

# E- DISHA (Electronic Data Integrity and Security in Health Activities)

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*Abstract— The healthcare system project is an extensive web-based application tailored to facilitate seamless communication between doctors, patients, and pharmacists. Its main goal is to streamline healthcare data management, boost patient engagement, and refine prescription handling. Comprising essential modules like the Doctor, Patient, and Pharmacist Modules, it offers a comprehensive solution. Within the Doctor Module, healthcare providers can securely access patient records, review medical histories, and prescribe treatments. Patients, through the Patient Module, gain the ability to register, access their medical history, schedule appointments, and renew prescriptions. Meanwhile, the Pharmacist Module allows pharmacists to access prescription details, ensuring accuracy in medication dispensing. A primary focus of the project is addressing critical concerns such as data privacy, interoperability, and scalability. Through a user-friendly and secure platform, the project aims to enhance overall patient care by facilitating effective collaboration between healthcare professionals and patients. By tackling these challenges head-on, the healthcare system project aims to revolutionize healthcare management and improve patient experiences, ultimately leading to better healthcare outcomes.*

*Indexed Terms- Healthcare System, Web Application, Doctor Module, Patient Module, Pharmacist Module, Medical Records, Prescription, Data Privacy*

## I. INTRODUCTION

In the contemporary landscape of healthcare, the digitization of patient information stands as a cornerstone in the management of medical data, the streamlining of clinical processes, and the enhancement of healthcare provision. As the healthcare sector shifts from traditional paper-based records towards Electronic Health Records (EHRs) and embraces digital innovations, safeguarding the integrity and security of electronic health data emerges as a paramount concern[1]. The industry has witnessed a profound digital revolution fueled by the imperative

of delivering efficient patient care, leveraging data for informed decision-making, and fostering greater accessibility to health-related information.

Electronic Health Records (EHRs), telemedicine platforms, wearable health technologies, and interconnected healthcare systems have become indispensable elements of contemporary healthcare ecosystems[1]. Data integrity, characterized by the accuracy, consistency, and reliability of data throughout its lifecycle, assumes critical significance in ensuring patient safety and treatment efficacy within the healthcare domain. Instances of errors or discrepancies within electronic health records can potentially lead to misdiagnoses, inappropriate treatment modalities, and jeopardized patient welfare, underscoring the pivotal role of maintaining data integrity.

Moreover, healthcare data is inherently sensitive and holds immense value, underscoring the imperative of preserving patient privacy and confidentiality to adhere to stringent legal and ethical standards[4]. Regulations such as the Health Insurance Portability and Accountability Act (HIPAA) in the United States mandate stringent safeguards to protect patient information from unauthorized access or misuse.

In alignment with these imperatives, the "E-Disha (Electronic Data Integrity and Security in Health Activities)" project endeavors to delve into the intricate realm of digital healthcare, focusing on fortifying the integrity and security of electronic health data. By addressing the multifaceted challenges associated with data integrity and security, the project aims to not only enhance the quality of patient care but also bolster trust and confidence in digital healthcare solutions. Through a comprehensive approach encompassing technological innovations, regulatory compliance frameworks, and ethical considerations,

E-Disha seeks to pave the way for a more resilient, efficient, and patient-centric healthcare ecosystem in the digital age.

## II. LITERATURE REVIEW

P. Vimalachandran, H. Wang [1], reported the impact of data integrity on the utilization of EHR systems and associated concerns. We thoroughly investigated and tackled three phases concerning the data integrity of EHR systems. Furthermore, we proposed an appropriate methodology for upholding the integrity of EHR systems. The study specifically focused on analyzing and evaluating the data integrity of a prominent clinical system in Australia. This analysis aims to demonstrate the implications for the quality and safety of patient care.

Ismail Keshta, Ammar Odeh [2] conducted extensive literature survey on the privacy and security challenges faced by healthcare institutions and explore viable solutions. It provides insights into the incidents concerning IT security within healthcare settings. Through this review, researchers can gain understanding of these security and privacy concerns, as well as the possible solutions at hand.

Mohammad Zarour, Mamdouh Alenezi [3] studied data poses serious risks to patient health and places considerable responsibility on healthcare professionals. Moreover, it can give rise to issues such as fraud, misconduct, substandard care, and data breaches. Managing healthcare data amidst such precarious circumstances presents considerable complexities. This study utilizes a range of global attack statistics to delineate the threat landscape concerning data integrity within the healthcare sector. Jayneel Vora, Parth Devmurari [4] addressed patient inquiries while preserving their confidentiality. Our study proposes a method that addresses identification concerns while also mitigating the aforementioned privacy issues. Additionally, the proposed technique upholds patient privacy through the implementation of an authentication scheme that meets anonymity requirements and adopts a flexible and adaptable approach within the cloud paradigm.

Nikita R. Nikam, Priyanka R. Patil [5] investigated increasing number of warning letters regarding data

integrity issues issued by inspectors worldwide, the Food and Drug Administration (FDA) aims to ensure the reliability of data throughout the drug production lifecycle and marketing phases. The FDA has established electronic data standards known as ALCOA, which stands for Original, Attributable, Legible, Contemporary, and Correct. This article comprehensively discusses the concepts, relevance, benefits, drawbacks, legal obligations, and various forms of data integrity. It also addresses concerns regarding data privacy and proposes strategies to mitigate risks. Industry stakeholders will find valuable insights in this paper for maintaining the security and accuracy of their data.

Md. Shohidul Islam, Mohamed Ariff Bin Ameen [6] presented blockchain applications often suffer from privacy shortcomings and performance issues. To tackle these challenges, this study proposes a blockchain-based system for public health facilities to securely exchange and store information. This solution ensures the security of health data sharing and storage on the blockchain by employing a hash-256-based access controller and transaction signature mechanism in conjunction with a consensus policy. Through this approach, blockchain technology offers a promising avenue for enhancing data security and integrity within healthcare systems.

Abhishek Kumar Pandey, Asif Irshad Khan [7] presented attack statistics to underscore the critical nature of data integrity concerns within the healthcare sector. The subsequent section systematically evaluates previous research concerning systematic literature reviews in healthcare and strategies for ensuring data integrity. Lastly, the compiled literature is analyzed using various analytical approaches in the third part of the study, where the most pertinent methodology and its associated challenges regarding healthcare data security are deliberated upon.

## III. SYSTEM ARCHITECTURE

System Architecture for E-DISHA project is

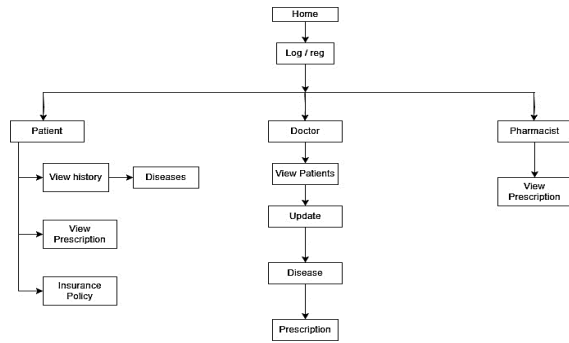


Figure 1: System Architecture

**Admin Module:**

Within this module, the administrator is required to log in using valid credentials. Upon successful login, the administrator gains access to operations such as viewing all users and authorizing them. This authorization process allows the administrator to review user details, including usernames, emails, addresses, and authorize them accordingly.

**View and Authorize Users Module:**

In this module, the administrator has the capability to view a comprehensive list of registered users. The displayed information encompasses user details such as usernames, emails, and addresses. Additionally, the administrator possesses the authority to authorize users, ensuring appropriate access privileges are granted.

**End User Module:**

This module caters to the multitude of end users within the system. Users are required to register before engaging in any operations. Upon successful registration, user details are securely stored in the database. Subsequently, authenticated users can log in using their designated credentials to access functionalities such as managing their accounts.

**IV. IMPLEMENTATION DETAILS**

**1)System Architecture:**

Through meticulous planning and execution, we've developed a sophisticated web-based application that encompasses distinct modules catering to the needs of doctors, patients, and pharmacists. Employing a robust client-server architecture has facilitated seamless communication and data exchange between these

modules, ensuring optimal performance and user experience.

**2)User Authentication and Authorization:**

The implementation of a stringent user authentication mechanism has fortified the system's security, allowing only authenticated users with valid credentials to access the platform. Furthermore, the integration of role-based access control (RBAC) has empowered administrators to efficiently manage user permissions, thus safeguarding sensitive patient information from unauthorized access.

**3) Doctor Module:**

Our focus on user-centric design has culminated in the creation of a highly intuitive interface within the Doctor Module. Healthcare professionals can effortlessly navigate through patient records, review comprehensive medical histories, and prescribe treatments with confidence, all while adhering to stringent data privacy and security protocols.

**4)Patient Module:**

With meticulous attention to detail, we've crafted a seamless user experience within the Patient Module, enabling individuals to register seamlessly, access their complete medical histories, schedule appointments with ease, and renew prescriptions conveniently. The implementation of robust security measures ensures that patient data remains confidential and accessible only to authorized personnel.

**5)Pharmacist Module:**

Leveraging cutting-edge technology, we've developed a dedicated module for pharmacists that facilitates efficient prescription management and medication dispensing. Pharmacists can effortlessly access prescription details, verify medication orders, and ensure accurate dispensing, thereby minimizing errors and enhancing patient safety.

**6)Data Privacy and Security:**

Our unwavering commitment to data privacy and security is reflected in the adoption of industry-leading encryption techniques and access controls. By encrypting sensitive patient information during transmission and storage, we've mitigated the risk of

unauthorized access and data breaches, thereby safeguarding patient confidentiality and trust.

#### 7) Interoperability and Scalability:

Through rigorous testing and optimization, we've ensured that the E-DISHA system seamlessly integrates with existing healthcare infrastructure and scales effortlessly to accommodate the evolving needs of healthcare organizations. Standards-based communication protocols enable interoperability with external systems, fostering seamless data exchange and collaboration.

#### 8) Testing and Quality Assurance:

Rigorous testing methodologies, including comprehensive unit testing, integration testing, and user acceptance testing, have been employed to validate the reliability, accuracy, and performance of the E-DISHA system. Our commitment to ongoing monitoring and maintenance ensures that the system remains resilient and responsive to emerging challenges and requirements.

With the successful implementation of these features and considerations, the E-DISHA project now provides a user-friendly, secure, and efficient platform for healthcare professionals and patients to collaborate effectively, ultimately leading to better healthcare outcomes.

## V. KEY ATTRIBUTES OF E-DISHA PROJECT

In our project targeting data integrity and security within healthcare, we underscore pivotal aspects that will propel the success of our initiative. These fundamental elements lie at the heart of our project's aims and objectives.

#### Aspect 1: Adaptability

The software boasts adaptability accessible to all users, ensuring seamless integration regardless of user expertise. Its flexible design accommodates diverse user needs, promoting ease of use across various healthcare settings. This adaptability fosters inclusivity, empowering a wide spectrum of users to leverage the software effectively.

#### Aspect 2: Availability

The software is readily accessible to all users. Its wide availability ensures that users of all backgrounds can easily obtain and utilize the software for their healthcare needs. This accessibility promotes inclusivity, enabling seamless adoption across diverse user demographics.

#### Aspect 3: Reliability

The software demonstrates superior performance, enhancing its overall reliability. This heightened reliability brings confidence in users, ensuring consistent and dependable functionality. With improved performance metrics, the software becomes a trusted tool for users across various healthcare scenarios.

#### Aspect 4: User Friendliness

As a GUI application, the software offers a highly intuitive interface, resulting in user-friendly behavior for generated outputs. This user-friendly design enhances usability, making the software accessible to users of all skill levels. With its intuitive layout and functionality, navigating the software becomes a seamless experience for users, fostering greater efficiency and satisfaction.

#### Aspect 5: Integrity

Integrity encompasses the degree to which unauthorized access to software or data can be effectively managed and controlled. It pertains to the robustness of measures in place to prevent unauthorized individuals from gaining entry to sensitive information or functionalities. Maintaining integrity ensures the confidentiality and reliability of the system, safeguarding against potential breaches and unauthorized usage. By prioritizing integrity, organizations can bolster trust and confidence in their software systems, ensuring compliance with security protocols and regulatory standards.

#### Aspect 6: Security

The security measures entail a multi-phase authentication process, ensuring robust and dependable security protocols[2]. Through the implementation of multiple authentication layers, the system delivers reliable security to users. This comprehensive approach enhances protection against unauthorized access, bolstering confidence in the

system's security integrity. By employing stringent authentication methods, users can trust in the system's ability to safeguard sensitive information effectively.

#### CONCLUSION

This module facilitates the seamless coordination between physicians, patients, and pharmacists, streamlining the process of accessing and updating medical records and prescriptions. Patients can easily access their medical history and prescriptions, empowering them to actively participate in their healthcare journey. They can conveniently request appointments and renew prescriptions, fostering a more engaged approach to their well-being. The system ensures the accurate and secure maintenance of all patient data, including diagnoses and prescription history, providing a comprehensive overview of each patient's health status. Access to sensitive patient information is carefully controlled and restricted to authorized personnel, safeguarding the privacy and security of medical records. Pharmacists are able to effectively manage prescriptions, minimizing the risk of errors and ensuring patients receive the correct medications in a timely manner.

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