



Indoor air quality monitoring

Embedded SW and IoT . Apex

APEX

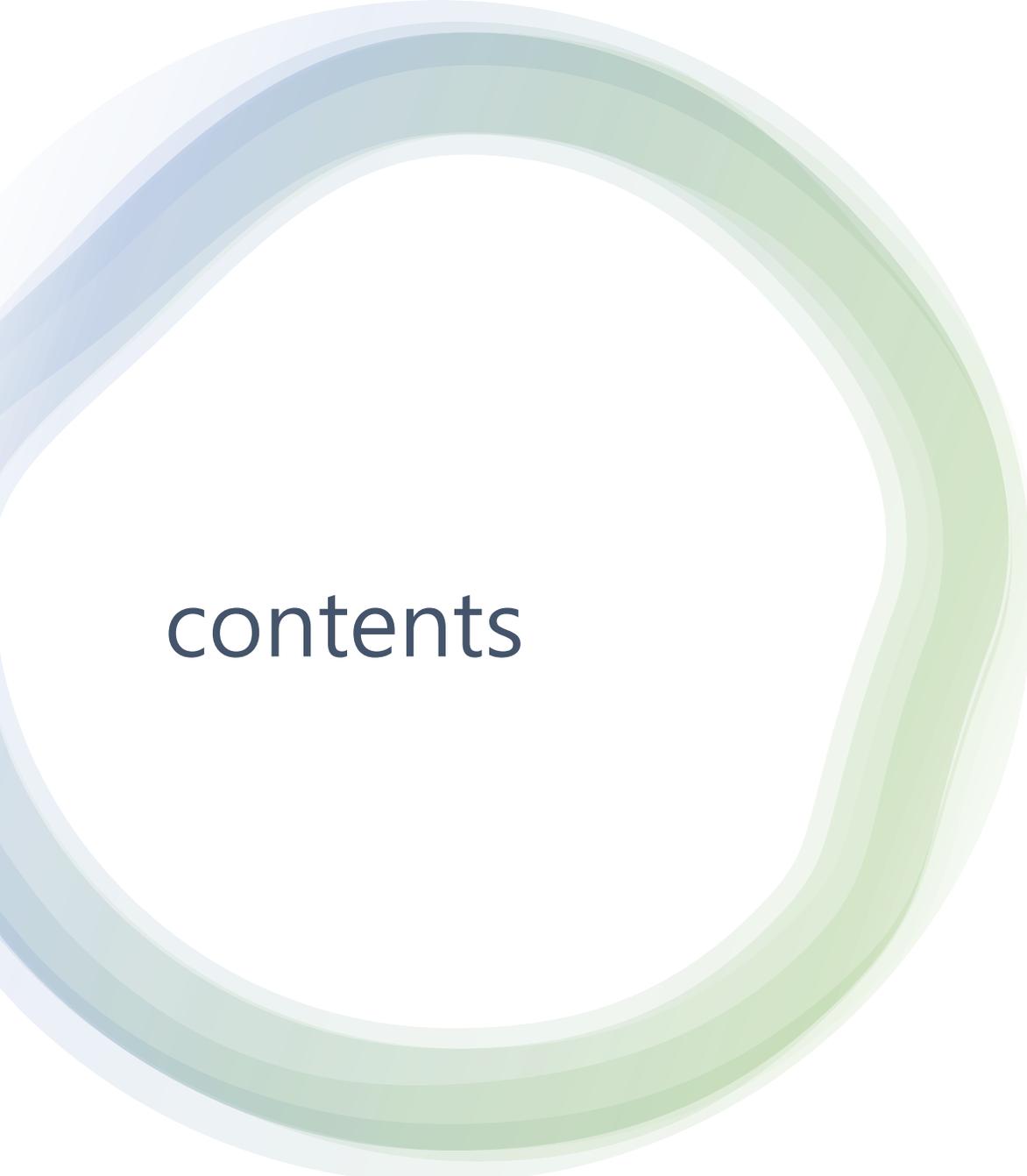
SARDOR : Wired up with sensor module
Connected to server

JU YOUNG : Connected with WiFi
Created presentation slides

KOYILBEK : Built web-site



Prof. Young il, Kim



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Project Introduction



Project goal

Monitoring indoor air quality



Key achievements

- Real time monitoring
- Sensor integration
- Data accuracy and calibration
- User interface design
- Alert system



Limitations

- Power consumption
- Sensor accuracy
- Integration with external systems
- Environmental conditions
- Scalability

The slide features a central, large, irregular shape with a gradient from light blue on the left to light green on the right. This shape is surrounded by several concentric, semi-transparent layers of the same gradient. The background is white, with additional semi-transparent curved bands of the gradient appearing in the top-left and bottom-right corners. The text "Project Summary" is centered within the main shape.

Project Summary



Project purpose

"Protect the safety of students taking classes at Woosong University's IT education center."



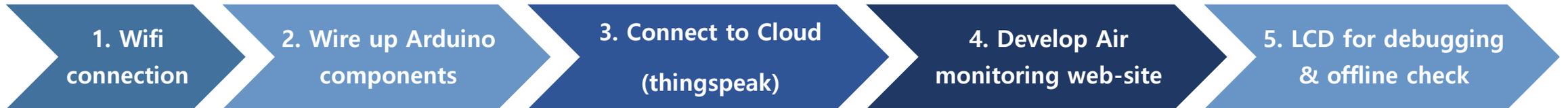
Background

As **most students spend a lot of time indoors**, indoor air quality has an impact on their health. Indoor air pollution can be caused by various sources, and **poor air quality can lead to health issues** ranging from minor irritations to serious diseases.

Scope

- Build Indoor air quality monitoring system
- Which **connect to cloud** and **send continuously sensors' data** for 5days
- Sensor list:
 - DHT11
 - MQ-2; gas sensor
 - Photoresistor

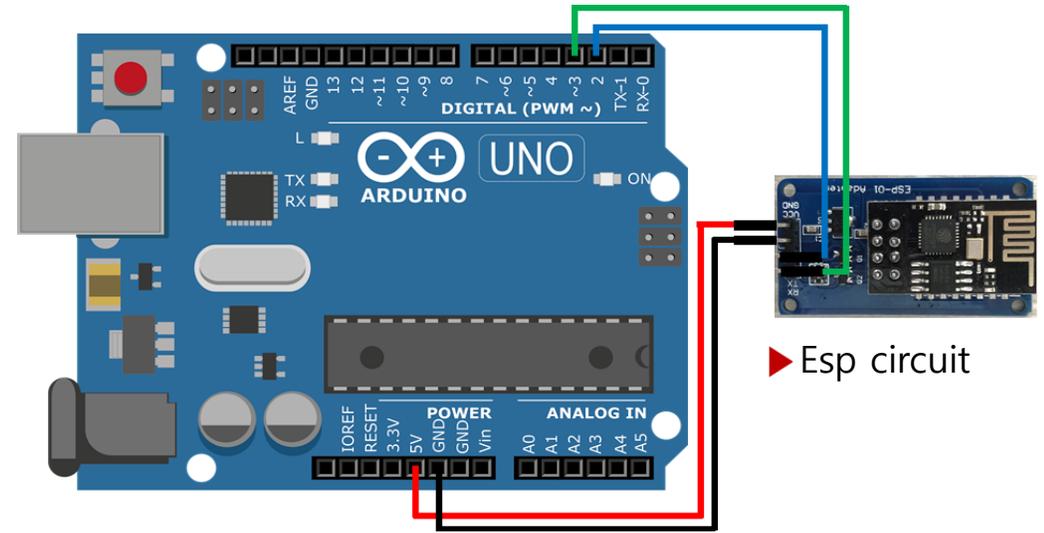
Milestone





Project execution design steps

1. Esp01 connection



▶ result

```
[WiFiEsp] Connected to 4Lab
* AP에 연결되었습니다.
```

```
[WiFiEsp] Server started on port 80
서버가 시작되었습니다!
```

아두이노를 컨트롤하기 위해 접속할 주소 : <http://192.168.0.186>

```
[WiFiEsp] New client 0
```

```
** 새로운 클라이언트가 연결되었습니다.
```

```
GET / HTTP/1.1
```

```
Host: 192.168.0.186
```

```
Connection: keep-alive
```

```
Upgrade-Insecure-Requests: 1
```

```
User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/90.0.4430.21 Safari/537.36
```

```
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,*/*;q=0.8,application/signed-exchange;v=b3;q=0.9
```

```
Accept-Encoding: gzip, deflate
```

```
Accept-Language: en-US,en;q=0.91,CONNECT
```

```
[WiFiEsp] TIMEOUT: 12
```

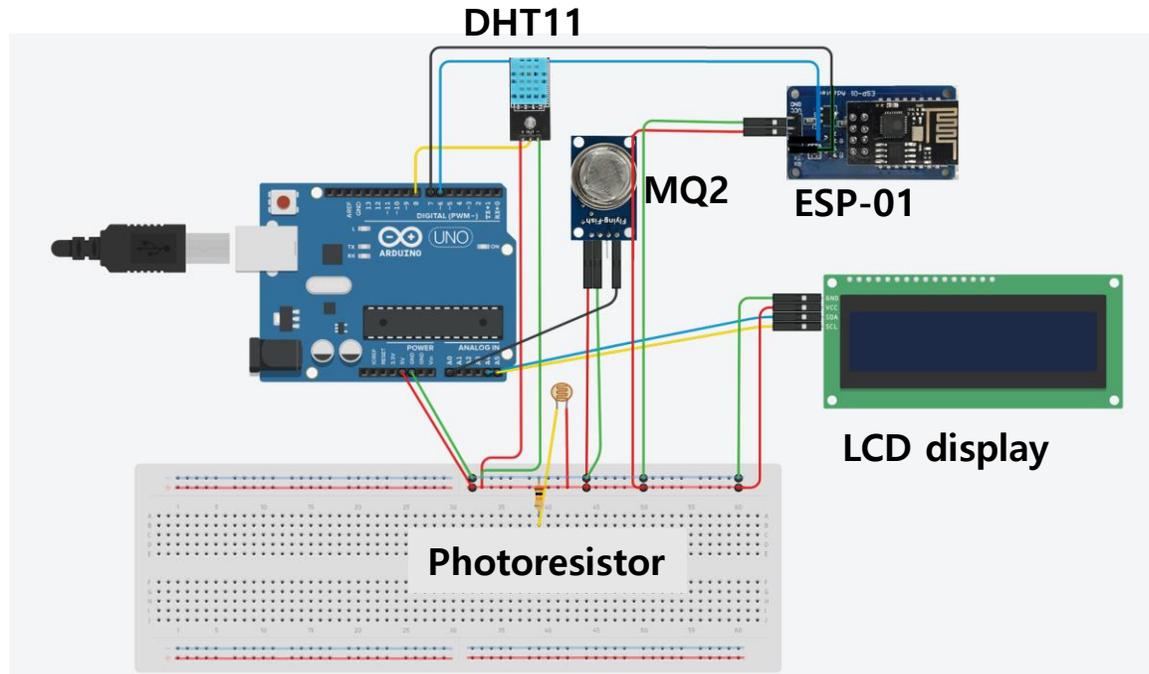


부록 17. 와이파이

WiFi connection source code	completed
APPENDIX_17-1_ESP_setting	✓
APPENDIX_17-2_connect_to_wifi	✓
APPENDIX_17-3_bare_minimum_server	✓
APPENDIX_17-5_web_control_server	✓

Conditions for project	completed
Connect Arduino to the Internet using Wi-Fi	✓
Collect data using three or more sensors	
Store the collected data in a cloud	
Store data for at least 5 days	
Expands data like collecting from 1,000 locations	

2. Wire up Arduino components



► Final circuit

Circuit components:

- Real time clock module **unnecessary**
- CO₂ sensor **delivery problem**
- DHT11
- MQ2 : gas sensor
- Photoresistor
- ESP adapter & ESP-01
- Lcd display 16*2



Conditions for project	completed
Connect Arduino to the Internet using Wi-Fi	✓
Collect data using three or more sensors	✓
Store the collected data in a cloud	
Store data for at least 5 days	
Expands data like collecting from 1,000 locations	

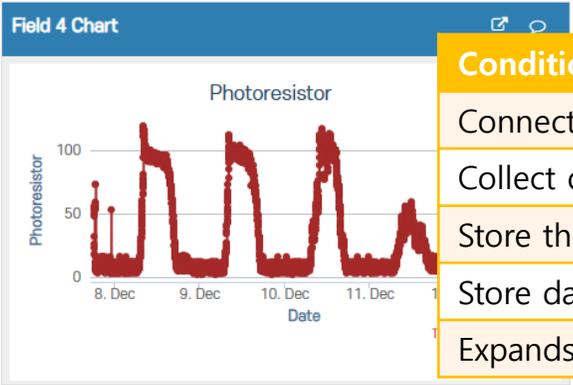
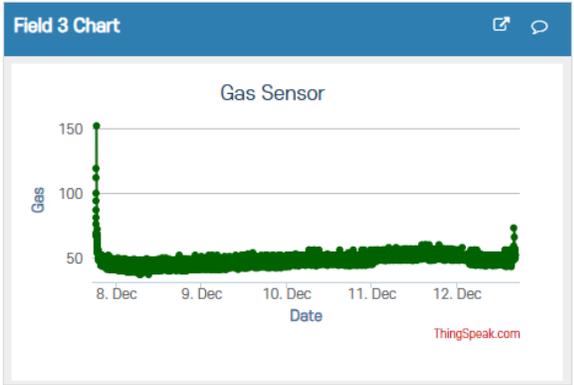
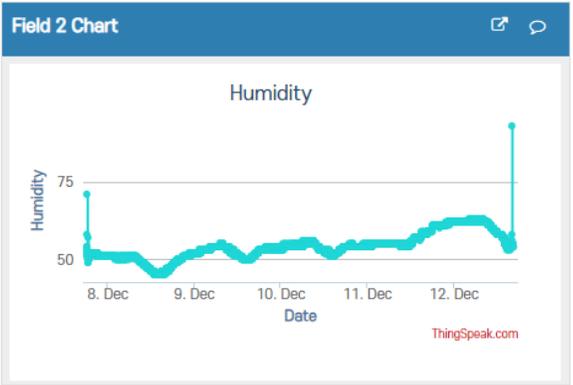
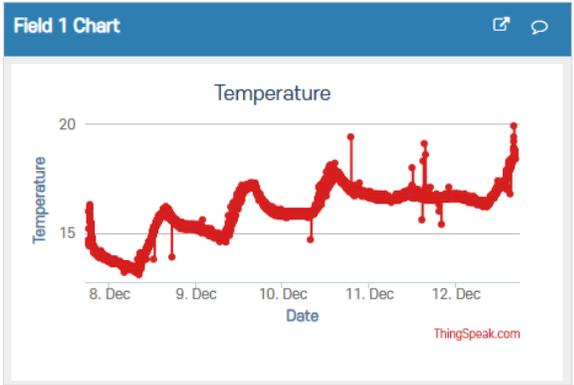
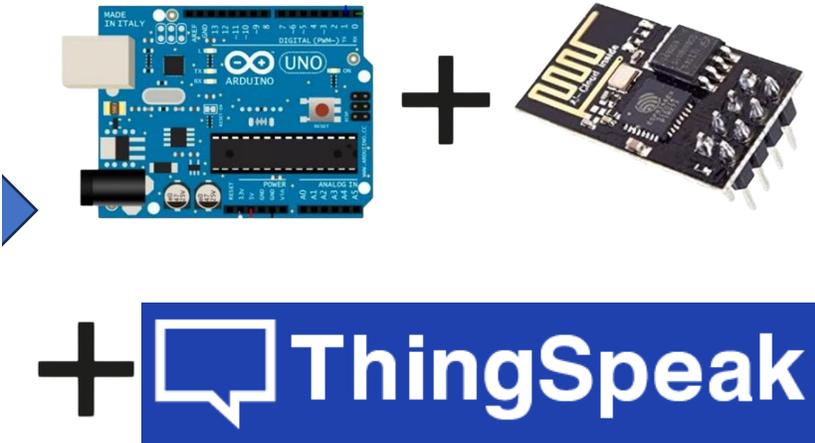
3. Connect to cloud

AirWater

Channel ID: 2363793
 Author: mwa0000032279364
 Access: Public

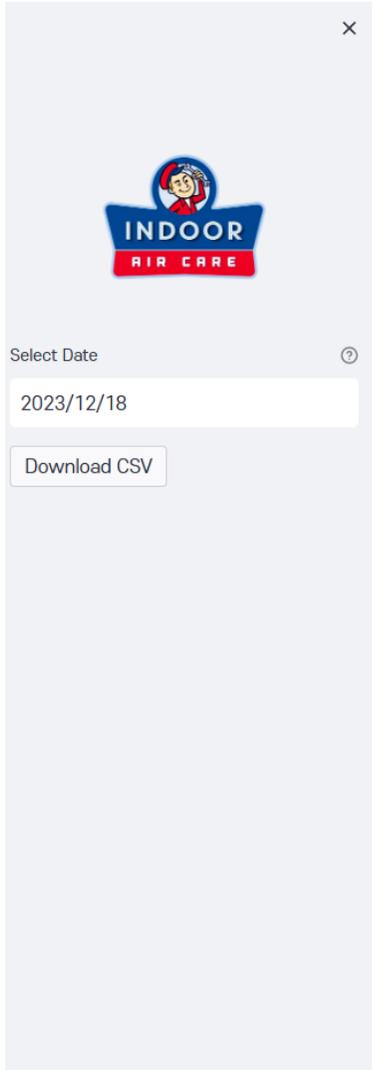
Export recent data

MATLAB Analysis MATLAB Visualization



Conditions for project	completed
Connect Arduino to the Internet using Wi-Fi	✓
Collect data using three or more sensors	✓
Store the collected data in a cloud	✓
Store data for at least 5 days	✓
Expands data like collecting from 1,000 locations	✓

4. Develop 'air quality monitoring' web site



INDOOR AIR CARE

Select Date

2023/12/18

Download CSV

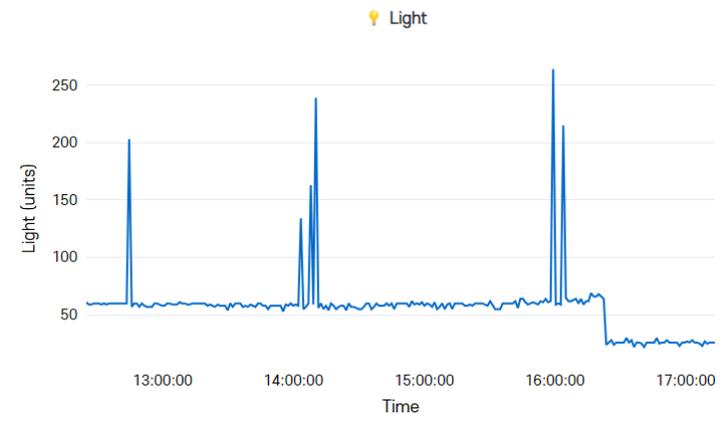
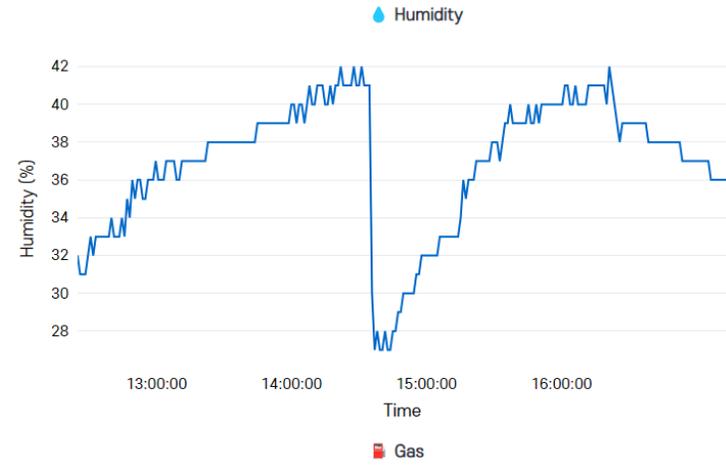
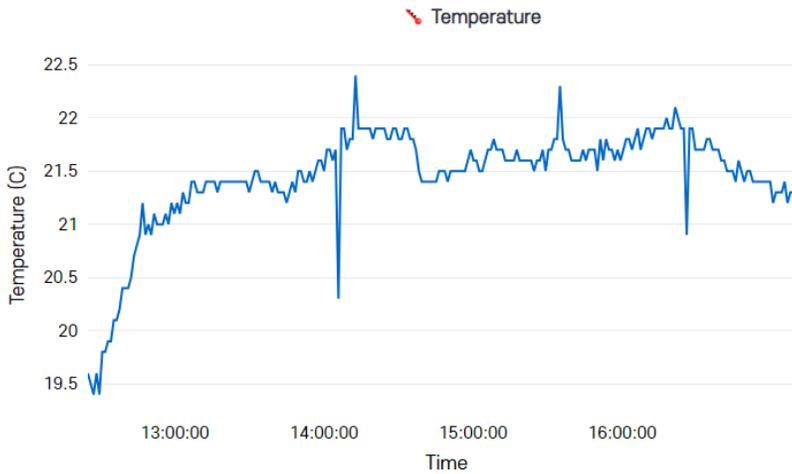
RUNNING... Stop Fork this app

Indoor Monitoring

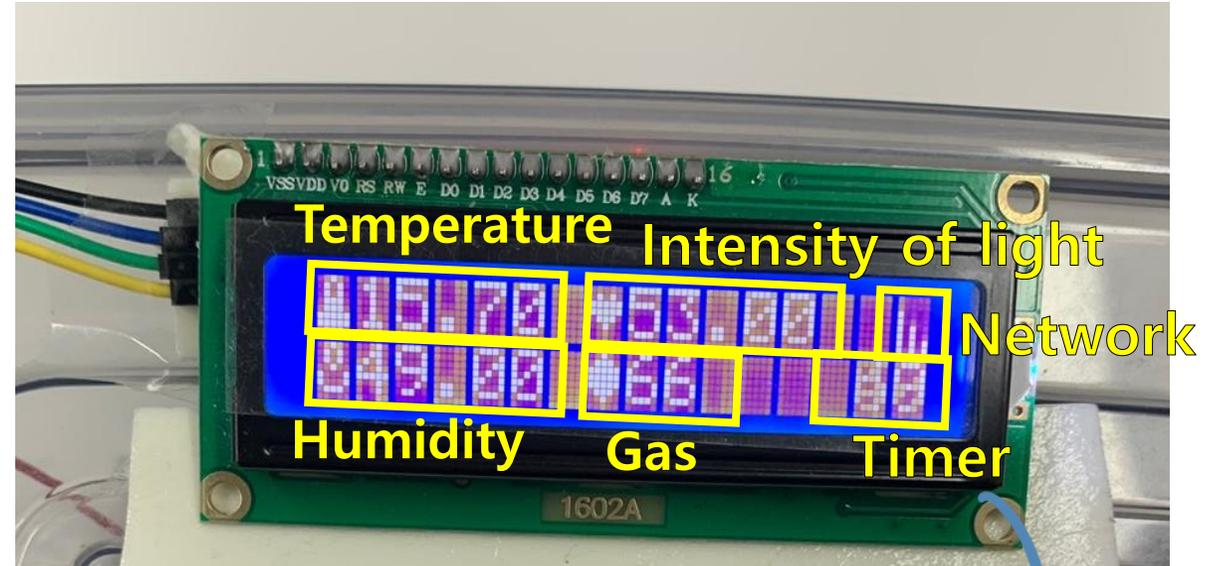
Updated Time	Temperature	Humidity	Gas	Light
2023-12-18 17:13	21.1°C / 69.98°F	36.0%	58.0 %	26.0 lux

Outdoor Monitoring

Updated Time	Location	Temperature	Humidity	Wind
2023-12-18 17:12	Sansogol, , South Korea	-4.0°C / 24.8 °F	49%	2.5 mph



5. LCD for debugging and offline check



If forgot
DHT11 sensor



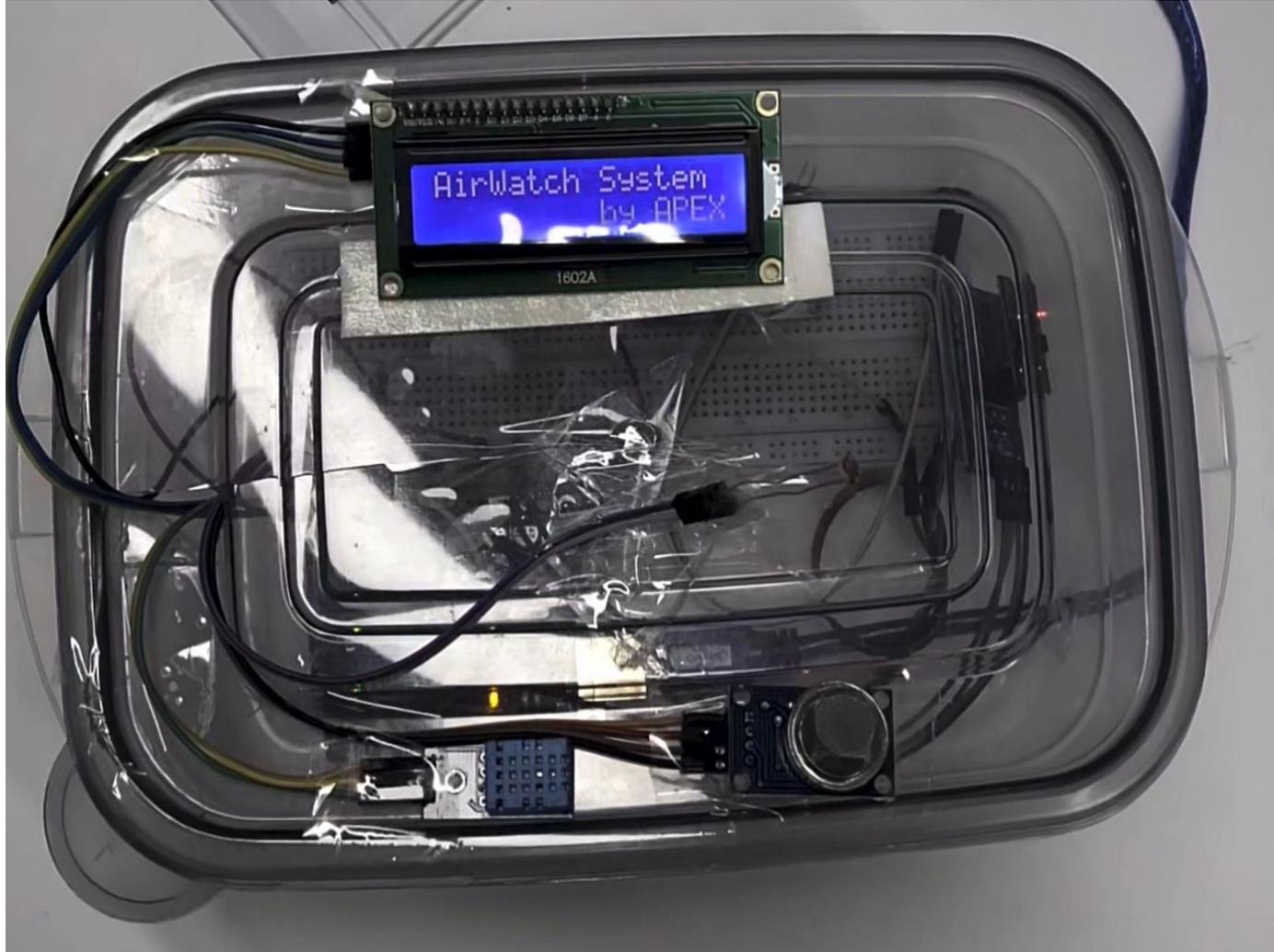
How we solved the difficult

- Watch youtube video
- Read documentation from prof
- Brainstorming in team
- Read research paper

The image features a large, central graphic composed of several overlapping, semi-transparent circles in shades of blue and green. The circles are arranged in a way that they appear to be part of a larger, abstract design. The text "Project Result" is centered within the largest, most prominent circle.

Project Result

Demo video

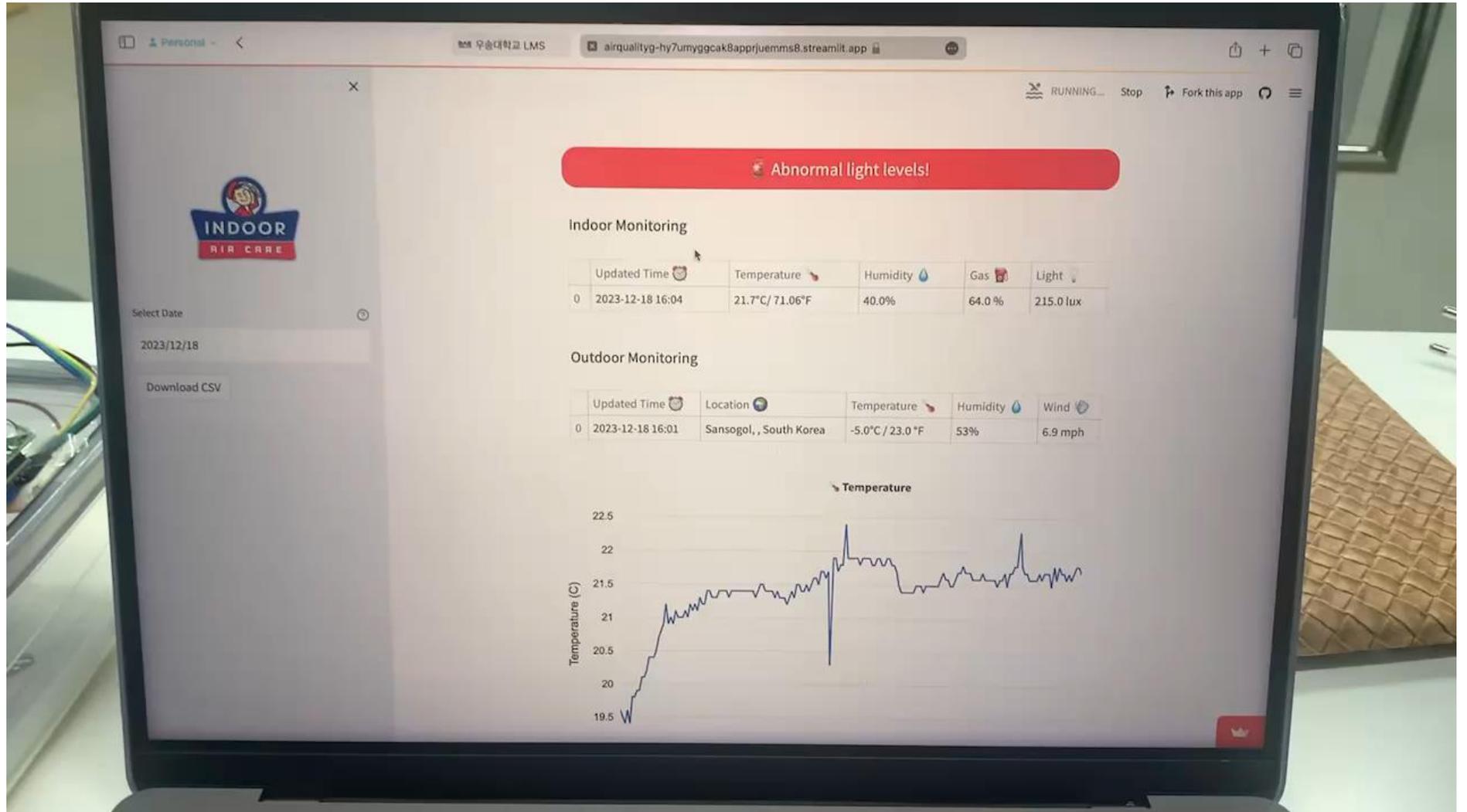


Dashboard Demo video

<https://airqualityg-hy7umyggcak8apprjuemms8.streamlit.app>



▲ Qrcord for dashboard



The background features two large, overlapping, curved lines. One line is light blue and the other is light green, both with a slight gradient and a soft shadow effect. They are positioned in the top right and bottom left corners of the slide.

Conclusion and recommendation

Conclusion and recommendation

Suggestion

Team work and **understanding each team member** is important
Listen to professor's comments

If we have **additional two weeks**:

- Add co2 sensor
- Add automatic data analysis system
- Implement battery power supply
- Machine learning model to predict sensor data
- Expand sensor location



Q&N

THANK YOU