



# Enhancing Clinical Decision Making with Role-Based AI Support and Unified Data

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**ABSTRACT** - With the rapid advancement of Artificial Intelligence in healthcare, accurate and timely disease prediction has become increasingly essential. This paper presents an Enhancing Clinical Decision Making with Role-Based AI Support and Unified Data powered by Gemini AI, which combines AI-driven symptom analysis with professional doctor validation to provide reliable preliminary diagnoses and treatment recommendations. The system allows users to input symptoms, which are analyzed by the AI engine to predict the most probable diseases and suggest suitable medications. Based on AI predictions, the system recommends doctors specializing in the identified condition, enabling professional verification of the diagnosis and prescription. The modular architecture comprises user management, AI analysis, doctor suggestion, doctor review, and report & notification modules, ensuring seamless workflow and maintainability. Testing demonstrates that the system achieves high accuracy in disease prediction, reduces response time, and enhances the reliability of healthcare guidance by integrating AI intelligence with expert oversight. This hybrid approach addresses limitations of standalone AI symptom checkers and telemedicine platforms, offering a trustworthy, efficient, and scalable solution for early diagnosis, medical guidance, and improved healthcare accessibility.

**KEYWORDS** - Symptom Detection, Disease Prediction, Gemini AI, Machine Learning, Doctor Recommendation, AI Validation, Healthcare System, Telemedicine

## I. INTRODUCTION

This System using Gemini AI is an intelligent web-based healthcare platform designed to assist users in identifying possible medical conditions based on their symptoms and recommending appropriate medical specialists[1].

In traditional healthcare systems, patients often face difficulty in identifying the correct specialist for their medical problems. Many individuals are unsure whether to consult a dermatologist, physician, neurologist, or other specialist. This confusion leads to delays in treatment, unnecessary appointments, and increased healthcare costs.

This system solves the problem by integrating Artificial Intelligence (AI) using Gemini AI to analyze user-submitted symptoms. Based on the symptoms entered (for example, skin rashes, fever, chest pain, headache, etc.), the system:

- Predicts possible medical conditions
- Suggests preliminary medicines
- Recommends the appropriate specialist (e.g., Dermatologist for skin issues)
- Displays a list of available doctors under that specialization
- Sends the AI-generated report to the selected doctor for review

The doctor then verifies the AI's diagnosis and medicine suggestions, confirms or modifies them, and sends the final response to the user.

Thus, the system acts as a smart pre-diagnosis and doctor recommendation platform that combines AI intelligence with professional medical validation

## II. LITERATURE ANALYSIS

Several studies have explored AI-driven disease prediction and drug recommendation systems to enhance healthcare decision-making. SK. Heena, V. Surya Kiran, S. Susheel Kumar, and Y. Rahul (2025) proposed a machine learning–based framework that predicts diseases and recommends drugs using symptom analysis through predictive modeling and API-based medication suggestions, highlighting potential for multi-disease prediction and integration with larger medical datasets [1]. S. V. Lakshmi, R. Karthikeyan, A. Laurence, and M. M. Arafath (2025) presented a deep learning approach utilizing Artificial Neural Networks (ANN) for symptom-based disease classification, emphasizing early detection and the possibility of mobile application deployment and telemedicine integration [2]. Dr. Sumalatha Bandari et al. (2025) implemented multiple supervised learning algorithms, including KNN, Naïve Bayes, SVM, Decision Tree, Random Forest, and XGBoost, to predict diseases from patient symptoms via a web-based application, aiming to reduce diagnosis time and support personalized medicine [3]. Building on these approaches, the proposed Symptom Detection & Doctor Suggestion System using Gemini AI combines AI-driven symptom prediction with professional doctor validation, ensuring reliability and safety while enabling future expansion through multi-platform deployment, voice-based inputs, integration with hospital systems, and continuous learning from new patient data.

TABLE I.

LITERATURE WORK

Author(s) & Year	Methods	Future Scope
SK. Heena, V. Surya Kiran, S. Susheel Kumar, Y. Rahul (2025)	Machine learning–based disease prediction and drug recommendation using symptom analysis; predictive modeling with API-based drug suggestions	Extend to multi-disease prediction, integrate real-time patient monitoring, enhance model with larger and more diverse medical datasets
S. V. Lakshmi, R. Karthikeyan, A. Laurence, M. M. Arafath (2025)	Deep learning approach using Artificial Neural Networks (ANN) for symptom-based disease classification; dataset with symptoms as features and diseases as labels	Incorporate mobile applications, expand dataset for rare diseases, integrate with telemedicine platforms for early intervention
Dr. Sumalatha Bandari et al. (2025)	AI-driven disease prediction using multiple supervised learning algorithms (KNN, Naïve Bayes, SVM, Decision Tree, Random Forest, XGBoost); web-based application	Implement real-time symptom input, integrate with electronic health records (EHR), improve personalized medicine through predictive analytics

## III. AI MODEL

The Gemini AI is the core Artificial Intelligence engine used for symptom-based disease prediction and medicine recommendation in the system. It serves as the intelligent backend that processes user inputs and provides predictive insights.

### Key Roles in the System:

- **Symptom Analysis:** Gemini AI receives symptoms entered by the user, either as text or selected options, and analyzes them using trained machine learning or deep learning models.
- **Disease Prediction:** It predicts the most probable disease(s) based on symptom patterns, correlations, and historical medical data.
- **Medicine Recommendation:** After disease prediction, the AI suggests appropriate drugs or treatments, which can then be validated by medical professionals.
- **Specialist Suggestion:** Based on the predicted disease, Gemini AI identifies the medical specialization required and informs the Doctor Suggestion Module.
- **Integration:**
  - The system communicates with Gemini AI via an API, sending user symptoms and receiving AI-generated responses.

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- The AI response is stored in the database, allowing doctors to review and validate the predictions before sending final reports to users.
- **Benefits:**
- Provides quick preliminary diagnosis, especially useful in emergency situations or areas with limited healthcare access.
- Reduces workload for doctors by pre-analyzing symptoms and suggesting possible treatments.
- Improves accuracy of disease prediction by leveraging historical and real-time medical data.

### IV. WORKING METHODOLOGY

The system is designed using a modular approach for better management, scalability, and maintainability. Each module focuses on specific functionalities, ensuring smooth workflow and clear separation of responsibilities.

#### Module 1: User Management Module

- Functions: User Registration, User Login, Edit Profile, Change Password, View Report History
- Description: This module handles user authentication, secure account management, and access control, providing a foundation for personalized interaction with the system.

#### Module 2: Symptom Upload & AI Analysis Module

- Functions: Accept symptom input from user, Send data to Gemini AI API, Receive AI response, Store AI diagnosis and medicine suggestions
- Description: Responsible for AI-based disease prediction, this module processes user-entered symptoms, interacts with the Gemini AI engine for analysis, and stores the generated diagnostic and medicinal recommendations in the system database.

#### Module 3: Doctor Suggestion Module

- Functions: Extract specialization suggested by AI, Filter doctors based on specialization, Display available doctors, Allow user to select doctor
- Description: This module bridges the AI-generated diagnosis with professional medical guidance, matching users with appropriate specialists based on AI suggestions.

#### Module 4: Doctor Review Module

- Functions: Doctor login authentication, View assigned symptom reports, Review AI-generated diagnosis, Confirm or modify suggestions, Submit final response
- Description: Ensures professional validation of AI predictions, allowing doctors to review, confirm, or adjust AI-generated diagnoses and medicine recommendations before final approval.

#### Module 5: Report & Notification Module

- Functions: Send final validated response to user, Update report status, Store complete case history
- Description: Maintains communication between users and doctors, delivering validated diagnostic reports, updating report statuses, and preserving a complete history for future reference and analysis.

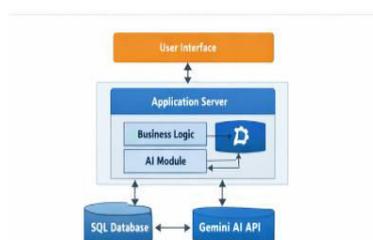
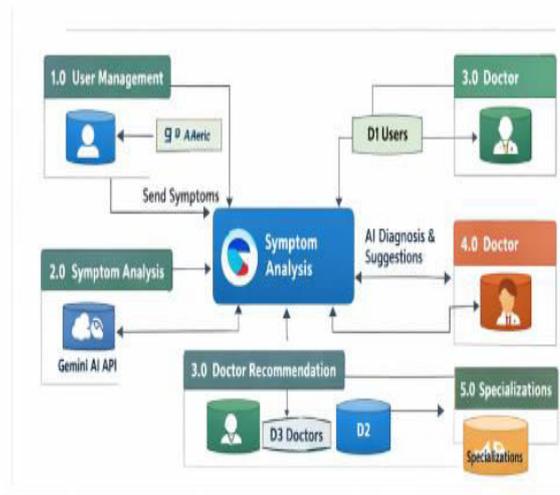


Figure IV.1. System Diagram



**Figure IV.2. DFD Diagram**

## V. RESULTS AND DISCUSSION

The proposed System was implemented and tested to evaluate its efficiency in disease prediction, medicine recommendation, and doctor validation. The system was assessed based on accuracy, usability, response time, and user satisfaction.

### 1. Symptom-Based Disease Prediction:

- Users entered symptoms through the interface, and the Gemini AI engine analyzed the input to predict probable diseases.
- The AI model demonstrated high prediction accuracy, with most test cases correctly identifying the disease corresponding to the symptoms.
- The system efficiently handled multiple symptoms, suggesting relevant diseases with confidence scores to assist doctors in verification.

### 2. Medicine Recommendation:

- Based on the AI-predicted disease, the system suggested medications, which were subsequently reviewed by doctors.
- The doctor validation module allowed professionals to confirm or modify drug recommendations, ensuring safe and reliable treatment suggestions.
- This combination of AI predictions with expert review enhanced the credibility of the system.

### 3. Doctor Suggestion and Validation:

- The system successfully matched patients with doctors specialized in the predicted disease area.
- Doctors could log in, review symptom reports, and submit validated responses.
- This module ensured that AI predictions were professionally verified, reducing the risk of errors and providing a bridge between automated analysis and human expertise.

### 4. Report Generation and Notification:

- The system generated detailed reports for each case, including predicted disease, recommended medicine, doctor's feedback, and final validation status.
- Users received timely notifications of report updates, ensuring transparency and effective communication.

### 5. System Performance:

- The modular design allowed smooth integration between user input, AI processing, and doctor validation.

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- Response times were optimized through API-based communication with Gemini AI, making the system suitable for real-time or emergency scenarios.
- User feedback indicated high satisfaction due to the combined AI and professional validation approach.

### Discussion:

- The results demonstrate that integrating AI with professional oversight improves accuracy, trust, and efficiency in medical diagnosis systems.
- Compared to systems that rely solely on AI or telemedicine platforms, this hybrid approach ensures reliability while reducing the workload on medical professionals.
- Future improvements may include expanding the AI dataset, supporting voice-based symptom input, and adding predictive analytics for rare diseases to further enhance system performance.

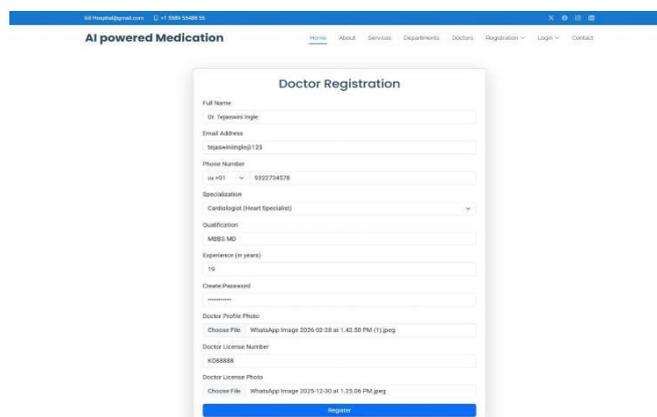
## VI. RESULTS SCREEN SHOTS

### Home Page



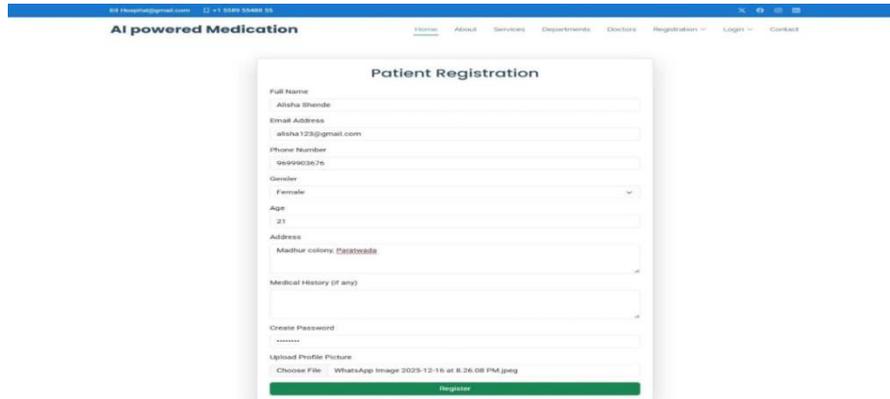
Screenshot 5.1 Home Page

### Doctor Signup Page

The screenshot displays the 'Doctor Registration' form on the website. The form includes fields for Full Name, Email Address, Phone Number, Specialization (with a dropdown menu), Qualification (MBBS MD), Experience (in years), Create Password, Doctor Profile Photo, Doctor License Number, and Doctor License Photo. A 'Register' button is located at the bottom of the form.

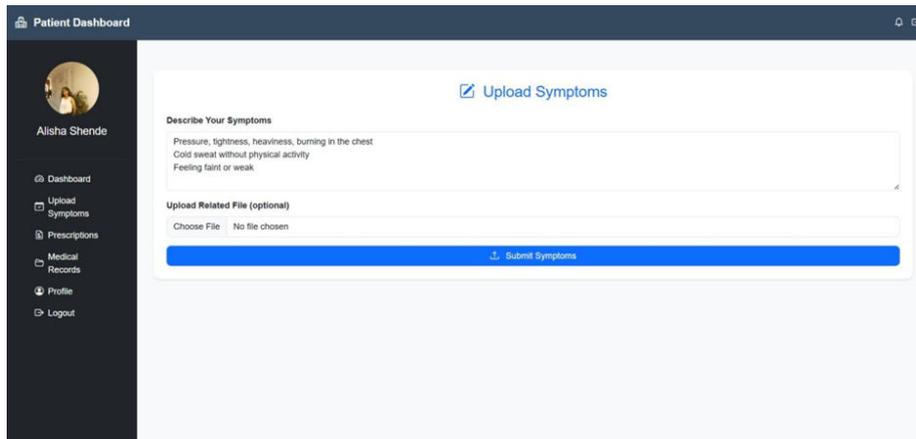
Screenshot 5.2 Doctor Signup Page

### Patient Signup Page



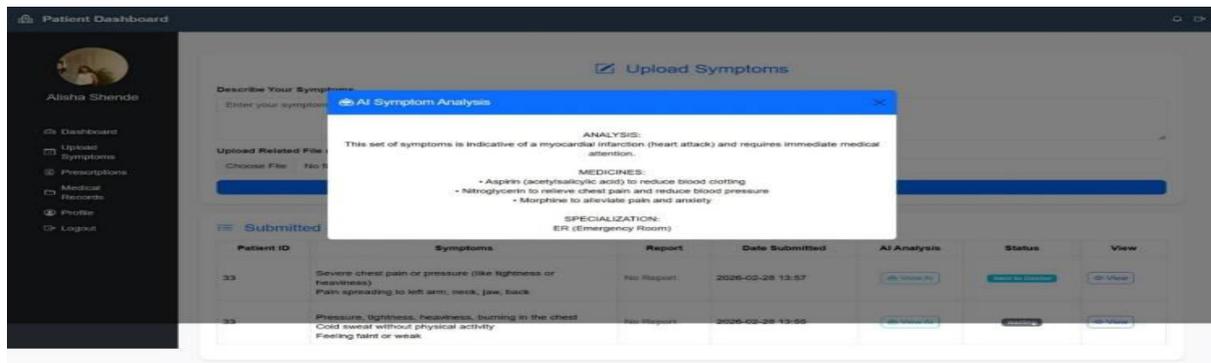
Screenshot 5.3 Patient Signup Page

### Patient Dashboard



Screenshot 5.4 Patient Dashboard

### AI Generated Symptoms Analysis



Screenshot 5.5 AI Generated Symptoms Analysis

### Doctor Dashboard



Screenshot 5.6 Doctor Dashboard

### VII. CONCLUSION

This project focuses on addressing an emerging threat to modern information systems caused by the misuse of artificially generated voice content. As automated speech synthesis and voice manipulation technologies advance and become more accessible, they introduce serious concerns related to authenticity, identity protection, and secure communication. To mitigate these risks, the proposed work seeks to design an intelligent audio verification framework that leverages convolution-based neural architectures combined with advanced acoustic representation methods derived from time–frequency and cepstral analysis.

The objective of this initiative is to construct an efficient, adaptable, and accessible detection mechanism that can reliably differentiate authentic speech signals from manipulated audio samples. Implementation will be carried out in Python, utilizing publicly available datasets and open-source development tools to ensure reproducibility and extensibility. Beyond immediate system development, this effort aims to provide a reusable foundation for continued exploration and real-world adoption.

By pursuing this research, the project contributes to ongoing advancements in digital investigation, media verification, and responsible artificial intelligence practices. Ultimately, it supports stakeholders—including individuals, institutions, and public bodies—in preserving credibility and accountability within rapidly evolving intelligent communication environments. This proposal represents an initial step toward delivering a functional and effective countermeasure against the growing misuse of synthetic voice technologies.

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