African Broadcasting Studies

Low-Cost IoT Framework for Urban Slum Environmental Monitoring in Morocco

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Abstract

Urban slums in Morocco face significant environmental challenges, including poor air quality, inadequate water management, and insufficient waste disposal systems. The methodology involved the design and deployment of an IoT network comprising wireless sensor nodes and cloud-based data management systems, with a focus on air quality and waste management indicators. Data collection and analysis were conducted to assess the performance of the system under real-world conditions in selected urban slums. The low-cost sensors achieved a precision error within ±5% for measuring particulate matter concentration in ambient air compared to reference instruments, indicating reliable data acquisition even in harsh environmental conditions. The developed IoT framework demonstrated its effectiveness and feasibility for continuous monitoring of urban slum environments at minimal cost. Future research should focus on expanding the sensor network coverage and integrating predictive analytics for early warning systems to enhance public health outcomes. Urban Slums, Environmental Monitoring, Internet of Things (IoT), Low-Cost Sensors Model estimation used $\hat{\{}\theta\}=argmin\{\theta\}sumiell(yi,f\theta(\xi))+\lambda lVert\theta rVert 2^{2}$, with performance evaluated using out-of-sample error.

Keywords: *Sub-Saharan, IoT, Sensor Networks, Wireless Communications, Energy Harvesting, Sustainable Development, Geographic Information Systems*

ABSTRACT-ONLY PUBLICATION

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