airgradient

OPEN-SOURCE INITIATIVE

Open-Source Initiative

28. April 2025


Opposite My House March 2019

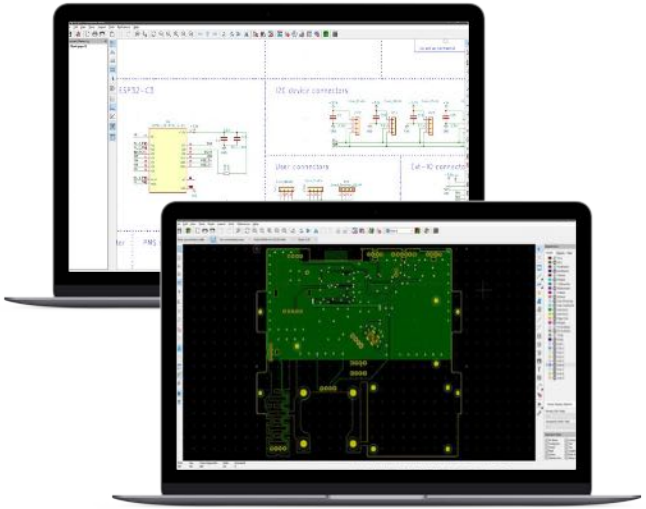
Let’s Do Something!

Clean Air Camp


airgradient
CO2: 600
PM2.5: 23
Temp: 32C
Hum: 65%
airgradient
airgradient
airgradient

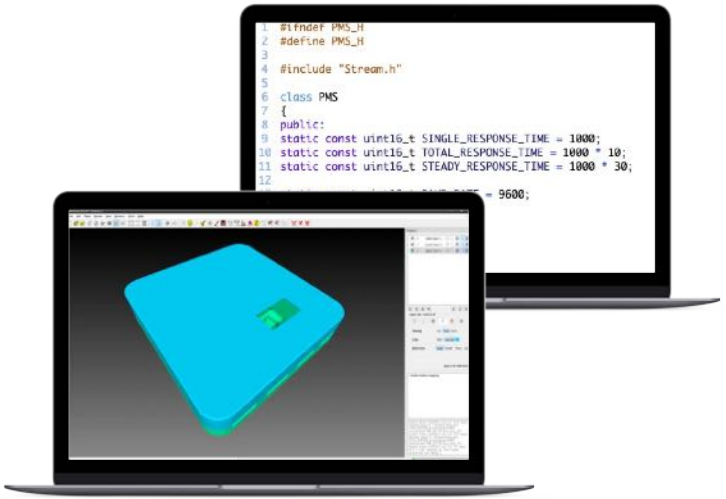
All Our Monitors are Open-Source Hardware

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



open source hardware

CC BY SA



GitHub

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.

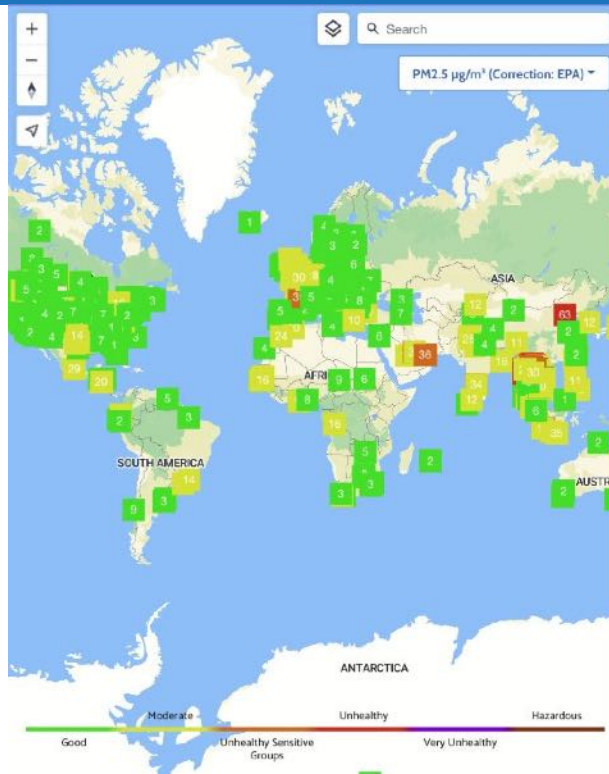
How To Get There (Step 1)

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

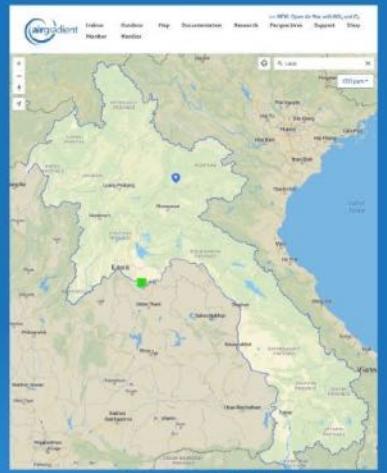
Who We Built It For: **UNICEF Lao PDR**

Background: In Lao we deployed 150 monitors across the country

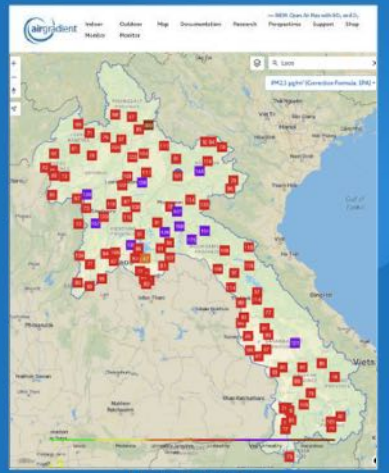
Partner: UNICEF Lao PDR country office, UNICEF Data Science Team

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**

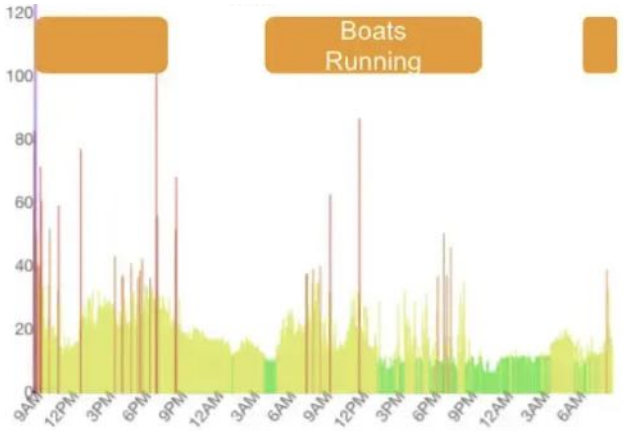
Background: Two civic organisations in South America building up an air quality network in Honduras and Ecuador

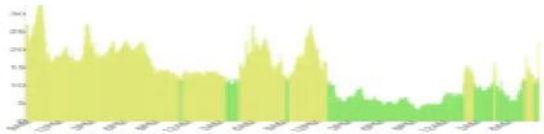
Partner: Sustenta Honduras & Pacha Ayllu

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!

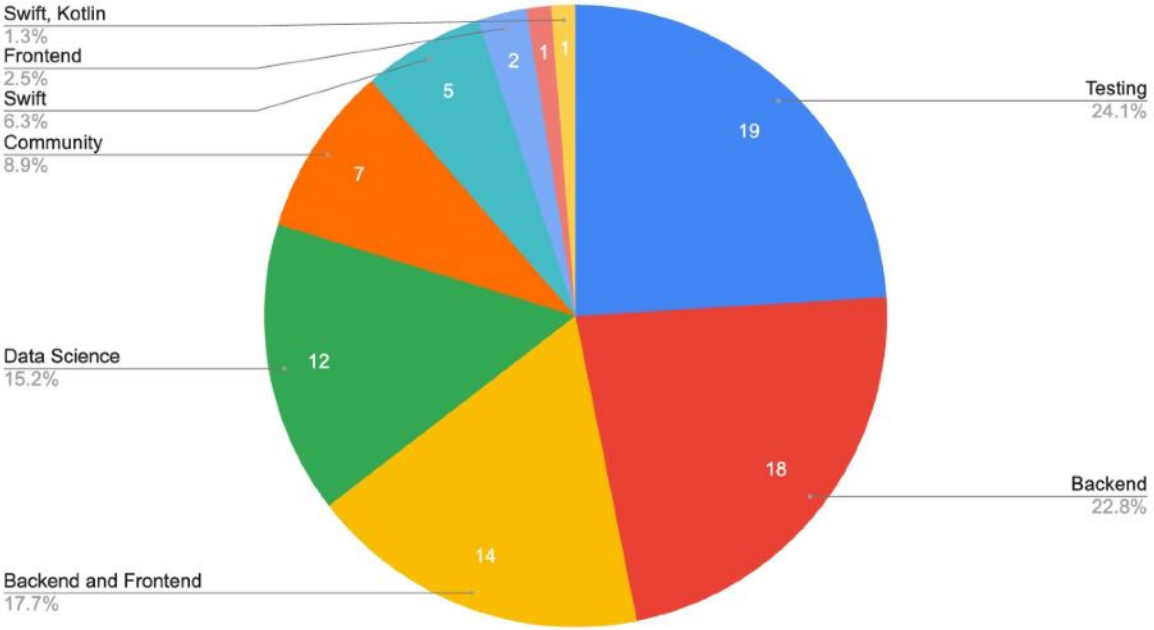
Purpose:

- 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

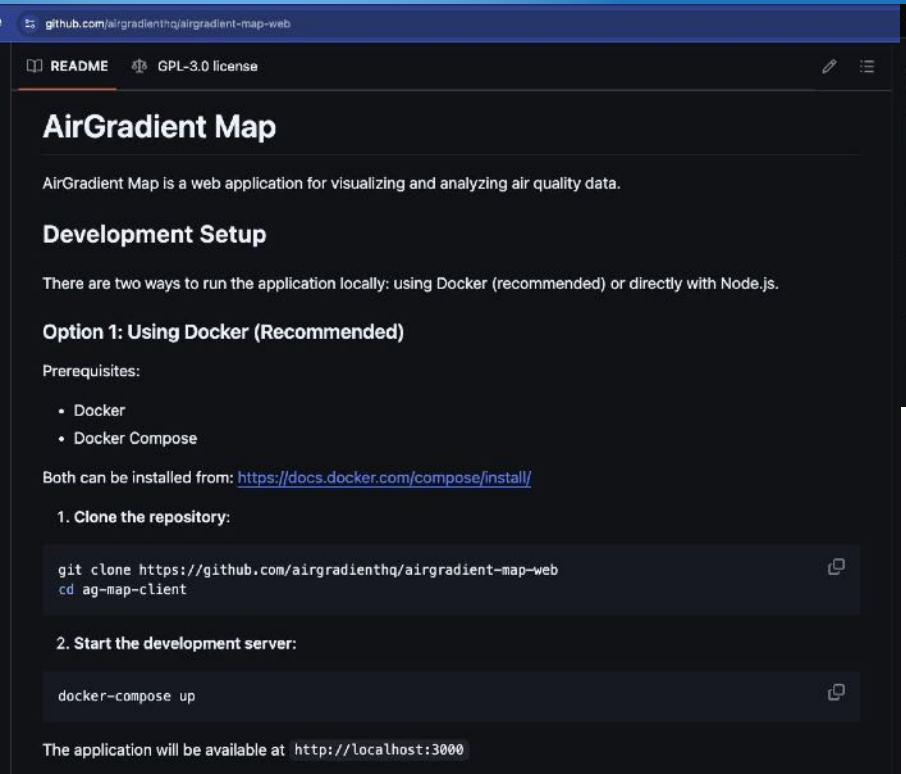
- **Excellent onboarding documentation**
  - Explaining the Vision behind this Project
  - Easy Technical Onboarding
- **Bringing Experts Together, Learning from Each Other**
  - Attract and connect with experts in their respective fields
- **Community Events**
  - Organising Webinars about interesting 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

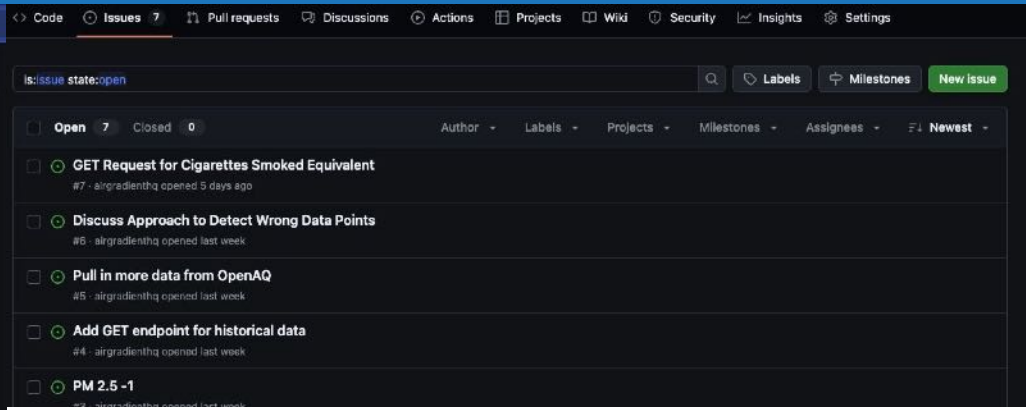
What We Will Bring In

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

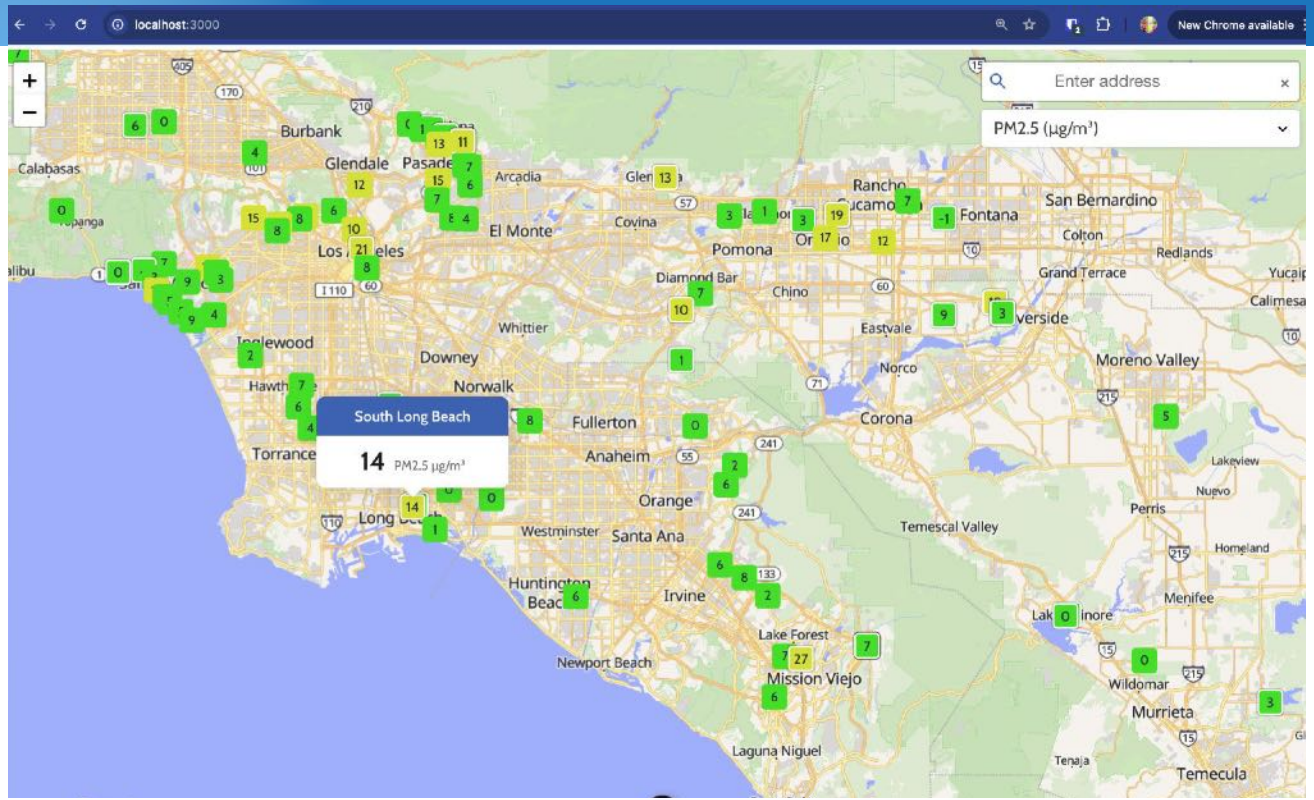




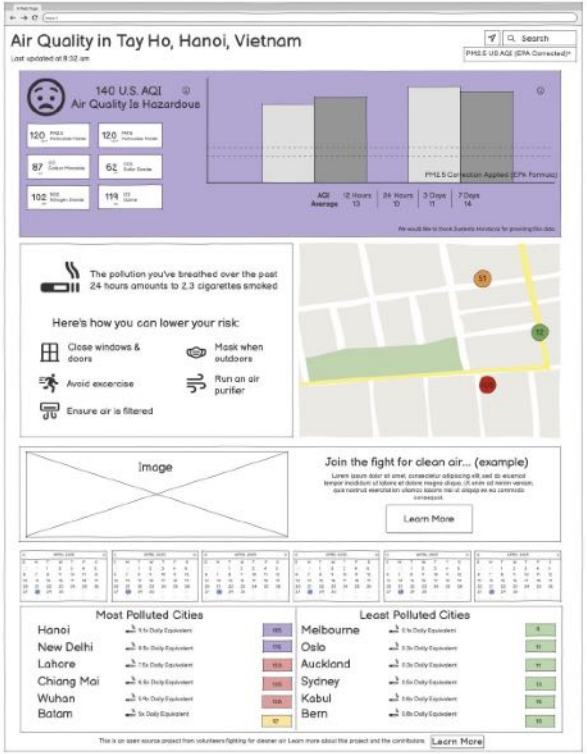
Front End: https://github.com/airgradienthq/airgradient-map-web

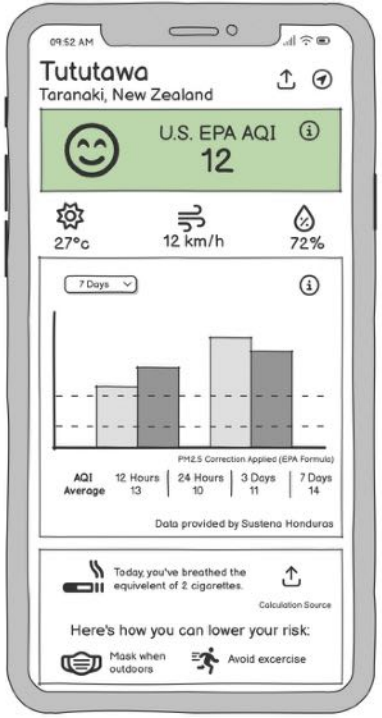
Back End: https://github.com/airgradienthq/airgradient-map-api

http://localhost:3000/

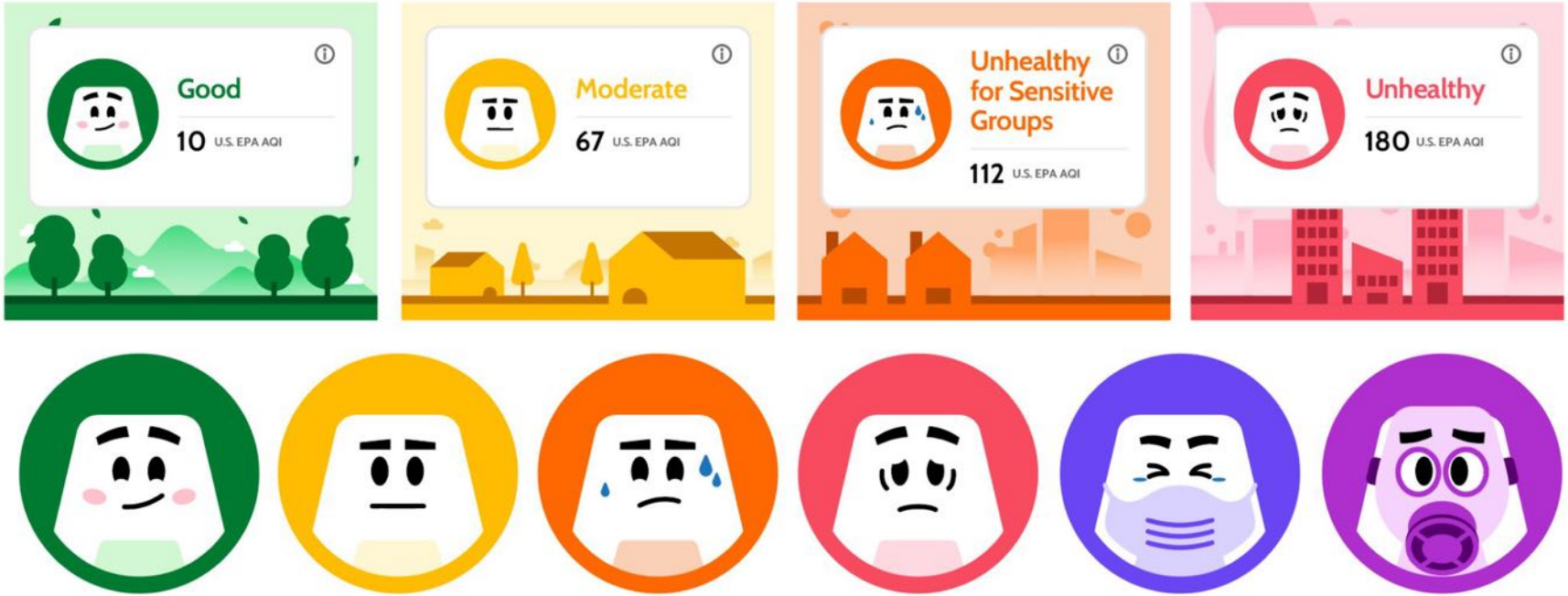


First Mockups Designs





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 intents 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**.

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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