



Development of Affordable Sensors for Urban Air Quality Monitoring in Guinea-Bissau

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Abstract

Urban air quality in Guinea-Bissau is a growing concern due to rapid industrialization and inadequate monitoring infrastructure. A combination of open-source hardware components and calibration methods were employed to design and test low-cost PM_{2.5} sensors. The sensors showed a linear relationship with PM_{2.5} concentrations within the range tested, with an R² value of 0.98. The developed sensors demonstrated reliability in measuring urban air quality parameters and can be utilised for cost-effective monitoring solutions. Further validation studies should be conducted to assess long-term stability and accuracy under varied environmental conditions. The empirical specification follows $Y = \beta_{0+\beta} X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Sub-Saharan, particulate matter, IoT, calibration, sensors, monitoring, urbanization*

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