Disaster Management And Safety For Enhancing Security Using Various IOT Devices

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Abstract : **A disaster is a serious disruption of the functioning of a community or a society involving wide spread human, material, economic or environmental loss and impacts, which exceeds the ability of the affected community or society to cope using its own resources. Disaster Management as a subject essentially deals with the management of resources and information as far as a disastrous event is concerned and also how effectively and seamlessly one coordinates these resources. Disaster management, at the individual and organizational level, deals with issues of planning, coordinating, communication and risk management. The most important aspect of disaster management is securing the people in the location where disaster has occurred and notifying them regarding the disaster so that they can take steps to ensure their safety from the disaster. In the case of disaster, the system needs to ensure that they follow a few steps to make sure that minimum damage is done during the disaster. This process involves the identification of risks, disaster preparedness, emergency response, resources allocation, reaction planning, and lastly disaster recovery. To make sure that this process is done properly the people need to be informed regarding the system. Here we propose to build a system which will identify the risk and make sure that the people who have registered into the system know regarding the disaster and relief centre's as soon as possible that helps for safety of people.**

Keywords— Disaster Management, IoT Devices, Analytic Reports, Safety Measurements, Disaster Predictions.

I. INTRODUCTION

Disasters have always happened and they will continue to. What changes though, is global awareness of these disasters as well as the number of people affected. Why should not use the internet of things and modern technology in order to survive the people life during the disaster at public places like mall! Why should not combine the programming and hardware skill together for computation in order to protect the people life ! Floods are the most common natural disasters, and cause significant damage to life, agriculture and economy. Research has moved on from mathematical modeling or physical parameter based flood forecasting schemes, to methodologies focused around algorithmic approaches.

The Internet of Things (IoT) is a field of applied electronics and computer science where a system of devices collects data in real time and transfers it through a Wireless Sensor Network (WSN) to the computing device for analysis. There lies a thin line between success and failure while considering management of disasters. Any calamity, whether natural or otherwise, does not allow for the luxury of time, while being handled. Timely and precise diagnosis of the situation will lead to better evaluation of the resources needed to contain and counter the calamity.

Disaster response teams must make decisions that can save innumerable number of lives instantaneously. Situations that require immediate and effective measures range be from fires to leakage of toxic or inflammable gases. The disaster management teams must rely on first hand insights of the affected zone and the data must be highly accurate and dependable. To this end, robots and machines are extremely valuable.

Disaster management is very important to survive in the case of a natural or a major man-made disaster and can be defined as the organization and management of resources as well as responsibilities for dealing with all humanitarian aspects of emergencies, in particular, preparedness, response, and recovery in order to provide safety measurements as well as to reduce economic losses.

This paper gives an outline for the development of an information system based on the existing systems with the utilization of some sensors and IoT. Also with the help of IOT devices we can get real time information about any of disaster events so that disaster predictions can be done as soon as possible.

Also after the predictions we can send alert notifications as well as signals with the use of IOT networking system that helps to provide security as well as we can arrange safety measurements earliest possible to safeguard living beings. In this we it helps to reduce social, economic losses and helps to enhance security as well.

Internet of Things (IoT) is one such technology for a smart nation. With easily available smart phones and Internet facilities to both urban and rural people in India in the recent years, this media can be utilized for communication with the citizens. The

Internet of Things (IoT) is a huge network of physical objects or devices along with virtual entities which are generally powered by small batteries and often connect to each other through the Internet.

As more number of these devices gets connected to each other, there lies a huge opportunity for development and implementation of such integrated flood disaster management system.
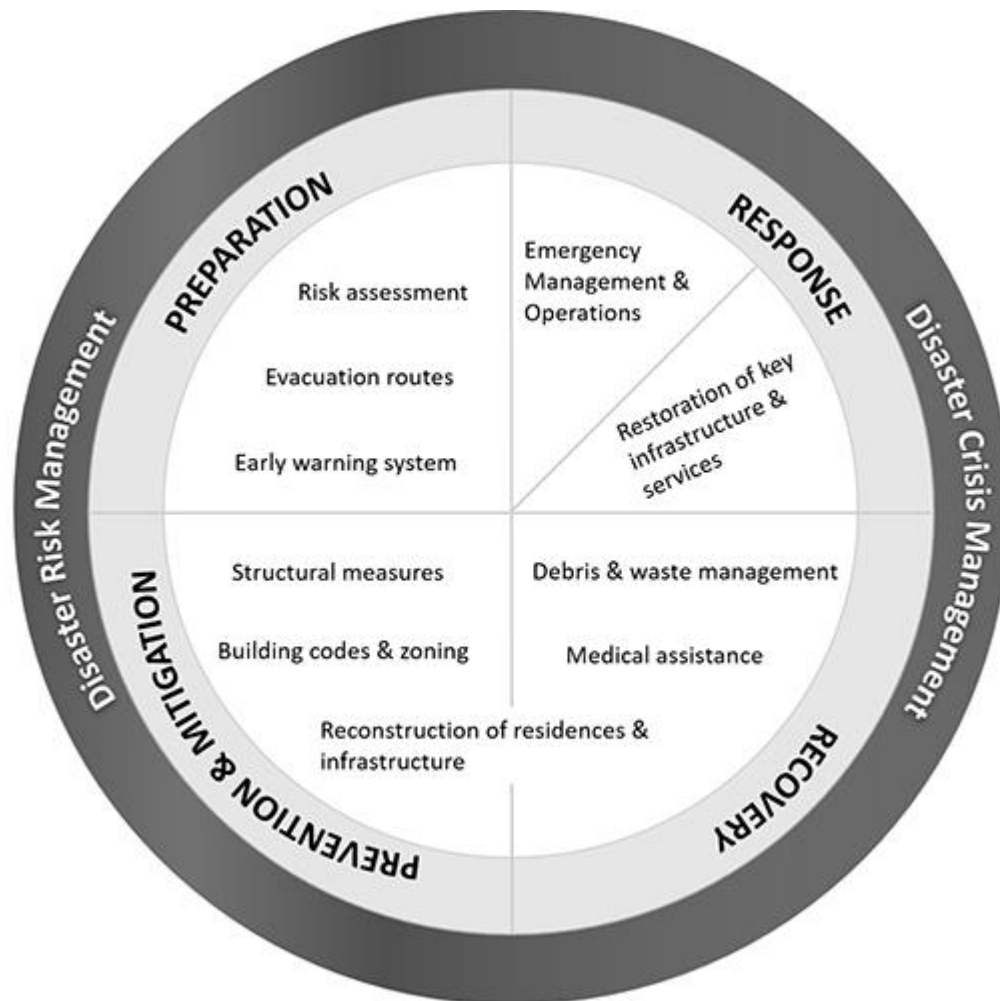

Figure 1: Phases Of Disaster Management

II. LITERATURE SURVEY

2.1 Study Of Various Methods And Technologies Used For Disaster Management

Sai Sreekar Siddula, Phaneendra Babu, P. C. Jain has implemented an efficient water level monitoring and management system. The motto of their research work was to establish a flexible, economical and easy configurable system which can solve our water distribution problem between two regions and safeguard the low lying areas from floods etc. among many other issues. They proposed a cloud-based water level monitoring and managing network whose flexibility would offer to control the system from any place via access to cloud data with a different type of devices. [1]

Himadri Nath Saha, Supratim Auddy, Subrata Pal, Shubham Kumar, Shivesh Pandey, Rakhee Singh, Amrendra Kumar Singh, Swarnadeep Banerjee, Debmalya Ghosh, Sanhita Saha researched regarding the use of IoT in Disaster Management. They discussed the seamless interconnection of devices to the net, being sensors of all kinds starting from unmoved activity devices, sensors on good phones up to hyper-spectral cameras mounted on satellites, offers a massive potential for the advance in recognizing and assessing risks, for the targeted launch of preventive measures resembling improved quality, preciseness and personalization of early warnings. [2]

Swapnil Bande, Prof. Dr Virendra V. Shete proposed an approach that combines the scalability of IoT and reliability of artificial neural networks to handle data provided by a sensor network and by effective communication between these two components, an early prediction of the flood is done. [3]

Abhishek Joshi, Nagarjun C S, Ravi Srinivas successfully developed a working remote controllable surveillance robot. It has environment sensing capability and high usability. Manual surveillance can also be given using LabVIEW GUI for the robot. [4]

XuefengLv, Yongfeng Liao, Lan Deng discussed regarding the problems solved by mobiles in disaster situations like the base number of the buried or trapped people is not clear, another is that where the trapped people are and the priorities of the emergency

rescue tasks are unknown, and the last is that the on-site live display of the rescue situation and the disaster integrated information interaction. They then proposed a system where the quantitative distribution of the possible life points are acquired and the emergency rescue task scheduling may be carried out according to the targeted point references. [5]

Prachatos Mitra, Ronit Ray, Retabrata Chatterjee, Rajarshi Basu, Paramartha Saha, Sarnendu Raha, Rishav Barman, Saurav Patra, Suparna Saha Biswas presented an approach combines the power of neural networks to handle data provided by a sensor network, and effectively communicate between these two components. [6]

Rossi Passarella, Sarifah Putri Raflesia, Dinda Lestarini, Taufiqurrahman, Reza Firsandaya Malik, Sutarno, Huda Ubaya, Ahmad Rifai presented an overview of a proposed IT-based approached for disaster mitigation in Indonesia by using geofencing and MANET to achieve the goal of making better results based on more realistic models for various disaster scenarios. [7]

Akira Suyama, Ushio Inoue proposed a system to present disaster information based on a person's movement. They implemented an experimental system by using geofencing and evaluated the system in an urban area. The system notifies disaster information when a user enters the fence with Wi-Fi on by the experiment. [8]

A M Rahman , Abdullah Al Mamun , Alma Islam presented Programming challenges of chatbot with Current and future prospective goals. This system helps for communication using chatbot mechanism under it. [9]

Prabodh Sakhardande, Sumeet Hanagal and Savita Kulkarni Presented Design of Disaster Management System using IoT Based Interconnected Network with Smart City Monitoring and this system helps design IoT based system design in order to monitor various disaster related activities and keep track of it. [10]

III. PROBLEM STATEMENT

The systems that are used before are very useful in identifying the disaster which is occurring. But most of the system lacks the requirement to give information to people regarding disasters. In our system with the use of IOT Devices, the people will be able to get different information from the system

IV. PROBLEM DEFINITION

The existing system consists of identifying various disasters using different sensors and analyzing the data from the centre's to know where the disaster is occurring. This information is used to alert the people leaving in that area through various means. Making a intelligent system using raspberry pi which will monitor unexpected events and will take desired action via its accumulators in order to survive both life and economy.

V. PROPOSED WORK

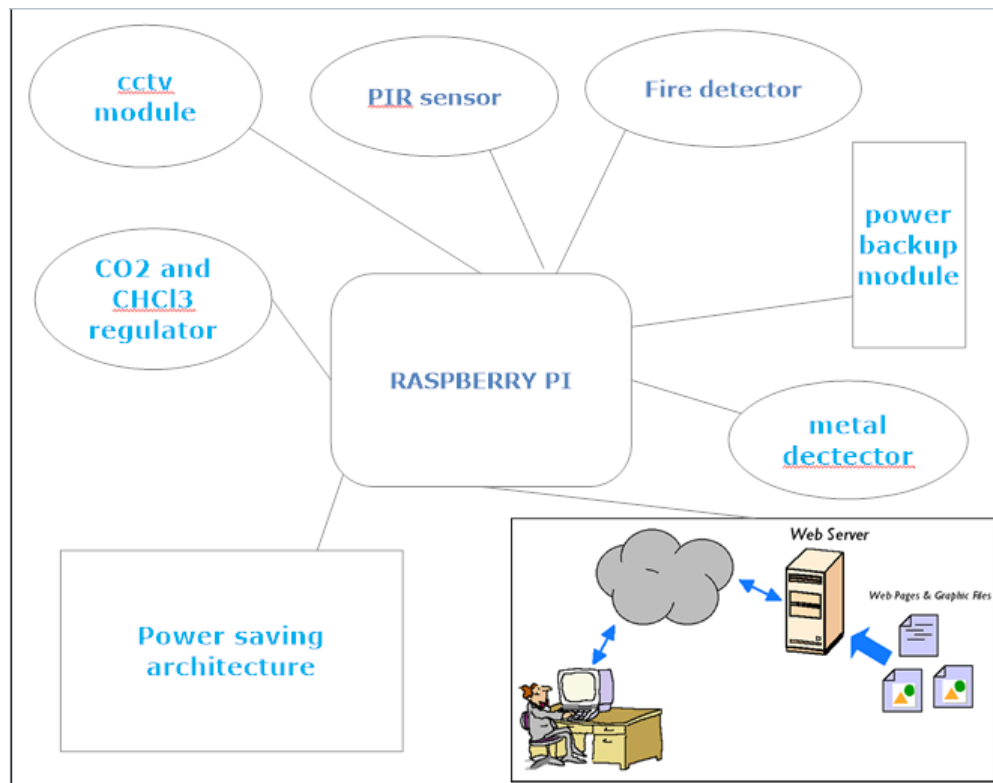### 5.1 Motivation and Objectives

Primary Motivation - Disasters have always happened and they will continue to. What changes though, is global awareness of these disasters as well as the number of people affected. Why should not use the internet of things and modern technology in order to survive the people life during the disaster at public places like mall !

Secondary Motivation - Why should not combine the programming and hardware skill together for computation in order to protect the people life! In this way this proposed system can be helpful for sending important information as soon as possible to save life of living beings and also it can be helpful to reduce economic losses.

5.2 Work Flow

1. The sensors will sense their respective parameters such as Temperature, humidity, rainfall, vibration and water level.

2. Raspberry Pi controller will send these sensor output to the server via Wi-Fi module to create database on server.

3. Raspbeian system will monitor distribution of people in mall via CCTV using image processing technique.

4. In case of fire, using the distance measuring algorithm, the raspberry will take efficient action to remove the people from mall and the same time it will activate the CO2 pipelining.

5. If some terrorist enters the mall forcefully crossing the metal detector, chloroform network will activate in that area by closing all doors of mall.

6. Power saving and load shading will be managed using intellect algorithm.

7. The whole data of processing will be saved at the cloud so that it can be used after the disaster to survey the people inside the mall.

5.3 System Architecture

. **Figure 2**: System Architecture

5.4 Non functional Requirements

1. The linking between the sensors and raspberry pi should be check periodically in automated manner.
2. Suppose If system fails under the influence of disaster then its clone system will automatically activate.
3. The complexity of all processing will be such that it will not take much more time to activate the survival task.
4. Unauthorized person will not able to access the raspbeian data on cloud as well as on system.
5. If there is unreliability of power than system should able to work under such conditions.
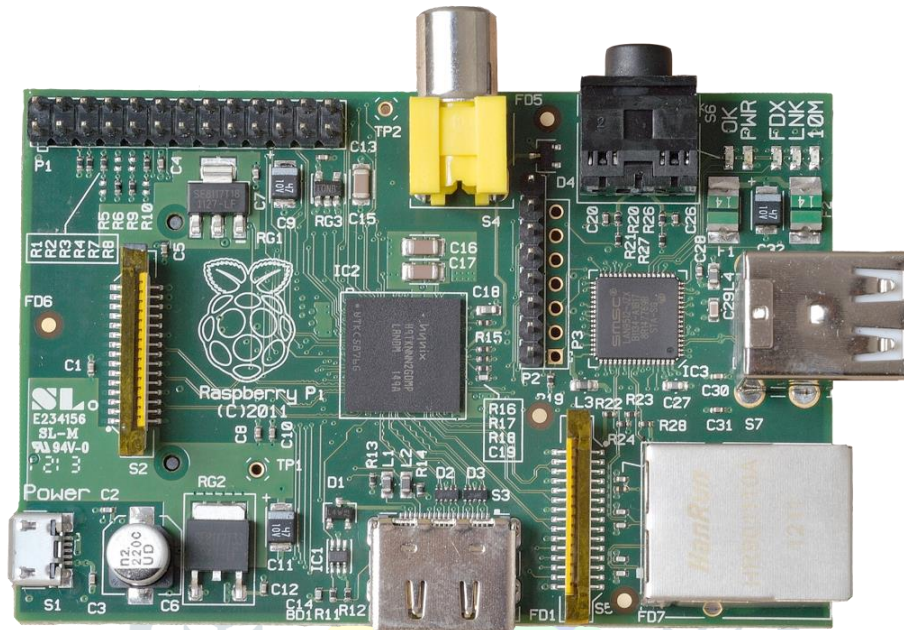
5.5 Hardware Requirement

1. Raspberry pi
2. Arduino uno or Arduino mega
3. Relay and jumpers
4. High definition camera
5. PIR and fire sensor
6. Led strip
7. Metal detector circuit hardware
8. Gas regulators & Gas sensors
9. Acrylic sheet made mall prototype
10. DC Motor
11. Battery
12. Solar Panel
13. Water level Sensors

5.6 Software Requirements

1. Integrated development environment for python and embedded c programming or Java programming.

2. Arduino IDE

3. Raspbeian Linux operating system

4. Image processing tools.

5. Netbeans.

6. Simulink.

5.7 Raspberry Pi
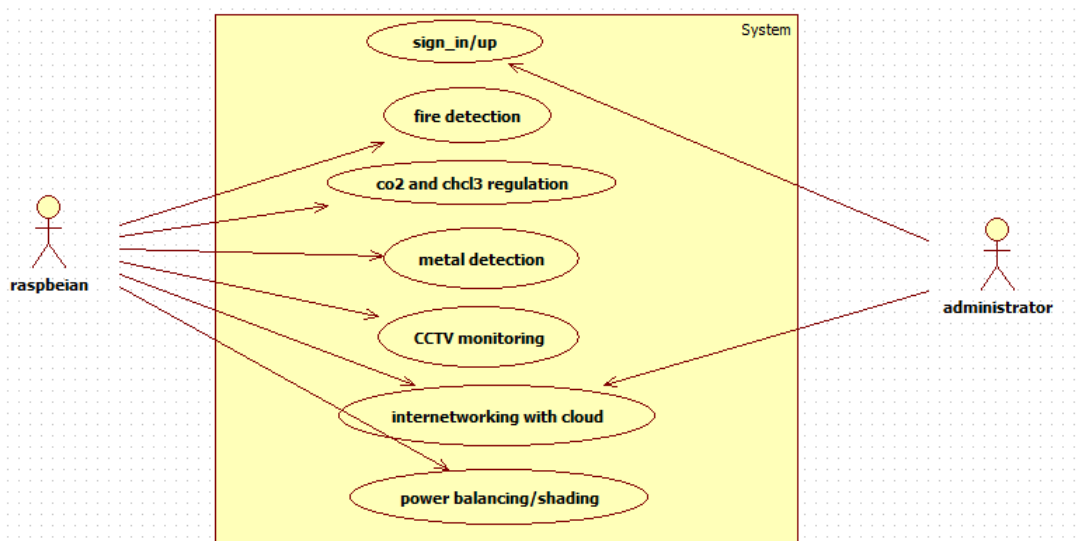

. **Figure 3**: Raspberry Pi

5.8 UML Diagram

Figure 4: UML Diagram

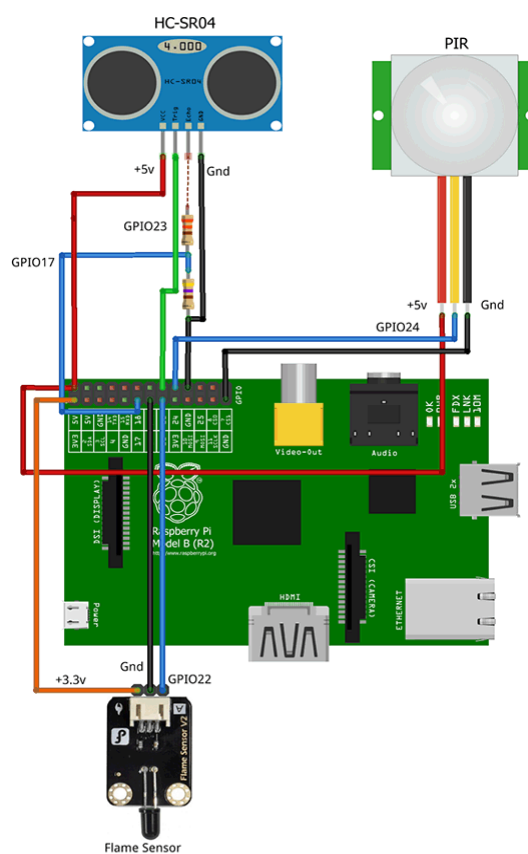### 5.9 CIRCUIT DIAGRAM FOR FIRE DETECTION

Figure 5: Circuit Diagram For Fire Detection

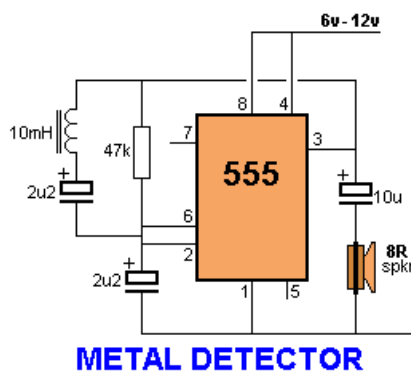## 5.10 Circuit Diagram For Metal Detection

Figure 6: Circuit Diagram For Metal Detection

5.11 MERITS OF PROPOSED SYSTEM

1. Human life can be saved.
2. We can get pre-alert regarding any disaster.
3. Human work can be reduced.
4. Continuous monitoring can be possible.
5. Consumes less time.
6. We can generate analytic reports of any disaster activity that helps to track & manage the various records based on locations & time.

5.12 Software Quality Attributes

1. **Correctness**: The system should provide correct and accurate results.

2. **Flexibility:** The system should be flexible enough to predict complicated sentiments.

3. **Reliability:** The system should provide reliable results.

4. **Reusability:** The system should be reusable for future upgrades.

5. **Usability:** The system must be easy to use even by non-technical users.

VI. CONCLUSION

Our Proposed methodology is generic in that it can be used for making a intelligent system using raspberry pi which will monitor unexpected events and will take desired action via its accumulators in order to survive both life and economy. Also the results from the study can be used to develop analysis & reports whenever any of disaster activity occurs. In future, we can make the system on more information. The system can be utilized in different areas. We can utilize in the complete country to make the people aware of the disaster as soon as possible. Also we can prepare android as well as iOS applications in future that can be helpful for emergency response system using which user can post disaster related information on social media such as Facebook, Twitter etc that can results into safety and security of living beings by providing them alert messages on their mobile devices.

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