



Low-Cost Sensor Platforms for Urban Air Quality Monitoring in Egypt: A Novel Approach to Environmental Protection

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Abstract

Urban air quality in Egypt is a significant environmental concern due to rapid industrial development and population growth. A novel approach combining IoT technology with open-source hardware components was employed to design and test the sensors in Egyptian cities. The sensors demonstrated an average accuracy of $\pm 10\%$ for PM2.5 levels, which is within acceptable limits for real-world applications. This study establishes a cost-effective framework for continuous urban air quality monitoring in Egypt using readily available technology. Government authorities should consider integrating these sensors into existing environmental surveillance systems to enhance data collection and public health initiatives. Low-Cost Sensors, Urban Air Quality Monitoring, IoT, Egyptian Cities The empirical specification follows $Y = \beta_{0+\beta}^{-} p X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords:

Egyptian

Geographic

Terms:

Methodological

Internet

of

Things

Terms:

(IoT)

Theoretical

Urban

Concepts:

Ecology

Environmental

Air

Quality

Science:

Assessment

Sensor

Low-Cost

Technology:

Sensors

Microcontroller

Open-Source Hardware

Applications:

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