Topic: Landslide Prediction and Prevention

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Task 1:- Research the problem statement

## 1.1 Problem Statement Understanding-

Landslide is a natural disaster damaging the social life every year. It can be defined as the movement of mass of rock, debris down a slope.

It occurs due to natural or manmade activities.

It is quite urgent to understand landslides to predict their occurrences and behavior, and then to adopt appropriate prevention policies and methodologies. The prevention of an incipient or potential landslide requires the recognition of the landslide and investigation of landslide-related information. Then, the region where a landslide is prone to occur in the future is predicted. Finally, the anticipation of the character and magnitude of movement may occur . Therefore, common landslides prevention techniques can be divided into two categories: *detection* and *prediction*.Reliable early warning systems can be used to predict the short-term behavior of landslides for preventing sudden events. Once emergency warnings are issued, people can take action before the disaster occurrences. An effective approach for achieving early warnings of landslides is to establish quantitative models of landslide evolution processes. The modeling of landslides is based on continuous monitoring of landslide-related variables[2].

Recently, as a consequence of human disturbance (e.g., deforestation, mineral mining, and intensive exploitation of land for construction) and extreme weather, the frequency and intensity of landslides have increased dramatically. With the advent of extreme natural events, the prevention of landslides has become an urgent task. landslides prevention involves an assessment of slope instability phenomena and the change in the occurrence of slopes by means of effective geological engineering principles and other existing and emerging technologies. landslides prevention can provide valuable information for government agencies, planners, decision makers, and local landowners to make emergency plans that reduce the negative effects on economics and human life

Fast and errorless detection of landslides is vital for rapid damage assessment and supporting disaster management activities and simultaneously increases the efficiency of disaster mitigation.
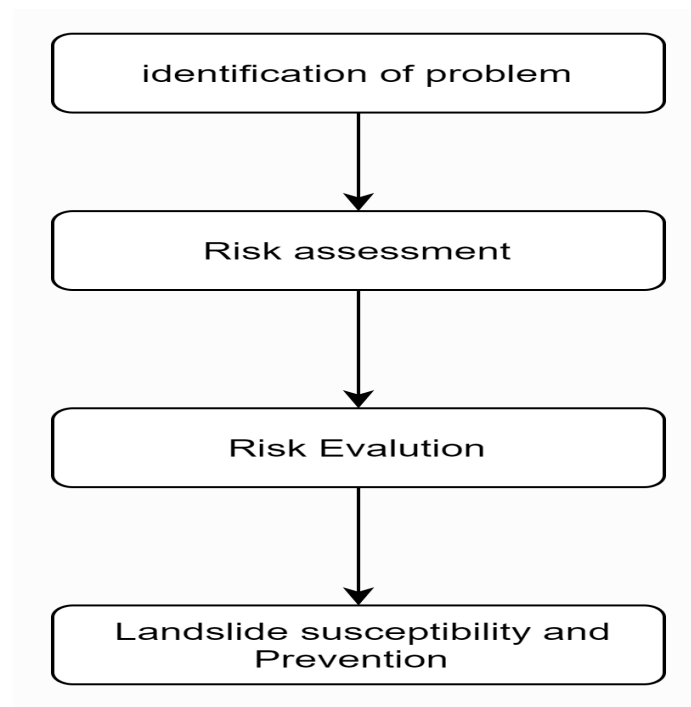
The proposed system uses soil moisture and accelerometer sensors. Moisture sensor readings are indicative of the
moisture content in the soil whereas accelerometer checks movement of land. The readings crossing the defined thresholds give alarm to
local citizens to safeguard themselves[3].

1.2 List of Components:

1.LCD Display
2.Arduino
3.Vibration Sensor SW-420-   A vibration sensor is a device that measures the amount and frequency of vibration in a given system, machine, or piece of equipment[4].
4.soil moisture sensor - The Soil Moisture Sensor is used to measure the volumetric water content of soil[5].
5.GPRS or Bluetooth module

1.3 Additionals and Updates

1.Blynk is the most popular IoT platform for connecting devices to the cloud, designing apps to remotely control and monitor them, and managing thousands of deployed products.

2.Also, additional ms time is required to upload data from raspberry pi to ThingSpeak cloud. where one node consist of one soil moisture and one accelerometer. As the system uses raspberry pi at the monitoring

center, machine learning can be implemented in the system through python programming in future work.

1.4.1 Advantages:

1. Landslide hazard analysis and mapping can provide useful information for catastrophic loss reduction, and assist in the development of guidelines for sustainable land use planning.
2. If we used Raspberry Pi (Rpi)
    -The Raspberry pi is interfaced with a laptop to display the SAFE, MIDDLE and DANGER zones
3.Rapid Assessment

1.4.1 Applications -

1.Preserving vegetation

2.modifying slope geometry

3.highly landslide prone Konkan railway line

1.4.3 Challenges-

 -Landslides, of slip/cast type, dynamics are mainly characterised by a sudden solid to fluid transitioning during heavy rain events. This feature makes them rather difficult to predict and therefore remains a major threat to nearby populated valleys[3].

1.5 Conclusion:

In this *I* research about the problem statement of landslide prevention and prediction.So here I concluded that Reliable early warning systems can be used to predict the short-term behavior of landslides for preventing sudden events.Also familiar with the component that are going to used in this project.and recognize what are the challenges and future scopes in this project.

1.6 References:

[1] Pawar, Pitambar & Patil, Akshay & Rathod, Hardik & Hadale, Ravi & Kharche, Shubhangi. (2019). IoT Based Landslide Detection and Monitoring.

[2]Y. Lami, G. Nocera, D. Genon-Catalot, A. Lagreze and N. Fourty, "Landslide prevention using a buried sensor network," 2016 IEEE Radio and Antenna Days of the Indian Ocean (RADIO), 2016, pp. 1-2, doi: 10.1109/RADIO.2016.7772030.

[3]@inproceedings{inproceedings,author = {Pawar, Pitambar and Patil, Akshay and Rathod, Hardik and Hadale, Ravi and Kharche, Shubhangi},year = {2019},month = {05},pages = {},title = {IoT Based Landslide Detection and Monitoring}}

[4]Wilson, J. (2021, May 20). *Soil Moisture Sensor Library For Proteus*. The EngineeringProjects.https://www.theengineeringprojects.com/2020/07/soil-moisture-sensor-library-for-proteus.html.

[5]Nasir, S. Z. (2021, May 28). *Vibration Sensor Library for Proteus*. The Engineering Projects.https://www.theengineeringprojects.com/2016/08/vibration-sensor-library-proteus.html