African Agricultural Systems Engineering

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

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Abstract

Mining activities in Egypt have led to significant environmental degradation, necessitating effective monitoring systems. A mixed-method approach was employed, combining laboratory testing with field deployment of sensor networks. Data were collected over a period of six months. The deployed sensors recorded an average temperature fluctuation range of ±2°C across the monitored areas, highlighting the need for adaptive cooling solutions in mining environments. The IoT systems demonstrated robust performance in real-world conditions, providing valuable data for environmental management and site optimization. Further research should focus on integrating predictive analytics into the monitoring systems to enhance their operational efficiency. The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Egypt, Geographic Information Systems (GIS), Sensor Networks, Internet of Things (IoT), Environmental Monitoring, Mining, Sustainable Development, Remote Sensing*

ABSTRACT-ONLY PUBLICATION

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