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A SURVEY ON LANDSLIDE DETECTION

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ABSTRACT

Nowadays, everyone wants to prefer safety in life and the prevention from catastrophic events. planet earth may get hit at any time, any place by any natural perilous, where billions of peoples died as well as economic loss takes place. These events cannot be stopped, but using some innovative techniques these losses may be avoided. Among these one of major natural hazard is landslide. There are different techniques used for landslide detection, this paper used wireless sensor network technique .WSN is used in interim and emergency region for development of real-time monitoring system. This this proposed system also explains geophysical sensors for detecting the change in pore pressure and moisture content with warning system developed for landslide detection.

Keywords: Landslide, WSN, Geographsical Sensor, Accelerometer Sensor, Humidity Sensor, Moisture Sensor.

I. INTRODUCTION

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 realised data to receiver section where cabling is not present WSN has capability of quick capturing ,exchanging and dispatching of required data in real time with high resolution.

WSN 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.

II. PROPOSED SYSTEM

Proposed system consist of zigbee modules for remote correspondence and three sensors for information collection sensors used in this system consist of soil moisture sensor, Humidity sensor and Accelerometer sensor. Warning sensors are installed at remote location with get activated when sensors values exceed prescribed limit.

LPC 2148 microcontroller collects the information through various sensors and monitors it. When the collected information is transmitted to the monitoring system. It has diverse sensors for example soil moisture sensor, Accelerometer sensor, Humidity Sensor.

Various diverse parameters for example dampness in air, soil moisture and soil movement are monitored using these sensors. These sensors works in coordination with ARM7 controller to provide the real time data. It is very important to develop a system which can safe many lives. Early detection of landslide can be carried out by using premethods such as visual surveying and instrumentation. Each of these has its own advantages and disadvantages and application range.

Ground based visual inspection is one of the most effective way of monitoring landslide. Real time monitoring of landslide is difficult due to some factors which are availability of power to be supplied to the sensors and installation of sensors on the working area. Hence to overcome these problems wireless sensing network comes into role.

The main advantage of this system is that there is no need to provide a wired transmitting lines from sensors to monitoring units.

III. COMPONENTS

Landslide: A landslide is a catastrophic event where a block of earthen mass slides downhill.

It Causes significant loss of life and billions of dollars in each year.

WSN: The wireless sensor network technology is used in accidental and emergency region to developing large scale system for real-time monitoring.

Accelerometer Sensor: An accelerometer is a transducer that is used to measure the physical or measurable acceleration tha is made by an object.

Moisture Sensor: Soil moisture sensor measure the volumetricwater content in soil.

Humidity Sensor: Humidity is the presence of water vapor in air.

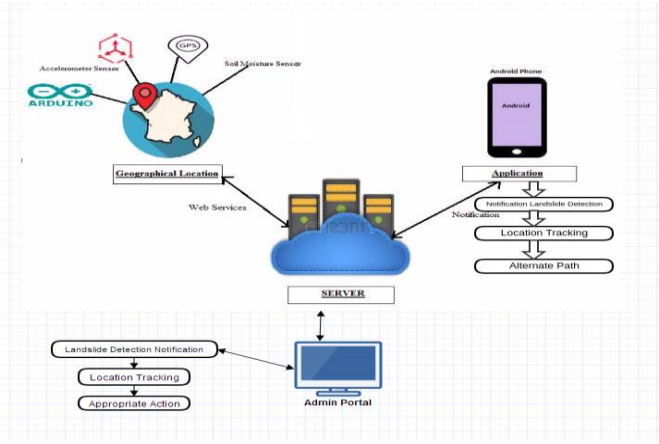

Figure 1 ARCHITECTURE DIAGRAM

Functionality:

1. Registration and Login.
2. Real time landslide detection using sensors Accelerometer, Soil Moisture, Load Cell (Hardware Requirements).
3. Prediction of a landslide (Based on sensor values).
4.Notify user about landslide & LEDs to glow as an indication.
5. Location tracking of the landslide (Geographical locations of sensors places at particular geographical locations), & suggesting alternate paths.
6. User should enter Source and Destination for system to provide with alternate paths.

IV. LITERATURE SURVEY

Various authors have proposed and discussed much advancement in educational field using technology that has helped in improving educational field.

1. **Publication :** International Conference on Sensor Technologies and Applications,2009,Kerala, India

Findings: This paper discusses the elevation and proficiency of an actual field deployment of WSN based landslide detection system. This system uses Wi-Fi, heterogeneous network and satellite terminals for efficient delivery of real time data to data management. It is also used to provide landslide waring and risk assessment to unoccupied of the region.

1) **Publication:** International Research Journal of Engineering and Technology (IRJET) Feb -2016, Pune, India.

Findings: This paper describes the uses of zigbee technology for wireless connection and ARM7 microcontroller.

2) **Publication:** IPASJ International Journal of Electronics & Communication (IIJEC) India,Oct 2014, Kashti, Maharashtra,India.

Findings: This paper introduced three types of sensors i.e. angle, liquid ,temperature Sensor.LPC Arm processor are connected to all nodes of sensors. LPC 2148. Microcontroller is used which is based on 32b ARM Processor.

3) **Publication:** Central Institute of Mining and Fuel Research, Jharkhand India.

Findings: The power of wireless sensor network used for real time monitoring system. In previous work WSN is one of the emerging areas which are extensively being used for development of real time monitoring system.

This paper discuss about development of a wireless sensor network to detect landslides, which includes design and development of WSN for real time monitoring system. In this paper three monitoring techniques are used. That are vi,visual,surveying and instrumentation.

4) **Publication :** International Conference on Communication and Signal Processing, April 2016, India

Findings: This paper used Arduino based data which acquistic system with geophone network. This paper mainly speck on network design and algorithm used identifying the characteristics of detecting landslide or signals.

5) **Publication:** International Conference on Technologies for Sustainability. Engineering, Information Technology, Management and the Environment Nov 2015,Jalna, India.

Findings: This paper states monitoring the hazard landslides and by measuring the parameters related to landslides the hazard is pre-warned before it occur. This paper is denote the pre-landslide alert system using wireless sensor networks, where data transmission is done by GSM module.This system collects data with wireless sensor network and transfers that data wirelessly using Zigbee.

6)**Publication:** International Conference on Circuit, Power and Computing Technologies.
Findings: This paper presented the implementation of the low cost energy harvesting powered wireless sensor network for landslide detection system. This system uses the solar energy harvest for the providing supply to the sensor. This system uses the super capacitor for harvested energy storing purpose. All this system handled by the base station.

7) **Publication :** International Conference on Communication and Signal Processing, April 6-8, 2016, India
Findings : This research introduced a new smart geophone sensor network with enhanced signal processing capability. A simple and cost effective Arduino based data acquisition system using geophones is developed thus reducing the energy consumption of the system. The smart geophones have the on-site processing capability, which avoids the unwanted data transmission. The interference of different types of noise leads to fault detection. The experimental setup is developed by using the smart geophone sensor network in real- time environment and various ground vibration signals such as footstep signals, vehicular signals and weight drop signals are identified. The features of various ground vibration are extracted and can be used for the effective removal of noises from the landslide signal. In this paper an efficient algorithm for the detection of landslide events is proposed. The proposed correlation technique improves the accuracy of the signal by eliminating different noises. Therefore, the multilevel processing will help to improve the efficiency of the overall system.[8]

8) **Publication :** International Conference on Communication and Signal Processing, April 6-8, 2016, India
Findings: Landslide know as geological phenomenon that causes down slop function of slop.In this process,the sensor module detects the viabration of natural heartbreaking from land after that it will send data to monitoring station through RFID module.

Wireless sensor network can be used in Proposed architecture for landslide Prediction so that it could be help in prevent these loss.

V. RESEARCH PAPER

S no.	Name of Paper	Published Date	Author Name
1	Real-time Wireless Sensor Network for Landslide Detection.	2009	Maneesha V.Ramesh
2	Landslide Detection and Warning System using WSN	2016	Mr.pranav pravin Garje Mr.Sagar Balasaheb Bawche Mr.Vaibhav Pandurang Mr. Suyog.S.Shah
3	Landslide Warning System using Wireless Sensor Network	2014	Mrs. Dhole Minakshi Subhas, Prof. More P.C. Prof. Kharade S.N.3
4	Detection of Landslide Using Wireless Sensor Networks	2012	P. K. Mishra, S. K. Shukla, S. Dutta,
5	Smart Geophone Network for effective Detection of landslide induced geophones signals	2016	Deekshit V.N Maneesha Vinodoni Ramesh Indukala P.K G. Jayachandran Nair
6	LANDSLIDE PRE-WARNING SYSTEM BASED ON WIRELESS SENSOR NETWORK USING ZIGBEE – A REVIEW	2015	Kuldip R. Jagtap1, Sunita P. Aware2
7	Smart Autonomous Self Powered Wireless Sensor Networks Based Low-Cost Landslide Detection System	2015	S. Karthik K. Yokesh Y.M.Jagadeesh R.K.Sathiendran

VI. CONCLUSION

The proposed work is for monitoring the hazard of landslides and by measuring the parameters related to landslides. In proposed system hazard was pre warned before it occurs. The proposed system based on sensors which collect data and transfers it to the server for further analysis in order to give a quick response. If any possibility of

occurrence of hazard was noticed to given users through the android application with an alternate route by taking the input of source & destination.

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[8] Satishkumar Chavan; Shobha Pangotra; Sneha Nair; Vinayak More; Vineeth Nair,"*effective And Efficient Landslide Detection System To Monitor Konkan Railway Tracks*" 2015 International Conference On Technologies For Sustainable Development (ICTSD), Year: 2015, Pp:1 – 6.

[9] Daniel Petrisor; Cristian Fosalau; Cristian Zet, "*Remote measurement and surveillance grid for landslide risk assessment and mitigation*" 2015 38th International Conference on Telecommunications and Signal Processing (TSP), Year: 2015Pp: 1 – 5.