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AI-Based Hospital Follow-Up and Emergency Assistance System with Smart Patient Monitoring

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Abstract: *AI-Based Hospital Follow-up and Emergency Assistance System with Smart Patient Monitoring is an intelligent healthcare platform designed to provide early disease prediction, emergency assistance, hospital recommendation, doctor assignment, and continuous patient monitoring through a user-friendly interface. In today's healthcare environment, patients often face delays in receiving timely medical guidance and emergency support. This project addresses these challenges by offering AI-based symptom analysis and real-time healthcare recommendations using multiple input methods such as text, voice, and image.*

The system analyzes patient symptoms using artificial intelligence, symptom matching, and emergency detection techniques to predict possible diseases and identify critical medical conditions such as chest pain, breathing difficulty, stroke symptoms, snake bite, and severe injuries.

It provides first-aid guidance, recommends suitable hospitals and doctors based on the patient's location and medical specialization, and securely stores patient records for follow-up and monitoring. The system integrates technologies such as Speech Recognition, Optical Character Recognition (OCR), Python, Streamlit, and SQLite to provide a scalable, efficient, and user-friendly healthcare solution.

By combining AI-based healthcare analysis with smart patient monitoring, the proposed system improves healthcare accessibility, reduces emergency response time, and supports better medical decision-making for patients and healthcare professionals.

I. INTRODUCTION

Healthcare plays a vital role in improving patient safety and providing timely medical support. However, many patients face difficulties in receiving quick disease prediction, emergency assistance, and continuous follow-up due to limited healthcare accessibility.

To overcome this problem, the AI-Based Hospital Follow-up and Emergency Assistance System with Smart Patient Monitoring is developed as an AI-powered healthcare platform. The system uses Artificial Intelligence (AI) to analyze patient symptoms, predict possible diseases, detect emergencies, and recommend suitable hospitals and doctors. It also supports text, voice, and image inputs, making healthcare services faster, smarter, and more accessible.

II. EXISTING SYSTEM

The existing healthcare systems mainly depend on manual hospital visits, doctor consultations, and traditional diagnosis methods for disease identification and emergency care. ^[16] Although these methods provide reliable medical services, they often require patients to visit healthcare centers, resulting in delays, especially during emergencies. Patients may also face difficulties in obtaining immediate medical guidance and continuous follow-up support. Moreover, traditional healthcare systems have several limitations, including limited accessibility, delayed emergency response, lack of AI-based disease prediction, and the absence of integrated hospital and doctor recommendation services.

Most existing systems do not support text, voice, or image-based symptom **submission** and fail to provide real-time healthcare assistance. Therefore, there is a need for an intelligent system that offers quick disease prediction, emergency detection, hospital recommendation, and smart patient monitoring.

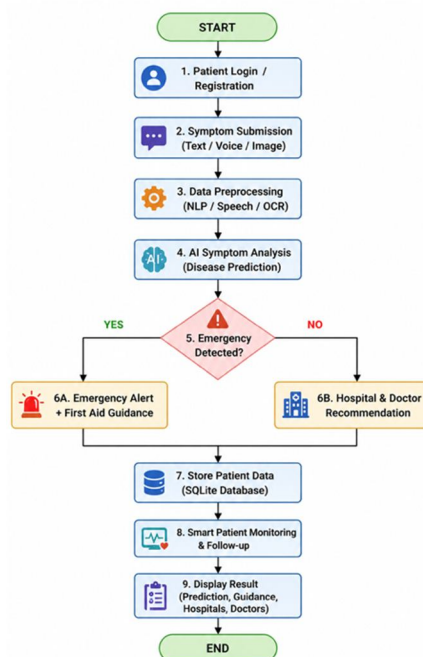


Figure : Flow Chat

A. Challenges

The existing healthcare systems face several challenges that affect the quality and speed of medical services. The major challenges are:

- **Delayed Diagnosis:** Patients often experience delays in receiving proper diagnosis and treatment because they depend on manual hospital visits and doctor consultations.
- **Poor Emergency Detection:** Traditional systems cannot quickly identify emergency conditions such as chest pain, breathing difficulty, snake bite, or severe injuries.
- **Limited Accessibility:** Patients living in remote areas may not receive immediate medical guidance due to the lack of easily accessible healthcare services.
- **No Smart Hospital and Doctor Recommendation:** Most existing systems do not automatically recommend suitable hospitals or specialist doctors based on patient symptoms and location.
- **Lack of Continuous Patient Monitoring:** Patient history and follow-up records are not maintained efficiently, making long-term healthcare management difficult.
- **Limited AI-Based Support:** Existing healthcare systems do not effectively use Artificial Intelligence for disease prediction, emergency detection, and smart healthcare recommendations.

III. PROPOSED SYSTEM

The proposed system, AI-Based Hospital Follow-up and Emergency Assistance System with Smart Patient Monitoring, is designed to provide intelligent healthcare support using Artificial Intelligence. ^[11]The system accepts patient symptoms through text, voice, and image inputs and predicts possible diseases. It detects emergency conditions such as chest pain, breathing difficulty, and snake bite, and provides first-aid guidance. The system also recommends suitable hospitals and specialist doctors based on the patient's symptoms and location. ^[8]Patient records are securely stored for continuous monitoring and follow-up. ^[1]Overall, the proposed system offers a fast, accurate, and user-friendly solution for smart healthcare management.

IV. ALGORITHM

The system uses Artificial Intelligence (AI) and Machine Learning (ML) techniques to process patient symptoms and generate intelligent healthcare recommendations. ^[19]These algorithms help in analyzing symptoms, predicting diseases, detecting emergency conditions, and improving the accuracy of healthcare services over time. ^[7]

The system continuously analyzes patient data and enhances its performance through intelligent processing. By combining different learning methods, it ensures better disease prediction, emergency detection, and hospital recommendation. Overall, algorithms play a key role in making the healthcare system smart and efficient.

- 1) **Decision Process** :The decision process involves analyzing patient symptoms and identifying meaningful patterns from the healthcare dataset. Based on this analysis, the system predicts the possible disease and generates suitable healthcare recommendations. ^[6]It helps in understanding the patient's condition and providing accurate medical guidance. This process forms the foundation for intelligent healthcare support.
- 2) **Error Function** : The error function is used to evaluate how accurate the system's disease predictions are. ^[13]It compares the predicted output with expected results to identify errors. ^[3]Based on this evaluation, the system measures its performance and prediction accuracy. This helps in improving the quality of healthcare recommendations over time.
- 3) **Optimization Process** : The optimization process focuses on improving the model's performance by adjusting its internal parameters. ^[12]It reduces prediction errors by continuously updating the model based on patient data. ^[24] This iterative process ensures better disease prediction and emergency detection. As a result, the system becomes more reliable and efficient.
- 4) **Supervised Learning** : Supervised learning uses labeled healthcare data to train the model for disease prediction and classification tasks. The system learns from known disease and symptom records and improves its prediction accuracy over time. ^[4] It is useful for structured healthcare data where symptom–disease relationships are already defined. This method helps in delivering accurate healthcare recommendations.
- 5) **Unsupervised Learning** : Unsupervised learning works with unlabeled healthcare data to identify hidden patterns and relationships among symptoms. It groups similar patient cases and discovers meaningful healthcare patterns. ^[19] This approach is useful for data analysis and symptom clustering. It enhances the system's ability to understand different patient conditions.
- 6) **Semi-Supervised Learning** : Semi-supervised learning combines both labeled and unlabeled healthcare data for training. It improves learning efficiency when labeled data is limited. ^[10]The system uses a small amount of known **healthcare** data to guide the analysis of larger datasets. ^[25]This method balances accuracy and flexibility in disease prediction and healthcare analysis.

V. TECHNIQUES

The system uses various modern techniques to provide accurate disease prediction, emergency detection, and smart healthcare recommendations. These techniques help in processing patient symptoms, analyzing healthcare data, and managing patient records efficiently. ^[15] They also improve system accuracy, response time, and overall performance. By combining different technologies, the system delivers reliable and real-time healthcare support. ^[17]Overall, these techniques play an important role in improving the functionality of the healthcare system.

- 1) **Artificial Intelligence (AI)**: Artificial Intelligence (AI) is used to analyze patient symptoms and predict possible diseases. It helps the system generate accurate healthcare recommendations and improves decision-making based on patient data.
- 2) **Speech Recognition and OCR**: Speech Recognition converts voice input into text, while OCR extracts text from uploaded images such as prescriptions and medical reports. These techniques make symptom submission easier and more convenient.
- 3) **Database Management**: Database management is used to store patient details, disease predictions, hospital recommendations, and medical history in a structured format. It ensures secure storage and easy retrieval of healthcare information.
- 4) **Hospital and Doctor Recommendation**: The recommendation technique suggests suitable hospitals and specialist doctors based on patient symptoms, location, and emergency level. ^[19]This helps patients receive appropriate medical care quickly.

VI. METHODOLOGY

The methodology of the proposed system follows a structured process to provide accurate disease prediction, emergency detection, and smart healthcare support. Initially, the data collection phase begins when patients submit their symptoms through text, voice, or image input. These inputs are collected in real time and securely stored for further analysis and patient monitoring. ^[21]Once the data is collected, it moves to the data preprocessing stage, where the symptoms are cleaned and converted into a standard format. ^[23] In this phase, the system applies preprocessing techniques such as Speech Recognition, Optical Character Recognition (OCR), and symptom standardization to prepare the data for analysis. After preprocessing, the structured data is sent to the AI-based symptom analysis module. The AI model compares the symptoms with the healthcare dataset, predicts possible diseases, detects emergency conditions, and generates suitable recommendations. Based on the analysis, the system provides first-aid guidance, recommends hospitals and specialist doctors, and stores the patient records for continuous monitoring and follow-up.

VII. SYSTEM IMPLEMENTATION RESULTS

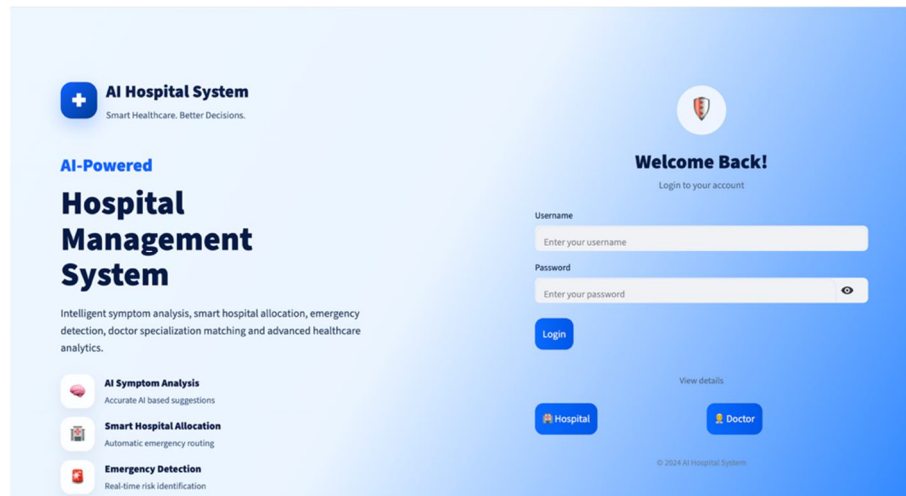


Figure 1: Home Page

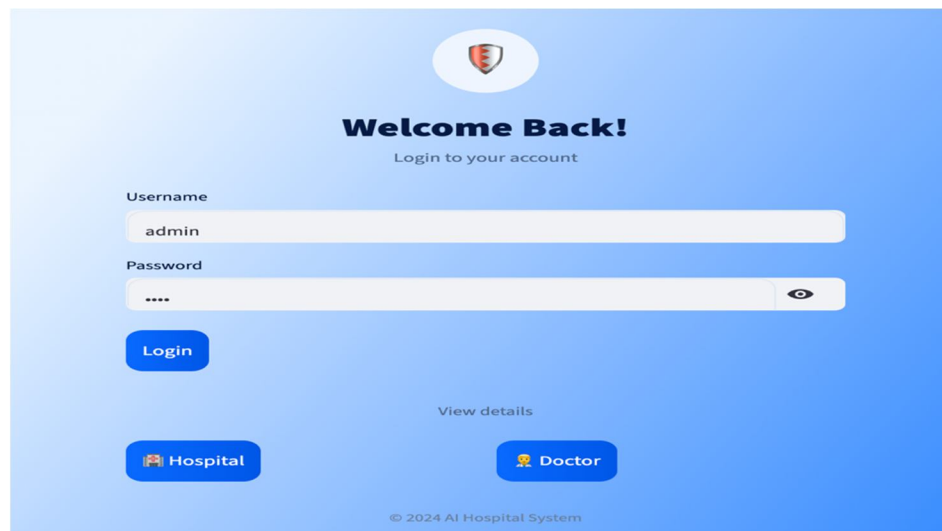


Figure 2 : Login Page

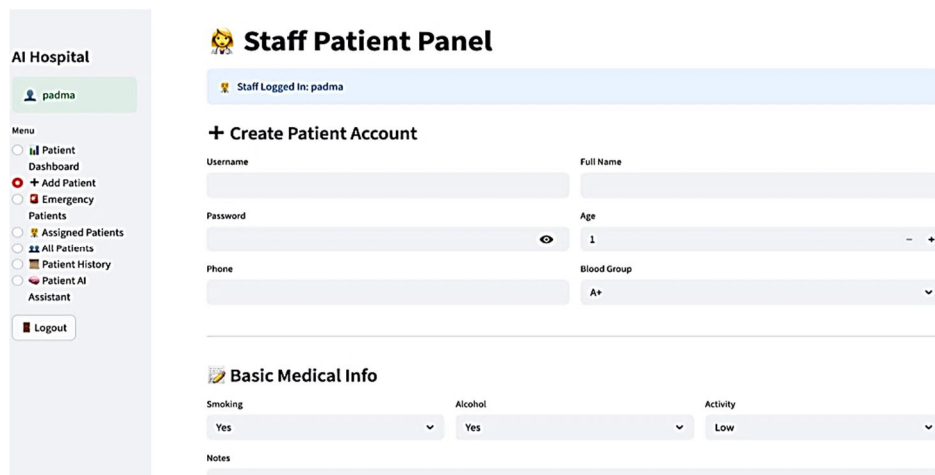
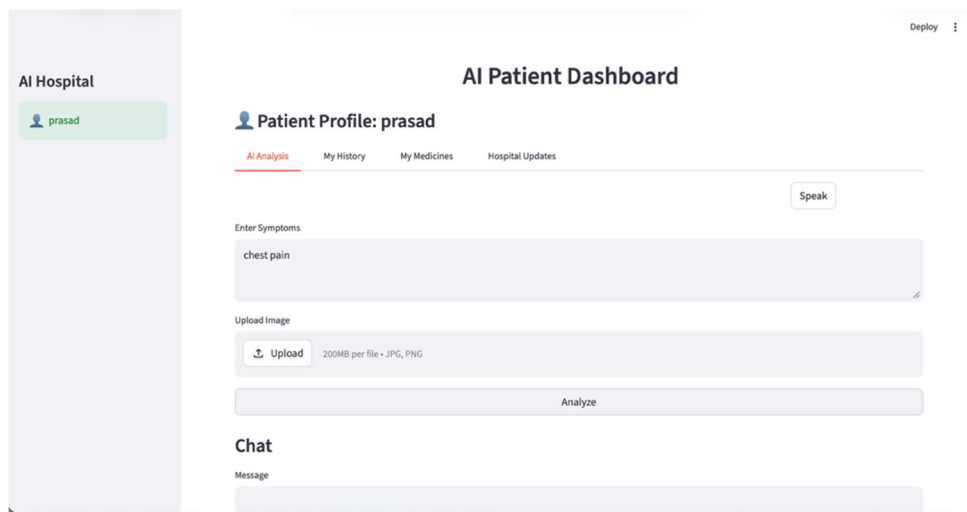
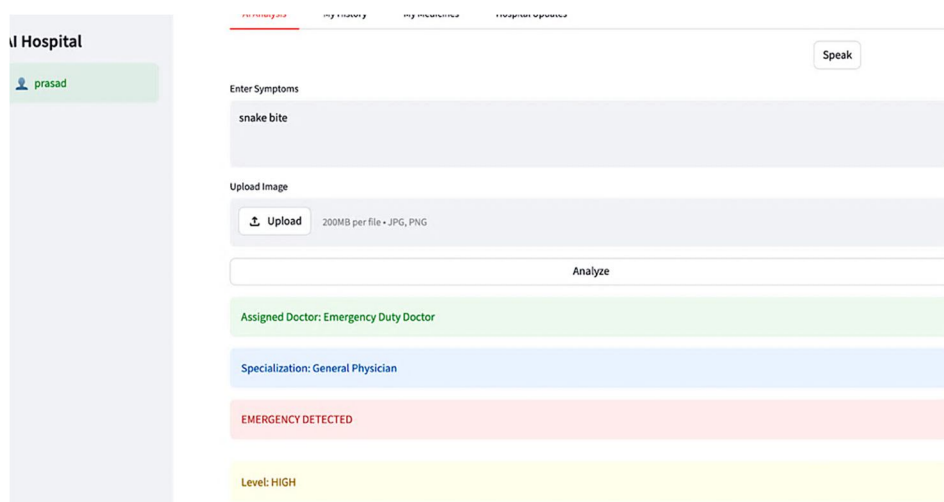


Figure 3 : Registration Page



The screenshot shows the 'AI Patient Dashboard' for a user named 'prasad'. The dashboard includes a sidebar with 'AI Hospital' and 'prasad'. The main content area has tabs for 'AI Analysis', 'My History', 'My Medicines', and 'Hospital Updates'. Below the tabs, there is a 'Speak' button and a text input field for 'Enter Symptoms' containing 'chest pain'. There is also an 'Upload Image' section with an 'Upload' button and a note '200MB per file • JPG, PNG'. Below this is an 'Analyze' button. At the bottom, there is a 'Chat' section with a 'Message' input field.

Figure 4 : Patient Symptom Submission Page



The screenshot shows the 'Disease Prediction Result Page' for a user named 'prasad'. The page displays the 'Enter Symptoms' field with 'snake bite'. Below this, there is an 'Upload Image' section with an 'Upload' button and a note '200MB per file • JPG, PNG'. Below this is an 'Analyze' button. The results section shows 'Assigned Doctor: Emergency Duty Doctor', 'Specialization: General Physician', 'EMERGENCY DETECTED', and 'Level: HIGH'.

Figure 5 : Disease Prediction Result Page

First Aid / జాగ్రత్తలు / प्राथमिक उपचार

English	తెలుగు	हिन्दी
• Do not move. Immobilize area. Call ambulance.	• కదవవద్దు. స్థిరంగా ఉంచండి.	• न हिलाएं। स्थिर रखें।

Emergency Location Required

Location Confirmed: visakhapatnam

Recommended Hospitals Near: visakhapatnam

Care Hospital
Address: Visakhapatnam City: visakhapatnam Phone: 9123456780 Rating: 4.2 Specialization: emergency Distance: N/A km ETA: Unknown Assigned Doctor: Emergency Duty Doctor

Figure 6: Hospital Recommendation Page

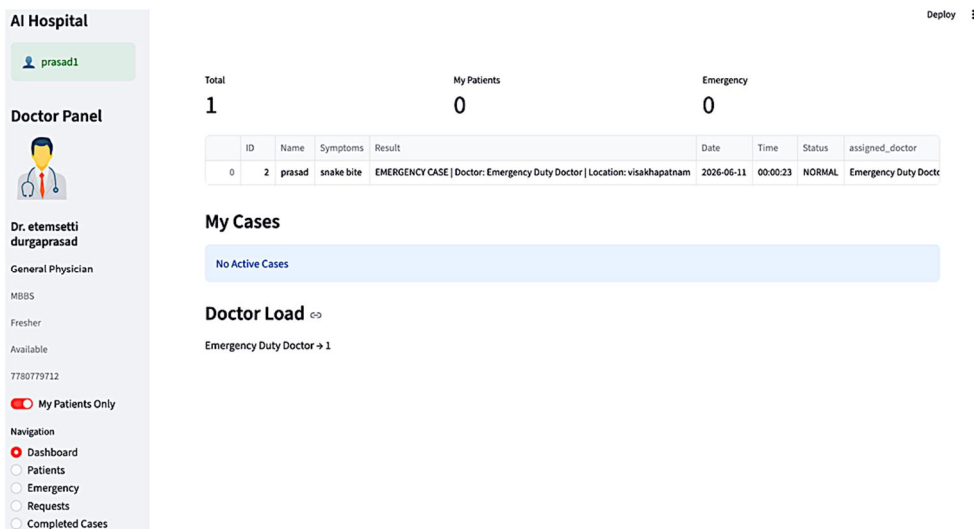


Figure 7: Doctor Dashboard

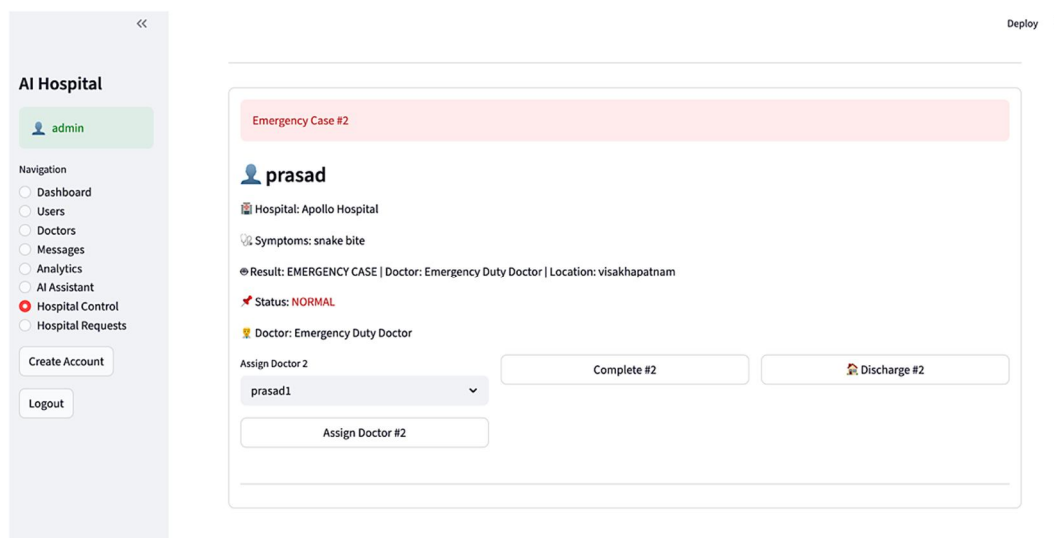


Figure 8: Admin Dashboard

VIII. CONCLUSION

The AI-Based Hospital Follow-up and Emergency Assistance System with Smart Patient Monitoring successfully provides an intelligent and efficient healthcare solution for patients and medical professionals. The integration of Artificial Intelligence (AI), Machine Learning (ML), Speech Recognition, and OCR enables accurate disease prediction, emergency detection, and smart hospital recommendations. The system improves healthcare accessibility by providing timely medical guidance, reducing response time, and supporting continuous patient monitoring. It also provides a strong foundation for future enhancements such as mobile application support, real-time ambulance tracking, GPS-based hospital allocation, and advanced AI integration.

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Muppala Naga Keerthi working as an Assistant Professor in Master of Computer Applications in Sanketika Vidya Parishad Engineering College, Visakhapatnam, Andhra Pradesh, affiliated by Andhra University and approved with 'A' grade by NAAC and member in IAENG with 14 years of experience in computer science. Her areas of interests in C, Java, Data Structures, DBMS, Web Technologies, Software Engineering and Data Science.



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