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Effective Management of Resources during Floods using Optimal Allocation Schemes

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Abstract:
Disasters can be natural or man-made or a mix of both. Severe floods affected the south Indian state Kerala due to unusually heavy rainfall during monsoon. Over 483 people died and more than 140 are missing. The 2019 Indian floods were a series of floods that affected over thirteen states due to incessant rains. 2017 floods hit the states of Bihar, Gujarat and West Bengal and also the North eastern parts of India. Steps can be taken to help the victims for post flood reliefs. In this work we present an innovative flood rescue system that helps to allocate resources to relief camps optimally. It also helps in finding the victims if present in a particular relief camps. Allocation of volunteers area wise wherever needed is also a feature of this system. This project aims to maintain a stock inventory which is basically the central management for the allocation of resources. Service requests from the public can also be accepted. Stock inventory is maintained for vehicles and the route for next stop is displayed. Camps' details can be modified by the authority in charge. This app and website will be very useful to the community and can be used by government authorities in the future.

Index Terms: Disaster Management; Flood; Flood Rescue; Resource Allocation; Flood Routing; Inventory Management; Stock Registry; Collection Point; Relief Camp;.

I. INTRODUCTION

We are living in an era of global warming, where flash floods, forest fires, and other disasters are going to be a normal occurrence. Therefore we must efficiently use technology to cope with disasters in a more proper way. The first major floods in Kerala, forest fires in Amazon rain forests and the bushfires in Australia were evidence to the fact that we are under prepared to handle a large scale disaster. As we recovered slowly after the floods which ravaged us, we understood the need for technology to interfere in our disaster management process. Hence, the Kerala State Disaster Management Committee was revived and they have been keen on using the latest technology in order to be better prepared if we face a disaster in the future. Disaster can be natural or manmade or a mixture of both. In both the cases the only possible thing we can do is to make sure that proper assistance is given to the victim as soon as possible[5].

Every Country has invested a lot in disaster man- agement recently because there has occurred a need to detect the emergency information before disasters strike. Recent and novel advances such as optical sensors, wireless sensor net- works, have been applied to predict and detect disasters such as floods, volcano, earthquakes, landslides etc. Overall loss experienced by India until now because of landslides alone is 400 million. Improved technologies for database management and data representation are present today. Communication technologies with more range consuming less power and lesser bandwidth are very useful. Disaster monitoring systems must be able to broadcast warning messages before the disaster strikes, so everyone can be better prepared.

II. LITERATURE SURVEY

To use the information while implementing,

• People in the affected area ignore the instruction to evacuate from rescue teams. Instead, they will start to evacuate only after they heard direct instruction from the local leaders[1]. So we need to integrate these peoples to our product.

• The resources are to be allocated in such a way that the place with higher priority should be served first than the remaining[2].

• The rescue mechanism of a unified command, complete perform and response sensitivity, and operate economical be shaped by the system and improve the city's ability to resist to public emergencies have nice significance[4].

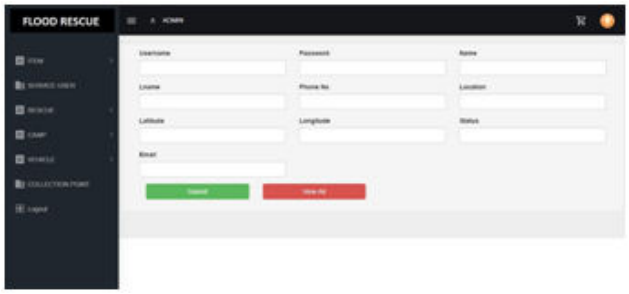

Figure.1. User ID generation for other users

• Disaster Related Data Transmission Channel Construction- Data collection usually directly connects with data transmission. As for disaster management and rescue, not only the disaster related data but also the location data are needed. Besides, the disaster reduction rescuing command must reach the disaster field by reliable communication means[3].

III. PROPOSED SYSTEM IDEA

We have the end users, who are the beneficiaries of this project. The end users are mainly five viz; relief camps, collection points, victims, volunteers and relief vehicle drivers. Each has separate user requirements and there is a dedicated admin panel for this who mostly would be top officials from the authority implementing this project. The admin has to acknowledge and allocate the provisions needed for each relief camp. Admin also creates user ID's for the four end users- victims, drivers and volunteers Fig. 1. Each relief camp will be uniquely identified by their latitudinal and longitudinal positions. Resources to each relief camp will also be allocated depending on the strength of the camp. The camp's strength will be specified by the officer in charge of each camp. When he/she specifies the number of victims in a camp, the amount of resources needed to meet the day to day requirements of the camp will be allocated accordingly. Users can log in via mobile application or straightaway from the website. The mobile application will be designed using android studio. The web version will be designed using HTML and PHP on client side and server side respectively. We'll be using My SQL for database management. Flow diagram given in Fig. 3, consists of 3 main blocks, viz: stock registry, relief camp and service.

A. Stock Registry

Admin, usually a Govt authority creates the collection centre. Volunteers who have applied through the volunteer call are roped in for proper management. Items collected which arrive at the collection centres are added to the inventory and updated in the stock registry. From there, items are transported to different relief camps according to their need. The vehicles required for transportation are allocated by the admin itself. The vehicle gets the details of the destination and a route map is also provided.

Figure.2. Volunteers data collection

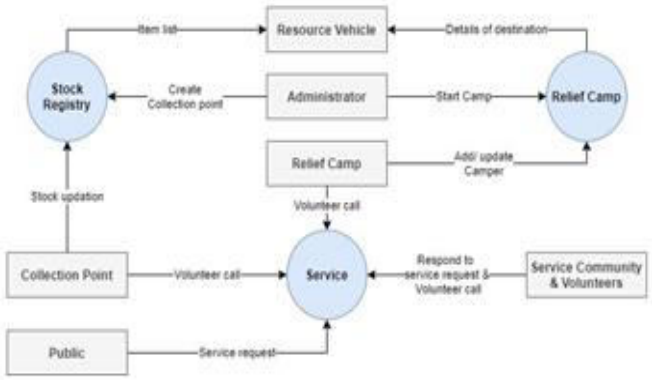

Figure. 3. Flow diagram

B. Service Management

There's a dire need of volunteers at this stage and a portal for the public is opened. Other than the public, there are various service community volunteers and NGO's who come forward to help. All these are registered Fig. 2 and called in at the time of need. They are allocated to different relief and collection centres. The public can also request for help through the portal(like cleaning a waterlogged house) and according to the magnitude of the task, volunteers will be allocated.

C. Relief Camp

The admin creates a relief camp at a specific latitude and longitude the authority in charge of the relief camp adds new victims (if any) who start residing in the camp and it is then approved by the admin panel. Volunteers are allocated to these camps for proper management. The coordinates of the camp is provided to the vehicle allocated for delivery.

IV. SYSTEM MODEL

Our system implements the integration between the three basic parts, they are,

- Victims database (relief camp)
- Stock registry (collection point)
- Allocation of schemes

Beyond this, the system also has the features to locate the missing ones. A feature of volunteer calls for completing the service requests has also been included.

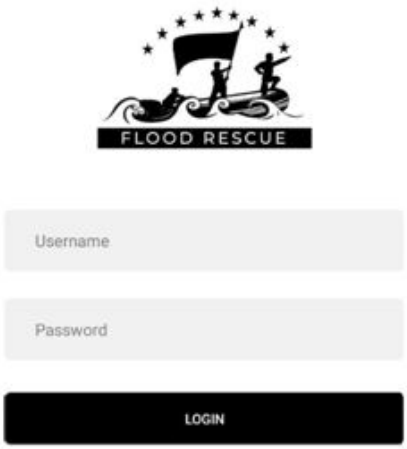

Figure.4. Driver interface is designed using android

A. Generation of Relief Camp

Login details are provided by the Admin under the concern of government authorities. Each relief can add or modify the details of people in the camp. A particular victim can be found if he is present in a particular camp by providing his unique details like Aadhar ID. While feeding the database with details of affected, adding their Aadhar ID will reduce the corruption which generally takes place in relief camps. This will eventually help in distributing the items among the needful.

B. Stock Registry Management

Login page for collection points are also provided by the admin. The authority of the collection points gets to access the updated database every time. This database will have the up to date details. Each modification made will be updated in the database immediately which would alternatively reduce the theft by

authorities that could take place in the collection points. The availability of resources in the camps can be verified if any kind of shortage happens.

C. Allocation of items and transportation

Login for resource vehicle in maintained in the system. Items are allocated in each resource vehicle according to the number of people in the camps. Vehicle may be allocated with resources to more than one camp according to the capacity of the vehicle. A route is set up with the help of Google API for an optimistic route. Vehicles can drop off the resources on their route to different relief camp. Log in interface of driver given in Fig. 4.

V. METHOD EMPLOYED

A. Android Studio

Android Studio is an integrated improvement environment (IDE) for Android app development, primarily based on

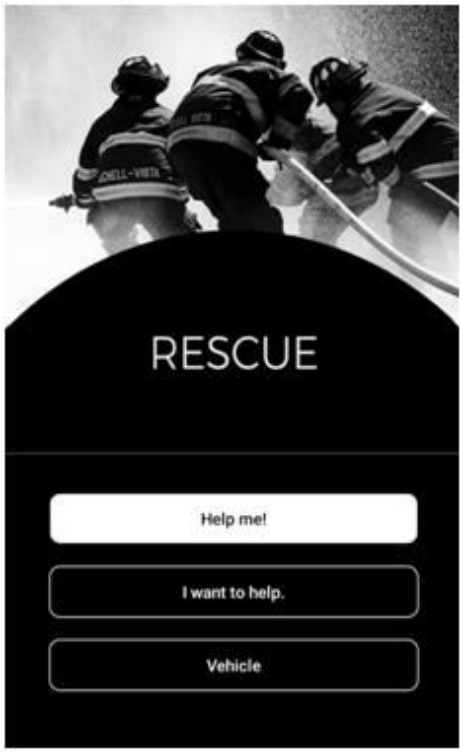

Figure.5. Application interface is designed using android

IntelliJ IDEA. Android Studio is designed specifically for Android development. It is to be downloaded on Windows, MAC OS X and Linux, and changed as Google's primary IDE for native Android application development. Android Studio offers flexible Gradle based totally construct system, code templates to help you build common app functions, rich format editor with support for drag and drop subject matter editing, built-in assist for Google Cloud Platform, making it clean to integrate Google Cloud Messaging and App Engine and plenty more. Android Studio functions a new and progressed interface design perspective where you can view the interface you are working on and its associated components. Android Studio provides a number of user interface tools to assist you with creating layouts, imposing style themes, and building picture or text resources for your app. Interface of Android app is given in Fig. 5.

B. Android SQLite

SQLite is an open-source social database i.e. used to perform database operations on android gadgets, for example, setting away, controlling or improving relentless records from the database. It is implanted in android by using default. In this way, there's no compelling reason to play out any database setup or organization assignment. The android. Database. Sqlite. SQLite Open Helper class is used for database introduction and model management. For any database operation, you need to offer the implementation of on Create() and on Upgrade() methods of SQLite Open Helper magnificence.

VI. CONCLUSION AND FUTURE SCOPE

Our system provides an easy way to manage people who are affected, by providing essential commodities at the earliest. Transparency is maintained in distribution of items and resources under this system. This will alternatively increase the trust of citizens on the authorities and motivate them with hope. In the future, Routing protocols can be added for better transportation of resources. Login can be provided for government authorities for direct accessibility. Flood mapping can be embedded to this system. Embedding weather prediction with this system will help in identifying flood alert areas and red zones.

VII. REFERENCES

[1]. M. Kartiwi and T. S. Gunawan," Framework for Logistics Coordination and Distribution Mobile Application in Disaster Management", Advanced Computer Science Applications and Technologies (ACSAT)2013 International Conference on, 2013.

[2]. Hiteswari Gamit, J Sathish Kumar and Mukesh A Zaveri," Resource monitoring and scheduling for post disaster management using Internet of Things", 2018 3rd International Conference for Convergence in Technology (I2CT), 2018.

[3]. Xuan, W., Chen, X., and Zhao, G. (2007, July 23–28). Early warning monitoring and management of disasters. In IEEE International Con- ference on Geoscience and Remote Sensing Symposium, IGARSS 2007 (pp. 2996–2999). Barcelona. 10.1 109/IGARSS.2007.4423475 [Crossref], [Google Scholar]

[4]. Chunquan Du, Shunbing Zhu,"Research on Urban Public Safety Emergency Management Early Warning System based on Technologies for the Internet of Things", 2012

[5]. C. V. Abhimanyu and Prof. Gripsy Paul," Efficient Traffic Clearance for Emergency Vehicle", 2020