A Survey on Landslide Detection Using Sensors and an Android Application

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ABSTRACT*:* Landslides can be caused by earthquakes; rainfalls and human activity among other reasons are responsible for multi-hazards. The main challenge in detecting landslides is that there are no physical sensors that would detect Landslides directly. We developed a complete system for landslide detection within a minimum time in various areas using sensor network. We are also doing a predictive analysis for saving lives in a landslide. Sensor network will capture data like soil displacement, rainfall, moisture level in soil etc. and use for prediction of a landslide. The system will take this data for analysis purpose and send an alert if the landslide is detected or recognized. Our system is also showing a real-time reading of monitoring of the area. Continuous monitoring by the sensor and collected data will be used for predictive analysis. The experimental result shows that; our approach gives more accurate result in landslide detection.

KEYWORDS: Landslide, Arduino, Bluetooth, GPS, Soil Moisture Sensor, Load Cell, Accelerometer Sensor, WSN.

I. INTRODUCTION

Environmental disasters are largely unpredictable and occur within very short spans of time. Landslides are the major cause of loss of life, human settlements, agriculture, forest land, and lead to damage of communication routes. The term landslide describes many types of downhill earth movements ranging from rapidly moving catastrophic rock avalanches and debris flows in mountainous regions to more slowly moving earth slides. Therefore technology has to be developed to capture relevant signals with minimum monitoring delay. Wireless sensors are one of the cutting edge technologies that can quickly respond to rapid changes of data and send the sensed data to a data analysis center in areas where cabling is inappropriate.

Wireless sensor network (WSN) technology has the capability of quick capturing, processing, and transmission of critical data in real-time with high resolution. However, it has its own limitations such as relatively low amounts of battery power and low memory availability compared to many existing technologies. It does, though, have the advantage of deploying sensors in hostile environments with a bare minimum of maintenance. This fulfills a very important need for any real time monitoring, especially in hazardous or remote scenarios. Another important is an android, as we know that today, Android plays a vital role in human's life because of its features like mobility, availability etc.

In proposed system, the user will register & then login by an android application. Soil moisture sensor, Accelerometer sensor, Load cell will be placed on proposed geographical location to monitor the real time data. Based on sensor values prediction of the landslide will be shown on the android application. If landslide detected, the application will notify the user about it & LEDs will be glow as an indicator. Also, the application will track Landslide location & will suggest an alternate path. For that, the user needs to give input of Source & Destination.

II. MOTIVATION

Landslides claim thousands of lives and cause considerable economic damage to buildings, roads, and other infrastructure around the world. As natural hazards, landslides are largely unpredictable. Early warning signs help people to minimize the impact of natural hazards. The main motive is early detection of landslide saves lives, economics damages with the help of Accelerometer, Soil Moisture, Load Cell (Hardware Requirement) we can predict landslide based on sensor value. And notify a user about landslide and suggest alternative path based on source and destination.

III. PROPOSED SYSTEM

The main focus of this work is improving the accuracy of real-time disaster detection. Sensors gives input data values to the Arduino and this data is sent to the server which analysis the data values and react on it and thus gives a quick decision and provide the notification to the Admin Portal as well as the User Portal. Admin Portal then notifies it to the Emergency Services such as Ambulance, Police, Hazard Management Officials, etc. which provides help in critical situations and take appropriate actions. User Portal is nothing but the Android Based Application which is secured with login credentials and is needed to be connected with internet connection through which application can be accessed and user can get notification and can get suggestion of alternative path by giving input of source and destination.

The proposed system mainly is classified into four parts:
1. Geographical Location
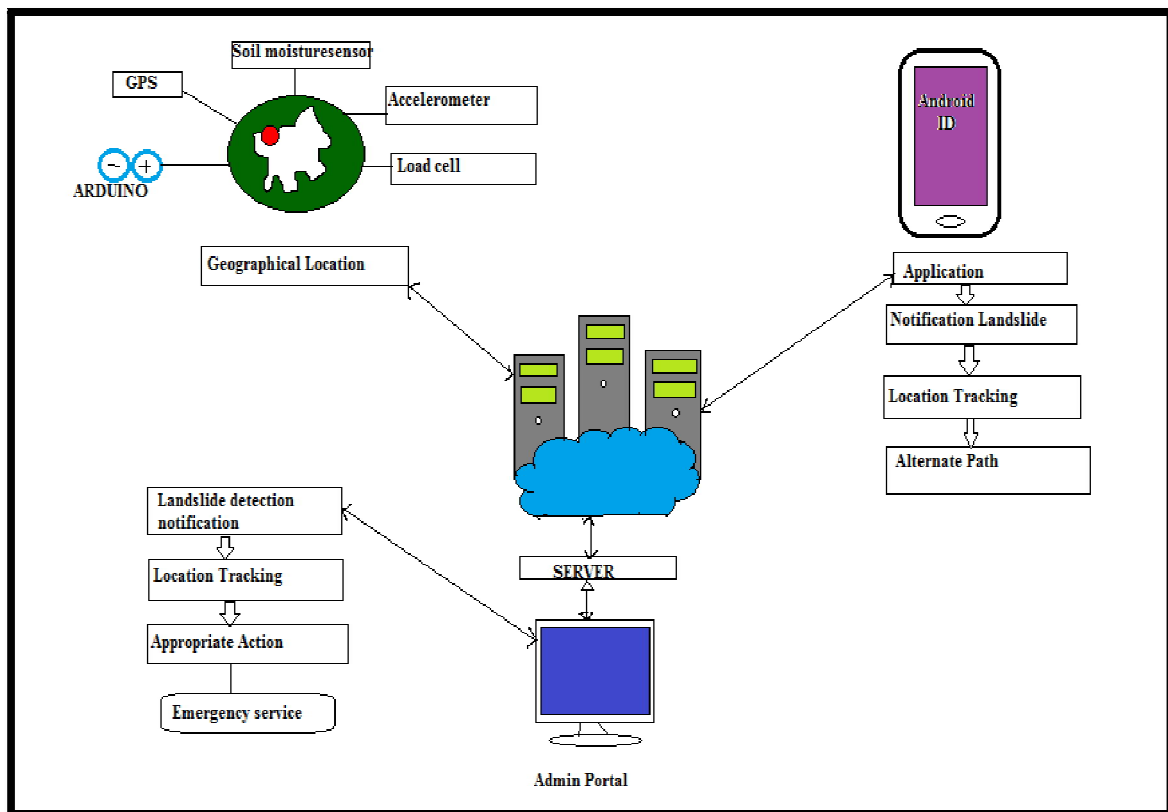2. Server
3. Admin Portal
4. User Portal

Fig.: Proposed System Architecture

IV. CONCLUSION

Hence the proposed work is for monitoring the hazard of landslides and by measuring the parameters related to landslides. If any possibility of occurrence of hazard was noticed then the hazard is pre-warned before it occurs to the users through an android application with an alternate route by taking the input of source & destination.

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