

**Name:- Gauri Karale**

**ETRX/D11B/28**

## **IOT based landslide prediction and prevention**

### **TASK 1:- Research the problem statement**

#### **1.The problem statement understanding:-**

A landslide also known as landslip, is a geological phenomenon which includes variety of processes that results in the downward and outward movement of slope-forming materials including rock, soil, artificial fill, or a combination of these. It occurs majorly due to rainfall and in coastal and mountainous areas. The various types of landslides can be differentiated by the kinds of materials involved and the mode of movement. It is very essential to monitor such natural hazard beforehand to avoid the loss of life and property costs afterwards.

In current existing system safety measures are taken only after landslide occurred. Also it needs human help for checking position to detect whether fall can occur not.

So for this we are going to build a solution which will monitor the surface and will give signals if it predicts any danger and in this way the landslide can be prevented. IOT based technology has the capacity of large scale deployment and real time detecting of landslide losses, it can detect the slightest movements of ground or slope instability due to several reasons. A system can be built using IOT networking is used that helps updating information and various vibration and moisture sensors are used. Microcontroller takes the information and updates it on the webpage.

Effect of landslide:

Loss of lives

Weakens the slope and it becomes more prone to further landslides

Damage of properties

Economic loss

#### **2. Software and hardware requirement:-**

Hardware:

Vibration sensor: Vibration Sensor Module SW-420 is a high sensitivity non-directional vibration sensor module that features an adjustable potentiometer, a vibration sensor, and a LM393 comparator chip to give an adjustable digital output based on the amount of vibration.

- Operating Voltage: 3.3V to 5V DC
- Operating Current: 15mA

Soil moisture sensor:

IP68 water proof casing

LoRaWAN coverage required

4000mAh Lo/soCL2 non-rechargeable battery for longterm use

ATmega8 (CU05)

It is low power CMOS 8bit microcontroller based on the AVR RISC architecture.

It achieves throughputs approaching 1 MIPS per MHz.

Moisture stripes (SN 23)

Range – 25°C ambient temperature unless otherwise specified. Single phase, half wave, 60 Hz, resistive or inductive load.

GPRS modem

Regulated power supply (PS01)

Buzzer (HM16)

Software:

Arduino IDE:

The Arduino Integrated Development Environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in functions from C and C++. It is used to write and upload programs to Arduino compatible boards, but also, with the help of third-party cores, other vendor development boards.

Python :

Python is an interpreted, object-oriented, high-level programming language with dynamic semantics. Its high-level built-in data structures, combined with dynamic typing and dynamic binding, make it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components together. Python's simple, easy to learn syntax emphasizes readability and therefore reduces the cost of program maintenance. Python supports modules and packages, which encourages program modularity and code reuse. The Python interpreter and the extensive standard library are available in source or binary form without charge for all major platforms, and can be freely distributed.

### **3.Additions and updates:-**

Following are some of the points that can be of help to increase the efficiency of the proposed system.

- To analyze the proper performance of the developed system weather stations can be built one for each cluster node, so it can be analyzed more efficiently.
- Various ranges can be given to sensors so that the reading can be more accurate like if the reading is between a particular value then it is safe , if it exceeds it then alert and if it reaches the maximum then there is danger.

### **4. Applications, Advantages and Challenges:**

#### **Application**

- Landslide prone zones gets early warning which makes it easier to evacuate people and animals safely.
- As much as possible precautions can be taken to save properties and vehicles.
- Proper arrangement can be made so that a havoc can be avoided.

#### **Advantages**

- Help saving number of lives and prevent loss of life.
- Helps updating information on the internet.
- Help notify the residents about the coming disaster.
- Helps sensing changes in geological parameters like soil moisture, vibrations, etc.

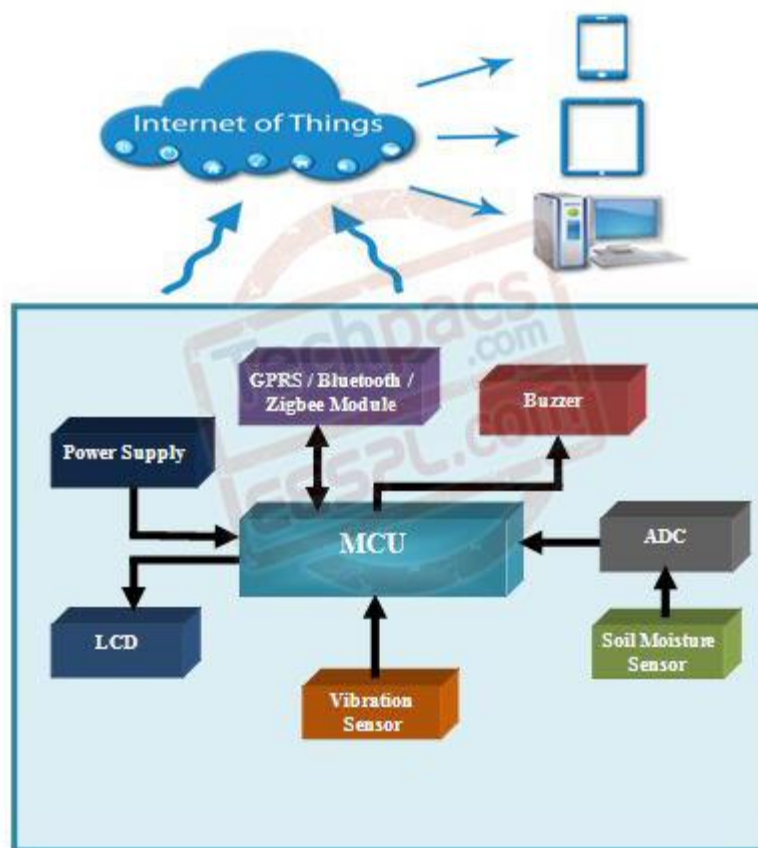
#### **Disadvantages**

- Needs good internet connection.
- Delay efficient.
- If loses its connectivity, human interference can be required.

### Challenges

- The system can be a bit unreliable due to the disadvantages mentioned above.
- Also the sensors can sense or detect the vibrations caused manually or water poured manually , so it can be a reading failure.
- Components should be easy to maintain.

### DIAGRAM



### 5. Conclusion:

This IOT based network will efficiently use the proposed system and also the capability and usability of wireless sensor network in critical and emergency application. Monitoring such natural occurring

of disaster is challenging and needs precise result which can be obtained by updating few changes and proper maintenance.

## **6. Reference:**

1. <https://pubs.usgs.gov/fs/2004/3072/fs-2004-3072.html>

2. IOT Based Landslide Detection & Prevention System - IJARIE <http://ijarie.com> › AdminUploadPdf › IOT\_based\_...