

Development of an underground positioning system

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RWTH: RWTH Aachen University - Institute of Advanced Mining Technologies
TNO: Netherlands Organisation for applied scientific research

ABSTRACT:

For quite some time, there has been extensive research into different technologies for indoor positioning systems. Of these systems only a handful are suitable for employ in an underground mining environment. Especially as GPS is not available in underground environments, alternative systems need to be employed. Many of the currently available technologies lack the necessary precision and robustness needed to enable automation of mobile equipment. Modern approaches now look into combining different technologies to harness the best features of each candidate compensating for deficits of the other systems.

In the Horizon 2020 funded Real-Time Mining research project, the Institute for Advanced Mining Technologies of RWTH Aachen University together with the Netherlands Organisation for applied scientific research (in Dutch: TNO) are also conducting research in this field. The goal is to develop an underground positioning system based on the combination of inertial measurement units (IMU), ultra-wideband radio technology (UWB) and geometrical sensors. While the partner TNO is developing a new IMU system based on the TNO DriftLess technology, RWTH Aachen University is focussing on the UWB part and laser-scanners. In the end, through shrewd sensor fusion the different technologies will be combined to enable precise localisation of mobile equipment in underground environments.

Taking a closer look at the UWB technology, next to hardware and software developments, different measurement campaigns were undertaken during the time of this research project. It was found that the precision and accuracy as well as the robustness of the ultra-wideband radio technology is sufficient for the mining context. Hence, in this contribution, we will present our findings during the development of an underground localisation system for the ultra-wideband radio technology.