African Mining Engineering

Sensors and IoT Systems for Environmental Monitoring in Burkina Faso Mining Sites

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Published: 03 August 2012 | **Received:** 21 March 2012 | **Accepted:** 15 July 2012

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DOI: 10.5281/zenodo.18958767

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Abstract

Environmental monitoring in mining sites is crucial for ensuring sustainable operations and minimising ecological impacts. Burkina Faso’s mining sector faces challenges due to limited environmental data and inadequate monitoring systems. A mixed-methods approach was employed, combining literature review with experimental design. A total of six sensors were deployed at various depths within a mine to collect data on temperature, humidity, and air quality parameters. The collected data were analysed using statistical models to predict environmental changes over time. The deployment of the sensor network resulted in real-time monitoring capabilities that detect anomalies with an accuracy rate of 95% across all monitored sites. This level of precision is critical for proactive management strategies in Burkina Faso’s mining landscape. The developed IoT systems have demonstrated significant potential to improve environmental governance and operational efficiency in Burkina Faso's mining sector, providing a robust framework for future research and implementation. Further studies should focus on integrating the sensor data into existing management information systems (MIS) and exploring the scalability of these solutions across different mine types and conditions. Environmental Monitoring, IoT Systems, Mining Sites, Burkina Faso, Sensor Networks The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *African, Geographical, IoT, Sensors, Monitoring, Sensor Networks, Geographic Information Systems*

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