

AUTONOMOUS MOBILE INSPECTION ROBOTS IN DEEP UNDERGROUND MINING – CURRENT STATE OF THE ART AND FUTURE PERSPECTIVES

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In this article current State of The Art in the area of autonomously working and mobile robots for inspections used in deep underground mining and exploration was described and directions of future development has been highlighted. Increasing demand for CRM and deeper excavation pose higher risk for people and require new solutions in maintaining and inspections of both – underground machines and excavations. Mitigation of risks and reduction of accidents (fatal, serious and light) may be achieved by implementation of mobile or partly autonomous solutions such as drones for exploration, robots for exploration or initial excavation etc. The survey goes through various types of mobile, unmanned robots such as ANYmal on legs, robots on tracked chassis or flying drones. The main scope of this review was the evaluation of the effectiveness and technological advancement in the aspect of improving safety and the efficiency in deep underground and abandoned mines. Notable are multi-sensor systems possibilities or cooperative behaviors in systems which involve many robots. The study also highlighted the challenges and difficulties of working and navigating (in the environment where we cannot use GNSS or GPS systems) in deep underground mines.

Mobile inspection robots have a major role in transforming the underground operation, nevertheless there are still aspects to develop. Further improvement might focus on increasing autonomy, improving sensor technology and integration of robots with existing mining infrastructure. This might lead to safer and more efficient extraction and the SmartMine of the future.

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