Flood Rescue System Using IoT and Android Applications

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Abstract— Flood Rescue System will monitor the disastrous situation and share real time details with the rescuer. This is an offline communication system, by which a user can send a message in the absence of the internet and cellular data. We have developed an IoT based android application to rescue people affected in emergency situations like flood, disaster etc. The features like live location, photo sharing and information to the rescuer can be taken. The rescuers will get the details from the database of the person who needs to be rescued in the nearby area where the rescuers belong to. The rescue operation can be done in priority wise, and it will be constituted by villagers, fishermen, army etc. These rescuers will be guided to a place that is appropriate for them. This will definitely be a huge contribution to the community, for disaster management.

Keywords— Cellular, IoT, location

I. INTRODUCTION

Chat Applications are nowadays so important. People are using different kinds of chat applications almost every day, which can send messages or even have a call internationally as long as there is internet available, whose impact on everyone is so large that Chat can replace the technology of Text messages. In a simple online buying, one has to communicate with seller with the use of Chat Application, and reserving a fine dining can be done through Chat. It made a big difference on the society. The core value of chat for every user is: it can send message to someone instantly, especially when it comes to emergencies.

In the past, it would take an hour or even days to send message, however, the mass of the population of chat apps, are dependent on the internet, data or cellular signal. We are aiming to develop an offline application which can send message and track the end user without the help of Internet. So, in case of emergencies, users can send message to someone, so as to accept aid as soon as possible. The application will have a solar- powered server, for that, in case of a huge disaster or calamity, the server will still be running and can offer a help to the users connected within the server. It will be a huge contribution to the community, especially now the society today is dependent on the growing technologies. Having an application that is no longer dependent on Internet will be a help to a lot of people.

II. LITERATURE SURVEY

Research of Oliver M. Junio and Enrico P. Chavez [1], proposed that this study is to develop an Offline Chat

Service, by which a user can send a message in the internet's absence, cellular data and signal. The Wireless Fidelity or Wi-Fi will serve as their access point to connect to another user, which can detect and pair into a different device as long as the other users are connected in the same network. But before the user can fully exchange messages; User B must accept user A's request to exchange messages, if User B declines the request, both users can search another device again to send a message. This study has an Admin side to see who and how many devices are connected in the same network. However, the mobile application can only pair into Android Devices; the researcher is still conducting research to make the application broader and pair into Apple Devices.

In research by Rakshith K & Mahesh Rae [2], Device-to-Device communication underlying cellular networks will become breakthrough innovation in future cellular networks such as LTE and LTE Advanced. D2D communication allows devices to communicate with each other without using the cellular infrastructure and reduces the load on the network. This can be achieved by using several approaches; one of them is built-in Wi-Fi. The application is implemented in real-time to exchange information between devices and also focuses on the concepts of direct device communication along with the scenarios the devices can communicate. They have discussed the concepts of D2D communication in the LTE Advanced networks. Many of the researchers are aiming towards developing new concepts and technologies for the betterment of direct D2D communication. In this work, we have developed a mobile application using TCP/IP client-server socket programming. The paper also has discussed the application developed for devices to communicate with

each other using built-in Wi-Fi modules on their cellular phones. The App provides direct communication between multiple devices to exchange information and interact with each other, the resultant App can be installed on any android devices. For further evaluation of the application, we want to have images, videos and graphs to be exchanged between devices. Additional discussion on the various scenarios that come across these devices and to investigate the problems and provide efficient protocols for known scenarios.

In research by Neha Patel and RuchaBhatt [3], widespread availability of mobile communication devices and public Wi-Fi grids, peer-to-peer services, and applications have become feasible and attractive. Educational campuses have a strong intranet infrastructure that provides near-complete Wi-Fi coverage. While this is adequate for client-server applications and browsing etc, it doesn't support p2p applications. We have proposed hybrid architecture for p2p services where the infrastructure network is used for providing directory services and moving data seamlessly across Wi-Fi access-points. It does this by implementing Mobile IP6 on the intranet along with maintaining real-time directories of the mobile nodes. Mobile IP is the protocol in which the mobile node can stay connected with the same network connections transparently irrespective of the current point of attachment to the IP network. While several p2p protocols and services exist, robust real-time application implementations have been difficult because of complexity in implementing directory and other network services. Here they have designed a p2p event scheduler that uses the real-time directories and has presented our findings.

III. PROBLEM STATEMENT

Due to the power failure in network towers during flood, there were no network connections available. Thus, people got isolated because they were not able to communicate with the rescuers. We are trying to solve this problem by providing a separate Wi-Fi hotspot and an application. From our app people can send rescue message using the Wi-Fi and can contact rescuers. We propose Flood Rescue System with Android application. This will monitor disastrous situation and share real time details with rescuers.

IV. PROPOSED SYSTEM

The project aims to develop an android application that can be used in a situation where there are no internet connection & Cellular networks. During floods, the power fails and this fails the cellular networks which destroys the communication network, which in turn affects the post-disaster rescue operations as the communication with the peoples in the affected area could not be made. To solve this problem, we implement a Flood rescue system that can be used to make communication with the rescuers; here the components of the proposed system are a Wi-Fi Router, A

server system, victims' mobile node, and Rescuer mobile nodes. All the components in this system are interconnected to a local network created with the Wi-Fi Routers; the server system is configured on the network using a Static IP address and all the mobile nodes in the system use Dynamic IP Configuration. When a mobile device is connected to the network, it is automatically assigned an IP address which can be used for back and forth communication.

The Wi-Fi router sends the beckons continuously and the devices' using the android application automatically searches for the Wi-Fi and joins the network. When a victim user opens the android application, the application starts to find the location of the devices using the Global Positioning System & GPS and The Android Location Library, The user communicates with the user interface of the application and provides necessary details like, no of persons in the house if there any casualties, the equipment required or materials that must be brought by the rescuer to rescue them, details about drug allergies (if any), Blood group of the family members and can even share the pictures of the situation of the flood, etc. The user interface facilitates a send button, which when pressed will send the contents and the location of the user to the central server on the same network.
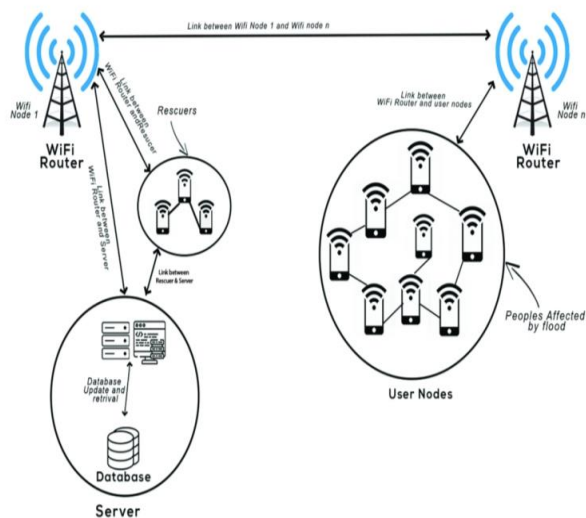

Figure 1: Architecture of the system

The server system contains web server software (Xampp) which contains the server script files that extract the data and stores in a structured manner on the database, here we use MySQL databases. When a victim at a particular location sends the request message, the script files in the server system executes the scripts and finds the rescuer who is closer to the victim and sends a notification to the rescuer with the details of the victim retrieved from the database immediately, the rescuer gets the user data and location and can immediately move to the location to help the victims.

As the rescuer accepts the request the requested victim will also get the details of the rescuer and can track their live

location and can communicate with them using the chat available on the application. Once the rescuer reaches the victim and is rescued, in the rescuer's interface can change the status of the operation as rescued or if the victims can't be reached and more help is needed for the rescuer, he can make a request for more help. The local government authorities can monitor the rescue operations from the server system or through the interface for the authorities.

V. DESIGN DESCRIPTION

A. VICTIM
Here it represents the flow of activities of the victim. Initially, the user opens the application and inputs the IP address, and then the login or sign up page will appears. If the user is an existing user then they need to sign in or else they need to sign up. During sign up, there will be a button for giving rescue request, on button click will get a form containing the basic details such as name, email address, phone number, and location. After filling those details they'll ask whether they need to send a rescue request, if yes then the user needs to give the rescue details. After which the sent request will be given and it will show the current status of the request. If he/she has signed in and haven't given any request yet then they can neither give request nor can see the status.
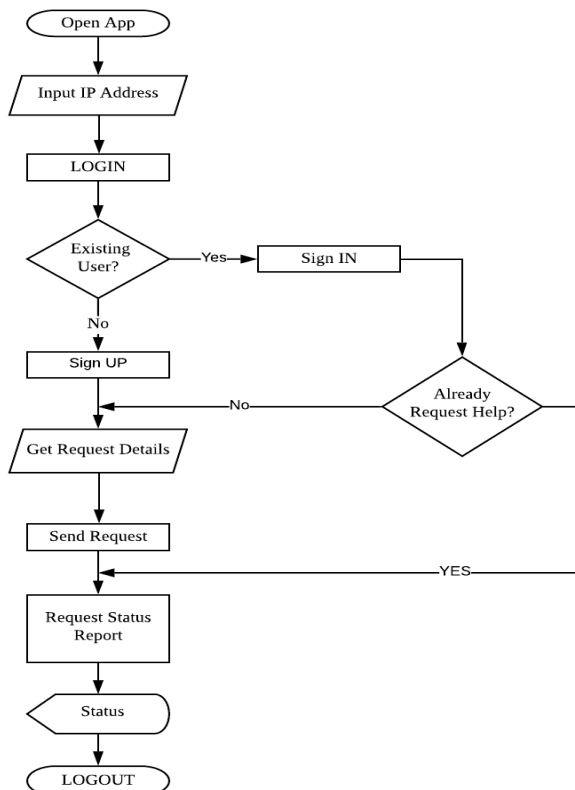

Figure 2: Flowchart (Victim)

B. RESCUER
Here it represents the flow of activities of the rescuer. Initially, the rescuer opens the application and inputs the IP address, and then the login or sign up page will appears. If

the rescuer is existing, then they need to sign in or else they need to sign up. During sign-in, they will be provided with all the requests that have been arrived. If he/she is not an existing one then they need to sign up, during which they will be provided with all the updates or requests. Then they check whether any request has been accepted, if accepted then the details of that victim will be shown. After this, they check whether those victims have been rescued, if not then they will notify the user about the arrival of the rescuer. After the rescue operation, the status of the corresponding rescue task will be updated in the victim details. All further requests that have not yet been accepted will again be shown on the request page further waiting for the acceptance.
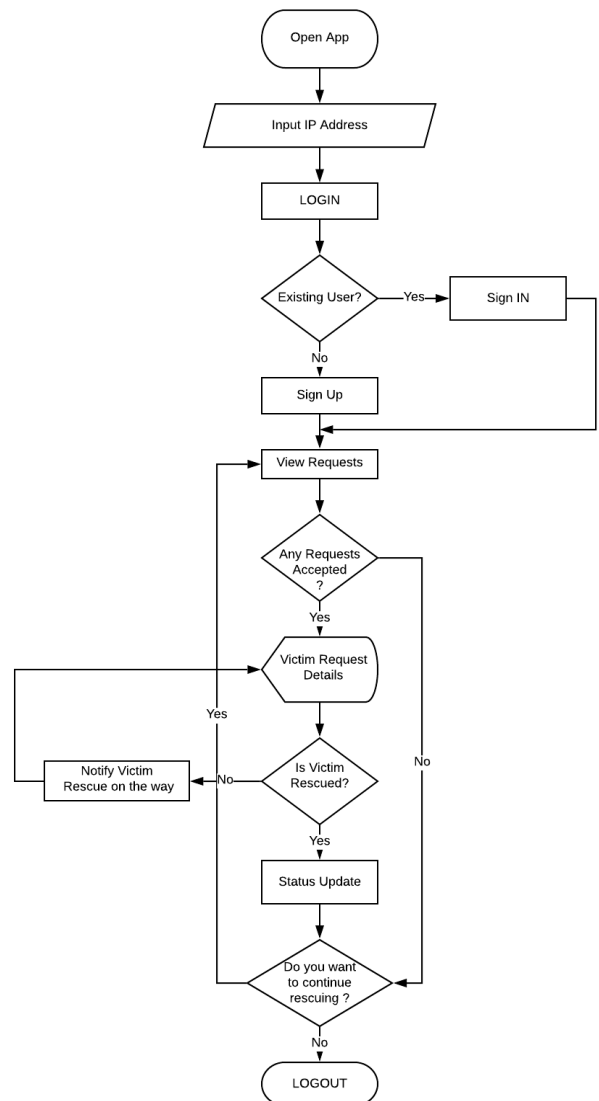

Figure 3: Flowchart (Rescuer)

VI. MODULE DESCRIPTION

A. USER TYPE SELECTION MODULE
This flood rescue app is designed for mainly two types of users namely the victims and rescuer. In the user type selection module two buttons are provided i.e. "Help Me" (for the victims) and "I want to help" (for the rescuers).

Using this button the user can select the type of the user based on the activity they will perform. If a user wants to Request Help from Rescuers they need to choose the "Help Me" button and if the user wants to help others from the situation, she/he needs to choose "I Want to Help".

B.USER REGISTRATION AND LOGIN MODULE

The registration activity is the module that is displayed right after choosing the user type. To use the Flood Rescue application the user must register their details within the registration activity, which requires details like First Name, Last Name, Mobile Number, Email Id, Username, and password (For Authentication purpose of the application). Once the user has successfully registered the user can log in with the registered username and password. If already registered, he/she can move directly to the login module without doing a registration again.

C. VICTIMS MAIN ACTIVITY MODULE

After Successful registration and login, the victim is directed to the Victims Main Activity Module, which contains a Hello message followed by the username of the victim, this activity contains two buttons

- Request Rescue - On Click, this button takes the victim to the rescue request module which contains the rescue request form.
- Request Status - On Click, this button provides the status of the Rescue request.

D. VICTIMS RESCUE REQUEST MODULE

When the victim chose the Request Rescue in the Main screen module, it is directed to this module which contains a rescue request form for collecting the details to make the rescue operation fully functional, it includes the name of the location, emergency, needs, Hazards around them, number of peoples, pets, disabled persons (if any) and messages to the rescuer. A send request button is placed below the form to send the details to the server and rescuer.

Figure 4: Victims Rescue Request Module

E. VICTIMS RESCUE REQUEST STATUS MODULE

After sending the request the victims can view the status of the request- whether the request is received, rescuer assigned or not. When a rescuer is assigned it displays the name, contact number, and the button to trace the live location of the rescuer.
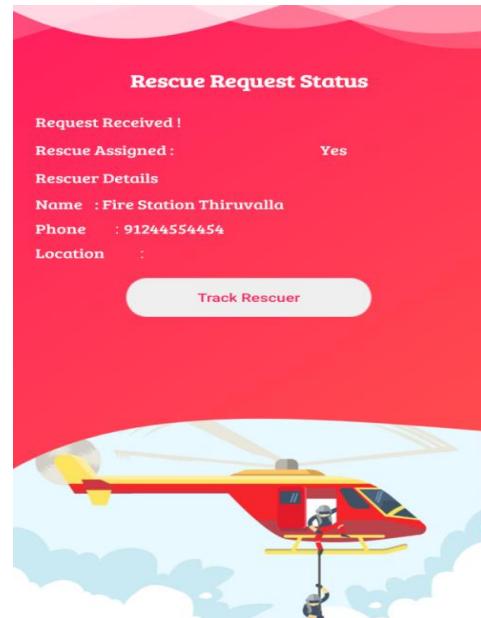

Figure 5: Victims Rescue Request Status

F. RESCUER TRACKING MODULE.

When a rescuer is assigned the victim gets the feature to track the live location of the Rescuer, this module shows the map and the rescuer marked with their live location within the map.
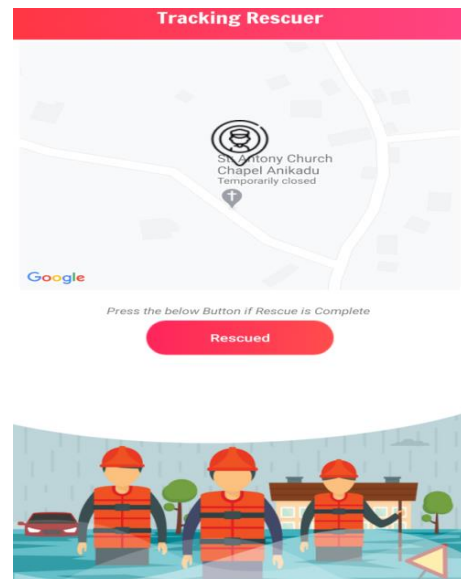

Figure 6: Rescuer Tracking Module

G.RESCUER MAIN ACTIVITY MODULE

After Successful registration and login, the rescuer is directed to the Rescuer Main Activity Module, which

contains a Hello message followed by the username of the rescuer, this activity contains two buttons

- View Request - On Click, this button takes the rescuer to the rescue Request list module which contains the list of request made by different victims.
- My Request - On Click, this button provides the list of the victim request accepted by the rescuer.

H. RESCUER VIEW REQUEST MODULE

This module gives the list of new rescue request from the victims with a button to accept the request; here if the priority of the request is high it will be displayed to the rescuer so that he can rescue them immediately.

I. RESCUER MY REQUEST MODULE

In this module it displays the list of request which are accepted by the rescuer on click the request the rescuer can view the data which contains   name of the location, emergency, needs, Hazards around them, number of people ,pets, disabled persons (if any)and messages. Also, track victim button, to track the location of the victim to reach them faster without any confusion.

J. USER TRACKING MODULE

When a rescuer is assigned the victim gets the feature to track the live location of the Victim, this module shows the map and the victim marked with their live location within the map, also a button for the rescuer to choose to update the status of the request as completed.
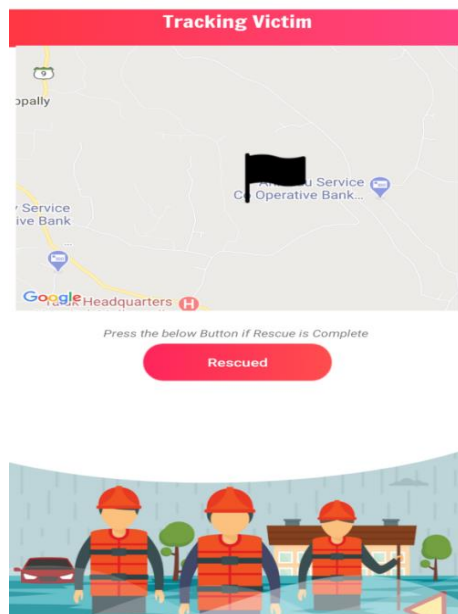

Figure 7: User Tracking Module

VII. RESULTS AND DISCUSSIONS

Flood Rescue system is an application that is used to monitor the disastrous situation. In this application we can prioritize the requests and also we can eliminate multiple requests .Then the details of the victim are given to the closest rescuer and thus the communication between the assigned rescuer and that particular victim is made possible. Those who visit this application may be either the rescuer or the victim. If he/she is a victim then they will be asked to provide their basic details such as name, email address, phone number and location and finally they will give a rescue request. On the other hand if he/she is a rescuer then they will be provided with the current status or requests. The rescuer checks whether the requests have been accepted, if accepted then checks whether the victims have been rescued. If not then they will notify the victim about the arrival of the request. After the rescue task the status will be updated in the victim's page. Thus the victims can be saved and reached to safe places.

VIII. FUTURE ENHANCEMENT AND CONCLUSION

A. FUTURE SCOPE

For wide area communication a centralized system can be developed with the satellite Wi-Fi hotspot. Embedded system can be developed which can help to reduce the human involvement in deploying the system in the affected areas. Various studies can be done to improve the efficiency of the router.

B. CONCLUSION

Due to the power failure in network towers during flood, there were no network connections available. So, people got isolated because they were not able to communicate with the rescuers. Our system aims to provide a mobile application that can send messages without the help of Internet and Cellular Data or Signals From this application people can send rescue Request message using the Wi-Fi and can communicate with rescuers.

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