African Visual Communication Studies (Media/Arts)

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

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Abstract

Urban slums in Kenya face significant environmental challenges due to inadequate infrastructure and management systems. A mixed-method approach combining IoT device deployment with community engagement surveys was employed to gather data from 10 selected urban slums. Data analysis included statistical modelling using linear regression to predict pollutant levels based on sensor readings and external environmental factors. The low-cost IoT devices demonstrated an average accuracy of 95% in predicting particulate matter concentrations, with a confidence interval around the mean prediction error of ±3%. The developed frameworks show promise for enhancing environmental monitoring in urban slums but require further refinement and integration into existing governance structures. Public-private partnerships should be encouraged to fund and implement these IoT solutions across multiple urban slums. Continuous data collection and regular updates are essential for maintaining the framework's efficacy. Environmental Monitoring, Urban Slums, Low-Cost IoT, Kenya 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: *African Geographic, IoT Frameworks, Data Analytics, Wireless Sensor Networks, Community Engagement, Sustainable Development, Techno-societal Approaches*

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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