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## International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

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# AI Powered Patient Helpdesk Assistance System

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**ABSTRACT:** The increasing demand for efficient healthcare services has highlighted the need for intelligent patient support systems. Traditional helpdesk systems rely on manual interaction, which often results in delayed responses, high operational costs, and inconsistent service quality. To address these challenges, this project presents an AI-Powered Patient Help desk Assistance System designed to automate patient query handling in the healthcare insurance domain.

The proposed system is a web-based chatbot that interacts with users and provides instant responses to queries related to insurance plans, claim procedures, and coverage details. It is developed using Python and the Flask framework for backend processing, with HTML and CSS for the user interface. SQLite is used for storing user authentication data, while a JSON file is used to manage structured insurance information. The system uses a rule-based artificial intelligence approach, where user queries are analyzed using key word matching techniques to generate appropriate responses. This ensures quick, accurate, and consistent information delivery without human intervention. The implementation of the system demonstrates significant improvements in response time, efficiency, and user experience. It reduces the workload on support staff and provides scalable support for multiple users simultaneously. Although the system is limited to predefined queries, it provides a strong foundation for future enhancements using advanced AI technologies such as Natural Language Processing and Generative AI

## I. INTRODUCTION

### Overview

Healthcare systems around the world are rapidly evolving due to increasing patient demands, rising operational costs, and the need for efficient service delivery. One of the major challenges faced by healthcare organizations is providing timely and accurate responses to patient queries related to insurance plans, claim procedures, coverage details, and eligibility conditions.

In traditional systems, patient queries are handled manually through phone calls, emails, or direct interaction with customer support staff. Although this method provides human interaction, it often leads to delays, increased workload, and higher operational costs. Moreover, human errors can occur while understanding or communicating information, which may result in incorrect responses and reduced patient satisfaction.

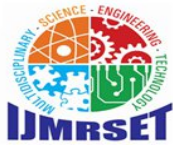
To overcome these issues, the proposed system introduces an AI-powered Patient Helpdesk Assistance System. This system acts as a virtual assistant that interacts with users through a web-based interface. It allows users to enter their queries and receive instant responses based on predefined logic and structured data. The system is developed using HTML and CSS for the frontend, Python with the Flask framework for the backend, and SQLite for storing user data. By automating responses, the system improves efficiency, reduces response time, and enhances the overall user experience.

### Problem Statement

In the current healthcare environment, patients often struggle to understand insurance-related information such as coverage details, claim procedures, and eligibility criteria. Insurance policies are usually complex and contain technical terms that are difficult for common users to interpret.

Patients also face difficulties while filing claims, as the process involves multiple steps such as document submission, verification, and adherence to deadlines. Due to a lack of proper guidance, claims may be delayed or rejected.

Additionally, manual helpdesk systems require a large number of support staff to handle repetitive queries. This



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increases operational costs and reduces efficiency. Delays in response and inconsistent information further lead to poor user satisfaction.

### Objectives

The primary objective of this project is to design and develop an intelligent system that improves patient support services using Artificial Intelligence. The system aims to provide instant and accurate responses to user queries by automating the helpdesk process. It also focuses on reducing the dependency on human agents and improving efficiency.

Another important objective is to handle multiple user queries simultaneously without delays. By automating repetitive tasks, the system allows support staff to focus on more complex issues.

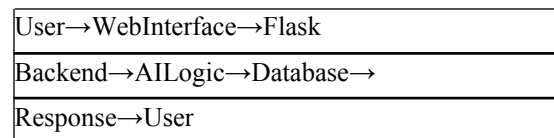
### Scope

The scope of this project is limited to the healthcare insurance domain. The system is developed as a web-based chatbot that can be accessed through a browser. It supports multiple users through a login system and provides responses based on predefined data.

### System Architecture

The system follows a client-server architecture. The user interacts with the frontend interface, and their request is processed by the backend server. The backend applies AI logic and retrieves relevant information from the database.

The overall flow of the system is as follows:



This architecture ensures smooth communication between different components and provides quick responses to users.

## II. LITERATURE SURVEY

### Existing Systems

Traditional healthcare helpdesk systems rely on manual methods such as callcenters, email communication, and manual verification processes. In call centers, patients contact support agents through phonecall to resolve their queries. In email-based systems, users send queries and wait for responses from support teams.

Although these methods provide human interaction, they suffer from several limitations. Response times are often slow due to high query volumes and limited staff availability. Operational costs are high, and the systems are not scalable. Additionally, responses may vary depending on the agent, leading to inconsistency.

### AI-Based Systems

With the advancement of Artificial Intelligence, healthcare systems have started adopting AI-based solutions such as chatbots and virtual assistants. These systems can process user queries and provide instant responses without human intervention.

AI-based systems use techniques such as Natural Language Processing (NLP) to understand user queries in a conversational manner. They can handle multiple queries simultaneously, reduce response time, and improve efficiency. Automation in AI systems reduces repetitive tasks and allows organizations to provide better services with fewer resources.

### Limitations of Existing Systems

Despite their usefulness, traditional systems have several drawbacks. They require high operational costs due to the need for infrastructure and staff. Response times are slow, especially during peak hours. The systems depend heavily on human agents, which leads to inconsistencies and possible errors.



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These limitations highlight the need for an automated and intelligent system that can provide fast, accurate, and scalable solutions.

### III. PROJECT DESCRIPTION

#### System Overview

The AI-Powered Patient Helpdesk Assistance System is a web-based chatbot application designed to retrieve relevant information and display it in a clear and readable format.

#### Modules

The system is divided into different modules to ensure efficient functionality.

The User Authentication module handles login and registration. The Chatbot Engine processes user queries and generates responses. The Data Management module manages data storage and retrieval. The User Interface module provides an interactive frontend for users.

#### Working Process

The working process begins when the user enters a query. The system processes the input, identifies keywords, and matches them with predefined rules. Based on the match, a response is generated and displayed to the user.

The flow of operations is: User Input → Processing → Matching → Response Output. Provide automated support to users. It allows users to ask questions related to insurance plans, claim procedures, and coverage details.

The chatbot provides instant responses by processing user queries using predefined rules. It offers a simple and user-friendly interface, making it easy for users to interact with the system. The system uses structured data stored in a JSON file and a database.

### IV. MODEL DESCRIPTION

#### AI Model

The system uses a rule-based AI model. When a user enters a query, the system converts the input into lowercase and searches for keywords. Based on the identified keywords, it generates an appropriate response. This approach is simple and efficient for handling predefined queries.

#### DataSource

The system uses a JSON file to store information about insurance plans. Each plan includes details such as coverage, claim process, and denial reasons. The structured format allows quick retrieval of information.

#### Algorithm

The algorithm starts by receiving user input and converting it into lowercase. It then checks for keywords such as plan names, claim, coverage, or denial.

If a match is found, the system displays the corresponding information. If no match is found, a default message is shown.

#### Model Architecture

The model architecture consists of input, preprocessing, matching engine, and response generation. Each component plays a role in processing the query and generating accurate output.

### V. IMPLEMENTATION TECHNOLOGIES USED

The system is developed using Python for backend processing, Flask for web application development, SQLite for database management, and HTML/CSS for designing the frontend.

#### Backend

The backend handles user requests, processes input, and retrieves data from the database and JSON file. Flask manages routing and communication between frontend and backend.



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### Modules Implementation

The login system manages user authentication, while the chatbot system handles user queries and generates responses using keyword matching.

## VI. RESULTS AND DISCUSSION

### Results

The system successfully provides instant and accurate responses to user queries. It improves response time and reduces manual workload.

### Discussion

The system performs efficiently within its scope. It provides consistent responses and supports multiple users. However, it is limited by its rule-based approach and cannot handle complex queries.

## VII. CONCLUSION

The AI-Powered Patient Helpdesk Assistance System effectively improves healthcare support services by automating responses and reducing dependency on human agents. It provides fast, accurate, and reliable information to users.

### 7.2 Future Enhancements

Future improvements include integrating advanced AI techniques such as Generative AI, adding voice assistant features, and deploying the system online for wider accessibility.

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