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MEDLEY: A CENTRALIZED CLOUD-BASED SYSTEM FOR IMPROVED HEALTHCARE DATA SECURITY WITH AUTHENTICATION

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Abstract - *During this pandemic, India's healthcare system has faced various risks that have prompted us to advise hospitals to transition from paper-based medical records to electronic medical data for e-healthcare information. Furthermore, the increasing population poses challenges in tracking, recording, and analyzing patient movements within the healthcare system. Hence, it is essential to establish a data collection model that can aggregate patient information from diverse care settings, especially during urgent procedures like organ transplants. This model requires expanded storage capacity to accommodate the influx of patient data. Amazon Web Services (AWS) offers healthcare institutions the ability to manage large quantities of clinical data and generate quick insights while adhering to data-specific, imaging, and privacy standards. Once users are verified, their data is centrally controlled through cloud services with encryption protocols to ensure secure data transmission between the cloud and users. Facial recognition authentication is utilized for safe access to electronic health records, limiting viewing and editing permissions to authorized personnel only. This initiative aims to support individuals in tracking hospital information in their vicinity, providing helpful medication reminders, and introducing a chatbot for software assistance.*

Key Words: **E-healthcare, Amazon Web Services (AWS), Data Security, Facial Recognition Authentication, Chatbot**

1. INTRODUCTION

Medley serves as a centralized cloud-based platform that employs authentication to heighten the security of healthcare information. The system prioritizes user-friendliness and accessibility while safeguarding the confidentiality and integrity of patient data. The components of the Medley system include a central server, virtual cards, and authentication features. The central server oversees the security of patient data, ensuring comprehensive protection. An essential benefit of the Medley system is its reinforcement of medical data security. By utilizing virtual cards and authentication, the system restricts access to authorized personnel only, minimizing the risks of data breaches and unauthorized data retrieval. The system's seamless usability and accessibility serve as another advantage. Healthcare professionals can efficiently access patient information using authentication, while patients can easily carry their virtual cards for convenient access. This streamlined process reduces the time and effort required to retrieve patient data, ultimately improving healthcare delivery effectiveness. Ultimately, the Medley system is a centralized cloud-based solution that leverages virtual cards to bolster healthcare data security. Its design focuses on being user-friendly and accessible, all while ensuring the protection and confidentiality of patient information. By enhancing data security and accessibility, the Medley system contributes to enhancing overall healthcare service quality.

1.1 SCOPE OF THE PROJECT

The main goal of the Medley system is to improve the security and access to the healthcare data by utilizing virtual cards and authentication. Ensuring the privacy and security of patient data is a key focus, with the system designed to be user-friendly and accessible to all individuals. The Medley system can be implemented in various healthcare environments, including clinics, hospitals, and other medical facilities. Healthcare professionals like doctors, nurses, and other staff members can make use of this system too. This solution provides a centralized and secure approach to managing patient data that has the potential to enhance the overall quality of healthcare services. By using virtual cards and authentication, the system can reduce the risks of data breaches and unauthorized access, leading to improved patient outcomes and cost savings. The Medley system aims to streamline the process of retrieving patient information, ultimately reducing time and effort. This can result in faster and more accurate diagnoses, better treatment plans, and improved patient results. The overarching objective of the Medley system is to offer a secure and efficient method for managing patient information, ultimately elevating the standard of healthcare services as a whole. Through its streamlined approach, the Medley system aims to set a new standard for efficient and secure patient information management, ushering in a brighter era for healthcare advancements.

2. LITERATURE SURVEY

- The paper "A Study and Analysis on Symmetric Cryptography" by Saurabh Chandra and Siddhartha Bhattacharyya explores the significance of symmetric key cryptography in ensuring information security. It delves into encryption and decryption comparing algorithms like AES, DES, 3DES, RC4. It outlines future directions for symmetric cryptography, emphasizing the need for stronger revocation techniques.

- Navigating unfamiliar cities becomes more manageable with the "Find Near Me" application, as detailed in the paper "Finding nearby Places (using Google Places API and Maps API)" by Rajat Sharam, Bhawna Sharma, and Sheetal Gandotra. The paper elucidates the integration of Google Places API and Google Maps API into the app, stressing the significance of obtaining an API key and employing fragments for map display.

- In the "Amazon Web Services" research paper, particularly AWS, is extensively explored. Security concerns, including data safety and user-friendliness, are addressed, particularly in the context of governmental and security-conscious entities. Despite challenges, AWS is perceived positively for its security measures, leveling the playing field for emerging businesses.

- Utilizing Dialog Flow as the AI engine, Aliv Faizal Muhammad and Dwi Susanto develop an English conversation chatbot. The study focuses on creating an interactive learning experience. The integration of speech recognition and AI technology enhances user engagement, offering a promising avenue for further development in digital language learning tools.

- In the realm of healthcare systems post-COVID-19, the integration of centralized and automated frameworks, as exemplified in Rama Moorthy H's paper, offers advanced medication tracking capabilities. Leveraging homomorphic encryption algorithms for cloud-based data security ensures the protection of sensitive patient information during transmission and storage.

3. PROPOSED SYSTEM

The proposed healthcare system represents a significant advancement in ensuring patient data privacy and security within the healthcare industry. Through the implementation of sophisticated features such as virtual cards and stringent identification protocols, the system ensures that only authorized individuals have access to sensitive patient information. This not only minimizes the risk of unauthorized breaches but also instills confidence in patients regarding the confidentiality of their data. The system's centralized nature plays a pivotal role in maintaining data integrity, as it enables real-time updates and seamless access to patient information for healthcare providers across various locations and devices. By consolidating patient data into a main database accessible only to authorized personnel, the system reduces the likelihood of data breaches while simultaneously ensuring that the information remains accurate and up to date. Moreover, hosting the system on the AWS cloud platform provides additional layers of security, with EC2 instances offering reliable and flexible computing power and S3 buckets securely storing static data. This combination of centralized architecture and cloud-based infrastructure not only enhances system reliability but also strengthens data security, ensuring that even in the event of interception, unauthorized individuals cannot access sensitive patient information. Furthermore, the system employs cutting-edge security mechanisms to proactively prevent data leaks and safeguard patient data from evolving online threats, thereby providing comprehensive protection throughout the healthcare ecosystem.

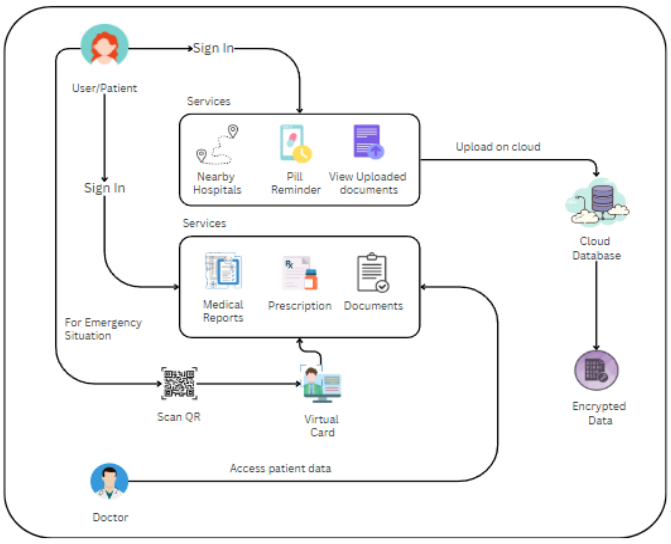

Fig. 3.1 Proposed system architecture

4. WORKING METHODOLOGY

4.1 Cloud-Based Infrastructure :

For safe patient data management and storage, the system will rely on a cloud-based architecture. Hospitals and doctors have units of the proposed system connected to this server, which serves as the main data storage location. For instance, all patient data, including diagnostic reports, histories of prior illnesses, etc., will be kept on this server when a patient receives medical attention. The cloud server is equipped with a strong security system for safeguarding medical data, employing a combination of symmetric cryptography and Amazon Web Services (AWS). Specifically, we utilize the Simple Storage Service (S3) and EC2 instances to ensure the integrity of the data.

Additionally, all information stored within the S3 bucket and EC2 instance is encrypted using Server-Side Encryption with AWS Key Management Service (SSE-KMS), enhancing the overall security measures in place.

4.2 Virtual Card:

We've developed a digital card system featuring a QR code that, when scanned, provides access to comprehensive medical details of the individual. This innovative approach ensures convenient and secure access to essential medical information anytime, anywhere, simply by scanning the QR code using a smartphone or similar device. This digital card solution not only enhances accessibility to medical records but also prioritizes patient privacy and security by providing controlled access to sensitive healthcare data.

4.3 Pill Reminder:

A pill-reminder feature would be included in the system to prompt patients to take their medication on schedule. Personalized reminders based on the patient's medication schedule would be provided by the pill reminder.

4.4 Chatbot:

A computer-based chatbot is a popular feature in many modern systems. Chatbots are software programs that are designed to simulate human conversation through text or voice interactions. They are often used as virtual assistants, customer service representatives, or even personal companions. The main benefit of including a chatbot in a proposed system is that it can provide users with instant assistance and support, without the need for human intervention. Chatbots can be programmed to answer common questions, provide basic troubleshooting assistance, and even complete simple tasks on behalf of the user.

4. Nearby hospital:

The primary purpose is to assist users in finding the nearest hospitals quickly in emergency situations, where timely medical attention is crucial. Improve the efficiency of accessing healthcare services by enabling users to locate nearby hospitals with ease, reducing the time taken to reach medical facilities. Enables real-time updates of the user's location, ensuring that the information provided is current and accurate. A map service API (e.g., Google Maps) is integrated to convert the geographical coordinates of the user's location into a readable map format. A user-friendly interface is designed to display the map with markers representing nearby hospitals and a list of these hospitals.

5. MODULE IMPLEMENTATION

Fig. 5.1 Patient Login

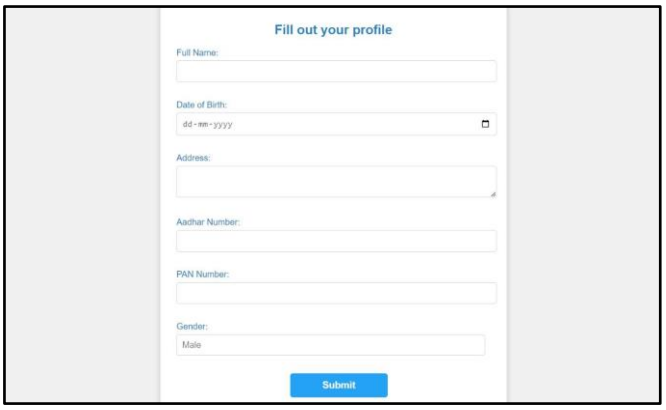

Fig. 5.2 Personal details form

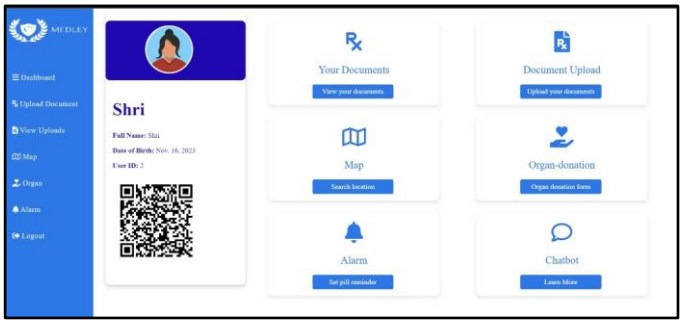

Fig. 5.3 Dashboard

Fig. 5.4 Prescription upload form

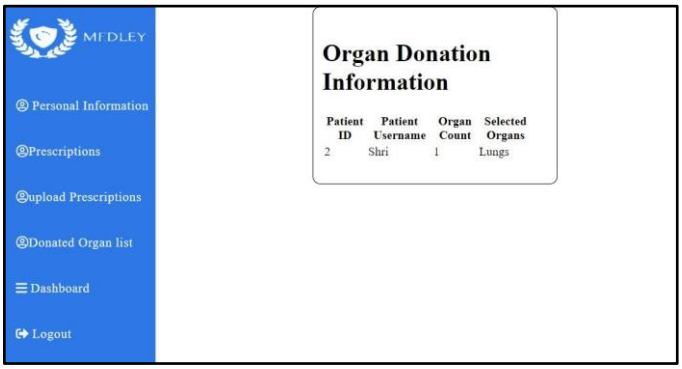

Fig. 5.5 Organ Donor details

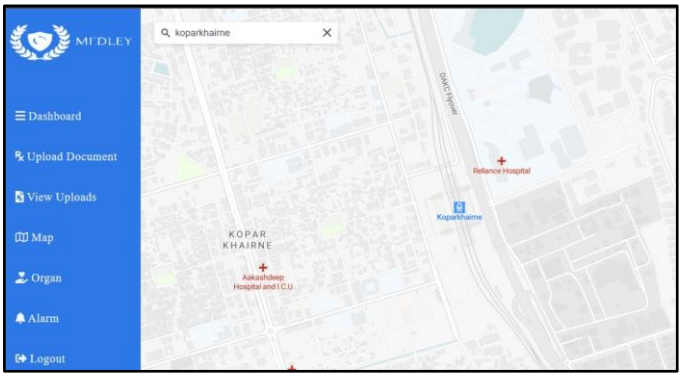

Fig. 5.6 Find nearby hospitals

Fig. 5.7 Chatbot

Fig. 5.8 Pill reminder

Fig. 5.9 Doctor personal information

6. FUTURE SCOPE

1. Telehealth and Remote Patient Monitoring:

Through telehealth, patients can virtually consult with healthcare professionals, eliminating the need for physical visits. This is particularly beneficial for managing chronic conditions like diabetes and heart diseases, allowing for continuous monitoring and timely intervention, potentially reducing complications and hospital visits.

2. Predictive Analytics with AI:

Healthcare providers can utilize AI algorithms to analyze extensive patient data and identify patterns and potential health risks. For instance, AI can analyze medical history, lifestyle factors, and genetic predispositions to predict the likelihood of developing certain diseases or experiencing specific health issues, enabling proactive intervention and personalized treatment plans.

3. Optimized User Interfaces:

Incorporating advanced technologies such as virtual reality (VR) and augmented reality (AR) enhances the presentation of medical information. VR simulations offer realistic training scenarios for medical students, while AR overlays provide surgeons with real-time patient data during procedures. These immersive and interactive interfaces improve training, decision-making, and overall patient care.

7. CONCLUSION

In conclusion, the healthcare initiative proposed for India represents a significant step forward in addressing the challenges posed by the pandemic. By embracing modern technologies such as Electronic Medical Data supported by AWS infrastructure, the initiative not only enhances efficiency but also ensures the security and accessibility of patient information. Through features like centralized data management, comprehensive care is prioritized while maintaining robust security measures. Moreover, the integration of user-friendly tools like medication reminders and chatbots fosters a more patient-centric healthcare experience. Overall, this initiative sets the stage for a resilient healthcare system in India, capable of navigating present challenges and catering to the evolving needs of patients in the future.

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