



Low-Cost IoT Solutions for Environmental Monitoring in Urban Slums of Cameroon: A Novel Approach

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Abstract

This study addresses a current research gap in Computer Science concerning Developing Low-Cost IoT Solutions for Environmental Monitoring in Urban Slums in Cameroon. The objective is to formulate a rigorous model, state verifiable assumptions, and derive results with direct analytical or practical implications. A mixed-methods design was used, combining survey and interview data collected over the study period. The results establish bounded error under perturbation, a convergent estimation process under stated assumptions, and a stable link between the proposed metric and observed outcomes. The findings provide a reproducible analytical basis for subsequent theoretical and applied extensions. Stakeholders should prioritise inclusive, locally grounded strategies and improve data transparency. Developing Low-Cost IoT Solutions for Environmental Monitoring in Urban Slums, Cameroon, Africa, Computer Science, original research This work contributes a formal specification, transparent assumptions, and mathematically interpretable claims. Model estimation used $\hat{\theta} = \operatorname{argmin} \{ \theta \} \operatorname{sumiell} (y_i, f\theta(\xi)) + \lambda \operatorname{Vert}\theta \operatorname{rVert}^2$, with performance evaluated using out-of-sample error.

Keywords: *Urbanization, Sub-Saharan, Sensor Networks, Data Analytics, Edge Computing, Sustainable Development, Wireless Communications*

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