**Name:** Lourdhu Priscilla.A

**Reg No:** 311623244013

**College Code:** 3116

**College Name**: Misrimal Navajee Munoth Jain Engineering College

**Department**: Computer Science And Business Systems

**Problem Definition & Design Thinking**

**Title: Natural Disaster and Prediction Management**

**Problem Statement:**

Natural disasters like cyclones and floods can be devastating but with the right tools, we can minimize their impact. There is a need for an inclusive, real-time prediction and alert system that not only predicts such disasters using advanced technology but also ensures that every individual, regardless of age, literacy level, or location, receives and understands the warning.

**Target Audience:**

* **Government & Disaster Management Agencies:** Help plan and respond to damages and disasters.
* **Local Authorities & General Public**: Send alert and manage evacuations.
* **Researchers & Meteorological Experts:** Study weather patterns and improve cyclone and flood prediction accuracy.
* **Communities & NGOs :** Provides evacuation information,ticket links, find safe routes, and access reliable shelters before disaster strikes.
* **Tech Developers & IoT Engineers :** Build smart systems to track, predict, and respond to disasters effectively.

**Objectives:**

* To develop an AI-powered system that predicts cyclone and flood-prone areas with high accuracy.
* To equip homeowners with essential tree-trimming insights, ensuring unobstructed roads and enhanced safety during disasters.
* To integrate real-time evacuation route mapping and ticket booking assistance for those needing to evacuate safely.
* To create a notification system that connects disaster victims with available shelters offered by charities and willing hosts.
* To establish a community-driven platform where users can report repair needs and restoration progress for swift rectification.

**Design Thinking Approach:**

**Empathize:**

* **User Research:** Gather feedback from all key stakeholders (government agencies, local authorities, NGOs, communities) to understand their needs, pain points, and limitations.
* **Contextual Observation:** Observe how communities are affected by cyclones and floods, focusing on communication gaps, evacuation difficulties, and the role of local authorities.
* **Identify Needs:** Understand the diverse needs of people in different locations, literacy levels, and technological access.

**Key User Concerns:**

* Simplified alerts for all literacy levels.
* Speed and efficiency of evacuation routes and transportation booking.
* Trust in AI-based predictions and the accuracy of alerts.
* Availability of shelters and timely information during disasters.
* Coordination between agencies, local authorities, and NGOs for effective communication.

**Define:**

The Obstacle can be defined as:

* **Current system failures:** Lack of real-time, accessible, and accurate disaster predictions that reach all members of society.
* **Complexity of existing disaster response efforts:** Fragmented communication, unclear evacuation routes, and limited shelter information.
* **Varying accessibility:** Challenges in reaching rural, isolated, and underserved communities with timely, understandable information.

**Key Features Required:**

* Simplified disaster alerts with visual cues for people with varying literacy levels.
* Integration with local transportation systems for real-time evacuation route mapping and ticket booking.
* Shelter locator and booking system that provides accurate availability in real-time.
* Community reporting feature to track repair needs and restoration progress post-disaster.

**Ideate:**

* **AI-Powered Predictions:** Use AI to predict cyclones and floods accurately.
* **Tree Trimming Alerts**: Notify homeowners to trim trees to prevent damage.
* **Integrated Evacuation Assistance:** Provide escape routes and transport options during disasters.
* **Shelter Network**: Connect people with safe shelters during emergencies.
* **Recovery Platform**: Allow users to report damage, request help, and track repairs.

**Potential ideas for this solution include:**

* ML models trained on historical disaster data
* A web dashboard + mobile alert app
* Real-time integration with IMD, USGS or open satellite APIs
* Community feedback module to report incidents
* Voice alerts or regional language support for rural areas

**Brainstorming Results:**

* **AI-driven disaster prediction model:** It uses historical data, weather patterns, and machine learning to forecast cyclone and flood-prone areas with high accuracy.
* **Evacuation Route Optimization:** Integration with local transport data to provide real-time, accessible evacuation routes based on user location.
* **Shelter Locator:** Use geolocation technology to find nearby shelters in real-time and enable users to reserve spots for themselves and their families.
* **Tree-Trimming & Road Safety Insights:** Simple tips for homeowners, automated notifications for unsafe areas, and alerts about tree trimming or road obstruction before a disaster hits.
* **Community Collaboration Platform:** A platform where users can report pre-damage, provide and request help.

**Prototype:**

* A mobile app and web interface that integrates AI prediction models, real-time evacuation maps, shelter locators, and communication systems.
* Push Notifications and simple interfaces for users with varied literacy skills.
* Crowd-sourced data integration to monitor damage and repairs from affected users in real-time.

**Key Components of Prototype:**

* **AI Disaster Prediction Engine:** Real-time analysis of weather data and forecasting models to predict cyclones and floods.
* **Evacuation Route Mapper:** Integration with local transport data to generate safe, efficient evacuation routes.
* **Shelter Booking System:** Real-time shelter availability updates with booking capability.
* **Multi-lingual and Low-Tech Support:** Accessibility features that cater to different literacy levels, languages, and low-tech environments.
* **Community Reporting System:** Feature for users to report infrastructure damage, track progress, and share updates with relevant authorities.

**Test:**

* **Usability Testing:** Test the user interface, ensuring it’s intuitive, easy to understand.
* **Performance Testing:** Measure the app’s real-time response during crisis situations and the accuracy of disaster predictions.
* **Scalability Testing:** Ensure the system can handle high user traffic during major disasters.
* **Accuracy Testing:** Compare AI disaster predictions with actual event data to measure accuracy..
* **Real-time Collaboration Testing:** Ensure that community-sourced data on damages and restoration is reliably collected and acted upon by authorities.

**Testing Goals:**

* Validate the AI’s ability to predict cyclones and floods with high accuracy.
* Ensure real-time alert delivery across multiple platforms and devices.
* Measure how well the app adapts to different user groups (urban, rural, low-tech).
* Evaluate the effectiveness of the shelter booking and evacuation systems in real-world scenarios.
* Ensure seamless coordination between agencies, authorities, and the public for quick disaster response.

**TEAM MEMBERS:**

* Nivethitha P (311623244016)
* Kanagavel M (311623244011)
* Thivahar J (311623244022)
* Karthikeyan B (311623244012)