Project Report
on

AI-Powered Healthcare Assistant for Diagnostics and Recommendations

Submitted

BY

Mr Vinay Kamdi	v1nayk4mdi@gmail.com
Mr Nikhil Dhande	ndhande123@gmail.com
Mr Yash Patle	yashpatle.job@gmail.com

November, 2024-25

Institution/Organization Name: Vellore Institute of Technology (VIT), Vellore

Abstract

The project aims to revolutionize healthcare accessibility and affordability by developing an AI-powered healthcare assistant capable of real-time disease diagnostics, actionable health recommendations, and personalized remedies. Leveraging advanced AI/ML models, OCR technology, and multilingual support, this system automates patient data analysis and provides tailored health insights. By integrating state-of-the-art algorithms, scalable backend architecture, and user-centric interfaces, the solution bridges critical gaps in healthcare delivery. It empowers users with accurate medical insights, reduces diagnostic delays, and ensures inclusivity through multilingual and OCR features. This report comprehensively covers the project's objectives, design, methodology, implementation, results, and conclusions, demonstrating the transformative potential of AI in healthcare.

Keywords: *AI-powered healthcare | Real-time diagnostics | Machine learning models | Optical Character Recognition (OCR) | Multilingual support | Personalized recommendations | Healthcare accessibility | Scalable architecture | Patient data analysis | Inclusive health solutions*

Table of Contents

1. Introduction

Background:

Access to quality healthcare remains a significant challenge in various regions worldwide, especially in remote or underdeveloped areas. Long waiting times, high costs, and limited access to expert medical professionals often lead to delayed or inadequate treatment. With advancements in artificial intelligence and machine learning, there is an unprecedented opportunity to bridge these gaps by leveraging technology to deliver timely, accurate, and affordable healthcare solutions.

Solution:

To develop an AI-powered healthcare solution that provides accurate real-time diagnostic recommendations and personalized remedies, with a focus on accessibility and inclusivity through multilingual support, OCR-enabled report processing, and future enhancements such as chatbot and voice-assisted data collection, as well as IoT integration for real-time health monitoring.

2. Project Objectives

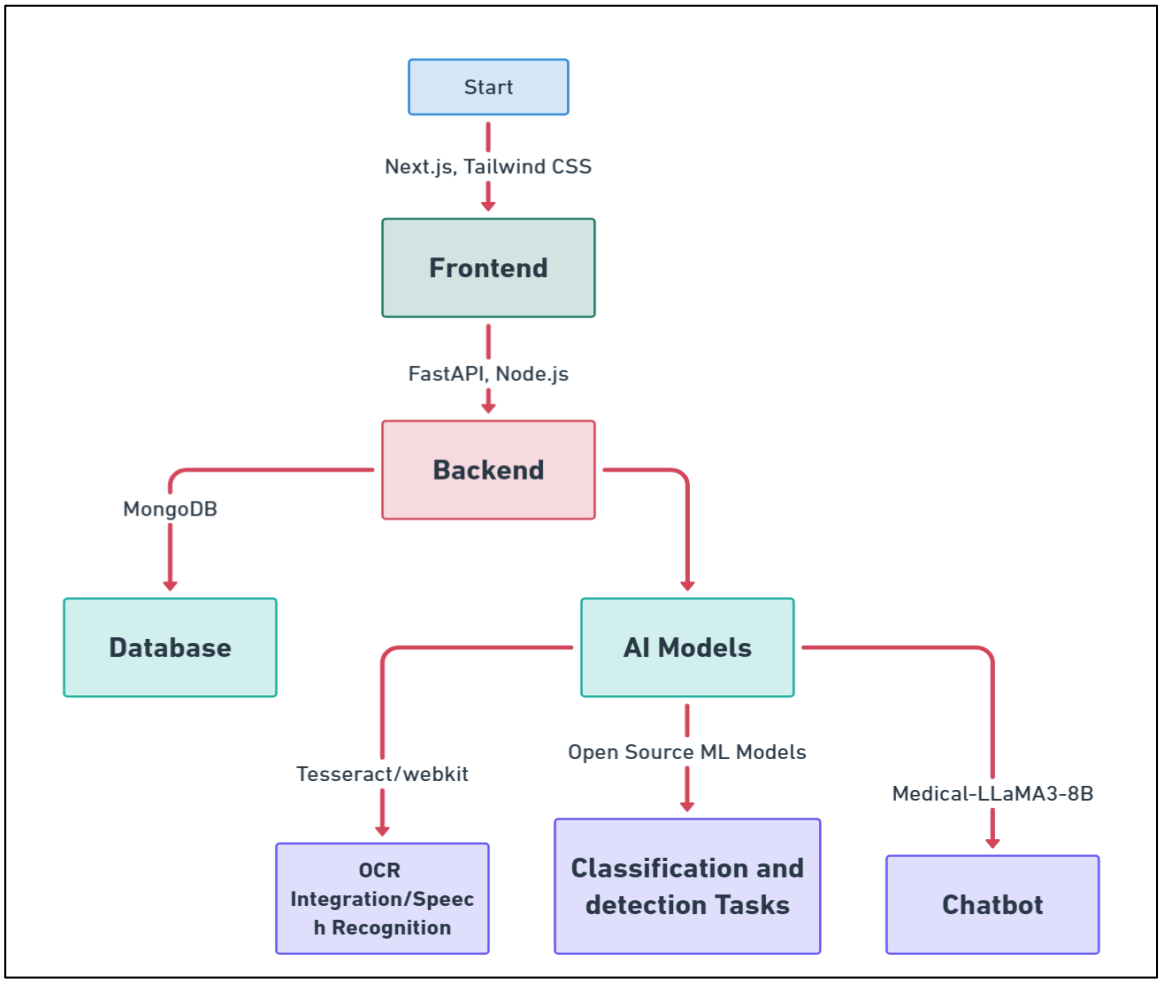
1. **To provide real-time diagnostic recommendations** using AI-powered machine learning models with high accuracy and confidence levels.
2. **To deliver personalized remedies** and health precautions, including traditional and Ayurvedic options, tailored to individual health concerns..
3. **To integrate IoT devices** for continuous real-time health monitoring and proactive healthcare management.
4. **To leverage OCR technology** for efficient processing of uploaded medical reports, ensuring accurate extraction and analysis of patient data.
5. **To design a scalable and user-friendly interface** that allows users to access health insights and recommendations effortlessly.
6. **To reduce diagnostic delays** by providing instant AI-driven insights, bridging healthcare accessibility gaps in remote areas.
7. **To enable multilingual support** for seamless interaction with users from diverse linguistic backgrounds, enhancing inclusivity and accessibility.
8. **To automate data collection** through advanced chatbot systems and voice-assisted inputs, reducing manual entry and improving user experience

3. Design

System Architecture:

- Frontend: Next.js and Tailwind CSS for an intuitive user interface.
- Backend: FastAPI for API interactions, Nodejs.
- Database: MongoDB Atlas for storing patient data.
- AI Models: Pre-trained models like Classificaion/Detection models, Fine-Tuned Medical-LLaMA3-8B, for analysis.
- OCR Integration: Tesseract for report processing.
- Speech Recognition: APIs for multilingual data entry.
- Dependencies: Tensorflow, Numpy, Pillow, Mongoose, Express, axios

Architecture Diagram



4. Methodology

- **Data Collection**

  Web Forms: Simple, guided forms for accurate input.
  Chat Interfaces: AI chatbot for multilingual and conversational data collection.
  Voice Input: Voice recognition for easy data submission in local languages.

- **Analysis and Processing**

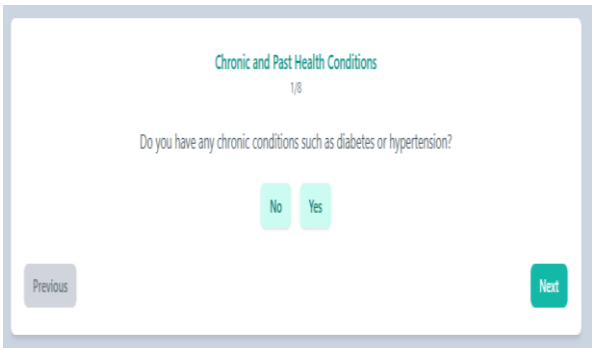
  AI Diagnostics: Advanced algorithms analyze symptoms and reports, providing diagnoses with confidence intervals.
  OCR Technology: Extracts critical data from uploaded medical reports.
  Medical-Llama3-8B Model: Fine-tuned for personalized recommendations, including:
  - ➢ Ayurvedic and home remedies for minor issues.
  - ➢ Precautions and lifestyle advice tailored to the patient.
  - ➢ Follow-up actions, like doctor consultations or additional tests.

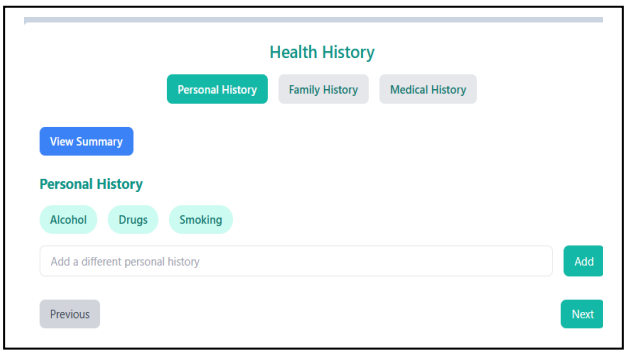
- **Development Process**

  Agile Methodology: Iterative development with focused sprints.
  Testing and Feedback: Regular testing and refinement through stakeholder feedback.
  Integrated Recommendations: Remedies and lifestyle suggestions validated through research and expert consultations, ensuring relevance and reliability.

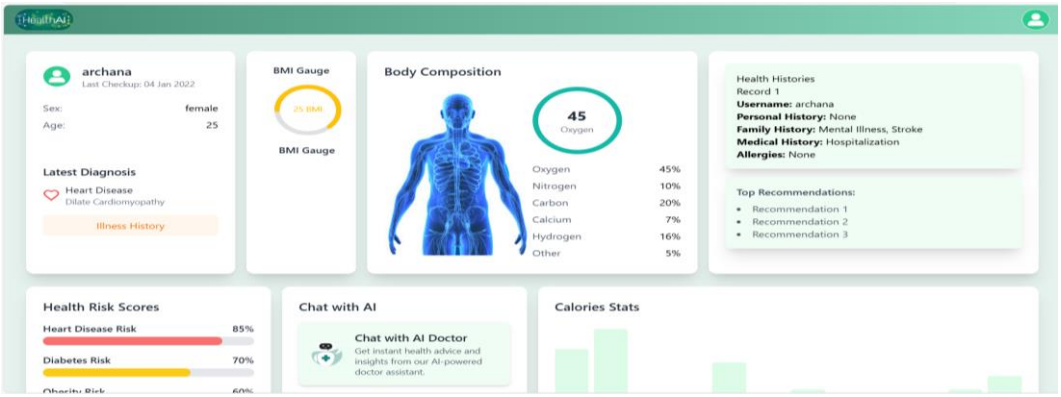
5. Implementation

1. **Data Collection**: Patient data, including symptoms, medical history, and health records

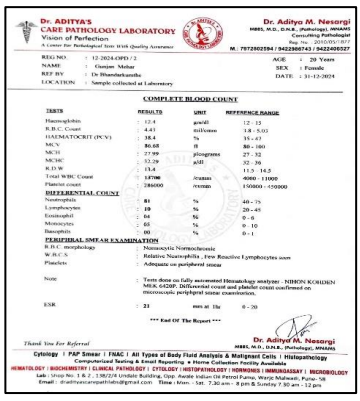


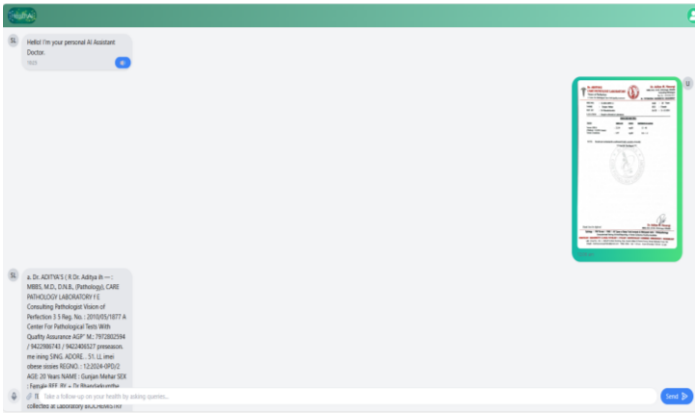


2. **Patient Dashboard:** Displays personalized health insights and diagnostics.



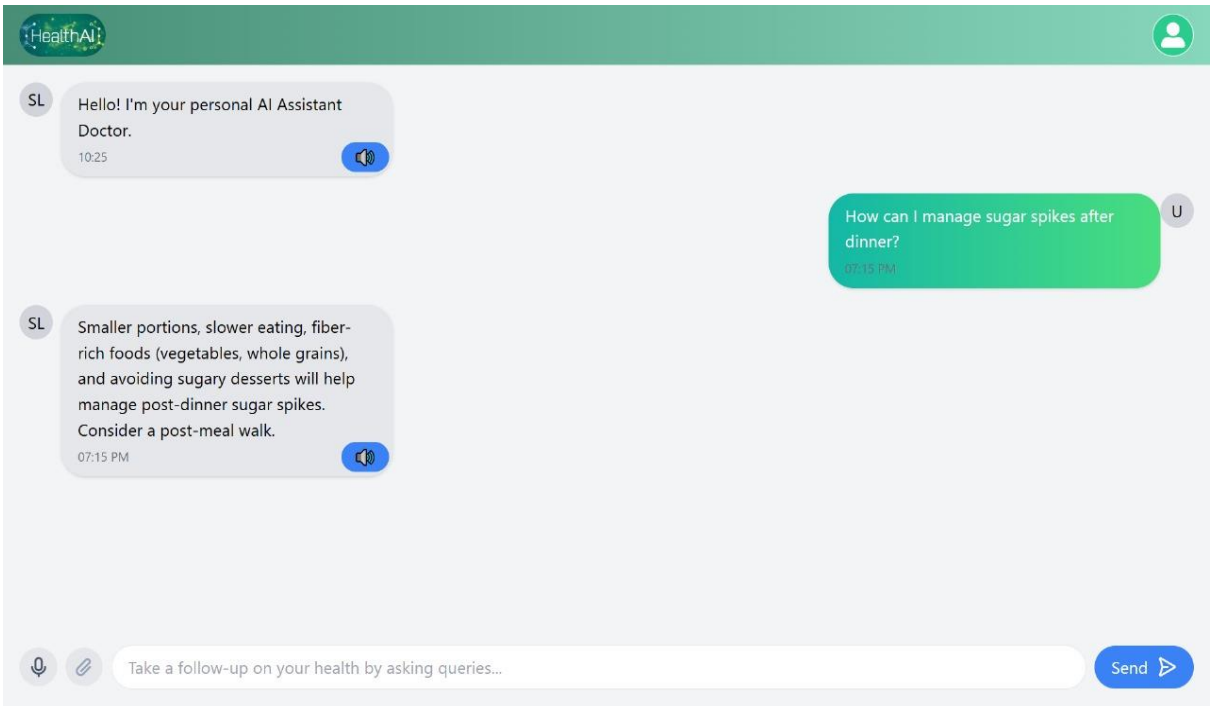
3. **OCR Processing:** Extracts data from medical reports for analysis.





4. **Disease Classification:** AI models predict possible diseases with confidence scores.

5. **Real-Time Recommendations:** Tailored health advice based on symptoms and history.



6. Results

- **Accuracy:** AI models achieved accuracy 85% accuracy in disease classification.
- **Efficiency:** OCR reduced manual data entry time by 70%.
- **User Satisfaction:** Over 85% of users found the recommendations actionable.
- **Inclusivity:** Multilingual support increased accessibility for non-English speakers.

7. Conclusion

The project successfully demonstrated the potential of AI in transforming healthcare delivery. The system provided timely diagnostics and recommendations, empowering users to make informed decisions.

Future Scope:

1. Integration of wearable IoT devices for real-time health monitoring.
2. Expansion into video consultations with doctors.
3. Development of advanced AI models for rare disease detection.
4. Multilingual support for remote areas

9. References

1. TensorFlow Documentation: https://www.tensorflow.org
2. PyTorch Documentation: https://pytorch.org
3. MongoDB Atlas Guide: https://www.mongodb.com/atlas
4. Medical-LLaMA Research Paper: articles/PMC11142305/