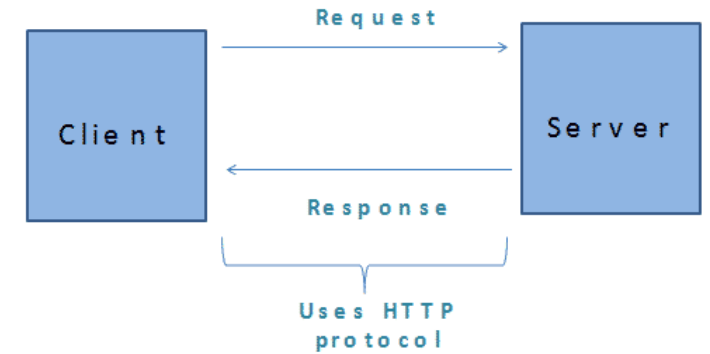
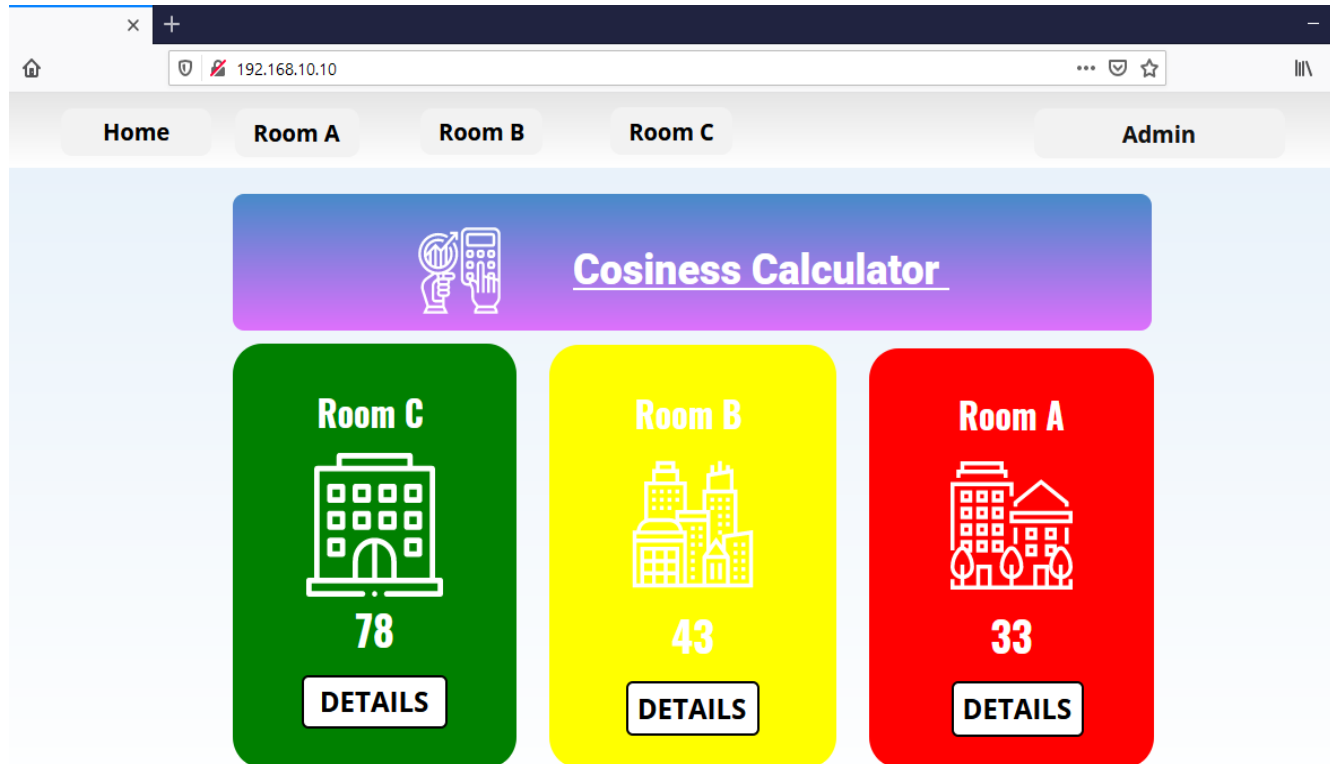


PRACTICAL PART

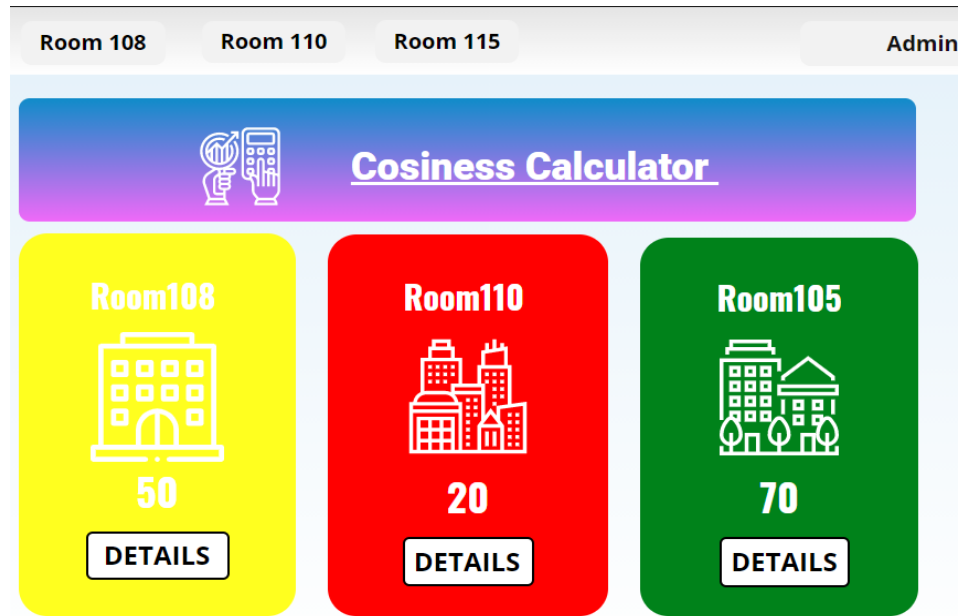
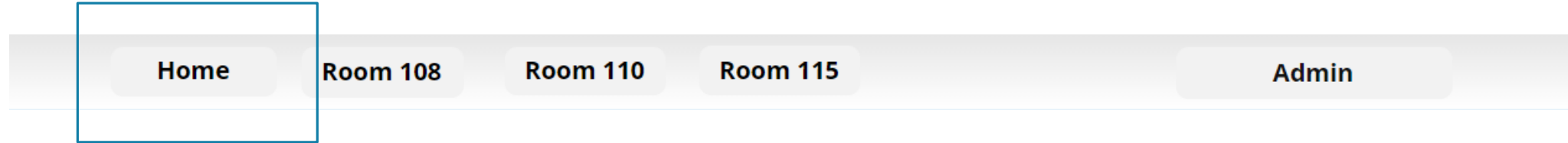


USAGE

MAIN PAGE



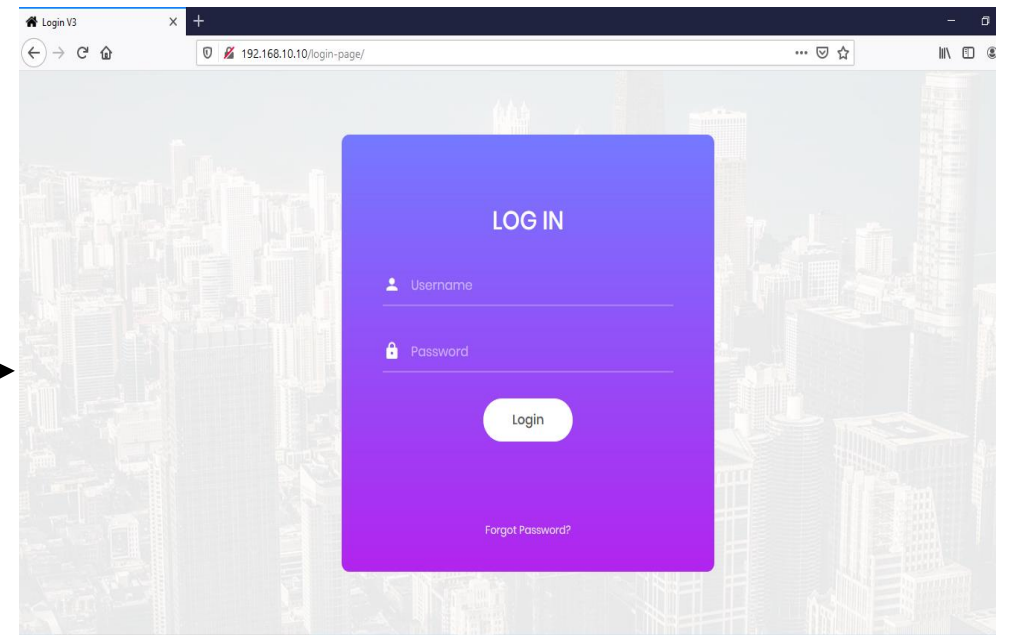
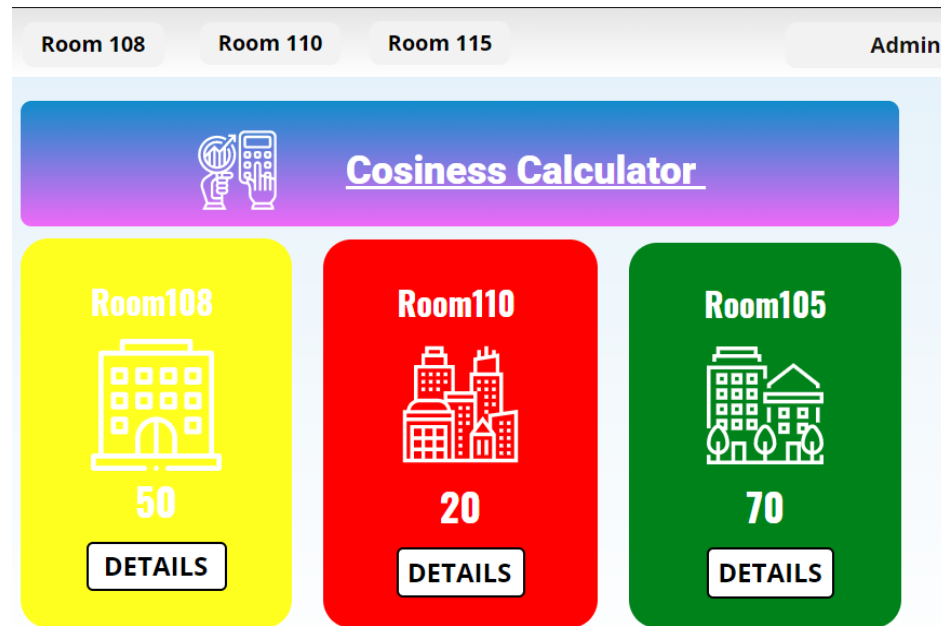
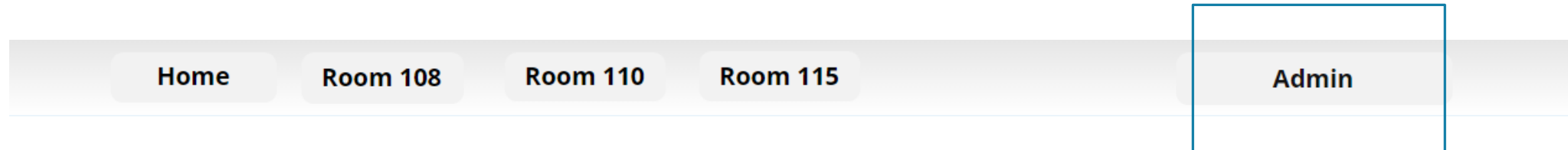
GET / RESPONSE



```
@app.route("/login-page/", methods=["GET"])  
def login_page_forwarding():  
    return render_template('login-page.html')
```

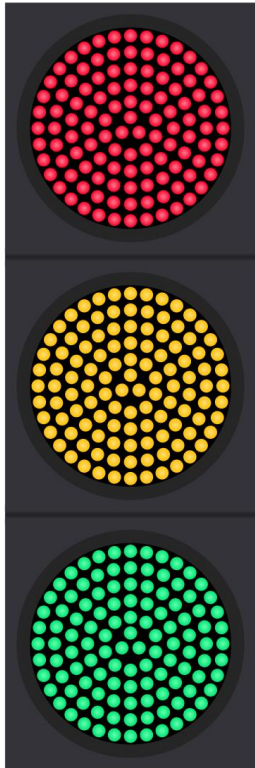
```
return render_template('Individual-Room.html', **selected_room)
```

ADMIN



```
if login == ADMIN_EMAIL and password == ADMIN_PASS:  
    return render_template('admin.html')
```

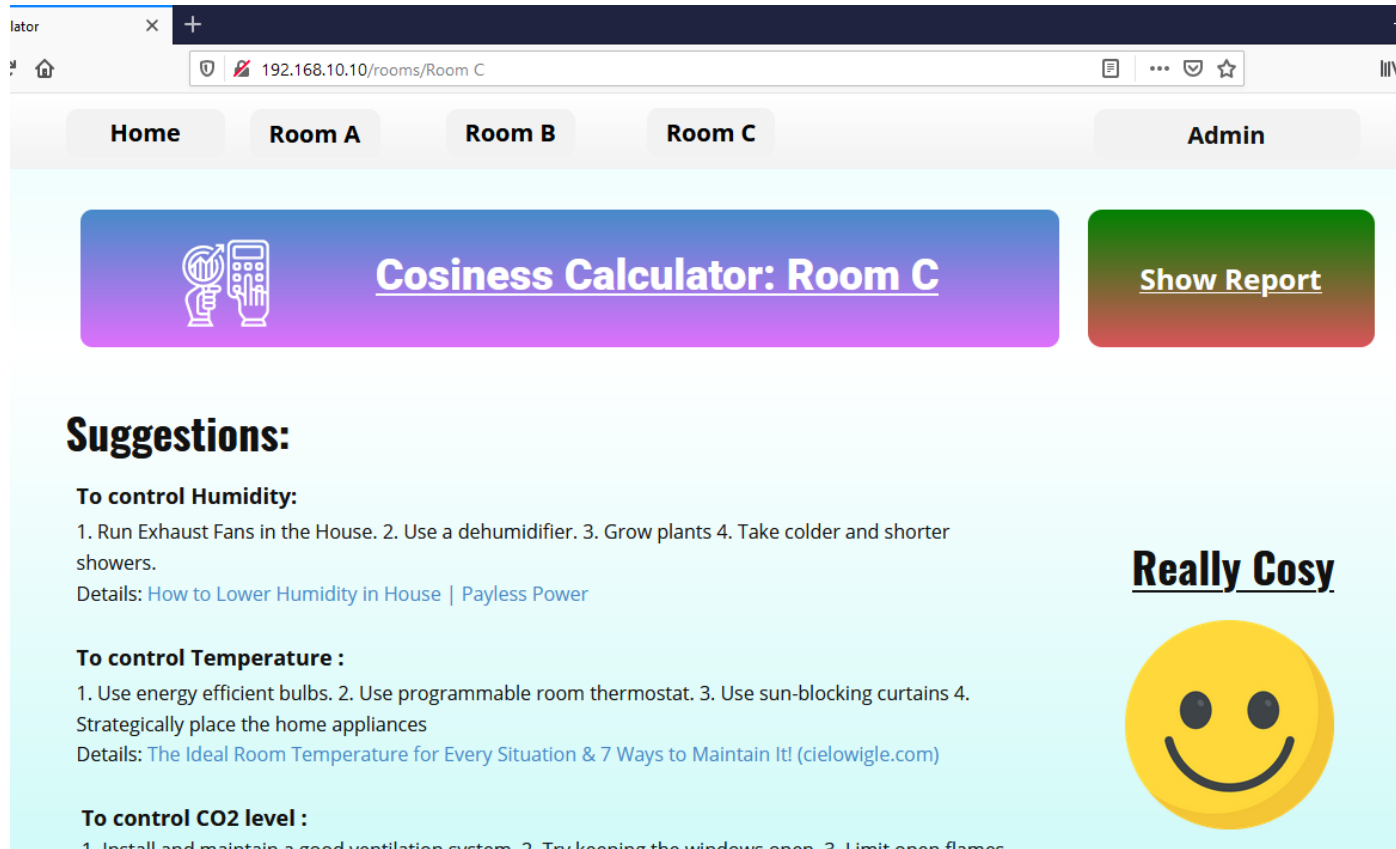

AHP COLORING SYSTEM



AHP Range Value	Color	is Cozy
0-39	RED	Not Cozy
40-69	YELLOW	Somehow Cozy
70-100	GREEN	Cozy




REPORT / SUGGESTIONS / VALUES



The screenshot shows a web browser window with the address bar displaying "192.168.10.10/rooms/Room C". The application has a navigation bar with tabs for "Home", "Room A", "Room B", "Room C", and "Admin". The "Room C" tab is selected. Below the navigation bar, there are two main buttons: a blue button labeled "Cosiness Calculator: Room C" with a calculator icon, and a green button labeled "Show Report". Below these buttons, the "Suggestions:" section is displayed. It contains three sub-sections: "To control Humidity:", "To control Temperature:", and "To control CO2 level:". Each sub-section lists suggestions and provides a link for more details. To the right of the suggestions, there is a yellow smiley face icon and the text "Really Cosy".

Home Room A Room B Room C Admin

 **Cosiness Calculator: Room C**

Show Report

Suggestions:

To control Humidity:

1. Run Exhaust Fans in the House. 2. Use a dehumidifier. 3. Grow plants 4. Take colder and shorter showers.

Details: [How to Lower Humidity in House | Payless Power](#)

To control Temperature :


1. Use energy efficient bulbs. 2. Use programmable room thermostat. 3. Use sun-blocking curtains 4. Strategically place the home appliances

Details: [The Ideal Room Temperature for Every Situation & 7 Ways to Maintain It! \(cielowigle.com\)](#)

To control CO2 level :

1. Install and maintain a good ventilation system. 2. Try keeping the windows open. 3. Limit open flames

Really Cosy

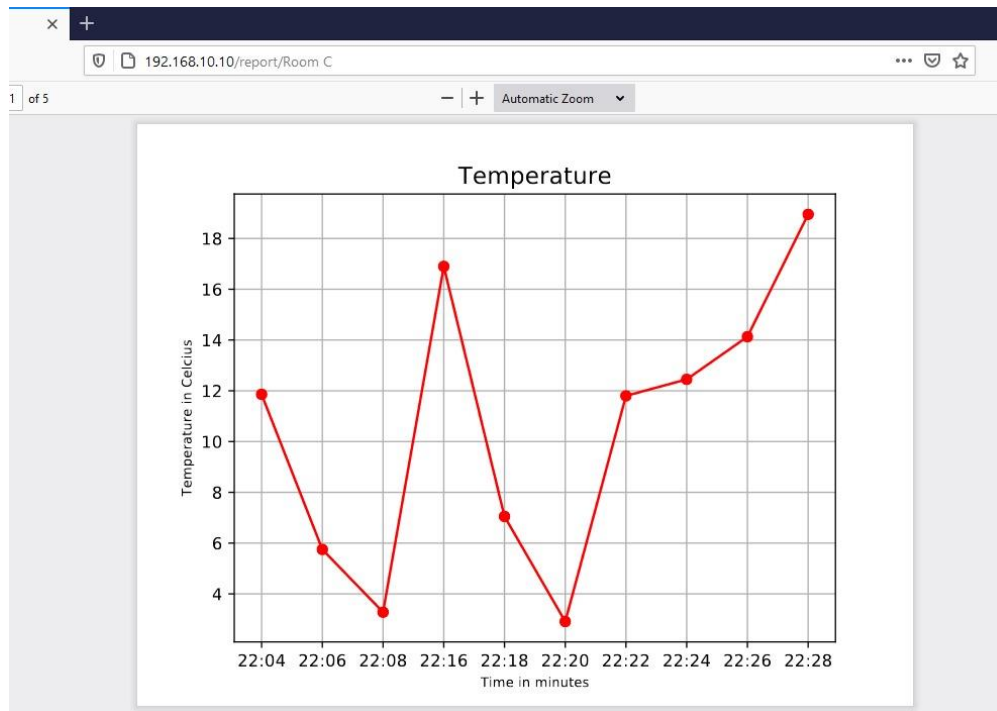


COZINESS CALCULATION PAGE

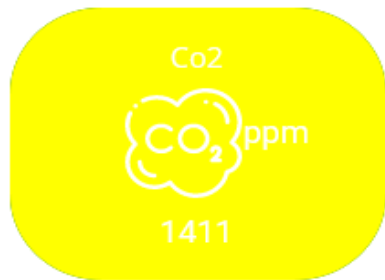
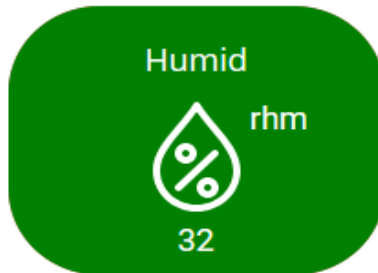
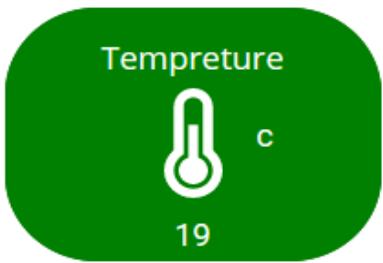
[Home](#)[Room 108](#)[Room 110](#)[Room 115](#)[Admin](#)

Cosiness Calculator: Room ###

Show Report



COZINES PARAMETER CALCULATION



Temperature

Ranges	Color -Coziness
16 – 22	Green - Cozy
13 – 15 23 – 26	Yellow – Somehow Cozy
Other	Red - Not Cozy

Sound

Ranges	Color -Coziness
0 - 600	Green - Cozy
600 - 800	Yellow – Somehow Cozy
Other	Red - Not Cozy

COSINES PARAMETER CALCULATION

.



Light

Ranges	Color -Coziness
200 – 500	Green - Cozy
20 – 200 500 - 100	Yellow – Somehow Cozy
Other	Red - Not Cozy

Humidity

Ranges	Color -Coziness
30 – 60	Green - Cozy
25 – 30 60 - 70	Yellow – Somehow Cozy
Other	Red - Not Cozy

COSINES PARAMETER CALCULATION



Co2

References

Ranges	Color -Coziness
0 – 800	Green - Cozy
800 - 2000	Yellow – Somehow Cozy
Other	Red - Not Cozy

Temperature
Humidity
Co2
Light
noise level is set at db