**Disaster Detection and Management System using IoT**

**Abstract:**

Disastrous events are cordially involved with the momentum of nature. As such mishaps have been showing off own mastery, situations have gone beyond the control of human resistive mechanisms far ago. Fortunately, several technologies are in service to gain affirmative knowledge and analysis of a disaster’s occurrence. Recently, Internet of Things (IoT) paradigm has opened a promising door toward catering of multitude problems related to agriculture, industry, security, and medicine due to its attractive features, such as heterogeneity, interoperability, light-weight, and flexibility. This project surveys existing approaches to encounter the relevant issues with disasters, such as early warning, notification, data analytics, knowledge aggregation, remote monitoring, real-time analytics, and victim localization. Simultaneous interventions with IoT are also given utmost importance while presenting these facts.

**Introduction:**

Disasters often take place in the vicinity of human livelihood. Most of the time, it is either natural (e.g., landslide, earthquake, tsunami, flood, forest-fire, and lightning) or manmade (e.g., industrial explosion, leakage in an oil pipeline, leakage in gas production, and terrorist attacks). Regardless the cause of incident, disaster leads to huge destruction in terms of economic and human lives. Some of the dangerous disasters in the history of mankind are Bhopal (India) gas accident (1984), Chansala (India) mining disaster (1975), 9/11 terrorist attack (USA), Chernobyl (Russia) nuclear accident (1986), Indian Ocean tsunami (2004), Nepal earthquake (2015), and Fort McMurray (Canada) forestfire (2016). Around 11 million people have directly or indirectly got affected during last decade [1], [2]. In most of the cases, people have acted just like an observer. The main reason behind is the lack of knowledge and distribution of the latest technological advancement that could at least alert the citizen of the happening of possible disaster in respective location.

Fortunately, the world has recently witnessed the origination of IoT that has already created a huge buzz in social, technological, political, and economic domains. Although IoT was coined in earlier 2000, IoT has recently grabbed huge attention in almost all areas of scientific and industrial fields such as smart-home, agriculture, industry, health care, entertainment, robotics, and transportation. IoT is formulated to establish seamless communication, monitoring, and management of smart embedded devices with its counterpart, i.e., analogue objects or ‘things’. The IoT leverages heterogeneity, interoperability, distributed processing, and real-time analytics in parallel.

Although Wireless Sensor Networks (WSNs) are widely deployed in disaster management, they lack in a multitude of socio-techno-economic perspectives. The WSN is fundamentally orientated to cater the vertical silos toward solving a problem. However, the following objectives are not properly discussed such as (i) managing heterogeneous embedded devices, e.g., different processor, memory space, operating system such as embedded Linux, iOS, and Android, (ii) managing heterogeneous protocols (e.g., discovery, data, infrastructure, semantics, communication, and security), (iii) providing efficient data analytics services, (iv) established middleware support, (v) user integration, (vi) real-time access, (vii) energy efficient algorithms, (viii) interoperability among associated enabled technologies, and (ix) cost. On the other hand, IoT is proven to be fundamentally capable enough to provide more significant, scalable, portable, and energy efficient solutions to various problems in the disaster management. Motivated by these issues, an overall understanding of how disasters are currently being monitored and managed by IoT becomes very important.

**RELATED WORK**

The following system proposes a multi agent system that is explained below consists of solar micro grid. A. Smart micro grid using Multi Agent System (MAS) Environment This paper aims to establish a microcontroller and IOT based Multi Agent System (MAS) for progressive demand side response of a solar micro-grid. High penetration of renewable energy resources needs new coordination and control approaches to meet the stochastic nature of the environment and dynamic loadings this work basically presents an approach that makes it possible to integrate IoT devices to a MAS environment, for an upsurge in the level of integration and interoperability of a smart micro grid.

**PROPOSED SYSTEM**

The proposed system records and analyses the earthquake, flood and landslide related information with very high precision and accuracy, involves two stages of operations:

Stage 1: First and foremost, stage is that the sensor network which contain the all the sensors (i.e., moisture sensor, earthquake sensor, landslide sensor) which are going deployed to sense/collect the real time data (i.e. earthquake, flood, fire and landslide) using respective sensors then the collected data is transmitted to the cloud for the further mechanism and all of these sensors are controlled by the MCU board

Stage 2: the data which is received from the stage 1 is going to be stored in cloud, further the data stored is analysed and compared with the standard values (i.e., which are stored as a threshold value) ,once the value compared as result if the sensed value is greater than the threshold value which leads to detection of disaster then a message is sent to the respective authorities to deal with further actions.

**METHODOLOGY**

The proposed hardware of this system includes earthquake, landslide, flood and MCU board. A.

The System Works in The Following Steps

1) The sensors monitor the earthquake, flood,fire and landslide. All the sensors are controlled by an MCU.

2) The captured data is stored in the cloud. Based on the data so monitor, the software should do appropriate data analytics.

3) If Captured value crosses the threshold value then the system should send timely alerts to concerned officials to take appropriate actions.

The proposed system will sense the parameters with the help of sensors. The sensors are controlled by the MCU and the data will be sent to cloud. The data within the cloud will be compared with the standard values if any variation found the alert messages will be sent to the related authority.

Cloud

Wi Fi Module

Earthquake Sensor

MCU

Fire Hazard Sensor

Authority

Power Supply

Land Slide Sensor

Flood Sensor

**Block Diagram**

The Architecture Contains

1) Sensor Module: Mainly sensor module contains wireless sensor network which is having all the sensors which are connected to MCU board the sensors.

2) Controlling Module: This contains an MCU Uno board, WIFI Module and Battery. The MCU board controls all the sensors which are connected to it and a WIFI module which connected to the MCU board used for transferring the collected data to the Cloud. Battery is used to give power supply to sensors and MCU board.

3) Analysing Module: This the Main part where the collected data is going to be Properly analysed and the data is compared to standard value (i.e., threshold value) and if variation found send alerts to respective authorities.

**CONCLUSION AND FUTURE SCOPE**

For the development of disaster warning system to alert about flood, earthquake and landslide alert to concern officials. It can monitor, earthquake and can alert the respective nearest authority like Fire Station, Hospital, and Police besides alerting CWC officials for mitigation. Among all these risks, we are going to develop a prototype to avoid these by using the MCU based IoT technology. Further in future the system can implement more features like system can also sense different pollutant gases and we can also have automatic Equipment control using IoT technology.

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