

EGU21-8447

<https://doi.org/10.5194/egusphere-egu21-8447>

EGU General Assembly 2021

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



A new IoT geosensor network for cost-effective landslide early warning systems

Moritz Gamperl¹, John Singer², and Kurosch Thuro¹

¹Technical University of Munich, Civil, Geo and Environmental Engineering, Chair of Engineering Geology, Munich, Germany (moritz.gamperl@tum.de)

²AlpGeorisk, Unterschleißheim, Germany (singer@alpgeorisk.de)

Worldwide, cities in mountainous areas struggle with increasing landslide risk as consequence of global warming and population growth, especially in low-income informal settlements. For these situations, current monitoring systems are often too expensive and too difficult to maintain. Therefore, innovative monitoring systems are needed in order to facilitate low-cost landslide early warning systems (LEWS) which can be applied easily.

Based on technologies such as micro-electro-mechanical systems (MEMS) sensors and the LoRa (Long Range) communication standard, we are currently developing a cost-effective IoT (Internet of Things) geosensor network. It is specifically designed for local scale LEWS in informal settlements.

The system, which is open source and can be replicated without restrictions, consists of versatile LoRa sensor nodes which have a set of MEMS sensors (e.g. tilt sensor) on board and to which various additional sensors can be connected. The nodes are autonomous and can operate on standard batteries or solar panels. The sensor nodes can be installed on critical infrastructure such as house walls or foundations. Two of the possible additions are the Subsurface Sensor Node and the Low-Cost Inclinometer. Both are installed underground and offer tilt- and groundwater-measurements of the subsurface.

Complemented with further innovative measurement systems such as the Continuous Shear Monitor (CSM) and a flexible data management and analysis system, the newly developed monitoring system offers a great cost to benefit ratio and easy application for similar sites and LEWS, especially in urbanized areas in developing countries.

This work is being developed as part of the project Inform@Risk, where the monitoring system will be installed as part of an early warning system in Medellín, Colombia. It is funded by the German Ministry of Education and Research (BMBF).