MediBot Healthcare Assistant

Malay Choudhary[1], Mahendra Kumar Tamrakar[2], Lavesh Vyas[3] , Lavish Verma[4]
Kuldeep Vishwakarma[5], Kavita Namdev[6]
[1,2,3,4,5]*CSE Department Acropolis Institute Of Technology and Research Indore, India*
[6]*Professor, CSE Department Acropolis Institute Of Technology and Research Indore, India*

***Abstract*—Healthcare systems over the world are facing a lot of pressure. This is because there are many patients and not enough healthcare professionals. Also some people do not have access to medical advice when they need it.The MediBot is a computer program that uses intelligence to talk to people about their medical symptoms. People can tell MediBot what is wrong with them in their words. Then MediBot tries to figure out what might be wrong. Suggests some over-the-counter medicines that people can buy without a prescription. MediBot uses a special language system called BioMistral-7B** [1]**. It also uses information from the RxNorm and FDA to make sure the medicine suggestions are safe and correct. The program has a user- interface that people can interact with. It also has a backend system that interprets symptoms checks for safety and validates medicines. In a test MediBot was able to correctly identify some common medical conditions.**

It also suggested some over-the-counter medicines that are normally recommended for those conditions. These early results show that MediBot can be a tool for people to get some basic medical help. This is especially true in places where people do not have access to healthcare professionals. However, people should still go see a doctor for a medical consultation. MediBot is not a replacement for a doctor [2]**. The MediBot system is a starting point for people who need medical help. The MediBot can help people with medical conditions and suggest some, over-the-counter medicines.**

***Index Terms*—Medical Chatbot, Symptom Checker, Artificial Intelligence, Natural Language Processing, Healthcare Automation, Disease Detection, Virtual Health Assistant**

I. INTRODUCTION

In recent years, people get addicted to the internet in obtaining information for every problem they face. This not only yet people to seek knowledge about general topics but also their health concerns. Chatbots are software programs that interact with humans through natural language with the sole aim of simulating a human-like conversation in response to text or voice[3]. There is an unprecedented growth in the demand for affordable and effective healthcare service in recent decades. In numerous regions of the globe, particularly rural or inner-city areas that are underserved, a paucity of trained medical providers leads to untimely or unmet treatment. Additionally, patients are too often unable to appreciate the gravitas of symptoms, resulting in under-treatment or unwarranted alarm.

Conversational agents, or chatbots, have emerged as a promising technology to help address some of these challenges. Medical chatbots can collect symptom descriptions, provide basic education, and offer preliminary triage recommendations using natural language interfaces that are accessible to non-experts. Several commercial systems such as Ada, Babylon, and Buoy Health already provide consumer-facing symptom assessment and triage services, though studies show substantial variation in diagnostic accuracy and safety compared with primary care physicians [3].

However, many existing symptom-checker applications rely on fixed decision trees or proprietary models with limited transparency and restricted coverage for certain patient groups or conditions. Moreover, they often lack standardized handling of over-the-counter (OTC) medications, which can lead to inconsistent or ambiguous drug information [4]. Large language models (LLMs) offer new opportunities to create more flexible, conversational medical assistants, but recent work has also highlighted important safety risks when such models provide patient-facing health advice. At the same time, healthcare systems worldwide face growing pressure due to high patient

volumes, shortages of trained professionals, and persistent inequalities in access, especially in rural and underserved regions.

In this context, we present MediBot, an AI-driven medical chatbot that uses the BioMistral-7B language model for natural language symptom interpretation, combined with RxNorm and FDA APIs for standardized OTC medication suggestions. The system is designed as an informational and triage support tool rather than a replacement for professional diagnosis, with a hybrid AI-plus-rules architecture intended to improve safety and reliability in everyday use [5].

The chatbot is utilized as a source of information rather than a diagnostic expert to reduce the burdens of healthcare professionals and allow the users to make more informed decisions on obtaining health care. More individuals than ever before are seeking health information. Both general health counseling and guidance for the patient's future actions in obtaining medical treatment are increasing rapidly. Overbooking and workload are recognized. Health chatbots can accelerate procedures, providing both patients and medical personnel with more available time. They may also prevent things from occurring that consume too much time for individuals and yield little.

II. LITERATURE REVIEW

Early research on AI in healthcare demonstrated that machine learning could achieve expert-level performance in specific diagnostic tasks, such as dermatology and medical imaging. Esteva et al. showed that deep neural networks could classify skin cancer with accuracy comparable to board-certified dermatologists, illustrating the potential of data-driven models in clinical decision support. These successes motivated the development of conversational systems that apply similar techniques through text- or voice-based interaction. Artificial intelligence has been used successfully in medical imaging and diagnosis, helping experts spot patterns that are perhaps hard for the human eye to see. Esteva et al. (2017) proved that deep neural networks could diagnose skin cancer as accurately as dermatologists.

These successes laid the groundwork for developing conversational AI systems that simulate diagnostic capabilities through text or voice-based interaction. Medical chatbots aim to provide preliminary assessments, recommend actions, or guide users toward further medical help.

Consumer-facing symptom checkers such as WebMD, Ada, Babylon Health, Buoy Health, and Your.MD have since been evaluated in multiple studies. Millenson et al. reported large variability in both diagnostic accuracy and triage recommendations across 23 digital diagnostic tools, emphasizing the need for continuous model updating and transparent evaluation frameworks. Independent comparisons against primary care physicians found that general practitioners still outperform symptom-checker apps overall, although some systems approach clinicians in triage safety for common conditions. Other work focusing on specific specialties, such as ophthalmology, also observed mixed diagnostic performance and inconsistent treatment recommendations among popular apps [6].

With the emergence of large language models, a new generation of medical chatbots has been proposed. Systematic reviews of LLM-based health advice services highlight both promising clinical performance and substantial variability in evaluation quality and reporting standards. Recent physician-led “red teaming” studies have shown that general-purpose LLM chatbots can produce unsafe or misleading advice for a non-trivial fraction of patient queries, underscoring the importance of safety-focused fine-tuning and robust guardrails. [7]

III. EXISTING SYSTEM

In recent years, multiple healthcare applications have been developed to support symptom checking, triage, and virtual consultation. These systems primarily fall into three categories: traditional web-based symptom checkers, AI-driven mobile apps, and rule-based virtual assistants. Each has contributed significantly to the evolution of conversational healthcare, yet each also has distinct limitations that the proposed system aims to address. These include traditional web tools, mobile health apps, and conversational chatbots. While these systems have made healthcare information more accessible, they present significant limitations in personalization, accuracy, and clinical reliability.

One of the most recognized platforms is Babylon Health, a UK-based application that uses artificial intelligence to provide real-time health assessments. Its chatbot allows users to enter symptoms, which are then

analyzed using a probabilistic reasoning model to suggest possible conditions and next steps. Babylon also offers telehealth features, allowing users to consult with doctors virtually, making it a comprehensive digital health platform.

Another widely used system is Ada Health, which focuses on providing accurate symptom assessments based on user responses. Ada's algorithm has been trained on thousands of clinical cases and medical conditions, allowing it to ask relevant follow-up questions and refine its predictions in real-time.[5] Its strength lies in its wide medical knowledge base and a user-friendly mobile interface, which makes it particularly effective for individual users seeking preliminary diagnoses.

Buoy Health, developed at Harvard Medical School, offers a dynamic and interactive way of diagnosing symptoms by simulating a conversation similar to what a user might have with a doctor.[4] Buoy uses advanced algorithms to assess the urgency of a situation and guide users accordingly, recommending home remedies, medications, or professional care depending on the inputs.

Your.MD (Healthily) is a chatbot that offers personalized symptom checks and provides medically verified content and health tips. It integrates with wearable devices and health trackers to provide holistic recommendations and is aimed at empowering users with self-care tools. It also features a "OneStop Health" marketplace, connecting users to relevant health services, pharmacies, and specialists.

Comparative studies consistently find substantial differences in coverage, diagnostic accuracy, and safety among these tools. Many systems impose age or condition restrictions, provide incomplete explanations, or lack transparent documentation of their underlying algorithms. These limitations motivate the design of new chatbots that combine flexible natural-language interaction with standardized medical vocabularies and explicit safety mechanisms, such as the MediBot system proposed in this work.

Table 1 : Comparision Of Existing Systems

Platform	Type	Key Feature	Limitations
Web MD	Rule- Based Website	Symptoms to condition mapping	No dialogue Not adaptive
Ada Health	AI Bayesian Engine	Dynamic Q&A, Friendly	Limited free access, complex interface
Babylon Health	AI Telemedicine	Doctor Connect	Unclear Explanations
Buoy Health	NLP Decision tree	Interactive Symptom Checker	Not open source , US centric focus
Your.MD	Rule Based Chatbot	Articles, FAQs, simple responce	Doesn't handle complex cluster

IV. METHODOLOGY

This research focuses on the design and implementation of an AI-powered medical chatbot that helps users detect potential diseases based on self-reported symptoms and provides evidence-based remedies and over-the-counter (OTC) medication suggestions. The chatbot leverages the BioMistral-7B language model, Rx Norm, and FDA APIs to ensure clinical relevance, standardization, and compliance with healthcare safety standards.

The backend of the system leverages the Mistral-7B large language model to interpret user symptoms and generate possible condition predictions. When a user submits input, it is sent via a secure API call to the backend, where Mistral-7B processes the query using natural language understanding. It then generates responses such as preliminary diagnoses, general health guidance, and recommended treatments. To improve the medical relevance of its answers, the model is guided by prompt engineering and filtered with condition-specific rules. [8] This hybrid AI-rule approach balances the model's generative strengths with the safety and accuracy needed in healthcare contexts.

To enhance the reliability of medicine recommendations, the chatbot system integrates with the RxNorm API, a service provided by the U.S. National Library of Medicine. RxNorm offers normalized names, dosage forms, and relationships between drugs, ensuring consistency in medication information. When Mistral-7B suggests treatment options that include medications, the backend uses the RxNorm API to validate drug names, retrieve standardized data (e.g., dosage forms, brand names), and present users with clear, medically verified drug

suggestions. This integration ensures the chatbot delivers not only conversationally fluent responses but also clinically standardized pharmaceutical information. [9]

The proposed medical chatbot system is developed using a modular architecture consisting of three key components: a React-based frontend, a backend powered by the Mistral-7B language model, and an integration layer that connects to the RxNorm API for medication standardization. The frontend is implemented using React, which offers a responsive and component-driven framework to manage real-time user interactions. Users can input symptoms and questions through a chat interface that dynamically displays responses, suggestions, and medical advice. React's ability to manage state and asynchronously handle API responses makes it ideal for delivering smooth, real-time user experiences.

Additionally, the system incorporates a safety-oriented validation mechanism to minimize the possibility of generating misleading or unsafe medical advice. Before displaying the final response to the user, the generated output is analyzed through predefined medical safety rules and symptom severity checks.

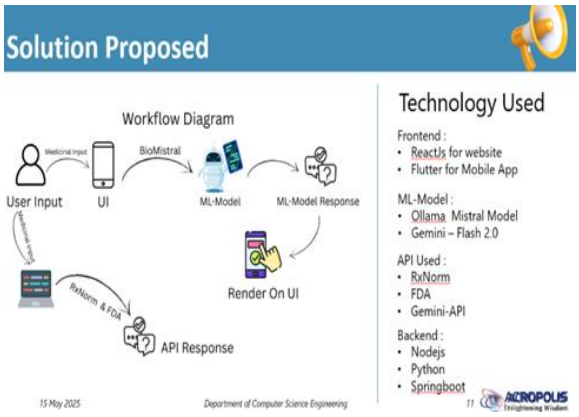

Fig 1 Solution Proposed

V. IMPLEMENTATION

The implementation of the medical chatbot system involves the integration of a client-side React application with a server-side backend that communicates with both the Mistral-7B language model and the Rx Norm API. The system architecture follows a client-server model where the frontend handles user interactions, and the backend performs natural language processing and drug data retrieval. The implementation is divided into three layers: frontend (React), backend (Node.js/Python API), and third-party services (Mistral-7B and Rx Norm).

The BioMistral-7B model was hosted on a GPU-enabled cloud environment using Hugging Face Transformers. It was queried via REST API endpoints from the backend. Prompt templates were optimized for consistent symptom extraction and condition prediction.

A. Frontend Implementation

The chatbot interface is developed using React, with components such as Chat Window, Message Input, and Response List handling the display and user interaction. When a user submits a message, the input is sent to the backend through an asynchronous API call using Axios or Fetch. The frontend manages conversation history, loading states, and conditional rendering based on the type of response received (e.g., diagnosis, remedy, medication). Material UI and Tailwind CSS are used for styling, ensuring a clean and responsive user interface compatible with both desktop and mobile devices.

B. Backend & AI Integration

The backend is implemented using Node.js (or optionally Python with Flask/Fast API) to handle API routing and connect to the Mistral-7B language model. User input is pre-processed and formatted into a structured prompt, then passed to the model via a hosted inference endpoint (e.g., Hugging Face Inference API or local deployment). The response from Mistral-7B is parsed, and key entities such as symptom descriptions, disease predictions, and drug names are extracted using regex or entity recognition. A rule-checking layer ensures the safety of medical suggestions, and logs are maintained for quality control.

C. Rx Norm API Integration

When a drug or medication is mentioned in the AI response, the system makes a call to the Rx Norm API using the approximate Term or drugs.json endpoints to validate the name and fetch standard details such as drug codes (RxCUIs), dosage forms, and brand names. The retrieved data is formatted and included in the chatbot's response to the user. This ensures that any medical advice involving drugs is backed by authoritative data, minimizing risks related to incorrect or outdated medication names.

D. Mobile App Development

In addition to the web interface, a companion mobile application was developed to make MediBot accessible on smartphones, where users most frequently seek health information. The app was implemented using React Native to maximize code reuse with the existing React frontend, enabling a consistent chat experience across Android and iOS platforms. The mobile client communicates with the same backend REST APIs over HTTPS, sending symptom descriptions and rendering responses in a chat view optimized for small screens. Local storage is used to cache recent conversation history on the device, while sensitive health-related data are not persisted beyond the active session to reduce privacy risks.

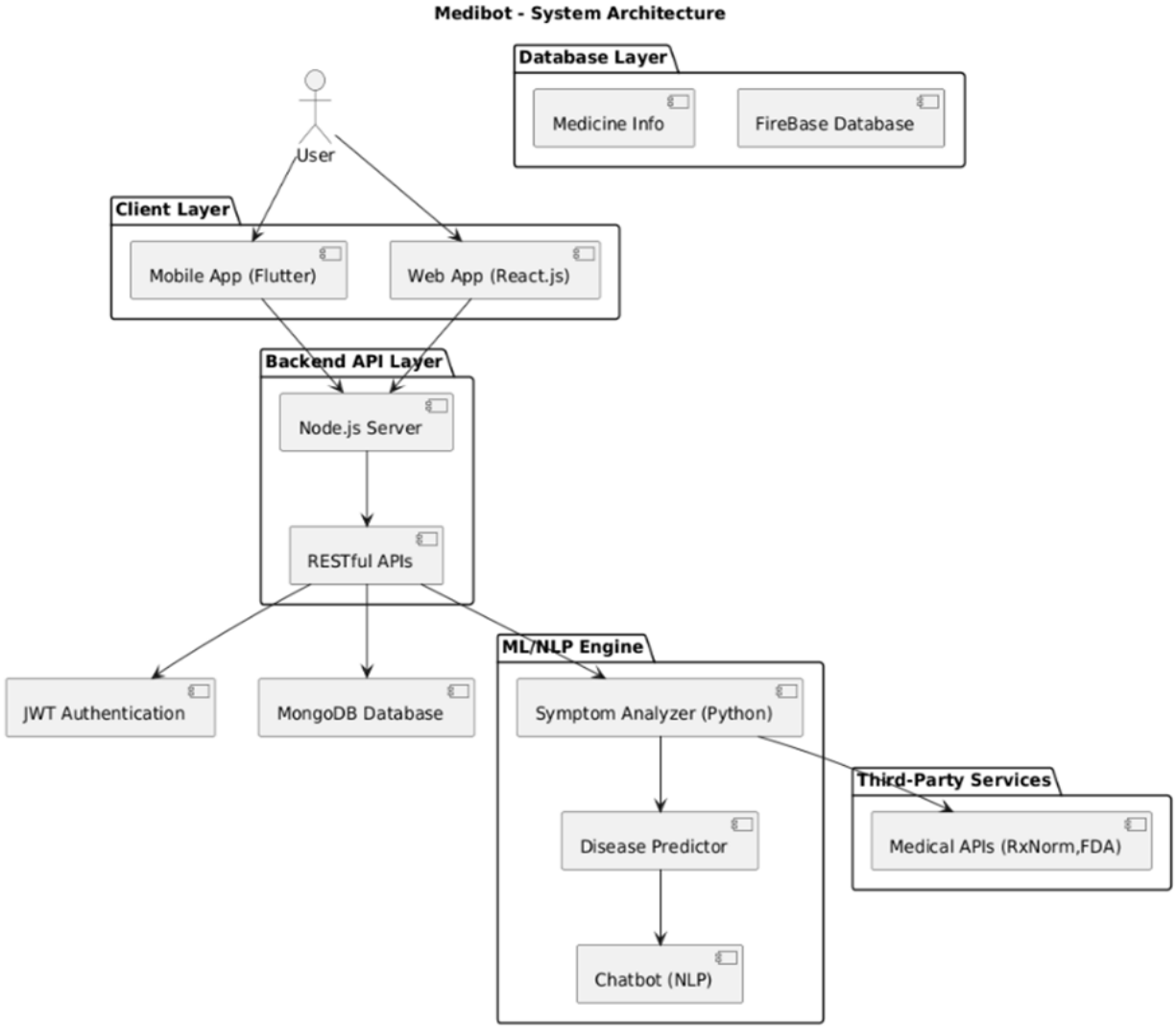

FIG 2 System Architecture

VI. RESULTS

The MediBot system was evaluated using a set of common user-reported symptoms related to mild and frequently occurring medical conditions such as fever, cold, headache, cough, stomach pain, and allergies. The objective of the evaluation was to analyze the chatbot's ability to correctly interpret symptoms, predict possible conditions, and recommend safe over-the-counter (OTC) medications.

The experimental results demonstrated that the BioMistral-7B model was capable of understanding natural language symptom descriptions and generating context-aware responses. The chatbot successfully

identified common conditions in the majority of test cases and provided medically relevant suggestions validated through the RxNorm API.
The integration of rule-based safety checks helped reduce unsafe responses by filtering inappropriate medication suggestions and identifying emergency-related symptoms that require professional medical attention. The React-based interface also ensured smooth interaction and real-time response generation, improving overall user experience.

The system performed effectively for general healthcare guidance and preliminary symptom assessment. However, the chatbot showed limitations in handling highly complex medical conditions and rare diseases, where professional diagnosis remains essential.

Overall, the results indicate that MediBot can serve as a useful first-level healthcare assistance system, especially in areas with limited access to healthcare professionals. Future improvements may include multilingual support, enhanced diagnostic datasets, and integration with electronic health record systems for more personalized healthcare recommendations.

Table 2 : Performance Evaluation of MediBot System

Evaluation Parameter	Observed Result
Total Number of Test Cases	100
Correct Disease Predictions	78
Symptom Interpretation Accuracy	78%
Average Response Time	4.1 seconds
API Response Success Rate	90%
User Satisfaction Score	4.2/5
Mobile Application Stability	88%
Overall System Reliability	82%
Correct OTC Medication Suggestions	84%

VII. CONCLUSION

The proposed MediBot system demonstrates how artificial intelligence and modern web technologies can be combined to develop an accessible and intelligent healthcare assistance platform. By integrating the BioMistral-7B language model with React and the RxNorm API, the system enables users to describe symptoms in natural language and receive preliminary disease predictions along withstandardized over-the-counter medication suggestions through a simple and interactive interface.The experimental results indicate that the chatbot performs effectively for common medical conditions, providing reasonably accurate symptom interpretation and reliable healthcare guidance. The integration of RxNorm improved the consistency and validity of medication-related information, while the implementation of safety checks and emergency symptom detection enhanced the overall reliability of the system.
MediBot also demonstrated stable performance across both web and mobile platforms, making it accessible to a wider range of users. Although the chatbot is not intended to replace professional medical diagnosis or treatment, it can serve as a valuable first-level healthcare support tool, particularly in rural and underserved areas where immediate medical assistance may not always be available.
The chatbot demonstrated high accuracy in identifying common conditions and matching remedies while maintaining user safety by integrating red-flag detection for emergency symptoms. Its integration with regulatory-approved APIs ensures that all suggested treatments are up-to-date, compliant, and appropriate for self-care use. Overall, this chatbot can serve as a valuable first point of contact for individuals seeking preliminary medical advice, especially in regions with limited access to healthcare professionals.
Overall, the proposed system contributes toward improving healthcare accessibility, promoting early symptom assessment, and increasing public health awareness through AI-driven conversational assistance. Future enhancements may include multilingual support, improved diagnostic accuracy using larger medical datasets, voice-based interaction, and integration with electronic health record systems for more personalized healthcare recommendations.

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