Intelligent Indoor Air Quality and Ventilation Management in Confined Spaces

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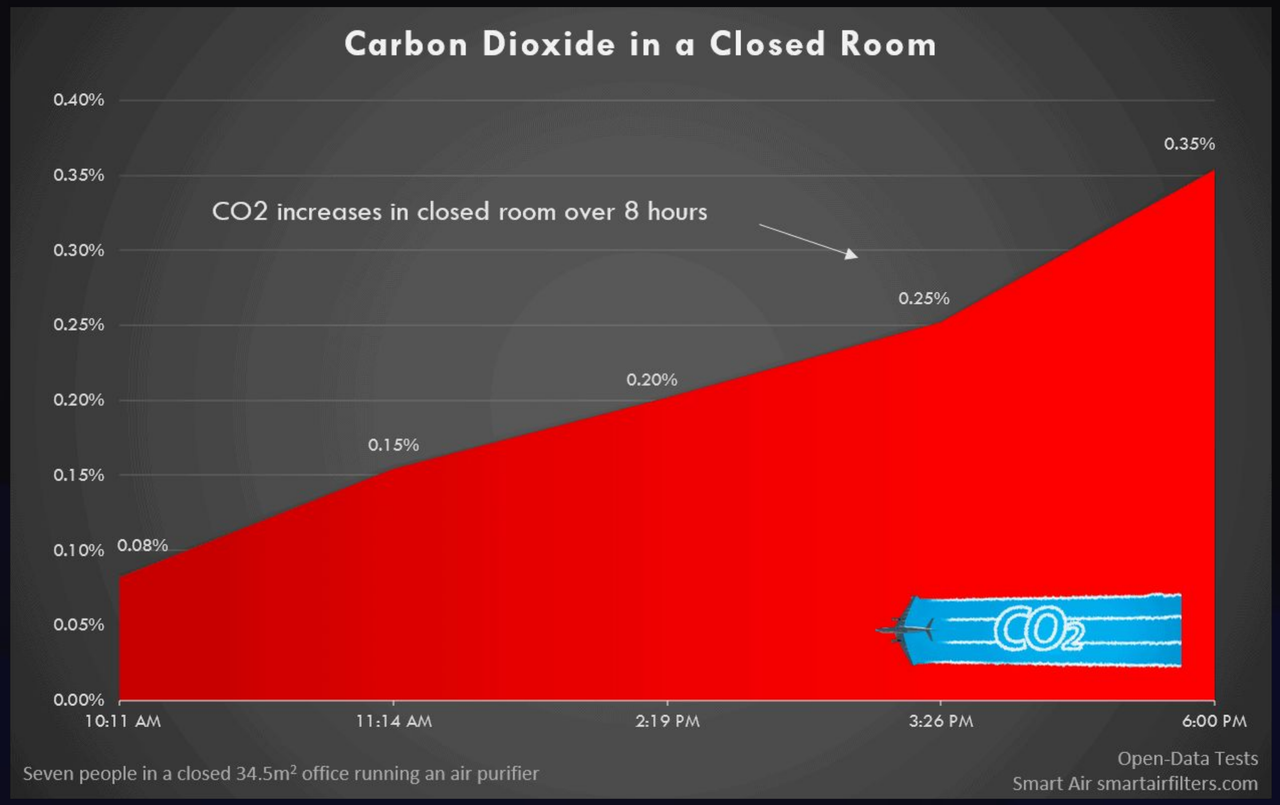
Introduction

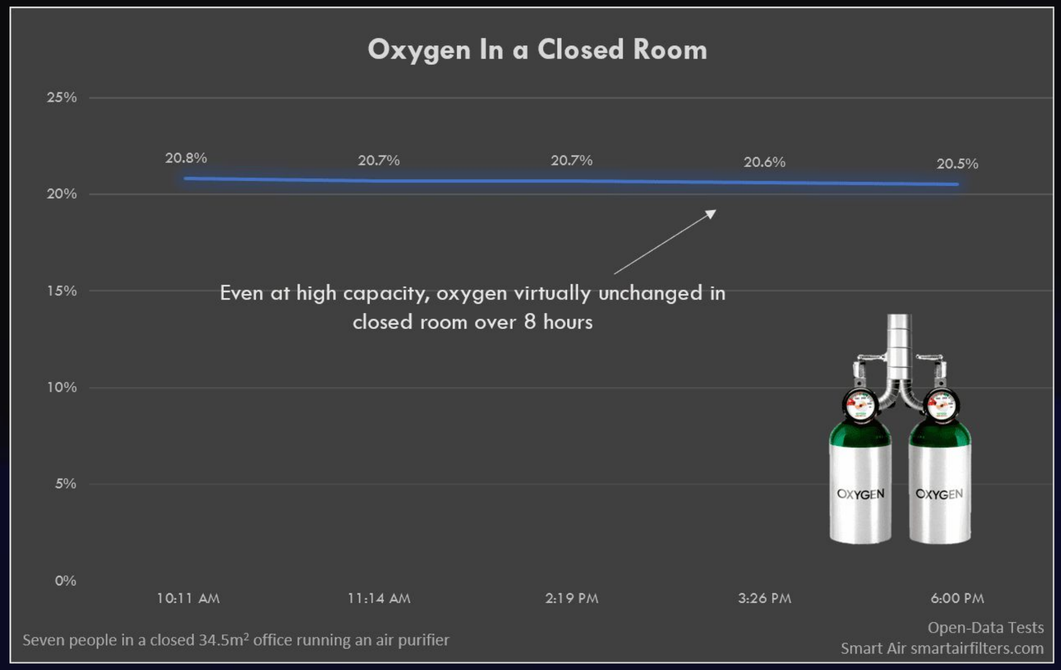
Think about the air we breathe in your homes

Is it truly clean and refreshing, or, are we unknowingly exposing ourselves to potential health risks?

Problem statement

- In recent years, energy-efficient homes have become more airtight, leading to decreased ventilation and potential health concerns.
- We don’t know at what time CO2 levels are high
- Everyone cannot operate windows/ventilators often to allow fresh air



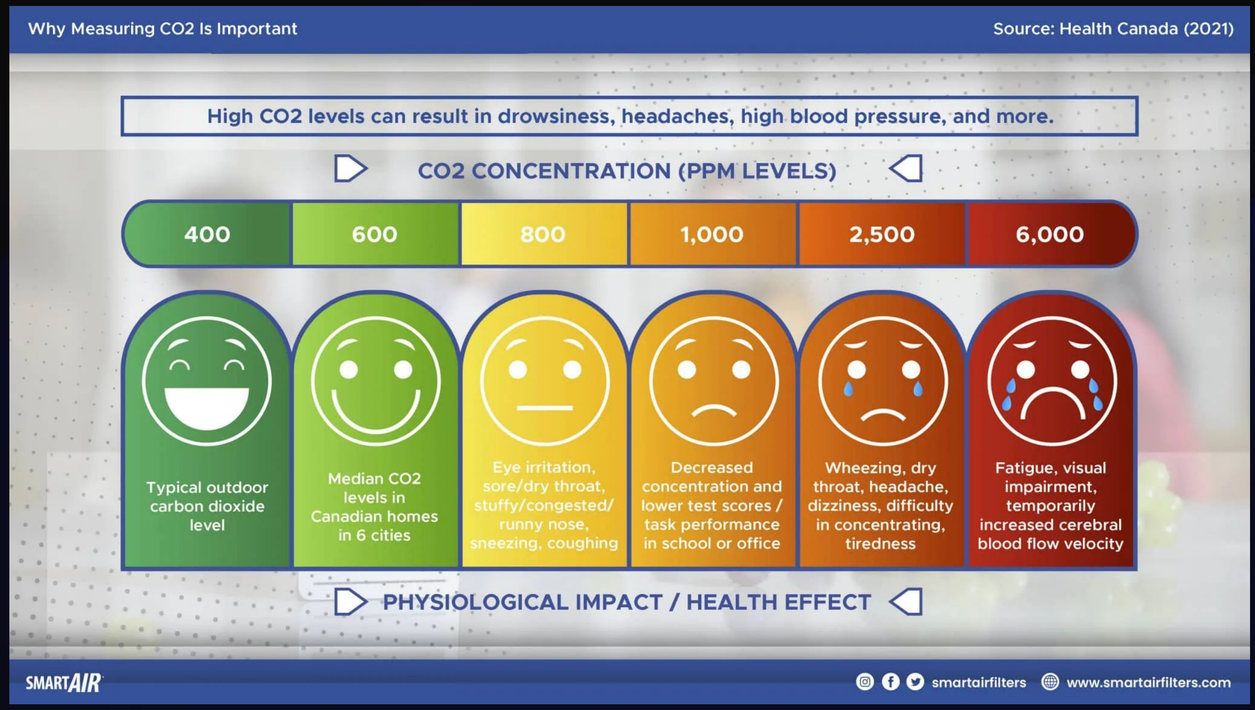


- A test conducted by Smart Air demonstrates a quick rise in CO2 levels while the oxygen levels are depleted gradually

- Raise of CO2 depends on the number of occupants and other indoor activities

Impact of CO2

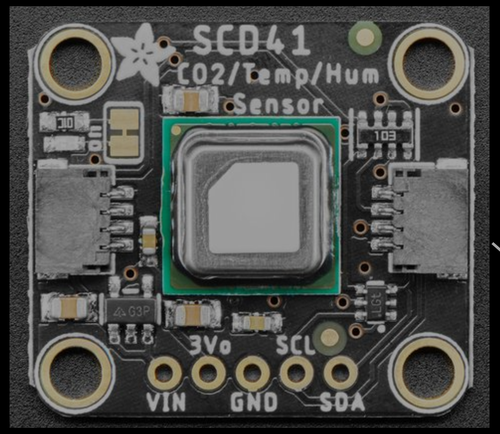
- CO2 can displace oxygen, leading to various negative effects on humans
- CO2 levels ranging from 600 ppm to 1000 ppm can decrease cognitive ability and impair decision-making.
- At extreme levels, CO2 can cause illness or even death



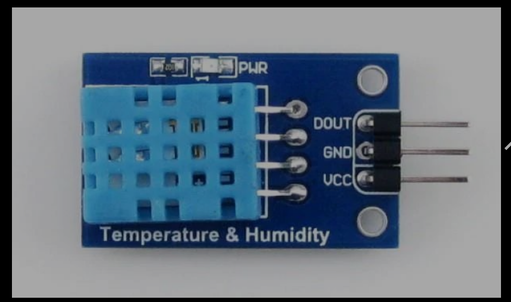
Objective

- Implement an air quality and temperature monitoring system using Raspberry Pi and a range of sensors (CO2, humidity, and temperature).
- Automate responsive actions such as vent control and temperature control to optimise the indoor environment.
- Provide timely alerts to notify individuals of any potential air quality issues
- Automate generation of air quality reports in Raspberry Pi

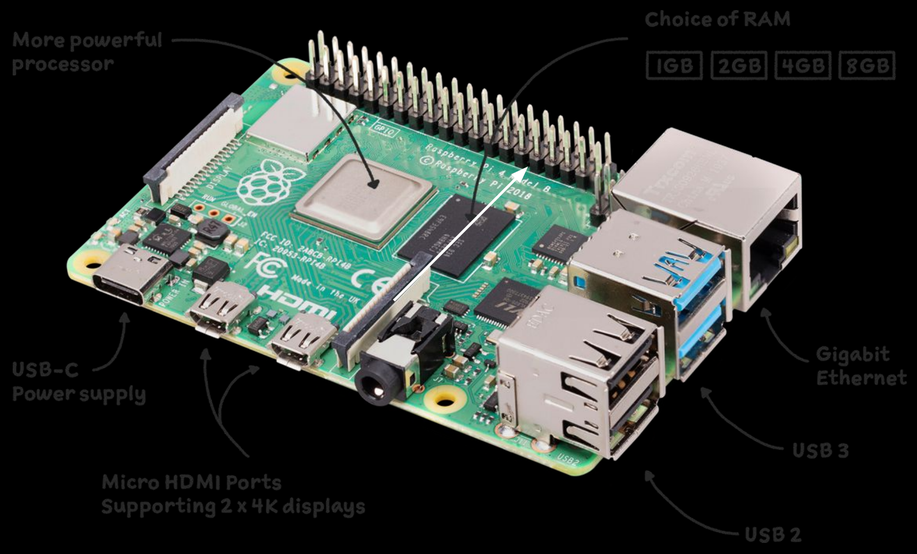
Design



Adafruit SCD41



DHT11



Raspberry Pi 4B

ThingSpeak™

Cloud platform

Actuators
Ex: Servo motor

Project Plan

- Hardware setup (Data collection and Automating Vents using Servo motor) (week 4)
- Data Storage and generating it graphs using Python libraries (week 5)
- Sending real time data to ThingSpeak for Status/Data Visualisation (Week 6)
- Testing in a Lab and comparing with an alternative sensor data (Week 7)

Conclusion

- Enhanced air quality and proper ventilation ensure a healthier and more comfortable indoor environment for individuals with breathing challenges in confined spaces.

- Vents automation with IoT makes the system user-friendly, efficient and promote sustainable practices.

Thank You