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3rd Gen Safety

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Overview

“3rd Gen Safety” is a conceptual platform designed to help homeowners and property stakeholders proactively prepare for natural disasters using artificial intelligence and 3D printing. Developed as part of the AIS Software Innovation Challenge, our project aims to contribute to disaster resilience by offering AI-based risk assessments and custom-designed, 3D-printable reinforcement components.

Although our current submission is a partially functional prototype, it effectively demonstrates how the final system would operate—bridging the gap between digital analysis and physical home protection.

The 3rd Gen Safety Digital Platform

3rd Gen Safety proposes a digital platform that guides homeowners through a four-step process:

- User Input—Homeowners submit key property data (e.g., materials, blueprints, images).
- AI Analysis—A planned future engine leverages convolutional neural networks, predictive analytics, and geographic data to assess disaster vulnerability.
- Recommendations—Tailored reinforcement plans, including 3D-printable designs, are generated.
- Feedback Loop—Users evaluate recommendations, enabling ongoing platform learning.

Prototype note: To simulate functionality in our prototype, we used ChatGPT to generate sample outputs that represent what a fully integrated AI system would provide. This allowed us to demonstrate the platform's potential, even without the complete backend implementation.

The Aim

Our project was driven by one key question:

Can we make disaster resilience smarter, faster, and more affordable?

We aimed to create a tool that:

- Minimizes post-disaster infrastructure damage.
- Provides personalized advice with minimal user friction.
- Integrates practical tools like 3D printing with advanced information systems.
- Offers a valuable partnership model for insurance providers, government agencies, and homeowners.

The Process

Our development process focused on user experience, concept design, and simulation:

- Frontend—Built in React.js to offer an intuitive interface.
- Backend—Developed in Python; for the prototype, all logic and responses were hardcoded to simulate functionality.
- AI Integration—We used ChatGPT to simulate risk assessment and personalized recommendations. In a full release, the platform would incorporate a robust AI pipeline.
- Database—While MongoDB is the intended solution for dynamic data storage in the full release, the prototype currently runs without a live database and simulates data responses directly in code.
- Hosting & Collaboration—The prototype was built in Visual Studio Code and published on GitHub.

Reflections

This project taught us several key lessons:

- A functional mockup can tell a compelling story and validate an idea—even without full technical implementation.
- AI isn't just code—it's collaboration. ChatGPT helped us simulate our vision early on, showing how LLMs can accelerate IS design before full models are built.
- Product evolution matters. Our core idea of property fortification can extend far beyond individual homeowners.

Potential applications include:

- Construction companies using the platform to assess building integrity during the design phase.
- Governments and nonprofits deploying the tool in vulnerable regions to support low-income communities.
- Insurance providers integrating the system into policy platforms to improve loss prevention modeling.

Looking forward, we also envision:

- Integration with 3D-printed housing firms (e.g., ICON or SQ4D) for on-site solutions.
- Expanding to a global model with support for diverse infrastructure types and climate conditions.
- A green version of the platform using biodegradable or renewable building materials.

More Information

More information about the authors:

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More information about the project (Check the README.txt file):

- https://github.com/vjack-daniels/NextGen

Declaration of AI Statement

ChatGPT was used to simulate the AI engine in our prototype and to assist with editing project proposals and presentation materials, including this document.

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