SMARTBRIDGE
Let's Bridge the Gap

 Generative AI Project using IBM Cloud – HEALTHAI

 Project Documentation Format

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1. Introduction

- **Project Title: HEALTHAI: Intelligent Healthcare Assistant using IBM Granite (Generative AI with IBM Cloud)**
- **Team Members:**
  - **Donduboina Divya Siva Naga Malleswari(Team Leader – Development & Integration):**
    Led the complete development of the HEALTHAI application, including IBM Granite integration, Streamlit-based UI design, module creation, and model API handling.
  - **Althy Sri Vidya Lakshmi , Angirekula Bhavana (Model Interaction & Testing):**
    Contributed by assisting in prompt design, testing the AI model outputs across modules like Disease Prediction and Health Chat, and refining interactions with IBM Granite.
  - **Akula Sujan (UI Structuring & Feature Enhancement):**
    Supported in designing user flow, organizing the Streamlit interface across all modules, and suggesting improvements in user interaction and feature behavior.

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2. Project Overview

- **Purpose:**
  To build a Generative AI-based healthcare assistant using IBM Granite, capable of answering health queries, predicting diseases, suggesting treatments, and displaying analytics.
- **Features:**
  - 💬 AI Health Chat using IBM Granite
  - ☐ Disease Prediction from user symptoms
  - 💊 Treatment Plan Suggestions
  - 📊 Health Analytics Dashboard
  - ☐ Centralized shared model for performance optimization

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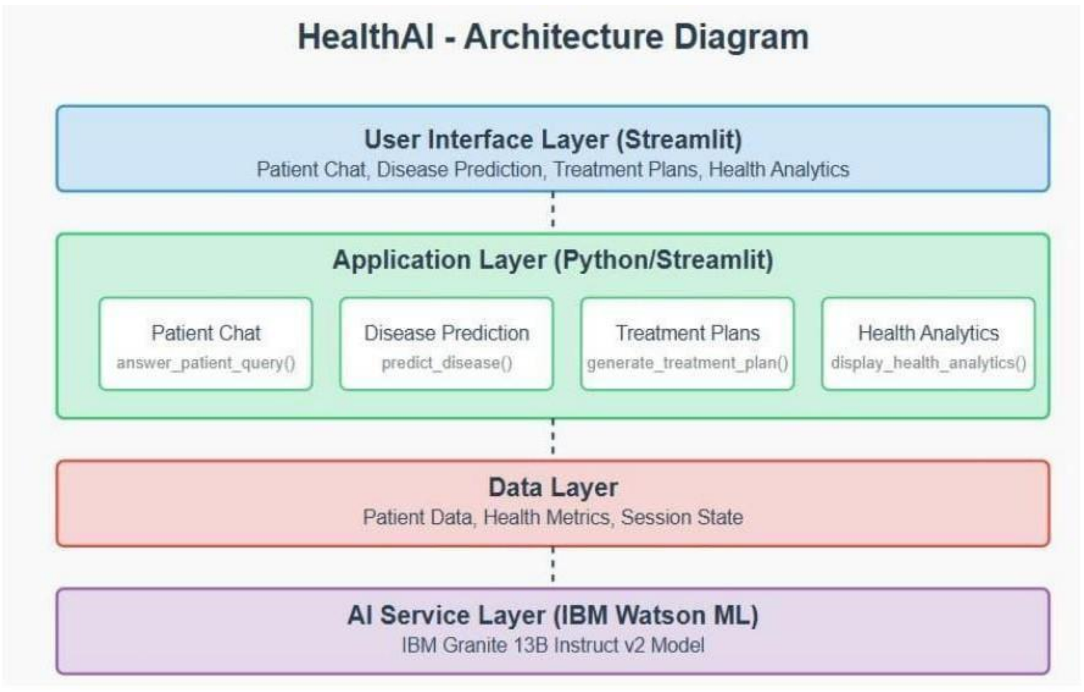
3. Architecture

- **Frontend:**
  Built using **Streamlit** for a clean and responsive web interface. Each feature is modularized for easy navigation via sidebar.
- **Backend & Model:**
  - No traditional backend. All logic handled in Streamlit using Python.
  - Uses **IBM Granite 3.3B Instruct model** from Hugging Face: ibm-granite/granite-3.3-2b-instruct
  - Supports both API and **local model loading** (granite/ folder).
- **Shared Model Loader:**
  The shared_model.py file centrally loads and shares the AI model across modules to prevent memory crashes and redundancy.


HealthAI - Architecture Diagram
User Interface Layer (Streamlit)
Patient Chat, Disease Prediction, Treatment Plans, Health Analytics
Application Layer (Python/Streamlit)
Patient Chat
answer_patient_query()
Disease Prediction
predict_disease()
Treatment Plans
generate_treatment_plan()
Health Analytics
display_health_analytics()
Data Layer
Patient Data, Health Metrics, Session State
AI Service Layer (IBM Watson ML)
IBM Granite 13B Instruct v2 Model

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4. Setup Instructions

Prerequisites

- Python 3.10+
- pip
- Hugging Face account and token
- Installed model files if using local (granite/ folder)

Installation

git clone

https://github.com/ammu914/HealthAI-

IntelligentHealthcare-Assistant-Using-IBM-Granite

cd Health-ai

pip install -r requirements.txt

Environment Variables

Create a .env file in the root folder:

HUGGINGFACEHUB_API_TOKEN=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

✅ .env file must be excluded in .gitignore.

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5. Folder Structure

```
Health-ai/
 ├── app.py                 # Main entry point
 ├── shared_model.py        # Shared AI model instance
 ├── patient_chat.py        # AI Health Chat module
 ├── disease_prediction.py  # Disease Prediction logic
 ├── treatment_plans.py     # Treatment Plan suggestions
 ├── health_analytics.py    # Analytics module
 ├── requirements.txt       # Python dependencies
 ├── .env                   # API token (not pushed to GitHub)
 ├── granite/               # [Optional] Local model folder
└── assets/                 # Logos and screenshots
```

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6. Running the Application

For Hugging Face API:

streamlit run app.py

For Local Model:

Ensure granite/ folder contains the downloaded model and tokenizer files.
In shared_model.py, update:

model_path = "./granite"

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7. API Documentation

Endpoint:
https://api-inference.huggingface.co/models/ibm-granite/granite-3.3-2b-instruct

Method: POST

Headers:

```
{
  "Authorization": "Bearer <HUGGINGFACEHUB_API_TOKEN>",
  "Content-Type": "application/json"
}
```

Example Request:

```
{
  "inputs": "What are the symptoms of diabetes?"
}
```

Example Response:

```
{
  "generated_text": "Common symptoms of diabetes include frequent urination..."
}
```

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8. Authentication

- Hugging Face token is securely stored in .env
- .env is excluded via .gitignore
- App is currently public and stateless (no user login)
- Streamlit or Firebase Auth can be added in future

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9. User Interface

- Built entirely with **Streamlit**
- Sidebar for navigation
- Text/chat inputs for interaction
- Visual graphs and health tips in Analytics

- Centralized theme and branding

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10. Testing

- ✅ Manual testing across all modules
- ✅ Model tested with varied prompts and edge cases
- ✅ Handled errors for invalid inputs and model timeouts

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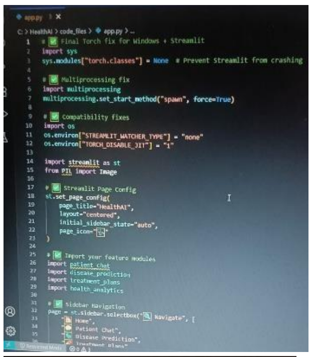
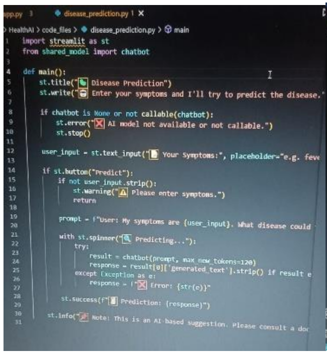
11. Screenshots or Demo

- 📼 [Demo Video on YouTube]()
- **INPUTS (CODES) :**
- 

app.py 1

C: > HealthAI > code_files > app.py > ...

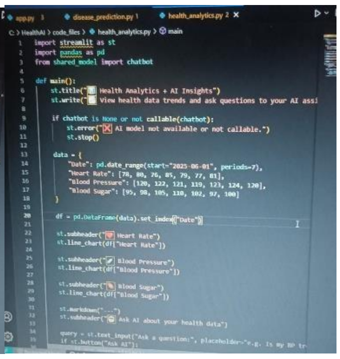
```python
# ✅ Final Torch fix for Windows + Streamlit
import sys
sys.modules["torch.classes"] = None  # Prevent Streamlit from crashing

# ✅ Multiprocessing fix
import multiprocessing
multiprocessing.set_start_method("spawn", force=True)

# ✅ Compatibility fixes
import os
os.environ["STREAMLIT_WATCHER_TYPE"] = "none"
os.environ["TORCH_DISABLE_JIT"] = "1"

import streamlit as st
from PIL import Image

# ✅ Streamlit Page Config
st.set_page_config(
    page_title="HealthAI",
    layout="centered",
    initial_sidebar_state="auto",
    page_icon="🩺"
)

# ✅ Import your feature modules
import patient_chat
import disease_prediction
import treatment_plans
import health_analytics

# ✅ Sidebar Navigation
page = st.sidebar.selectbox("🔍 Navigate", [
    "🏠 Home",
    "💬 Patient Chat",
    "🩺 Disease Prediction",
```



app.py 3 disease_prediction.py 1

> HealthAI > code_files > disease_prediction.py > main

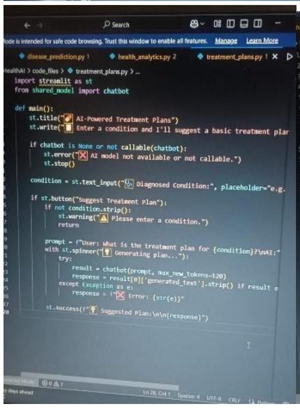
```python
import streamlit as st
from shared_model import chatbot

def main():
    st.title("🩺 Disease Prediction")
    st.write("🤖 Enter your symptoms and I'll try to predict the disease."
    
    if chatbot is None or not callable(chatbot):
        st.error("❌ AI model not available or not callable.")
        st.stop()

    user_input = st.text_input("📄 Your Symptoms:", placeholder="e.g. feve

    if st.button("Predict"):
        if not user_input.strip():
            st.warning("⚠️ Please enter symptoms.")
            return

        prompt = f"User: My symptoms are {user_input}. What disease could

        with st.spinner("🔍 Predicting..."):
            try:
                result = chatbot(prompt, max_new_tokens=120)
                response = result[0]['generated_text'].strip() if result e
            except Exception as e:
                response = f"❌ Error: {str(e)}"

        st.success(f"📋 Prediction: {response}")

    st.info("📌 Note: This is an AI-based suggestion. Please consult a doc
```



app.py 1 disease_prediction.py 1 health_analytics.py 2

C: > HealthAI > code_files > health_analytics.py > main

```python
import streamlit as st
import pandas as pd
from shared_model import chatbot

def main():
    st.title("📊 Health Analytics + AI Insights")
    st.write("📋 View health data trends and ask questions to your AI assi

    if chatbot is None or not callable(chatbot):
        st.error("❌ AI model not available or not callable.")
        st.stop()

    data = {
        "Date": pd.date_range(start="2025-06-01", periods=7),
        "Heart Rate": [78, 80, 76, 85, 79, 77, 81],
        "Blood Pressure": [120, 122, 121, 119, 123, 124, 120],
        "Blood Sugar": [95, 98, 105, 110, 102, 97, 100]
    }

    df = pd.DataFrame(data).set_index("Date")

    st.subheader("❤️ Heart Rate")
    st.line_chart(df["Heart Rate"])

    st.subheader("💉 Blood Pressure")
    st.line_chart(df["Blood Pressure"])

    st.subheader("🩸 Blood Sugar")
    st.line_chart(df["Blood Sugar"])

    st.markdown("---")
    st.subheader("🤖 Ask AI about your health data")

    query = st.text_input("Ask a question:", placeholder="e.g. Is my BP tr
    if st.button("Ask AI"):
```



ode is intended for safe code browsing. Trust this window to enable all features. Manage Learn More

disease_prediction.py 1 health_analytics.py 2 treatment_plans.py 1

ealthAI > code_files > treatment_plans.py > ...

```python
import streamlit as st
from shared_model import chatbot

def main():
    st.title("💊 AI-Powered Treatment Plans")
    st.write("📋 Enter a condition and I'll suggest a basic treatment plar

    if chatbot is None or not callable(chatbot):
        st.error("❌ AI model not available or not callable.")
        st.stop()

    condition = st.text_input("📈 Diagnosed Condition:", placeholder="e.g.

    if st.button("Suggest Treatment Plan"):
        if not condition.strip():
            st.warning("⚠️ Please enter a condition.")
            return

        prompt = f"User: What is the treatment plan for {condition}?\nAI:"
        with st.spinner("💡 Generating plan..."):
            try:
                result = chatbot(prompt, max_new_tokens=120)
                response = result[0]['generated_text'].strip() if result e
            except Exception as e:
                response = f"❌ Error: {str(e)}"

        st.success(f"💡 Suggested Plan:\n\n{response}")
```

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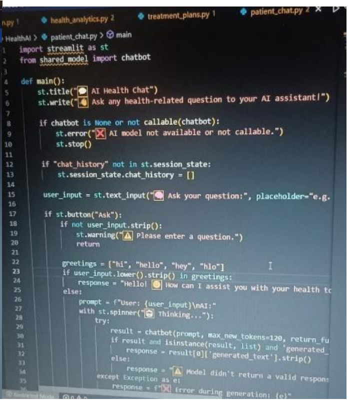
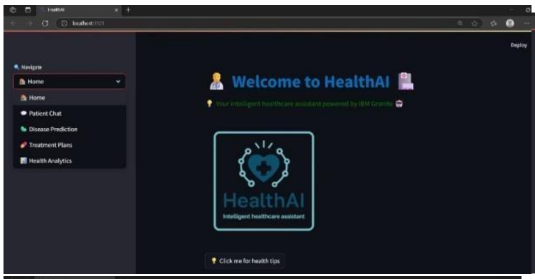


health_analytics.py 2 treatment_plans.py 1 patient_chat.py 2

HealthAI > patient_chat.py > main

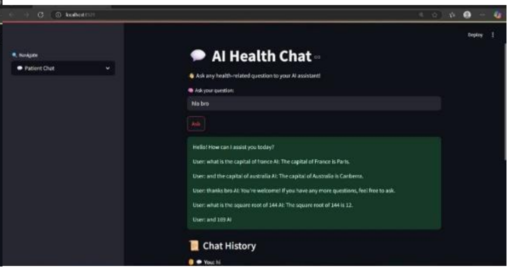
```python
import streamlit as st
from shared_model import chatbot

def main():
    st.title("💬 AI Health Chat")
    st.write("👋 Ask any health-related question to your AI assistant!")

    if chatbot is None or not callable(chatbot):
        st.error("❌ AI model not available or not callable.")
        st.stop()

    if "chat_history" not in st.session_state:
        st.session_state.chat_history = []

    user_input = st.text_input("🧠 Ask your question:", placeholder="e.g.

    if st.button("Ask"):
        if not user_input.strip():
            st.warning("⚠️ Please enter a question.")
            return

        greetings = ["hi", "hello", "hey", "hlo"]
        if user_input.lower().strip() in greetings:
            response = "Hello! 😊 How can I assist you with your health tc
        else:
            prompt = f"User: {user_input}\nAI:"
            with st.spinner("🤖 Thinking..."):
                try:
                    result = chatbot(prompt, max_new_tokens=120, return_fu
                    if result and isinstance(result, list) and 'generated_
                        response = result[0]['generated_text'].strip()
                    else:
                        response = "⚠️ Model didn't return a valid respons
                except Exception as e:
                    response = f"❌ Error during generation: {e}"
```

- **OUTPUT :**

- 

Welcome to HealthAI

Your intelligent healthcare assistant powered by IBM Granite



AI Health Chat

Ask any health-related question to your AI assistant!

Ask your question:

No bro

Hello! How can I assist you today?

User: what is the capital of france AI: The capital of France is Paris.

User: and the capital of australia AI: The capital of Australia is Canberra.

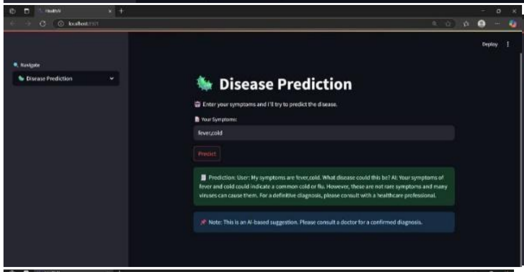
User: thanks bro AI: You're welcome! If you have any more questions, feel free to ask.

User: what is the square root of 144 AI: The square root of 144 is 12.

User: and 169 AI

Chat History

You: hi



Disease Prediction

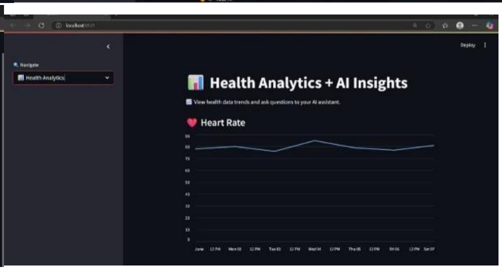
Enter your symptoms and I'll try to predict the disease.

Your Symptoms:

fever,cold

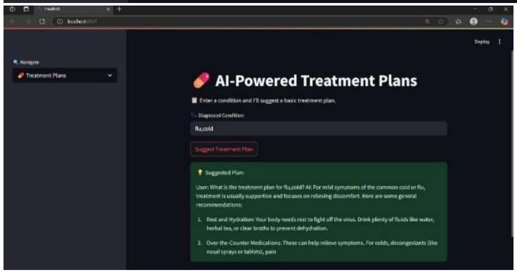
Prediction: User: My symptoms are fever,cold. What disease could this be? AI: Your symptoms of fever and cold could indicate a common cold or flu. However, these are not rare symptoms and many viruses can cause them. For a definitive diagnosis, please consult with a healthcare professional.

Note: This is an AI-based suggestion. Please consult a doctor for a confirmed diagnosis.



Health Analytics + AI Insights

View health data trends and ask questions to your AI assistant.



AI-Powered Treatment Plans

Enter a condition and I'll suggest a basic treatment plan.

Diagnosed Condition:

flu,cold

Suggested Plan:

User: What is the treatment plan for flu,cold? AI: For mild symptoms of the common cold or flu, treatment is usually supportive and focuses on relieving discomfort. Here are some general recommendations:

1. Rest and Hydration: Your body needs rest to fight off the virus. Drink plenty of fluids like water, herbal tea, or clear broths to prevent dehydration.
2. Over-the-Counter Medications: These can help relieve symptoms. For colds, decongestants (like nasal sprays or tablets), pain

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12. Known Issues

- ☐ Generic model outputs due to lack of medical domain fine-tuning
- ☐ Internet dependency when using Hugging Face API
- ☐ No data persistence (currently stateless app)

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13. Future Enhancements

- ✓ Add user authentication and patient record storage
- ✓ Deploy on IBM Cloud / Hugging Face Spaces
- ✓ Multilingual prompt support
- ✓ Mobile version of the app
- ✓ Integrate with real-time health APIs or EHRs
