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AI-BASED HEALTH ASSISTANCE SYSTEM AND DISEASE ANALYSIS

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Abstract

This paper presents a health assistance system powered by AI, built with React Native and the MERN stack. It aims to make healthcare support smarter and more accessible. The application uses Google Gemini AI to provide users with real-time conversations about their health. This helps them understand

symptoms and analyze injuries through images. To assist users further, the system includes the Google Maps API, which helps them find nearby doctors and pharmacies based on their location.

For security, the platform employs JWT-based authentication to protect user data. MongoDB stores personal information and health records securely. Unlike many traditional healthcare apps that focus on just one function, this system combines several features. It offers AI-driven guidance, location-based services, and multilingual support all in a single mobile application. This approach aims to promote preventive healthcare practices and enhance the overall user experience.

Disclaimer: The health suggestions, symptom analysis, and injury-related recommendations from this system are generated using artificial intelligence. They are intended for general information and initial guidance only. This application is not a replacement for professional medical advice, diagnosis, or treatment. Users should consult qualified healthcare professionals before making any medical decisions based on the system's recommendations.

1 Introduction

Modern healthcare services have changed a lot because of how quickly digital technology and artificial intelligence are growing. Because of this, there is a growing need for smart, mobile-based healthcare solutions that can give users quick and accurate initial advice.

This paper talks about an AI-based health help system that was made with React Native and the MERN stack. With AI-powered features, the app lets users talk to each other in real time, look at symptoms, and check out injuries. It also offers location-based services, which help users quickly find doctors and pharmacies nearby. The system uses secure authentication methods to protect user data, and its ability to support multiple languages makes it easier for more people to use

2 Literature Review

Recent studies show that artificial intelligence is becoming more and more important in digital healthcare solutions. The study "Personalized Flexible Meal Planning for Individuals With Diet-Related Health Concerns," published by JMIR Publications, looks at how AI can help people with diet-related health problems plan their meals. But it doesn't have features for real-time interaction or image-based analysis. BMJ Publishing Group published another study called "A Symptom Checker for Primary Care" that looks at AI-powered symptom checkers in primary care. It helps with early diagnosis, but it only works with text inputs and doesn't connect to other health services.

"Mobile Health Applications for Chronic Disease Management" talks about mobile health monitoring in a similar way, but it doesn't include advanced AI interaction or injury image assessment.

3 Problem Statement

A lot of people have trouble taking care of their health every day because they can't get timely medical advice and there aren't many digital solutions that work together. Many health apps only focus on one thing, like checking symptoms or keeping track of fitness, and don't offer a full platform. Most systems also don't have AI that works in real time, image-based injury analysis, or healthcare services that are based on where you are. Because of this, people have to use more than one app or go to a doctor's office for small problems. So, we need a single, AI-powered health assistance system that can give basic advice, analyze symptoms, assess injuries, and connect people with nearby healthcare providers on a safe and easy-to-use mobile platform.

4 Research Objectives

The main goal of this research is to create an AI-Based Health Assistance System that offers smart, easy-to-use, and real-time health care help through a mobile app.

The study's specific goals are:

1. To develop a cross-platform mobile application using React Native and the MERN stack.
2. To integrate artificial intelligence for real-time health chat, symptom analysis, and injury image assessment.
3. To implement secure user authentication and data storage using JWT and MongoDB.
4. To incorporate location-based services for finding nearby doctors and pharmacies.

5 Research Questions / Hypotheses

The primary research question directing this study is: Does the incorporation of Vision AI substan- tially enhance the precision of initial symptom evaluation and the user's capacity to articulate medical conditions in comparison to text-only interfaces? The hypothesis posits that a multimodal approach diminishes ambiguity, reduces user error in symptom reporting, and achieves assessment accuracy that aligns more closely with clinical standards.

6 Proposed Methodology

The suggested system is based on a client-server model, with React Native for the mobile front end and Node.js with Express.js for the back end. MongoDB is a safe place to keep user data, health records, and chat history.
The app uses AI to offer real-time health chat, symptom analysis, and injury image evaluation. Health suggestions are made based on what users type or upload as images. JWT-based authentication keeps access safe, and location-based services help people find doctors and pharmacies near them. The method focuses on providing a mobile healthcare solution that is safe, smart, and works with other systems.

7 System Architecture Explanation

The system is built on a client-server model. The mobile client, which was made with React Native, talks to a RESTful API that was made with Node.js and Express.js. A separate API layer is used for inference with Gemini AI (Pro and Pro Vision models). This layer gets user requests that have text and maybe pictures, and it sends back health insights that have been analyzed. MongoDB is the main database. It stores encrypted user health profiles, interaction history, and cached provider information. The Google Maps API is built into the server to handle location data and show nearby healthcare facilities. Bcrypt hashing and JSON Web Tokens (JWT) keep authentication and data transmission safe.

8 Technologies Used

Frontend & Mobile: React Native (Expo), Expo Notifications

Backend (MERN): Node.js, Express.js, MongoDB

APIs & Services: Google Gemini AI (Text & Vision), Maps API, JWT & bcrypt.js

9 Implementation Details

The AI-Based Health Assistance System is implemented in four modules: frontend, backend, database, and AI integration.
The frontend is built with React Native (Expo) for cross-platform mobile support and includes Login, Dashboard, AI Chat, Symptom Checker, Injury Analyzer, and Nearby screens.
Axios handles API communication between the frontend and backend. The backend is developed using Node.js and Express.js to provide RESTful APIs for user authentication, chat processing, and data management. Secure authentication and authorization use JWT.
The database component employs MongoDB with Mongoose to store user information securely along with health records .
For AI integration, user input text and images are processed through the AI service to allow health suggestions as well as first-aid recommendations.
Location-based services help find nearby doctors and pharmacies so that real-time healthcare access can be ensured.

10 Comparative Analysis

Table 1: Comparative Analysis of Health Systems

Feature / Criteria	**Meal Planning System (JMIR 2023)**	**Symptom Checker (BMJ 2020)**	**mHealth App (JMIR 2019)**	**Proposed AI-Based Health Assistance System**
Primary Focus	AI-based diet planning	Text-based symptom diagnosis	Chronic disease monitoring	Integrated AI health assistant

Real-time AI Chat	X	X	X	
Symptom Analysis	X	(Text only)	Limited	(Advanced)
Injury Image Assessment	X	X	X	
Location-Based Services	X	X	X	
Preventive Healthcare Focus	Limited	Limited	Moderate	Strong
Unified Platform	X	X	X	

11 Results and Discussion

The AI-Based Health Assistance System was successfully deployed and tested for health chat, symptom analysis, injury image assessment, and search for nearby healthcare. The system provided real-time AI-generated suggestions and Doctor and pharmacy location services. Secure authentication and data storage also worked perfectly. Results indicate that the fusion of AI chat, image analysis, and location- based services into a single platform enhances accessibility and user engagement compared to health applications with standalone features; however, the accuracy of suggestions is contingent upon AI capa- bilities as well as internet connectivity. In general terms, this system has high potential to be considered an efficient solution in digital health support.

12 Limitations

The system needs a constant, strong internet connection to work with AI and Maps API, which makes it less useful in places with weak connectivity. Image analysis may not be accurate in low light, with poor quality images, or from unusual angles. The AI's knowledge is limited by the training data cut-off and may not include the latest medical research or rare conditions. This system is used for preliminary triage and cannot do physical examinations or fully interpret complex medical histories

13 Conclusion

- Unified AI health assistant with chat, symptom analysis, injury detection, and location-based services.
- Real-time guidance, preventive healthcare.
- Scalable, user-centric, and cross-platform system enhancing personal health management.

14 References

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