Development of Low-Cost Air Sensor Packages for Youth Education, Citizen/Community Science, and Developing Countries

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Albany High School (AHS) Air Quality Club

- Formed September 2017
- Meets once a week to build Low-cost Air Sensor Packages
- So far indoor packages only. Going outdoor soon.
- Members: >5. Kept small purposely. Will expand this year.
- Sean Morris - Faculty Advisor (Computer Science Teacher)
- Ajith Kaduwela - Parent Advisor (Air Quality Scientist)
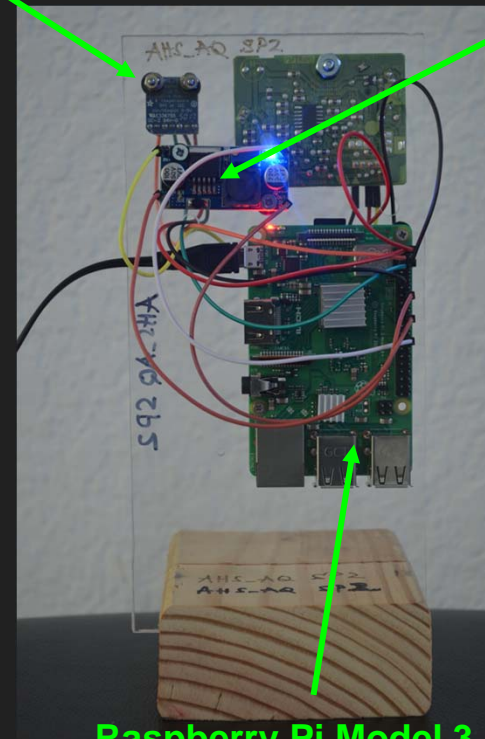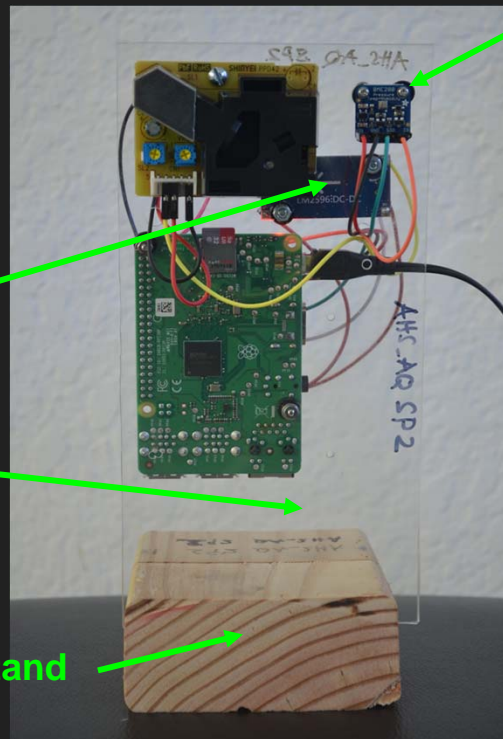- Physics/Chemistry/Mathematics/Statistics teachers are interested

Basic Sensor Package

BMP280 Meteorology Sensor

Buck Converter eBoot LM2596

Shinyei PPD42 Particulate Counter

Transparent Acrylic Mounting Plate

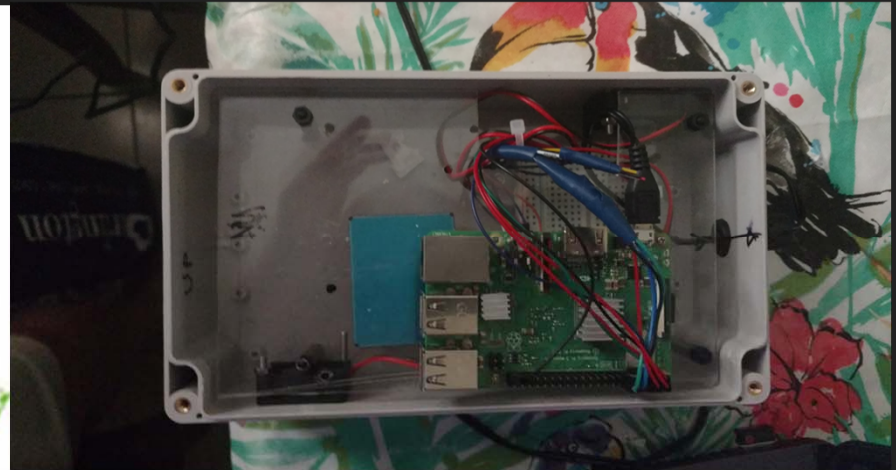**Slotted wood-block stand**

Raspberry Pi Model 3 B+

3

# BErkeley Atmospheric CO_2 Observation Network

- Collaboration with Cohen Group at UC Berkeley started in 2017
- One $BEACO_2N$ node on the roof of AHS
- Not using $BEACO_2N$ data yet (no outdoor sensor packages to compare with)
- Will use $BEACO_2N$ CO_2 data soon to calculate the efficiency of AHS HVAC system

Sri Lanka Air Network

- Spent three weeks in Sri Lanka teaching local Air Quality scientists how to build AHS sensor packages
- They built three packages and one is now collecting outdoor data
- Sri Lankans are very motivated to build an island-wide network
- Talk on this tomorrow at 10 am in Monitor Siting Session
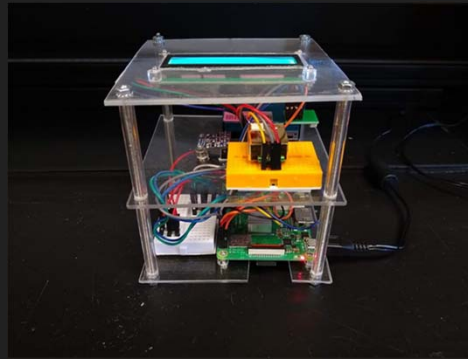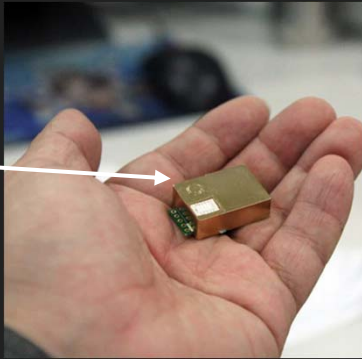
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UC Davis small Unmanned Aerial Vehicle (sUAV)
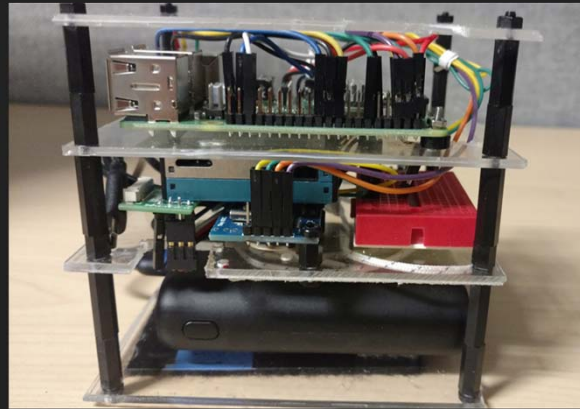
- For more information, see Poster #75

Albany Schools Indoor Air Quality Package

MH-Z19
CO_2 sensor

- Already measuring CO_2 in one classroom
- Upgrading sensor packages to measure in more classrooms including other schools in the Albany Unified School District
- Teachers are getting curious about air pollution and cognitive impairment of students (e.g., high levels of CO_2)

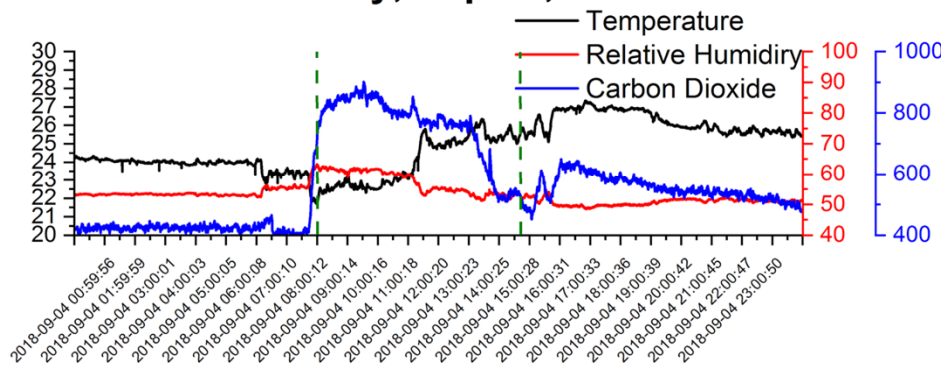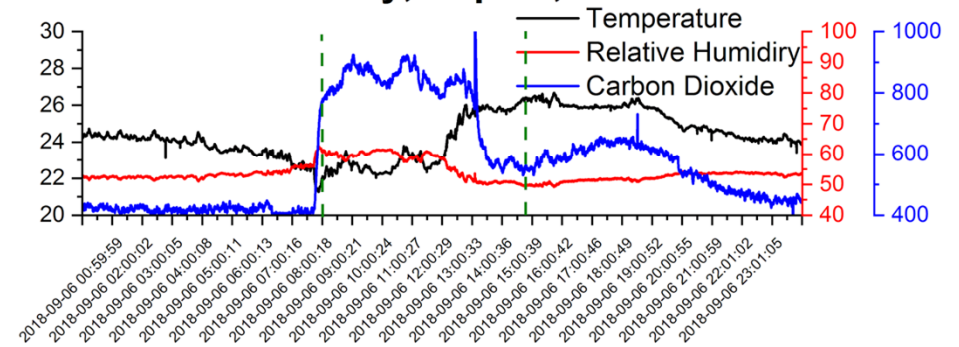# CO_2 in AHS Classroom (Preliminary Data)
Saturday and Wednesday
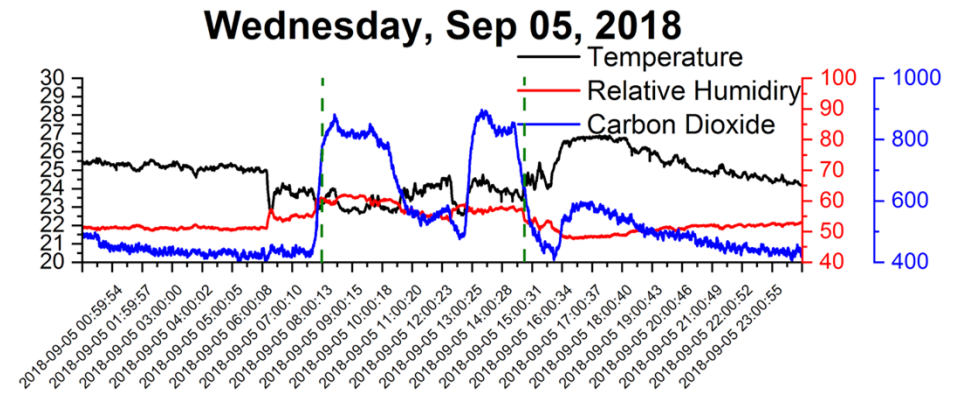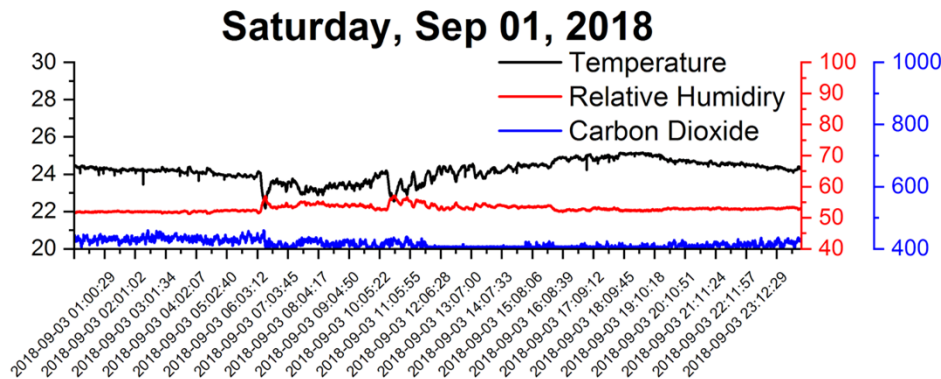
CO$_2$ in AHS Classroom (Preliminary Data)

Tuesday and Thursday

Future Directions

- Data analyses as a STEM activity (Chemistry/Physics/Mathematics/Statistics/Computer Science)
- Learning data dissemination through apps/webpages
- Learning how to code better by improving software (e.g., Python threading)
- Gathering actionable data to improve indoor air quality at Albany schools and beyond
- Engage the Albany community (potentially with UC Berkeley) as a pilot/blueprint for other communities who wants to coalesce around high schools to measure/solve their air quality issues: High School science teachers are the first-line scientists in most impoverished communities.
- Making the next generation aware of the perils of environmental pollution - Youth Education!

Thank you for your attention!

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