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# Development of a Communication System for Underground Mining Informatization Leading to Smart Mining: A Comparison of Wi-Fi Ad Hoc and Wi-Fi Direct

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The enclosed space of an underground mining operation has issues, safety and productivity are concerns of utmost importance. As the danger increases as it goes deeper, there is a need for more technological innovation than now Smart mining is a general term for a new resource development technology that combines mining and ICT (Information and Communication Technology). As an example of smart mining, in this study, an in-situ stress monitoring system was developed, and demonstration test of the system in a mine was conducted. Wireless sensor networks (WSNs) have been proposed as a solution for environmental monitoring, worker position tracking, and additional functions. There are different types of WSN systems including "Wi-Fi" technology. This research proposes a communication system using the "Wi-Fi Ad Hoc, Direct" mode, in which data loggers and mobile terminals (i.e., smartphones) transfer data to each another. Data are transmitted from a fixed underground base unit to a worker's mobile terminal. Next, these data transferred to a data logger in the surface once the worker leaves the mine. Hence, data wirelessly transmits between the surface and underground locations. Data communication range, transfer speed, and received signal strength indicator (RSSI) in different conditions were measured to verify feasibility of the system.

*Keywords* : Smart mining, Wi-Fi technology, Communication system, Underground mining