CoastGuard AI

AI-Powered Early Warning & Evacuation Intelligence

Team AquaGuard | Hackathon Innovate 2024

The Problem: Coastal Vulnerability

Coastal communities face sudden floods and storm surges, leading to:

- Lack of hyperlocal warning systems
- Poor evacuation planning
- Heavy loss of life and property

Current systems are often inadequate, leaving residents vulnerable.

Our Solution: CoastGuard AI Platform

CoastGuard AI provides comprehensive flood risk prediction and evacuation intelligence.

- AI flood risk prediction & real-time alerts

- Dynamic risk heatmaps & evacuation routing

- Integrated shelter mapping & traditional knowledge

Key Features

Coastal Flood Alerts

Timely warnings for impending floods.

Risk Zone Heatmaps

Visual representation of high-risk areas.

Cyclone Track Overlay

Real-time cyclone path visualization.

Evacuation Routes

Optimised safe passage guidance.

Shelter Locations

Designated safe havens for evacuees.

Traditional Knowledge

Integrating local wisdom for better insights.
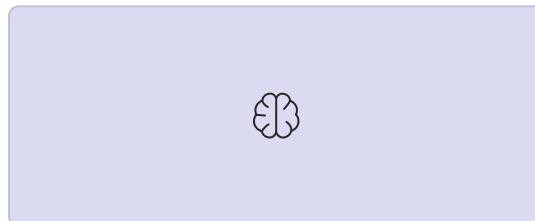
System Architecture

Our 'Digital Fortress for Coastal Defense' is built on a robust, layered architecture for comprehensive flood prediction and response.

The Watchtower (Frontend)

Reactive dashboard with Streamlit, featuring 3D geospatial visualization of flood zones via Pydeck.

The Intelligence Core (Logic)

Python-powered Risk Scoring Engine integrates satellite API data with a weighted Traditional Knowledge Modifier.

The Data Reservoirs (Backend)

Utilizes GeoJSON for village boundaries & evacuation shelters, and FastAPI for real-time sensor simulation.

The Deployment Shield

Orchestrated with Docker for single-command launch across any environment, ensuring reliability and scalability.

Risk Scoring & Alerts

Alert Trigger Logic

Risk Score Formula

$$RiskScore = Tide + Rainfall + Cyclone + TraditionalModifier$$

A dynamic formula combining multiple environmental factors and local insights.
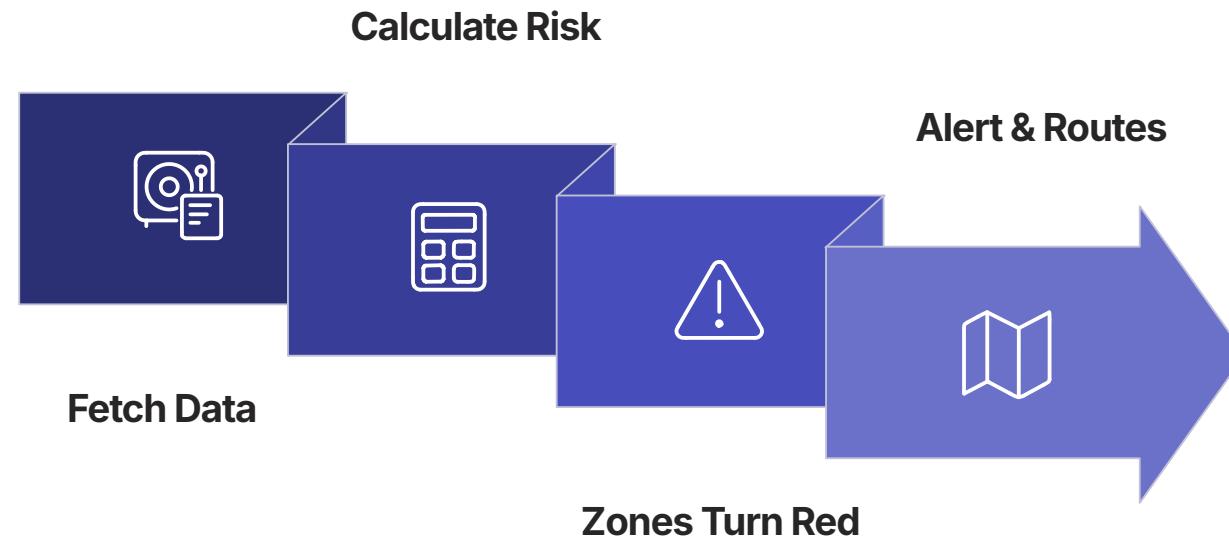
Automated alerts are triggered when risk thresholds are exceeded, ensuring timely notifications.

Map Dashboard & Evacuation

The interactive dashboard provides a clear overview of flood risks, evacuation routes, and shelter availability.

Demo Workflow

Calculate Risk

Fetch Data

Alert & Routes

Zones Turn Red

A step-by-step process from data acquisition to actionable evacuation intelligence.

Impact & Future Scope

Immediate Impact

- Saves lives and property
- Facilitates faster, organised evacuations
- Supports effective coastal governance

Future Enhancements

- Integration with IoT sensors
- SMS and multi-channel alerts
- Advanced satellite imagery feeds
- Dedicated mobile application

CoastGuard AI: Protecting Our Coasts

Empowering coastal communities with intelligent early warning systems for a safer future.

Learn More   **Contact Us**