

Applied AI INTERNSHIP

AICTE IBM SkillsBuild

HEALTHCARE AGENT AI (SDG 3)

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Report

Title: Development of an AI-Powered Healthcare Agent for Preventive Health Monitoring and Intelligent Assistance

Introduction

Healthcare management has become increasingly complex due to rising chronic diseases, mental health challenges, and the need for continuous monitoring of personal health data. Many individuals struggle with missed medications, delayed medical attention, and lack of clarity regarding symptom severity. Traditional healthcare systems are often reactive rather than preventive and rely heavily on manual processes.

With advancements in Artificial Intelligence and cloud technologies, intelligent healthcare assistants can play a crucial role in preventive care, early risk identification, and personalized health guidance. This project presents the development of an AI-powered Healthcare Agent that assists users in managing their health through symptom analysis, medication reminders, health tracking, mental health support, and appointment scheduling using modern AI and cloud-based tools.

Problem Statement

- Health data is fragmented across multiple sources.
- Users often ignore early symptoms due to lack of guidance.
- Medication and appointment non-compliance is common.
- Personalized healthcare insights are not easily accessible.

Objective

- Provide a centralized healthcare management platform.
- Enable early symptom assessment using AI.
- Improve medication and appointment adherence.
- Offer personalized health and mental wellness support.
- Ensure secure storage and handling of medical data.

Scope of the System

The system supports:

- Individual users managing personal health data.
- AI-assisted symptom and health analysis.
- Automated reminders and notifications.
- Scalable backend architecture for future enhancements.

The system does not replace medical professionals and is intended for assistance and awareness only.

System Architecture

Streamlit Frontend → Python Backend → Supabase Database → AI Modules → Email Notification Service

High-Level Flow

1. User interacts with Streamlit frontend.
2. Backend Python logic processes requests.
3. Supabase handles authentication and data persistence.
4. AI modules analyze symptoms, health logs, and chats.
5. Email services send reminders and alerts.



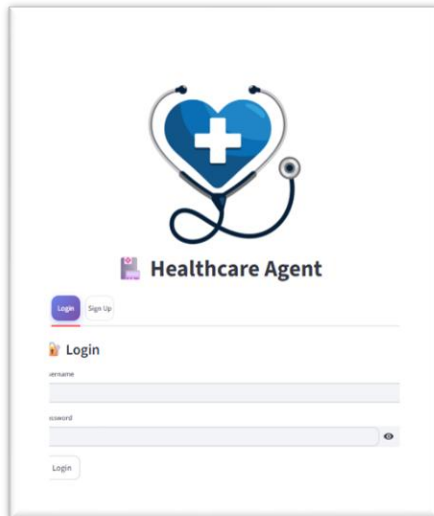
Architecture Components

- Presentation Layer: Streamlit UI
- Application Layer: Python backend modules
- Data Layer: Supabase (PostgreSQL)
- Intelligence Layer: LangGraph + LLM
- Notification Layer: Relay / SMTP Email

Function Modules

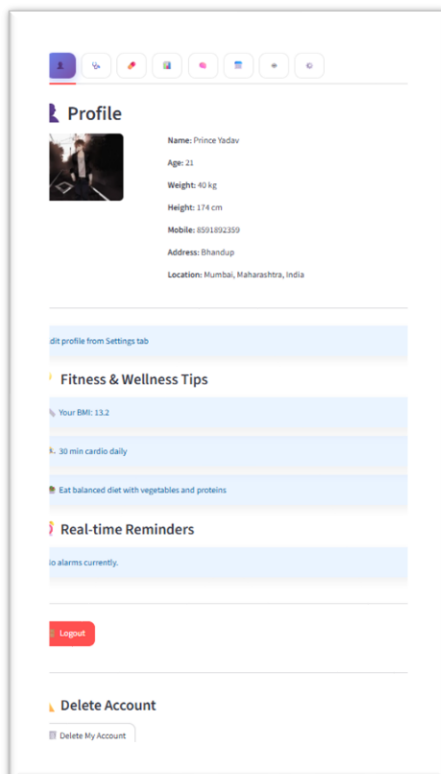
1. User Authentication

- Signup and login using Supabase authentication.
- Password hashing and role-based access.
- One-time profile setup after first login.



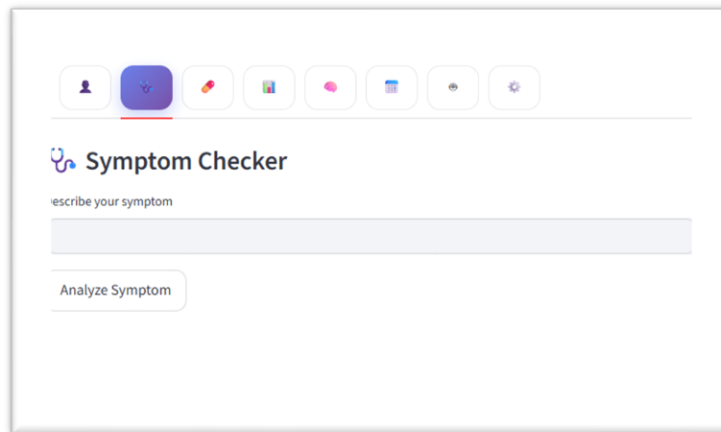
2. Profile Management

- Stores personal and medical details.
- Editable profile information.
- Profile image upload and retrieval.



3. Symptom Checker

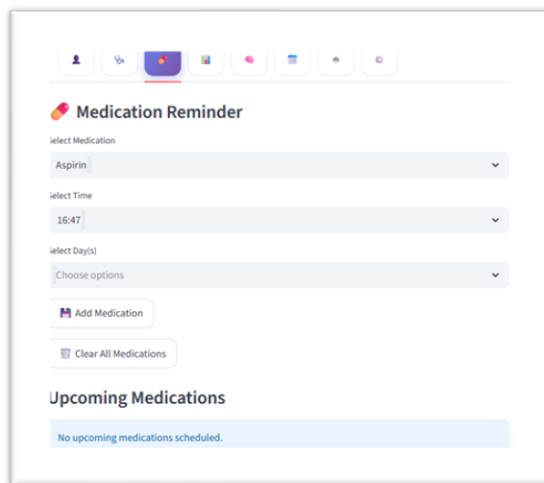
- Accepts user-reported symptoms.
- AI categorizes symptoms as emergency or non-emergency.
- Provides suggested actions and guidance.



The screenshot shows a web application interface for a Symptom Checker. At the top, there is a navigation bar with several icons: a person, a heart, a pill, a calendar, a brain, a document, a speech bubble, and a gear. The 'Symptom Checker' section is highlighted. Below the navigation bar, the title 'Symptom Checker' is displayed with a stethoscope icon. Underneath, there is a text input field labeled 'Describe your symptom'. Below the input field is a button labeled 'Analyze Symptom'.

4. Medication Reminder

- Medication scheduling by time and frequency.
- In-app alerts.
- Automated email reminders.
- Background scheduler using Python threading.



The screenshot shows a web application interface for a Medication Reminder. At the top, there is a navigation bar with several icons: a person, a heart, a pill, a calendar, a brain, a document, a speech bubble, and a gear. The 'Medication Reminder' section is highlighted. Below the navigation bar, the title 'Medication Reminder' is displayed with a pill icon. Underneath, there are three dropdown menus: 'Select Medication' (showing 'Aspirin'), 'Select Time' (showing '16:47'), and 'Select Day(s)' (showing 'Choose options'). Below these dropdowns are two buttons: 'Add Medication' and 'Clear All Medications'. At the bottom, there is a section titled 'Upcoming Medications' with a light blue background and the text 'No upcoming medications scheduled.'

5. Health Tracker

- Logs vitals such as heart rate, sleep, steps, glucose.
- BMI calculation.
- Trend-based AI health suggestions.

The screenshot shows a 'Health Tracker' interface with a top navigation bar containing icons for profile, vitals, diet, health, chat, and settings. The 'Health Tracker' section includes input fields for Heart Rate (bpm) set to 70, Sleep Hours set to 7, Steps Today set to 0, and Blood Glucose (mg/dL) set to 90. Below these is a 'Save Health Data' button. A status bar indicates 'Condition: Needs Attention'. Under 'Tasks to improve your health:', there are two green boxes with suggestions: 'Increase caloric intake with protein and healthy fats' and 'Walk at least 5000 steps daily'. The 'Personalized Diet Suggestions' section has a blue box suggesting to 'Include protein-rich foods and healthy fats'. The 'Health Recommendations' section has a green box suggesting 'Underweight: increase calories and protein.'

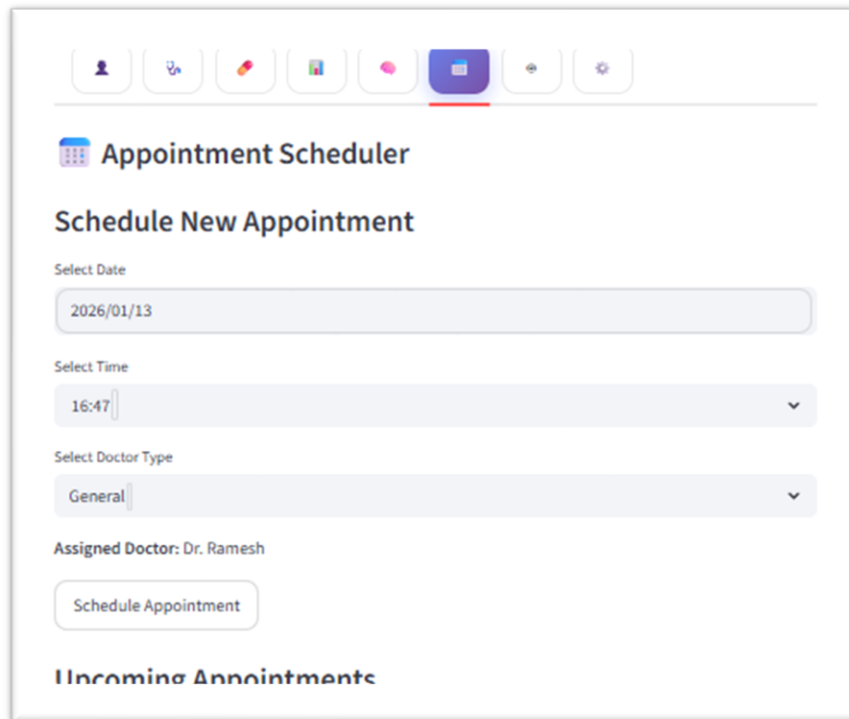
6. Mental Health Support

- Conversational AI for mental well-being.
- Session-based chat storage.
- Privacy-focused interaction design.

The screenshot shows a 'Mental Health Chat' interface with a top navigation bar containing icons for profile, vitals, diet, health, chat, and settings. The 'Mental Health Chat' section includes a 'Clear Chat' button, a text input field labeled 'Type your message', and a 'Send' button.

7. Appointment Management

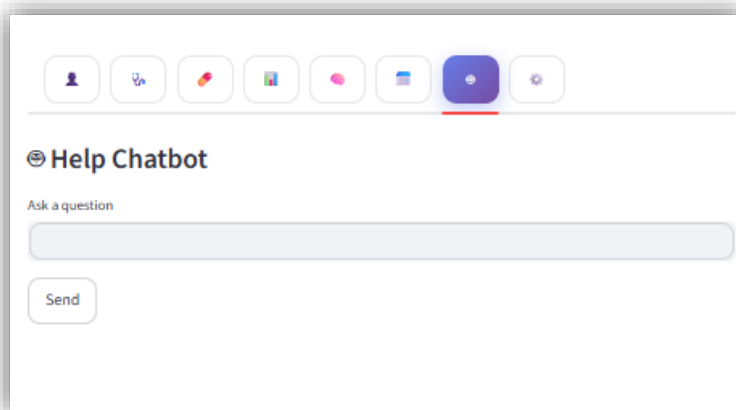
- Schedule, reschedule, and delete appointments.
- Automated email notifications.
- Centralized appointment tracking.



The screenshot shows a web application interface for an appointment scheduler. At the top, there is a navigation bar with several icons, including a calendar icon which is highlighted with a red underline. Below the navigation bar, the title "Appointment Scheduler" is displayed. The main heading is "Schedule New Appointment". There are three dropdown menus: "Select Date" with the value "2026/01/13", "Select Time" with the value "16:47", and "Select Doctor Type" with the value "General". Below these, it says "Assigned Doctor: Dr. Ramesh". There is a button labeled "Schedule Appointment". At the bottom, the text "Incoming Appointments" is visible.

8. Help Chatbot

- AI-driven question answering.
- General healthcare guidance.



The screenshot shows a web application interface for a help chatbot. At the top, there is a navigation bar with several icons, including a chatbot icon which is highlighted with a red underline. Below the navigation bar, the title "Help Chatbot" is displayed. There is a text input field with the placeholder text "Ask a question". Below the input field, there is a button labeled "Send".

Technical Implementation

- Frontend: Streamlit
- Backend: Python 3.x
- Database: Supabase (PostgreSQL)
- AI Engine: LangGraph with Large Language Models
- Notifications: Relay / SMTP
- Scheduler: Python threading
- Deployment: Render / Streamlit Cloud

Database Design (Supabase)

Key tables include:

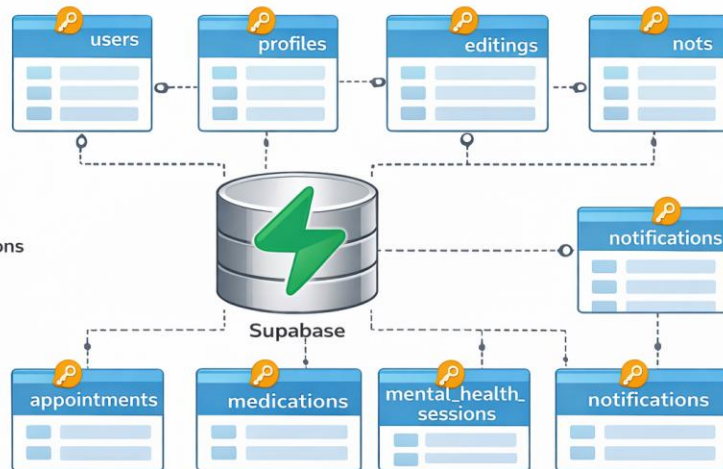
- users
- profiles
- health_logs
- medications
- appointments
- mental_health_sessions
- notifications

Relationships are enforced using foreign keys for data integrity.

Database Design (Supabase)

Key tables include:

- ✓ users
- ✓ profiles
- ✓ health_logs
- ✓ medications
- ✓ appointments
- ✓ mental_health_sessions
- ✓ notifications



Relationships are enforced using foreign keys for data integrity.

Security Considerations

- Passwords stored using secure hashing.
- Secrets managed through environment variables.
- No plaintext credentials stored.
- Secure role separation using Supabase keys.
- HTTPS enforced in deployment.

Development Strategy

- Local development using virtual environments.
- Cloud deployment using Render or Streamlit Cloud.
- Environment variables configured through platform dashboards.
- Port binding using \$PORT for cloud compatibility.

Limitations

- Dependent on internet connectivity.
- Free-tier deployments may experience cold starts.
- AI responses are advisory, not diagnostic.
- Background schedulers pause on free hosting tiers.

Future Enhancements

- Predictive health risk analytics.
- Wearable and IoT device integration.
- Telemedicine and video consultations.
- Multi-language support.
- Health report export (PDF/CSV).
- Enhanced compliance (HIPAA/GDPR).
- Family and caregiver account support.

SDG Alignment

- United Nations Sustainable Development Goal 3
Good Health and Well-Being
- Focus on preventive care, accessibility, and early intervention.

Conclusion

This project successfully demonstrates the development of an AI-powered Healthcare Agent designed to support preventive healthcare and daily health management. By combining AI-driven analysis, secure cloud infrastructure, and automation, the system helps users track health data, understand symptoms, adhere to treatment schedules, and receive personalized guidance.

The solution has strong potential for future expansion, including predictive analytics, wearable device integration, and telemedicine features. Overall, the project aligns with United Nations Sustainable Development Goal 3: **Good Health and Well-Being**, contributing to accessible and intelligent healthcare solutions.