African ICT Law and Policy (Law/Technology/Policy crossover)

Developing Precision IoT Sensors for Low-Cost Environmental Monitoring in Senegal's Urban Slums

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Abstract

Urban slums in Senegal face significant environmental challenges due to inadequate waste management systems and poor air quality monitoring. The study employed a mixed-method approach combining IoT sensor design with field testing. Sensor prototypes were designed using Arduino microcontrollers and wireless communication modules to collect data from multiple locations within the target area. A preliminary test revealed that the sensors achieved an accuracy of 95% in measuring temperature fluctuations, contributing to enhanced urban planning efforts. The results indicate that IoT technology can be effectively utilised for environmental monitoring without requiring high initial costs or sophisticated infrastructure. Further research should focus on scalability and integration with existing municipal systems to ensure sustainable implementation of the proposed solution. Internet of Things, Urban slums, Environmental Monitoring, Low-cost Sensors Model estimation used $\hat{\{}\theta\}=argmin\{\theta\}sumiell(yi,f\theta(\xi))+\lambda lVert\theta rVert2^{2}$, with performance evaluated using out-of-sample error.

Keywords: *Sudanic, IoT, Sensor Networks, Wireless Communications, Data Analytics, Geographic Information Systems, Precision Measurement*