



OPEN-SOURCE INITIATIVE

# Open-Source Initiative

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28. April 2025

Opposite My House March 2019



# Let's Do Something!





# Clean Air Camp

CLEAN AIR FOR OUR FUTURE  
อากาศสดใส หายใจไร้ฝุ่น



**Clean Air For Our Future**  
29 February – 1 March 2020

**Learner Outcomes: participants will**

- Investigate the impact of forest fire on the local environment
- Interact with local people and experts with an interest in local forest
- Explore the impacts of high levels of PM2.5
- Develop skills of advocacy
- Work together collaboratively to create a project that can be worked on in school to raise awareness of the problem of forest burning in represented

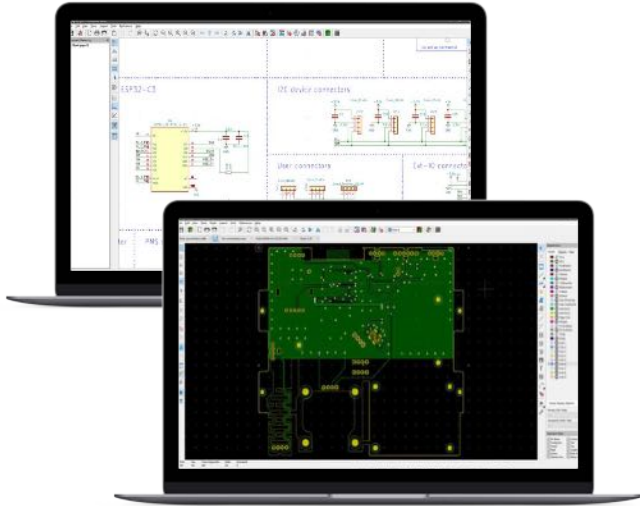
INDOOR & OUTDOOR AIR QUALITY MONITORS

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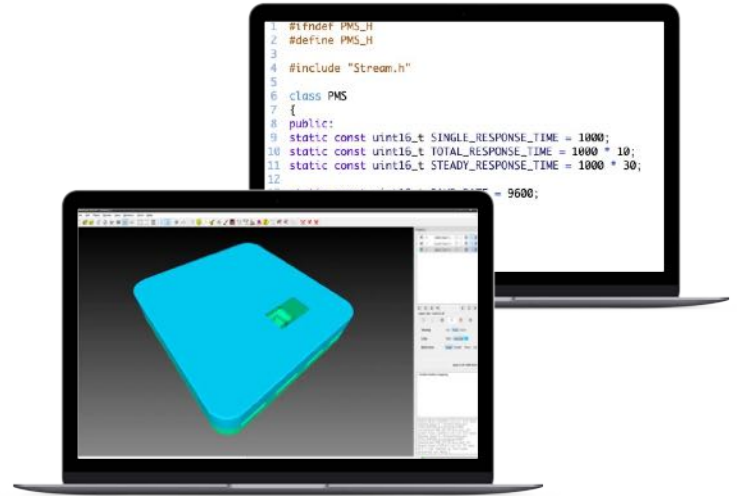


# All Our Monitors are Open-Source Hardware

Open Data: User has full Ownership of the Air Quality Data of the Monitor



open source  
hardware



☆ 251 stars    🍴 121 forks  
🌿 Branches    🏷️ Tags ↕️ Activity

# What We Have Figured Out:

- **Sustainable** business model based on open source hardware (We define ourselves as **Social Impact Business**) without external funding
- Closing data gaps with **affordable monitors** (sub USD 200)
- Scaling up **manufacturing** into 10Ks of monitors
- **Mobilizing** individuals and **communities**
- **Productionizing science** (e.g. automatic calibration tools) (in progress)

*Producing affordable, accurate, open data on a global scale.*

The Next Step:  
**Maximizing Impact**



# Our Vision

Our vision is to empower **one billion people** globally to **combat air pollution** and **reduce their carbon footprint**. We will achieve this by scaling our successful **open-source, community-driven** activities, providing **accessible air quality monitoring** technology and data-driven insights.

We aim to foster a self-sustaining **global movement** where individuals, communities, and organizations are equipped and motivated to make **informed choices, advocate for change**, and collectively create a **cleaner, healthier planet**.



## Clean Air Advocates Program

At the core of the **Clean Air Advocates Program** is an App that **effectively connects** stakeholders globally. On the data/supply side, individuals or organisations get **motivated & incentivised** for providing high quality air quality data, validation and clean air activities. On the impact/demand side, the platform will provide direct **benefits**, e.g. more targeted information, and **awareness** on air quality and carbon emissions.

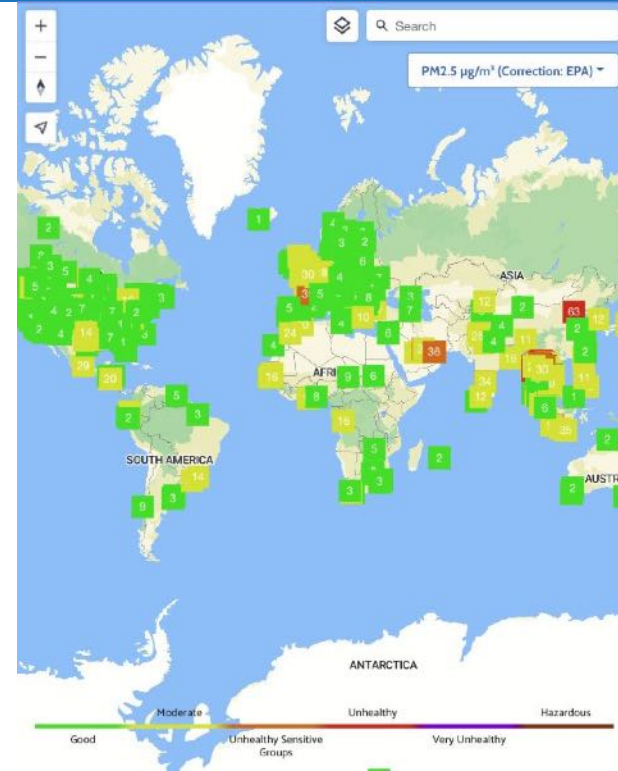
# How To Get There (Step 1)

## An Accessible Global Air Quality Map

We'll start by creating an **intuitive map** that makes it easy for anyone, anywhere, to understand the air quality around them in **real-time** and **localized**. This won't just show raw data, but will also provide **health-based information** and timely **alerts** to help people make informed decisions for their well-being.

### Key Features:

- Open source, vendor agnostic
- Easy to use, localized, very accessible
- Inform about air quality, create awareness, and help to protect people
- Accurate, science backed & integrate forecasting and QA/QC models
- Highlight contributors and community organizations on the ground



# How To Get There (Step 2)

## A Hub for Community Engagement & Action

We plan to build features that foster **community engagement**, connecting users, motivating action, and potentially even offering **incentives for individuals and groups actively working to lower air pollution and reduce their carbon footprint**. Imagine communities setting goals, sharing successes, and collectively making a measurable difference!

### Key Features:

- Platform to manage local community projects
- Engage local community members towards cleaner air and lower emissions
- Support local groups with donations streams
- Develop scientific approaches to quantify local impact, e.g. through AI/ML models measuring emission reductions





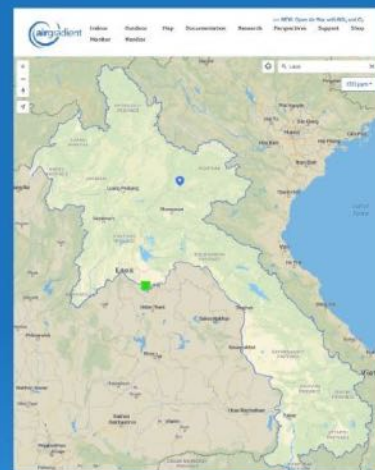
# Who We Built It For: UNICEF Lao PDR

**Background:** In Lao we deployed 150 monitors across the country

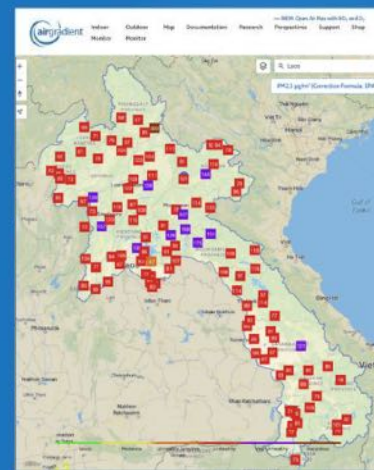
**Partner:** UNICEF Lao PDR country office, UNICEF Data Science Team

**Purpose:** Easy to use air quality app, with Lao localisation helps the local population to know more about air pollution episodes, create awareness and helps them to protect themselves.

Integration of ML air quality forecasting model currently developed by UNICEF data scientists



January 2025



March 2025

# Who We Built It For: Sustenta Honduras & Pacha Ayllu

**Background:** Two civic organisations in South America building up an air quality network in Honduras and Ecuador

**Partner:** Sustenta Honduras & Pacha Ayllu

**Purpose:** Easy to use air quality app, with Spanish localisation helps the local population to know more about air pollution.

Strong integration of the community aspect, with features to use the app as an information source to give organisations like these more visibility.

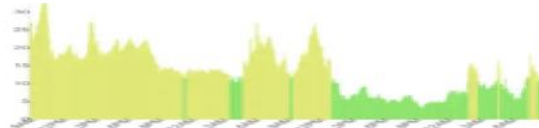
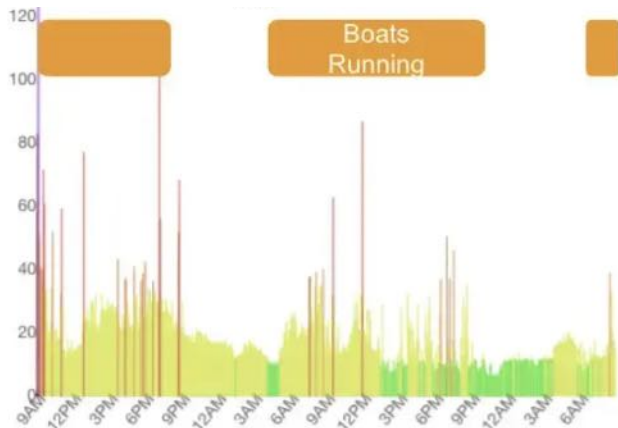


# Who We Built It For: CITIES to Detect Emission Hotspots



## Example: Detect Emission Hotspots

- Example Bangkok. Same 48 hours.
- Dense network picks up pollution spikes from boats measured with a low cost sensor at a peer
- Quiet street (10km away), during the same time, does not show these pollution spikes but shows same background levels



# Who We Built It For: For All of Us

**Background:** We have such a strong community of open-source enthusiasts, top air-quality scientists and developers. Combining forces, we can build a truly open-source & powerful app and leverage the reach we already have.

**Partner:** All of Us!

**Purpose:**

- Build something we Love.
- Build something we use Ourselves.
- Build something that helps Others!

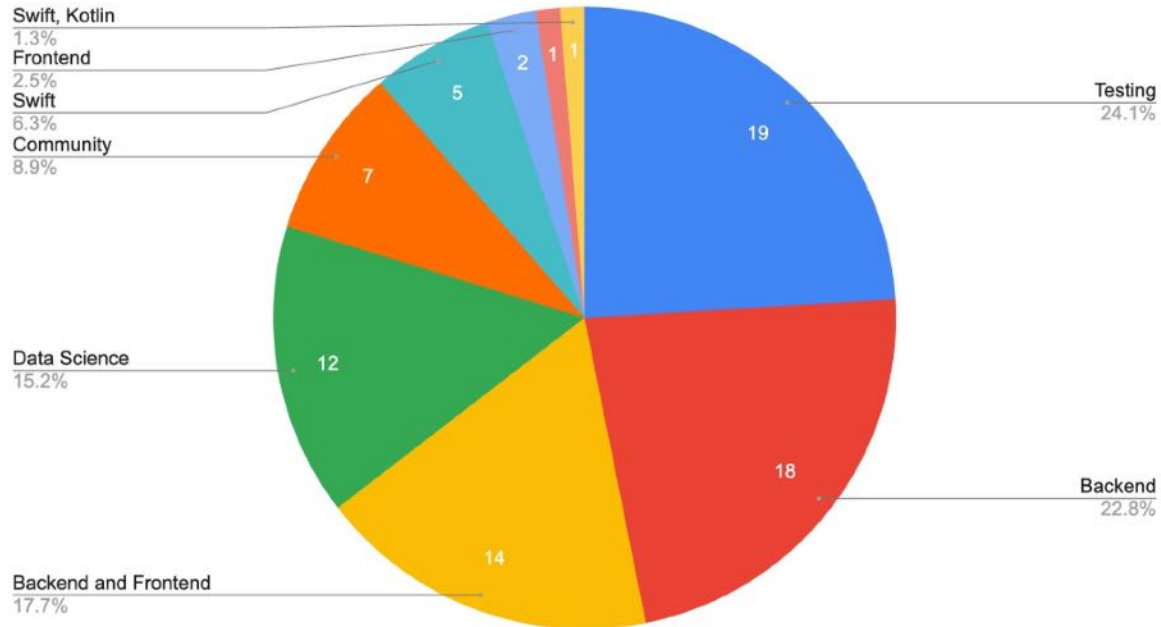




**We Cannot Do This Alone.**

Let's Work Together!

# More than 80 People Signed Up as Volunteers



	Number of Respondents	Hours/Week Available
Testing	19	103
Backend	18	90
Backend and Frontend	14	94
Data Science	12	52
Community	7	16
Swift	5	20
Frontend	2	13
Kotlin	1	8
Swift, Kotlin	1	5

**How To Make This Work.**

# Creating A Welcoming, Exciting & Productive Environment & Community

- **Excellent onboarding documentation**
  - Explaining the Vision behind this Project
  - Easy Technical Onboarding
- **Bringing Experts Together, Learning from Each Other**
  - Attract and connect with experts in their respective fields
- **Community Events**
  - Organising Webinars about interesting topics (e.g. air quality science)
  - Reports from the ground, e.g. grass roots organisation using the application
- **Attribute & Showcase Contributions**
  - Highlights contributors for their work they put into the project



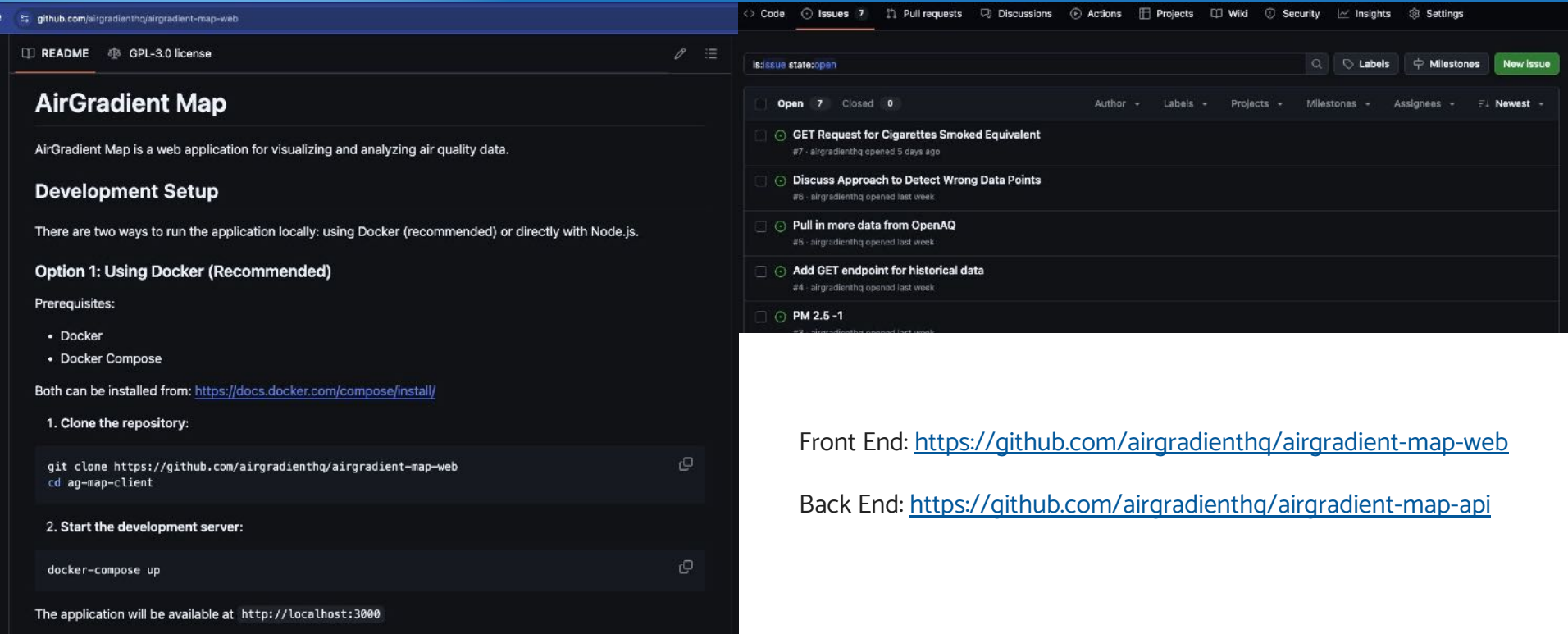
# What We Will Bring In

AirGradient will bring in substantial resources to make this work.

- Project Management Support
- Development Support (Frontend, Backend, Mobile?)
- Scientific Support
- Community Integration
- Graphic Design
- Server Infrastructure



# Good Documentation & Issue Description



The image shows a GitHub repository page for 'AirGradient Map'. The left sidebar contains the repository's README, which includes a title, a brief description, a 'Development Setup' section, and a list of prerequisites. The main content area displays a list of open issues, with the first issue being 'GET Request for Cigarettes Smoked Equivalent'. The right sidebar shows the GitHub navigation menu.

**AirGradient Map**

AirGradient Map is a web application for visualizing and analyzing air quality data.

## Development Setup

There are two ways to run the application locally: using Docker (recommended) or directly with Node.js.

### Option 1: Using Docker (Recommended)

Prerequisites:

- Docker
- Docker Compose

Both can be installed from: <https://docs.docker.com/compose/install/>

1. Clone the repository:

```
git clone https://github.com/airgradienthq/airgradient-map-web
cd ag-map-client
```
2. Start the development server:

```
docker-compose up
```

The application will be available at `http://localhost:3000`

is:issue state:open

Open 7 Closed 0

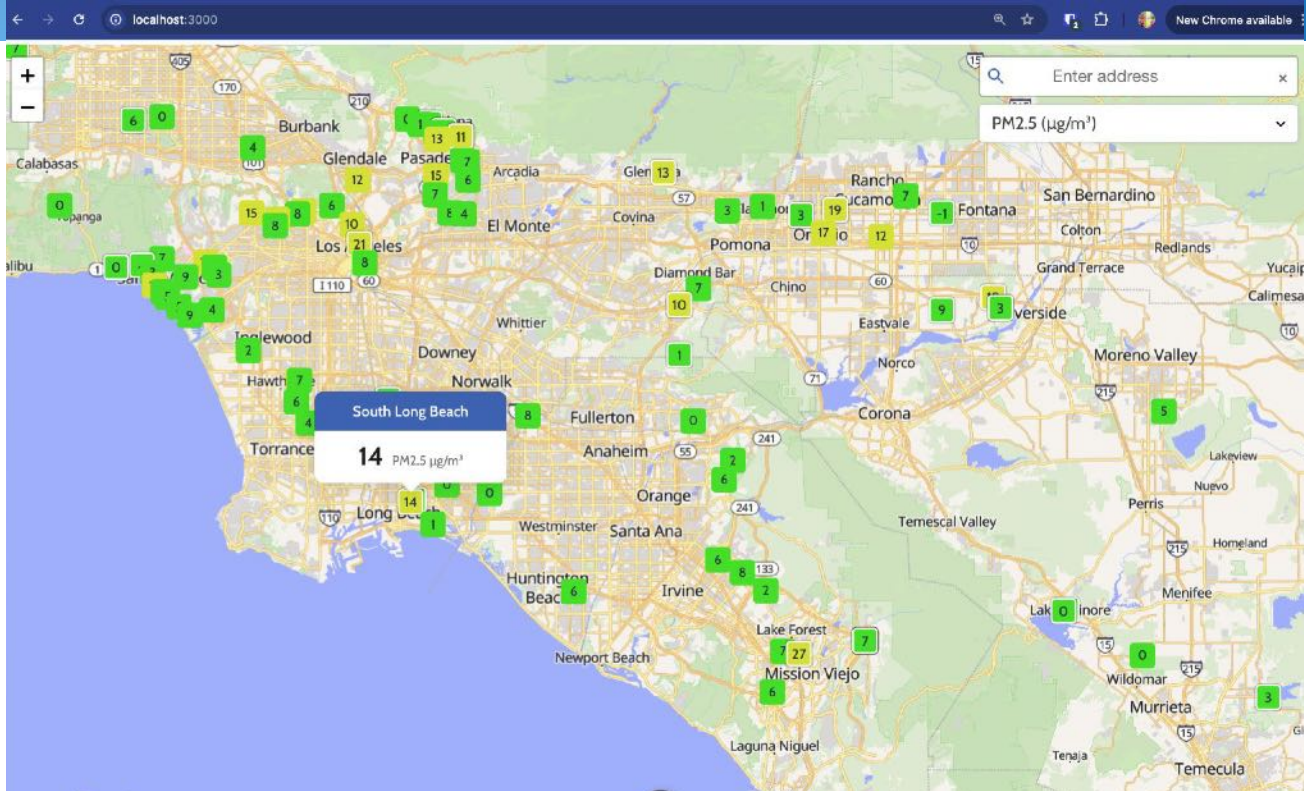
Author Labels Projects Milestones Assignees Newest

- GET Request for Cigarettes Smoked Equivalent  
#7 - airgradienthq opened 5 days ago
- Discuss Approach to Detect Wrong Data Points  
#6 - airgradienthq opened last week
- Pull in more data from OpenAQ  
#5 - airgradienthq opened last week
- Add GET endpoint for historical data  
#4 - airgradienthq opened last week
- PM 2.5 -1  
#3 - airgradienthq opened last week

Front End: <https://github.com/airgradienthq/airgradient-map-web>

Back End: <https://github.com/airgradienthq/airgradient-map-api>

<http://localhost:3000/>



# First Mockups Designs

chrome

Air Quality in Tay Ho, Hanoi, Vietnam PH2.5 US AQI (EPA Correction)

Last updated at 9:32 am

140 U.S. AQI  
Air Quality is Hazardous

150 PM2.5 PM10  
120 PM2.5 PM10  
87 CO O3  
62 CO O3  
102 PM2.5 PM10  
119 CO O3

PH2.5 Correction Applied (EPA Formula)

AQI Average 12 Hours 24 Hours 3 Days 7 Days

PH2.5 Correction Applied (EPA Formula)

The pollution you've breathed over the past 24 hours amounts to 2.3 cigarettes smoked

Here's how you can lower your risk:

- Close windows & doors
- Avoid exercise
- Ensure air is filtered
- Mask when outdoors
- Run an air purifier

Image

Join the fight for clean air... (example)

Learn More

City	AQI	PM2.5	PM10	CO	O3
Hanoi	140	150	120	87	62
New Delhi	150	160	130	90	65
Lahore	160	170	140	95	70
Chiang Mai	170	180	150	100	75
Wuhan	180	190	160	105	80
Batam	190	200	170	110	85
Melbourne	10	15	20	25	30
Oso	12	17	22	27	32
Auckland	14	19	24	29	34
Sydney	16	21	26	31	36
Kabul	18	23	28	33	38
Bern	20	25	30	35	40

Most Polluted Cities

Least Polluted Cities

This is an open source project from volunteers fighting for cleaner air. Learn more about this project and the contributors. [Learn More](#)

09:52 AM

Tututawa  
Taranaki, New Zealand

U.S. EPA AQI 12

27°C 12 km/h 72%

7 Days

PH2.5 Correction Applied (EPA Formula)

AQI Average 12 Hours 24 Hours 3 Days 7 Days

Data provided by Sustena Honduras

Today you've breathed the equivalent of 2 cigarettes.

Here's how you can lower your risk:

- Mask when outdoors
- Avoid exercise

09:52 AM

Tututawa  
Taranaki, New Zealand

Image

Join the fight for clean air...

Learn More

APRIL 2025

S	M	T	W	T	F	S
1	2	3	4	5		
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

This is an open source project from volunteers fighting for cleaner air. Learn more about this project and the contributors.

Learn More



# First Visual Designs





# Managing Potential Conflicts of Interest: AirGradient's Role

- Project licensed under **GPL**.
- All work that AirGradient does for this project will be open-source (**no open-core** model planned).
- AirGradient will **proactively address** and discuss **potential conflict of interests** with the community in case they arise.
- AirGradient intends to **setup a non profit entity** and move the project (including source-code) to the non-profit entity. Likely this will be a Swiss **Non Profit Association** or **Foundation**.
- Platform to be **air quality monitor agnostic**.



OPEN-SOURCE INITIATIVE

# How To Make This Sustainable?

## Challenges & Premisses

### Challenges:

- Many organisations fighting air pollution and climate change **lack funding** and recently has seen a substantial cut in funding. **How can we help them?**
- How can we support this project **beyond volunteers?** (e.g. technical infrastructure, additional resources etc)?

### Premisses:

- **Open Data:** Data and data derivatives (e.g. forecasts) will not be sold and should be freely available.
- **Responsibility** towards the Community:
  - How can we support local actors in their fight against air pollution
  - How can we reward engaged contributors

# How To Make This Sustainable?

## Build into the Platform Donations & Contributions

### Ideas:

- User that like the app can make **donations** within the app and get attributed.
- Larger organisations / municipalities etc. can **contribute money** into the system for **specific purposes** (e.g. reward users marking pollution hotspots in a specific city).

### Premisses:

- **100%** of any money flowing into this app should support the community and this app.
- These contributions should be funneled through a **non-profit entity** as soon as setup.

# Incentivising Open-Source Volunteer Contributors

AirGradient is **extremely thankful** for contributions and can offer incentives like e.g.

- **Custom branded** AirGradient air quality monitors for core contributors
- Contributors have influence to **which organisation** AirGradient donates monitors to
- **Acknowledgement** of contributors on website and in application
- Direct **monetary incentives** (to be revisited once sustainable financing is working)

# Maintainers & Advisors and Partners

- Maintainers should **support the vision of the project**
- Maintainers should not only include developers but also **other stakeholders**
- **Rules and regulations** on how we work together need to be developed
  - Code style guide
  - How tickets get assigned
  - How to avoid merge conflicts
- **Maintainers & Advisors that already volunteered** (excluding AirGradient Staff):
  - Prof. Rod Jones, University of Cambridge, UK
  - Joshua Post
  - Paolo Del Fabbro, Communities Against Pollution, South Africa
  - Anthony Mockler
- **OpenAQ** partner for data sharing
- Contact us if you are interested in a maintainer role



# Let's Get Started

- **Clone** backend or frontend GitHub **repositories** and play around with the existing code
- **Engage** on the GitHub **discussion forums**
- Start working **on some of the existing issues**
- Contact us if you are interested in a **maintainer role**
- Join an **upcoming Zoom discussion** on, e.g.
  - Discussions on mobile stack (cross platform vs swift/kotlin)
  - Outlier detection (malfunctioning monitors etc)
  - Air Quality Alerts and Notifications Feature Definition
  - General feature discussion
- Optional (weekly?) **call** for anybody interested to drop-in

## GitHub Repositories:

Front End:

<https://github.com/airgradienthq/airgradient-map-web>

Back End:

<https://github.com/airgradienthq/airgradient-map-api>



# Q&A Session

[airgradient.com](https://airgradient.com)