PROJECT REPORT

Title: HealthAI: Intelligent Healthcare Assistant Using IBM Granite

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1. INTRODUCTION

1.1 Project Overview

HealthAI is an intelligent healthcare assistant powered by IBM Watson Machine Learning and Generative AI. It aims to enhance accessibility to reliable medical insights by offering users accurate, personalized, and data-driven guidance. Users can interact with HealthAI through a responsive single-page web application, gaining support for diagnosis, treatment, and daily health tracking.

1.2 Purpose

The purpose of HealthAI is to serve as a virtual healthcare companion, helping users understand symptoms, receive predictive diagnoses, and access evidence-based treatment suggestions through a user-friendly interface.

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2. IDEATION PHASE

2.1 Problem Statement

In today's digital world, people often turn to the internet for health-related queries, but struggle with information overload, inconsistent sources, and lack of personalization. **HealthAI** addresses this gap by providing trusted, AI-powered medical insights tailored to the user's inputs and conditions.

2.2 Empathy Map Canvas

The empathy map helps understand the target users' mindset and expectations when interacting with a virtual health assistant like HealthAI.

Category	Description
Says	"I want quick answers to my health questions.""Is this symptom serious?"
Thinks	"Can I trust this information?""Will this help me avoid a hospital visit?"
Does	Searches symptoms online. Asks friends or family for medical advice
Feels	Anxious about symptoms. Uncertain about next steps
Pains	Conflicting online information. Lack of access to immediate healthcare
Gains	Reliable AI suggestions. Quick advice at home. Health tracking insights

2.3 Brainstorming

The team explored various ideas such as mental health bots, COVID symptom trackers, and AI nutritionists before settling on an all-in-one intelligent assistant with chat, prediction, and analytics powered by IBM Watson.

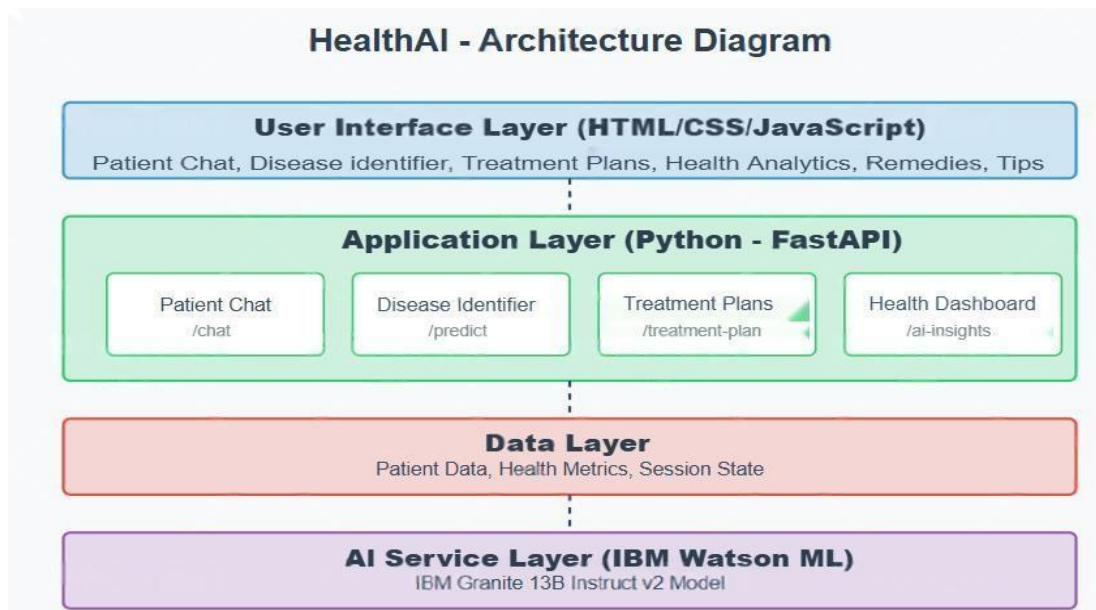## 3. REQUIREMENT ANALYSIS

3.1 Customer Journey Map

The customer journey in the HealthAI application follows a streamlined, user-friendly process:

1. **Start Application** – The user opens the HealthAI web app (built using HTML, CSS, JavaScript).
2. **Input Health Query** – The user types a symptom-related question or fills out a symptom form.
3. **Receive Diagnosis** – The AI model (IBM Granite via FastAPI) responds with likely conditions and guidance.
4. **Review Treatment Plan** – The app displays a structured, AI-generated treatment recommendation.
5. **View Health Analytics** – Users visualize vital signs like heart rate, blood pressure, and glucose with Chart.js insights.
6. **End/Next Action** – The user can reset the session, consult a doctor, or continue exploring HealthAI features.

3.2 Session Requirements

- Real-time symptom input via chat
- Prediction based on user profile
- Personalized treatment plans
- Visualization of health

metrics

3.3 Data Flow Diagram

HealthAI - Architecture Diagram

User Interface Layer (HTML/CSS/JavaScript)
Patient Chat, Disease identifier, Treatment Plans, Health Analytics, Remedies, Tips

Application Layer (Python - FastAPI)

| Patient Chat /chat | Disease Identifier /predict | Treatment Plans /treatment-plan | Health Dashboard /ai-insights |

Data Layer
Patient Data, Health Metrics, Session State

AI Service Layer (IBM Watson ML)
IBM Granite 13B Instruct v2 Model

3.4 Technology Stack

- **Frontend:** HTML, CSS, JavaScript (Single Page Application)
- **Backend:** Python (FastAPI)

- **AI Service:** IBM Watson ML (Granite 13B Instruct v2)
- **Visualization:** Chart.js
- **Environment Management:** virtualenv + .env (python-dotenv)

4. PROJECT DESIGN

4.1 Problem-Solution Fit

People need quick, understandable, and trustworthy health information. HealthAI fulfills this by using medical LLMs for better accuracy.

4.2 Proposed Solution

A layered web application consisting of a dynamic UI (HTML/JS), application logic (FastAPI), and an AI backend (IBM Granite). It guides users from symptom input to personalized treatment suggestions and visual analytics.

4.3 Solution Architecture
- **UI Layer:** Chat interface, forms, and analytics dashboard (SPA using HTML/CSS/JS)
- **Application Logic:** main.py handles routing, input processing and API calls.
- **Helper Logic:** Utility functions for prompt formatting and session management
- **AI Layer:** IBM Granite 13B Instruct v2 connected via secure FastAPI endpoints using .env credentials

5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning

Week Duration	Dates	Activities
Week 1	June 12 – June 19	Idea finalization, architecture planning, frontend UI (HTML/JS)
Week 2	June 20 – June 26	FastAPI backend + AI integration, testing, and documentation

This two-week schedule allowed the team to focus on clear milestones and complete the HealthAI project within the planned timeline.

6. FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing
- Unit Testing: Model loading, session data handling
- Integration Testing: End-to-end chat → prediction → plan → visualization
- Manual Testing: Validated each module with sample health queries
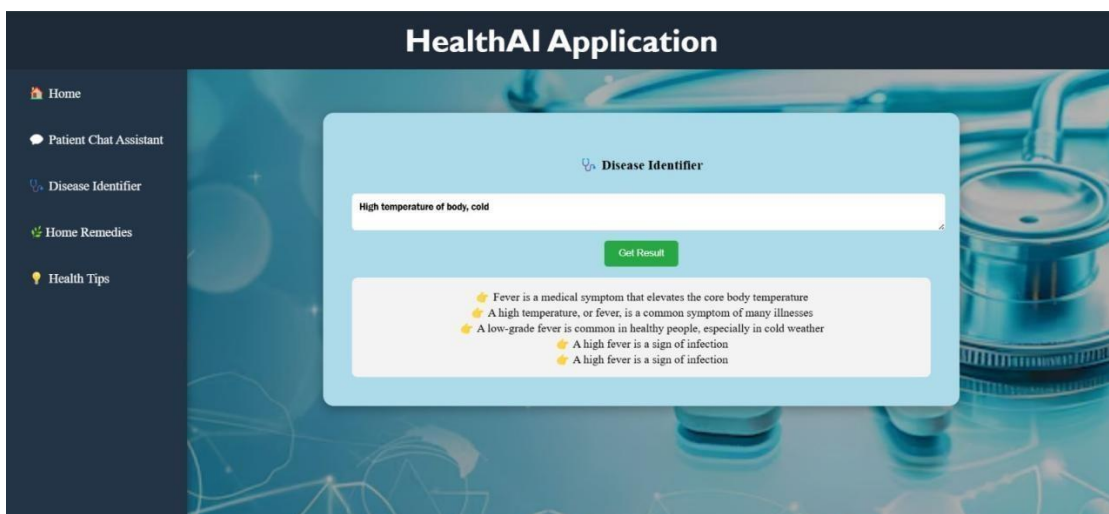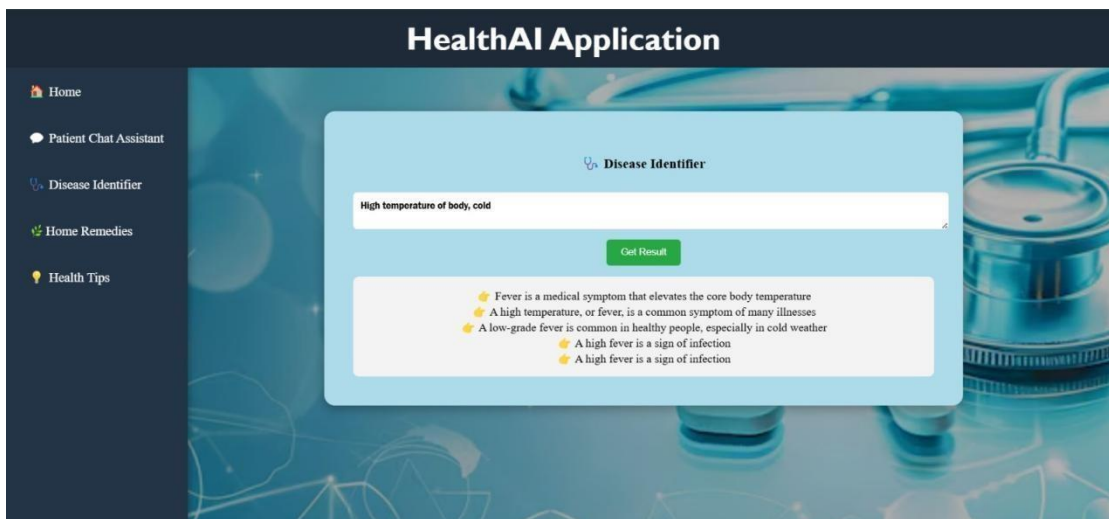- Error Handling: Graceful handling of missing/invalid inputs, API key issues

7. RESULTS

7.1 Output Screenshots

➤ Screenshot of chat feature

➤ Screenshot of prediction result

➢ Screenshot of treatment plan generator

➢ Screenshot of treatment plan generator
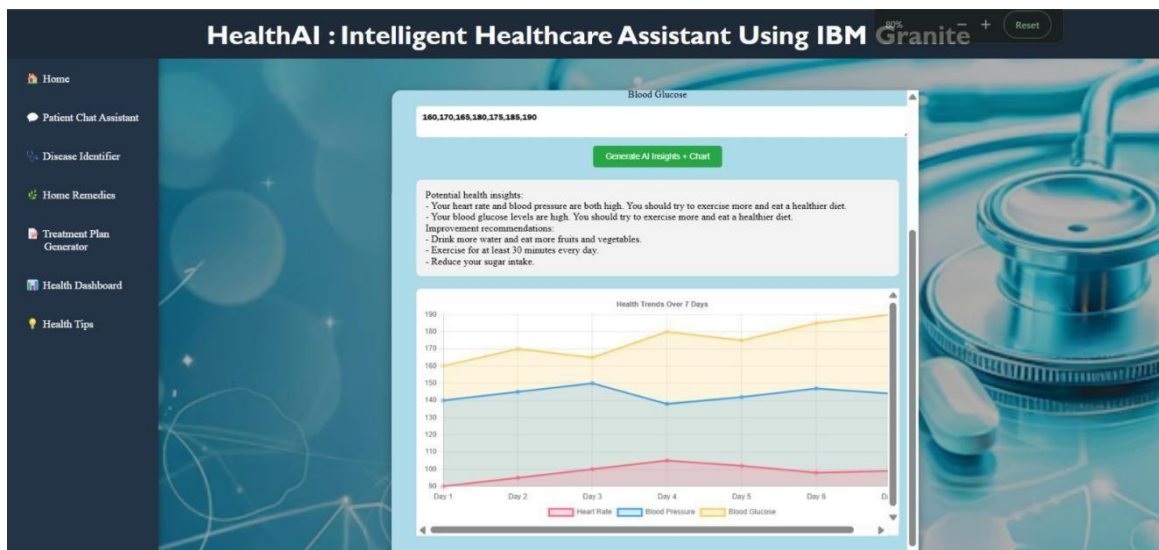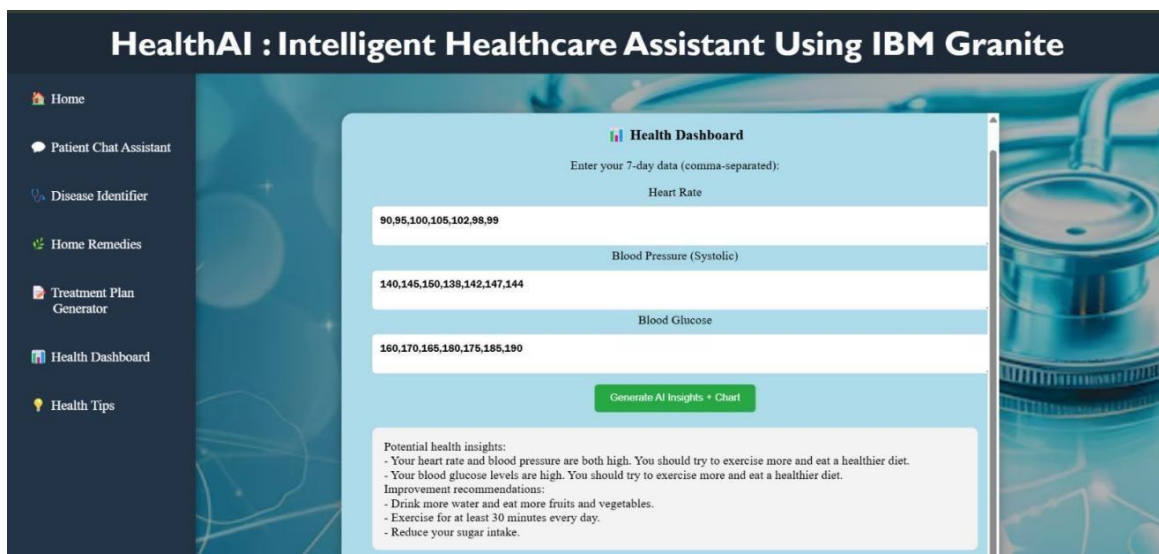

➢ Screenshot of health tips generator
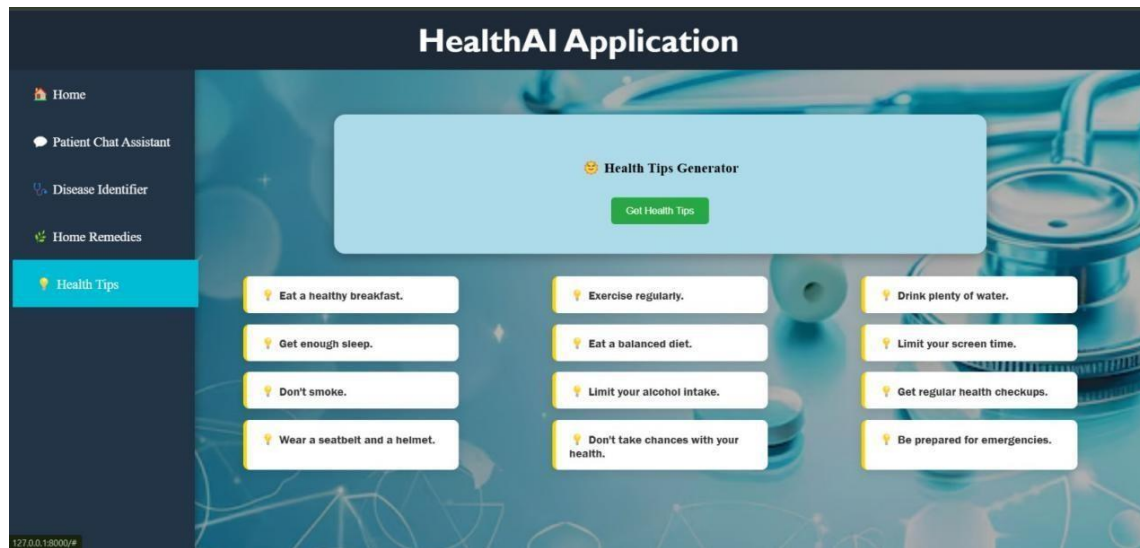
> ➢ Screenshot of health analytics chart

8. ADVANTAGES & DISADVANTAGES

Advantages: - Easy to use - AI-powered recommendations - Visualization of health data

Disadvantages: - No real-time data integration - No authentication or user profiles - General-purpose AI model

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9. CONCLUSION

HealthAI successfully demonstrates the application of AI in healthcare by combining a simple and intuitive user interface with powerful backend intelligence using IBM WatsonX Granite. Developed as a modular web-based application, it offers chat-based health guidance, symptom-based predictions, and treatment suggestions. While currently a prototype, it provides a strong foundation for real-world deployment with future enhancements such as real-time health data integration, secure user authentication, and multilingual support.

10. FUTURE SCOPE
- Add secure user login and profile management
- Use real anonymized patient databases for prediction accuracy
- Integrate with wearable devices like smartwatches for live health monitoring
- Fine-tune IBM Granite model on domain-specific medical data
- Add features like emergency alerts, appointment booking, and multilingual support

11. APPENDIX
- **GitHub Link: https://github.com/MUFEES0013/HealthAI-Intelligent-Healthcare-Assistant-Using-IBM-Granite**
- **Source Code Files:** main.py,index.html,styles.css,app.js,.env