PROTOTYPE OF FUEL TANK AND PUMP MONITORING SYSTEM BASED ON LORA AND IOT WITH SAFE LIMIT NOTIFICATIONS IN MINING AREAS

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ABSTRACT

The mining industry faces significant challenges in managing water pumps and fuel tank capacity, particularly in remote areas with limited internet access. The temperature of pump engines and fuel tank levels are often not monitored in real-time, which can lead to damage and operational losses. This study aims to design an IoT system based on LoRa communication to monitor pump temperature and fuel tank capacity both in real-time and historically, without the need for an internet connection. The system integrates a thermocouple sensor and ultrasonic sensor, an Android application with Firebase, and historical data logging via Google Sheets. Test results show a high level of accuracy—99.93% for pump temperature and 97.33% for tank capacity. LoRa communication testing confirmed successful data transmission over a distance of up to 1100 meters. Furthermore, the system successfully sends automatic notifications when critical conditions are detected, and all test scenarios demonstrated 100% success. In conclusion, this system is effective as a remote monitoring solution for mining areas, supporting preventive maintenance and enhancing operational efficiency and safety.

Keywords: IoT, LoRa communication, pump temperature monitoring, fuel tank capacity.