DHAANISH AHMED COLLEGE OF ENGINEERING

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BOOK A DOCTOR USING MERN

A NAAN MUDHALVAN PROJECT REPORT

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- **Project Title**: Book A Doctor using MERN
- **Team Members**:
  - **Julfath Sahania N** : Frontend Developer
  - **Jebasti S**: Backend Developer
  - **Bhuvanesh M**: Database Architect
  - **Akula Sumanth A** : Quality Assurance Engineer

2.Project Overview

Purpose

The "Book A Doctor" application was created with one primary mission in mind: **to bridge the gap between patients and doctors** in a way that is simple, convenient, and deeply focused on improving the healthcare experience. We understand that health is personal, and finding the right doctor at the right time should not be a stressful or overwhelming task. Our goal is to empower patients by providing them with an easy-to-use platform that connects them directly to healthcare providers, ensuring they can get the care they need, when they need it.

Humanizing the Experience:

- In today's fast-paced world, time is precious, especially when it comes to healthcare. Imagine being able to book a doctor's appointment in just a few clicks, without the need to make lengthy phone calls or wait on hold. No more worrying about long waiting lines or wasting time traveling to a clinic only to find that the doctor is unavailable or fully booked. With "Book A Doctor," we've designed the application to eliminate these frustrations, offering a seamless, personalized experience that respects your time and health needs.
- For **patients**, this application is like having a trusted healthcare assistant in your pocket. You can quickly search for doctors based on specialty, location, availability, and patient reviews—helping you find the right match in just a few seconds. Whether you're seeking a consultation for a routine check-up, a specific illness, or even a second opinion, the platform puts the power of choice in your hands.
- Moreover, the application is intuitive and designed to make the entire booking process as smooth and comfortable as possible. You can view real-time availability, schedule your appointment with a few taps, and even receive reminders for follow-up visits.

- The heart of "Book A Doctor" lies in its simplicity, but it's also about **human connection**. This isn't just about booking a slot on a calendar—it's about helping people **connect** with trusted healthcare professionals in a way that feels personal and attentive. For us, it's not just about providing a service; it's about **building relationships**, ensuring that every patient feels heard, cared for, and supported through their health journey.

A Compassionate Approach:

- We understand that when it comes to health, every person has unique needs, and we want to meet those needs with compassion and respect. "Book A Doctor" is more than a functional tool—it's a digital companion that's here to make your life easier, whether you're dealing with a minor concern or navigating a serious condition. The app's goal is to make sure you have access to the right care, whenever you need it, without unnecessary stress or confusion.
- By providing patients with a streamlined, accessible, and personalized way to book doctor's appointments, "Book A Doctor" is here to help take the hassle out of healthcare—making it more **efficient, human, and accessible** for everyone.
- In essence, our purpose is clear: **To make healthcare more accessible, efficient, and human-centered, one appointment at a time.**

Key Features

1. User Authentication:

For Patients and Doctors: The app offers a smooth and secure sign-up and login process, ensuring that both patients and doctors can easily create and manage their profiles.

- Patients can sign up using their email or phone number, providing basic details about themselves, such as their medical history and contact preferences. Once logged in, they have quick access to their appointments, doctor profiles, and personal health information.
- Doctors can create their professional profiles, showcasing their qualifications, areas of expertise, and availability. They can also update their details to reflect their current schedule, making it easy for patients to find and book them.

2. Doctor Search:

For Patients: The doctor search functionality enables users to find the best healthcare providers based on several personalized filters:

- Specialization: Whether a patient is looking for a general practitioner, cardiologist, dermatologist, or pediatrician, they can easily filter doctors by specialization.
- Location: Users can search for doctors close to their location or in specific areas, ensuring convenience for in-person visits.
- Availability: Patients can view doctors' available time slots, making it easier to select the right time for their consultation.

3. Appointment Booking:

For Patients: Once a patient finds the right doctor, they can book an appointment instantly through the app. The process is simple and user-friendly:

- Available Time Slots: Patients can view available time slots and select the one that works best for them.
- Booking Confirmation: Once an appointment is booked, the system sends an immediate confirmation, giving the patient peace of mind.
- Appointment Management: Patients can reschedule or cancel appointments as needed, offering flexibility if their plans change.

4. Doctor Profiles:

For Doctors: Doctors can create and continuously update their profiles with key details that allow them to connect with potential patients:

- Specialization & Expertise: Doctors can list their areas of focus, certifications, and qualifications to build trust with patients.
- Education & Experience: Patients can learn about a doctor's educational background and years of practice, helping them make an informed decision.
- Available Times: Doctors can update their schedules in real-time, ensuring patients always know when they are available for appointments.

5. Admin Panel:

For Administrators: The admin panel allows administrators to efficiently manage and monitor all activities within the platform:

- User Management: Admins can view and manage patient and doctor profiles, ensuring that only verified individuals have access to the platform.
- Doctor Management: Admins can approve, review, and help maintain doctor profiles, ensuring that information remains up-to-date and accurate.
- Appointment Management: Admins can oversee the booking system, address any issues related to appointments, and provide assistance if patients or doctors face difficulties.

6. Notifications:

For Patients and Doctors: The app sends timely notifications to remind users of their appointments and ensure they don't miss important consultations:

- Appointment Reminders: A day before and an hour before the appointment, both patients and doctors receive notifications as reminders.
- Doctor Availability Updates: Doctors receive reminders about their upcoming appointments, helping them stay on top of their schedules.

3.Architecture

- **Frontend**:
  The frontend is built using **React.js**, which provides a dynamic, responsive, and fast user interface. The application uses **React Router** for smooth navigation between pages and **React Context API** for state management across components. API requests are made using **Axios**.
- **Backend**:
  The backend is powered by **Node.js** and **Express.js**, which handle server-side logic, API routes, and communication with the database. The application is designed around RESTful principles, with endpoints for handling users, doctors, appointments, and more. The backend also includes middleware for tasks like authentication and error handling.
- **Database**:
  MongoDB is used to store data. It is a NoSQL database that is flexible and scalable, making it ideal for this application. Collections in the database include:
    - **Users** (patients, doctors, admins)
    - **Appointments** (appointments between patients and doctors)
    - **Doctors** (doctor profiles with information about their specialties and availability)

Example schema for **appointments**:

json

```
{
  "patient_id": ObjectId,
  "doctor_id": ObjectId,
  "appointment_time": Date,
  "status": String  // e.g. "booked", "completed", "cancelled"
}
```

4.Setup Instructions

- **Prerequisites**:
    - **Node.js** (version 14.0 or higher)
    - **MongoDB** (either local or MongoDB Atlas)
    - **npm** (Node Package Manager)
- **Installation**:

1.Clone the repository:

git clone https://github.com/Julfathsahania/Naan_Mudhalvan.git

2.Navigate into the project directory:

cd doctor

3.Install dependencies for both the client and server:

cd client

npm install

cd ../server

npm install

4.Set up environment variables: Create a .env file in both the root and server directories:

env

MONGO_URI=mongodb://your-database-uri

JWT_SECRET=your-secret-key

5.Run the frontend and backend:

Frontend:

Navigate to the client directory and run:

npm start

Backend:

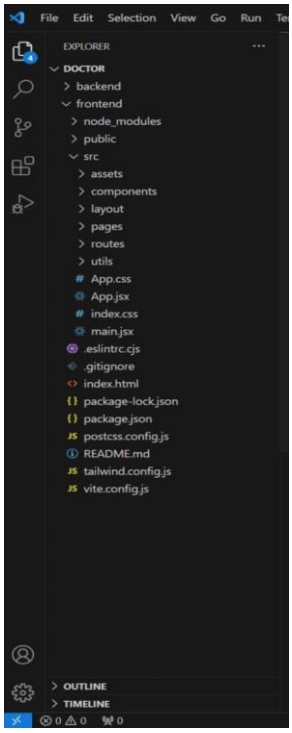
Navigate to the server directory and run:

npm start

Now the application should be running locally. The frontend will be accessible at

http://localhost:3000, and the backend API will be at http://localhost:5000.

5.Folder Structure



6.Working of the Application

To run the application locally, you'll need to start both the frontend and backend servers:

Frontend:
In the client directory, run:

npm srun dev

Backend:
In the server directory, run:

node index.js

The frontend should be available at http://localhost:3000, and the backend API at http://localhost:5000.

7.API Documentation

Here is an overview of the main API endpoints:

POST /api/users/register:

- Register a new user (patient or doctor).
- Request body:

json

```
{
  "username": "JohnDoe",
  "email": "johndoe@example.com",
  "password": "securepassword",
  "role": "patient/doctor"
}
```

Response:

json

```
{
  "message": "User registered successfully",
  "user": { "id": "user_id", "username": "JohnDoe" }
}
```

POST /api/users/login:

- Log in a user and receive a JWT token.
- Request body:

json

```
{
  "email": "abcd@example.com",
  "password": "securepassword"
}
```

Response:

json

```
{
  "token": "jwt_token_here"
}
```

GET /api/doctors:

- Fetch a list of doctors, optionally filtered by specialization or location.
- Query parameters: specialization, location
- Response:

json

```
[
  {
    "id": "doctor_id",
    "name": "Dr. John Doe",
    "specialization": "Cardiology",
    "available_times": ["2024-11-20T10:00", "2024-11-20T14:00"]
  }
]
```

POST /api/appointments:

- Book a new appointment with a doctor.
- Request body:

json

```
{
  "doctor_id": "doctor_id",
  "appointment_time": "2024-11-20T10:00"
}
```

Response:

json

{

"message": "Appointment booked successfully",

"appointment": { "id": "appointment_id", "status": "booked" }

}

8.Authentication

- **JWT Authentication**:
    - Users log in and receive a **JWT token** that must be included in the header of any protected API requests:

Authorization: Bearer <token>

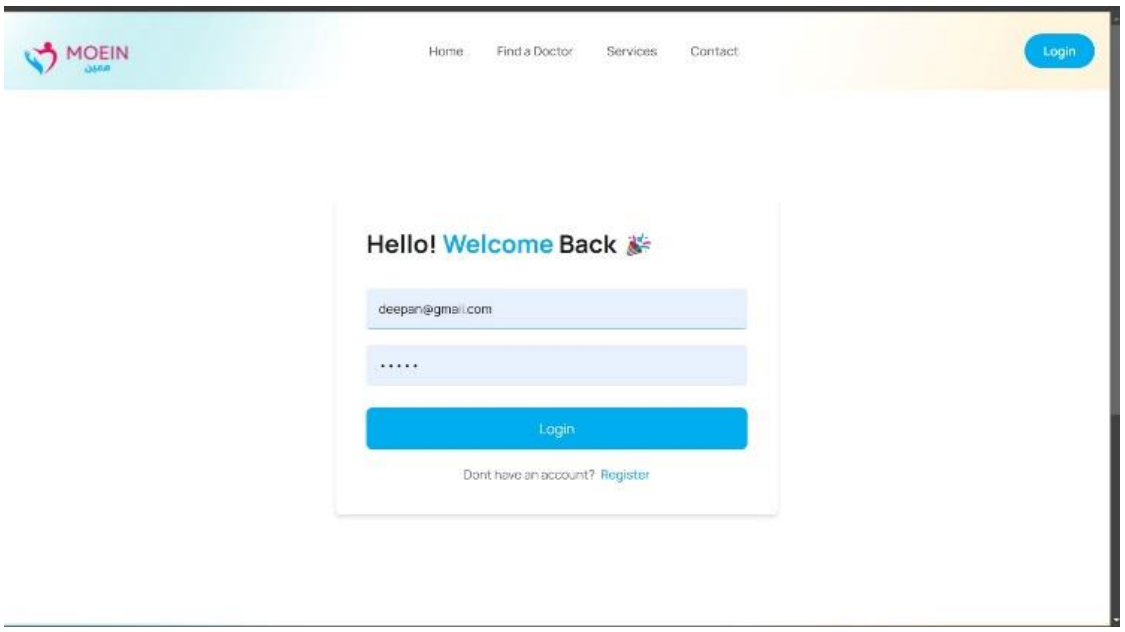
    - The JWT is stored either in **localStorage** or **cookies** on the frontend to persist the user session.

8.User Interface

The UI is designed to be clean, intuitive, and responsive. Key screens include:

- **Home Page**: A search interface for finding doctors based on specialty, location, and availability.
- **Doctor Profile**: Displays detailed information about the doctor, including their specialties, availability, and consultation options.
- **Booking Appointment**: Users can view available slots and book an appointment directly through an easy-to-use calendar.


MOEIN
Home
Find a Doctor
Services
Contact
Log in
We assist children in living healthier and more fulfilling lives.
In the main section of our website, we show how we're here to help kids stay healthy and happy. We talk about how our online platform makes it easy for parents to get top-notch medical help for their children. We want to make it simple for families to find the care they need, whenever they need it. Our goal is to make sure every child gets the best care possible.
Request an Appointment


MOEIN
Home
Find a Doctor
Services
Contact
Login
Hello! Welcome Back
deepan@gmail.com
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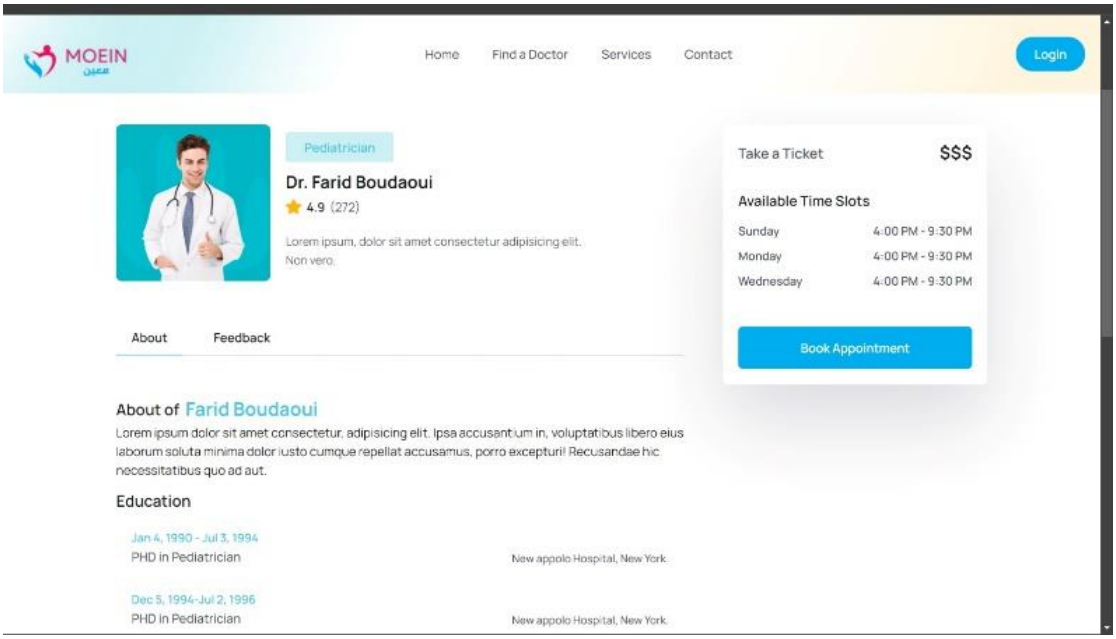
Login
Dont have an account? Register



9.Testing

Testing is a critical part of the development process. We used the following strategies:

- **Unit Testing**: Components and functions are tested using **Jest** and **React Testing Library** for the frontend, and **Mocha/Chai** for backend logic.
- **Integration Testing**: We use tools like **Postman** to test API endpoints and verify their functionality.
- **End-to-End Testing**: **Cypress** is used for simulating user behaviour to test the full application flow from login to booking an appointment.

10.Screenshots or Demo

- **Demo Link**: https://drive.google.com/file/d/1WcZuNW6Tm8SZDMKa3aPrVJzryXOb7sj6/view?usp=drivesdk

11.Known Issues

- **Bug 1**: Users have reported occasional slow load times when fetching doctor availability. This will be investigated and optimized in a future update.
- **Bug 2**: Sometimes, the appointment cancellation status does not update immediately in the UI. This is being addressed with a fix.

12.Future Enhancements

Personalized Patient Dashboard

- **User Profiles:** Allow users (patients) to create profiles where they can save their medical history, ongoing treatments, allergies, and preferred doctors**.**
- **Appointment Reminders & Notifications:** Implement automated reminders for upcoming appointments and health check-ups via email/SMS.
- **Doctor Recommendations**: Use AI/ML algorithms to recommend doctors based on user history and preferences (e.g., specialization, location, ratings).

2. Real-Time Doctor Availability

- **Live Scheduling:** Integrate a real-time scheduling system where users can see when doctors are available for appointments based on their calendar, similar to how appointment systems in email apps work.
- **Instant Booking with Confirmation**: Use live notifications to inform users about available slots and confirm appointments instantly**.**

3. Virtual Consultation (Telemedicine)

- **In-App Video Calls:** Add secure video conferencing for online doctor consultations. Use WebRTC or integrate services like Zoom API for a seamless experience.
- **Chatbot Assistance:** Incorporate a medical chatbot powered by AI to guide users through the booking process, answer general medical questions, or pre-screen patients before a consultation.

4. Doctor Reviews and Ratings

- **User Feedback System:** Allow patients to leave reviews and ratings after each consultation, helping future users choose the right doctor.
- **Humanized Reviews:** Instead of just ratings, encourage patients to leave detailed testimonials with their experiences (e.g., "Dr. Smith was very attentive and explained the treatment clearly").

5. Intelligent Search and Filters

- **Natural Language Search:** Implement NLP (Natural Language Processing) where users can search for doctors using conversational language (e.g., "Find a cardiologist near me available this weekend").
- **Advanced Filters:** Offer filters like doctor specialties, languages spoken, gender, patient reviews, insurance compatibility, and more to make it easier for users to find the best match.

6. AI-Powered Symptom Checker

- **AI Diagnosis Tool:** Build or integrate an AI-based symptom checker that helps patients assess their condition before booking an appointment. The tool can guide users in determining whether they need to see a doctor or if they can treat their symptoms at home.
- **Human-Like Conversations:** Use a conversational interface that responds like a human assistant, asking clarifying questions to make sure the symptom input is accurate.

7. Integrated Health Records

- **EHR Integration:** If you can partner with healthcare systems or clinics, integrate Electronic Health Records (EHR) so that users can have a centralized view of their medical records. This would include prescriptions, test results, and past consultations.
- **Prescriptions and Medical Documents:** After the consultation, patients can receive digital prescriptions and medical documents through the app, which they can access or share with pharmacies and other doctors**.**

8. Smart Appointment Scheduling

- **Optimized Time Slots:** Use machine learning to suggest the best times for appointments based on the doctor's and patient's past habits, as well as the clinic's load.
- **Smart Waitlist Management:** If a doctor's schedule is full, provide a smart waitlist feature. When a slot opens up, notify patients automatically, so they can grab the available time quickly.

9. Insurance Integration

- **Insurance Compatibility:** Allow patients to filter doctors based on insurance coverage. Provide a feature where users can check if their insurance covers a doctor's consultation fees.
- **Instant Insurance Claim Assistance:** Provide an easy-to-use interface for patients to submit claims for reimbursement after consultations.

10. Appointment Follow-Up

- **Automated Follow-Up Messages:** After the consultation, send follow-up messages to the patient, including a summary of the visit, reminders for any prescribed treatments or tests, and when to schedule their next visit.
- **Feedback Loop:** Incorporate follow-up surveys to assess the quality of care and service provided.

11. Integration with Wearables and Health Apps

- **Health Data Syncing:** Sync with fitness wearables (like Fitbit, Apple Watch, etc.) to gather health data (e.g., steps, heart rate, sleep patterns). This data can be useful for the doctor during consultations.
- **Health App Integration:** Allow users to connect with other health apps (e.g., MyFitnessPal, Google Fit) so that they can track their health journey and share relevant data with their doctor.

12. Multilingual and Accessibility Support

- **Multi-Language Support:** Include options for multiple languages to cater to a diverse range of users, making it accessible to people from different linguistic backgrounds**.**
- **Voice Assistance:** Implement voice commands to allow users to navigate the app hands-free, enhancing usability, especially for elderly patients or those with disabilities.
- **Screen Reader Support:** Ensure that the platform is fully accessible to those using screen readers by following WCAG guidelines.

13. Doctor's Professional Profile Enhancement

- **Doctor's Bio and Credentials:** Doctors should have detailed profiles with information on their qualifications, years of experience, certifications, and areas of expertise.
- **Humanized Introduction**: Create a friendly introduction that humanizes the doctor, sharing their approach to patient care, interests, and any specialties in a conversational tone.

14. Seamless Payment Integration

- **Flexible Payment Methods:** Integrate payment gateways to allow users to pay via credit cards, PayPal, and even insurance claims directly within the app.
- **Affordable Payment Plans**: Offer installment plans or discounts for low-income patients or those with long-term treatments.

15. Health Tips and Articles

- **Personalized Health Tips**: Provide users with health tips based on their medical history, appointments, and search history. For example, someone who frequently books dermatology appointments might get skin care tips.
- **Articles and Blogs:** Include educational content about common diseases, treatments, and healthy living.

16. Doctor Availability via Chat

- **Instant Messaging with Doctors**: Enable real-time chat with doctors for simple inquiries. While this won't replace full consultations, it can be useful for quick questions.
- **24/7 Chatbot:** Implement a chatbot that answers basic medical questions (e.g., "What are the symptoms of the flu?") and helps book appointments.

17. Gamification and Engagement

- **Health Challenges**: Introduce health challenges where patients can track their progress over time, earn points, and receive rewards such as discounts on appointments or health products.
- **Badges for Healthy Habits:** Offer badges for users who complete regular check-ups, follow up on appointments, or maintain healthy practices.