Opportunity and Significance

Millions of lives are believed to end prematurely due to air pollution and it is the world’s largest environmental health risk as discussed by the World Health Organization [1]. Cities like Beijing and New Delhi regularly experience high Air Quality Index (AQI) values. A lack of air quality monitoring exists in some areas and during extreme events such as warehouse or forest fires.

Technical Objectives

We attempt to tackle the problem using a seamless integration of local and cloud computing and machine learning. This affords us an intelligent solution for monitoring and response utilizing the Internet of Things. Our drone can carry a monitoring station to a location that does not have one to rest on a nearby building allowing for short-term monitoring. Or be one itself. Employing the Intel Edison Compute Module, Amazon Web Services, ElasticSearch, and Kibana, our approach is scalable to a high level.

Related Work and State of Practice

Novel approaches to air quality monitoring are being employed. These include monitoring ‘backpacks’ on pigeons and as part of Google cars. However for certain events, deploying animals or cars might not be ideal, especially as recent warehouse fires have persisted for over 20 hours.

Next Steps for Development and Test

Further work is needed to integrate Amazon ML into the analysis and response from the UAV. We have selected a field adjacent to an athletic complex that is safe for point to point testing of the system.

Cybersecurity

Our Edison modules are secured with strong passwords. However, if a hacker obtained access to the boards, he or she could re-flash them and repurpose them. We employ Amazon’s Identity and Access Management to create role-based access. We use Public Key Infrastructure and certificates for enhanced security.

Commercialization Plan & Partners

We make special acknowledgement to the Intel IoT Innovator Lab for providing us the majority of the hardware and resources needed for this work. Commercialization of this work has not been discussed but we are willing to work with a government agency, municipality, or industry partner to implement a custom solution.