The Community Disaster Relief Coordination Hub

Adarsh Karanth[1], Basavaprabhu[2], Bharath Hemaraddi Giraddi[3], Ganesh K[4]and Karthik A R[5]

[1]Professor of Practice, Department of Computer Science & Engineering, SDM Institute of Technology, Karnataka, India
2,3,4,5 B.E Scholars, Department of Computer Science and Engineering, SDM Institute of Technology, Karnataka, India

Correspondence should be addressed to Sahana Kumari B: kumaribsahana07@gmail.com

ABSTRACT- Community Disaster Relief Coordination Hub is an integrated web-based solution that aims at ensuring the efficiency, accuracy, as well as coordination of disaster response efforts. In cases like floods, earthquakes, cyclones, or landslides, effective communication as well as resource distribution becomes necessary. This particular project aims at integrating affected individuals, volunteers, NGOs, as well as the government on one common platform. This platform was developed using Java Spring Boot and ReactJS. This platform helps the affected persons make real-time rescue requests for essential requirements like food, shelter, or the need for medical services. This will be done based on priority, with the help of which it will be shown on the map.

Registered volunteers can also take up tasks based on their skills and update the progress status, which helps the operations be transparent and coordinated. NGOs can effectively track the relief item inventories and distribute the relief items to the highest priority regions. A registered administrator can view a complete dashboard containing active requests, available resources, and volunteer engagement.

With features like real-time notification and communication, the platform eliminates any delay and confusion during a critical situation. On the whole, the Community Disaster Relief Coordination Hub provides a dependable, scalable, and user-friendly solution to enhance the disaster management process, as well as facilitate timely assistance to the affected community.

KEYWORDS- Disaster Management, Emergency Response, Relief Coordination, Volunteer Management, Resource Allocation, Real-Time Communication**.**

INTRODUCTION

Communities are severely affected by disasters such as floods, cyclones, earthquakes, and landslides, which cause loss of life, displacement, and disruption of essential services. In these critical situations, timely communication, organized coordination, and proper utilization of available resources are vital for minimizing damage and ensuring public safety. Traditional disaster management systems often fail to avoid miscommunication, delayed responses, lack of accurate information, and difficulty in coordinating volunteers and relief materials.

The Community Disaster Relief Coordination Hub is designed to meet these challenges by offering a single digital platform for connecting victims, volunteers, NGOs, and authorities. The system brings all the stakeholders together, whereby information flows effectively, and the help reaches the right place at the right time. Victims can use the platform to make immediate requests for rescue, food, shelter, and medical support. Volunteers and NGOs are aided in managing their tasks and resources effectively by the app. Real-time updates, map-based tracking, and priority-based task allotment make disaster response coordination easier with the system.

It was developed using the MERN stack and cloud technologies for scalability, data security, and smooth performance even on peak usage. These features, combined in the Community Disaster Relief Coordination Hub, give a modern and cutting-edge solution for disaster management. It is equipped with role-based functionality, a user-friendly interface, and auto-notifications.. It pursues the goal of minimizing chaos, improving the efficiency of organizational teams, and provide quick and reliable help to those in distress in emergency situations.

I. LITERATURE REVIEW

Several studies have explored the use of digital platforms and communication technologies to improve disaster responses and emergency coordination.

1. A study on use social media for disaster communication highlights how platforms such as twitter and facebook enable rapid dissemination of emergency alerts and real-time updates between authorities and local communities.
2. Research in crisis informatics emphasizes the integration of user-generated social media data with formal emergency response systems to improve situational awareness and decision-making during disasters.
3. Studies on community- centered emergency management systems stress the importance of collaboration among citizens, volunteers, NGOs, and government agencies to build resilient and scalable disaster response frameworks.
4. Research on Information and Communication Technology (ICT) for disaster risk reduction shows that tools such as mobile applications, and cloud.
5. Studies on social media use in crisis communication highlight the importance of transparent two-way communication between organizations and the public. Secure information sharing, real-time notifications, and reliable digital platforms help build public trust and ensure efficient coordination during emergencies.

II. PROBLEM STATEMENT

During disasters like floods, cyclones, earthquakes, and landslides, major challenges persist due to the absence of an integrated, effective, and real-time coordination system. The victims often cannot communicate their urgent needs for rescue, shelter, food, and medical support. Volunteers, NGOs, and government agencies, on the other hand, seem to work independently through scattered communication channels of phone calls, social media posting, and manual reporting. This leads to delays in assistance, duplication of efforts, and poor allocation of limited resources. Critical information about the availability of relief supplies, the location of victims, the condition of the affected areas, and the status of rescue teams remains unorganized and inaccessible when it is most needed. Due to the lack of real-time tracking and prioritization, it is difficult to identify people in high risk, act on time, and also ensure accountability about the distribution of relief materials. All these gaps and inefficiencies in communication lead to slow response times, increase in casualties, and unnecessary human suffering. None of the current systems have been found to integrate all stakeholders on a single platform that can support coordinated decision-making and rapid disaster response. So, there will be an increased and immediate need for a centralized solution that should be scalable, technology-driven, and able to unify information, streamline communication, and enhance the effectiveness of disaster relief operations.

III. OBJECTIVES

A. To develop a single-window disaster coordination platform that connects victims, volunteers, NGOs, and authorities.

An efficient disaster response calls for a unified digital platform that brings all stakeholders under a single system. The proposed system provides a unified web-based hub where victims can raise emergency requests, volunteers take up tasks, NGOs manage resources, and authorities can keep track of operations. This eliminates communication gaps, reduces delays, and ensures coordinated disaster management across many agencies and communities.

B. This enables real-time reporting and priority-based tracking of emergency requests

A timely response is critical for saving lives. The system allows victims to submit real-time requests for rescue, medical support, food and shelter. These requests are automatically prioritized according to severity and urgency. Real-time updates and tracking ensure that high-risk cases are addressed first, improving response accuracy and reducing the loss of life and property.

C. This enhances the efficient management and distribution of relief resources.

Proper management of relief materials is essential in disaster situations. The platform enables NGOs and authorities to monitor the inventory levels of food, medicines, shelter kits, and other essentials. It supports real-time updates of available resources and their allocation to high-priority areas. This prevents resource shortages, minimizes waste, and ensures fair and effective distribution to affected communities.

D. To implement map-based visualization and location tracking for improved situational awareness.

Geographical awareness is vital for disaster response. The system integrates an interactive map-based visualization to display the locations of victims, volunteers, rescue teams, and relief centers. Live location tracking functionality facilitates effective route rescue planning for the concerned authorities and helps in effective zone identification during emergencies.

E. To provide a secure, scalable, and automated communication platform using cloud technology.

The platform is designed as a secure and user-friendly web application optimized for high traffic during emergencies. It uses cloud infrastructure for scalability and reliability. Features such as real-time notifications, secure authentication, and automated communication improve transparency and response speeds. This ensures uninterrupted service, protects user data, and builds trust among all stakeholders involved in disaster relief operations in Japan.

IV. METHODOLOGY

A. OVERVIEW OF OBJECTIVES

1. Data collection

Information is collected from victims, volunteers, NGOs, and administrators, including disaster location, type of request, severity, available resources, volunteer skills, and geographical coordinates for accurate mapping.

2. System Design and UI Development

User interfaces for the Victim, Volunteer, NGO, and Admin modules were designed using React.js, focusing on responsive layouts, interactive dashboards, forms, and map-based visual displays.

3. Backend and Database Setup

The backend was developed using **Java Spring Boot**, where the **REST APIs** handled request submission, volunteer assignment, and resource management. **My SQL** was used to securely store user data, disaster requests, resource inventories, and transaction logs for tracking and reporting purposes

4. Functionality and Integration:

Core functionalities, such as real-time request handling, priority-based classification, volunteer/resource assignment, status update (Pending, Assigned, In Progress, Completed), and live map tracking, were implemented. All features were integrated using Spring Boot APIs consumed by the React frontend.

5. Testing and Deployment:

The System modules were tested using Postman to ensure performance, reliability, and correct API responses. The complete application was deployed using Git, CI/CD pipelines, and cloud platforms, ensuring stable and scalable access during disaster scenarios.

B. SYSTEM ARCHITECTURE

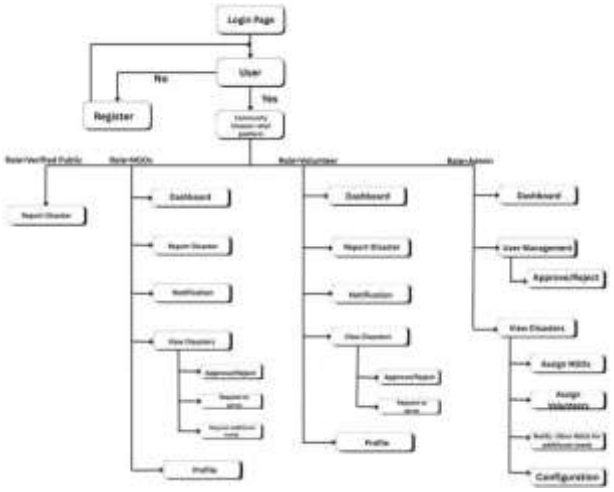

Figure1. System design architecture

The image is a flowchart representing the architecture and user journey of the Community Disaster Relief Platform. The Process begins at the login page, where users can either log in or register if they are new users. Upon registration, users are categorized into four main types: Verified Public, NGO or Relief Organization, Volunteer, and Admin, each with specific roles and functions. Verified Public users have limited access and can only report disasters. NGOs and Volunteers share similar functionalities, such as accessing a dashboard to view ongoing disasters, submitting requests to serve, reporting disasters, receiving notifications, and managing their profiles. They can also view all reported disasters and approve or reject service requests. In addition, NGOs can request additional resources for ongoing relief efforts. Admin users possess the most comprehensive access, including user management, where they can approve or reject new users' requests. They can also view disasters, assign NGOs and volunteers to specific tasks, notify relevant parties, and configure the platform settings.

C. FLOWCHART

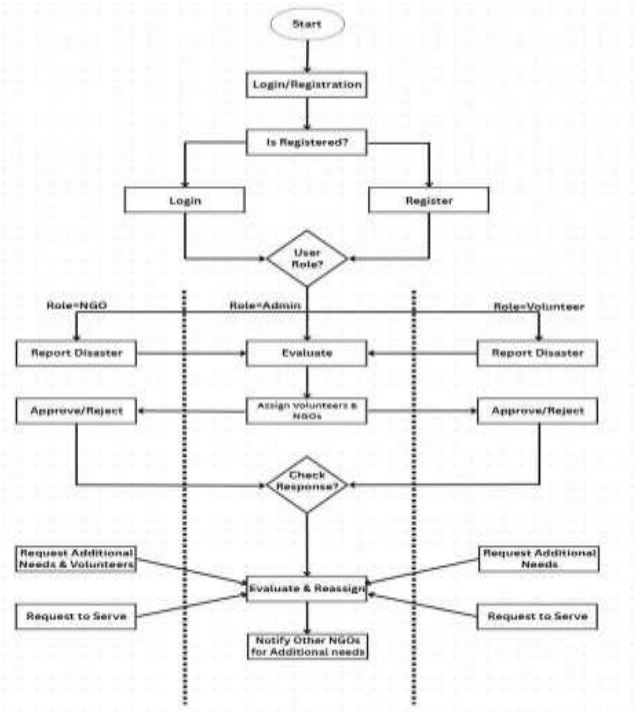

Figure2. Flowchart

V. RESULTS AND DISCUSSION

The evaluation of the **Community Disaster Relief Coordination Hub** demonstrated a positive impact on users' understanding of coordinated disaster responses and technology-driven emergency management. Users reported that the integrated system, which combined real-time emergency reporting, volunteer coordination, resource tracking, and authority communication, made complex disaster management processes easier to understand and implement. Real-time incident updates and priority-based request handling helped users recognize how digital platforms can guide effective rescue operations, medical support, food distribution and shelter allocation. Most users appreciated the interactive features, including live status tracking and notification systems, which simplified their understanding of disaster response workflows, such as victim rescue, relief material distribution and inter-agency coordination. The automated alert and communication modules further enhanced responsiveness by providing instant updates to volunteers and authorities, making critical information accessible to all stakeholders. Overall, the results indicate that the platform significantly improves awareness of organized disaster preparedness and response and supports users in understanding how digital tools can help communities cope with emergencies and large-scale disasters. Additionally, users observed that the platform encouraged the early adoption of digital relief coordination systems by demonstrating their practical benefits in a simple and user-friendly manner. The combined modules also helped users understand the importance of real-time data and predictive coordination in reducing human and material losses, particularly in extreme disaster situations. Furthermore, the system's structured operational flow improved users' ability to connect theoretical disaster

management concepts with real-world emergency response applications, making the entire learning and coordination experience more holistic and impactful for the user.

Figure3. Home page of the application

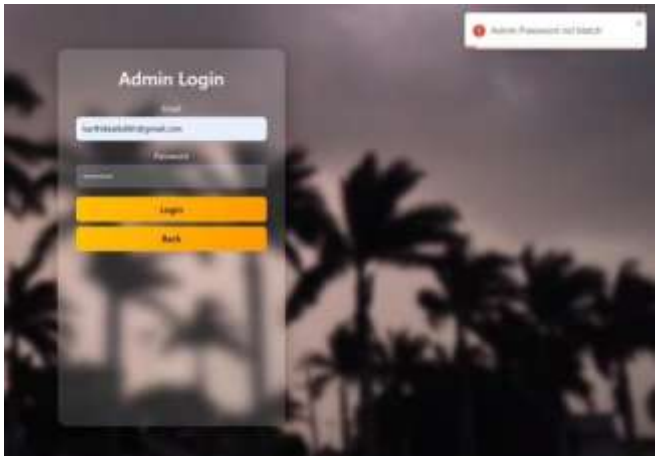

Figure4. Admin login

Figure5. Volunteer registration page

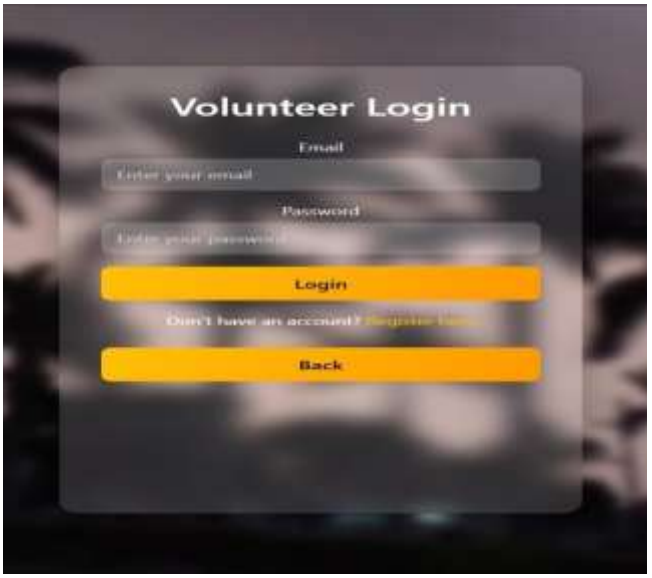

Figure6. Volunteer login page

Figure7.Submiting the Disaster Report

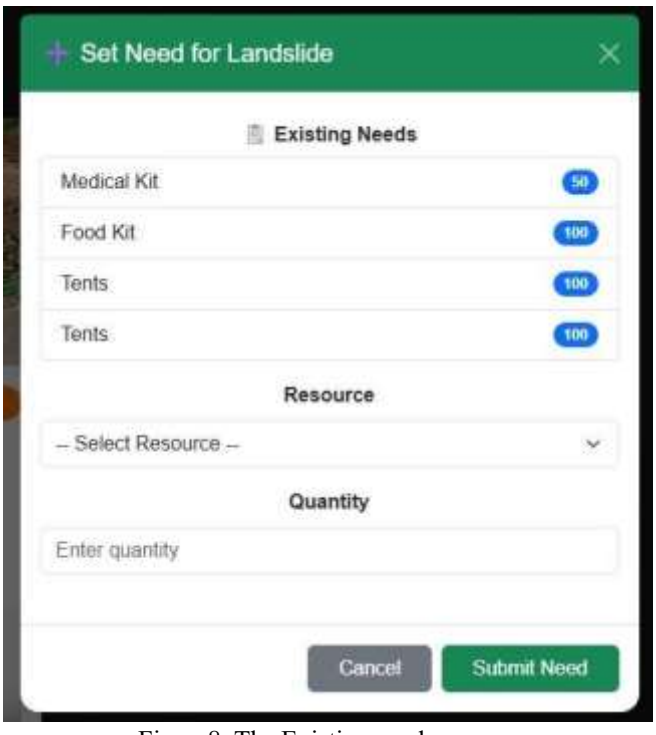

Figure8. The Existing needs

Figure9. NGO registration through Admin

Figure10. Volunteer registration through NGO

Figure11. Recent disaster report card

VI. FUTURE SCOPE

The **Community Disaster Relief Coordination Hub** can be significantly enhanced in the future by integrating **IoT-based sensors** and smart devices to capture real-time data related to water levels, seismic activity, weather intensity, and infrastructure damage, thereby enabling faster and more accurate disaster prediction and responses. **Drone and satellite imagery** can be incorporated into large-scale disaster area monitoring, victim detection, damage assessment, and route planning for rescue teams. Advanced **AI and machine learning models** can be used to forecast disaster impact, optimize resource allocation, and predict high-risk zones, thereby improving preparedness and minimizing the loss of life and property damage. The platform can evolve into a fully **multilingual and personalized emergency advisory system** that delivers location-based alerts, evacuation guidance, and relief updates tailored to the needs of individual users. Furthermore, **Blockchain technology** can be applied to ensure transparency in relief fund management, donation tracking, and resource distribution. With **cloud-based scalability**, the system can be expanded to serve entire cities, states, or even at a national level, making coordinated disaster responses faster, more reliable, and accessible to all communities.

VII. CONCLUSION

The **Community Disaster Relief Coordination Hub** provides an innovative, technology-driven solution for strengthening emergency response and community resilience during disasters. By integrating real-time incident reporting, volunteer coordination, resource tracking, automated alerts, and authority communication, the system enables faster, more organized and transparent relief operations. This helps reduce response delays, minimize losses, and ensure timely support for the affected communities. Overall, this project demonstrates how digital platforms, real-time data, and intelligent coordination can work together to build a more efficient, reliable, and resilient disaster management ecosystem that protects lives and supports rapid recovery following a disaster.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

REFERENCES

[1] Mitcham M., Taylor A , Harris J. (2018). *Utilizing Social Media for Information Dispersal During Local Disasters: The Communication Hub Framework for Local Emergency Management* . Journal of Emergency Management, 16(3), 153–165

[2] Palen, L., Anderson, K., Mark, G., Martin, J., & Sicker, D. (2010). *Crisis Informatics: New Data for Extraordinary Times* . ACM Transactions on Computer-Human Interaction, 18(4), 1–23

[3] Lin, X., & Margolin, D. (2014). *Designing Emergency Management Systems: Integrating Technology, Collaboration, and Community Engagement* . International Journal of Information Systems for Crisis Response and Management, 6(2), 50–65

[4] Shaw, R., & Izumi, T. (2014). *Information and Communication Technology for Disaster Risk Reduction (ICT-DRR)* . Routledge Publications

[5] Austin, L., Fisher Liu, B., & Jin, Y. (2012). *Social Media Use in Crisis Communication*. Public Relations Review, 38(3), 317–326.

[6] Meier, P. (2015). *Digital Humanitarianism: How Big Data Is Changing the Face of Disaster Response*. CRC Press.

ABOUT THE AUTHORS

	Mr. Adarsh Karanth is currently a Professor of Practice. He completed his B.E. in 2004 from MCE, Hassan. His technical areas of expertise include Java, J2EE, and full-stack frameworks. He has approximately 17 years of experience in the IT industry, having undertaken various roles such as Programmer, Team Lead, Architect, and Subject Matter Expert (SME). Additionally, he has around 2 years of academic teaching experience
	Mr.. Basavaprabhu is currently pursuing Bachelor of Engineering in Computer Science from SDM Institute of Technology, Ujire and is in the final year. He has a keen interest in java programming, Web Development and MERN stack.
	Mr. Bharath Hemaraddi Giraddi is currently pursuing Bachelor of Engineering in Computer Science from SDM Institute of Technology, Ujire and is in the final year. He has a keen interest in java programming and Web Development.
	Mr. Ganesh K is currently pursuing Bachelor of Engineering in Computer Science from SDM Institute of Technology, Ujire and is in the final year. He has a keen interest in Web development, C programming and React, node.js and java programming.
	Mr. Karthik A R is currently pursuing Bachelor of Engineering in Computer Science from SDM Institute of Technology, Ujire and is in the final year. He has a keen interest in Web Development, React.js and java programming.