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EMERGYLINK – PERSONAL HEALTH RECORD & AI WELLNESS MANAGER

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Abstract: Modern healthcare systems require secure, accessible, and well-organized digital platforms to manage patient medical information efficiently. This project proposes EmergyLink: A Personal Health Record and AI-Based Wellness Management System, designed to provide a centralized and secure platform for storing and managing personal health data. The system enables users to upload and maintain medical records, track medications, and monitor health information through an easy-to-use digital interface. A QR-based emergency access mechanism is integrated into the system, allowing authorized healthcare professionals to retrieve critical medical information during emergency situations after proper verification. In addition, the platform incorporates an AI-based wellness assistant that analyzes stored health data and provides personalized health insights, reminders, and preventive healthcare recommendations. The system is implemented using modern web technologies based on the MERN stack architecture to ensure scalability, security, and efficient healthcare data management. By combining digital health record storage, artificial intelligence, and emergency medical accessibility, EmergyLink enhances healthcare management, improves patient awareness ,and supports faster medical response in critical situations .

Index Terms - Personal Health Record (PHR), Digital Healthcare System, Artificial Intelligence in Healthcare, QR Code Medical Access, Health Data Management, MERN Stack, Healthcare Security, AI Wellness Assistant.

1.INTRODUCTION

In recent years, the rapid advancement of digital technologies has significantly transformed the healthcare industry. Modern healthcare systems increasingly rely on digital platforms to manage patient information, improve communication between patients and healthcare providers, and enhance the efficiency of medical services. One of the major challenges in healthcare management is the secure storage and easy accessibility of personal health records. Traditional paper-based medical records are often difficult to maintain, prone to loss or damage, and not easily accessible during emergency situations. These limitations highlight the need for a reliable digital system that allows individuals to securely store and manage their health information.Personal Health Record (PHR) systems have emerged as an effective solution to address these challenges. A PHR allows individuals to maintain their own health-related information, including medical history, prescriptions, laboratory reports, and other important health data in a digital format. Such systems enable patients to actively participate in their healthcare management while also allowing authorized medical professionals to access relevant information when required. However, many existing healthcare platforms lack integrated emergency access mechanisms and intelligent health monitoring features that can assist users in maintaining their overall well-being.To overcome these limitations, this project proposes EmergyLink – A Personal Health Record and AI-Based Wellness Management System. The proposed system provides a centralized digital platform that allows users to securely store and manage their medical records, track medications, and monitor personal health information. One of the key features of the system is a QR-code-based emergency access mechanism that enables healthcare professionals to retrieve critical medical information during emergency situations after proper verification from authorized contacts. This feature ensures that important health data can be accessed quickly while maintaining user privacy and security.In addition, the system incorporates an AI-based wellness assistant that analyzes stored health data and provides personalized health insights, reminders, and preventive healthcare recommendations. The integration of artificial intelligence helps users monitor their health status and promotes better health awareness and lifestyle management. The platform is developed using modern web technologies based on the MERN stack architecture, which ensures scalability, security, and efficient management of healthcare data.Overall, the EmergyLink system aims to enhance healthcare accessibility, improve personal health management, and support faster medical response during emergencies. By combining secure digital health records, artificial intelligence, and emergency accessibility features, the proposed system contributes to the development of intelligent and user-centered healthcare solutions .

2. LITERATURE REVIEW

Early detection of Alzheimer’s disease has become a major focus in computational diagnostic research because timely diagnosis can significantly improve patient management and slow disease progression. Traditionally, researchers have relied on neuroimaging modalities such as structural Magnetic Resonance Imaging (sMRI), Positron Emission Tomography (PET), and electroencephalography (EEG), combined with classical machine learning algorithms, to assist clinical diagnosis. For instance, Liu et al. applied Support Vector Machines (SVM) to sMRI-derived features to differentiate Alzheimer’s patients from healthy individuals, achieving reasonable classification accuracy but demonstrating limited sensitivity in identifying early-stage Mild Cognitive Impairment (MCI) [1]. Similarly, Zhang et al. combined PET imaging with cerebrospinal fluid biomarkers through linear discriminant analysis, improving diagnostic performance but introducing the challenge of invasive biomarker collection [2].

Klöppel et al. further validated the potential of SVM-based MRI classification, though their findings revealed difficulties in generalizing across multi-centre datasets [3]. Random Forest classifiers were later introduced to enhance robustness and feature ranking capabilities, providing more stable predictions compared to single-model approaches [4]. With the rapid advancement of deep learning, research has shifted toward models capable of automatically learning complex feature representations. Suk et al. proposed a Deep Belief Network (DBN) to extract hierarchical features from multimodal neuroimaging data, demonstrating superior performance compared to conventional shallow models [5]. Convolutional Neural Networks (CNNs) have since gained widespread adoption; Payan and Montana developed a 3D-CNN trained directly on MRI volumes, reducing reliance on handcrafted features while achieving competitive results [6]. Yan et al. further expanded this approach using deeper 3D-CNN architectures, although overfitting remained a concern due to limited labelled datasets [7]. To mitigate data scarcity issues, transfer learning strategies utilizing pre-trained networks such as ResNet and VGG have been explored to enhance performance in smaller medical datasets [8], [9]. In addition, recurrent neural networks (RNN) and Long Short-Term Memory (LSTM) models have been employed to analyse longitudinal cognitive assessments, enabling the modelling of disease progression over time [10]. Alongside deep learning, ensemble learning techniques have been increasingly applied to improve predictive stability. Methods such as Gradient Boosting Machines (GBM), AdaBoost, and XGBoost combine multiple weak learners to form stronger predictive models. Ortiz et al. demonstrated that AdaBoost applied to diverse feature subsets improved robustness, although it struggled to fully capture highly nonlinear relationships within heterogeneous clinical data [11]. Similarly, XGBoost-based frameworks have shown improved predictive power through optimized boosting mechanisms [12], while bagging techniques have contributed to variance reduction and better generalization across multimodal datasets [13].Recent studies emphasize the importance of multimodal data fusion to enhance diagnostic reliability. Integrating MRI, PET, demographic factors, and cognitive test scores has consistently produced superior performance compared to single-modality systems [14], [15]. Both feature-level and decision-level fusion strategies have been explored to address data heterogeneity and improve consistency in predictions [16]. Emerging graph-based neural network models further leverage brain connectivity patterns to capture structural relationships between affected brain regions [17], while attention mechanisms within neural networks enhance interpretability by highlighting critical regions associated with cognitive decline [18].To harness complementary strengths of different techniques, hybrid models have been introduced. Patil et al. combined deep feature extraction with an SVM classifier, reporting performance improvements over standalone approaches [19]. Likewise, autoencoder-driven feature reduction integrated with ensemble classifiers has shown enhanced classification accuracy and dimensionality optimization [20]. Despite these advancements, many hybrid frameworks continue to depend heavily on deep feature learning without fully leveraging ensemble-based generalization strategies. Moreover, several studies prioritize overall accuracy rather than sensitivity toward early-stage MCI detection, which remains clinically crucial for timely intervention. Although significant progress has been achieved, challenges persist in designing models that effectively balance feature learning, generalization, computational efficiency, and early-stage sensitivity. These limitations motivate the proposed hybrid integration of Artificial Neural Networks (ANN) with ensemble learning techniques, aiming to improve early Alzheimer's detection performance while ensuring robustness and scalability across diverse multimodal datasets.

3.PROPOSED FRAMEWORK

Healthcare management often relies on maintaining medical records, monitoring patient health conditions, and ensuring timely access to important medical information. In many healthcare systems, patient medical records are still stored in paper form or scattered across different hospital databases. This makes it difficult for individuals to maintain a complete history of their health information. In emergency situations, doctors may not have immediate access to a patient's critical medical details such as allergies, medications, or previous treatments, which can delay proper medical care.Another challenge is that many individuals do not actively monitor their health status or maintain organized personal medical records. Without a centralized system, patients often forget medication schedules, lose medical documents, or fail to track important health data. Existing digital healthcare platforms attempt to address these issues, but many of them lack integrated emergency access mechanisms, intelligent health monitoring, and user-friendly interfaces that allow individuals to easily manage their personal health records.Furthermore, most existing systems focus only on storing medical data without providing intelligent insights that help users understand and improve their health conditions. The absence of AI-based analysis and preventive health guidance limits the usefulness of such systems for long-term health management.Because of these limitations, there is a need for a secure and intelligent healthcare management platform that allows individuals to store their medical records digitally, access them easily, and share critical health information during emergencies. This project aims to address these challenges by developing EmergyLink, a digital healthcare platform that integrates personal health record management, QR-based emergency medical access, and an AI-powered wellness assistant to improve healthcare accessibility, data security, and proactive health monitoring.

3.1 System Architecture

To address the limitations of existing single-model approaches, this project proposes a Hybrid ANN-Ensemble Model for Alzheimer's Detection. The core idea behind the proposed system is to combine the learning capability of Artificial Neural Networks (ANN) with the stability and robustness of ensemble learning techniques. By integrating these methods, the system Early aims to improve early-stage detection accuracy while reducing overfitting and enhancing generalization.The proposed model accepts multimodal input data, including structural MRI-derived features, cognitive assessment scores, and relevant clinical or demographic attributes. Initially, the data undergoes preprocessing steps such as missing value handling, normalization, and feature selection to ensure consistency and improve model performance. The processed features are then fed into a multi-layer Artificial Neural Network, which learns complex nonlinear patterns associated with Alzheimer's progression. To enhance prediction reliability, the ANN output is combined with ensemble classifiers such as Random Forest or Gradient Boosting using a voting or weighted aggregation mechanism. This hybrid integration helps reduce variance, improve stability, and increase sensitivity, particularly in identifying Mild Cognitive Impairment (MCI). Overall, the proposed system functions as an intelligent clinical decision support tool, offering improved robustness, better early detection performance, and scalable implementation for real-world medical applications.

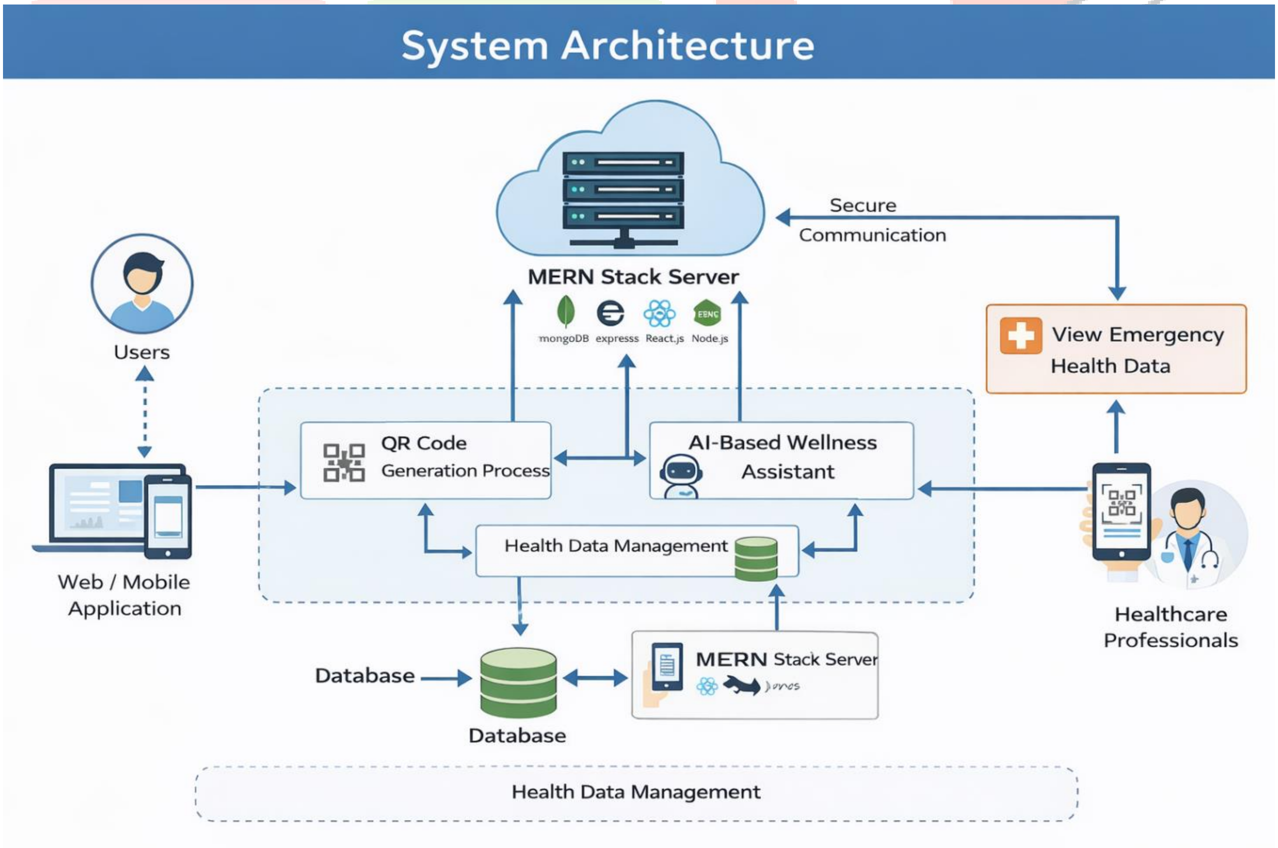


Figure 3.1 System Architecture

3.2 Working

To manage personal health information efficiently using the proposed EmergyLink system, the platform first allows users to create a secure account and store their medical records digitally. Users can upload and manage important health information such as prescriptions, diagnostic reports, medications, allergies, and medical history. This data is securely stored in a centralized database to ensure easy access and organized record management.

The stored health data is processed by the system to maintain structured and reliable information. The platform also generates a unique QR code for each user, which contains essential emergency medical details such as blood group, allergies, medications, and emergency contact information. During emergency situations, healthcare professionals can scan this QR code to request access to the patient's critical medical data. The system verifies the request through authorized contacts to ensure data privacy and security.In addition, the system integrates an AI-based wellness assistant that analyzes stored health information and provides personalized health recommendations, medication reminders, and lifestyle suggestions. This intelligent feature helps users monitor their health conditions and encourages proactive healthcare management. The final system output provides organized health records, emergency access through QR code verification, and AI-based health insights, enabling faster medical response and improved healthcare decision support.

3.3 Library Used

Programming Environment The proposed EmergyLink – Personal Health Record and AI Wellness Management System is developed using modern web technologies to ensure scalability, security, and efficient data management. The system is implemented using the MERN Stack, which includes MongoDB, Express.js, React.js, and Node.js. The development process is carried out using tools such as Visual Studio Code and Node Package Manager (NPM), which support efficient coding, testing, and deployment of web applications.

Core Development Libraries and Technologies

The system utilizes several libraries and frameworks for frontend development, backend services, and database management.

1)MongoDB:

MongoDB is used as the NoSQL database to store user health records, medical history, prescriptions, and emergency contact details. It allows flexible and scalable storage of structured health information.

2)Express.js:

Express.js is a backend web framework used to handle server-side logic, API creation, and communication between the frontend and the database.

3)React.js:

React.js is used for building the user interface of the web application. It provides dynamic and responsive components that allow users to easily manage their personal health records.

4)Node.js:

Node.js is used as the runtime environment for executing server-side JavaScript code. It enables efficient handling of user requests and system operations.

5)QRCodeLibrary:

A QR code generation library is used to create unique QR codes for each user. These QR codes enable emergency access to essential medical information when scanned by healthcare professionals.

6)AIWellnessModule:

The AI wellness component analyzes stored health data and provides health recommendations, reminders, and basic wellness guidance to support proactive health management.

3.3.1 Visualization and Interface Libraries

1)HTMLandCSS:

Used to design the structure and layout of the web application interface.

2)React.js:

Used to build dynamic and responsive user interface components for managing health records.

3)Bootstrap:

Provides responsive design and improves the visual appearance of the application.

4)Chart.js:

Used to display graphical representations of health-related data.

5)QRCodeLibrary:

Used to generate unique QR codes for emergency access to user health information.

4. IMPLEMENTATION

The implementation of the proposed EmergyLink – Personal Health Record and AI Wellness Management System is carried out in a structured manner. The system allows users to securely store and manage personal health information while providing emergency access and wellness support. The implementation process consists of the following steps:

1) User Registration:

Users create an account and securely log in to access the system.

2) Health Data Entry:

Users can upload medical records such as prescriptions, reports, allergies, and personal health details.

3) Database Storage:

All health information is stored securely in the MongoDB database for efficient management and retrieval.

4) QR Code Generation:

The system generates a unique QR code for each user containing essential medical information for emergency situations.

5) AI Wellness Assistance:

The system analyzes stored health data and provides basic health suggestions and reminders.

6) Emergency Access:

Healthcare professionals can scan the QR code to access critical medical information after verification.

7) System Interface:

The user interface is developed using React.js to provide an easy-to-use platform for managing health records.

8) Secure Backend Processing:

Node.js and Express.js handle server-side operations and secure communication between the user interface and database.

9) Final Output:

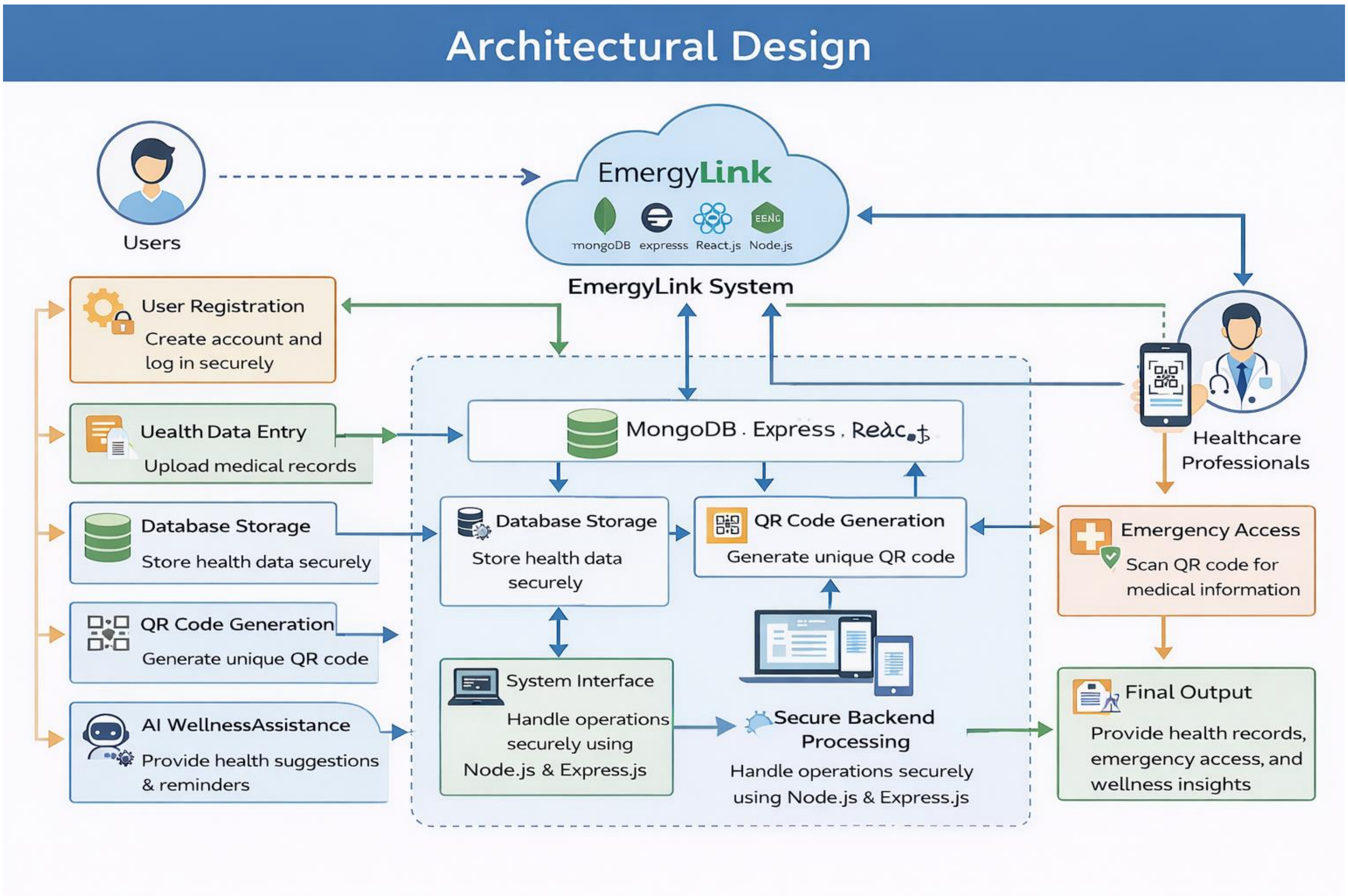
The system provides organized health records, emergency access through QR scanning, and wellness insights to support effective healthcare management.

Flowchart

The flowchart represents the working process of the EmergyLink healthcare management system. The process begins with User Registration, where users create accounts and log in securely. After authentication, users can upload and manage their personal health records, including medical reports and prescriptions.

The system stores this information in a secure database and generates a unique QR code for emergency access. In case of emergencies, healthcare professionals can scan the QR code to obtain critical medical details after verification. Additionally, the AI wellness assistant analyzes health information and provides recommendations and reminders to improve personal health management. Finally, the system presents organized health records and wellness insights through a user-friendly interface.

5. ARCHITECTURAL DESIGN



6. RESULT AND DISCUSSION

The proposed EmergyLink – Personal Health Record and AI Wellness Management System was successfully implemented and tested to ensure efficient management of personal health information. The system allows users to securely store medical records, access health data easily, and manage their medical information through a user-friendly interface.The QR code–based emergency access feature enables healthcare professionals to quickly retrieve essential medical details during emergency situations after proper verification. This improves response time and helps doctors make informed decisions. The AI wellness assistant also provides basic health suggestions and reminders based on the user's stored health information.The system demonstrates improved accessibility, secure data management, and efficient health record organization. Overall, the proposed platform provides a reliable solution for digital health record management and emergency medical support, making healthcare information easily accessible while maintaining data privacy and security.

7.CONCLUSION

The proposed EmergyLink – Personal Health Record and AI Wellness Management System provides a secure and efficient platform for managing personal health information digitally. The system enables users to store medical records, access health data easily, and maintain organized medical information through a user-friendly interface.A key feature of the system is the QR code–based emergency access, which allows healthcare professionals to quickly obtain essential medical details during emergency situations after proper verification. Additionally, the integration of an AI wellness assistant helps users monitor their health conditions and receive basic health recommendations and reminders.Overall, the system improves healthcare accessibility, enhances personal health monitoring, and ensures secure management of medical records. In the future, the platform can be enhanced by integrating advanced AI health analytics, mobile application support, and real-time healthcare connectivity to further improve healthcare management and emergency response.

8. REFERENCES

[1] T. K. Das and S. Chatterjee, "Electronic Health Record Systems: A Review of Current Trends and Future Directions," *International Journal of Medical Informatics*, vol. 120, pp. 1–10, 2018.

[2] J. H. Halamka and J. Mandl, "The Future of Electronic Health Records," *New England Journal of Medicine*, vol. 381, no. 10, pp. 961–964, 2019.

[3] M. A. Musen et al., "Biomedical Informatics and Health Information Systems," *Springer International Publishing*, 2021.

[4] S. Kumar and R. Kumar, "A Secure QR Code-Based Healthcare Information System," *International Journal of Advanced Computer Science and Applications*, vol. 11, no. 3, pp. 234–240, 2020.

[5] A. Smith and L. Anderson, "Mobile Health Applications and Their Impact on Healthcare," *IEEE Access*, vol. 8, pp. 102345–102356, 2020.

[6] R. Fielding and R. Taylor, "Principles of Modern Web Application Development," *ACM Computing Surveys*, vol. 54, no. 6, pp. 1–35, 2021.

[7] MongoDB Inc., "MongoDB Documentation: NoSQL Database for Modern Applications," Available: https://www.mongodb.com/docs.

[8] React Developers, "React.js Documentation: Building User Interfaces," Available: https://react.dev.

[9] Node.js Foundation, "Node.js Runtime Environment Documentation," Available: https://nodejs.org.

[10] M. Chen, Y. Hao, K. Hwang, L. Wang, and L. Wang, "Disease Prediction by Machine Learning Over Big Data from Healthcare Communities," *IEEE Access*, vol. 5, pp. 8869–8879, 2017.