



The Citizen Science Toolbox

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Overview

- Sensor technology to enable citizen science
- Air pollution and communities
- Introduction of EPA's Air Sensor Toolbox
- EPA's Citizen Science Air Monitor (CSAM)

High interest by public for more personal information



What about *my* exposure, *my* family, *my* neighborhood?

Sensor Technology is Enabling Citizen Science

How to Build an AirCasting Air Monitor





ny sci
New York Hall of Science

habitat
map

Mechatronics
Technology Center of CUNY
CITY TECH

Funding for the AirCasting Air Monitor was provided by the New York Hall of Science, the New York State Dept. of Environmental Conservation Environmental Justice Community Impact Grant Program, and the National Science Foundation (NSF ATE No 1003712). The Monitor was created at the Mechatronics Technology Center (MTC) of the New York City College of Technology (City Tech). The electronics were designed and programmed by Dr. Iam Heng and Raymond Yip and the casing was designed by Dr. Andy Zhang. AirCasting is a collaborative project lead by HabitatMap in partnership with City Tech's MTC and the New York Hall of Science.

AirCasting App

AirCasting Air Monitor

Citizen Science for a variety of interests:

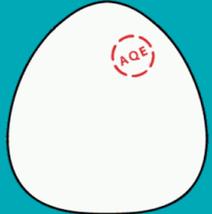
- Individual Health
- Community Exposures
- Research
- Education
- Technology

Air Quality Egg community led sensing network



Home Updates 20 Backers 927 Comments 187 New York, NY Hardware

Funded! This project successfully raised its funding goal on April 26, 2012.



927 backers
\$144,592 pledged of \$39,000 goal
0 seconds to go

Funding period
Mar 27, 2012 - Apr 26, 2012 (30 days)

Project by
#SenseMakers
New York, NY
[Contact me](#)

First created - 9 backed
Has not connected Facebook
Website: sensemake.rs
[See full bio](#)

Share Tweet Embed

A community-led air quality sensing network that gives people a way to participate in the conversation about air quality.



**My Air
My Health**

U.S. Department of Health and Human Services
U.S. Environmental Protection Agency

EPA's Motivation: Research to Action

- ORD supporting EPA's Citizen Science (CS) Initiative by enabling community-based environmental monitoring efforts
- EPA is working with community partners to:
 - Develop and test CS air monitoring protocol
 - Test effectiveness of low-cost sensor technologies for community-based data collection
 - Provide tools to assist the community in implementing a study design of their choice

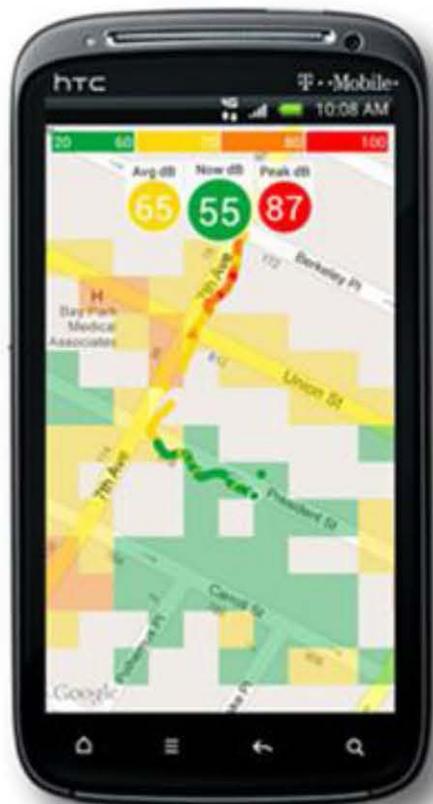


To help citizens more accurately and reliably collect air quality data in their community, including information on:

- Low cost sensor performance information
- Generalized calibration/validation approaches
- Sampling methodologies
- Measurement methods options
- Data interpretation guidelines
- Education and outreach

<http://www.epa.gov/heasd/airsensortoolbox/>

Example-AirCasting

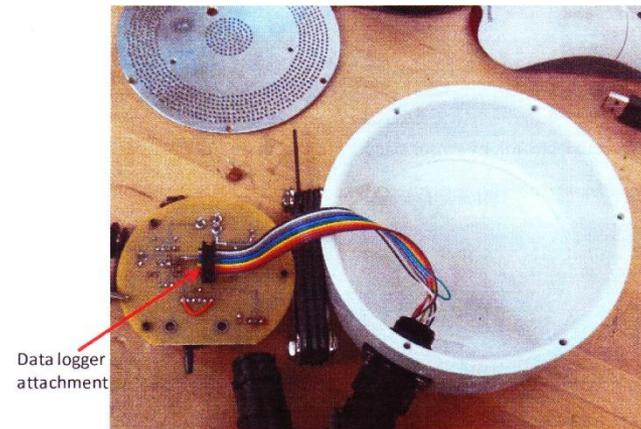
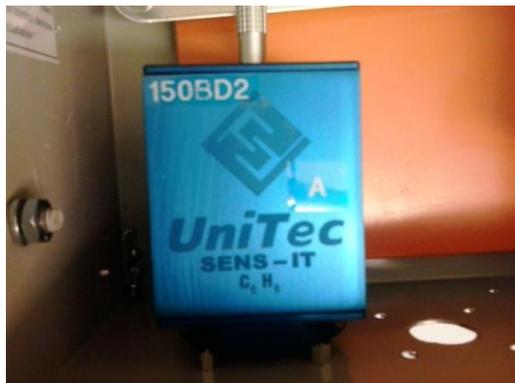
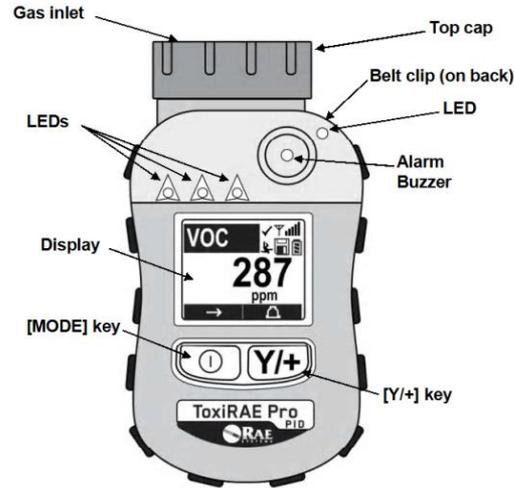


AirCasting App



AirCasting Air Monitor

Example-UniTec, ToxRae, EPA VOC sensors



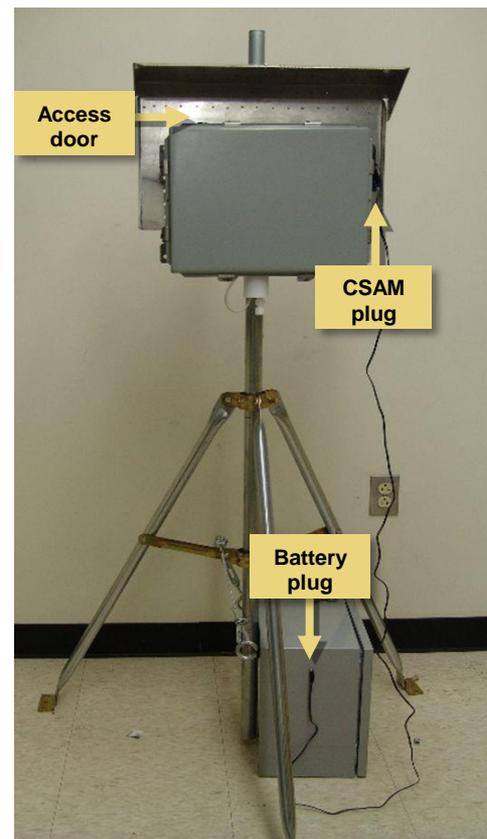
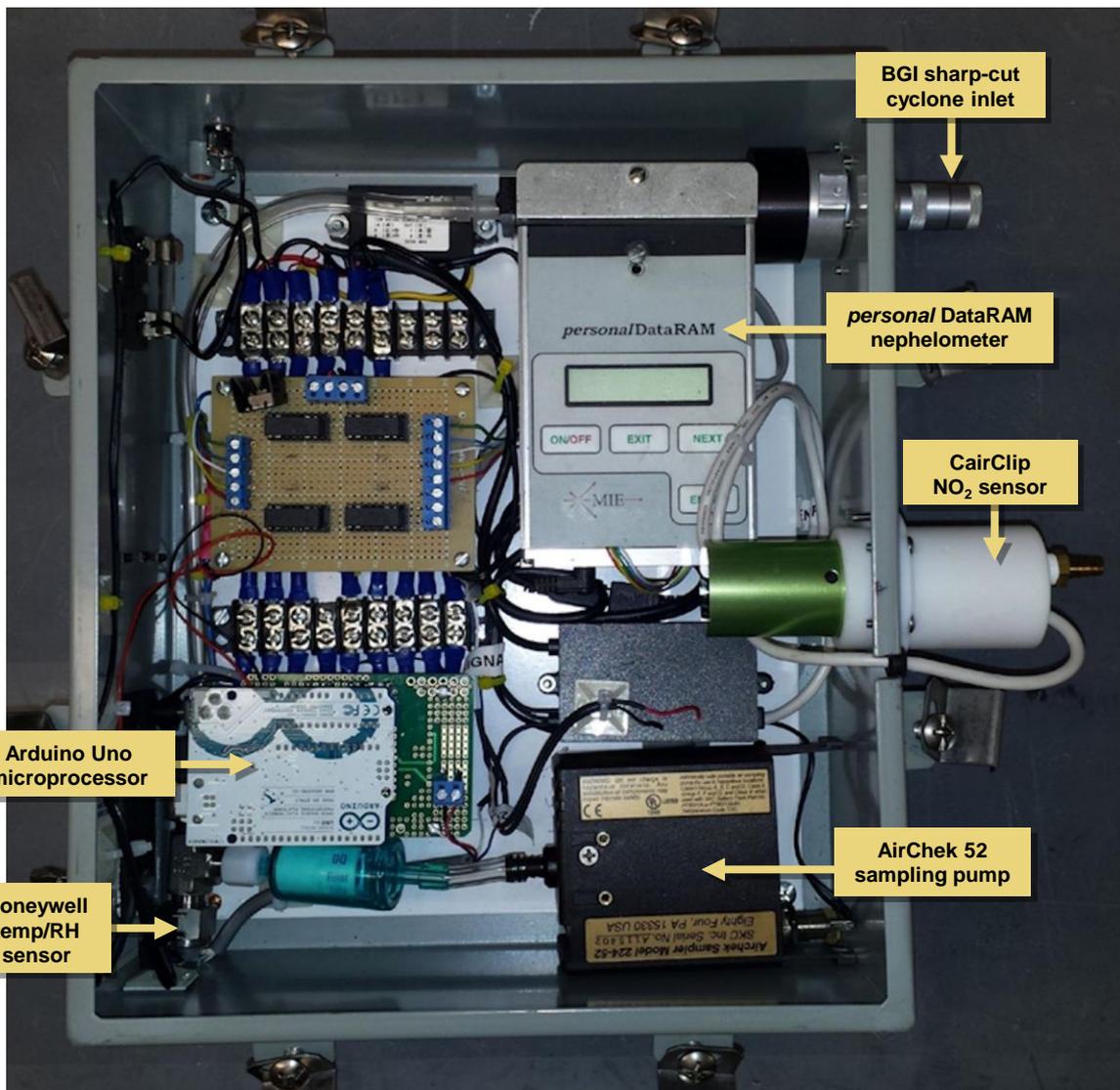
Example-Carnegie Mellon (Speck)



Citizen Science Toolbox: Resources and Guidance

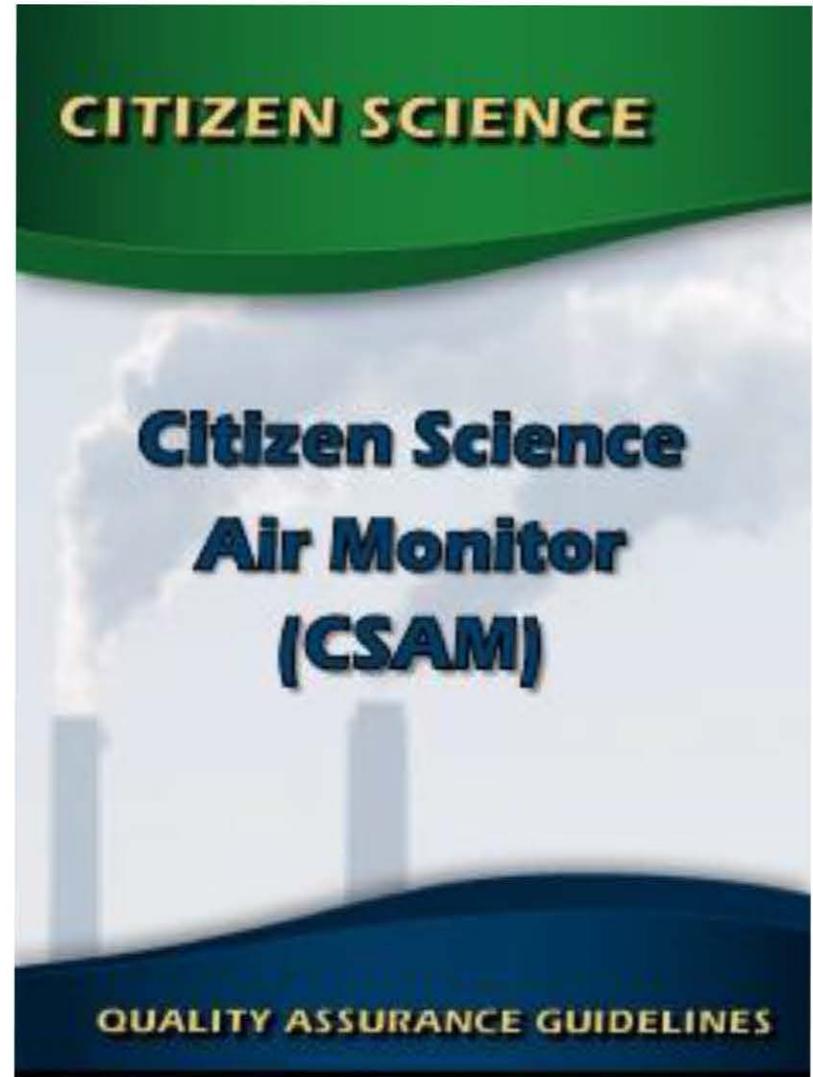
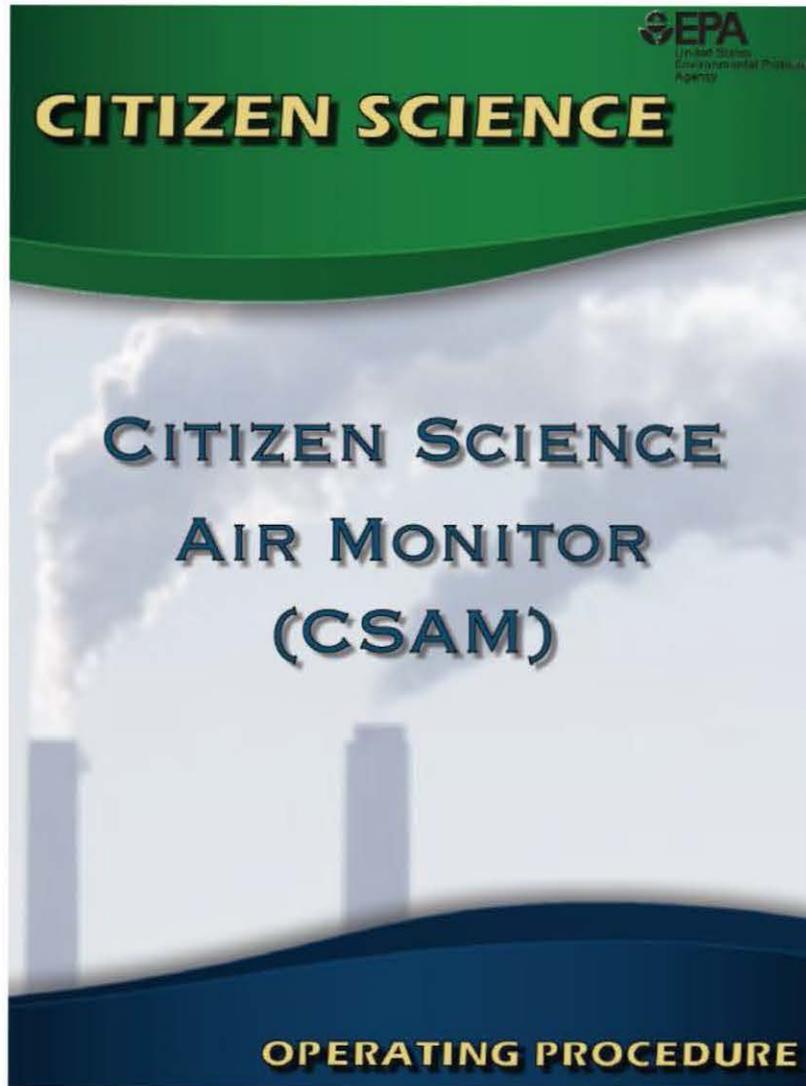
1. Identify pollutants of interest, appropriate sensors
2. Basic Operating Procedure guide for sensors
3. Quality assurance guidelines for sensors
4. EPA-led community training on sensor use
5. Guidance and deployment based on pollutants and sources
6. Basic ideas for data analysis, interpretation, and communication

EPA's Citizen Science Air Monitor (CSAM)



Measurement	Reporting Unit
NO ₂ concentration	Parts per billion (ppb)
PM concentration	Micrograms per cubic meter ($\mu\text{g}/\text{m}^3$)
Temperature	Degrees Celsius ($^{\circ}\text{C}$)
Relative humidity (RH)	Percent (%) at $^{\circ}\text{C}$

Citizen Science Tools



Summary

- ORD is supporting the improvement of citizen science
- Ironbound air monitoring project presents the opportunity to apply EPA research and tools to community issues
- Provides foundation for future community interactions



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Online Resources Available at:

<http://www.epa.gov/heasd/airsensortoolbox/>