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**Project Title**

# Smart Healthcare System for Hospital Bed Availability, Doctor Analysis, Patient History, and Fundraising

1. **Statement about the Problem**

Healthcare is a fundamental necessity, yet access to real-time information about healthcare facilities is often limited. Patients seeking hospital beds, especially in emergencies, often face challenges in finding available resources quickly.

Additionally, patients rarely have transparent access to doctors’ credentials, such as the number of successful surgeries or treatments they have performed, which could aid in making informed decisions.

Moreover, a segment of the population struggles to afford basic healthcare services. In such cases, those who can’t pay for treatment might miss opportunities for financial assistance, further exacerbating health crises.

A centralized healthcare system that solves these issues by providing real-time data on hospital bed availability, access to detailed information on doctors' expertise, and supporting patients in financial distress is needed to improve the overall healthcare experience.

# Why This Topic Was Chosen

This project was chosen because it addresses several critical issues in the healthcare sector that have come to the forefront, especially during the COVID- 19 pandemic. The need for real-time information regarding hospital resources such as bed availability, access to a doctor’s professional record, and mechanisms to support patients in financial distress became more apparent. The goal is to create a system that benefits all stakeholders, including patients, healthcare providers, and donors, by integrating all these features into a single platform.

Additionally, as a minor project for the B.Tech program, this project presents a great opportunity to apply learned technical skills, including MERN stack

development and database management, to solve real-world problems in healthcare.

# Objective and Scope of the Project

**Objective:**

The objective of this project is to design and implement a web-based smart healthcare system that enables users to:

* 1. **Check real-time bed availability** in hospitals within a specified city.
  2. **View detailed information about doctors**, including their experience, number of operations performed, and their success rates.
  3. **Access patient medical history**, which includes medication details and known allergies, using their Aadhar card number for verification.
  4. **List financially distressed patients for fundraising**, allowing donors to contribute to their treatment.

# Scope:

The platform is intended to serve multiple user types:

* **Patients:** Who need access to information about hospital resources and their medical records.
* **Doctors and Hospitals:** To provide their data on bed availability and professional history to the system.
* **Donors:** Who want to contribute to patients in need through a transparent fundraising platform.

The scope includes both front-end and back-end development, ensuring that the system is responsive, secure, and scalable. Future developments could include mobile app integration, expanding to more cities, and adding advanced data analytics features to improve decision-making.

# Methodology (Including a Summary of the Project) Step 1: Requirement Analysis

The project starts with understanding the specific requirements of the healthcare domain, including the type of information hospitals, doctors, and patients would need. Discussions with potential users (patients and healthcare workers) will help identify key features.

# Step 2: Design

* **User Interface (UI) Design**: The UI will be developed using React and Tailwind CSS to ensure the platform is visually appealing and easy to navigate. Pages will be designed for bed availability searches, doctor analysis, patient history access, and fundraising.
* **Database Design**: MongoDB will be used to store hospital information, doctor details, patient medical history, and donation records. The database will be structured to ensure quick and efficient data retrieval.

# Step 3: Development

* **Front-End**:
  + The front-end will be developed using React to create interactive interfaces where users can easily search for hospitals, view doctors' profiles, and access patient history.

# Back-End:

* + The back-end will be developed using Node.js and Express.js. RESTful APIs will be created for hospital bed availability, doctor records, and patient history retrieval based on the Aadhar card number.

# Fundraising Module:

* + A fundraising module will allow users to donate towards specific patient cases. Payment gateways such as Razorpay or Stripe will be integrated for secure transactions.

# Step 4: Testing and Integration

Testing will be conducted to ensure data accuracy, UI responsiveness, and overall system security. Unit testing with Jest, API testing with Postman, and end-to-end testing with Cypress will be performed.

# Step 5: Deployment and Maintenance

The final system will be deployed on cloud platforms such as AWS or Heroku for easy access by users. Continuous maintenance and updates will be provided based on user feedback and data integrity.

# Hardware & Software to be Used Hardware Requirements:

* A development PC with a standard configuration (Intel Core i5 or higher, 8GB RAM) for coding, testing, and running the application.

# Software Requirements:

* **Operating System**: Windows/Linux

# Languages & Frameworks:

* + Front-end: React, Tailwind CSS
  + Back-end: Node.js, Express.js
  + Database: MongoDB
* **Version Control**: Git for tracking changes and collaboration.
* **API Testing**: Postman for testing REST APIs.
* **Payment Gateway**: Razorpay or Stripe for online fundraising transactions.
* **Deployment Platform**: AWS or Heroku for hosting the application.

# Testing Technologies Used

To ensure the quality and functionality of the system, various testing methods will be employed:

* **Unit Testing**: Components of the front-end and back-end will be tested individually using Jest, ensuring that each part of the system functions as expected.
* **API Testing**: APIs for hospital bed data, doctor analysis, and patient history will be tested using Postman to ensure correct data retrieval and security.
* **End-to-End Testing**: The entire system will be tested using Cypress to simulate real-world user interaction and ensure that all features work seamlessly.
* **Load Testing**: JMeter will be used to test the system’s response under different load conditions, ensuring it can handle large amounts of traffic.

# Contribution of the Project

This project will make several important contributions to healthcare:

* **Efficiency in Emergencies**: Patients will be able to find hospitals with available beds quickly, improving emergency response times.
* **Informed Decision-Making**: Patients can make informed choices about their doctors based on their experience and success rates.
* **Patient Data Management**: Easy access to medical history via Aadhar verification helps in faster and more accurate healthcare delivery.
* **Fundraising for Needy Patients**: The system allows financially distressed patients to be featured for fundraising, making healthcare more accessible to those in need.

This project also presents a real-world use case for implementing MERN stack development, API integration, and security measures, thus improving the technical skills of the developer.

# Conclusion

The **Smart Healthcare System** is designed to improve healthcare services by providing an integrated platform for hospital bed availability, detailed doctor analysis, secure patient history management, and fundraising support for needy patients. This innovative approach leverages modern web technologies to solve existing problems in healthcare, providing a seamless experience for patients, hospitals, and donors alike.

The use of real-time data, user-friendly interfaces, and scalable cloud-based deployment will make this system a valuable addition to the healthcare industry. With its comprehensive features, this project stands out as an all-in-one healthcare platform aimed at improving accessibility and transparency in healthcare services.