

# WIRELESS SYSTEM FOR IDENTIFICATION BLAST AND FIRE

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## ABSTRACT

Existing physical security challenges are strongly connected to terrorist or accident blasts and may include fires. The consequences of explosions and fires are more destructive in confined spaces compared to an open air explosion due to the nature of the shock waves reflection and propagation. Critical infrastructure sites may include tunnels of different functionalities and underground structures of various applications including military as well as civil nature.

This paper describes the process of designing and constructing, including testing validation results, of the wireless system for identification of explosions and fires in real time. Physical protection of critical infrastructure requires the creation of reliable system which provides quick and accurate identification of the hazards and subsequent transmission of the alarm signal to the response and rescue services. Proposed wireless system for the identification of unauthorized blasts and fires consists of transmitter and receiver modules. A transmitter module contains sensors and a microprocessor equipped with blast and fire identification software. A receiver module produces an alarm signal and activation signal for the operation of protecting devices. The experimental validation has been carried out at the underground experimental base of G,Tsulukidze Mining Institute, Tbilisi, Georgia. The results of the testing outlined the main characteristics of the system listed below:

- No false signal generation within the series of experiments (20 experiments);
- In case of blasts, the time span between the moment of receiving a signal by the sensor and the moment of activation of a start signal is 2.4 milliseconds;
- In case of fires, the time for analyzing the potential threat of fires is selected 5 seconds;
- For reliable signal transmission distance between the transmitter and a receiver in a direct tunnel - 150m; in a tunnel with an 90<sup>0</sup> angle - 50m.

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