INTERNSHIP TITLE: **LANDSLIDE PREDICTION**

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INTRODUCTION :

Existing Problem :

Landslides are a natural disaster damaging 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. Asia was found to be the most affected continent where 75% of landslides occurred. India also faced the loss of humans due to landslides which occurred last year during monsoon in kerala. The main aim of the proposed system is to detect those

conditions which lead to the occurrence of landslides and notify it well before time so that necessary steps can be taken to reduce or save human loss.

A Landslide, also known as a landslip, is a geological phenomenon that includes a wide range of ground movements. Monitoring is essential to predicting the behavior of landslides and forecasting which storms can trigger large numbers of landslides. This can help save a number of lives and prevent loss of life and property as people will be aware of the upcoming danger slide and can take necessary steps for safety.

Landslides are a geographical disaster that occurs in a short period due to the variations in environmental actions and causes damages in human lives, properties of agriculture. During the rainy season, unlike divisions of India are affected by the landslide natural hazard every year.
IOT based technology has the capacity of large scale deployment and real time detecting of landslide losses.
IOT based networks detect the slightest movements of ground or slope instability due to the several reasons such as dielectric moisture, pore pressure and so on that may occur during a landslide.

Overview :

The aim of the system is to determine the probability of slope failure in terms of Landslide sucsceptibility mapping along a road section using moisture sensor, vibrational Sensors and wireless sensor networks(WSN) like wifi module and programmed with Arduino. It helps in ensuring safety for humans to alert them from landslides.

Purpose :

To reduce the losses caused to oth human and the city cused by the natural calamity landslide, by predicting its occurance.

LITERATURE REVIEW :

Landslides : A landslide is defined as the movement of a mass of rock, debris, or earth down a slope. Landslides are a type of "mass wasting," which denotes any down-slope movement of soil and rock under the direct influence of gravity. The term "landslide" encompasses five modes of slope movement: falls, topples, slides, spreads, and flows. These are further subdivided by the type of geologic material (bedrock, debris, or earth). Debris flows (commonly referred to as mudflows or mudslides) and rock falls are examples of common landslide types.

Almost every landslide has multiple causes. Slope movement occurs when forces acting down-slope (mainly due to gravity) exceed the strength of the earth materials that compose the slope. Causes include factors that increase the effects of down-slope forces and factors that contribute to low or reduced strength. Landslides can be initiated in slopes already on the verge of movement by rainfall, snowmelt, changes in water level, stream erosion, changes in ground water, earthquakes, volcanic activity, disturbance by human activities, or any combination of these factors. Earthquake shaking and other factors can also induce landslides underwater. These landslides are called submarine landslides. Submarine landslides sometimes cause tsunamis that damage coastal areas.

SENSORS :

1) Arduino Microcontroller
2) SOIL MOISTURE SENSOR
3) VIBRATIONAL SENSOR
4) ATMEGA 328 MICROCONTROLLER
5) MEMS ACCELEROMETER

Software :

Proteus: The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards.

Arduino Microcontroller : it is a open source computer hardware and software company, project and user community that designs and manufactures kits for building digital devices and interactive devices that can sense and control the physical world. Arduino boards cand be purchased or can be designed. The arduino board required for this project is

Microcontroller: ATmega328

Soil Moisture Sensor : it is an electronic brick is an electronc module which can be assembled like lego bricks Simply by plugging in and pulling out. Compared to traditional universal boards and circuit modules Assembled

wih various electronic components,which help in detecting the misture content in the soil. The control board can get the moisture value or threshold in the soil via analog or digital pins.

VIBRATION SENSOR : A piezoelectric effect to measure the pressure uses the acceleration, strain or force by converting them to an electric charge.It exploits the piezoelectric property of the piezo electric crystals.the piezoelectric effect could be direct in which the electric charge develops or indirect piezoelectric effect in which a In which a mechanical force such as pressure develops due to the application of an electric field.

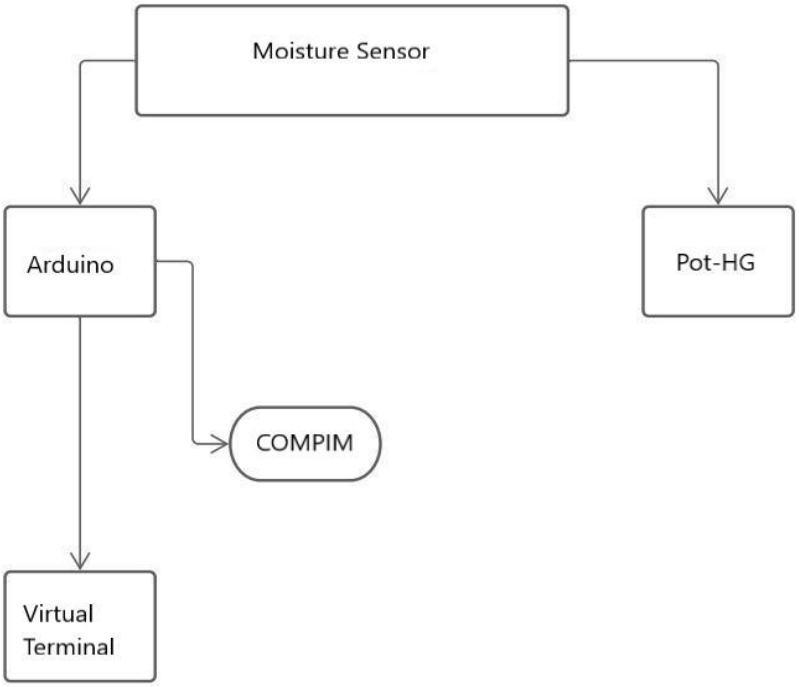
TEST SETUP :The power supply is applied to the microcontroller generally the the preferred microcontroller is arduino. We have to uload Water level detector program to the arduino and open the serial plotter from the arduino. The components are placed in the dot board and soldered according to the circuit diagram. The power supply is given to Vin port. The positive of level sensor is connected to Vcc port.

For the Node 2 we use arduino as microcontroller. We have to upload vibrational detector program to the rduino and open the seria plotter from the arduino tool list . then we have to burn the program to arduino. The components are placed in dot bord and soldered according to the circuit diagram. The power supply is given to Vin port. The positive of vibration sensor is connected to the vcc port.

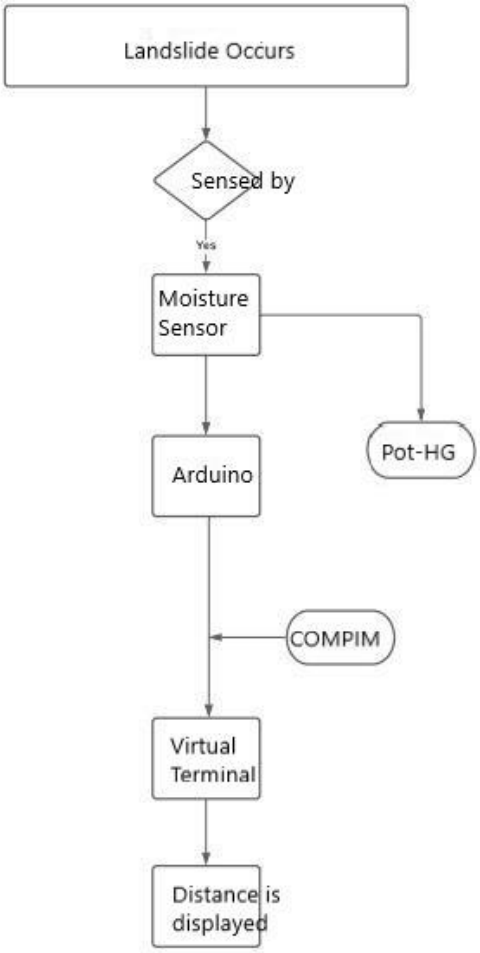
We have to set the location of the kit in thingspeak portal. The kit connects with port through wifi module. The level sensor shows te rise in water level and the result are obtained in the form of graph.

PROPOSED SOLUTION :

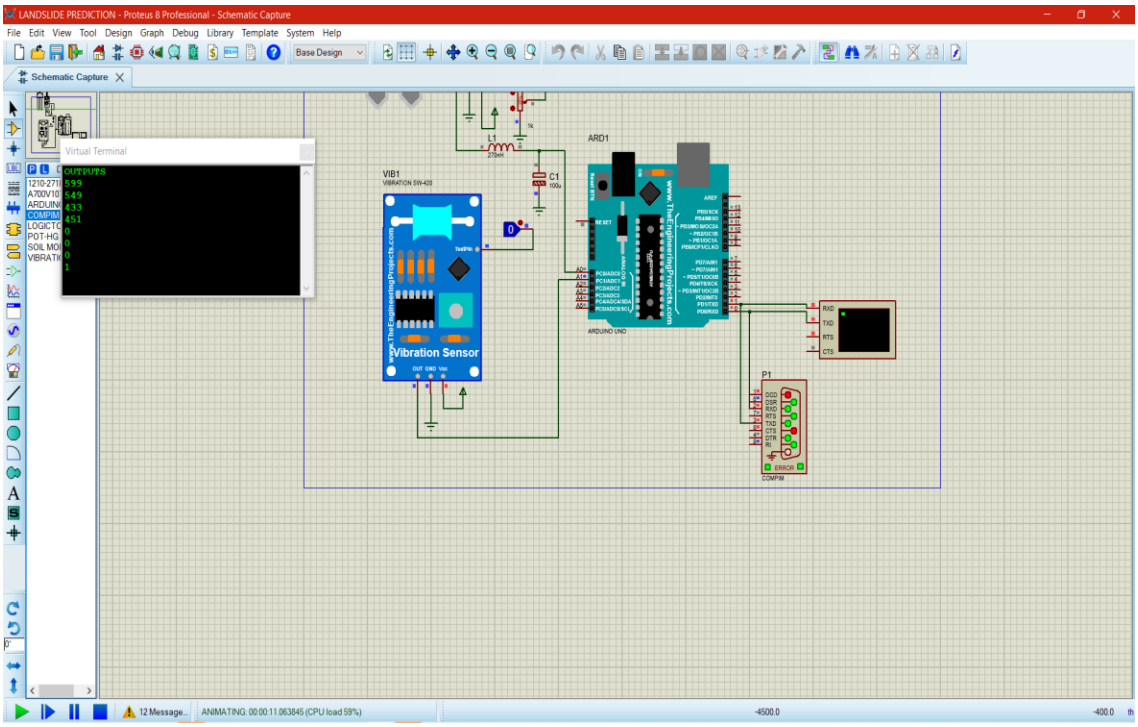
BLOCK DIAGRAM:

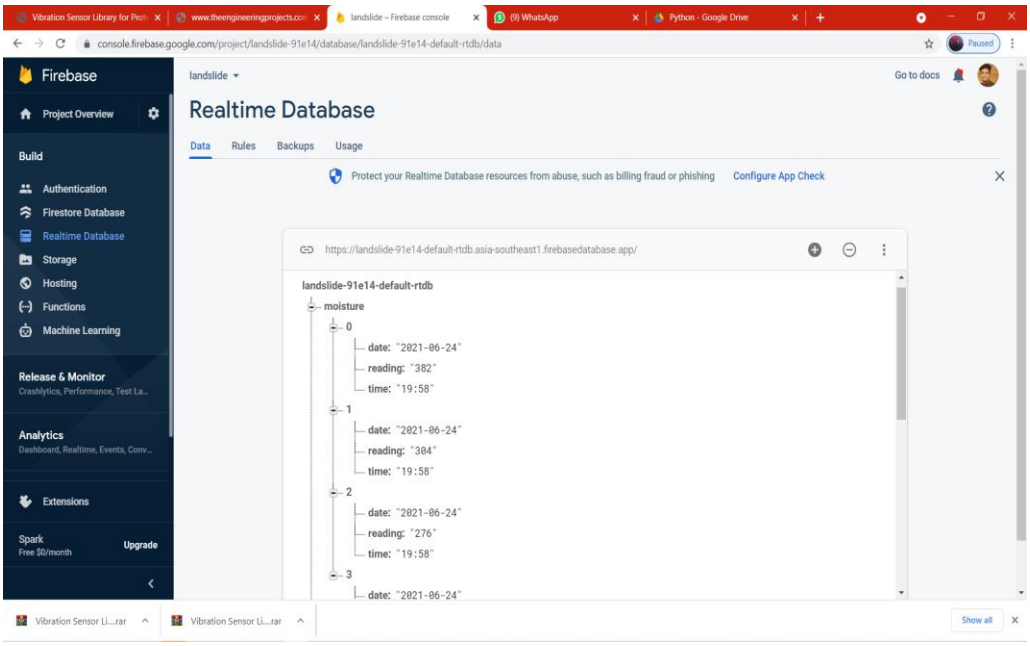


FLOW CHART:


Landslide Occurs
Sensed by
Yes
Moisture Sensor
Pot-HG
Arduino
COMPIM
Virtual Terminal
Distance is displayed

RESULT :





LINK OF WEB APPLICATION : https://adoring-ptolemy-bdf6d8.netlify.app/

ADVANTAGES:

1) Helps in preventing human loss by evacuating the affected area by predicting the landslides.

2) Can help in saving economy of the country.

DISADVANTAGE:

1) Can have loss of time by false predictions.
2) The accuracy of the system is not 100%

APPLICATION:

1) Can be used by Meteorological Department to have proper security measures

LEARNING OUTCOMES:

1) From this internship I learnt about how to approach the problem while doing something.
2) How to look about relevant sources on the web.
3) How to work on deadline-based tasks.

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Appendix:

Arduino code:

```
int i,j,moistvalue,vibrationvalue;

void setup() {

Serial.begin(9600);

Serial.println("OUTPUTS");

}


void loop() {
```

```
 delay (5000);
 for (i=0;i<4;i++)
 {moistvalue=analogRead(A0);
 Serial.println(moistvalue);
 delay(500);
 }
 for (j=0;j<4;j++)
 {
  vibrationvalue=digitalRead(A1);
  Serial.println(vibrationvalue);
  delay(500);

  }

}
```

WEB APPLICATON CODE :

```
<!DOCTYPE html>
<html>
<head>
 <link rel="stylesheet" href="styles.css">
 <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/bootstrap.min.css">
 <script src="https://canvasjs.com/assets/script/canvasjs.min.js"></script>
 <script src="script.js"></script>
</head>
```

```
<body>


<h1>Sensor Data Plotting</h1>

<div class="row" style="padding:10px 10px 10px 10px;">

<div class="jumbotron" style="height:600px;margin-left:20px;margin-right:20px;border-radius:20px;width:1000px;">

  <p>MOISTURE SENSOR </p>

  <hr>

  <label>Please Select the date:-</label><input type = "date"  id="demo">

  <button class="btn btn-success" type="button" onclick="myFunction()">Plot data</button>

  <br><br>

  <div id="chartContainer"></div>

</div>


<div class="jumbotron" style="height:600px;margin-left:20px;margin-right:20px;border-radius:20px;width:1000px">

  <p>VIBRATION SENSOR </p>

  <hr>

  <label>Please Select the date:-</label><input type = "date"  id="demo2">

  <button class="btn btn-success" type="button" onclick="myFunction2()">Plot data</button>

  <br><br>

  <div id="chartContainer2"></div>

</div>

</div>


</body>
```

```
</html>
```

Python code :

```
import serial

from firebase import firebase

from time import sleep

from datetime import datetime

import serial.tools.list_ports


ports = serial.tools.list_ports.comports()

for port, desc, hwid in sorted(ports):

    print("{}: {} [{}]".format(port, desc, hwid))


ser = serial.Serial("COM2", 9600)

print(ser.readline())

res = 1

i = 0

time = datetime.now().strftime("%d-%m-%Y %H:%M:%S")

print(time)


while res:

    cc = str(1234)

    print(cc)

    val = cc

    firebase1 = firebase.FirebaseApplication('https://landslide-91e14-default-rtdb.asia-southeast1.firebasedatabase.app/', None)
```

```
  for i in range(0, 4):
    #string1 = "123"
    string1=str(ser.readline())
    string1=string1[2:][:-5]
    data = {'date': datetime.now().strftime("%Y-%m-%d"),
          'reading': string1,
          'time': datetime.now().strftime("%H:%M")
          }
    result = firebase1.patch(
       'https://landslide-91e14-default-rtdb.asia-southeast1.firebasedatabase.app/' + '/moisture/' +
str(i), data)
    print(result)


  for i in range(0, 4):
    #string2 = "123"
    string2=str(ser.readline())
    string2=string2[2:][:-5]
    data1 = {'date': datetime.now().strftime("%Y-%m-%d"),
          'reading': string2,
          'time': datetime.now().strftime("%H:%M")
          }
    result1 = firebase1.patch('https://landslide-91e14-default-rtdb.asia-
southeast1.firebasedatabase.app/' + '/vibration/' + str(i),
                    data1)
    print(result1)
```

res = 0