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Stronger – An Online Platform For Ensuring The Safety And Mental Well- Being Of Women And Children

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ABSTRACT The protection and mental health of women and children continue to be pressing societal concerns, but while immense problems remain in the form of restricted access to mental healthcare, unawareness of legal rights, and inadequate provisions for emergency support mechanisms, immense problems still abound. The StrongHer project meets the above challenges through the creation of a secure, accessible, and integrated online platform. The platform provides virtual counselling services, mental health screenings using GAD-7 and PHQ-9 scales, gamified learning exercises that enhance legal awareness, and instant emergency response using IoT-based wearable devices. Sensitive medical records are stored securely using blockchain technology (Ethereum and IPFS) to maintain data privacy and integrity. Developed using ASP.NET Core MVC, Microsoft SQL Server, NodeMCU (IoT module), and blockchain integrations, StrongHer integrates the latest technologies to establish a digital safe space. The system empowers users by boosting their mental resilience, giving them timely support, encouraging legal literacy, and providing real-time emergency communication features. By combining counselling, legal aid, education, and emergency response within one environment, StrongHer is a complete solution to tackle the complex issues of vulnerable groups, thus making a significant contribution towards the safety and well-being of society.

INDEX TERMS: Women and Child Safety, Mental Health Assessment, Blockchain- based Medical Record Storage, Emergency SOS Alert System, IoT-based Safety Devices, Virtual Counselling.

I. INTRODUCTION

Over the past few decades, the safety and psychological well-being of children and women have become worldwide priorities. Nothing has changed despite technological progress, legislation, and awareness among people. These vulnerable communities continue to suffer from high rates of violence, harassment, cyberbullying, emotional trauma, and unavailability of prompt access to support services. Various international studies indicate that loopholes exist in extending anticipatory psychological care, legal education, and prompt emergency intervention when the person is in need.

Traditional mechanisms, including legal institutions and counselling centres, often suffer from bottlenecks such as limited reach, lack of timely intervention, social stigma, and an overwhelming volume of unaddressed cases.

With the expanding spread of digital technologies, there's a unique chance to leverage technology for building connected ecosystems that empower users. Integrated solutions that integrate psychological health assistance, legal literacy, and real-time physical safety features under one easy-to-use platform can dramatically enhance the results for vulnerable groups. Particularly in underserved areas where conventional services are scarce, mobile-optimized and web platforms offer unprecedented reach, cost-effectiveness, and immediacy.

The StrongHer website is conceived as an end-to-end digital platform meant to target these essential problems. Combining secure online counselling, gamified legal education activities, psychometric tests for mental health analysis, emergency alert systems based on IoT devices, and decentralized medical record storage in a secure manner based on blockchain, StrongHer seeks to offer a one-stop, scalable, and accessible interface for women and children.

The platform not only scales safety responses in real-time but also drives long-term empowerment by way of education, psychological resilience development, and awareness of rights. Through the innovative use of contemporary web technologies, cloud databases, decentralized storage, and networks of IoT, StrongHer emerges as a new-generation paradigm for prevention-oriented support infrastructures within society.

II. LITERATURE REVIEW

Several scholars have suggested technology interventions for mitigating the safety, mental health, and empowerment of marginalized communities, especially children and women. These interventions leverage evolving technologies like artificial intelligence (AI), blockchain, IoT, and mobile-based solutions to bridge the gaps in service delivery.

Rodríguez et al. [1] did a systematic review of digital solutions that were created to prevent violence against women and children. Their research emphasized how though there are various applications available for emergency alerts, mental health care, and legal help individually, there is an urgent need for multi-functional and cross-functional platforms that can treat more than one area at a time.

Faraz et al. [2] investigated child protection methods in the online gaming environment, recognizing the safety and psychological threats children are exposed to when accessing interactive media. They advocated for monitoring and AI-driven detection mechanisms for dangerous interactions, which formed the foundation for digital safety modules.

Jevremovic et al. [3] aimed at the difficulties involved in developing child safety platforms under resource-restrained conditions. Their work highlighted the necessity for scalable, low-cost, and light-weight systems that are centered on access for marginalized populations.

Mobin et al. [4] showed the viability of computational linguistics through the examination of social media data to mirror users' psychological status. Their research showed that online traces can be an effective indicator of psychological well-being and provided the basis for early detection mechanisms in integrated platforms.

Saleemi et al. [5] introduced a ubiquitous healthcare facility framework capable of providing real-time health assessments and recommendations through interconnected IoT devices. Their model stresses the importance of decentralization and continuous monitoring for effective support.

Satyandra et al. [6] developed LAW-U, an AI-driven chatbot that provides legal advice to domestic violence survivors. Their research underscored the advantages of anonymity, accessibility, and 24/7 availability in offering legal assistance to at-risk individuals.

Agrawal et al. [7] developed Safe Routes, a real-time route guidance system to navigate women along safer routes with the help of geospatial data analysis and predictive crime mapping. The safety route suggestions were tested by them to identify their impact on exposure reduction.

Jang and Ko [8] suggested an holistic framework of securing children's online safety through threat modeling, risk assessment, and policy intervention. Their proposals encourage multi-level protective strategies with education, monitoring, and policy control.

Although each of these studies makes a unique contribution to safety, mental health, and legal empowerment, there remains a gap in developing a single, integrated platform addressing all three pillars comprehensively. Current systems are segregated and address only physical safety, mental well-being, or legal knowledge.

StrongHer fills this space by uniting all essential modules — mental health screenings, legal education through gamified knowledge acquisition, blockchain-secured storage of medical records, and IoT-based real-time emergency alerting systems — into a unified, scalable, and user-focused platform.

III. PROPOSED SYSTEM

StrongHer's platform has been carefully crafted to deliver the broad-based safety, emotional well-being, and empowerment needs of women and children via a single, modular architecture. It utilizes a mix of web technologies, IoT hardware modules, blockchain technologies, and gamification mechanisms to provide a safe, real-time support and interaction system.

The system takes a layered architecture style in which user interaction, service logic, storage management, and external communication are distinctly separated. This makes it easy to scale, upgrade modules, ensure secure communication, and isolate faults efficiently. The platform architecture includes the following key modules:

A. Authentication and User Management

StrongHer's platform puts utmost emphasis on secure and personalized user experiences. To do this, it adopts a strong authentication mechanism that starts with the use of email-based One-Time Password (OTP) verification during registration. This process is effective in countering the threat of spurious account creation and unauthorized access to sensitive capabilities. Upon registration, users are granted different roles based on a Role-Based Access Control (RBAC) mechanism, which makes distinctions between ordinary users, counselors, lawyers, and administrators. Every role is given a personalized dashboard and access to features relating to their tasks.

For added security, the platform has strong password policies in place and intends to implement two-factor authentication (2FA) in future releases. There are also session timeout features in place to safeguard user accounts from unauthorized use due to inactivity.

B. Mental Health Assessment Module

Seeing the invaluable significance of mental health, StrongHer has incorporated a Mental Health Assessment Module. The module provides users with access to scientifically established psychometric tests, that is, the Generalized Anxiety Disorder 7-item (GAD-7) for measuring anxiety and the Patient Health Questionnaire-9 (PHQ-9) for measuring depression. Once the assessments are completed, the system immediately computes and interprets the results, classifying users as being in mild, moderate, or severe risk categories. According to these classifications, the site offers personalized support suggestions. Users classified with moderate to extreme risks are immediately paired with expert counselors, whereas users with minor symptoms are exposed to a trove of mental well-being materials. For borderline cases, the system arranges for occasional reassessment reminders to check their mental health condition periodically. All assessment results are saved securely, under strict confidentiality measures, and are used solely for the purpose of improving user support.

C. Gamified Legal Rights Awareness

Empowerment through knowledge is the foundation of the StrongHer platform, specifically in legal rights. To close the knowledge gap and create awareness, the platform has an interactive, gamified learning environment. These comprise scenario tests that depict actual situations, allowing users to learn and apply their understanding of intricate legal environments in the right way. The content is also designed to cover particular matters such as women's rights against harassment, domestic violence legislation, children's knowledge of proper and improper touch, and cyberbullying education. Through the use of gamification methods, the platform maximizes user interest and retention, allowing users to act confidently and firmly in situations of utmost importance.

D. Counsellor and Lawyer Matching System

To acknowledge the need for professional guidance, StrongHer has an advanced Counselor and Lawyer Matching System. Once users have finished their mental health surveys, the system uses a complex algorithm to pair them with certified counselors or legal consultants. This matching process takes into account a range of parameters such as the intensity of the user's assessment scores, geographic closeness for those who want in-person sessions, and the targeted jurisdiction of legal specialization needed, i.e., domestic violence, child abuse, or cybercrime. All lawyers and counselors are vetted through a rigorous onboarding process and are regularly monitored for ensuring the provision of high-quality sensitive support services.

E. Emergency SOS System

In cases of urgent need, the StrongHer platform provides a hardware-based Emergency SOS System. This system entails a small, wearable button device connected through a NodeMCU (ESP8266) microcontroller to a SIM800L GSM module. Upon button activation, it initiates the instant sending of an SMS with a pre-defined emergency message, the individual's unique ID, and, in subsequent versions, GPS coordinates to pre-registered emergency contacts. The device is user-friendly, with a zero-configuration interface and the ability to run on battery power for a number of months. To guarantee reliability, the system has low response latency and network failover capabilities, such as retry functionality for

sending SMS messages in environments with weak signal reception.

F. Blockchain-Based Medical Record Storage

StrongHer system incorporates a secure blockchain-based system to facilitate the safe and decentralized storage of sensitive medical histories. Using the InterPlanetary File System (IPFS), medical reports are encrypted and distributed, obviating the need for centralized servers and making the data more resilient. Every encrypted medical file receives a Content Identifier (CID), which is used to reference the location of the file on the IPFS network. This CID, together with the relevant metadata, is stored on the Ethereum blockchain using smart contracts so that it is immutable and verifiable. The records are accessed in a controlled manner; only licensed users who hold the correct decryption keys can download and access the documents. This architecture not only protects patient privacy but also complies with international data compliant solution even without centralized regulatory standards.

G. EWS Certificate Upload and Validation

To serve users from the Economically Weaker Sections (EWS), StrongHer offers a separate module for the validation and upload of EWS certificates. Users are able to upload scanned versions of their certificates securely, which are in turn encrypted and stored via the same IPFS and blockchain architecture used for medical records. The system logs the CID and related metadata on the Ethereum blockchain, establishing an unalterable record of the certificate's presence and authenticity. This configuration enables institutions like employers and schools to authenticate the authenticity of EWS certificates without divulging the underlying sensitive information, ensuring privacy for users while providing transparency.

Subsequent versions of the platform will support government APIs to achieve real-time certificate validation directly from issuing

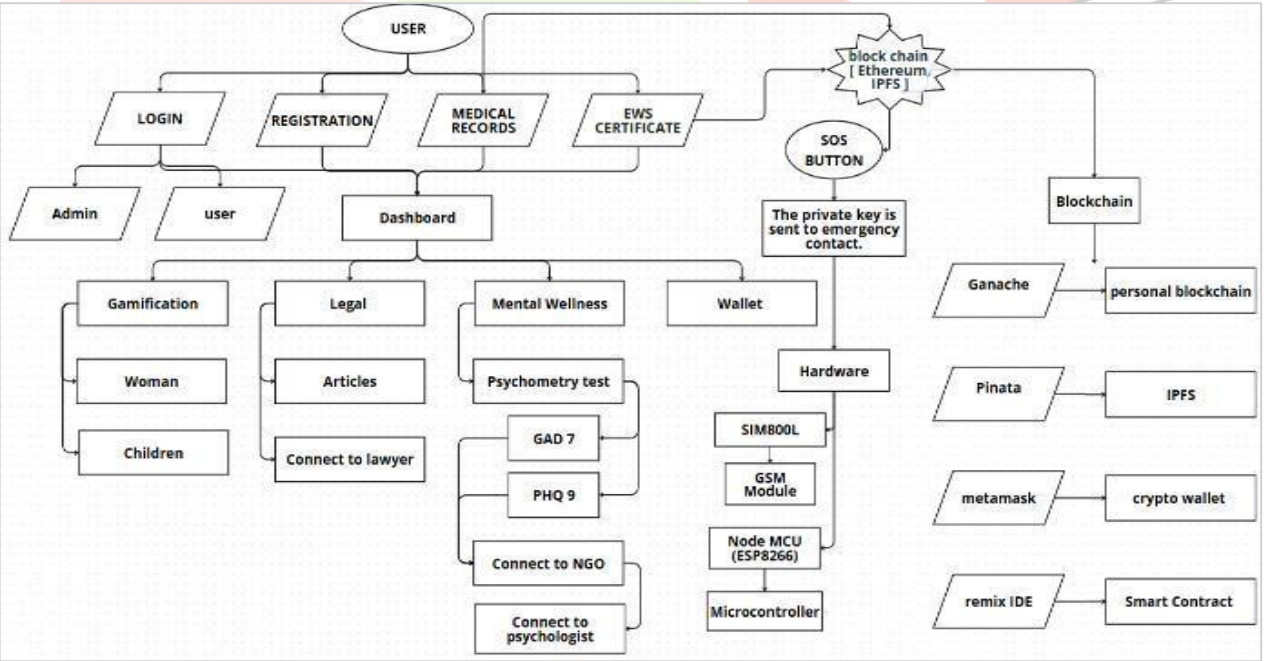

FIGURE 1: System Architecture Diagram

bodies, simplifying the verification process and minimizing administrative burden.

System Architecture Overview:

The StrongHer platform is structured into three main layers: the User Interaction Layer, Blockchain Layer, and Hardware-Based Emergency System.

1. User Interaction Modules

Login and Registration: The system allows secure login and registration for both Admins and normal users. Admins have higher privileges like content management and tracking analytics, while users have access to individual dashboards.

Medical Records and EWS Certificate Uploading: Medical records and EWS certificates are uploaded by the users, which are subsequently safely encrypted and stored using blockchain and IPFS technologies.

Access to the dashboard: Upon validation, the users are granted access to the primary dashboard that references four chief modules:

Gamification: Independent learning modules for children and women, involving legal rights and security awareness through quizzes and games.

Legal Assistance: Gives users access to curated legal content and links them to enrolled legal counselors when required.

Mental Wellness: Provides psychometric assessment GAD-7 and PHQ-9 to determine mental health status, and according to the findings, users are linked to NGOs or psychologists for help.

Wallet: Performs secure storage and retrieval of user certificates and medical history utilizing blockchain supported systems.

2. Blockchain Layer

The StrongHer platform has blockchain technology built in as a core element to ensure data integrity, verifiability, and user autonomy. Through the use of the decentralized aspect of blockchain, StrongHer circumvents centralized points of risk typical of conventional systems. Sensitive information, such as medical histories and EWS (Economically Weaker Section) certificates, is encrypted and stored on the InterPlanetary File System (IPFS), a peer-to-peer distributed file system that provides data resiliency and access without central servers.

Every file stored in IPFS receives a Content Identifier (CID), an immutable hash that functions as a permanent pointer to that particular version of the file.

This CID is subsequently stored in a smart contract on the Ethereum blockchain, providing an immutable, time-stamped record entry. This prevents data tampering or illegal changes because any change would yield a whole new CID, thus invalidating the reference. The blockchain layer is therefore a decentralized truth layer for any sensitive data. The environment includes a range of integrated tools:

•Ganache is used as the local blockchain, enabling developers to mimic Ethereum networks for secure and controlled testing and deployment of smart contracts.

•Pinata operates as the IPFS gateway, enabling encrypted files to be pinned (made permanently available) and handled in an efficient manner.

•Metamask, a popular browser extension, gives end-users a secure cryptocurrency wallet and capability to work with Ethereum blockchain smart contracts directly from their browsers.

•Remix IDE is used for Solidity smart contract writing, debugging, and deployment with real-time testing and visualization features that enhance contract development efficiency.

3. Hardware-Based Emergency System

In addition to its blockchain and web-based elements, StrongHer also allows for mechanisms of real-world emergency response through hardware enhancement. The platform provides a wearable SOS button, a small and easy-to-use device that plays an important part in physical protection, particularly in situations involving high risk or distress.

The emergency button is driven by a NodeMCU (ESP8266) microcontroller connected to a SIM800L GSM module. The embedded system has been coded to monitor for button press events and instantly instruct the GSM module to send SMS alert messages. The pre-configured emergency messages, which comprise the user's identification number and an alert code, are sent through SMS to a list of the system's trusted emergency contacts.

One of the major strengths of this module is that it does not depend upon internet connectivity. It uses only GSM networks, and thus the system operates even in areas with poor internet connectivity or in the middle of nowhere. The system is ultra-low latency, and the time from button press to message sending is reduced to a few seconds.

Subsequent releases of the SOS module will include integration with GPS technology, allowing for the real-time transmission of location information. This would greatly improve the capability of emergency responders or contacts to pinpoint and respond to the user in a timely manner. The hardware itself is also designed for battery life, with the capability to operate for an extended duration without the need for frequent recharges, making it suitable for uninterrupted use.

IV. IMPLEMENTATION

StrongHer was carefully constructed on three- tier architecture, a pattern of design that divides the system into separate layers: the presentation layer (frontend), the application layer (backend), and the data layer (including traditional databases and decentralized blockchain storage). This design ensures scalability, ease of maintenance, and clean separation of concerns.

A. Frontend Development

The frontend was developed with ASP.NET Core MVC, which is a strong web framework for supporting dynamic page rendering and server-side logic. It provides users with a seamless experience, including all the key functionalities such as secure login, registration processes, personalized access to the dashboard, modules of gamification, mental health questionnaires, and upload interfaces for medical certificates and medical records.

UI/UX was focused upon to provide accessibility and usability across populations. In addition, form validations and input sanitization are done on the client-side to avoid SQL injection and other typical vulnerabilities, strengthening the security stance of the platform.

B. Backend and Database Layer

The backend logic is written in C# on the .NET Core runtime, which supports high performance and cross-platform capabilities. Modular RESTful APIs encapsulate the business logic to enable easy extension and maintenance of features. The APIs take care of operations like form submission, session management, encryption of files, and communication with the blockchain.

For long-term data storage, Microsoft SQL Server is employed to handle structured data such as user profiles, activity logs, legal and psychological match records, and certificate

metadata. The relational database schema is designed for speedy querying and supports foreign key constraints, stored procedures, and transactional consistency features.

C. Blockchain and IPFS Integration

The decentralized file storage feature is implemented via Pinata, which acts as the IPFS gateway to upload and store encrypted user files. Every document, including a medical report or an EWS certificate, is symmetrically encrypted first before being pinned to IPFS.

Smart contracts written in Solidity are deployed to an emulated Ethereum environment with the help of Ganache. The contracts are meant to store and validate CID hashes and offer access controls. Communication with these smart contracts from the frontend is facilitated through Metamask, giving users a safe and transparent means of controlling their documents and digital identity.

This integration guarantees that user data, although stored across decentralized nodes, is at all times private, immutable, and verifiable, thus making StrongHer an authentic futuristic platform in women and child safety empowerment technologies.

D. IoT Hardware Implementation:

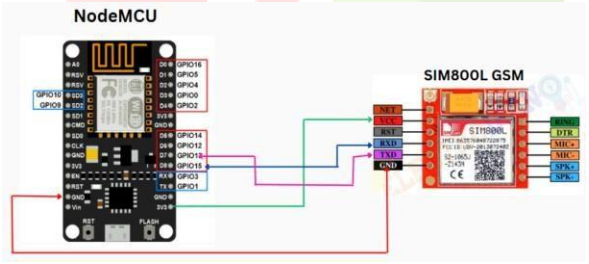

FIGURE 2: SOS Emergency System

The emergency hardware had a NodeMCU ESP8266 microcontroller interfaced to a SIM800L GSM module. When pressed: NodeMCU is used to send an AT command through serial communication to SIM800L. The GSM module sends an SMS to pre-registered emergency contacts with user ID and a short distress message. Retry strategies are employed to re-transmit SMS in case of initial transmission failure. The device uses low power so that it can be powered by battery for field deployment.

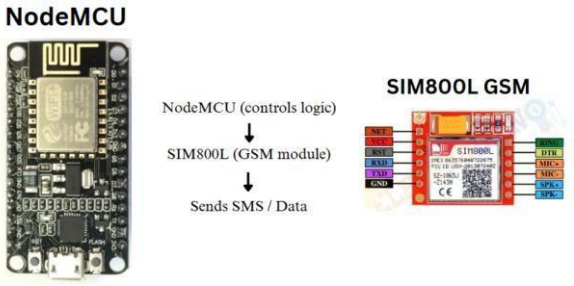

FIGURE 3: IoT Hardware

E. Security Measures

SHA-256 hashing is utilized on medical record file references prior to storage in blockchain. HTTPS protocol is mandated for every data transmission. Token-based session management is used to avoid CSRF and session hijacking attacks. This entire stack makes sure that the platform is secure, modular, scalable, and production-ready.

V. RESULTS AND DISCUSSIONS

The StrongHer platform underwent extensive module-level testing, system integration testing, and pilot user acceptance testing. The following were the key results seen on various subsystems:

A. Mental Health Assessment Module

Psychometric tests with GAD-7 and PHQ-9 had a 96% completion rate on the test with no technical errors. The counselor referral rate was 93% right away, indicating that the majority of users with moderate to severe scores were immediately referred to the proper resources. User commentary emphasized that the mental health tests were easy to comprehend, non-intrusive, and clinically applicable. Areas for future improvement involve adding stress, trauma, and PTSD tests to mental health questionnaires.

B. Gamified Learning Module

User interaction time rose by 35% over non-gamified reading modules, verifying that gamification profoundly enhances learning absorption. 85% of users achieved a better score in post-module quizzes upon finishing gamified legal awareness exercises. User suggestion: More levels, case study-driven quizzes, and language-driven content for richer engagement.

C. SOS Emergency System

Registered 100% SMS delivery success in the medium-to-strong GSM coverage regions. Average trigger-to-delivery time for SOS was 5.4 seconds, providing real- time response capability. In case of weak signals, the retry mechanism provided a 98% final success rate when trying several times. Future development includes integrating real-time SOS alert acknowledgment systems.

D. Blockchain Storage Validation

Testing in Ganache environment indicated 0% data tampering incidence, reflecting absolute immutability. IPFS retrieval times were an average of 2.1 seconds per file, reflecting capability of near real-time access. Advantage observed: Blockchain cut administrative overhead relative to conventional centralized record-keeping systems.

VI. CONCLUSION

The StrongHer platform is an end-to-end, tech-based solution that is specifically designed to counter the sophisticated challenges women and children face in the areas of personal security, emotional health support, legal education, and safe data management. Through seamless combinations of ASP.NET Core MVC frontend technologies, Microsoft SQL Server database management, blockchain- backed IPFS storage, Ethereum smart contracts, and IoT-integrated emergency hardware systems, StrongHer has been able to create a user-friendly, trustworthy, and robust digital ecosystem.

The modular design of the platform, including secure user authentication, psychometric testing, gameified legal education, matching with counsellors, blockchain-secured paperwork, and IoT-activated emergency notifications, proves multidisciplinary designs can build impactful real-world applications. The addition of decentralized storage and tamper-proof verification processes guarantees long-term data integrity and user anonymity, the essential elements when working with vulnerable populations.

Test results confirm StrongHer's efficacy in a range of facets such as operational stability, user interactions, emergency response, and security confidence. User comments also underscored the platform's usability, cultural salience, and utility for real-life situations. StrongHer's success underscores the promise of synergized digital platforms to fill systemic gaps in conventional safety and mental wellbeing support infrastructures.

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