Continuous Search System Algorithm for Mudslide Monitoring and Controlling Based On Wireless Sensor Network

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***Abstract*— Landslide is a general term for a wide variety of down slope movements of earth materials that result in the perceptible downward and outward movement of soil, rock and vegetation under the influence of gravity. The materials may move by falling, toppling, sliding, spreading, or flowing. Some landslides are rapid, occurring in seconds, whereas others may take hours, weeks, or even longer to develop. Mudflows (or debris flows) are fluid mass of rock, earth, and other debris saturated with water. We proposed an autonomous landslide monitoring system based on wireless sensor networks.**

***Index Terms*—About four key words or phrases in alphabetical order, separated by commas.**

I. INTRODUCTION

Landslides cause significant damages to civil infrastructure. Over the years, methods and technologies have been proposed to determine the risk of landslides and to detect hazardous slope movements. There have been increasing interests in developing and landslide monitoring systems to observe movements using sensors installed on the slope. Although providing accurate data, many landslide monitoring systems are not operating in an automated fashion and lack the ability to analyze the collected data in a timely manner. This paper presents an autonomous landslide monitoring system based on wireless sensor networks. Self-contained, autonomous software programs ("software agents") are embedded into the wireless sensor nodes.

In cooperation with each other, the software agents are continuously collecting and analyzing sensor data, such as recorded ground acceleration and the orientations of the sensor nodes along the slope. If movements are observed, the collected data sets are automatically transmitted to a connected server system for further diagnoses. The landslide monitoring system presented in this paper is remotely accessible via Internet and provides real-time information about the current state of the monitored slope. Laboratory tests have been conducted to validate the reliability and the performance of the monitoring system.

1. Falls: Abrupt movements of materials that become detached from steep slopes or cliffs, moving by free-fall, bouncing, and rolling.

2. Flows: General term including many types of mass movement, such as creep, debris flow, debris avalanche, lahars, and mudflow.

3. Creep: Slow, steady down slope movement of soil or rock, often indicated by curved tree trunks, bent fences or retaining walls, tilted poles or fences.

4. Mudflow Rapidly flowing mass of wet material that contains at least 50 percent sand-, silt-, and clay-sized particles.

5. Slides Many types of mass movement are included in the general term "landslide." The two major types of landslides are rotational slides and translational landslides.

6. Topple A block of rock that tilts or rotates forward and falls, bounces, or rolls down the slope.

II. FRAMEWORK

Predicting Rainfall-Triggered Landslides

This paper addresses those landslides caused primarily by prolonged, heavy rainfall on saturated hill slopes characterized by high permeability. Rainfall-triggered landslides may mobilize into fast-moving mudflows, which generally present a greater hazard to human life than slow moving deep-seated slides. Although most parts of the world have experienced major socioeconomic losses related to landslide activity, currently no system exists at either a regional or a global scale to identify rainfall conditions that may trigger landslides. Useful assessment of landslide hazards requires, at the minimum, an understanding of both "where" and "when" that landslides may occur. In this framework, the first-order control on the spatial distribution (the "where") of landslides is the topographic slope of the ground surface, elevation, soil types, soil texture, vegetation, and the land cover classification, while the first order control on the temporal distribution (the "when") of shallow landslides is the space-time variation of rainfall, which changes the pore-pressure response in the soil or colluviums to infiltrating water.

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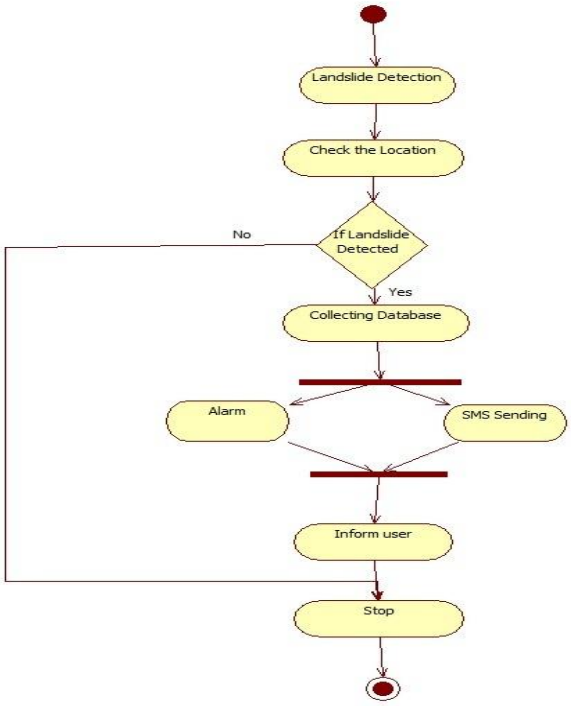
III. SYSTEM FLOW



IV. ALGORITHM

Continuous Search System Algorithm

1. Start

2. Start laser source and LDR transmitter and receiver connected to interface card with ready card.

3. Check the interface card connected to web server.

4. Check out the continuous laser transmission.

5. If laser transmission breaks then LDR transmitter stops the work.

6. Web Server generate signal and alarm system turn on.

7. Stop

V. CONCLUSION

The Early warning technologies have greatly benefited from recent advances in communication &Information technologies and an improved knowledge on natural hazards and the underlying science. Landslide are natural hazards, affecting people around the globe; Landslide are occurring more often more property damage and loss of life. Many countries have introduced alert systems aims to minimize this impact. However, it seems the systems are not always effective due to poor landslide disaster strategies and procedures. This system has proposed an appropriate automatic landslide disaster system using SMS to directly warn people in remote landslide disaster areas in developing countries, where mobile phone networks are available and there is a high level of mobile phone penetration.

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REFERENCES

[1] S. Ghosh, A. Gunther, E. J. M. Carranza, C. J. van Westen, and V. G. Jetten, “Rock slope instability assessment using spatially distributed structural orientation data in Darjeeling Himalaya (India),” Earth Surf. Process. Landforms, vol. 35, no. 15, 2010.

[2] Busslinger, M. (2009). “Landslide time-forecast methods”, HSR University of Applied Sciences Institute für Bauund Umwelt. Report, Rapperswil, Switzerland, Jan, 2012.

[3] Garcia, A., Hördt, A. and Fabian, “Landslide monitoring with higher solution tilt measurements at the Dollendorfer Hardt landslide, Germany”, Geomorphology, 120(2010).

[4] Tsai, F., Hwang, J.-H., Chen, L.-C., and Lin, T.-H.: Post-disaster assessment of landslides in southern Taiwan after 2009 Typhoon Morakot using remote sensing and spatial analysis, Nat. Hazards Earth Syst. Sci., 10, 2179–2190, doi:10.5194/nhess-10-2179-2010