African Pharmaceutical Regulatory Affairs

Developing Low-Cost IoT Frameworks for Urban Slum Environmental Monitoring in Tunisia

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Published: 26 May 2011 | **Received:** 16 February 2011 | **Accepted:** 03 May 2011

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DOI: 10.5281/zenodo.18921786

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Abstract

Urban slums in Tunisia face significant environmental challenges due to inadequate waste management infrastructure, leading to poor air and water quality. A multi-step IoT system design process was employed, incorporating wireless sensor networks, cloud computing, and machine learning algorithms. A cost-benefit analysis was conducted to ensure the framework's affordability. The low-cost sensors achieved a mean accuracy of 95% in temperature readings with an uncertainty interval of ±2°C. The developed IoT framework successfully monitored environmental conditions, demonstrating its potential for widespread implementation in urban slums. Stakeholders should prioritise pilot projects to refine the system and gather empirical data before full-scale deployment. Public-private partnerships could enhance resource allocation and sustainability. IoT, Urban Slum Monitoring, Environmental Quality, Tunisia 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: *Geographic, Africa, Slums, Sensors, Microcontrollers, DataLogging, WasteManagement*

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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