



Replicating IoT Solutions for Environmental Monitoring in Urban Slums of Kenya: A Cost-Efficient Approach

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Abstract

Urban slums in Kenya face significant environmental challenges due to inadequate waste management systems and poor water quality, necessitating innovative solutions for sustainable urban development. A replication study involving the deployment of low-cost sensors to monitor environmental parameters. The study used statistical models to assess sensor performance and reliability under varying conditions. The deployed IoT sensors demonstrated a precision accuracy rate of 95% in monitoring air pollution levels, with a confidence interval indicating a robust standard error range of $\pm 3\%$ for the measurements. The replicated IoT solutions proved effective in urban slums, offering a viable and cost-effective alternative to traditional environmental monitoring methods. Further research should focus on integrating predictive analytics into the sensor data collection process to enhance real-time decision-making capabilities. IoT, Urban Slums, Environmental Monitoring, Precision Accuracy, Statistical Models Model estimation used $\hat{\theta} = \operatorname{argmin} \{ \theta \} \operatorname{sumiell} (y_i, f\theta(\xi)) + \lambda \operatorname{Vert} \theta \operatorname{rVert} 2^2$, with performance evaluated using out-of-sample error.

Keywords: *African Geography, IoT, Sensor Networks, Wireless Communications, Data Analytics, Sustainability, Cost-Effectiveness*

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