International Journal of Engineering& Scientific Research
Vol.10 Issue 01, January 2022
ISSN: 2347-6532 Impact Factor: 6.660
Journal Homepage: http://www.ijmra.us, Email: editorijmie@gmail.com
Double-Blind Peer Reviewed Refereed Open Access International Journal - Included in the International Serial Directories Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gage as well as in Cabell's Directories of Publishing Opportunities, U.S.A

Literature Review of Wireless Sensor Networks in Landslide Detection

Maruthi H C
Assistant Professor
Department of Electronics and Communication Engineering
Government Engineering College
Chamarajanagara India

Abstract **- Nowadays, everyone wants to choose life safety and prevention of tragic events. planet earth may discover anytime, any dangerous natural environment, in which millions of people die and economic losses place. In India Landslide occurs due to heavy rainfall. Landslide causes loss of life, human settlement, agriculture and lead to damage of communication routes.15% of land area affects due to landslide in India. The aim of using insatiable reply to promptitude changes of data and send the realized data to receiver section where cabling is not present Wireless Sensor Network has capability of quick capturing, exchanging and dispatching of required data in real time with high resolution. Wireless Sensor Network plays significant and vital role in detection, prediction and management of debris. Different sensors like accelerometer sensors to sense the vibration and management of changes in speed. Moisture sensor to valuate volumetric water content, ultrasonic sensor, video camera, pendulums etc.**

Index Terms – Landslide, Wireless Sensor Network.

I. INTRODUCTION

Landslides are defined as the massive movement of rock, debris, or ground beneath a slope and has been associated with wide-ranging movements where falls, slides, and currents are under the influence of gravity. Landslides occur when earthquakes, floods / heavy rains, or volcanic eruptions.

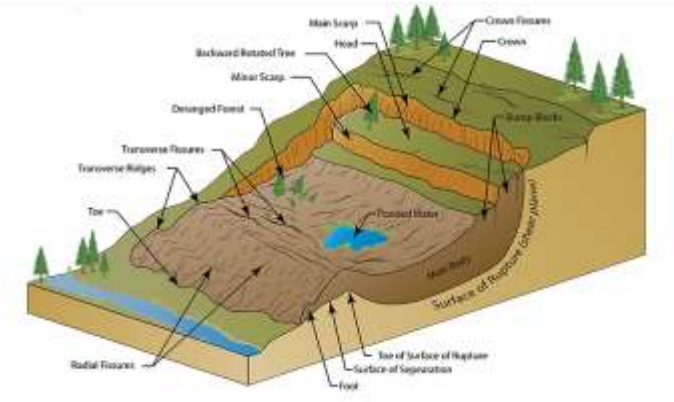

Figure 1 Features of Landslide [1]

Every year, landslides kill thousands of people and cause extensive economic damage to buildings, roads, and other infrastructure around the world. Like natural disasters, landslides are often unpredictable. Improvements in monitoring, detection, and landslides will help raise awareness of the mechanisms underlying these disasters and help researchers identify their early warning signs. Neglect requirements for slopes and other fragile earth elements (rocks and soil). When gravity exceeds the gravitational force that holds rocks and soil together, landslides occur. Conflict power can be reduced for natural or human reasons. Heavy rains or melting snow, for example, can weaken the stability of a building and ground machinery by overflowing. Earthquakes or landslides can cause landslides.

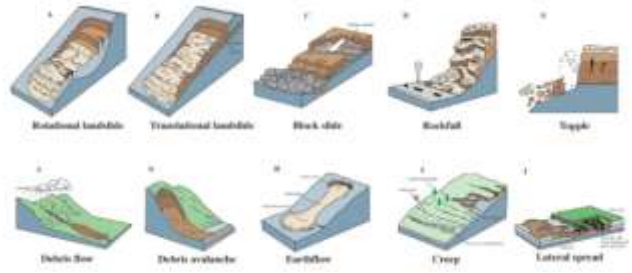

Figure 2 Major Types of Lanslide Movement [1]

Human activities, such as excavation and deforestation, can cause landslides by placing the soil at risk of overcrowding and erosion. Extreme weather and weather events, such as heavy rains, have increased in frequency and are expected to continue to increase in this century. These events can have a profound effect on people and natural systems, which can be thought of as disasters or emergencies and include severe damage to property, loss of human life, and loss and impact on plants, animals, and ecosystem services.

Remote sensitivity has been shown to be useful in various stages of disaster management, ranging from early diagnosis to long-term recovery, even in pre-event planning and mitigation planning. Optical remote sensor data has been widely used to map geographical area and landslide distribution. The most commonly used method has been to apply the crop changes to different plants between pre- and

post-events. Sudden decrease in degraded areas due to loss of crop cover. Data-based methods of polar-orbiting optical satellite have been used successfully to record landslides and to monitor long-term recovery, but may be limited to pre-event assessment because post-event image data is generally not available immediately after heavy rain events due to persistence. cloud cover.

II. Literature Review

In this section, the technologies and techniques that are used for monitoring landslides are discussed.

Zhen et al.'s [2] work gives the prospects of integrating the sensing devices with the Low Earth Orbit satellites using the 6G communication technology. This would make the data collection more comfortable and would also minimize the complexity in routing the packets to the base stations.

Ramesh et al. published paper [3] concerning the prediction of landslides in the real world used project. Explain network requirements and sensor selection and placement, as well as protocol specifications. They also share his practical knowledge of field service. Data is sent via UDP, which includes the recovery of lost packets and secure transfers. In a joint project, Azzam et al. [4] developed a prototype based prototype monitoring system in a collaborative project, the Early Floods-Based Earth Warning System. Solar power gates are used to transmit data to the base station. You have used sensor fusion, a collective resolution that displays data from all sensors. In this way, the data is validated, reaching a high level of accuracy; however, this work focuses on identification.

Rosi et al. [5] describe real-life experiences that highlight problems encountered during the dispatch phase. They identified performance differences in simulations, laboratory test sites, and actual locations. In this system, the sensors are positioned based on their characteristics, and the node bridges are placed in a stable position which extends the life of the network. In-node compression is used to distinguish between audio and real data, reducing data transfer and power consumption. One node data is related with data from elsewhere. If both data indicates the possibility of an event, the data will be transferred for decision making.

The study by Andreas Terzis et al. [6] focuses on finding a place that observes the movement of the slide and makes an accurate prediction of the smoothness of the earth. Examine their model in a laboratory test site, taking into account the many factors that cause the earth to glide. It incorporates multiple sensors into rod-shaped columns used in the form of a grid. The system identifies a smooth surface by determining the moving and moving columns. research uses a method of reducing energy consumption, by shutting down all other nerves, the only strain gauge is the opening. When he observes certain movements, he is, in effect, informing other senses. However, in this way, the system may miss important data.

In [7], Rehana Raj et al. proposed an integration and sub clustering method in which node leaders and cluster heads are used. Data transfer and power consumption are reduced by using this method. Whenever cluster heads fail, node leaders will pick up failed cluster headers, improving error tolerance. Basic based a sensory strategy is used in this activity for use sensors in different localities. Occasional data sample was also sent although no new event is taking place, consuming more power. The collection is based on the complex algorithms of the Graph-Partitioning period requiring high calculation and strength.

The work of Teja et al. [8] followed a step-by-step procedure; in the first step, the pressure change is considered, if it varies then, in the second step, the geophone is introduced again heard any vibration produced in the ground, and, for the third time step, telemeter calculates any movement that occurs. It transfers are made using the IEEE Zigbee standard clarification.

In the study [9], the Standing Disaster Warning Program was integrated with WSN. Can transmit multimedia GPS messages and links for mobile users, what you need great power; however, to monitor landslides systems are less likely to be empowered source.

The study of Tejaswi [10] proposed clustering and routing protocols for WSN, which embed dynamic-clustering based on energy level and distance from the base station. Specialized nodes having high energy levels would be the best option for minimizing the re-election computation and energy diminution. In [11], the ultrasonic signals are used to detect the movement of the land. It assigns duty cycles to the sensor nodes. This method achieves high accuracy by attaining high-level synchronization among the nodes; however, sync pulses transmission may fail.

Chang et al. [12] show the effect of distance, weather, a temporal condition on signal and transmission strength The environmental-conditions like humidity, temperature, rainy day, and sunny day also affect packet loss.

Ali et al. [13] provide a significant technical and mathematical background for designing early warning. The sensors used in the testbed were moisture, pressure, and flexible bend sensors. Shukla et al. [14] developed a prototype model for generating 2-level alerts; the first level alert is based on a single parameter, and the next level is based on the values of multiple parameters when more than one sensor

reaches the threshold value. This study considered most of the triggering parameters that influence slope stability.

III CONCLUSION

Landslides are a rare and sudden event. At the same time, a major hazard that causes damage to both infrastructure and human health. Slopes near infrastructure as well people need to be monitored by a careful and accurate person a plan to avoid such damage. As landslides are affected by a number of factors, both internal and external conditions, monitoring and predictive systems need to cover all those potential features which can contribute to the stability of slopes and cause landslides. These parameters need to be monitored and calculated real time; changes in these parameter values compel that Chances of a landslide. The accuracy of the detection model is influenced by network size and density.

REFERENCES

[1] https://janeceegavan.wordpress.com/2018/01/24/78/
[2] L. Zhen, A. K. Bashir, K. Yu, Y. D. Al-Otaibi, C. H. Foh, and P. Xiao, "Energy-efficient random access for LEO satellite assisted 6G internet of remote things," IEEE Internet of 6ings Journal, vol. 2020, 2020.
[3] M. V. Ramesh, "Design, development, and deployment of a wireless sensor network for detection of landslides," Ad Hoc Networks, vol. 13, pp. 2–18, 2014.
[4] R. Azzam, C. Arnhardt, and T. Fernandez-Steeger, "Monitoring and early warning of slope instabilities and deformations by sensor fusion in self-organized wireless AD-HOC sensor networks," in Proceedings of the International Symposium and the 2nd AUN/Seed-Net Regional Conference on Geo-Disaster Mitigation in ASEAN-Protecting Life from Geo- Disaster and Environmental Hazards, Yogyakarta, Indonesia, 2010.
[5] A. Rosi, M. Berti, N. Bicocchi et al., "Landslide monitoring with sensor networks: experiences and lessons learnt from a 12 Complexity real-world deployment," International Journal of Sensor Networks, vol. 10, no. 3, pp. 111–122, 2011.
[6] A. Terzis, A. Anandarajah, K. Moore, and I.-J. Wang, "Slip surface localization in wireless sensor networks for landslide prediction," in Proceedings of the 2006 5th International on Information Processing in Sensor Networks, IEEE, Nashville, TN, USA, 2006.
[7] T. Rehana Raj, R. V. Maneesha, and K. Sangeeth, "Fault tolerant clustering approaches in wireless sensor network for landslide area monitoring," in Proceedings of the 2008 International Conference on Wireless Networks, Las Vegas, NV, USA, 2008.
[8] G. R. Teja, V. Harish, D. N. M. Khan, R. B. Krishna, R. Singh, and S. Chaudhary, "Land slide detection and monitoring system using wireless sensor networks (WSN)," in Proceedings of the 2014 IEEE International Advance Computing Conference (IACC), IEEE, Gurgaon, India, 2014.
[9] C.-I. Wu, H.-Y. Kung, C.-H. Chen, and L.-C. Kuo, "An intelligent slope disaster prediction and monitoring system based on WSN and ANP," Expert Systems with Applications, vol. 41, no. 10, pp. 4554–4562, 2014.
[10]] K. Tejaswi, P. Mehta, R. Bansal, C. Parekh, S. Merchant, and U. Desai, "Routing protocols for landslide prediction using wireless sensor networks," in Proceedings of the 2006 4th International Conference on Intelligent Sensing and Information Processing, IEEE, Bangalore, India, 2006.
[11] M. C. R. Talampas and R. J. de Dios, "Detection of millimeter movements using ultrasonic ranging and precise time synchronization in wireless sensor networks," in Proceedings of the SENSORS, 2011, IEEE, Limerick, Ireland, 2011.
[12] D. T. T. Chang, L. L. Guo, K. C. Yang, and Y.-S. Tsai, "Study of wireless sensor network (WSN) using for slope stability monitoring," in Proceedings of the 2011 International Conference on Electric Technology and Civil Engineering (ICETCE), IEEE, Lushan, China, 2011.
[13] N. A. Ali, M. Drieberg, and P. Sebastian, "Development of wireless sensor network for slope monitoring," in Proceedings of the 2012 4th International Conference on Intelligent and Advanced Systems (ICIAS 2012), vol. 1, IEEE, Kuala Lumpur, Malaysia, 2012.
[14] S. Shukla, S. Chaulya, R. Mandal et al., "Real-time monitoring system for landslide prediction using wireless sensor networks," International Journal of Modern Communication Technologies and Research, vol. 2, no. 12, Article ID 265744, 2014.