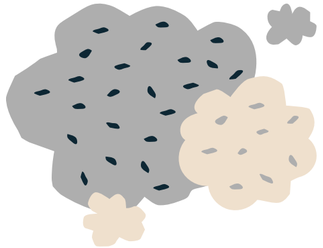
AREA ENVIRONMENTAL MONITORING

BY GNBP GROUP



About The Project

Project Description

Our project, Area Environmental Monitoring is a project designed to provide the most recent data on some of the key environmental parameters where we integrated data from multiple data source which are air quality (PM2.5) data, population density, sound levels, etc. in a specific location. By addressing these critical aspects, the project aims to contribute significantly to the environment, public health, and safety.

About The Project

Project Motivation

Our motivation start from sound intensity detection where we can detect the sound in a certain area or certain events such as at the concert to measure and monitor the sound intensity that is safe for human ears. However, we then also want to measure other values so it cover all major environmental parameters.
This lead us to start project about Area Environmental Monitoring.

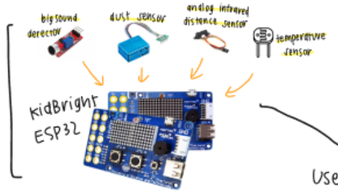
What will provide to users?

Answer

1. What is the latest pm2.5 aqi index at a certain location?
2. How many people are in a particular area recently?
3. What is latest temperature at a certain location?
4. What is latest sound intensity at a certain location?
5. Measurement of the latest wind at a certain location?

overall architecture

Primary Data



Use MQTT

Secondary Data

save in

dust table

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
1	id	int(11)			No	None		AUTO_INCREMENT
2	ts	timestamp			No	CURRENT_TIMESTAMP		DEFAULT_GENERATED
3	lat	float			No	None		
4	lon	float			No	None		
5	pm25	float			No	None		

humancount table

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
1	id	int(11)			No	None		AUTO_INCREMENT
2	ts	timestamp			No	CURRENT_TIMESTAMP		DEFAULT_GENERATED
3	lat	float			No	None		
4	lon	float			No	None		
5	count	int(11)			No	None		

kidbright table

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
1	id	int(11)			No	None		AUTO_INCREMENT
2	ts	timestamp			No	CURRENT_TIMESTAMP		DEFAULT_GENERATED
3	lat	float			No	None		
4	lon	float			No	None		
5	temp	float			No	None		

kidbright table

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
1	id	int(11)			No	None		AUTO_INCREMENT
2	ts	timestamp			No	CURRENT_TIMESTAMP		DEFAULT_GENERATED
3	lat	float			No	None		
4	lon	float			No	None		
5	sound	int(11)			No	None		

api-airvisual table

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
1	id	int(11)			No	None		AUTO_INCREMENT
2	ts	timestamp			No	CURRENT_TIMESTAMP		DEFAULT_GENERATED
3	lat	float			No	None		
4	lon	float			No	None		
5	pm25	float			No	None		
6	wind	float			No	None		
7	temp	float			No	None		
8	hum	float			No	None		

api-open-weather table

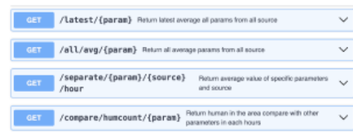
#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
1	id	int(11)			No	None		AUTO_INCREMENT
2	ts	timestamp			No	CURRENT_TIMESTAMP		DEFAULT_GENERATED
3	lat	float			No	None		
4	lon	float			No	None		
5	wind	float			No	None		
6	temp	float			No	None		
7	hum	float			No	None		

api-wqi table

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
1	id	int(11)			No	None		AUTO_INCREMENT
2	ts	timestamp			No	CURRENT_TIMESTAMP		DEFAULT_GENERATED
3	lat	float			No	None		
4	lon	float			No	None		
5	pm25	int(11)			No	None		

main table

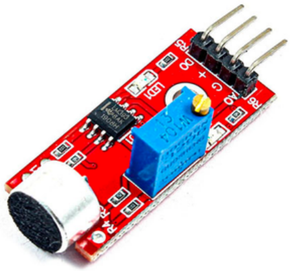
#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
1	id	int(11)			No	None		AUTO_INCREMENT
2	ts	timestamp			No	CURRENT_TIMESTAMP		DEFAULT_GENERATED
3	lat	float			No	None		
4	lon	float			No	None		
5	param	char(255)	utf8_general_ci		No	None		
6	source	char(255)	utf8_general_ci		No	None		
7	value	float			No	None		



API

Primary
Data Source

Source



big sound detector
1 ea.

temperature sensor
(maybe from Kidbright)

connect with
kidbright
(ESP32)

dust sensor
1 ea.

Analog Infrared Distance Sensor
1 ea.

Source

Primary

Data Source How we keep

Each sensor, we keep it in separate table by collect

- Sound: we keep if the value is more than 2000 in sound table
- Temperature: we keep in every 10 minutes in kidbright table
- Dust: we keep in every 10 minutes in dust table
- Analog Infrared: we keep every time that people walk in human count table

dust sensor
1 ea.

Analog Infrared Distance Sensor
1 ea.

temperature sensor
(maybe from Kidbright)

big sound detector
1 ea.

Primary

Data Source Collection

Source

Name	Type
id	int(11)
ts	timestamp
lat	float
lon	float
pm25	float

dust table

Name	Type
id	int(11)
ts	timestamp
lat	float
lon	float
count	int(11)

humancount table

Name	Type
id	int(11)
ts	timestamp
lat	float
lon	float
temp	float

kidbright table

Name	Type
id	int(11)
ts	timestamp
lat	float
lon	float
sound	int(11)

sound table

Secondary
Data Source

Source

1

AirVisual API | Trusted Live and Forecast Air Pollution Data

Enhance your projects with free trusted historical, real-time and forecast air quality data. Air pollution...

airvisual

IQ air

pm25, temperature, wind, humidity

2

Current weather and forecast

Get current weather, hourly forecast, daily forecast for 16 days, and 3-hourly forecast 5 days for your city. Historical weather data for 40 years back for any coordinate. Helpful stats, graphics, and this day in history charts are...

openweathermap.org

OpenWeather

temperature, wind, humidity

3

API - Air Quality Programmatic APIs

How polluted is the air today? Check out the real-time air pollution map, for more than 100 countries.

aqicn.org /

aqicn

pm25

All of secondary source, we keep in every 10 minutes in table name

1. api-airvisual
2. api-open-weather
3. api-wqi

Secondary

Data Source Collection

Source

Name	Type
id	int(11)
ts	timestamp
lat	float
lon	float
pm25	float
wind	float
temp	float
hum	float

airvisual table

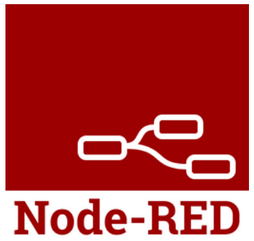
Name	Type
id	int(11)
ts	timestamp
lat	float
lon	float
wind	float
temp	float
hum	float

openweather table

Name	Type
id	int(11)
ts	timestamp
lat	float
lon	float
pm25	int(11)

wqi table

Database Schema
for integration



get data from sensor

use phpMyAdmin to keep data with SQL

main table schema

Name	Type
id	int(11)
ts	timestamp
lat	float
lon	float
param	char(255)
source	char(255)
value	float

DATA
sharing API

OPENAPI

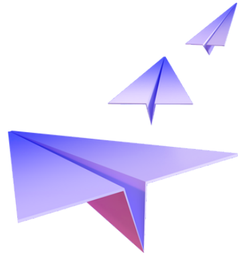
Flask
web development,
one drop at a time

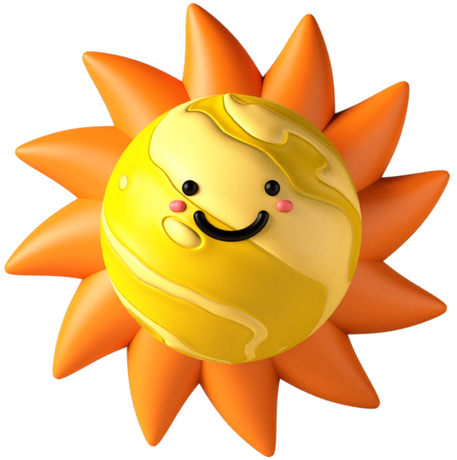
Swagger™

GraphQL

tools we use to make an API

LIVE DEMO





Latest Graph

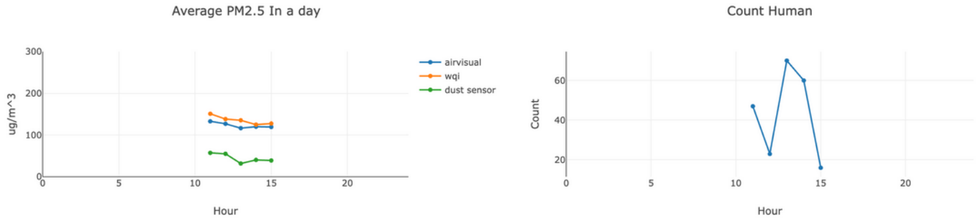
Latest value

location: 13.5, 100.25

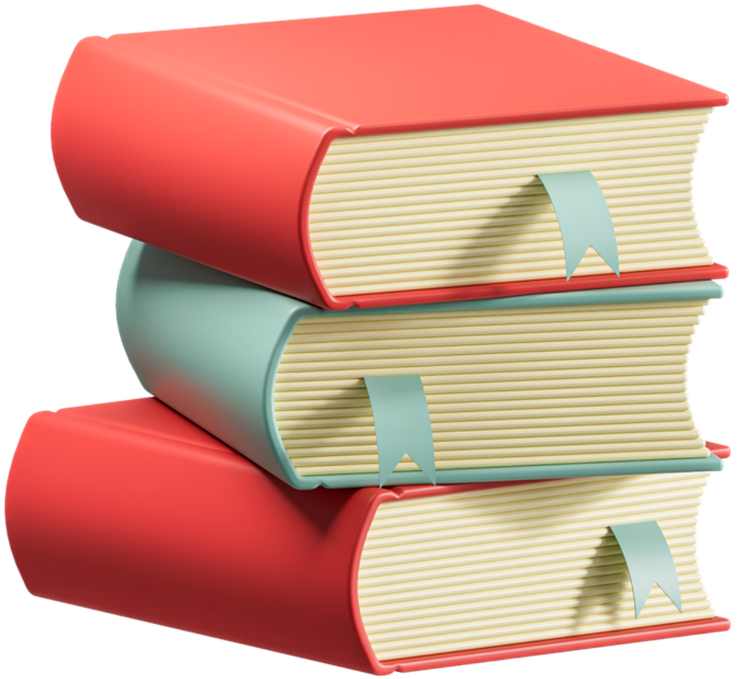
Temperature	PM2.5	Humidity
32.82 C	106.6 ug/m^3	47.42 g.m-3
15:00 22 - 11 - 2023	15:00 22 - 11 - 2023	15:00 22 - 11 - 2023

People in area	Sound	Wind
16 People	152.94 dB	5.95 m/s
15:00 22 - 11 - 2023	15:00 22 - 11 - 2023	15:00 22 - 11 - 2023

Latest Graph



THANK YOU

BY GNBP GROUP

6410545452 Nichakorn Chanajitpairee
6410545592 Zion Keretho
6410546181 Panitta Tanyavichitkul
6410546246 Ratthicha Parinthip