

# Health AI Assistant

## 1. Introduction

Project title: Health AI Assistant  
Team Leader: A. Abinaya  
Team member: S. Alagumeenal  
Team member: P. Anusiya  
Team member: T. Atchaya  
Team member: P. Bhuvaneswari

## 2. Project Overview

### Purpose:

The purpose of the Health AI Assistant is to provide intelligent, personalized, and accessible healthcare support. By leveraging AI and real-time medical data, the assistant helps patients manage their health, track vital signs, and receive tailored health recommendations. For doctors and healthcare providers, it acts as a clinical decision support system—offering medical insights, patient data summaries, and anomaly detection to improve diagnosis and treatment efficiency. Ultimately, the assistant bridges technology, healthcare professionals, and patients to create safer, more connected, and efficient healthcare systems.

### Features:

#### Conversational Interface

Key Point: Natural language interaction

Functionality: Allows patients and doctors to ask health-related questions, track symptoms, and receive AI-driven recommendations in plain language

#### Medical Report Summarization

Key Point: Simplified clinical understanding

Functionality: Converts lengthy lab reports and medical histories into concise, patient-friendly summaries

#### Health Forecasting

Key Point: Predictive analytics

Functionality: Predicts possible health risks (e.g., diabetes, heart conditions) using historical and wearable data

#### Personalized Health Tips

Key Point: Preventive care guidance

Functionality: Recommends diet, exercise, and lifestyle modifications based on patient profile and medical history

#### Patient Feedback Loop

Key Point: Continuous improvement

Functionality: Collects patient feedback on treatments and recommendations to refine healthcare services

#### Anomaly Detection

Key Point: Early warning system

Functionality: Identifies unusual patterns in vitals or lab results to flag potential health risks early

#### Multimodal Input Support

Key Point: Flexible health data handling

Functionality: Accepts text, PDFs (reports), and device data (wearables, IoT health sensors)

#### Streamlit or Gradio UI

Key Point: User-friendly interface

Functionality: Provides an intuitive dashboard for both patients and doctors to interact with the assistant

### 3. Architecture

Frontend (Streamlit):

Interactive web UI with dashboards for patient health tracking, file uploads (lab reports), chat interface, and doctor–patient collaboration features.

Backend (FastAPI):

Serves as the backend REST framework powering API endpoints for medical data processing, chat interactions, health-tip generation, and anomaly detection.

LLM Integration (Medical AI Models):

Fine-tuned LLMs for healthcare (HIPAA-compliant) used for summarization, recommendations, and patient-friendly explanations.

Vector Search (Pinecone or FAISS):

Medical records and reports are embedded for semantic search, enabling natural language queries on patient history.

ML Modules (Forecasting & Anomaly Detection):

Predictive models trained on healthcare datasets for risk prediction and anomaly detection in vitals/lab values.

### 4. Setup Instructions

Prerequisites:

Python 3.9+

pip and virtual environment tools

API keys for LLM (Watsonx, OpenAI, or Hugging Face) and vector DB

Secure cloud storage (HIPAA/GDPR compliance)

Installation Process:

Clone repository

Install dependencies (requirements.txt)

Configure .env with credentials

Run backend with FastAPI

Launch frontend with Streamlit

Upload reports / connect wearable devices .

### 5. Folder Structure

app/ – FastAPI backend logic

API routes for chat, health reports, feedback, and embeddings

Streamlit frontend with patient/doctor dashboards

health\_forecaster.py – Predicts potential risks from vitals and history

report\_summarizer.py – Generates simplified summaries of medical documents

anomaly\_checker.py – Detects abnormal values in uploaded health data

feedback\_handler.py – Stores patient feedback

dashboard.py – Main Streamlit entry script

### 6. Running the Application

Start FastAPI server

Run Streamlit dashboard

Navigate via sidebar (Chat, Reports, Health Tips, Forecasting)

Upload reports or connect wearable devices

Interact with AI for real-time health insights

### 7. API Documentation

POST /chat/ask – Patient/doctor queries → AI response  
POST /upload-report – Uploads lab reports/records for summarization  
GET /search-records – Retrieves patient history insights  
GET /get-health-tips – Provides personalized health recommendations  
POST /submit-feedback – Stores patient feedback

## 8. Authentication

JWT tokens or OAuth2 for secure logins  
Role-based access: patient, doctor, admin  
HIPAA/GDPR compliance for medical data handling

## 9. User Interface

Sidebar navigation  
Patient health dashboards (vitals, history, trends)  
Doctor dashboards (summarized patient reports, alerts)  
Real-time AI chat for Q&A  
Report download (PDF)

## 10. Testing

Unit Testing: For NLP & ML modules  
API Testing: Swagger UI & Postman  
Manual Testing: Upload reports, connect wearables, validate outputs  
Edge Cases: Incomplete records, abnormal values.

Enter Symptoms

fever

Analyze Symptoms

Possible Conditions & Recommendations

The symptom of fever is quite common and can be associated with a wide range of conditions, from mild viral infections to severe bacterial or viral illnesses. Here are some possible medical conditions related to fever, along with general medication suggestions based on common treatments for these conditions:

- "Viral upper respiratory infections":** Common colds, flu (influenza)  
- Treatment: Over-the-counter (OTC) pain relievers and fever reducers like acetaminophen (Tylenol) or ibuprofen (Advil, Motrin) for pain and reducing fever. Do not use aspirin for children and teenagers due to the risk of Reye's syndrome. Hydration and rest are crucial.
- "Bacterial infections":** Some examples include strep throat or sinusitis  
- Treatment: Antibiotics, usually prescribed by a doctor, are necessary for bacterial infections. Common choices are penicillin, amoxicillin, or clindamycin. Ensure to complete the full course of antibiotics as prescribed, even if symptoms improve.
- "Fever of unknown origin (FUO)":** A serious condition where the cause of fever cannot be identified despite extensive testing  
- Treatment: Depends on the underlying cause. This may involve a variety of investigations, including blood tests, imaging studies (e.g., CT scans), and sometimes hospitalization for close monitoring. Specific treatments may include antibiotics, anti-inflammatories, or surgery depending on the cause.

Medical Condition

diabetes

Age

30

Gender

Male

Medical History

none

Generate Treatment Plan

Personalized Treatment Plan

- "Lifestyle Modifications:"**
  - "Diet:"** Adopt a balanced, Mediterranean-style diet rich in whole grains, fruits, vegetables, lean proteins, and healthy fats (e.g., olive oil). Limit processed foods, sugars, and unhealthy fats. Aim for 5 servings of fruit and 4 servings of vegetables daily.
  - "Exercise:"** Engage in regular physical activity, such as brisk walking, cycling, or swimming, for at least 150 minutes per week or 75 minutes for vigorous exercise. Aim for at least 3 days of activity per week.
  - "Weight Management:"** Maintain a healthy body weight by monitoring caloric intake and balancing it with energy expenditure.
- "Medication:"**
  - "Metformin:"** Start with a low dose (500-1000 mg) and gradually increase based on blood sugar control and tolerability. Metformin helps lower glucose production in the liver and improves insulin sensitivity.
  - "Lifestyle Adjustments:"** If metformin causes gastrointestinal side effects (e.g., bloating, gas, or diarrhea), try taking it with meals or after a small snack.
  - "Monitor Blood Sugar:"** Regularly check blood glucose levels using a home glucose meter. Adjust medication or lifestyle changes as needed.
- "Home Remedies:"**

Use via API Built with Gradio Settings