

Field Deployment Experience of Low-Cost Smart City Air Pollution Monitoring Network

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Increasing, air pollution become an emerging concern and highly public awareness topic. The advance of sensor technology and low power long range communication protocol enabled the development and deployment low cost air pollution monitoring network. Such a network established a higher spatial and temporal density data collection system compare to traditional national air quality monitoring station.

Environmental Protection Administration (EPA), Taiwan, initiated a project of smart city air pollution monitoring network deployment. A total of 10,200 low-cost air quality sensor nodes will be deployed on the street light across the country, covering industrial park, city, small town and countryside. Until Aug 2018, 3200 nodes have been deployed, another 7000 nodes will be installed in 2019. The locations are carefully selected to tackle different application requirements. With 150~300 meters' density in sensitive area, to 1km ~ 1.5km sparse deployment in countryside. Forming a grid network around the area of interest in order to achieve a better understanding of the local air quality condition, propagation of the pollutant, and the source of pollution.

The sensor nodes measure the PM2.5, CO, NO₂, O₃, related humidity and temperature, and report the reading to a central server every minute. Prior to the deployment, lab evaluation compare the FEM equipment and field evaluation to standard EPA monitoring station was conducted to ensure the quality of the data.

Valuable lessons learned along the course of deployment were documented and several standard operating procedures were standardized. Along with the real field deployment restrictions and problems, negotiation experience with the local authority, as well as the maintenance requirements were also recorded to enable rapid duplicate deployment in different areas.

Traditionally, factory inspections carry out by EPA authority was highly depends on the experience of the inspectors. With the aid of high density spatial-temporal data, and advance machine learning and artificial intelligent analysis, EPA inspectors can effectively pin point the pollution hot zone and emission pattern, tremendously enhance the efficiency of the inspection.

With friendly user interface design and government open data, community citizens can access the air quality information in real time, empower them to limit exposure and reduce pollution through behaviour change, advocacy, and community engagement.