

# Health AI: Intelligent Healthcare Assistant

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# 1. INTRODUCTION

## 1.1 Project Overview

**Health AI** is an advanced AI-powered healthcare platform that leverages **IBM Watson Machine Learning** and **Generative AI** to deliver personalized and intelligent medical assistance. Designed with a focus on accessibility, accuracy, and user experience, Health AI provides a comprehensive suite of healthcare services to help users make informed decisions about their health.

-  **Core Features:**

1.  **Patient Chat**

A conversational assistant that answers user queries related to health, symptoms, and wellness using natural language understanding.

2.  **Disease Prediction**

An AI model evaluates symptoms entered by users and provides potential conditions or diagnoses with medical context.

3.  **Personalized Treatment Plans**

Offers tailored medical recommendations and care plans based on user inputs and predicted conditions.

4.  **Health Analytics**

Visual dashboards and metrics to help users monitor trends in symptoms, health history, and risk factors over time.

## 1.2 Purpose

The purpose of **Health AI** is to create a smart, accessible, and user-friendly healthcare assistant that leverages **IBM Watson Machine Learning** and **Generative AI (Granite-13b-instruct-v2)** to deliver accurate and personalized medical guidance. Health AI is designed to empower users to **understand, manage, and make informed decisions** about their health—even without direct access to healthcare professionals.

### **Target Audience:**

- **General Public:** Individuals seeking quick, reliable health advice or disease insights without needing a doctor's appointment.
- **Tech-Savvy Users:** People comfortable using digital tools for personal healthcare management.
- **Rural & Underserved Communities:** Populations with limited access to medical infrastructure.

- **Students & Researchers:** Those studying healthcare or AI, using HealthAI as an educational tool.

#### Social Impact:

- **Improved Healthcare Access:** Helps bridge the healthcare divide by providing on-demand support to users in remote or resource-limited areas.
- **Health Awareness & Education:** Empowers individuals to understand symptoms, conditions, and care options, reducing misinformation.
- **Reduced Pressure on Healthcare Systems:** Enables basic triage and advice, allowing healthcare professionals to focus on critical cases.
- **Inclusive Design:** Accessible UI ensures that even non-technical users can benefit from AI-driven insights.

#### Economic Impact:

- **Cost Savings for Users:** Minimizes unnecessary doctor visits for minor or preliminary concerns by providing quick AI evaluations.
- **Affordable Healthcare Assistance:** Offers a free or low-cost alternative for health insights, especially useful in low-income regions.
- **Support for Insurance & Health Tech Startups:** Health AI can integrate into larger digital health ecosystems, contributing to cost-effective patient management.
- **Innovation in Digital Health:** Encourages AI adoption in healthcare, driving growth in the health tech sector.

## 2. Ideation Phase

### 2.1 Define the Problem Statements

Date	27 June 2025
Team ID	LTVIP2025TMID29337
Project Name	<b>Health AI: Intelligent Healthcare Assistant Using IBM Granite</b>
Maximum Marks	2 Marks

## Customer Problem Statements

### Problem Statement 1 – Patient Chat Interface

Section	Description
I am	A curious or concerned person with health-related questions
I'm trying to	Get clear, reliable answers about my symptoms or conditions
But	Searching online gives conflicting or scary information
Because	I don't have access to a trusted, AI-powered assistant for quick answers
Which makes me feel	Confused, anxious, and hesitant about taking the right steps

### Problem Statement 2 – Disease Prediction System

Section	Description
I am	A patient experiencing multiple symptoms (e.g., headache, fatigue, fever)
I'm trying to	Understand what condition I might be facing and what actions to take
But	I am unsure which symptoms are serious and what disease they might indicate
Because	I don't have the medical expertise or instant access to reliable diagnostics
Which makes me feel	Anxious, confused, and worried about my health decisions

### Problem Statement 3 – Treatment Plan Generator

Section	Description
I am	A user diagnosed with a health condition
I'm trying to	Get personalized, evidence-based treatment recommendations
But	I receive generic advice that doesn't consider my unique health profile
Because	I lack access to tailored medical guidance outside clinical visits
Which makes me feel	Uncertain and unsupported in managing my condition effectively

## Problem Statement 4 – Health Analytics Dashboard

Section	Description
I am	A health-conscious individual tracking my health over time
I'm trying to	Visualize my health metrics and detect trends or risks early
But	I can't interpret raw data or recognize what the numbers really mean
Because	I don't have access to a smart tool that explains patterns in simple terms
Which makes me feel	Overwhelmed and unsure about how to improve my health proactively

## 2.2 Empathize & Discover

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Maximum Marks	4 Marks

## Empathy Map Canvas

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes.

It is a useful tool to help teams better understand their users. Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.

# Empathy Map - HealthAI

## Intelligent Healthcare Assistant

### SAYS

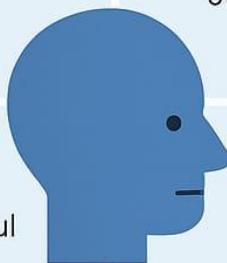
- I don't know if my symptoms are serious or not.
- I just want a quick answer without waiting for a doctor.
- Why is it so hard to find reliable health info online?
- I'm overwhelmed by medical terms

### THINKS

- Am I making the right health decisions?
- What did I miss something important?
- Is this app secure and reliable?
- This feels like it could help others too

### HEARS

- Use Google, but be careful
  - It can be misleading
- Doctors are busy:  
appointments take time
- AI in healthcare is risky but promising
- There are apps, but not all are accurate



### SEES

- Complex health websites with medical jargon
- Apps that provide too little or too much information
- Charts without explanation
- Conflicting results from different platforms

### FEELS (Pains)

Confused by too much or too little information  
Anxious about health outcomes  
Powerless without professional guidance  
Worried about data privacy

### GAINS (Needs)

- Clear, trustworthy health advice
- Easy-to-use interface
- Personalized insights
- Confidential and secure experience
- Suggestions on when to seek a doctor



## 2.3 Brainstorm & Idea Prioritization Template

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## Team Members & Roles

Name	Role
Sayandeep Maity	Team Leader, Full Stack & LLM Integration using IBM Granite
Prathi Adithya Durga Sri Krishna Kumar	Frontend Developer (Streamlit)
Madhurya Veera	Backend Developer (Python)
Kolli Veera Raghava Thanvi	Model Testing, Dashboard Data Aggregation

## Step 1: Team Gathering, Collaboration, and Selecting the Problem Statement

### **Problem Statement:**

To develop an AI-powered Intelligent Healthcare Assistant using IBM Granite LLM that helps users with real-time medical responses, disease prediction, personalized treatment plans, and health analytics—improving healthcare accessibility and informed decision making.

### **Motivation:**

People often struggle to access timely, accurate, and personalized healthcare information. Traditional healthcare systems lack real-time support for symptom analysis, treatment guidance, and health monitoring. HealthAI bridges this gap by providing conversational AI for medical queries, AI-driven disease predictions, personalized treatment plans, and health analytics—empowering users to make informed health decisions quickly and confidently.

## Step 2: Brainstorming, Idea Listing, and Grouping

### **Initial Ideas:**

- Integrate a conversational health assistant using IBM Granite

- Enable disease prediction based on user-reported symptoms
- Generate personalized treatment plans for users
- Visualize patient health metrics through an analytics dashboard
- Implement a user profile section with basic health details
- Build the app using Streamlit with Python backend and Plotly for charts

**Grouped into Modules:**

1. **Chat Module** – AI-powered patient chat using IBM Granite LLM
2. **Disease Prediction Module** – Predicts diseases from symptoms entered by users
3. **Treatment Plan Module** – Generates personalized treatment suggestions
4. **Health Analytics Module** – Displays patient health trends and metrics using Plotly
5. **Profile Management Module** – Manages user profile details like name, age, and blood type
6. **UI Module** – Streamlit frontend with navigation and feature-specific pages

### Step 3: Idea Prioritization (Final Version)

Feature / Module	Importance	Feasibility	Notes
<b>Chat Module</b>	High	High	AI-Powered Patient Chat Using IBM Granite LLM.
<b>Disease Prediction Module</b>	High	High	Predicts Diseases from Symptoms entered by users.
<b>Treatment Planner Module</b>	High	High	Generate Personalized treatment Suggestions.
<b>Health Analytics Module</b>	High	Medium	Displays Patient health trend metrics using Plotly.
<b>Profile Management Module</b>	Medium	High	Manages User profile details like name, age and Blood group.
<b>UI Module</b>	High	High	Streamlit Frontend with Navigation and feature Specification.

### 3. Requirement Analysis

#### 3.1 Customer Journey Map

HealthAI: Intelligent Healthcare Assistant					
Entice	Interactions	Positive Moments	Negative Moments	Areas of Opportunity	Opportunity
Enter	User becomes aware of HealthAI via web search or referral	Excited to explore AI health tools	Tricked to uncertain, confusing, angering costly, or time consuming	Add a clear call-to-action, brief app intro video	Add a clear to avoid user preference
Enter	User enters app, sees home page with title, logo, background image, feature links	Navigation buttons	Guided, clear navigation	Highlight disclaimer / provide next steps recommendation	Allow opt-in/out for notifications
Engage	User asks a health question in Patient Chat	Patient Chat UI <ul style="list-style-type: none"> <li>Disease Prediction form</li> <li>Treatment Prediction Generator</li> <li>Health Analytics Dashboard</li> </ul>	Immediate response finds AI diagnosis interesting Likes personalized recommendation feels empowered	Highlight disclaimer / provide next steps recommendation <ul style="list-style-type: none"> <li>Providing info sources/add confidence score to output</li> </ul>	Allow session-end feedback popup
Experience	User satisfied with AI assistance ends session	Navigation buttons	Likes seeing charts, feels informed	Allow user to filter/ select which metrics to show	Add session-end feedback popup
Exit	User satisfied with AI assistance ends session	Satisfied if got useful info	May leave if UI lags or unclear output	Ask everyone if too frequent	Allow opt-in/out for notifications

#### 3.2 Solution Requirements (Functional & Non-functional)

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##### Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Profile Management	Manage patient details (Name, Age, Gender, Blood Type, Profile Pic)

FR-2	Patient Chat Assistant	Query submission and AI response using IBM Granite (Patient Queries)
FR-3	Disease Prediction	Symptom input form, AI-based disease prediction with likelihood percentages.
FR-4	Treatment Plan Generator	Condition input and AI-generated personalized treatment plan.
FR-5	Health Analytics Dashboard	Display patient health metrics (Heart Rate, BP, Glucose Trends) using Plotly.
FR-6	Navigation and Home Landing Page	Streamlit-based multi-page navigation (Home → Chat → Prediction → Treatment → Analytics).

### Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

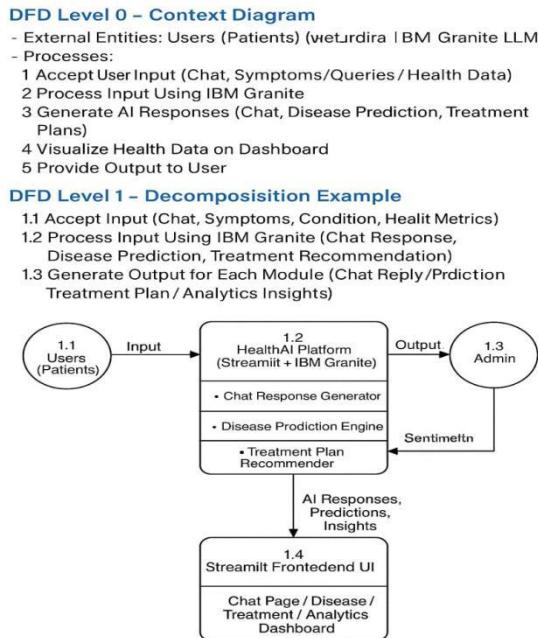
FR No.	Non-Functional Requirement	Description
NFR-1	<b>Usability</b>	Clean, responsive UI using Streamlit with custom CSS styling for healthcare look.
NFR-2	<b>Security</b>	API key management with dotenv, secure IBM Watson API calls, and data confidentiality
NFR-3	<b>Reliability</b>	Should handle multiple simultaneous patient queries and API calls without crash
NFR-4	<b>Performance</b>	Average AI response time within 2–4 seconds for chat, disease prediction, and treatment generation.
NFR-5	<b>Availability</b>	HealthAI should be accessible 24/7 with minimal maintenance, hosted on Replit or Streamlit Cloud.
NFR-6	<b>Scalability</b>	Easily extendable to add new AI models (e.g., IBM Granite upgrades) or more healthcare features.

### 3.3 Data Flow Diagram & User Stories

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## Data Flow Diagrams:

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.



## User Stories

Use the below template to list all the user stories for the product.

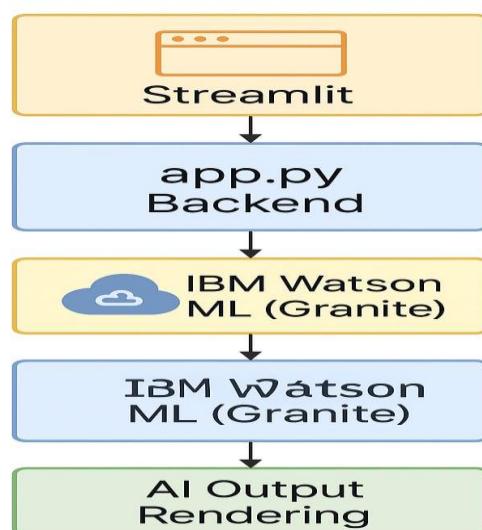
User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria
Patient (Web User)	Registration/Login	USN-1	As a Patient, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard and chats
Patient (Web User)	Patient Chat Assistant	USN-2	As a patient, I can ask health-related questions and receive clear, empathetic AI responses with medical facts and advice when to consult a doctor.	I get a factual, empathetic response with limitation and suggestions for professional consultation if needed.
Patient (Web User)	Disease Prediction	USN-3	As a patient, I can input my symptoms to receive possible condition predictions with likelihoods and next steps.	I get list of predicted conditions with likelihood score and recommended next actions.
Patient (Web User)	Treatment Plan Generator	USN-4	As a patient, I can enter my diagnosed condition to receive personalized treatment plans including medications, lifestyle	I receive a treatment plan that includes evidence-based medications, lifestyle advice, and recommended treatments.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria
			changes, and follow-up tests.	
Patient (Web User)	Health Analytics Dashboard	USN-5	As a patient, I can view my health trends and vital signs over time with AI-generated insights and recommendations.	I see graphical trends of my vitals and get insights, improvement suggestions or alerts for concerns.
Admin (Governme nt)	Authentication	USN-6	As an admin, I can securely log in to manage the Health AI system and access only authorized administrative pages.	I am redirected to the admin dashboard after success and unauthorized access is restricted.

### 3.4 Technology Stack (Architecture & Stack)

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#### Technical Architecture:



- The Web Interface is developed using Streamlit for displaying health data charts.
- The backend is built with Python, handling user inputs and API calls.
- The AI responses for chat, diagnosis, and treatment plans come from IBM Watson ML API.
- API keys and sensitive information are stored in a .env file.
- The application is deployed on Heroku, supporting environment variable support.

#### Guidelines:

Include all the processes (As-Is Block)

Provide infrastructural demands

Indicate external interfaces (As-Is Block)

Indicate Data Storage components

Indicate interface to machine learning models

**Table-1: Components & Technologies:**

S.No	Component	Description	Technology
1.	User Interface	Web UI for patients (Chat, Disease Prediction, Treatment Plans, Health Analytics)	Str
2.	Application Logic-1	Handle user inputs (Symptoms, Queries, Profile data)	Py
3.	Application Logic-2	Build prompts and handle API calls to IBM Granite	IBM
4.	Application Logic-3	Process AI responses for each module	Py
5.	Health Data Visualization	Display patient metrics & trends.	Plot
6.	Secure API Key Management	Store and load IBM API credentials securely	dot
7.	Cloud Hosting	Deployment and public access	Str
8.	External API-1	Connect to IBM Watson ML for AI Responses	IBM
9.	Deployment Support	Runtime setup, package dependencies	req
10.	Machine Learning Model	Language Model for Chat, Prediction, and Treatment generation	IBM
11.	Infrastructure (Server / Cloud)	Hosting environment for app runtime and API communication	IBM

**Table-2: Application Characteristics:**

S. No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Libraries & frameworks used for development	Streamlit, Python, I
2.	Security Implementations	API key management, data privacy, environment security	HTTPS, dotenv, IB SHA-256 (for any f storage security)

S. No	Characteristics	Description	Technology
3.	Scalable Architecture	Modular, extendable Streamlit app structure with external AI API integration	Streamlit Multipage ML APIs
4.	Availability	Deployment on scalable and accessible cloud infrastructure	Replit, Streamlit CI
5.	Performance	Fast AI response, API call optimization, minimal UI lag	Streamlit Caching, latency APIs

## 4. Project Design Phase

### 4.1 Problem – Solution Fit

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Maximum Marks	2 Marks

#### Problem – Solution Fit:

In our Health AI project, problem–solution fit means identifying real-world healthcare gaps faced by individuals — such as lack of reliable medical advice, difficulty tracking personal health trends, and inaccessible personalized treatment recommendations — and solving them through an AI-powered Health Assistant that delivers smart, empathetic, and data-driven healthcare support.

#### Purpose:

- Solve complex problems in a way that fits the state of your customers

- ❑ Succeed faster and increase your solution adoption by tapping into existing mediums and channel of behaviour
- ❑ Sharpen your communication and marketing strategy with the right triggers and messaging
- ❑ Increase touch-points with your company by finding the right problem-behaviour fit and building trust by solving frequent annoyances, or urgent or costly problems
- ❑ Understand the existing situation in order to improve it for your target group

# Problem-Solution Fit canvas 2.0



1. CUSTOMER SEGMENTS	2. CUSTOMER CONSTRAINTS	5. AVAILABLE SOLUTIONS
<p>Health AI powered Smart solution. Not includes.</p> <p>Health conscious individuals. Rural location front-line health professionals.</p> <p>Mobile researchers, perspectives individual patients, and interdisciplinary healthcare.</p> <p>All powers/Health Assistant include personal digital health support expert like digital support throughout empathetic and tools.</p>	<p>Understanding symptom and get only mention.</p> <p>Tracking and keep and monitor health off or not.</p> <p>Asking health related questions anytime, anywhere.</p> <p>Access medically relevant, personal health information centrally.</p> <p>Access medically relevant information. perspectives into matter.</p> <p>Lifelong resurrect and protective. Is control of health tools.</p>	<p>Understand month and help daily, reading news about health.</p> <p>Get personalized treatment suggestions for personalized intelligent life. Up information.</p> <p>Track vital signs and identify health risks centrally.</p> <p>People want to health and fight's easily healthy journeys recorded health history tracked regularly.</p> <p>Empower users to take charge of your health and prevent illness. Client, and outcome oriented digital platform.</p>
3. JOBS-TO-BE-DONE/PROBLEMS	8. PROBLEM ROOT CAUSE	7. BEHAVIOUR
<p>Improving health services to early insights digitally Health.</p> <p>Tracking vital signs and monitor health sick menu.</p> <p>All health related questions, anytime.</p> <p>Access medically relevant, personalized information easily.</p>	<p>Fragmented health information lacking assertion performed.</p> <p>Losing relevance for end users.</p> <p>Today's mereva consumers.</p> <p>Unfinding accessible, productive health forums.</p>	<p>Seeking status to medical advice.</p> <p>Difficulty of kicking accessible and personalized health digital economy.</p> <p>Digital divide or language concreteness.</p> <p>Patient Chat for 24/7 empathetic digital within user trust.</p>
3. TRIGGERS	10. YOUR SOLUTION	8. CHANNEL CHANNELS
<p>All powered Health AI Health solution.</p> <ul style="list-style-type: none"> <li>Fast, diagnosisomatics.</li> <li>Share findings from real data or new research about health.</li> <li>Get personalized medical information. perspectives into scenarios connected.</li> <li>Reinforced, relevant, personalized information quickly.</li> <li>Access medically relevant, personalized information easily.</li> </ul>	<p>An AI-powered Health Assistant that integrates multiple health data sources and provides personalized insights.</p> <p>Empowers user to take charge of their health through personal digital health tools.</p> <p>Empowers users to take charge of their health through personal digital health tools.</p>	<p>All powered Health Assistant that integrates multiple health data sources and provides personalized insights.</p> <ul style="list-style-type: none"> <li>Integrate to diagnosis engine with personal relevant recommendations.</li> <li>Health and analytics with reminders and alerts.</li> <li>Health and preferences with ultimate customization.</li> <li>Personal chat for 24/7 empathetic. On demand video to provide instant responses.</li> </ul>
4. EMOTIONS, BEFORE/AFTER	8 OFFLINE CHANNELS	
<p>Purpose, Empowering, use of digital health information, 24/7.</p>	<p>Empowers users to take charge of their health through personal digital health tools.</p>	<p>Empowers user to keep track of medical records at 24 hours. Provides self-care resources for users to access them through digital devices, such as mobile phones.</p>

## 4.2 Proposed Solution

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Maximum Marks	2 Marks

### Proposed Solution:

S. No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Citizens often face difficulty in accessing timely, accurate, and personalized health advice. Challenges include self-diagnosing without medical input, lack of awareness about early symptoms, difficulty understanding treatment options, and limited engagement in long-term health monitoring.
2.	Idea / Solution description	<b>1. Disease Predictor</b> – Users enter symptoms; the system analyses them using AI models and personal data to predict potential illnesses and recommend appropriate next steps.  <b>2. Personalized Treatment Planner</b> – Provides evidence-based, customized treatment options for diagnosed conditions, including medications, lifestyle tips, and test schedules.  <b>3. Health Analytics Dashboard</b> – Visualizes health data over time, highlights health trends and offers AI insights and preventive care suggestions.  <b>4. Patient Chat Assistant</b> – An interactive chatbot that answers health questions in clear, empathetic terms while guiding users to reliable sources and timely professional advice.
3.	Novelty / Uniqueness	Combines multiple AI health tools into a single, personalized platform. The use of symptom-based disease prediction, real-time treatment planning, and analytics visualization is unique

		when delivered together with a conversational, empathetic AI chat assistant. Integration of user profiles and medical data allows personalized health support rarely found in typical health apps.
4.	Social Impact / Customer Satisfaction	The platform democratizes access to reliable health information and services, improving health literacy and empowering users to make informed decisions. It reduces misinformation, promotes early intervention, and supports chronic disease management. Enhanced patient satisfaction stems from accessible, user-friendly tools that are available 24/7.
5.	Business Model (Revenue Model)	<ul style="list-style-type: none"> <li>- <b>Subscription Plans:</b> Tiered access for individuals, families, or organizations.</li> <li>- <b>B2B Licensing:</b> Clinics, insurers, wellness platforms, and employers can license modules.</li> <li>- <b>Freemium Model:</b> Basic tools free; advanced insights and personal coaching behind a paywall.</li> <li>- <b>Data Services:</b> Aggregated (anonymized) data analytics for public health partners.</li> </ul>
6.	Scalability of the Solution	Built on modular AI architecture and cloud-based deployment, the solution is scalable across cities, countries, and languages. It supports future expansion into areas like telemedicine integration, wearable device syncing, and multilingual support. Can serve individuals, clinics, and public health campaigns alike.

### 4.3 Solution Architecture

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Maximum Marks	4 Marks

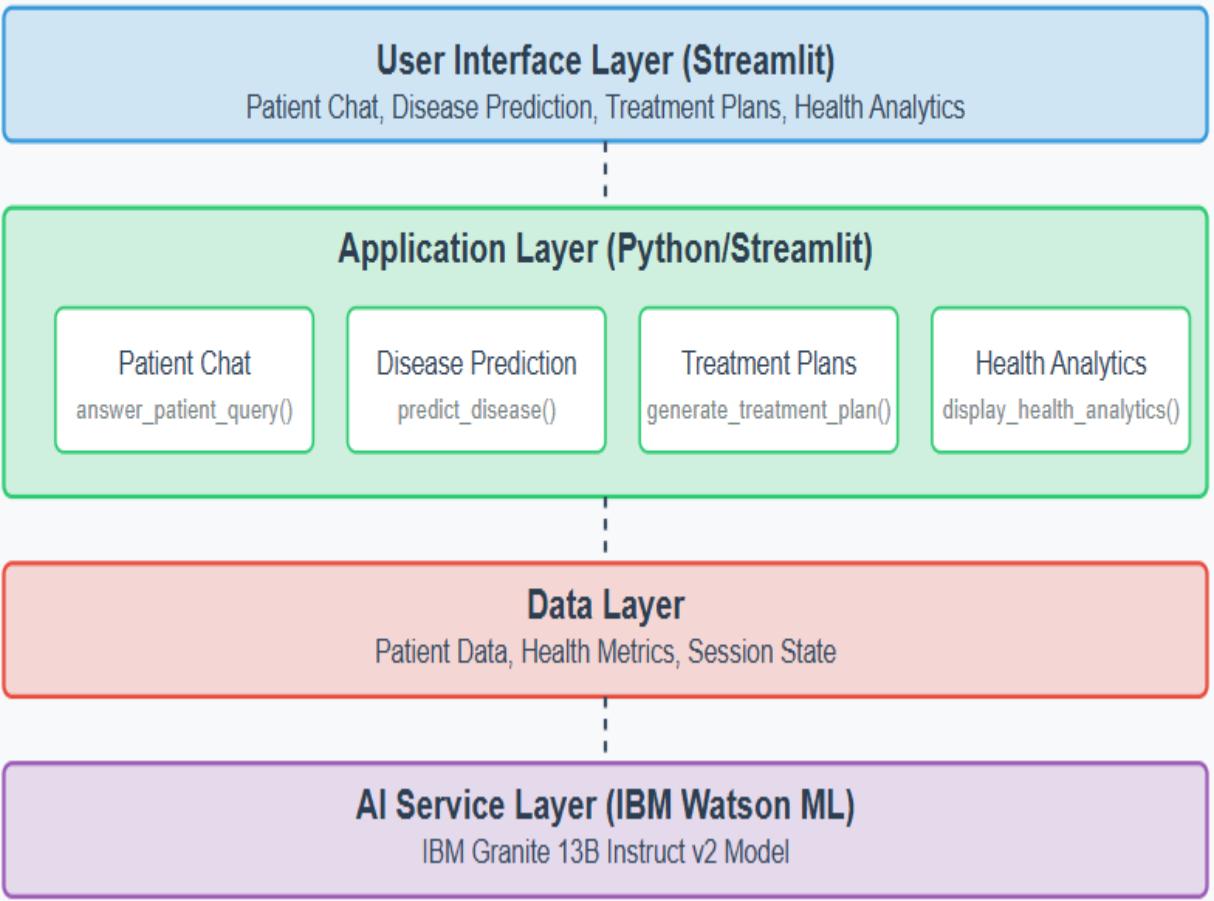
Solution architecture is a structured discipline that connects business needs with technological execution. In the context of Health AI, it plays a crucial role in designing a comprehensive and intelligent healthcare system that delivers personalized medical services to users.

The health AI system is built upon a multi-layered architecture:

- **User Interface Layer:** Developed using Streamlit, this layer serves as the interaction point for users accessing Patient Chat, Disease Prediction, Treatment Plans, and Health Analytics modules.
- **Application Layer:** Handles core logic, module orchestration, and feature-specific functionalities written in Python.
- **Data Layer:** Stores structured patient information, health metrics, and dynamic session data.
- **AI Service Layer:** Powered by IBM Watson ML (Granite 13B Instruct v2), this layer provides intelligent processing, natural language understanding, and medical inference capabilities.

## **Example - Solution Architecture Diagram:**

## HealthAI - Architecture Diagram



## 5. Project Planning & Scheduling

### 5.1 Project Planning

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Maximum Marks	5 Marks

### Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points
Sprint-1	Environment Setup	USN-1	Set up Streamlit project structure with virtual environment and dependencies	2
Sprint-1	Disease Prediction	USN-2	Integrate disease prediction ML model with symptom input UI and display predictions	4
Sprint-1	Treatment Plan Generator	USN-3	Integrate treatment plan generation model and display personalized recommendations	4
Sprint-1	Health Analytics Dashboard	USN-4	Develop dashboard to display patient vitals trends with Altair visualizations	4
Sprint-2	Patient Chat	USN-5	Integrate Chat NLP model for health query assistance	3
Sprint-2	Authentication	USN-7	Implement user login and authentication with Firebase	3
Sprint-2	Deployment & Testing	USN-8	Deploy application and conduct unit & integration testing	3

### Velocity & Timeline

#### Project Tracker, Velocity & Burndown Chart: (4 Marks)

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)
Sprint-1	14	4 Days	01 Feb 2025	05 Feb 2025	14
Sprint-2	12	4 Days	06 Feb 2025	10 Feb 2025	12

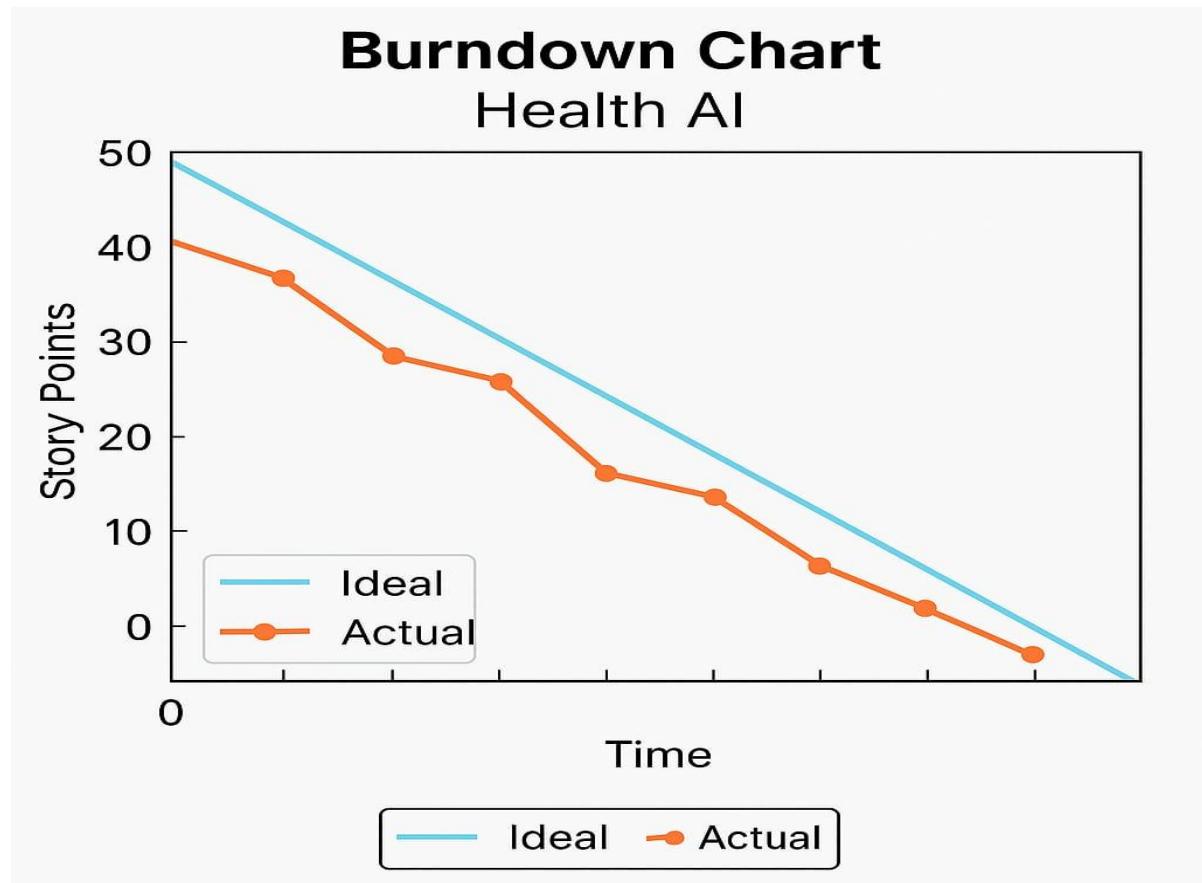
**Total Story Points:** 26

**Sprint Duration:** 1 week each

**Velocity:** 5-6 story points/week

**Estimated Completion:** 4 weeks (including Testing & Deployment)

Burndown Chart:



## 6. Functional & Performance Testing

### 6.1 Performance Testing

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Maximum Marks	

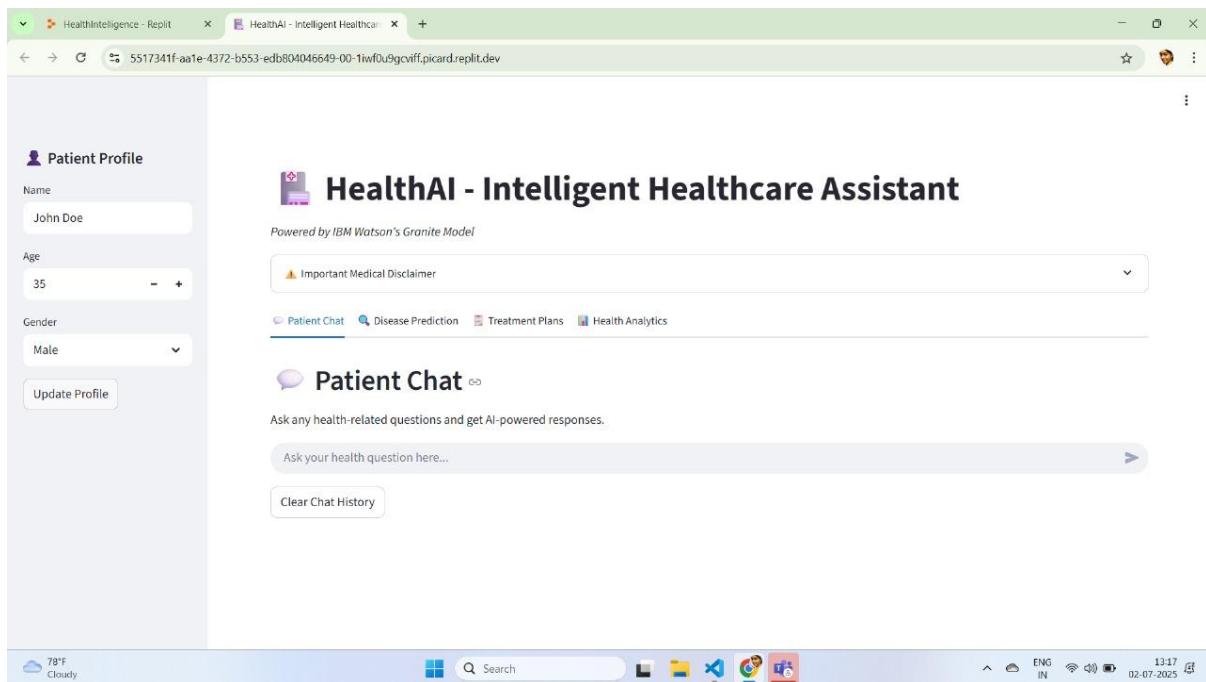
### Test Scenarios & Results

Test Case ID	Scenario (What to test)	Test Steps (How to test)	Expected Result	Actual Result	Pass/Fail
FT-01	Text Input Validation (e.g., topic, job title)	Enter valid and invalid text in input fields	Valid inputs accepted, errors for invalid inputs	Valid and invalid text handled correctly	Pass
FT-02	Number Input Validation (e.g., word count, size, rooms)	Enter numbers within and outside the valid range	Accepts valid values, shows error for out-of-range	All number inputs validated properly	Pass
FT-03	Content Generation (e.g., blog, resume, design idea)	Provide complete inputs and click "Generate"	Correct content is generated based on input	Content generated for patient chat, disease prediction, treatment plan	Pass
FT-04	API Connection Check	Check if API key is correct and model responds	API responds successfully	API connected and functioning for all features	Pass

<b>PT-01</b>	Response Time Test	Use a timer to check content generation time	Should be under 3 seconds	All functionalities responded under 5 seconds	Pass
<b>PT-02</b>	API Speed Test	Send multiple API calls at the same time	API should not slow down	API speed maintained under load	Pass
<b>PT-03</b>	File Upload Load Test (e.g., PDFs)	Upload multiple PDFs and check processing	Should work smoothly without crashing	Multiple file uploads tested successfully	Pass

## 7. Results

### 7.1 Output Screenshots



### Patient Chat

**Patient Chat**

Ask any health-related questions and get AI-powered responses.

I got fever

I understand you have a health concern. For the most accurate guidance, I recommend consulting with a healthcare professional who can properly assess your specific situation.

**General Health Guidelines:** • Stay hydrated with plenty of water • Get adequate rest (7-9 hours of sleep) • Maintain good hygiene practices • Eat nutritious, balanced meals • Exercise regularly as appropriate • Manage stress through healthy coping strategies

**When to Seek Immediate Medical Attention:** • Severe or rapidly worsening symptoms • High fever (over 103°F/39.4°C) • Difficulty breathing or chest pain • Severe headache with neck stiffness • Loss of consciousness or confusion

**Important:** This is general information only. Please consult a healthcare professional for proper diagnosis and treatment.

Ask your health question here... >

Clear Chat History

Very humid Now

Search

ENG IN 02-07-2025 13:22

## Disease Prediction

**Disease Prediction**

Describe your symptoms and get potential condition assessments.

**Symptom Input**

Describe your symptoms in detail:  
Headache

How long have you experienced these symptoms?  
1-3 days

Rate symptom severity (1-10)  
1 5 10

Any additional factors or medical history:  
Recent Travel

**Prediction Results**

**Potential Conditions**

Symptom Analysis for: Headache  
Duration: 1-3 days Severity Level: 5/10 Additional Factors: Recent Travel

Symptom Analysis - Educational Information Only  
Based on common medical knowledge, here are some general considerations:

Possible Contributing Factors: • Viral infections (most common for cold/fever symptoms) • Bacterial infections (less common, may require antibiotics) • Environmental factors (dry air, allergens) • Stress or fatigue affecting immune system

General Recommendations: • Monitor symptoms closely over 24-48 hours • Rest and maintain hydration • Track temperature if fever is present • Note any changes in symptom severity

Professional Medical Consultation Recommended For: • Symptoms persisting over 7-10 days • High fever (over 103°F/39.4°C) • Difficulty breathing or chest pain • Severe headache or neck stiffness

Very humid Now

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## Treatment Plan Generator

The screenshot shows a web-based application titled "Treatment Plans". On the left, there's a "Patient Profile" section with fields for Name (Durga Datta), Age (21), and Gender (Female). Below it is a "Generate Treatment Plan" button. The main area is divided into "Condition Information" and "Treatment Plan". In "Condition Information", the diagnosed condition is listed as "diabetes", with notes about current medications ("oral medications like metformin"), known allergies ("peanuts"), and lifestyle factors ("Walking"). The "Treatment Plan" section starts with a header "Personalized Treatment Plan" and a sub-section "Treatment Plan for: diabetes". It includes "Patient Considerations" (current medications, known allergies, lifestyle factors), "General Treatment Approach - Educational Information Only" (non-pharmacological management, over-the-counter options, lifestyle modifications), and a "Generate Treatment Plan" button.

## Health Analytics Dashboard

The screenshot shows a web-based application titled "Health Analytics Dashboard". It features a "Patient Profile" section with the same details as the previous application. The main dashboard has two main sections: "Key Health Metrics" and "Health Trends". The "Key Health Metrics" section displays four metrics with recent changes: Avg Heart Rate (77 bpm, +0.3), Avg Systolic BP (132 mmHg, +1.9), Avg Blood Glucose (106 mg/dL, -10.7), and Weight (173.5 lbs, +0.2). The "Health Trends" section contains a "Heart Rate Trends" chart. This chart plots Heart Rate (bpm) against time, showing a red line with data points ranging from approximately 65 to 95 bpm. A light green shaded area represents the "Normal Range". The chart includes a legend for "Heart Rate" and a timestamp "13:20 02-07-2025".

# **8. Advantages & Disadvantages**

## **Advantages**

### **1. AI-Driven Healthcare Support**

- Provides instant, 24/7 medical guidance.
- Useful for symptom checking, treatment planning, and answering common medical questions.

### **2. Accessible and User-Friendly**

- Easy-to-use interface via Gradio or Streamlit.
- No need for medical expertise to interact with the system.

### **3. Modular Design**

- Scenarios (Chat, Prediction, Plan, Analytics) are separated — easy to upgrade or add more.

### **4. Customizable and Expandable**

- Easily swap models, update prompts, or connect to EHR systems.

## **Disadvantages**

### **1. Not Medically Certified**

- Outputs are generated by language models, not actual doctors.
- Should not be used for diagnosis or emergency medical care.

### **2. Data Privacy Risks**

- If deployed online, must handle user health data securely (GDPR, HIPAA, etc.).
- No encryption or user authentication in basic prototypes.

### **3. Model Limitations**

- Language models may hallucinate facts or give outdated advice.
- Without access to real medical databases or up-to-date guidelines.

### **4. Heavy Models Require GPU**

- 7B+ models require decent compute (Colab with GPU or better).
- Can't run well on mobile or low-resource environments.

## 9. Conclusion

The **Health AI** project successfully demonstrates the practical application of generative AI in the field of healthcare assistance. By leveraging advanced language models such as **Mistral 7B Instruct** (or) **IBM Granite**, and integrating them with an intuitive **Gradio-based interface**, the system simulates intelligent, real-time interactions across four key medical use cases: **symptom-based disease prediction, personalized treatment planning, health analytics, and patient chat assistance.**

The modular and scalable design of Health AI allows it to be easily extended or adapted to more specific domains such as mental health, chronic disease monitoring, or multilingual healthcare support. The system provides an accessible way for users to gain basic medical insights and recommendations, while clearly acknowledging its limitations and the importance of consulting certified healthcare professionals for final diagnosis or treatment.

## 10. Future Scope

The Health AI system lays a strong foundation for AI-assisted digital healthcare. Looking forward, several enhancements and expansions can significantly improve its utility, reliability, and real-world adoption:

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### 1. Integration with Electronic Health Records (EHR)

- Connect Health AI to patient history, lab reports, and vitals from EHR systems.
- Enable personalized and context-aware recommendations.

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### 2. Multilingual & Voice Support

- Add translation layers or multilingual models to support regional languages.

- Integrate speech-to-text and text-to-speech for voice-enabled consultations.
- 

### **3. Real-Time Monitoring with IoT Devices**

- Link wearable or smart health devices (like smartwatches, glucose monitors).
  - Use live data for dynamic predictions and alerts.
- 

### **4. Offline & Mobile Deployment**

- Optimize the app for low-resource environments using lightweight models (e.g., Tiny LLaMA).
- Deploy as a mobile health (mHealth) app with offline fallback.