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Project Synopsis

Community Disaster Response Network

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Introduction

Disaster-prone regions frequently suffer significant human and economic losses due to fragmented communication, delayed warnings, limited situational awareness, and poor coordination among citizens and emergency responders. Traditional channels such as phone calls, local announcements, and scattered social media messages often lead to misinformation, slow response, and inefficient resource allocation.

The Community Disaster Response Network (CDRN) is a unified, real-time digital platform designed to empower communities, local authorities, volunteers, and NGOs to collaboratively prepare for, respond to, and recover from disasters. This platform integrates incident reporting, live communication, resource coordination, and data-driven decision support to minimize response time and enhance community resilience.

Problem Statement

Despite advances in communication technology, disaster response remains slow and uncoordinated due to:

- Delayed early warnings
- Fragmented information across multiple platforms
- Lack of real-time updates
- No unified map of incidents, shelters, and affected areas
- Inefficient volunteer and resource management
- Poor tracking of recovery and relief efforts

There is a critical need for a scalable, real-time, multi-role disaster management system that connects all stakeholders on a single platform.

Objectives

- Build a **real-time alert system** using WebSockets.
- Enable citizens to report incidents with media + location.
- Provide authorities with a **live dashboard** for coordination.
- Assign tasks to volunteers and track completion.
- Visualize high-risk areas using **heatmaps**.
- Predict upcoming risks using external APIs (weather, AQI, flood).
- Provide offline-friendly features during connectivity failure.
- Ensure multi-language support and accessibility.

Technology Stack

- Frontend:HTML,CSS, Tailwind CSS
- Backend: Node.js, Express.js
- Database: MongoDB Atlas (Mongoose)
- Authentication: JWT & Google OAuth

- Hosting: Render
- Version Control: Git & GitHub
- Image Storage: Cloudinary (for secure and scalable image management).

System Architecture

- **Frontend Layer (React/Flutter):** User apps for citizens, volunteers, and a dashboard for authorities.
- **Backend Layer (Node.js):** Handles authentication, incident processing, task management, and alerts.
- **Real-Time Communication (Socket.IO):** Enables instant updates for incidents, volunteer tasks, and alerts.
- **Database Layer (MongoDB/SQL):** Stores user profiles, incidents, shelter data, and recovery records.
- **External Integrations:** Weather APIs, SMS notifications, push alerts, and map services (Mapbox/OSM).

Workflow Overview

- **Users (citizens) report incidents** using mobile/web app with photos, videos, and GPS location.
- **Real-time alerts and warnings** are pushed to all users based on weather API or authority updates.
- **Authorities monitor incidents on a dashboard** with heatmaps and assign tasks to volunteers.
- **Volunteers receive tasks instantly**, update status, and navigate to affected areas using live maps.
- **System tracks recovery activities**, including damage assessment, relief distribution, and case updates.

Modules and Features

A. Module 1: Citizen App

- Report incidents
- Profile creation
- Track safe routes

B. Module 2: Real-Time System

- Build WebSocket server
- Emit events for incidents, alerts, and updates
- Manage connected clients

C. Module 3: Authority Dashboard

- Live feed.
- Task assignments
- Heatmaps.

Expected Outcome

- Faster disaster response
- Improved communication between community and authorities
- Reduced casualties through early warnings
- More structured and transparent rescue operations
- Community-driven disaster resilience

Conclusion

The Community-Based Disaster Response & Early Warning System provides a powerful, scalable, and real-time solution to enhance disaster preparedness and community resilience.

By connecting citizens, volunteers, and authorities on one unified platform, this system can significantly reduce response time and save lives.

This project has vast potential for future expansions and real-world deployment, especially in disaster-prone areas.

Future Scope

- AI-Based Disaster Prediction
- Drone-Based Surveillance
- Offline Mesh Networking
- Integration with National Disaster Agencies
- SMS-Based Alert System
- Blockchain for Data Integrity
- AI Chatbot for Emergency Guidance

Thank You.