Civil Engineering

Title: Enhancing Air Quality Monitoring Through the Integration of Sustainable, Low-Cost Sensors.

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The goal of this proposal is to improve the accessibility, number, and spatial resolution of air quality sensors using low-cost sensors (LCSs) to monitor particulate matter (PM), a significant atmospheric pollutant impacting human health and the environment. Traditional PM monitoring methods, limited by their urban/regional focus, high costs, and size, fail to capture the detailed spatial and temporal variations in PM concentrations, particularly in under-monitored urban and remote areas. This project aims to characterize and compare the performance of three commercially available PM LCSs across three operational modes: stationary (1D), mobile on manned vehicles (2D), and unmanned aerial vehicles (UAVs) (3D), enhancing the horizontal and vertical profiling of PM. Employing the Triple Bottom Line model, we aim to balance environmental, economic, and social factors, ensuring broad stakeholder engagement in the development and implementation of air quality monitoring solutions. This Approach Aligned with SDGs: Good Health and Well-being, Sustainable Cities and Communities, Climate Action; showcasing broad benefits Expected outcomes are developing public and vehicle-integrated monitoring systems, deepening understanding of PM pollution effects, and enhancing strategies for environment and health that align with NAAQS. This effort seeks to spur collaborative innovation in monitoring, aiming for a healthier, sustainable future.