IOT BASED LANDSLIDE DETECTION SYSTEM

Prof.N.R.Ingale ,Sarvesh Thakur , Omkar Kadam , Roshani Borate , Shubhangi Dundle

1.2.3 Department of Electronics & Telecommunication Engineering, Bharati Vidyapeeth College of Engineering, Navi Mumbai, Maharashtra, India.

Abstract_ These days, everyone wants to prefer safety in life and prevention from the natural disaster. The earth may get hit at any place, any time by any natural perilous, where billions of peoples died as well as economic loss takes place. These processes cannot be stopped, but using some intelligence system these losses may be avoided. Among these landslide is considered as a one of the major natural hazard.But we have a suitable solution for this with IOT (Internet of Things) based approach.The system will include soil moisture sensor as it has been demonstrated by various researcher that rainfall is one of the leading cause of landslide. DHT22 sensor is used to record the air temperature and humidity of the soil surface. MPU6050 gyro-accelerometer which consisted of 3-axis gyroscope and 3-axis accelerometer will be utilized to detect soil movement and vibration with relatively high accuracy and resolution. Arduino Mega 2560 will record the temperature, humidity, vibration and moisture of the soil surface. These real-time data will be transmitted using via ZigBee to a receiver unit which is equipped with ESP8266 Wi-fi module so that the data can be uploaded to the cloud. The data and status of the terrain is assessable to other researchers and public via smart phone application developed using Blynk Internet of Things IoT platform. The landslide alert will be broadcast through smartphone application unlike other proposed system in the literature. Communities can receive the alert in real-time thereby potentially reduce the fatality risk.

KEYWORDS: Landslide, Prediction , Sensor technology , Wireless sensor network , Alert.

I. INTRODUCATION

Due to progressive development of urban areas and infrastructure, more and more people settle in the environments such as hilly sides that have become dangerous due to different types of natural hazards. The occurrence of landslides is a huge loss for human life and economic property and such events are fast. For such rapid events the wireless sensor techniques are best suitable as it can respond quickly to rapid changes like unfortunate weather conditions of data and send the sensed data wirelessly to the receiver station in areas where cabling is not possible. Cable has obvious drawbacks such as difficulties on wiring and construction at the danger zone, man-made destroying and devastation from natural disasters. In addition, GPRS communication also has technical limitations. It cannot be used in remote mountainous areas where signal is weak even hard to be received so that qualified GPRS network is hard to be established. There are projects developed which uses satellite images it consists of combination of digital classification and textual analysis to identify landslide features. Thus, using the satellite image includes huge processing which will conclude large calculation and complexity of the system which will make the project harder to analyse. These methods, however are known to be labour-intensive as well as costly. To overcome these limitations, LoRa based wireless sensor networks and Internet of things are a viable alternative technology.

International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 06 Issue: 05 | May - 2022 Impact Factor: 7.185 ISSN: 2582-3930

II. PROBLEM ARISE

To design and develop a Landslide Monitoring System which has the following features:

1. Early signs of landslide detection using various sensors monitoring atmospheric conditions.

2.Landslide detection using Accelerometer and vibration sensors.

3. Local display and alert using I2C LCD and Buzzer respectively.

4. LoRa based communication for sending alerts to base station.

III.METHOD

A. Product testing:

It's an important factor in any project. And is especially required, when the aim is to assist individuals in the early Warning Detection. Subsequently, the project will be tested on a local server before being made public.

B. Toolboxes:

- ESP32 Microcontroller
- NodeMCU ESP12E Microcontrollerv
- LoRa SX1278 Module
- I2C LCD Buzzer
- Buzzer
- Rain Sensor
- Temperature & Humidity Sensor
- Soil Moisture Sensor
- Accelerometer
- Vibration Sensor
- Zero PCB
- Connecting Wires
- Jumper Wires
- Male Headers (Burg Strips)
- Female Headers (Burg Strips)

IV.PROPOSED SYSTEM

1. The system uses ESP32 Module on the Data Acquisition System Side and Node MCU ESP-12E on the Receiver Side.

2. LoRa SX1278 Modules are used for sending data from one place to another.

3. A rain sensor, humidity sensor, temperature sensor and soil moisture sensor are used for early detection and alert.

4. A vibration sensor and accelerometer are used to detect landslides.

5. Buzzer is used to provide local alerts along with I2C LCD which displays the current status of the system.

6. All the data collected is sent using LoRa Module to another LoRa Module connected at receiver end.

7. This data is then pushed to ThingSpeak cloud storage and can be viewed in Android App.

8. Alerts are also sent to Telegram

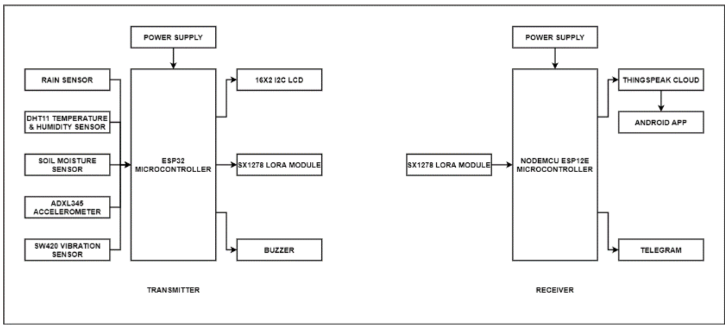

Fig.1 Block Diagram of Landslide Detection System

V.RESULT

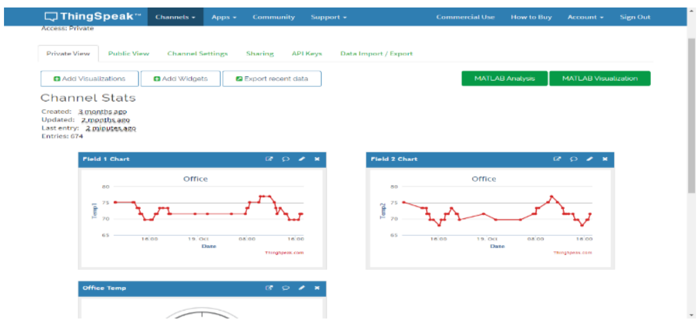

Fig.2(a)

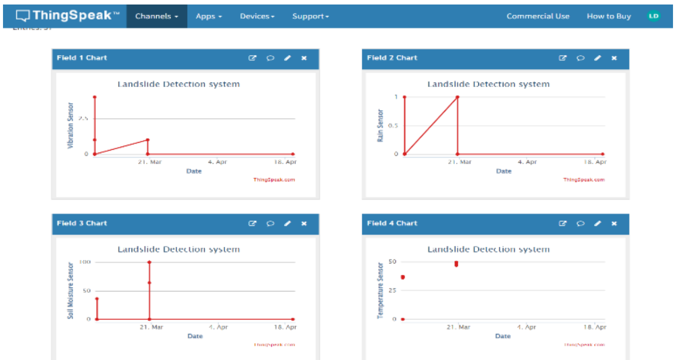

Fig.2(B)

VI.CONCLUSION

Landslides pose significant socio-economic risks to regions which are favoured by their geography. Already current technologies and strategies for tracking landslides are distinguished by major shortcomings in terms of both technological (quality and data frequency) and applicability (high implied costs, unique skill requirement). Through this study we proposed a revolutionary detection framework for landslides that leverages state-of-the-art IoT & LoRa technology. The program is extremely robust and flexible although, as compared with current solutions, its implementation and service involve drastically reduced costs. The system has been deployed successfully providing a modern way to control a landslide site quickly. When an enormous transition takes place in the world, we get to learn the details sooner through LoRa and IOT technologies.

VII. REFERENCES

[1]. B. Wisner, J. Gaillard, and I. Kelman, “Framing disaster,” in Handbook of Hazards and Disaster Risk Reduction. Evanston, IL, USA: Routledge, 2011.

[2]. B. Wisner, “Vulnerability as a concept, model, metric and tool,” in Oxford Research Encyclopedia of Natural Hazard Science, vol. 1, London, U.K.: Oxford Univ. Press, 2016.

[3]. CRED, “Center for Research on Epidemiology of Disasters,” Brussels, Belgium, 2018. J. C. Gaillard, “Natural hazards and disasters,” in International Encyclopedia of Geography: People, the Earth, Environment and Technology. Hoboken, NJ, USA: Wiley, 2017, pp. 1–15.

[4]. J. W. Brown and M. Lisa, “Older adults and disasters: How to be prepared and assist others.” Washington, DC, USA, American Psychological Association, 2018.

[5]. NIDM, “Disaster risk profile,” New Delhi, India, 2014.

[6]. P. Pandey and R. Litoriya, “An activity vigilance system for elderly based on fuzzy probability transformations,” J. Intell. Fuzzy Syst., vol. 36, no. 3, pp. 2481–2494, 2019.

[7]. P. Pandey and R. Litoriya, “Legal/regulatory issues for MMBD in IoT BT,” Multimedia Big Data Computing for IoT applications: Concepts, Paradigms and Solutions, S. Tanwar, S. Tyagi, and N. Kumar, Eds., Singapore: Springer, 2020, pp. 367–388.

[8]. United Nations Department of Economic and Social Affairs, “Population aging 2006,” New York, NY, USA. 2006. [Online]. Available: http://www.un.org/esa/population/publications/ageing/ageing2006.htm. Accessed on: Feb. 1, 2018.

[9]. World Health Organization, “Disasters & emergencies definitions training package,” Geneva, Switzerland, 2002.