

A Low-cost Subsurface Landslide Monitoring And Early Warning System

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ABSTRACT

A LOW-COST SUBSURFACE LANDSLIDE MONITORING AND EARLY WARNING SYSTEM is described said IoT and MEMS-based system comprising of a sensing unit, data logging and thresholding unit, and an alerting unit. The sensing unit further consists of multiple nodes comprising of a plurality of sensors such that each sensor is connected to the master-microcontroller (MMC) unit, and the MMC is responsible for reading the sensor values of both Surface Sensors (SSs) and Buried Sensors (BSs). System issues alert based upon the statistical and predictive algorithms based upon the previously acquired data values. Alerts of different severity levels are generated based on the previous dataset for a range of soil movements. Simultaneously, a Global System for Mobile (GSM) service sends the sensed data over the cloud at minute-scale intervals. An appropriate depth of failure zone can be estimated from the system, which can reference the mitigation scheme for landslide disaster risk reduction.

KEY APPLICATION AREAS

- 1.Landslide monitoring and early warning.
- 2.Disaster risk reduction and emergency management.
- 3.Slope stability and geotechnical monitoring.
- 4.IoT and MEMS-based environmental sensing.
- 5.Infrastructure health monitoring.
- 6.Smart environmental monitoring systems

POTENTIAL USE

- 1.Real-time subsurface landslide monitoring using buried MEMS sensor nodes to detect soil movement and failure planes.
- 2.Early warning systems for landslide-prone regions, generating SMS, cloud-based,

and local light/sound alerts.

3. Continuous monitoring of soil and weather parameters (soil moisture, stress, temperature, rainfall, humidity, pressure, light intensity) for hazard prediction.

4. Remote monitoring and predictive analytics through GSM-enabled cloud data logging and threshold-based alert generation.

5. Monitoring of critical infrastructure such as highways, railways, tunnels, dams, and hill-side construction vulnerable to landslides.

6. Mass deployment in mountainous and high-risk regions using a low-cost, scalable sensing network for disaster mitigation.