



Measuring Temporal and Spatial Exposure of Urban Cyclists to Air Pollutants Using an Instrumented Bike



Project Description

An increase in using active transportation, such as bicycles, can offer many health, environmental, and other societal benefits. However, in the process of cycling for transportation, cyclists are exposed to multiple pollutants that could adversely impact their health. Particles in the air with an aerodynamic diameter of 2.5 micrometers or smaller (PM_{2.5}) are particularly harmful to human health (U.S. EPA, 2018). This project refined the use of an instrumented bicycle for air quality data collection and monitoring the PM_{2.5} exposure of cyclist on major cycling routes in Atlanta, Georgia. The researchers also mapped the pollutant exposure levels on the routes tested.

What Researchers Did

The instrumented bike components were attached to participants' bikes and needed minimal intervention from researchers once started. At least 5 study participants rode the instrumented bicycle on one of the four predetermined routes at different times throughout the day because PM exposure can vary depending on the time of day. Further data collection efforts included having a researcher ride one of the routes five different times during the same day and exploring the variability of different commuting routes to Georgia Institute of Technology.

What They Found

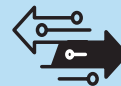
Based on the research team's calculations of the total exposure for the cyclists versus exposure to the urban background for the same time interval, values are low enough to show that the health impact of the exercise would far outweigh the small increase in exposure, regardless of the bicycle infrastructure used on the route. However, these results are true for Atlanta, Georgia, and locations that enjoy similar levels of particulate matter. After initial calibration, the low-cost PMS5003™ sensors were determined to be appropriate for mobile air quality monitoring, although some large spikes in PM_{2.5} may be missed with such low-cost sensors.

Key Outcomes



Research

- PM_{2.5} exposure maps of cyclists in Atlanta, Georgia.
- A refined methodology for using an instrumented bicycle for mobile air quality monitoring.



Technology Transfer

- A data collection procedure that can be replicated along other routes and in other cities.
- A framework for future cyclist exposure studies.

For More Information

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