

FALL 2020 IRG LIGHTNING TALK 2021 S&CC PI MEETING

SMART AIR: INFORMING DRIVING BEHAVIOR THROUGH DYNAMIC AIR-QUALITY SENSING AND SMART MESSAGING

NSF Project_ID 1952008

K.E. Kelly, University of Utah

Award Type: IRG, Solicitation Year FY2019

Principal Research Investigators

- . *Kerry E. Kelly, Chemical Engineering, University of Utah*
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- . *Gregory Madden, Behavioral Economics, Utah State University*
- . *Elizabeth Joy, Intermountain Healthcare*

Community Partners

- . *Intermountain Healthcare*
- . *Utah Clean Cities*
- . *Utah Clean Air Partnership*
- . *Salt Lake City School District*
- . *Bear River School District*



Sensors and wireless networks



Behavioral economics



Community health



Air quality



Image processing

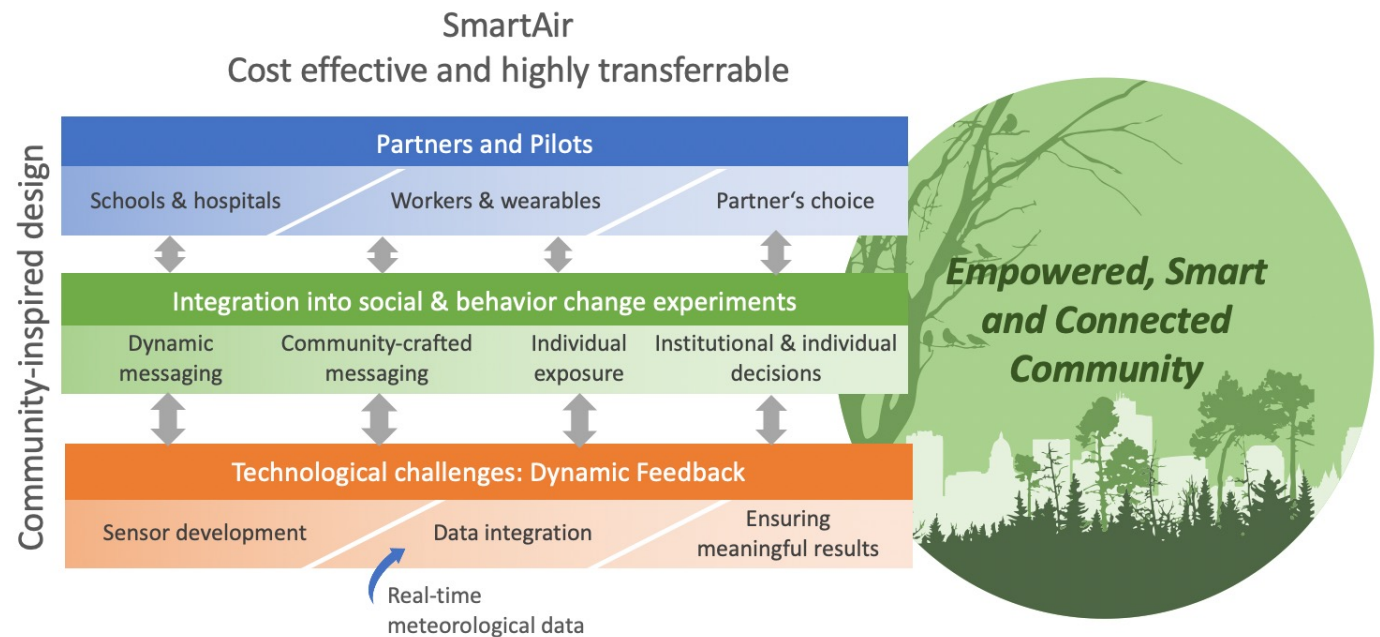
Project Overview

Project Vision



- Scalable approach to encourage good air quality choices
- Improve air quality in locations areas of concentrated idling
- Promote health of children and individuals who spend time in these microenvironments

Project Schematic



Project Overview

The Problem



- Salt Lake City, UT periodically experiences the worst air quality in the country.
- Vehicles are a major contributor to poor air quality.
- Idling causes microclimates of poor air quality.

Fundamental Research Contributions

- Developing accurate, wearable, low-cost air quality sensing nodes
- Dynamically integrating sensor measurements with local meteorological information and data-screening algorithms
- Integrating into behavior-change experiments and the co-creation of community-crafted messaging to influence individual choices.
- Co-creating solutions with the community partners will be critical to address poor air quality and ultimately ensure a highly scalable and sustainable system.

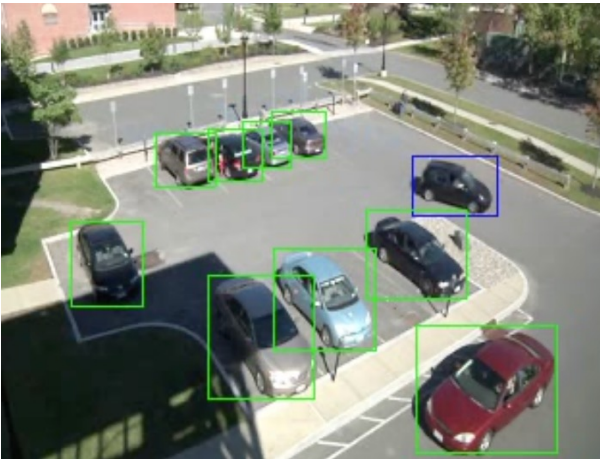


Project Update

Community-crafted messaging

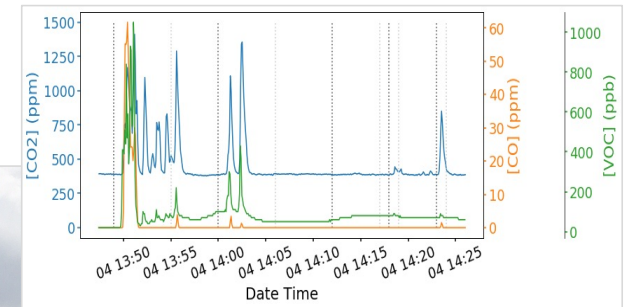
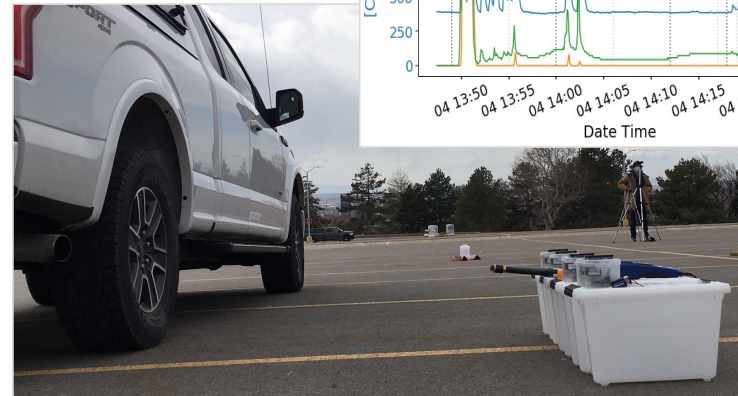
- UCAIR partner focus group
- Intermountain healthcare communications team
- Surveying the efficacy of social-norm messaging

Vehicle detection

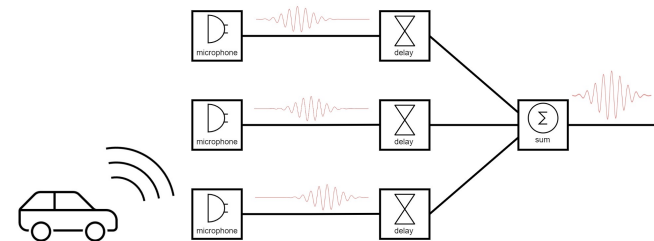


Suggested length: 90(s)

Air-quality impacts of idling



Idle detection



Project Evolution

How have your project activities to-date shaped or evolved the long-term vision of the project?

“As we began developing community-crafted messaging around idling behavior, we learned that some messages induce anger or guilt. Our partners are concerned about individuals confronting each other regarding idling behavior. Thus, we are surveying a variety of community members to understand which messages are likely to be effective without encouraging negative behavior.”

“Our community partners are concerned about ensuring privacy of individuals in the vicinity of the pilot testing. We are working with our partners to address this concern through a combination of technology (secure data storage and signal filtering) and training (basic human subjects research) for faculty, staff, and student researchers.”

Anticipated outcomes & success measures for next year

Next Year's Milestones

- Develop the preliminary dynamic air-quality, digital display system
- In close collaboration with our community partners, identify the community-crafted messages that will be pilot tested
- Perform initial pilot testing of the dynamic air quality display system at a partner location

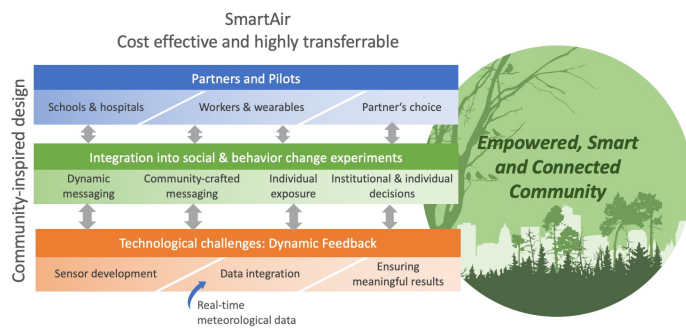
Planned Research Activities

- Validate low-cost, air quality sensors
- Optimize the vehicle and idle detection techniques for identifying vehicles
- Refine the beam-forming techniques for identifying idling vehicles

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NSF Project_ 952008 , Kerry E. Kelly, University of Utah
IRG FY2019

Visual Schematic



Project Vision

- Scalable approach to encourage good air quality choices
- Improve air quality in locations areas of concentrated idling
- Promote health of children and individuals who spend time in these microenvironments



Use-Inspired Research

- Salt Lake City, UT periodically experiences the worst air quality in the country
- Vehicles are a major contributor to poor air quality.
- Idling causes microclimates of poor air quality
- Wasatch Front Utah Community Partners: Bear River School District, Intermountain Healthcare, Salt Lake City School District, UCAIR, Utah Clean Cities,

Fundamental Research Contributions

- Accurate, wearable, low-cost air quality sensing nodes
- Integrated sensor measurements and data-screening algorithms
- Co-created solutions with the community partners to address poor air quality and ultimately ensure a highly scalable and sustainable system.

Please organize the contents of slides (2) and (3) as a quad-chart using the template below. The quad chart should not be included in your lightning talks but should be submitted to NSF S&CC through an upload link that will provided in the coming weeks.