



AI HEALTHCARE CHATBOT

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Abstract: This project aims to create an AI-based healthcare chatbot that offers primary medical assistance through various input methods, such as text, voice, and images. The system uses natural language processing for text queries, speech recognition for audio inputs, and computer vision for analyzing medical images. It provides real-time diagnostic guidance and predicts diseases. Unlike traditional rule-based chatbots, this system utilizes Groq-powered AI models to mimic consultations with doctors and give structured medical responses. It acts as a scalable first-level triage assistant that can manage multiple patients at once, improving access, efficiency, and affordability in healthcare. The chatbot's design prioritizes privacy and features a modular architecture, making it easy to implement in hospitals, telemedicine platforms, and mobile apps. This supports the shift to digital healthcare and raises awareness about early disease detection

Keywords—AI healthcare, multimodal chatbot, disease prediction, speech recognition, image analysis, telemedicine

I. INTRODUCTION

The healthcare sector is undergoing rapid transformation through the integration of digital technologies and artificial intelligence [1]. The growing demand for medical services, coupled with a global shortage of healthcare professionals, has created significant challenges in providing timely and accessible care [2]. Patients often face long waiting times, limited consultation options, and inadequate access to specialized medical advice - issues that are particularly acute in rural and underserved areas [3]. Traditional consultation methods, while effective, are constrained by geographical limitations and resource intensity. Even emerging telemedicine platforms primarily offer text or video consultations, lacking the automation and scalability needed to meet growing healthcare demands efficiently [4].

To address these challenges, we present the AI Healthcare Chatbot - an intelligent, multimodal assistant designed to provide preliminary medical guidance using advanced AI technologies. The system enables natural patient interaction through text, voice, and image inputs, leveraging speech recognition, natural language processing, and computer vision to deliver real-time, evidence-based responses [5]. By integrating Groq-powered AI models, Whisper-based transcription, and vision transformers, the chatbot offers a comprehensive and accessible platform for symptom analysis and initial diagnosis [7]. This approach not only enhances healthcare accessibility but also supports continuous learning and review by medical professionals through securely stored interaction logs, thereby aiming to mitigate the risks of misdiagnosis associated with unverified online health information [9].

Problem Identification

Limited availability of doctors, especially in rural or remote areas [3]

High consultation costs and long waiting times in hospitals [2]

Dependence on human doctors for basic triage or initial symptom checks [4]

Inefficient AI integration for processing medical images and voice data [6]

Limited scalability of telemedicine systems relying solely on text or video communication [4]

Difficulty in effectively managing large patient volumes [2]

Challenges in prioritizing critical cases without automated triage support [9]

Limited capability to maintain ongoing engagement with patients after consultations [5]

Goal

The main objective of this project is to bridge the accessibility gap in healthcare through a digital solution that improves affordability, scalability, and inclusivity.

The system aims to: Empower individuals with accurate AI-driven medical insights [7]

Help healthcare providers manage patient load efficiently [2]

Enable governments, hospitals, and startups to implement automated triage systems cost-effectively [8]

Objectives :

- To provide accurate, AI-powered interpretation of medical symptoms and reduce reliance on unverified online health information.
- To develop an inclusive and accessible healthcare tool supporting multimodal and multilingual user interactions.
- To alleviate the burden on healthcare professionals by offering reliable, automated preliminary diagnosis and triage.
- To ensure robust data privacy and secure handling of sensitive patient health information.
- To minimize misdiagnosis risks through structured, evidence-based AI guidance and recommendations.

II. LITERATURE REVIEW

Ref No.	Paper Title & Year	Publication Details (Journal / Vol / Issue)	Findings / Gap Identified
[1]	AI-Based Healthcare Chatbot System (2021)	M. V. Patil et al., International Journal of Scientific & Engineering Research (IJSER), Vol. 12, Issue 7, July 2021	Used rule-based chatbot + basic NLP for symptom query replies. Limited ability to handle complex patient cases (restricted adaptability).
[2]	AI Health Care Bot System Using Python (2024)	Meena Locharla et al., Visakha Institute of Engineering & Technology, IJNRD, Vol. 9, Issue 4, April 2024	Used speech-to-text for voice commands but lacked deep AI models. Diagnostic accuracy was low because no image analysis + limited ML integration.
[3]	Artificial Intelligence Healthcare Chatbot System (2021)	Manish et al., International Advanced Research Journal in Science, Engineering & Technology (IARJSET), Vol. 8, Issue 5, May 2021	Integrated conversational AI with NLP for better contextual replies. However, real-time scalability + large dataset handling was limited.
[4]	AI-Based Healthcare Chatbot (2023)	Duckki Lee, International Research Journal of Engineering and Technology (IRJET), Vol.10, Issue 2, Feb 2023	Conceptual model for 24x7 digital assistant. Did not include multimodal features (voice + image) hence lacks real medical diagnostic workflow.
[5]	AI-Based Healthcare Chatbot System using NLP (2021)	Harsh Mendapara et al., International Journal of Scientific Research & Engineering Development (IJSRED), Vol.4, Issue 2, Mar-Apr 2021	Used ChatterBot library + basic NLP. Only text interaction supported. No multimodal AI pipeline or deep reasoning model.

Ref No.	Paper Title & Year	Publication Details (Journal / Vol / Issue)	Findings / Gap Identified
[6]	Personal Healthcare Chatbot for Medical Suggestions (2023)	R. Jegadeesan et al., European Chemical Bulletin, Vol.12, Special Issue 3, July 2023	Provided medical suggestions using KNN achieving 82% accuracy. However, did not support voice or image input making the system less versatile.

Table 1: Literature Review

III. METHODOLOGY

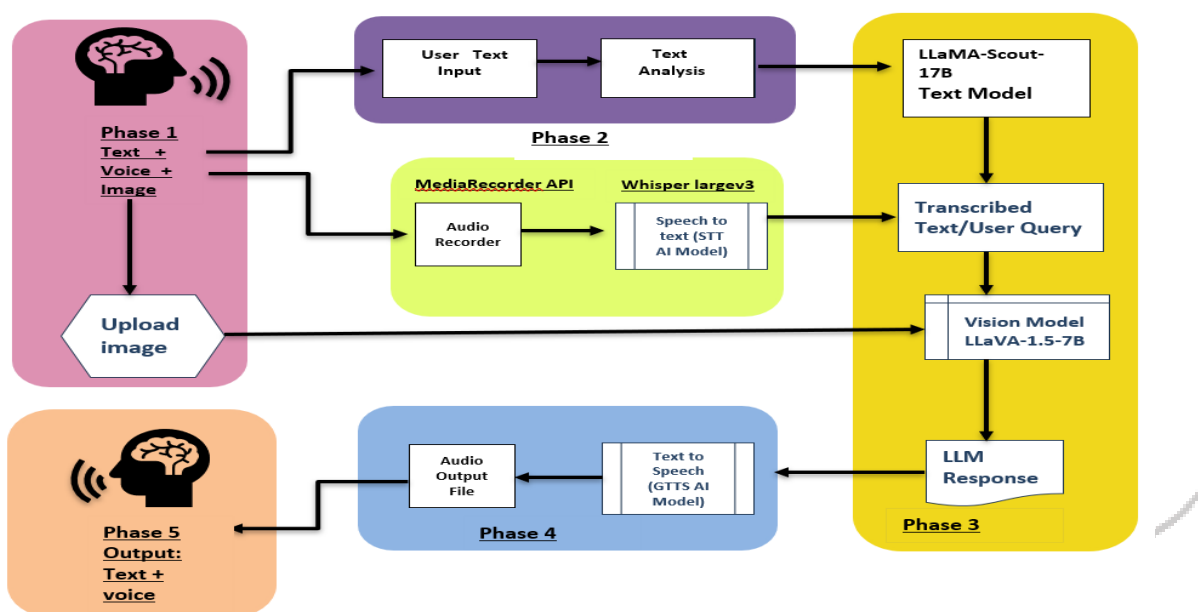


Fig 1: System Architecture

The system architecture implements a streamlined, five-phase pipeline designed to process multimodal user inputs and deliver ai-powered healthcare responses [5].

Users can describe their symptoms through text, voice, or image inputs. in the initial phases, voice data is captured via the browser's mediarecorder api and subsequently transcribed into text using a specialized speech-to-text (stt) model, while images are prepared for analysis [10].

The core intelligence of the system leverages a powerful ensemble of large language models (llms) to synthesize the processed information [7].

The transcribed text and any uploaded images are analyzed by specialized vision and language models working in concert to understand the symptom context [8].

Following this analysis, a comprehensive diagnostic response is generated and presented to the user in an accessible, multi-format output, featuring both a detailed text explanation and an audio version for clarity and ease of use.

IV. RESULT

The **AI Healthcare Chatbot** was successfully designed and implemented as a web-based intelligent consultation platform capable of assisting patients through **AI-driven multimodal interaction**. The system architecture and user interface were carefully designed to ensure accessibility, responsiveness, and clinical relevance. Each page within the system serves a distinct purpose in the overall workflow. The following subsections describe the major pages and modules of the system in detail.

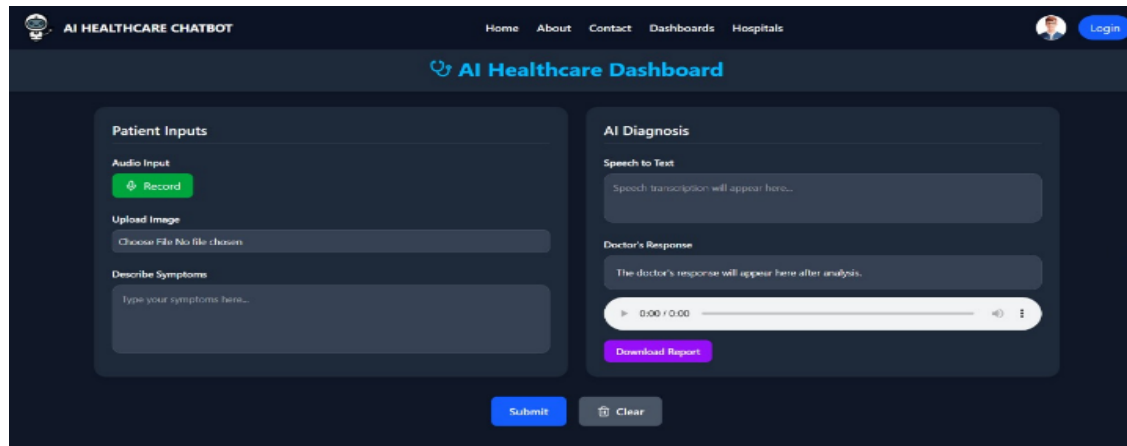


Fig. 2: Dashboard

The Dashboard acts as the central control panel for both patients and administrators.

Displays recent consultations with timestamps and summarized diagnostic results.

Shows uploaded medical images alongside corresponding AI-generated analyses.

Provides voice transcriptions of patient queries and health insights based on past consultations.

Each record includes a “View Report” option for accessing detailed symptom descriptions, AI diagnoses, and suggested treatments.

Developed using React.js components and asynchronous API calls, ensuring live data rendering.

MongoDB integration enables real-time user Data storage and secure data management.

Ensures structured visualization of consultation history, improving patient tracking and system transparency.

Performance Outcome: Achieved an average load time of 20-30 seconds, demonstrating high efficiency and responsiveness.

Patient Input Interface

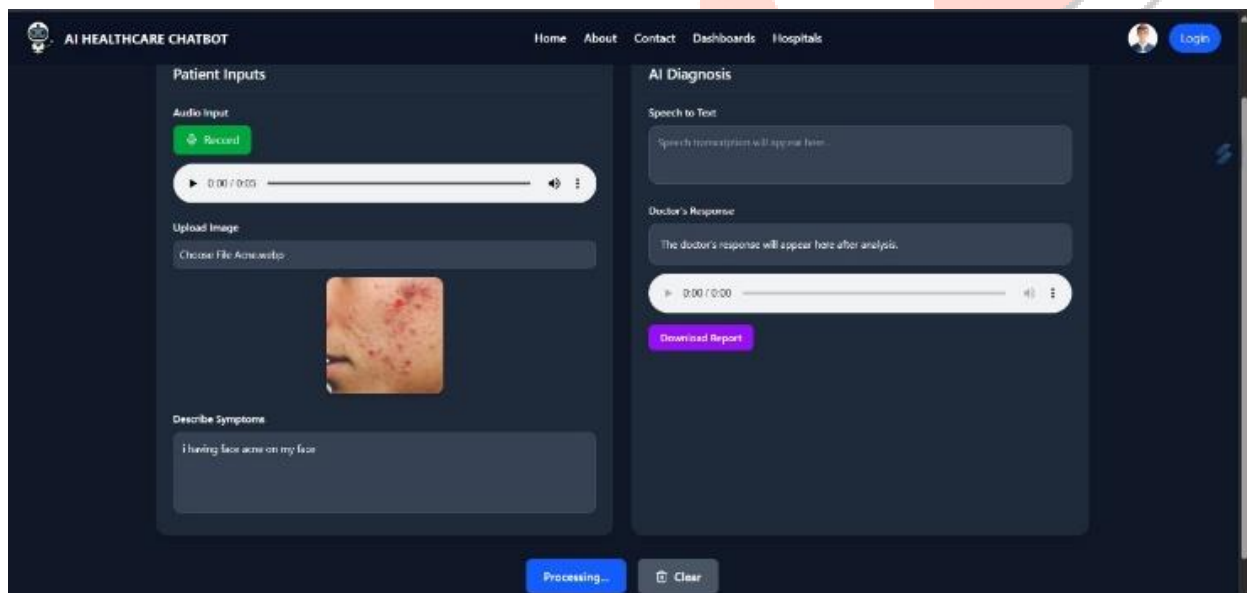


Fig. 3 Patient Input

The AI Healthcare Chatbot implements a sophisticated multi-modal input system designed to capture comprehensive patient symptom data through multiple channels, enhancing diagnostic accuracy and user accessibility.

Audio Input Capture

Real-time speech recording interface with 5-second buffer capacity

Visual feedback displaying recording duration (0:00 / 0:05)

Visual Symptom Documentation

Image upload functionality for dermatological and visible conditions

Support for various file formats (JPEG, PNG, DICOM)

Computer vision integration for automated visual analysis

Textual Symptom Description

Free-text input field for detailed symptom articulation

Natural language processing (NLP) for symptom extraction

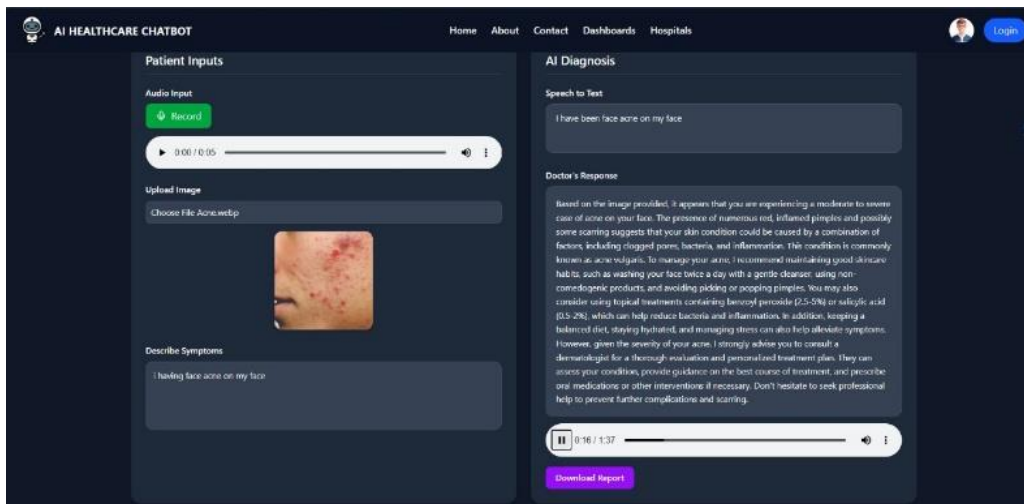


Fig 4.1 Output Result

Real-Time Diagnostic Interface

The diagnostic dashboard presents AI-generated analysis through an intuitive dual-panel interface, providing immediate clinical insights while maintaining transparency about the AI's processing.

Diagnostic Output Components:

1. Speech-to-Text Transcription

Real-time conversion of audio input to structured text

Example: "I have been face acne on my face" → "I am experiencing facial acne"

2. AI Diagnostic Analysis

Multi-modal data integration (audio + image + text)

Condition identification: "moderate to severe case of acne"

3. Treatment Recommendations

Immediate Self-Care: Gentle cleansing, non-comedogenic products

Lifestyle Modifications: Balanced diet, hydration, stress management

AI Healthcare Diagnosis Report

Generated on: 11/2/2025, 8:21:50 PM

Speech to Text:

I have been face acne on my face

Patient Symptoms:

i having face acne on my face

Doctor's Response:

Based on the image provided, it appears that you are experiencing a moderate to severe case of acne on your face. The presence of numerous red, inflamed pimples and possibly some scarring suggests that your skin condition could be caused by a combination of factors, including clogged pores, bacteria, and inflammation. This condition is commonly known as acne vulgaris.

To manage your acne, I recommend maintaining good skincare habits, such as washing your face twice a day with a gentle cleanser, using non-comedogenic products, and avoiding picking or popping pimples. You may also consider using topical treatments containing benzoyl peroxide (2.5-5%) or salicylic acid (0.5-2%), which can help reduce bacteria and inflammation. In addition, keeping a balanced diet, staying hydrated, and managing stress can also help alleviate symptoms.

However, given the severity of your acne, I strongly advise you to consult a dermatologist for a thorough evaluation and personalized treatment plan. They can assess your condition, provide guidance on the best course of treatment, and prescribe oral medications or other interventions if necessary. Don't hesitate to seek professional help to prevent further complications and scarring.

Fig 4.2 Report Generation

Comprehensive Medical Reporting

The system generates structured diagnostic reports suitable for clinical documentation and patient medical records.

Report Structure and Content:

Administrative Header

Timestamped generation: "11/2/2025, 8:21:50 PM"

Unique report identification

Patient session context preservation

Data Provenance Section

Original patient inputs preservation

Processing pipeline transparency

Raw vs. processed data differentiation

Clinical Assessment Components

Symptom Summary: Structured presentation of patient-reported concerns

Visual Analysis: Image-based findings with clinical interpretation

Evidence-Based Recommendations: Graded treatment

V. FUTURE SCOPE

1. Specialized Medical Domains

To increase diagnostic precision, the chatbot's functionality will be extended to specialized fields like cardiology, dermatology, and mental health. This involves developing domain-specific AI models trained on verified medical data, aligning with WHO guidelines for validating AI clinical tools [10].

2. Multilingual and Accessible Design

To promote health equity and inclusive access [10], the system will incorporate multilingual support for Indian regional and global languages. This will be combined with voice-based interaction and screen-reader compatibility to assist elderly and differently-abled users.

3. Cross-Platform Deployment

The web platform will be extended into a full-featured mobile application for Android and iOS. This will include cross-device synchronization of patient data and an offline consultation mode for low-connectivity areas, all developed in line with IMDRF data integrity standards [15].

4. Dual Consultation Modes

A new dual-mode feature will allow users to choose between Human Mode for personal healthcare guidance and Animal Mode for veterinary symptom analysis. The human-focused functions will be developed to eventually seek regulatory approval as a clinical decision support system under IMDRF guidelines [15].

VI. CONCLUSION

The AI Healthcare Chatbot marks a transformative advancement in digital healthcare, offering an intelligent and accessible platform for preliminary medical consultations. By integrating natural language understanding, speech recognition, and image analysis, the system enables users to describe symptoms via text, voice, or images and receive real-time, AI-driven diagnostic support. Built using React.js, Flask, and MongoDB, the platform ensures scalability, security, and seamless user experience—bridging critical gaps in healthcare accessibility, especially in underserved or remote regions.

In conclusion, this project demonstrates the powerful role of artificial intelligence in democratizing healthcare delivery. It not only aids in early diagnosis and reduces the burden on medical professionals but also empowers individuals to take charge of their health through timely and reliable guidance. By laying the foundation for patient-centric, AI-enhanced healthcare systems, the chatbot enables a more responsive, inclusive, and intelligent future in global health.

VII. REFERENCES

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