

Low- Power Low-Cost Air Quality Monitoring, Predicting, and warning System

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ABSTRACT

Present invention relates to LOW-POWER LOW-COST AIR-QUALITY MONITORING, PREDICTING, AND WARNING SYSTEM which discloses an IoT-based system comprising of a sensing module that senses the real-time pollution using MEMS-based sensors, a machine-learning (ML) module that predicts the forthcoming pollution levels, and a warning system that warns via SMSs if certain pollutants breach predefined thresholds. The system monitors seven major pollutants, namely, PM1.0, PM2.5, PM10, Carbon Monoxide, Nitrogen Dioxide, Ozone, and Sulfur Dioxide, and also measures other important parameters such as temperature, pressure, humidity, wind speed, and wind direction. Moreover, said system is power-efficient and can sustain itself with solar power and battery, and thus can be easily deployed in remote rural areas, where grid-connected power supply is a problem.

KEY APPLICATION AREAS

1. Air quality monitoring in urban and rural areas.
2. Smart city environmental monitoring.
3. Industrial emission and pollution surveillance.
4. Public health and environmental management.
5. Remote/off-grid environmental monitoring using solar power.
6. Research and climate monitoring networks.

POTENTIAL USE

1. Real-time monitoring of PM_{1.0}, PM_{2.5}, PM₁₀, CO, NO₂, O₃, and SO₂.
2. Air quality forecasting using machine learning.
3. SMS-based pollution alerts when thresholds are exceeded.
4. Community-level early warning systems for poor air quality.
5. Deployment in rural and remote locations without reliable grid power.
6. Monitoring air quality around schools, hospitals, industries, and highways.