African Transportation Engineering

# Development of Sensors and IoT Systems for Environmental Monitoring in Senegalese Mining Sites,

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## Abstract

This study addresses a current research gap in Engineering concerning Development of Sensors and IoT Systems for Environmental Monitoring in Mining Sites in Senegal. The objective is to formulate a rigorous model, state verifiable assumptions, and derive results with direct analytical or practical implications. A structured analytical approach was used, integrating formal modelling with domain evidence. The results establish bounded error under perturbation, a convergent estimation process under stated assumptions, and a stable link between the proposed metric and observed outcomes. The findings provide a reproducible analytical basis for subsequent theoretical and applied extensions. Stakeholders should prioritise inclusive, locally grounded strategies and improve data transparency. Development of Sensors and IoT Systems for Environmental Monitoring in Mining Sites, Senegal, Africa, Engineering, comparative study This work contributes a formal specification, transparent assumptions, and mathematically interpretable claims. The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** *Sudanic, GIS, IoT, Sensors, Modelling, Remote Sensing, Sustainability*