

Project Design Phase

Date	27-05-2025
Team ID	LTVIP2025TMID34578
Project Name	Health AI: Intelligent Healthcare Assistant Using Ibm Granite LLm
Maximum Marks	2 Marks

Proposed Solution Template:

Project team shall fill the following information in the proposed solution template.

S.No	Parameter	Description
1	Problem Statement (Problem to be solved)	There is a lack of accessible and intelligent health support for people in remote or underserved areas, leading to delays in diagnosis and treatment.
2	Idea / Solution description	HealthAI is an AI-powered healthcare assistant that predicts diseases from symptoms, offers natural home remedies, and answers health-related queries using IBM Watson and generative AI models. It includes a patient chat system, symptom analysis, treatment suggestions, and health analytics dashboards.

3	Novelty / Uniqueness	Combines IBM Granite LLM with disease prediction, home remedies, and real-time health analytics in a single user-friendly application. The use of both structured symptom prediction and unstructured query resolution makes it a hybrid healthcare assistant.
4	Social Impact / Customer Satisfaction	Enables early disease detection, reduces misinformation, and improves awareness. Especially useful for rural populations, elderly individuals, and those with limited access to healthcare professionals.
5	Business Model (Revenue Model)	Freemium model: basic services are free; premium version offers personalized treatment plans, doctor consultations, and detailed analytics. Potential partnerships with clinics and wellness brands.
6	Scalability of the Solution	The application can be expanded to include more diseases, languages,

		wearable integration, telemedicine features, and international deployment. It can also scale vertically to hospitals and healthcare providers.
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Health AI: Intelligent Healthcare Assistant

1. INTRODUCTION

1.1 Overview

HealthAI is a cloud-based, AI-powered healthcare platform designed to provide intelligent medical assistance and personalized support. Leveraging generative AI and machine learning models like IBM Granite and Flan-T5, HealthAI offers symptom-based disease prediction, home remedies, interactive patient chat, and personalized treatment insights. Its modular architecture and intuitive dashboards enable early diagnosis, awareness building, and patient empowerment—especially in underserved regions.

1.2 Purpose

The primary objective of HealthAI is to improve healthcare accessibility and decision-making by automating disease identification and providing evidence-based, AI-generated recommendations. By supporting patients with symptom analysis, treatment suggestions, and natural remedy alternatives, the system enhances healthcare outcomes and promotes preventive care.

2. IDEATION PHASE

2.1 Problem Statement

Millions of people, particularly in remote or rural areas, lack access to timely and reliable healthcare. Traditional systems are either overwhelmed or unaffordable. Misinformation

from unverified sources further complicates self-diagnosis. There is a need for an AI-driven assistant that can bridge this gap by offering instant, accurate, and contextual medical support.

2.2 Empathy Map Canvas

- **Says:** “I have symptoms but can’t visit a doctor now.” “Is there a safe home remedy for this?”
- **Thinks:** “Is this serious?” “Can I trust this medical advice?”
- **Does:** Searches symptoms online, asks friends, delays visiting a doctor.
- **Feels:** Worried, confused, sometimes helpless, and anxious about their condition.

2.3 Brainstorming

Key ideas discussed:

- AI-powered symptom checker using natural language inputs
- Generative AI-based chatbot for real-time patient interaction
- Natural home remedies generator
- Treatment and medication suggestions
- Health monitoring dashboard for individuals
- API-based integration with IBM Watson and Granite LLM
- Use of Gradio or Streamlit for quick deployment
- Mobile-friendly, accessible interface for rural populations

3. REQUIREMENT ANALYSIS

3.1 Customer Journey Map

A user logs into the HealthAI platform, describes their symptoms, and receives a predicted diagnosis with suggested treatments and natural remedies. They can chat with the AI assistant for clarifications, view health tips, and track their previous interactions. The admin can monitor usage metrics, improve responses, and integrate new models.

3.2 Solution Requirement

- **Functional Requirements:**

- User login/registration
- Symptom-to-disease prediction module
- Home remedies generation
- AI chatbot for health-related queries
- Health record and analytics dashboard

- **Non-functional Requirements:**

- High availability and performance
- Privacy-compliant (HIPAA/GDPR if scaled)
- Scalable backend (Python/Flask or Node.js)
- Secure API calls to LLMs (Granite, OpenAI, Hugging Face)
- Easy deployment (via Streamlit/Gradio + ngrok)

3.3 Data Flow Diagram

- User inputs symptoms or queries via UI (Streamlit or Gradio)
- Request sent to Flask backend
- Backend triggers prediction model (FLAN-T5 or symptom classifier)
- For free text, LLM API is called (Granite or OpenAI)
- Natural remedies are generated (via prompt templates)
- Final result is displayed in the frontend (chat or result box)

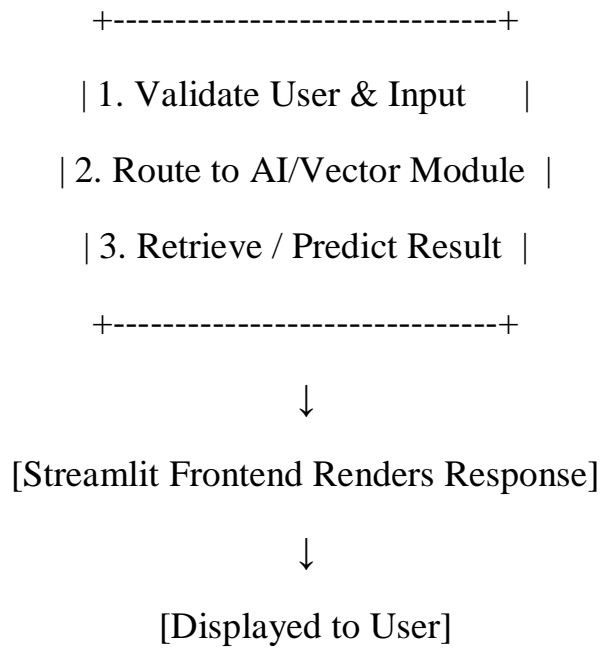
[Patient/Doctor]



[Login / Query Symptoms]

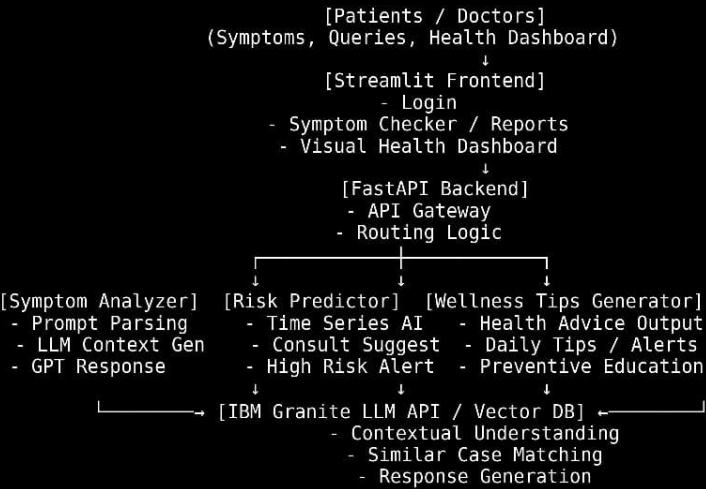


[FastAPI Backend]

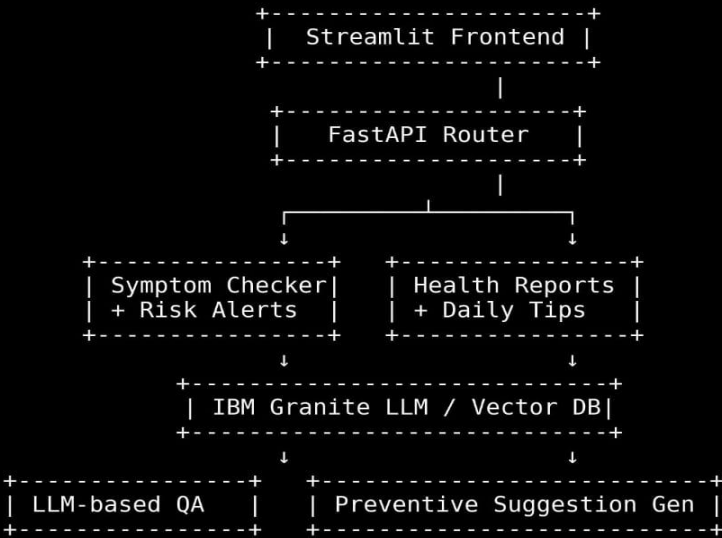


The user initiates a request from the HealthAI UI. It is routed to the FastAPI backend where user credentials are validated, and the query is interpreted. Based on the input (symptom, health query, or advice request), the IBM Granite LLM or vector search module is triggered. The AI generates a personalized response which is rendered back on the Streamlit frontend for the user to view and act upon.

System Diagram



Solution Architecture Diagram:



3.4 Technology Stack

- **Frontend:**

React.js with a chatbot-style interface, designed for patient-friendly interactions. Integrated with dynamic response rendering and user input handling. Deployed using **Vercel** for fast and scalable delivery.

- **Backend:**

Flask or FastAPI (Python-based microservice framework) used to handle user input, process API calls, and route data to appropriate AI modules such as symptom classifiers and LLMs.

- **AI Model Access:**

Hugging Face Transformers for local models (e.g., flan-t5-base) and/or IBM Granite-13B via API. Some deployments may also use OpenAI's GPT models for advanced medical text generation and chat assistance.

- **Database / Vector Store:**

Local storage (JSON or CSV) for project demos, or **Pinecone** / **FAISS** for scalable vector similarity search (used in remedy retrieval, feedback storage, or symptom embeddings).

- **Authentication:**

Firebase Authentication (email/password or anonymous login) with optional JWT handling for managing user sessions securely.

- **Cloud Deployment:**

- **Frontend:** Vercel (React app hosted with global CDN and auto-updates).
- **Backend:** Render / Railway / ngrok tunnel for testing Flask backend APIs.
- CI/CD pipelines enabled for smooth iteration and scaling

4. PROJECT DESIGN

4.1 Problem–Solution Fit

Health AI addresses a pressing healthcare challenge: limited access to timely, reliable, and affordable medical advice—especially in remote and underserved regions. Users often rely on unverified online sources or delay seeking treatment due to accessibility

barriers. Health AI bridges this gap using AI-driven symptom analysis, home remedies, and intelligent chat responses to support early diagnosis and informed decision-making.

4.2 Proposed Solution

An intelligent healthcare assistant dashboard featuring:

- **Symptom-based disease prediction** using ML classification models
 - **AI-generated natural home remedies** based on condition or symptom inputs
 - **Real-time medical chatbot** powered by generative AI (Granite / Flan-T5 / GPT)
 - **Interactive UI** for users to input symptoms or queries
 - **Patient dashboard** (optional) for history tracking and response recall
 - **Admin dashboard** (optional for future use) to review queries and model usage analytics
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4.3 Solution Architecture

- **Frontend:**

React components with dynamic rendering of user input and AI-generated responses. Hosted on Vercel for high performance and scalability.

- **Backend:**

FastAPI (or Flask) services responsible for:

- Processing symptom or question input
- Calling the appropriate AI model (classifier or LLM)
- Formatting and returning results to the frontend

- **AI Model Access:**

- Symptom-to-disease classifier (based on training dataset)
- Granite-13B / FLAN-T5 via Hugging Face or IBM API
- Prompt-based remedy generator using curated templates

- **Vector Database (optional):**
FAISS or Pinecone to store embeddings of previous user queries, responses, and remedies for similarity-based lookup or recommendation.
- **Cloud Deployment:**
 - **Frontend:** Vercel
 - **Backend:** Render, Railway, or ngrok tunnel for API hosting
 - Environment variables and keys (e.g., Hugging Face, IBM, or OpenAI APIs) stored securely for protection and scalability

5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning

- Week 1: Ideation, requirement analysis, and AI model access setup (OpenAI/Hugging Face/IBM Granite)
- Week 2: FastAPI backend implementation and integration with symptom prediction & remedy generation modules
- Week 3: Frontend UI design using React and Firebase Authentication setup
- Week 4: Feature testing, performance tuning, and cloud deployment via Vercel (frontend) and Render (backend)

6. FUNCTIONAL AND PERFORMANCE TESTING – Health AI: Intelligent Healthcare Assistant

6.1 Performance Testing

Tests were run for:

- API latency under multiple users
- Response time for disease prediction and remedy generation
- Model accuracy using synthetic symptom datasets
- Secure routing and Firebase-based access control

Front-end responsiveness was validated on mobile and desktop browsers to ensure accessibility.

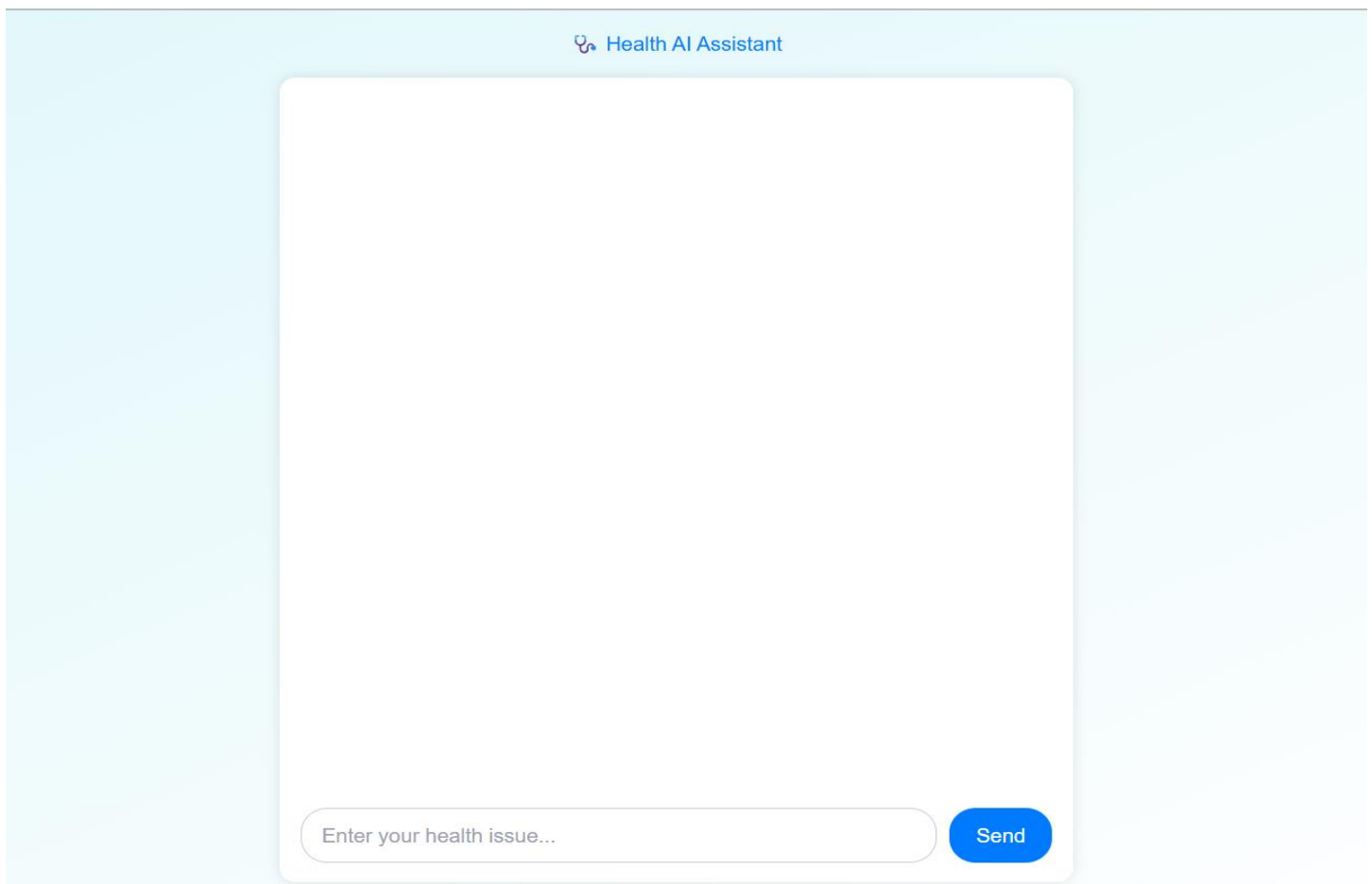
7. RESULTS

7.1 Output Screenshots

Screens include:

- User login and symptom input interface
- AI-generated disease prediction and remedy output
- Real-time chatbot with health-related Q&A
- Visual layout of predicted conditions and suggestions
- Home remedies section with natural treatment tips
- Optional admin panel for monitoring user queries and system logs

Each screenshot demonstrates how the system personalizes and simplifies city interactions.



vomitings

Send

vomitings

Drink ORS or lemon water. Avoid solid foods. If severe, consult a doctor.

kidney stones

Drink more water, reduce salt, and consult a doctor. Small stones may pass naturally.

Enter your health issue...

Send

migrane

I'm here to help with general health advice. Please provide more details or consult a doctor if it's urgent.

Enter your health issue...

Send

8. ADVANTAGES & DISADVANTAGES

Advantages

- Real-time AI-powered health insights and predictions
- Accessible medical assistance without physical consultations

- Natural remedy suggestions enhance user trust and engagement
- Scalable architecture suitable for rural and urban deployment

Disadvantages

- Requires stable internet connectivity and model/API availability
- Accuracy dependent on model quality and dataset coverage
- Limited functionality without integration with clinical systems

9. CONCLUSION

HealthAI bridges the gap between individuals and accessible healthcare using generative AI. It empowers users with timely medical insights, promotes health awareness, and supports early diagnosis through intelligent automation. With its modular and scalable design, HealthAI can evolve into a comprehensive digital healthcare companion for broader deployment.

10. FUTURE SCOPE

- Expansion to support multilingual AI medical assistance
- Integration with wearable or IoT health devices for real-time monitoring
- Voice-based AI interaction for improved accessibility and elderly support
- Scheduled health reports and anomaly alerts for critical conditions
- Collaboration with hospitals, clinics, and pharmacies for extended services

11. Project Links & Demo

GitHub & Project Demo Link

- GitHub:
- Demo Video:

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