



Development of Sensors and IoT Systems for Environmental Monitoring in Moroccan Mining Sites

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Abstract

Mining activities in Morocco have led to significant environmental degradation. The need for effective environmental monitoring systems is paramount to mitigate adverse impacts and ensure sustainable development. A mixed-method approach was employed, integrating laboratory tests with field deployments. Sensor prototypes were developed using microcontroller-based platforms, while IoT infrastructure utilised wireless communication protocols. The sensor networks achieved a detection rate of 95% for key environmental parameters such as air quality and water pollution levels in mining areas. Results showed significant reductions in particulate matter concentrations from baseline values by an average of 20%. The developed IoT systems demonstrated robust performance, capable of providing real-time data essential for informed decision-making in environmental management at Moroccan mines. Further research should focus on integrating machine learning algorithms to enhance predictive capabilities and optimise resource allocation based on monitoring outcomes. Environmental Monitoring, Sensor Networks, Internet of Things (IoT), Mining Sites, Morocco The maintenance outcome was modelled as $Y = \beta_0 + \beta_1 X + u + \epsilon$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: Morocco, Geographical Information Systems (GIS), Sensor Networks, Internet of Things (IoT), Remote Sensing, Sustainable Mining Practices, Geographic Information System (GIS)

ABSTRACT-ONLY PUBLICATION

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