

Project: Personalized Climate Control System

Overview:

→ Measured dimensions:

1) Temperature

2) Humidity

3) Smoke/CO₂ level

4) PM 2.5

5) Air Pressure

6) Light Intensity (Maybe)

Air Quality

→ Sensors Used :

1) Temp : DHT22 (AM2302)
DS18B20

2) Humidity : DHT22 (AM2302)

3) Air Quality : CO₂ : MQ-135

~~PM2.5 : PMSS003~~

~~VOCs, CO₂ : CCS811~~

4) Light Level : LDR Sensor

5) Gas Leaks : MQ-2 for LPG
and Methane

6) 2 IR Sensors : to calculate
room occupancy.

DHT22

MQ-135

MQ-2

121

106

200

427

Temp

Humidity

CO₂

level

(100 - 200)

Detected LPG

and Methane

level

(150 - 200)

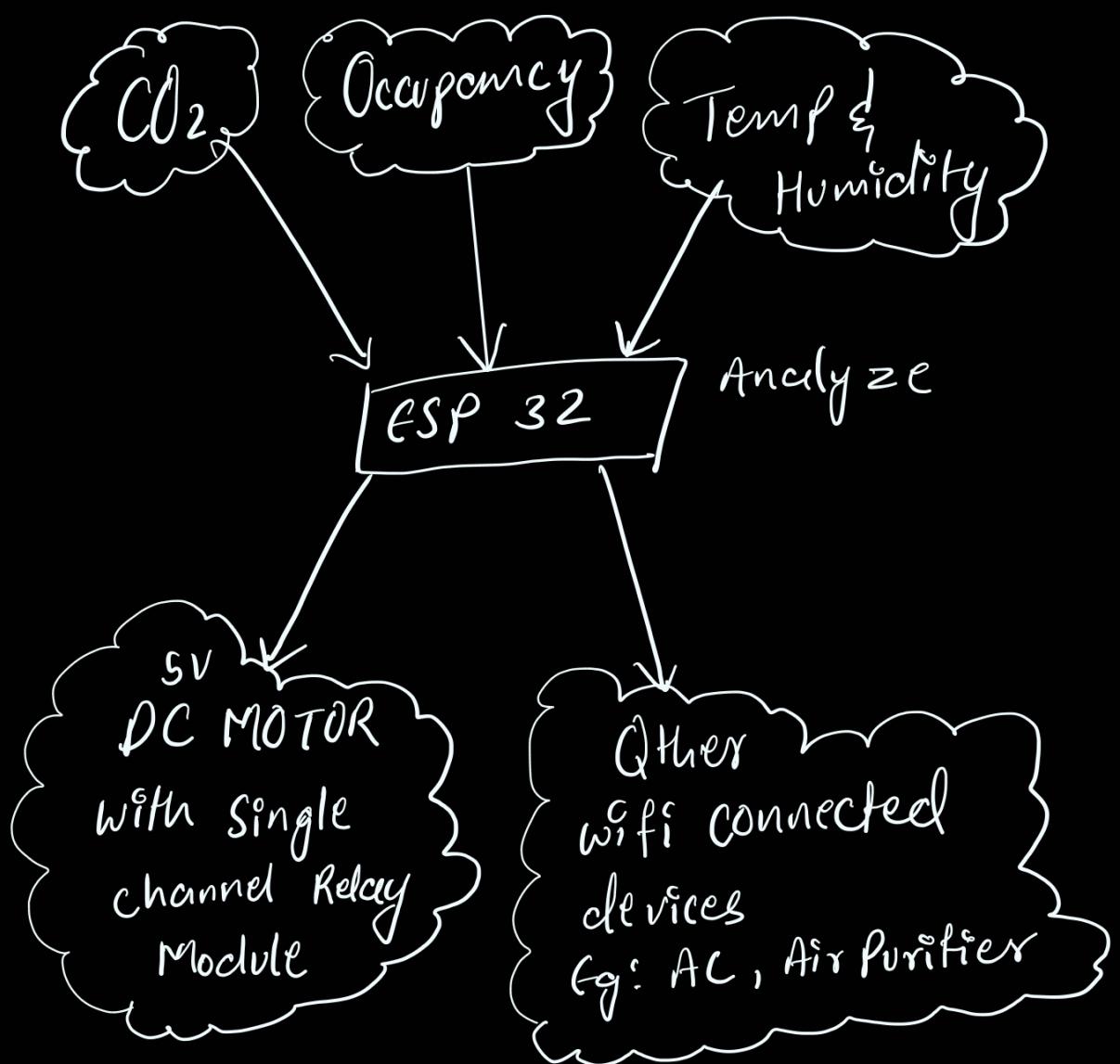


Robo.in



Amazon.in

Implementation:



→ Server will be hosted on cloud (Thinkspeak)

Include controls of these in Web/App Interface

→ ESP32 will publish data to the server via MQTT

→ A user-interface (Web App) reads the data using MQTT (subscribe & display real-time values).

Threshold Values:

Heat Index (HI):

$$HI = T + 0.5555 \times \left(6.11 \times e^{\frac{17.277}{237.7+T}} - 10 \right)$$

But instead, we will use this:

$$\underline{HI} = -8.784 + 1.611 \times T + 2.339 \times RH$$

$$\text{Heat Index} = -0.146 \times T \times RH - 0.0123 T^2$$

represents
"feels-like"
temperature $+ 0.0007 \times T \times RH^2$

Why this formula?

→ empirical approximation derived
from National Weather Service (NWS)
Heat Index equations.

→ The NWS Heat Index was developed
using regression analysis on experimental
data

When,	Humidity	Temp	Feels Like
	40%	30 °C	31 °C
	80%	30 °C	38 °C
	60%	40 °C	55 °C

Humidity high \rightarrow sweat evaporates slowly



feels hotter

If $HI > 30^\circ C \rightarrow$ Turn AC ON
 If $HI > 35^\circ C \rightarrow$ Increase Cooling Power

What to show on dashboard?

- 1) Temperature
- 2) Humidity
- 3) Feels Like Temp
- 4) Air Pressure
- 5) AC Status
- 6) Air Purifier Status

$$AQI = \alpha \times CO_2 + \beta \times \text{Humidity} \\ + \gamma \times \text{Occupancy}$$

(Based on the data we have)

Initially, let $\alpha = 0.7$ $\beta = 0.2$ $\gamma = 10$ Will change based on the practical data

AQI	Purifier Status
> 700	HIGH
> 300	128
> 100	64
else	LOW

Occupancy threshold for vents:
 $\text{Occupancy / Area} > x$
 Determine the appropriate value of x .