Patent Search

Invention Title	A LOW-COST LANDSLIDE EARLY WARNING SYSTEM USING ARDUINO UNO AND IMU TILT SENSOR
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Inventor

Name	Address	Country	Nation
Teja munaga	Associate Professor, Vishnu Institute of Technology, Bhimavaram, Andhra Pradesh-534202	India	India
Mary Devika Bandaru	Assistant Professor, Vishnu Institute of Technology, Bhimavaram, Andhra Pradesh-534202	India	India
Yeswanth Paluri	Associate Professor, Vishnu Institute of Technology, Bhimavaram, Andhra Pradesh-534202	India	India
Jenu Akhil	Student, Vishnu Institute of Technology, Bhimavaram, Andhra Pradesh-534202	India	India
Inti Niharika Sri	Student, Vishnu Institute of Technology, Bhimavaram, Andhra Pradesh-534202	India	India
Pandranki Sai Naga Mahendra	Student, Vishnu Institute of Technology, Bhimavaram, Andhra Pradesh-534202	India	India

Applicant

Name	Address	Country	Nationality
vishnu institute of technology	Kovvada Rd, Vishnupur, Kovvada, Andhra Pradesh 534202	India	India

Abstract:

This invention presents a low-cost, real-time Landslide Early Warning System using an Arduino UNO microcontroller and an MPU6050 IMU tilt sensor. It continuously moni slope deformation and triggers audible, visual, and remote alarms when abnormal tilt patterns are detected. Designed for Northern Himalayan and Southern Western Gha regions, the invention provides a robust, scalable, and cost-effective approach to landslide prediction. The system supports remote communication, solar-powered operati multi-sensor scalability, enabling widespread adoption for disaster mitigation in vulnerable terrains.

Complete Specification

Description:The present invention relates to geotechnical engineering, disaster mitigation, and slope stability monitoring. More particularly, it relates to a low-cost, real-ti landslide early warning system that detects slope deformation using an Arduino-based microcontroller, an IMU tilt sensor, and wireless communication modules.
The system is intended for deployment in Northern Himalayan regions and Southern Western Ghats, where slope angles typically range from 25° to 70°, annual rainfall exceeds 1500–4000 mm, and fragile geological conditions significantly increase landslide risk. The invention falls within the domains of sensor-based monitoring, environmental safety, and community-level early warning systems. , Claims:1.
A landslide early warning system comprising an Arduino-based microcontroller, an IMU tilt sensor, and an alert unit, wherein the system detects real-time slope moveme and generates an early warning signal upon detection of hazardous conditions.
2.
The system of claim 1, wherein the IMU tilt sensor measures pitch and roll angles at a sampling rate of 50–100 Hz and transmits the data to the microcontroller.
3.
The system of claim 1, wherein the alert unit includes an audible buzzer (80–90 dB), a visual LED indicator, and a wireless communication module selected from GSM or LoRa.
4.
The system of claim 1, wherein hazardous slope activity is identified based on tilt magnitude exceeding 1°–3°, rate of tilt change exceeding 0.1–0.3° per minute, or sustair tilt trends over time.

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