

Title: Identifying Signatures for Idling Vehicle Emission Detection to Promote Smart Air Quality Behaviors

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Abstract:

Vehicle emissions contribute to air pollution, and engine idling can cause microenvironments of poor air quality. Can a dynamic feedback system that provides air quality metrics, percent of idling vehicles, and a community-crafted message produce a behavior change in individuals and reduce the number of idling vehicles? The project aims to develop a Smart Air system that integrates air quality sensors and idling vehicle detection with cloud infrastructure to allow real-time feedback through a Dynamic Air Quality Display (DAQD). Preliminary measurements determine the sensitivity and ranges required from the prospective low-cost air quality sensors and the expected pollution signatures from idling engines.

The goal of this study is to provide initial air-quality measurements using research-grade and low-cost sensors. Two TSI Q-Track instruments collect volatile organic compounds, carbon monoxide, and carbon dioxide concentrations, and multiple Plantower sensors collect particulate matter concentrations. The measurements occur in areas where a high number of idling vehicles are expected, such as parking lots and COVID drive-up testing sites.

Preliminary data is needed to determine if there is a difference in idling vehicle emissions from moving vehicle emissions and to develop a vehicle emission signature. The project will use the vehicle emission signature to differentiate pollutant spikes from vehicles to those from humans, natural events (wildfires, etc.), or other pollution sources. Field measurements are being collected in a parking lot, hospital drop-off zone, and a COVID drive-up testing site. These experiments will cover multiple independent variables, including sensor distance from the source, meteorological conditions (wind, etc.), number of idling vehicles, and idling event time. The poster presentation will discuss and display preliminary results for individual pollutant concentration, environmental conditions, and the number and types of vehicles in operation.