

Question Report Jun 26, 2023 | New Air Monitoring for Tracking Air Quality

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EESN: New Air Monitoring for Tracking Health and Energy Benefits

| Order | Question from | Question | Answer | Responder |
|-------|----------------|---|--|--|
| 10 | Alice | This is all great info --will the recording and or slides be shared with us afterwards? | Yes. | Sarah Simon eesn_info@mit.edu |
| 16 | Shirook Ali | Can these slides be shared please? | Yes, we have submitted our slides to Sarah Simon for distribution after the webinar. Thank you | Karen Donoghue kdonoghue@alum.mit.edu |
| 1 | Tom | I would like to know more about the PM stations available. I can also offer a device I am currently testing for unexpected fires in trucks. | Hi Tom, Please send me a note to kdonoghue@alum.mit.edu to follow up. Thank you! | Karen Donoghue |
| 5 | | Is your app on Google play for android? | Hi Tom, Local Haze is only available for iOS | Karen Donoghue |
| 2 | Mark Camenzind | PurpleAir.com has map of particles worldwide. AirNow is also useful. | LocalHaze pulls data from both systems | Sarah Simon |
| 20 | | I downloaded Local Haze app and give local sites, but Purpleair.com is more useful since can also get graph of particle counts vs time for any sites and can overlay indoor site like my home with outside site nearby. | Thanks Mark! | Karen Donoghue |
| 22 | | CO ₂ monitoring indoors is very important also. I have www.CO2Meter.com NDIRs, 2 at home, but wish this would go to internet to see all sites and trends vs time, like Purpleair.com | | |
| | Tom | I would be interested in hearing more about the benefits of monitoring CO ₂ vs the PM indicators | | |

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- 29 Tom CO₂ indoors is key for adequate ventilation and assessing if you are rebreathing air, incl from others. Outside air 420ppmv outside worldwide. The CO2meter.com sensors work quite well for the pricepoint, \$70 via Amazon. Particles in air is completely different. Love PurpleAir and hope Piera systems is better and need lower cost to use in every home, business, hospital, cleanroom. SmartCities is looking at collecting data for cities worldwide. SEMI.org standards MSIG = MEMS/Sensor Industry Group has Smart Cities group. It seems as though AirBeam data is not included in Local Haze. Curious if there is a reason why. [Comment from Mark] 32. Harvard has good book called "Healthy Buildings" that is useful. Mark.Camenzind83@gmail.com, IAQ expert, San Ramon CA. PhD chemist/Consult
- 4 Blanca Himes Hi Blanca, Thank you for making us aware of AirBeam! We are going to look into these sensors as soon as we finish the webinar. Thanks very much. (Bianca) Sure thing! I believe they were the first citizen science low cost PM2.5 sensor. Their third generation devices are supposed to be much improved over prior ones. Though not as much as the Piera ones by the look of things! Karen Donoghue
- 4 Thank you Blanca - may I connect with you on LinkedIN to keep in touch? (Bianca) Absolutely
- 6 Erik Velasco Dear Karen, how do you ensure that your low-cost sensors report truly representative data? Citizens are generally unaware of air quality monitoring. There are many issues with low cost air quality sensors that are not just sensor related such as poor maintainence (e.g. spider webs) and poor deployment (e.g. sensor not in the open). And some sensors such as PurpleAir include multiple sensors to have some redundancy of the data. Karen Donoghue
- 6 Could you elaborate on that? We use many methods to filter out misbehaving sensors and data.
- 11 Erik Velasco Dear Vin, have you compared the readings of your sensors with those of research-grade instruments? Particle counters by size distribution are quite common nowadays among the scientific community. Your presentation would gain by showing results of an intercomparison study against such instruments. But GRIMM-11D is a portable monitor. We have. Our sensors are calibrated vs. a reference instrument, the GRIMM-11D, this was shown on slide 4. Vin Ratford
Vin.ratford@pierasystems.com

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| 19 | Erik Velasco | Dear Kathikeyan, if I understand well your proposal of mapping pollution by mounting sensors in cars, you won't be monitoring air quality at all. You will be measuring emission hot spots in the middle of the street. In the best case you will detect bursts of vehicle exhausts (i.e., emissions associated to acceleration). | (see partial response, at S. Usmani, #3 below) | |
| 7 | dag | Indoor air is almost always worse than outdoor since it comes from outdoor air and adds indoor pollutants | Many buildings are over-ventilated with ach of 10 or more, knowing the ach in real time can lower | Vin Ratford |
| 8 | | The new indoor standard of 5 air changed per hour (ach) has tremendous energy penalties | energy consumption dramatically. Most homes are ~1 so may need air purifiers to reduce particle count. The new standard doesn't require that you have ach of 5 or more all the time, just when there is the risk of virus infection or the AQI measure is too high. If you can't measure it, you can't reduce it. | Vin Ratford |
| 9 | Alice | Does or can Local Haze differentiate between indoor air quality and outdoor air quality sensor data for comparison? | Local Haze only displays outdoor air as we are concerned about the privacy impacts of publicly available indoor air quality. (e.g. you can tell if a space is occupied from the sensor data). | Karen Donoghue |
| 12 | | what is the cost of the Piera indoor air sensors for schools or homes? And do they measure all the pollutants from natural gas combustion (including formaldehyde, Nox etc.) as well as PM 2.5-1.0, etc.? | ~\$300 and yes we measure PM, TCOC, T, humidity, pressure | Vin Ratford |
| 13 | | Is the data downloadable in formats for students or other citizen scientists to use --from both Local Haze and Piera systems? | A large number of the air quality networks have APIs to allow access to historical data especially for outdoor air quality. Indoor air quality data is generally not available publicly and requires permission from the sensor owner to access. | Karen Donoghue |
| 14 | | Can one Piera systems device measure both indoor and outdoor air quality from one location? for example showing difference in air inside a school or home vs. just outside when a wildfire is occurring vs. a clear day? | It can if you locate a unit outdoors. I simply take my unit outdoors if shows an alert. You can also look at LocalHaze to see what is going on outdoors. | Vin Ratford |
| 15 | Peter Messinger | Here in Seattle we are having problems with fentanyl users smoking on the light rail. Can transportation systems efficiently install focused detectors to set off alarms of drug use? | Good question. If they are vaping, we'll be able to detect that | Vin Ratford |

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| 3 | Sabah Usmani (Columbia) | Do you plan to integrate satellite data into your app? | We are focusing on “real-time” data so that it is possible to get hour by hour actionable information for individuals. | Karen Donoghue |
| | Sabah Usmani (Columbia) | how useful are these connected vehicle based air pollution (i.e. mobile mapping of air pollution) for targetted policy and planning? | Connected vehicle air pollution monitoring has very specific urban planning applications because it is able to identify hyperlocal air pollution peaks that occur at specfic locations and times, which a thinly spread network of static sensors cannot identify. This can help determine which communities (typically marginalized) are most exposed to air pollution peaks - it can drive a rationale for higher spending for public health in areas of high air pollution exposure. Also, it can influence motorized transportation planning (traffic control and density), active transportation planning (where cycling and outdoor spaces need to be located) and green space planning at the block | Karthikeyan Kuppu Sundara Raman |
| | | what type of air pollution data is most helpful for urban planning/transportation policy rather than just individual decision making. How can advocates use this data for make the case for better policies/regulations? | CO, NOX, SO2, PM air quality data are used for transportation policy. Some cities have adopted them as a basis to reduce vehicle miles traveled and push policy for green vehicles incentives. Air quality data around industrial sites has been used as a measure of compliance to regulations of emission from industries, especially when these industries are in urban areas. Planning policies on public spaces have been driven in several cases by air quality indices, which are a composite of different air pollutants. | Karthik Kuppu |
| 18 | Jeff Berner | Generation Aviation in the United States still uses leaded fuels. Does the Piera system capable of identifying composition of pollutants, specifically lead, so that exposure to lead levels could be measured adjacent to airports? [comment: Thanks, but it is my understanding that EU has already banned leaded GA fuels. US has not made endangerment finding as yet.] | We are monitoring levels around airports in Europe. We are working to create an AI model to detect. | Vin Ratford |
| | | | US air quality standards, rather than “endangerment”, set an unhealthy lead concentration, which is applied near airports. | Sarah Simon |
| 24 | Jeff Berner | How could these sensors be used in a network to minimize pollution exposure for neighborhoods beneath airplane flight paths? There is a class-action lawsuit in Seattle over this issue. | | |

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| 25 | Kirpal Khalsa | How does wind impact the accuracy of your measurements? | Wind disperses contamination so air quality readings will change from moment to moment | Sarah Simon |
| 21 | Chris Schaffner | Can the panelists discuss the usefulness of monitoring PM indoors, vs other sensors for CO2, VOCs etc? | | |
| 23 | | Do the panelists have any experience using their products as part of green building certification projects LEED, WELL etc? | | |
| 27 | MITCSC | I have 2 questions. Regarding mobility, as anyone looked at the impact of brake and tire dust as a cause of asthma and other health effects? | Given that brake and tire dust contribute to about a fifth of the PM 2.5 air pollution from road transportation it is very important. The concern is about the dust made of metals such as copper which mixes with acidic sulphates in the air to irritate lungs. There have been studies that show how metals in the air aggravate asthma, especially in children, but I am not aware of studies that directly link asthma and brake and tire dust. Here is a link to a heavy metal-asthma study: https://pubmed.ncbi.nlm.nih.gov/33378689/ | Karthik Kuppu |
| | | The second question is about indoor air quality, how do the sensors work with disinfection systems such as UV, which inactivate the pathogens but do not remove them from the air? | | |
| 28 | Joyce Lee | Are there brands out there combining door bell video with air sensors taken at the same location? Seems synergistic for residential. Thanks. Info@indigoJLD.com | | |
| 31 | Ken Kershner | Which N95 respirators would you recommend and why? | | |
| 33 | kparker | Can the Piera Systems monitors detect/distinguish mold? | | |
| | Cath | I have similar question. Please let us know | | |