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Smartphone Application for Disaster Management Using Peer-To-Peer Network

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ABSTRACT
Common problems observed during a disaster strike include spreading of fake news, duplication of already processed help requests, failure of communication facilities and ineffective coordination of rescue operations. A dedicated mobile application is proposed to avoid the disadvantages of existing system by establishing communication, providing help for victims, implementing a unified platform for rescue operation and sharing updated news from the authorities. The application will be prebuilt with an offline database consisting of precautions to be taken under any given scenario. It uses mesh technology to establish communication when all else fails. Through the unified platform, a person can register as a victim or volunteer. The rescue operations are monitored and coordinated by the respective authorities and officials with the help of a control room where all victim requests as well as the volunteer details are recorded. The application is designed to be very light weight, energy efficient and easy to use.
Keywords - disaster, rescue, peer to peer, mesh technology, decentralization.

I. INTRODUCTION

Disasters are an inevitable scenario in the world. The loss of lives are inevitable. There is nothing could done to prevent disasters from happening. The only disasters that man can prevent is the one created by himself.

There are mainly two difficulties during these times, loss of communication network and inefficient rescue operations.

Communication network can be implemented with the peer to peer principle by using mesh technology which can easily invented in today's world with the abundance of smartphones available with everyone

One thing could be done is to take measures to reduce the impact of these disasters on us. For this purpose we need an efficient and unified platform for evacuation and rescue processes. Through this project we are proposing a way of creating an efficient and unified platform by implementing a smartphone application, a web interface and a control room software

The application serves as a way to establish contact b/w victim and volunteer. Control room software is run by the government officials who will monitoring all the requests and the volunteers involved in the process.

II. LITERATURE SURVEY

A. Existing System

Sahana Eden Humanitarian Management Platform by Sahana Foundation is a system available for disaster management. It provides the feature to register as a volunteer. But it only works on a single platform as web interface. It doesn't provide any dedicated smartphone application.

It only gives the option to register as volunteer. It doesn't give any option to request for help by the victims. It doesn't have any information sharing platform or any way to get the latest updates from the government officials. It can't be used during the internet is down or there is no network access.

Apart from that there are no existing system that can used for rescue operations during the disaster time. All the systems related to disaster management is designed for post disaster scenarios where the speedy recovery of the affected system is targeted.

B. Proposed System

The proposed system is designed to overcome all the challenges and drawbacks of the existing system. It have a dedicated smartphone application, a computer software to monitor all requests and responses and a web interface that provides the similar functionality as the smartphone application.

The system proposed is divided into three modules of smartphone application, web interface and a computer

software.

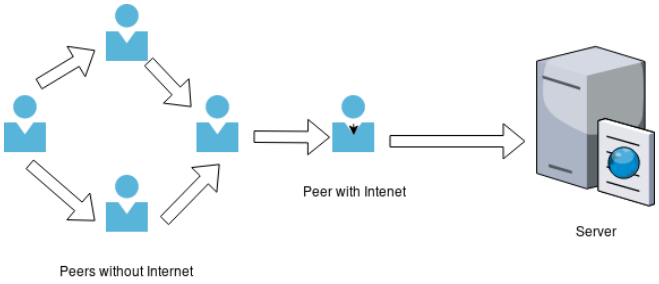

Figure 1: Peer-To-Peer Connection

Peer-to-peer communication facility is implemented for situations where normal communication facilities are down. Figure 1 depicts the communication through peer- to-peer network. Each device acts as peers and maintains a local database within itself. The connection is established through Wi-Fi-direct or Bluetooth. When a peer comes in contact with another peer, the connection is established and the copy of data is transferred to the connected peer and to the server if the new peer has an internet connection. This process repeats until the data reaches the server or local control room. The filtration of duplicate data is done at cloud server or control room.

The system mainly focuses on establishing an efficient unified platform for rescue operations.

III. SYSTEM OVERVIEW

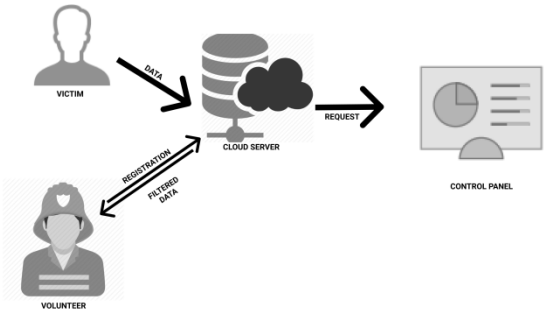

Figure 2: System Architecture

There are four modules in the proposed system. a) A smartphone application b) Control room software c) Web interface d) Server

A. Smartphone Application

It acts as the gateway between victim and volunteer. A victim can send help request with option to add one's name and contact number.

The person wish to volunteer will be able to register with one's name, contact number and location. Location is used to filter the requests that are from their nearby locations. Once the volunteer registers, they will be able to see the help requests received from the nearby places of their location.

It also provides information that are given by the government officials. Smartphone application also comes with a prebuilt database which contains the precautions to be taken under different disaster scenarios.

B. Control Room

It is a computer software designed to be operated by government officials. Using this software they can monitor all the requests that are processed, in progress, pending and also the list of volunteers available with their location.

It provides the option to send new information, updates regarding the situation. These information will be relayed through the server to all the applications where both the victim and volunteer can view it. The software also provides the option to manually assign volunteers to the pending requests thereby makes sure every requests are processed.

C. Web Interface

It serves as an alternative to the smartphone application with all the features similar to it. It is designed in case the user doesn't have the application installed and for those who have access to computer.

It gives the platform to send help request for victims, registration for volunteers and access to the information passed by the officials.

D. Server

All the above modules are connected to the server. Server manages all the incoming requests and their responses. All the information from the control room is relayed through the server. All the algorithms used are running on the server.

IV. WORKING

Initially the smartphone application/web interface provides the option to either to choose as a victim or volunteer. Choosing the victim will provides the window where the user can choose to provide their name, contact number, location and press on send button. Even if the user doesn't provide their location it will automatically selected using their GPS location. When pressing send button it will be send to the server where their request will be saved and will be shown to the volunteers nearby the requested user.

Choosing the volunteer option will provide the user with window to fill their details, i.e., their name, phone number and location. After registering they will be directed to a window where it will show all the requests from the user's nearby locations. The user can select any of the request. On selecting that particular request will be temporarily unavailable to other volunteers. After selection the user have two choices, mark the request as done or choose to leave it. When it is marked as done it will be deleted permanently. If the user choses to leave it, it will be back to visible state where other volunteers can choose from.

When the user is not connected with internet or no option to connect to internet, peer to peer connection take place. In such cases the peers can connects to each other using the wireless technology in their smartphones like Wi-Fi, Bluetooth. When connected to each other, the requests from each devices will be shared with each other thereby creating a copy of the all the requests that are not sent and distributing to everyone. So when one of them connects to internet it will be sent to the server.

V. CONCLUSION

The unified platform for rescue operations during disaster strike focuses on providing an efficient rescue operation by able to coordinate the rescue operation. It make sure to provide a way for the victims to request for help and people to act as volunteers. It gives the latest information from government officials about the situation. It is also prebuilt with a database that provides precautions to be taken under different hazards. By peer to peer connection it will help in overcoming the challenges of communication during these times.

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