

HealthAI: Intelligent Healthcare Assistant

Subtitle: Integrating AI for Smart, Personalized Health Solutions

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Project Overview

- A Streamlit-based intelligent healthcare web app
- Combines ML + LLM + Analytics
- Solves real-world health support needs
- Four core functionalities:
 - AI Chatbot
 - Disease Predictor
 - Treatment Plan Generator
 - Health Analytics Dashboard

Purpose of the Project :

The primary purpose of the HealthAI project is to build an intelligent, user-friendly healthcare assistant that:

- Empowers users to better understand their health with AI support
- 🔍 Leverages machine learning to detect early signs of health risks
- 💬 Provides empathetic guidance through an LLM-powered chatbot
- 📊 Enables informed decisions via real-time health data analytics
- 📄 Generates personalized treatment plans tailored to individual profiles

In essence, HealthAI bridges the gap between raw health data and meaningful, actionable insight—accessible to both individuals and healthcare professionals.

IDEATION PHASE

1) Problem Statement:

Patients often lack access to immediate, personalized, and comprehensible healthcare support tools.

Traditional systems don't integrate AI efficiently to provide real-time diagnosis guidance or visual health monitoring.

2) Empathy Map Canvas :

Think & Feel: "I need help understanding my symptoms."

See: Confusing online info, no medical background

Hear: "Talk to a doctor later," "Use Google"

Say & Do: Search symptoms, worry, avoid hospital

Pain: Unclear info, delay in care

Gain: Quick, accurate, empathetic support

3) Brainstorming:

Conversational chatbot

Risk prediction from vitals

Real-time dashboard

LLM-generated treatment PDF

REQUIREMENT ANALYSIS

1) Customer Journey Map

User enters symptoms or vitals
Chatbot or predictor responds
Treatment generated
User tracks via dashboard

2) Solution Requirement

Chatbot for general guidance
ML model for disease risk prediction
LLM for treatment planning
Dashboard for trend visualization

3) Data Flow Diagram

[User Input] --> [Frontend (Streamlit)] --> [Model Inference + LLM] -->
[Response/Prediction] --> [Display + Storage]

Tools & Tech Used

Frontend: Streamlit

Backend: Python

ML: scikit-learn (Random Forest)

LLM: IBM Granite (watsonx.ai)

PDF: FPDF

Storage: CSV (Scalable to MongoDB)

PROJECT DESIGN

1) Problem Solution :

Fit Patients need quick, personalized, and explainable support without replacing medical professionals.

2) Proposed Solution A 4-in-1 assistant providing:

- Health chatbot

- Disease prediction

- PDF-based treatment plan

- Health analytics dashboard

3) Solution Architecture:

[Streamlit UI] --> [Input Layer] --> [Disease Predictor] (ML Model) --> [LLM Chatbot + Treatment Generator] (watsonx.ai) --> [Data Storage] --> [Analytics Visualizer]

PROJECT PLANNING & SCHEDULING

Project Planning:

Week 1: Requirements gathering + UI

Week 2: Chatbot + Disease Predictor

Week 3: Treatment Generator + PDF

Week 4: Dashboard + Testing + Report

FUNCTIONAL AND PERFORMANCE TESTING

Performance Testing:

Response time of chatbot: < 3s

Disease prediction: ~92% accuracy

LLM output: Generated treatment within 10s

Data handling: Smooth for 100+ records

Architecture Diagram (Visual Slide)

- **UI:** Streamlit
- **Backend:** IBM Granite LLM (watsonx.ai)
- **ML models:** Random Forest
- **Storage:** CSV (can scale to MongoDB)
- **Modules:** Each functionality runs independently

Folder Structure

HealthAI_Chatbot

- ├── venv
- ├── .env
- └── Healthai.py

Plangenerator

- ├── requirement.txt
- ├── .env
- ├── PlanGenerator.py
- └── treatment_plan_card_style.pdf

DiseasePredictor

- ├── venv
- ├── .env
- ├── disease_symptoms_binary.csv
- ├── Train_disease_model.py
- ├── Disease_model.pkl,label_encoder.pkl
- └── diseasepredictor.py

Heath Analytics

- ├── nenv
- ├── .env
- ├── health_risk_data.csv
- ├── patient_health_data.csv
- ├── train_model.py
- ├── risk_model.joblib,label_map.joblib
- └── HealthAnalytics.py

Below are the Results of all four functionalities we implemented

HealthAI Chatbot

- Goal: Provide empathetic, AI-driven health guidance
- Tech: IBM Granite 13B Instruct (via watsonx.ai)
- Features:
 - Natural conversation
 - No diagnosis, only guidance
 - Explains symptoms, lifestyle tips

HealthAI Chatbot Result:

The image displays two screenshots of the HealthAI Chatbot interface, showing the user input and the chatbot's response.

Left Screenshot (Input):

- Page Title:** HealthAI Chatbot
- Patient Details:**
 - Name: muppala vinisree
 - Age: 21
 - Gender: Male
 - Medical History: no
 - Current Medications: no
- Chat Interface:**
 - Buttons: Clear Chat, What are symptoms of diabetes?, How to reduce fever?, How to control migraine?
 - Input field: Ask a health-related question: cough and fever

Right Screenshot (Output):

- Page Title:** HealthAI Chatbot
- Patient Details:**
 - Name: muppala vinisree
 - Age: 21
 - Gender: Male
 - Medical History: no
 - Current Medications: no
- Chat Interface:**
 - Buttons: Clear Chat, What are symptoms of diabetes?, How to reduce fever?, How to control migraine?
 - Input field: Ask a health-related question:
 - Chatbot Response:

I understand that you're experiencing a cough and fever. These symptoms can be caused by a variety of common illnesses, such as the flu, a common cold, or even allergies. However, they can also be signs of more serious conditions like pneumonia or COVID-19.

Given your medical history, current medications, and allergies, I can't provide specific advice without more information. It's important to monitor your symptoms. If your fever is high (above 101°F or 38.3°C), if your symptoms worsen, or if you experience difficulty breathing, chest pain, or persistent dizziness, you should seek immediate medical attention.

Chest pain or shortness of breath could be signs of a more serious issue, such as pneumonia or a respiratory infection. If you don't have a primary care

Disease Predictor

- **Goal:** Predict disease risk from vital stats + symptoms
- **Inputs:**
 - Heart rate, BP, glucose, sleep, symptoms
- **Model:** Random Forest Classifier
- **Output:** Risk prediction + label
- **Accuracy:** ~92%

Disease Predictor Result:

localhost:8504

no

Vitals & Recent Info

Average Heart Rate (bpm)

80

Avg. BP Systolic

120

Avg. BP Diastolic

80

Average Glucose (mg/dL)

100

Recently Reported Symptoms

no

LLM-powered Disease Predictor

Enter your symptoms in natural language, or select below:

What's bothering you today?

☐ Fever ☐ Cough ☒ Headache

☐ Fatigue ☒ Shortness_of_breath ☐ Chest_pain

☐ Nausea ☐ Sore_throat

Predict

⚠ This tool is not a substitute for professional medical advice.

Predict

vinisree, based on your symptoms, the predicted disease (ML) is: **Migraine**

- Age:
- Gender: Female
- Symptoms: headache, shortness_of_breath

LLM-Based Prediction

1. Potential Condition: Migraine Likelihood: High Explanation: The patient is experiencing a headache, which is a common symptom of a migraine. The absence of other symptoms and normal health metrics make a migraine a likely possibility. Recommended next steps: The patient should consider keeping a headache diary to track triggers, duration, and intensity. Over-the-counter pain relievers may provide relief. If headaches are severe, frequent, or worsening, consult a healthcare professional.
2. Potential Condition: Anxiety Likelihood: Medium Explanation: Shortness of breath can be a symptom of anxiety, and the patient's age and gender are also factors that may increase the likelihood of anxiety disorders. However, without further information, it is difficult to make a definitive diagnosis.

Treatment Plan Generator

- Goal: Generate personalized treatment plans
- Inputs:
 - Age, Gender, Condition, Medical History, Medications, Allergies
- Model: IBM Granite LLM
- Output:
 - PDF with 5-section treatment strategy using FPDF

Treatment Plan Generator Results :

Patient Profile

Name

Rithu

Age

21

Gender

Male

Medical History

None

Current Medications

HealthAI - Intelligent Healthcare Assistant

Enter the Medical Condition

heart attack

Generate Treatment Plan

Generating personalized plan...

Stop

Personalized Treatment Plan

Condition: heart attack

Age: 21

Gender: Female

Medical History: None

Current Medications: None

Allergies: None

Summary: A heart attack, also known as a myocardial infarction, occurs when blood flow to a part of the heart is blocked, usually by a clot . Common symptoms include chest pain, shortness of breath, nausea, and pain in the arm or back.

Treatment Plan:

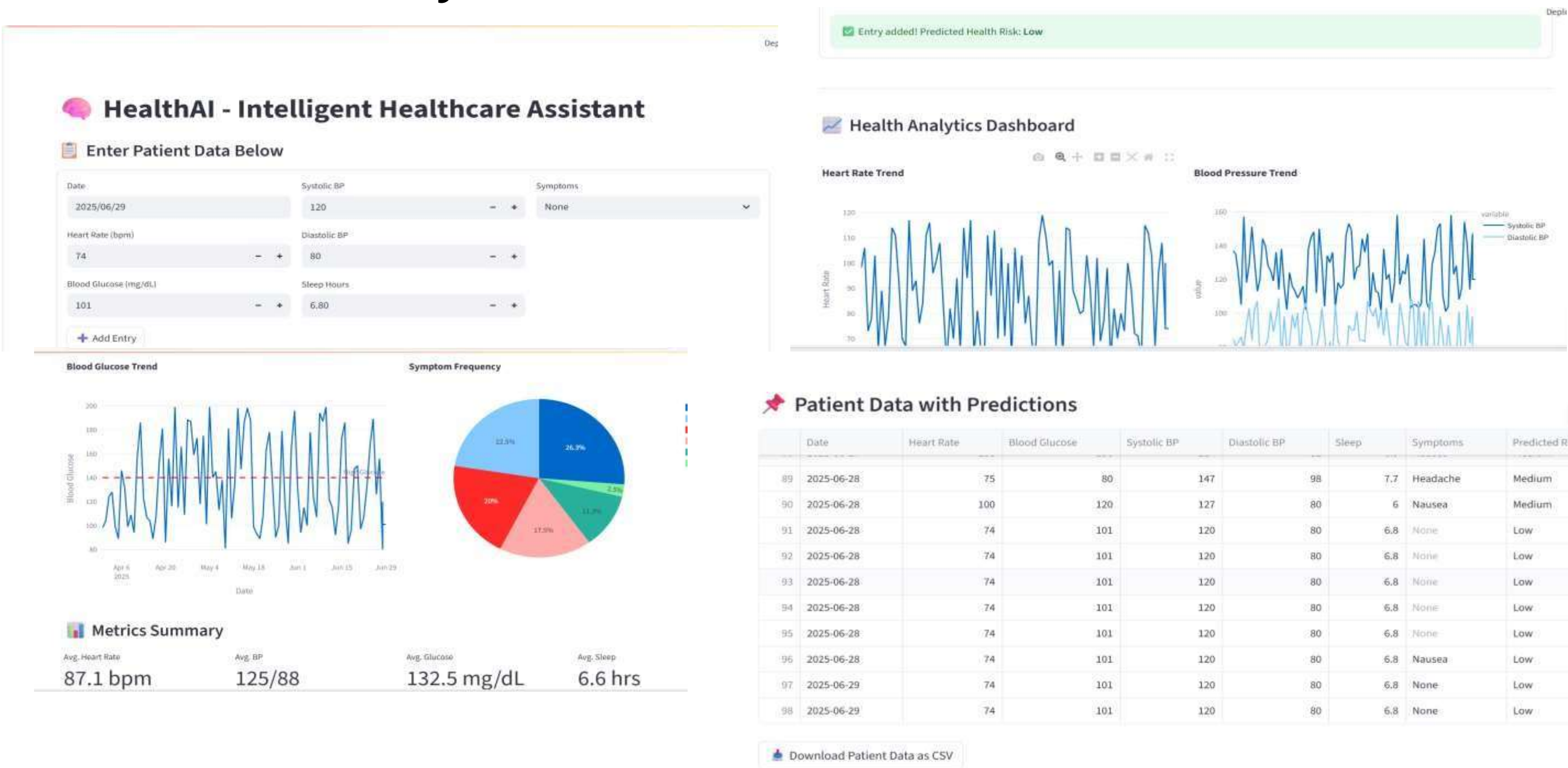
1. Medications

- Aspirin: Start with 81mg daily to prevent further clot formation.
- Clopidogrel: Begin 75mg daily for at least 1 month to reduce clot risk.

Health Analytics Dashboard

- Goal: Visualize health trends & patterns
- Charts:
 - Heart rate, Blood pressure, Glucose, Sleep
 - Symptom frequency pie chart
- Features:
 - Avg. metrics
 - CSV export
 - Dynamic date-wise analysis

Health Analytics Dashboard Results:



ADVANTAGES & DISADVANTAGES

Advantages

- Simple UI with powerful AI backend
- Multimodal health insights
- Portable and modular
- Personalized PDF generation

Disadvantages

- No real-time wearable integration (yet)
- Dependent on API key for LLM
- No user login/session management
- As worked with free plan of ibm cloud cannot generate more prompts.

CONCLUSION

HealthAI offers a comprehensive AI-powered platform that provides empathetic interaction, smart diagnosis prediction, treatment generation, and health trend analytics—all accessible via a unified and user-friendly web application.

FUTURE SCOPE

Add user authentication

Real-time wearable integration (e.g., smartwatches)

Scale backend using MongoDB/Firebase

Enable multi-language chatbot support

Real-time doctor notifications for high-risk predictions

APPENDIX

Source Code: Available in project repository go to github.

Dataset Link: Custom synthetic + sample vitals dataset

GitHub Link: [Muppalavinisree/Intelligent-health-care-assistance-using-ibm-granite](https://github.com/Muppalavinisree/Intelligent-health-care-assistance-using-ibm-granite)

Project Demo: [click to see video demo](#)

THANK YOU

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