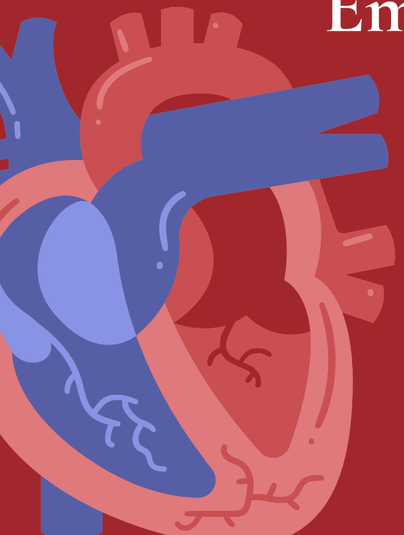
MEDI-CHAIN

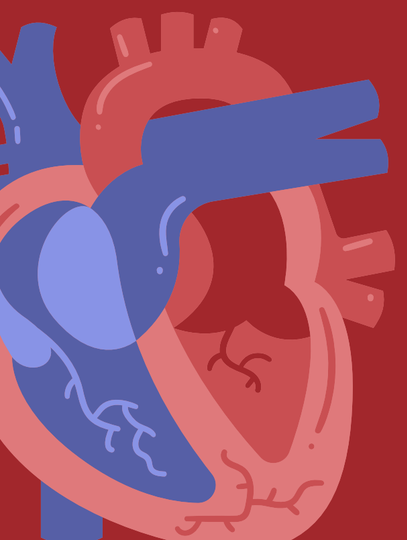
Empowering Patients, Securing Data, Revolutionizing Healthcare

Team No: 242



SUPERVISOR: Ms. Pavithra Kannan
REVIEWER 1: Mr Shahab Saquib Sohail
REVIEWER 2: Mr Vivek Sharma

Team No. 242



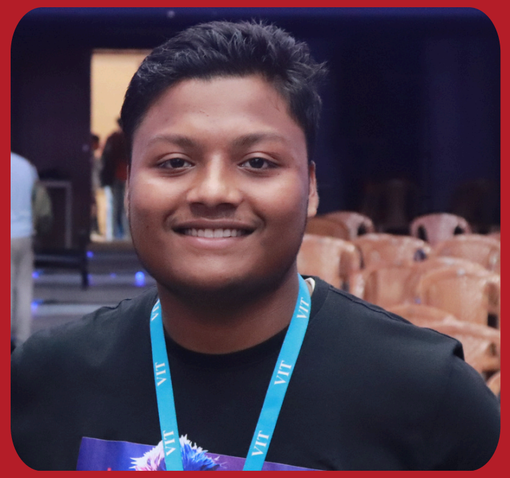
TEAM

Riya Mehta

23BCE10456

Vipanchi Barman

23BCE10886



Sagnik Sahoo

23BCE11649

Pranav Chaturvedi

23BCE10563

Himanshu

23BCE11375

TABLE OF CONTENTS

TIP Remember ‘A’ for ‘artery’ and ‘away’ from the heart!

Introduction

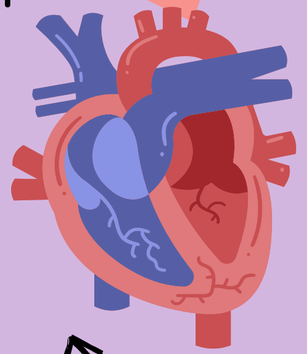
- Medichain is a platform designed to revolutionize how healthcare data is managed, stored, and shared.
- By giving patients control over their medical records and enhancing data security, Medichain addresses critical challenges in today's fragmented healthcare systems.
- Our platform aims to streamline data access for healthcare providers, reduce inefficiencies, and empower patients with secure and seamless control over their health information.

PROBLEM STATEMENT

Problems

Data Fragmentation

Over 75% of Indian Healthcare Providers face data fragmentation issues, with patient information scattered across different hospitals, clinics, and labs, making it challenging to access a unified medical history (Source: FICCI-EY Healthcare Report).



Inefficiencies in Healthcare Operations:

Administrative Costs: Inefficient data handling and manual processes contribute to 20-30% of operational costs in Indian hospitals, affecting the overall efficiency of healthcare delivery (Source: CII-PwC Report on Healthcare).

Growth of Digital Health Data in India:

Digital Health Records: With the rise of telemedicine, wearables, and digital health platforms, the volume of healthcare data in India is expected to grow by 40% annually, increasing the need for secure and interoperable data management solutions (Source: NITI Aayog Report on Digital Health).

Data Security

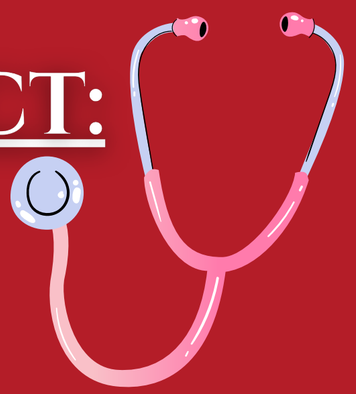
60% of Indian Healthcare Organizations have experienced some form of cyberattack or data breach, highlighting critical vulnerabilities in current data management systems (Source: KPMG in India Healthcare Report).

Patient Control Over Medical Data:

Less than 20% of Patients in India have access to their complete medical records, reflecting a significant gap in patient autonomy and the ability to manage their health information (Source: Indian Journal of Medical Informatics).

RESEARCH PAPERS

RESEARCH PAPERS IN SUPPORT OF OUR PROJECT:



Paper 1: The Impact of Hospital Queue Management Systems
-by GJR Publication

https://www.researchgate.net/publication/363891831_The_Impact_of_Hospital_Queue_Management_Systems

Paper 2: Queueing Problems in Emergency Departments: A Review of Practical Approaches and Research Methodologies

https://www.frontiersin.org/journals/digital-health/articles/10.3389/fdgth.2024.1377531/full

Paper 3:A Unified Health Information System Framework for Connecting Data& People
-by the Journal of Global Information Management

https://digitalcommons.odu.edu/cgi/viewcontent.cgi?article=1088&context=itds_facpubs

by Frontiers in Digital Health

PAPER -1

TITLE:

"The Impact of Hospital Queue Management Systems"

https://www.researchgate.net/publication/363891831_The_Impact_of_Hospital_Queue_Management_Systems

AUTHORS;

- Muhammad Ahmad Baballe (Corresponding Author)
- Abubakar Sani Muhammad
- Jamilu Yakubu Abdullahi
- Mohammed Habib Abubakar
- Aminu Ya'u
- Ibrahim Idris Giwa
- Usman Sani Farouk
- Zainab Abdulkadir

PUBLISHER:

- The paper is published by GJR Publication in the Global Journal of Research in Medical Sciences, Volume 02, Issue 05, September-October 2022. The DOI for this article is 10.5281/zenodo.7117651.

The paper titled "The Impact of Hospital Queue Management Systems" explores the challenges associated with long wait times in hospital emergency departments and proposes solutions through the implementation of queue management systems (QMS). Here's a detailed analysis of the key takeaway points, problems faced, solutions proposed, authors, and publisher.

KEY TAKEAWAY POINTS:

- **Patient Experience and Satisfaction:** The study emphasizes that patient satisfaction is significantly affected by their experiences during waiting times in hospitals. Long wait times can lead to frustration and dissatisfaction among patients.

- **Queue Management Systems (QMS):** The paper discusses the importance of implementing effective QMS to optimize patient flow, reduce waiting times, and improve overall service delivery in hospitals.

- **Technological Integration:** The integration of mobile applications, cloud databases, and real-time information sharing is highlighted as a means to enhance the efficiency of queue management.

- **Dynamic Resource Adjustment:** The paper suggests that hospitals should employ dynamic resource adjustment policies and intelligent prioritization algorithms to manage supply and demand effectively in emergency departments.

- **Improved Operational Efficiency:** By automating certain processes and providing patients with real-time updates on their queue status, hospitals can improve operational efficiency and reduce congestion.

Problems Faced:

1. **Long Wait Times:** Hospitals often struggle with overcrowding in emergency departments, leading to extended wait times for patients seeking care.
2. **Patient Frustration:** The psychological impact of waiting is significant; patients often feel stressed or anxious while waiting for treatment, which can affect their perception of care quality.
3. **Resource Allocation:** Inefficient allocation of resources can exacerbate wait times, as hospitals may not have enough staff or facilities to meet patient demand.
4. **Lack of Information:** Patients frequently lack access to information regarding their wait times and the status of their treatment, contributing to dissatisfaction.

Solutions Proposed:

1. **Implementation of E-Queue Systems:** The study proposes the development of an electronic queue management system that allows for better tracking and management of patient flow using mobile applications.
2. **Real-Time Updates:** By providing patients with real-time information about their queue status and estimated wait times, hospitals can enhance patient experience and satisfaction.
3. **Smart Queue Management Algorithms:** The use of intelligent algorithms for token generation and allocation can streamline the process across various hospital service areas.
4. **Comprehensive Framework:** The authors suggest a framework for dynamically managing queues from both supply and demand perspectives, which includes prioritizing patients based on urgency.

PAPER-2

TITLE:

- Queueing Problems in Emerg[illegible]ctical Approaches and Research Methodologies

https://pmc.ncbi.nlm.nih.gov/articles/PMC8716576/#l

AUTHOR:

- Khulekani Sibanda (University of Johannesburg, South Africa)
- Patrick Ndayizigamiye (University of Johannesburg, South Africa)
- Hossana Twinomurinzi (University of Johannesburg, South Africa)

PUBLISHER:

Frontiers in Digital Health

INTRODUCTION:

- The paper explores the potential of non-fungible tokens (NFTs) as a transformative technology in healthcare. It highlights the growing concern over patient data commodification and the need for patient empowerment through better control of health information. NFTs, which are unique digital assets on blockchain technology, can allow patients to track access to their health data, monetize its use, and create secure health information systems. However, the authors note that research on NFTs in healthcare is still in its early stages, necessitating a comprehensive review to identify key use cases, design models, and challenges.

Problems Identified:

1. **Data Ownership and Control:** Patients often lack control over their health data, which is frequently commodified by corporations.
2. **Limited Research:** The application of NFTs in healthcare is under-researched, with few real-world implementations.
3. **Interoperability Issues:** There are challenges related to integrating NFT systems with existing healthcare infrastructure.
4. **Data Security and Privacy Concerns:** Ensuring the security and privacy of sensitive health information remains a significant challenge.
5. **Cost Implications:** The financial aspects associated with implementing NFT solutions can be prohibitive.

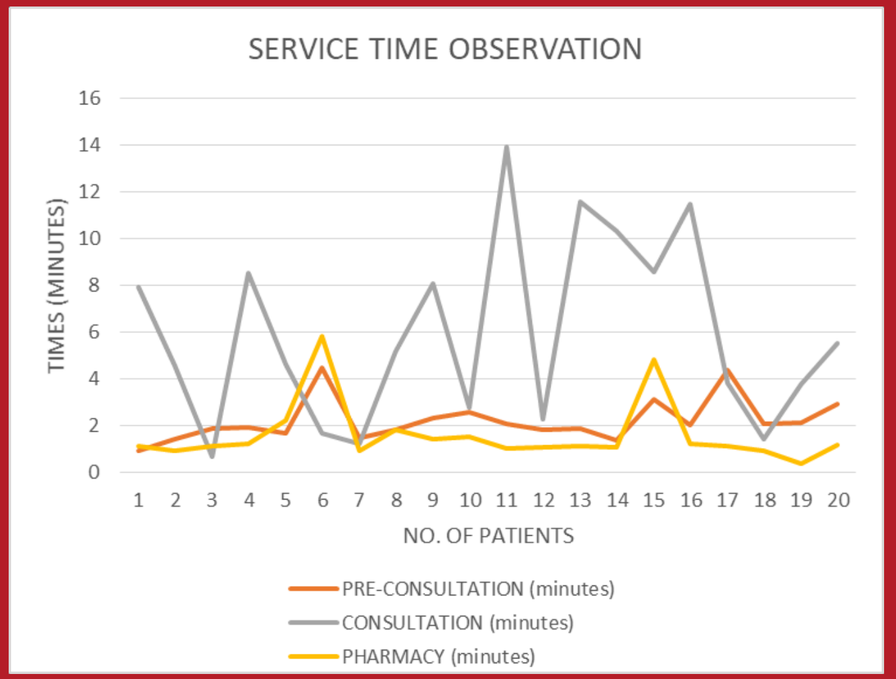
Solution Proposed:

The authors propose a comprehensive framework for adopting NFTs in healthcare that focuses on:

- **Patient-Centric Data Management:** Empowering patients to manage their health data through NFTs.
- **Supply Chain Management for Data Provenance:** Using NFTs to track the origin and integrity of medical products and data.
- **Digital Twin Development:** Creating digital replicas of patients that can be managed using NFT technology for better healthcare delivery.
- **Research Agenda:** The paper outlines future research directions focusing on governance models, data storage solutions, and commercialization strategies for health data.

ABSTRACTION

This study employs a systematic literature review methodology to analyze existing research on NFTs in healthcare. The authors conducted a thematic analysis of 19 selected papers, identifying three primary use cases: patient-centric data management, supply chain management, and digital twin development. They also highlighted four overarching themes: data governance, data monetization, data protection, and data storage. The findings indicate that while NFTs hold promise for enhancing healthcare data exchange systems, significant challenges remain that need to be addressed through further research.



PAPER-3

TITLE:

"A Unified Health Information System Framework for Connecting Data, People, Devices, and Systems"

: https://digitalcommons.odu.edu/cgi/viewcontent.cgi?article=1088&context=itds_facpubs

AUTHOR:

- authored by Wu He, Justin Zuopeng Zhang, Huanmei Wu, Wenzhuo Li, and Sachin Shetty.

PUBLISHER:

It is published in the Journal of Global Information Management, Volume 30, Issue 11, in 2022.

INTRODUCTION:

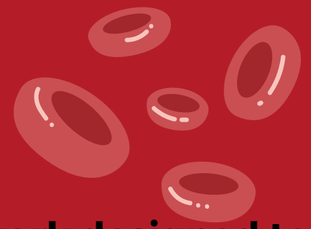
The introduction highlights the urgent need for improved interoperability in health information systems, particularly exacerbated by the COVID-19 pandemic. The pandemic has underscored the necessity for timely and effective data exchange among healthcare providers, public health agencies, and other stakeholders. The authors emphasize that interoperability—critical for managing healthcare information effectively during crises like pandemics. They argue that a unified health information system framework can enhance data connectivity and system integration, ultimately improving responses to public health emergencies.

-

Problem Statement:

The paper identifies several key problems related to interoperability in health information systems:

- **Fragmentation of Data Systems:** Existing healthcare systems often operate in silos with incompatible data formats and standards, making it difficult to share patient information across different providers.
- **Lack of Standardization:** There is no universal standard for health data interoperability in the U.S., leading to inefficiencies in data sharing and communication among healthcare entities.
- **Resistance from Stakeholders:** Various stakeholders are hesitant to adopt interoperable solutions due to concerns over market share, costs, and regulatory burdens.
- **Insufficient Research Contributions:** There is a noted shortage of research focused on leveraging information systems (IS) to address interoperability challenges during pandemics.



Proposed Solution:

The authors propose a unified health information system framework designed to enhance interoperability among healthcare data, systems, and devices. Key components of this framework include:

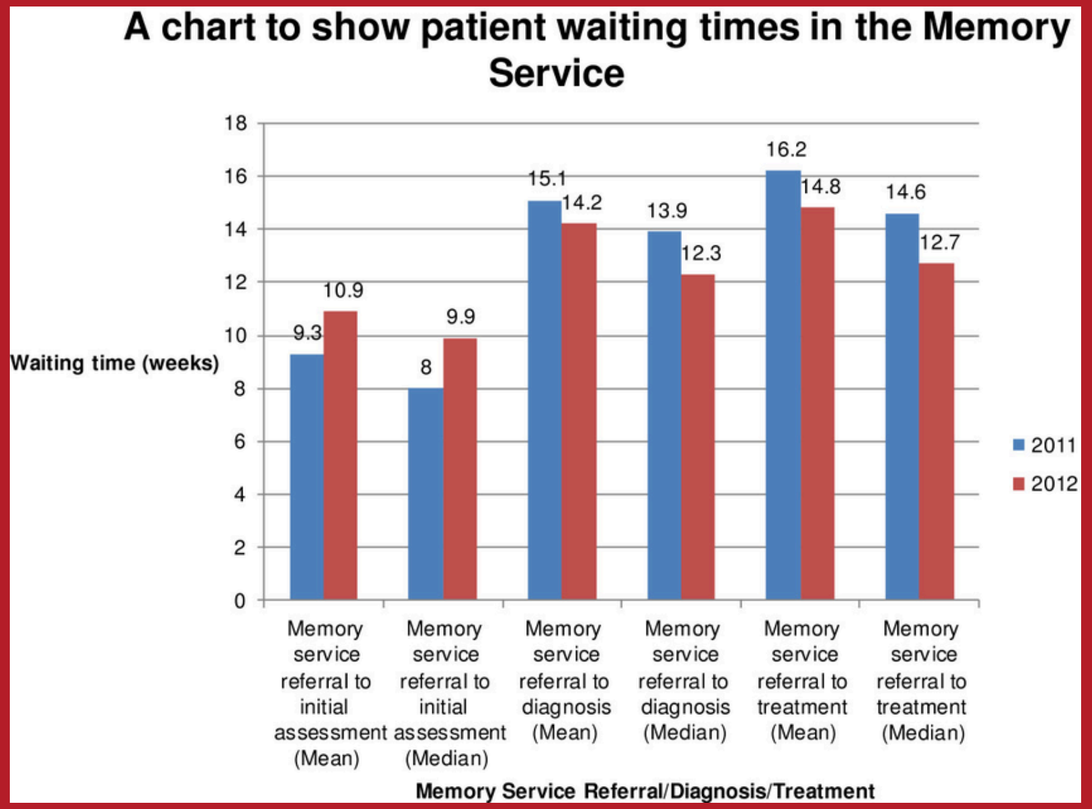
- **Integration of Technologies:** Utilizing advanced technologies such as blockchain to facilitate secure data sharing across disparate systems.
- **Standardized Protocols:** Advocating for the adoption of common data standards and protocols to ensure seamless communication between different healthcare entities.
- **Enhanced Collaboration:** Encouraging collaboration among stakeholders—governments, healthcare providers, technology companies—to foster a culture of shared data use for better decision-making.
- **Implementation Guidance:** Providing concrete recommendations for implementing the proposed framework effectively within existing healthcare structures.

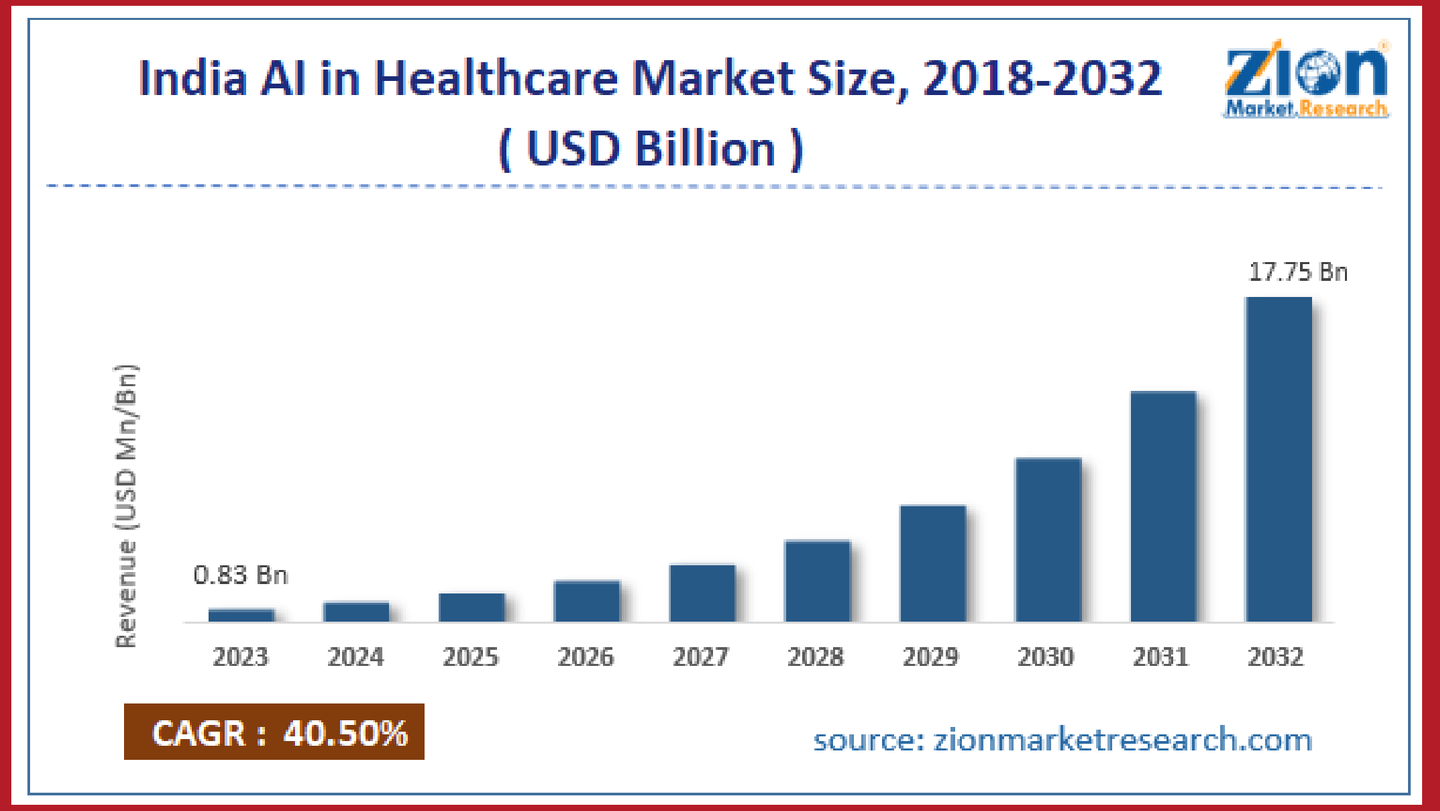
Key Takeaway Points:

1. **Interoperability is Essential:** Improved interoperability is crucial for effective healthcare management during pandemics and can lead to better patient outcomes.
2. **Need for Unified Framework:** A cohesive approach that connects various stakeholders through standardized protocols can mitigate existing fragmentation in health information systems.
3. **Role of Technology:** Leveraging emerging technologies like blockchain can enhance security and efficiency in data sharing.
4. **Collaborative Efforts Required:** Successful implementation of interoperable systems necessitates collaboration among diverse stakeholders within the healthcare ecosystem.
5. **Research Opportunities:** The paper calls for more research contributions from IS scholars to develop solutions addressing interoperability challenges.

Overall Gist of the Paper:

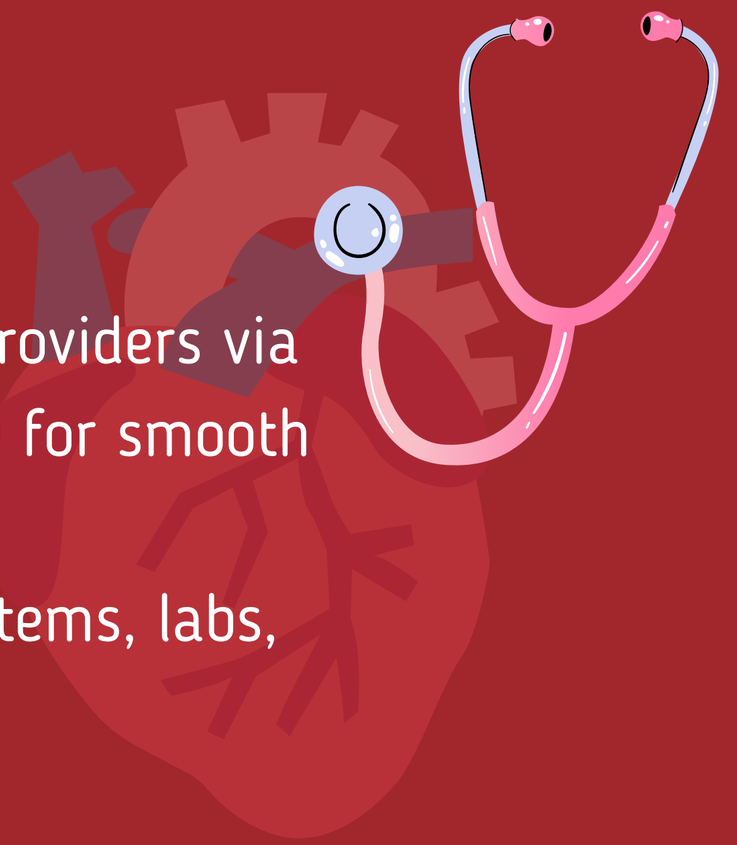
The paper presents a comprehensive analysis of the challenges facing health information systems regarding interoperability, particularly highlighted by the COVID-19 pandemic. It argues that without a unified framework connecting data, people, devices, and systems, healthcare responses will remain inefficient and fragmented. The authors propose actionable solutions aimed at enhancing interoperability through technology integration and stakeholder collaboration. Ultimately, they advocate for a systematic approach to improve public health responses not only during crises but also in routine healthcare delivery.


A chart to show patient waiting times in the Memory Service
Waiting time (weeks)
18
16
14
12
10
8
6
4
2
0
9.3
10.9
8
9.9
15.1
14.2
13.9
12.3
16.2
14.8
14.6
12.7
2011
2012
Memory service referral to initial assessment (Mean)
Memory service referral to initial assessment (Median)
Memory service referral to diagnosis (Mean)
Memory service referral to diagnosis (Median)
Memory service referral to treatment (Mean)
Memory service referral to treatment (Median)
Memory Service Referral/Diagnosis/Treatment


India AI in Healthcare Market Size, 2018-2032
(USD Billion)
Zion Market Research
Revenue (USD Mn/Bn)
0.83 Bn
17.75 Bn
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
CAGR : 40.50%
source: zionmarketresearch.com

INNOVATIVE SOLUTION

- MEDICHAIN IS A PLATFORM THAT ALLOWS PATIENTS TO SECURELY STORE, MANAGE, AND SHARE THEIR MEDICAL RECORDS.
- THIS SYSTEM ENSURES DATA INTEGRITY, PRIVACY, AND TRANSPARENCY, GIVING PATIENTS FULL CONTROL OVER WHO CAN ACCESS THEIR DATA.



SOME OF THE KEY FEATURES ARE:

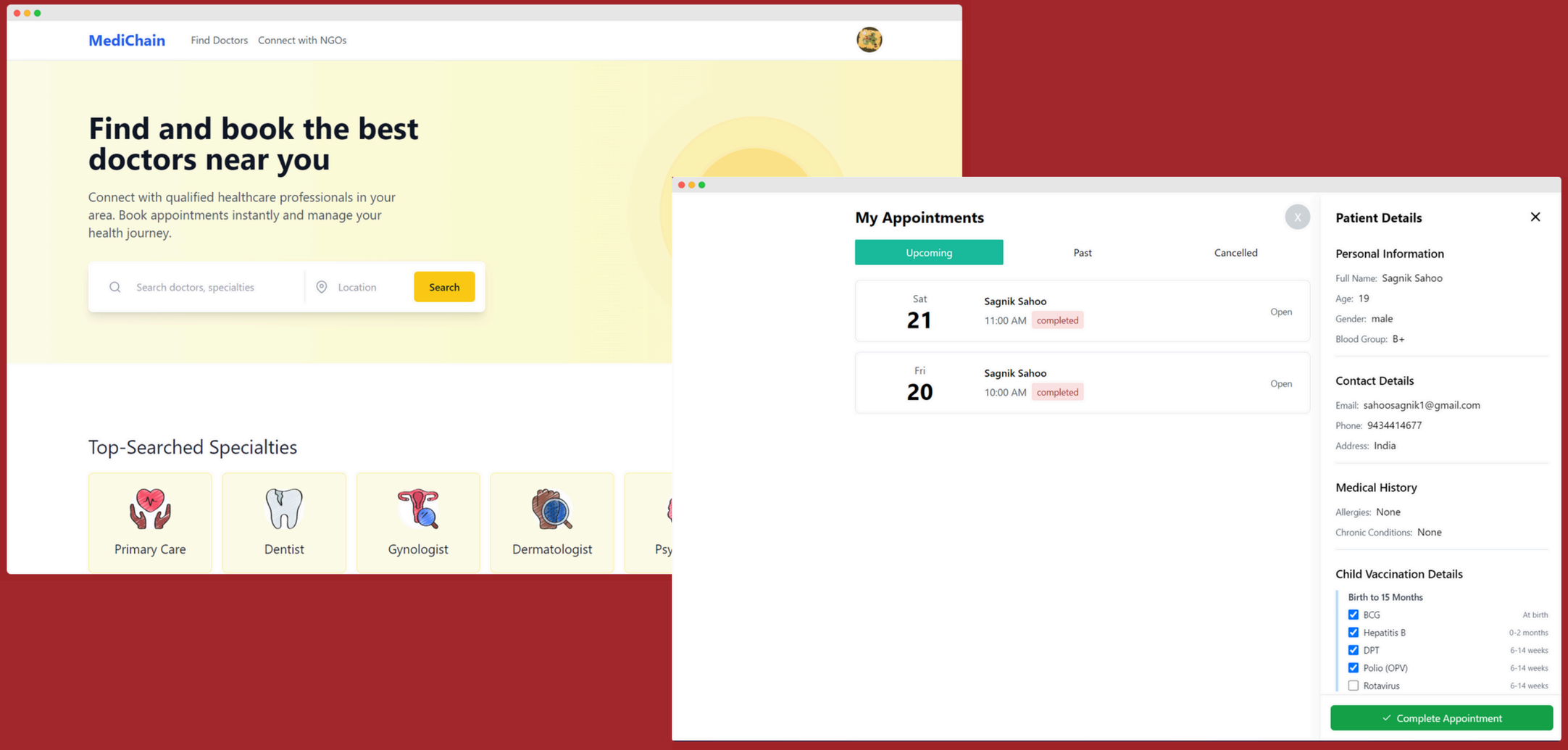
- **Patient-Controlled:** Patients can share records with healthcare providers via UID number as there records will be linked through AADHAR CARD for smooth transfer.
- **Cross-Platform Compatibility:** Works with different hospital systems, labs, and insurance providers to provide a unified medical history.

- **AI-Driven Analytics:** Provides patients and healthcare professionals with health insights, flagging trends that may require early intervention (e.g., identifying risk factors for chronic diseases).

- **RESEARCH ORGANIZATIONS:** Provide patient record to medical research organizations such as Indian Council of Medical Research (ICMR) whose work is to conduct research on rare diseases and find a cure to it.

- **Token System** IMPLEMENT A DIGITAL TOKEN SYSTEM TO REDUCE WAITING TIMES BY NOTIFYING PATIENTS OF THEIR TURN IN REAL-TIME

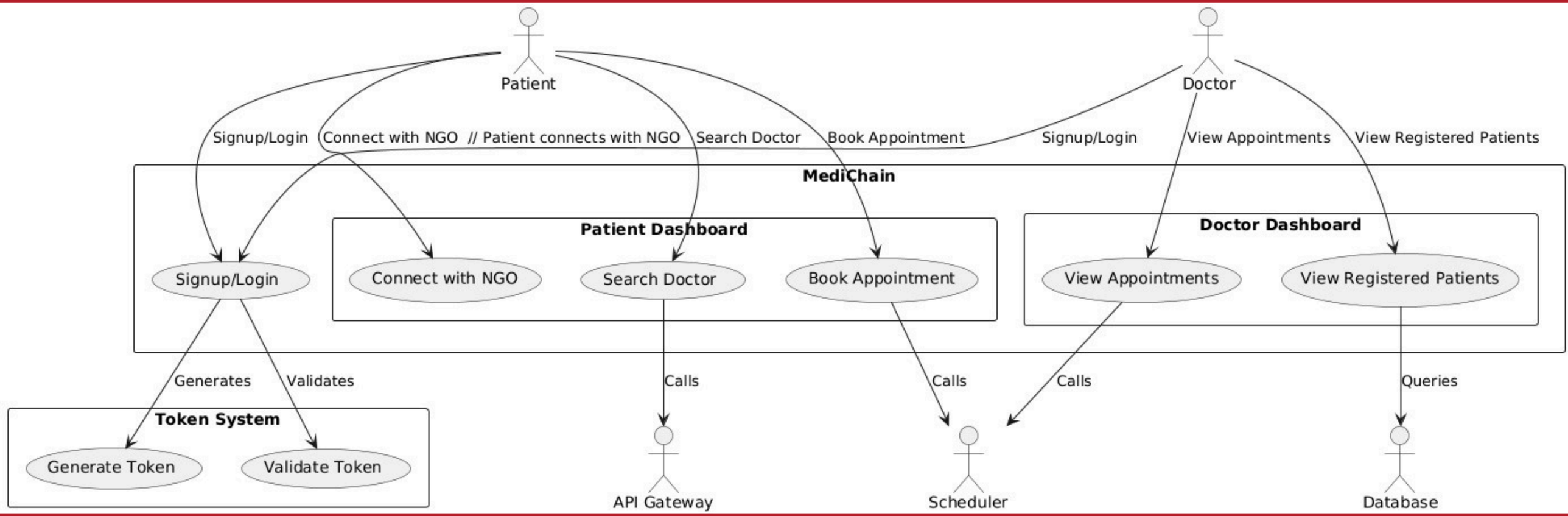
- **HASSLE FREE TREATMENT:** As patient's record is maintained on cloud so its eas[illegible] fo[illegible] the individual to have a smooth visit to the doctor


MediChain
Find Doctors
Connect with NGOs
Find and book the best doctors near you
Connect with qualified healthcare professionals in your area. Book appointments instantly and manage your health journey.
Search doctors, specialties
Location
Search
Top-Searched Specialties
Primary Care
Dentist
Gynologist
Dermatologist
My Appointments
Upcoming
Past
Cancelled
Sat
21
Sagnik Sahoo
11:00 AM
completed
Open
Fri
20
Sagnik Sahoo
10:00 AM
completed
Open
Patient Details
Personal Information
Full Name: Sagnik Sahoo
Age: 19
Gender: male
Blood Group: B+
Contact Details
Email: sahoosagnik1@gmail.com
Phone: 9434414677
Address: India
Medical History
Allergies: None
Chronic Conditions: None
Child Vaccination Details
Birth to 15 Months
BCG
At birth
Hepatitis B
0-2 months
DPT
6-14 weeks
Polio (OPV)
6-14 weeks
Rotavirus
6-14 weeks
Complete Appointment

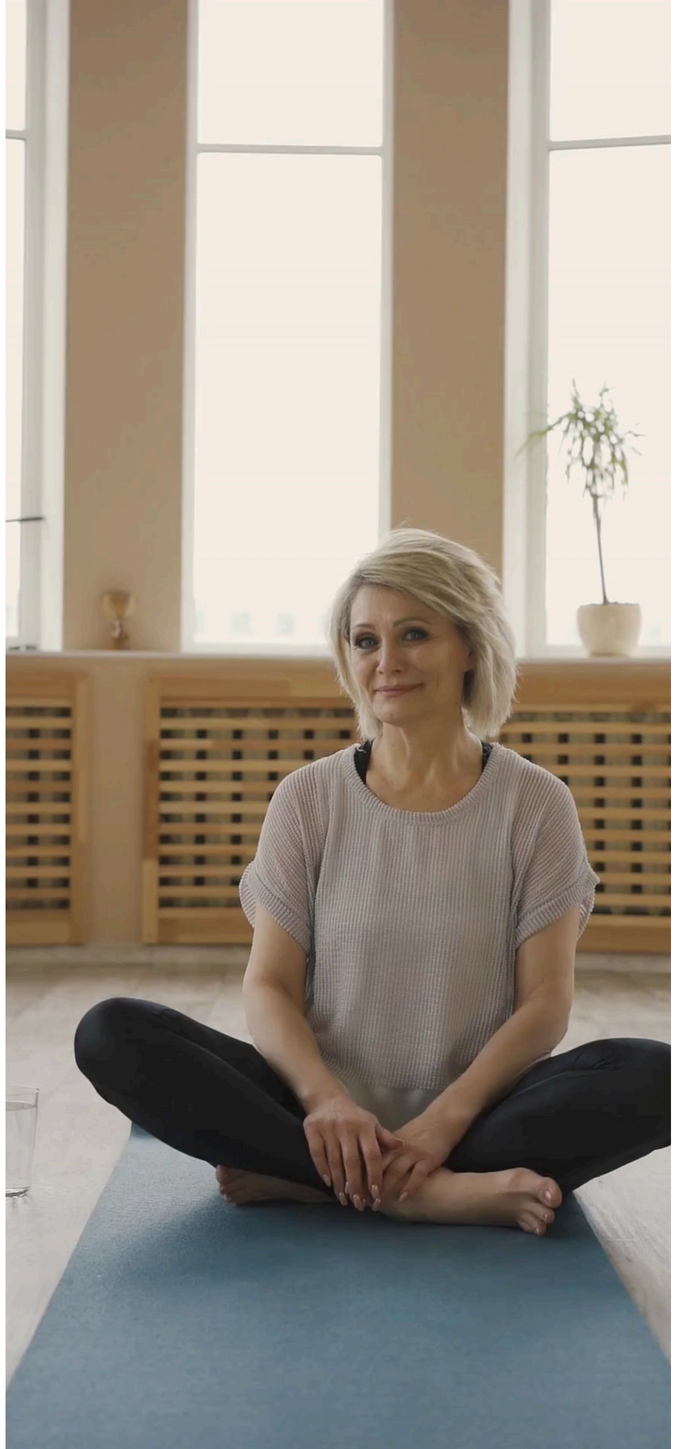
MEDICHAIN

COURSE OF ACTION

UML:


Patient
Doctor
Signup/Login
Connect with NGO
// Patient connects with NGO
Search Doctor
Book Appointment
Signup/Login
View Appointments
View Registered Patients
MediChain
Patient Dashboard
Doctor Dashboard
Signup/Login
Connect with NGO
Search Doctor
Book Appointment
View Appointments
View Registered Patients
Generates
Validates
Calls
Calls
Calls
Queries
Token System
Generate Token
Validate Token
API Gateway
Scheduler
Database

PARTS DIVISON



1

PATIENT DASHBOARD

- **Riya Mehta**-Connect with NGO and Token system.
- **Pranav Chaturvedi**-login page and search doctor
- **Vipanchi barman**-book appointments

PARTS DIVISON

2

DOCTORS DASHBOARD

- **Sagnik sahoo** - View Appointments
- **Himanshu kumar**- View Registered Appointments

BRIEF DESCRIPTION OF EXECUTION

Users

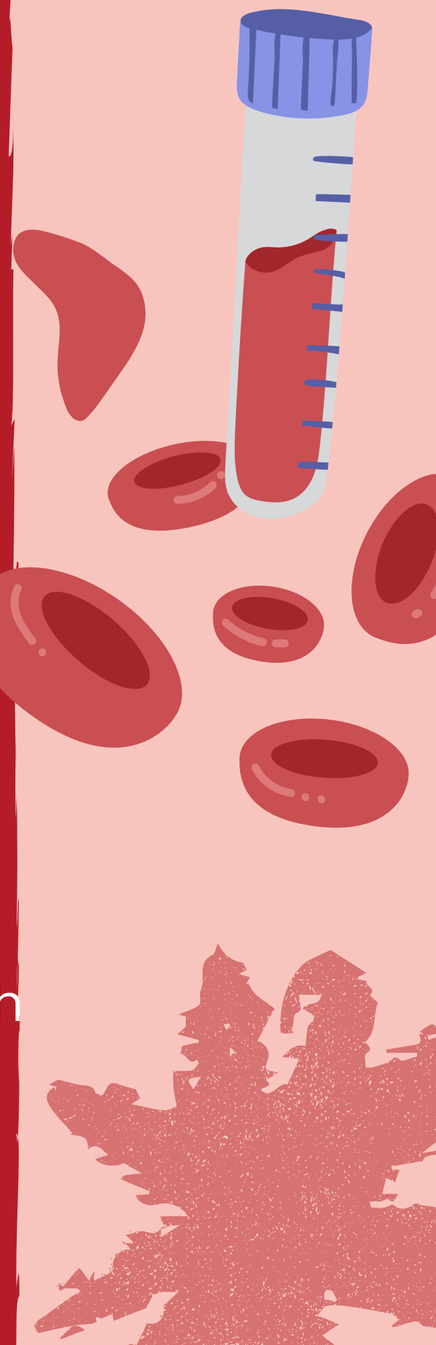
- Patient: Can Signup/Login, Connect with NGO, Search Doctor, and Book Appointment.
- Doctor: Can Signup/Login, View Appointments, and View Registered Patients.

Core Components

- Patient Dashboard: Includes Connect with NGO, Search Doctor, and Book Appointment.
- Doctor Dashboard: Features View Appointments and View Registered Patients.
- Token System: Manages Generate and Validate Token functions.

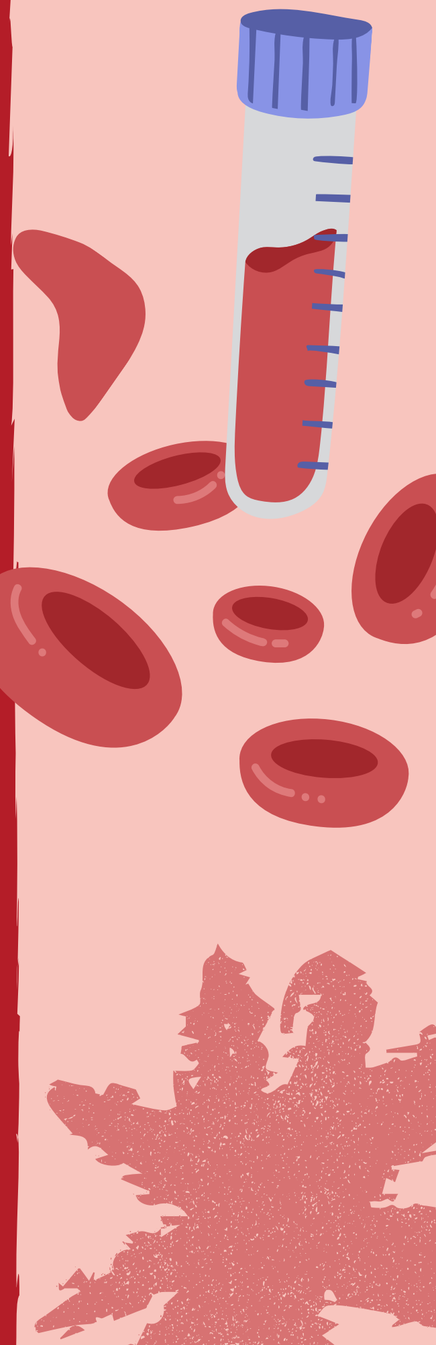
Supporting Components

- API Gateway: Facilitates communication with the Connect with NGO and Search Doctor functionalities.
- Scheduler: Manages Book Appointment requests.
- Database: Stores data and handles queries related to registered patients.

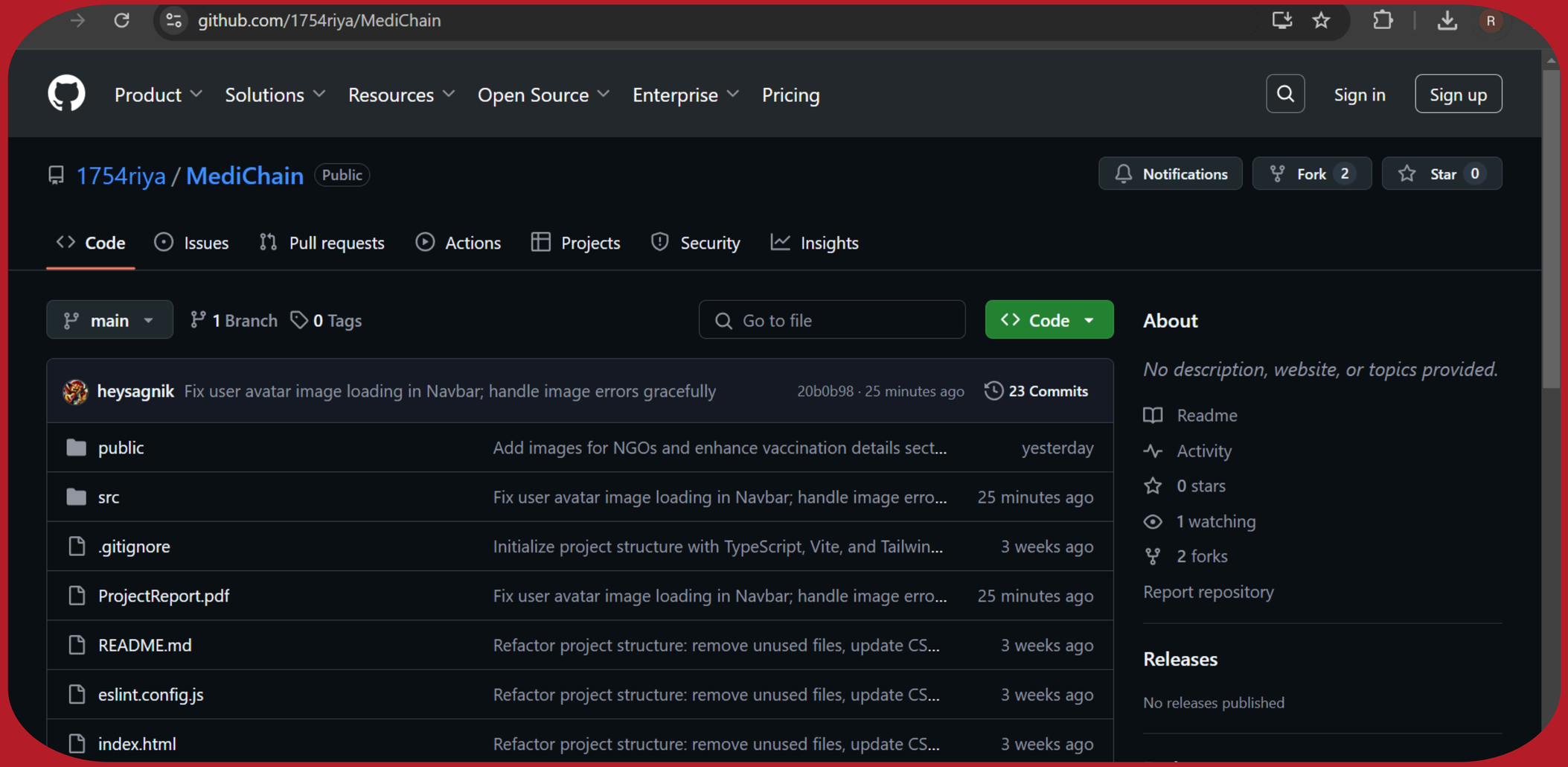


CONCLUSION:

THE ONLINE HEALTHCARE APPOINTMENT AND NGO CONNECTION PLATFORM AIMS TO REVOLUTIONIZE THE WAY HEALTHCARE APPOINTMENTS ARE BOOKED AND HOW PATIENTS CAN ACCESS SOCIAL SUPPORT THROUGH NGOS. BY INTEGRATING A USER-FRIENDLY INTERFACE WITH A POWERFUL BACKEND POWERED BY FIREBASE, THE PLATFORM ENABLES PATIENTS TO EASILY BOOK APPOINTMENTS WITH DOCTORS WITHOUT WAITING IN LONG QUEUES, WHILE OFFERING REAL-TIME UPDATES ON THEIR QUEUE POSITION. THE USE OF FIREBASE FIRESTORE ENSURES EFFICIENT MANAGEMENT OF DATA, AND FIREBASE AUTHENTICATION SECURES USER CREDENTIALS, MAKING THE PLATFORM BOTH ACCESSIBLE AND SECURE. ADDITIONALLY, THE INCORPORATION OF TAILWIND CSS GUARANTEES A RESPONSIVE, MOBILE-FRIENDLY DESIGN, OFFERING A SEAMLESS EXPERIENCE ACROSS ALL DEVICES. THE PLATFORM NOT ONLY ENHANCES HEALTHCARE ACCESSIBILITY BUT ALSO PROVIDES A DIRECT CONNECTION TO NGOS, ENSURING THAT PATIENTS HAVE ACCESS TO SUPPORT WHENEVER THEY NEED IT. WITH AN INTUITIVE ADMIN DASHBOARD AND REAL-TIME FEATURES SUCH AS NOTIFICATIONS AND QUEUE TRACKING, THE PLATFORM SIMPLIFIES APPOINTMENT SCHEDULING AND ADMINISTRATIVE MANAGEMENT. HOSTED ON FIREBASE HOSTING, THE PLATFORM IS SCALABLE, SECURE, AND EASILY MAINTAINED, ALLOWING IT TO GROW AND ADAPT TO INCREASING USER DEMAND. OVERALL, THIS PROJECT ADDRESSES KEY PAIN POINTS IN THE HEALTHCARE SYSTEM BY PROVIDING A STREAMLINED, ACCESSIBLE SOLUTION FOR APPOINTMENT SCHEDULING AND NGO SUPPORT, SHOWCASING THE POWER OF MODERN WEB DEVELOPMENT TOOLS AND CLOUD-BASED SERVICES TO CREATE A COMPREHENSIVE, USER-CENTRIC PLATFORM.



OUR PROJECT LINK :
HTTPS://GITHUB.COM/1754RIYA/MEDICHAIN.GIT



THANKYOU!