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Review on Earthquake Safety Bed Authenticated by GPS

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Abstract - An innovative earthquake safety bed system integrated with GPS technology to enhance personal safety during seismic events. The proposed system utilizes real-time earthquake detection through seismic sensors, triggered an automated response that activates safety mechanisms within the bed. GPS technology is incorporated to track the bed`s location, ensuring precise data for rescue operations and post-events analysis. System aims to minimizes injuries by providing protection features such as automatic shielding, securing the user in place, and activating emergency alerts to near by responders. By combining seismic sensing with GPS based location tracking, the earthquake safety bed offers a proactive solution to reduce harm during earthquakes, offering both immediate protection and aiding post events recovery efforts.

***Key Words*:** GPS authentication, emergency response system, protection shields, microcontroller ATmega328p, piezo sensor, safety protection.

1.INTRODUCTION

The concept of an earthquake safety bed is an innovative approach to protecting individuals during seismic events. These specially designed beds detect earthquake and automatically activate mechanisms to safeguard the occupant. The introduction of GPS in earthquake safety beds can enhance safety and emergency response by automatically sending the beds location to emergency services during an earthquake.

An advanced earthquake safety bed might incorporate features like steel enclosures, shock absorbers, or emergency supplies stored within the structure to provide immediate protection. This real time location tracking allows for quick dispatch of rescue teams, particularly in situations where people might be trapped under debris or isolated. The combination of an earthquake resistant design and GPS technology creates a smart bed that not only shields the occupant from falling objects but also helps in coordinating rescue efforts efficiently.

This innovation could potentially save lives by reducing rescue times and providing a secure shelter during seismic events. In this research paper we can observe that It addresses to growing need for smart furniture that can enhance disaster preparedness, offering users peace of mind in areas vulnerable to earthquakes. Through this project, we aim to contribute to safer living environments and more effective earthquake response strategies.

2.OBJECTIVE

Provide immediate protection: The bed is designed to shield occupants from falling debris, collapsing structure, or other hazards during an earthquake, ensuring a safe space.

Enable location tracking: The integration of GPS technology ensures that the beds exact location is recorded and can be shared with emergency services. This circuit for timely rescue operations, especially in scenarios where people may be trapped under rubble.

Ensure autonomous activation: The beds mechanisms can automatically activate when seismic activity is detected, providing a quick response to protect occupants even if they are asleep unaware.

Enhance earthquake preparedness: This system promotes a protective approach to earthquake safety, incorporating protective infrastructure that can function independently to safeguard lives during and after a quake.

3.PROBLEM STATEMENT

Existing sleeping solutions lack sufficient protection against earthquake related injuries and death.

4.LITERATURE REVIEW

Agarwal and Shrikhande(2017)- "Earthquake-Resistant Design of Structures" This book provides a comprehensive overview of earthquake-resistant design of structures, covering the fundamental principles, design methods, and practical applications. The authors, both experts in structural engineering, aim to bridge the gap between theoretical knowledge and practical implementation. Comprehensive coverage of earthquake-resistant design principles and practices. Includes numerous examples, case studies, and illustrations. Covers advanced seismic design methods and techniques. Provides practical guidance for structural engineers and architects. Includes a solutions manual for instructors.

Schwarz and Oberst (2018) - "GPS and Geometric Geodesy" This book provides a comprehensive overview of the principles and applications of GPS and geometric geodesy. The authors, both experts in geodesy and GPS, aim to provide a thorough understanding of the underlying concepts and technique. Introduction to GPS and geometric geodesy Fundamentals of GPS: satellite orbits, signal structure, and receiver technology Geometric geodesy: coordinate systems, reference frames, and datum transformations GPS data processing: from observations to position and velocity determination Geodetic networks: design, adjustment, and analysis Applications of GPS and geometric geodesy: navigation, surveying, geophysics, and Earth system .

5. METHODOLOGY

1. Requirements gathering & system design.
2. GPS integration or automated safety features.
3. Communication system and real-time alerts.
4. Prototype development (e.g., hardware & software)
5. Testing and calibration.
6. Prototype evaluation & refinement.

6.BLOCK DIAGRAM & WORKING

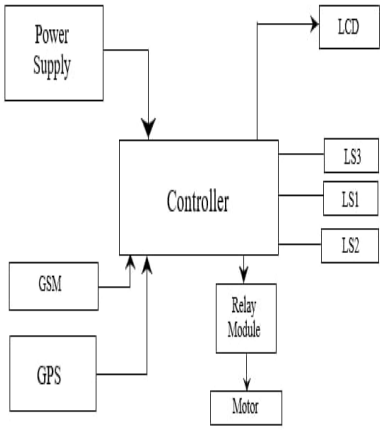

Fig : Block diagram

Controller: Controller are used to process signals and detects earthquake. Controller activates motor to lift bed`s safety enclosure. Controller monitors sensor data .Processes from the seismic sensor and GPS module, making decisions on whether to activate safety mechanisms. If the seismic detection and GPS confirmation are meet, the microcontroller activates the safety mechanism.

Limit switches: There are three limit switches are used. The limit switches ensure safety enclose. The limit switches are used to normally open and normally close the bed.

GPS: The GPS module receives earthquake warning signals from satellite. GPS module provides location coordinates. Provide the geolocation of the bed and verifies if it is in a high risk earthquake zone during the detected seismic activity. GPS accuracy is +/- 10 meters.

GSM: The GSM module receive earthquake alerts from monitoring centers. Provide location coordinates for rescue teams.GSM module alerts and triggers safety measures.

Relay module: Relay module are used to activate and deactivate emergency lights. Control motor to lift /lower safety enclosure. Control other safety devices. The relay module plays a critical role in controlling in earthquake safety bed devices.

LCD: LCD display shows warning messages and safety instructions. It is used to display system status. Displays static images and text. displays warning msg upon

seismic detection. Shows exact location and coordinates.

Motor: It is used to limit switches are close and open system and move bed to safe position. Regulates the motor speed and direction. It is used in a automatic deployment.

Power Supply: The power is stored in a battery because the power is provided in a 2 to 3 days in system.

Seismic sensor: Piezo module detects vibration and ground motion associated with earthquake. Detects vibrations above 4.0 magnitude. If it detects vibrations above a specific threshold, it triggers an alert to the microcontroller.

Safety mechanism: Mechanical components (such as cover, shield, or collapsible bed structure) that protect the occupant. It is supply first aid kit, oxygen, food and water three days minimum.

3. CONCLUSIONS

In conclusion, an earthquake safety bed equipped with GPS authentication represents a significant advanced in personal safety during seismic events. This innovative solution offers immediate protection through an automatic encloser system & enhance rescue efforts by transmitting the occupants exact location via GPS

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