

AI-Powered Intelligent System for Complaint Resolution in IT Helpdesk

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Abstract—In modern organizations being highly dependent on IT infrastructure, timely resolution of IT-related problems is critical to ensure high productivity. However, existing IT help desk systems are mostly based on manual handling of IT-related problems, which is time-consuming and inefficient in managing IT-related problems. To address these problems associated with existing IT help desk systems, this project proposes an AI Powered Intelligent System for Complaint Resolution in IT Help Desk that can automate the process of dealing with IT-related problems. The system has been implemented using a full-stack web application technology using MERN Stack (MongoDB, Express.js, React.js, and Node.js), along with HTML5, CSS3, Angular, and JavaScript ES6+ to design a responsive user interface. The system has been implemented using Role-Based Access Control (RBAC), along with secure authentication using JWT and crypt password hashing to provide a separate dashboard for employees, IT support staff, and administrators. Another significant aspect is the chatbot, which is based on AI and acts as the first level of support. Here, users can describe their technical issues in a natural language, and the chatbot will provide suggestions for troubleshooting the issues or create a support ticket if the issues cannot be solved. Additionally, the system has a smart ticket management system, which handles ticket creation, priority, scheduling, and tracking in real-time. The architecture is based on the MVC model with MongoDB and Mongoose ORM. This ensures a scalable and maintainable architecture. Real-time updates are also possible with Socket.io, where users will be updated on the status of the tickets. This system is also scalable and deployable in a cloud environment with Vercel and Render.

Index Terms—Artificial Intelligence, Intelligent Complaint Resolution, IT Helpdesk System, AI chatbot, Complaint management system, Automated Support System, Digital IT service management.

I. INTRODUCTION

In modern organizations, the role of the information technology (IT) infrastructure is critical in the support of day-to-day business activities. The employees use computers and computer-based systems to carry out their activities. However, sometimes technical challenges arise. These challenges include computer hardware failures, software failures, network connectivity failures, and permission issues. To solve the technical challenges that arise in the organization, the common solution is the use of IT helpdesk systems. The common helpdesk systems use manual handling of the issues that arise.

The project aims to develop an AI Powered Intelligent System for Complaint Resolution in IT Helpdesk. The proposed system aims to simplify the process of reporting and resolving IT-related issues within an organization. The proposed system will offer an online platform for users to report their technical issues. One of the most important features of the proposed system is the use of an AI-powered chatbot that will act as the first level of support. The chatbot will allow users to describe their issues in their own words. The chatbot will analyze the issues and offer suggestions to the users. If the issues cannot be resolved automatically, the chatbot will offer support tickets. The system is developed using various modern web technologies like the MERN stack, which includes MongoDB, Express.js, React.js, and Node.js; along with HTML5, CSS3, Angular, and JavaScript versions like ES6+ for creating a user-friendly interface. The system is developed using Role-Based Access Control (RBAC) for creating different dashboards for employees, IT support staff, and system administrators. The system is

secure as it is developed using authentication techniques like JSON Web Tokens (JWT) and bcrypt password hashing.

II. LITERATURE REVIEW

The increase in the growth of information technology in organizations has led to an increase in the dependency on IT systems. Therefore, the importance of IT helpdesk services has become critical in the management of technical issues. Several researchers have proposed intelligent systems and automated solutions to enhance the efficiency of complaint management and IT service support.

As mentioned by R. J. Barlow & I. Stewart (2018), traditional IT helpdesk operations are mostly dependent on manual ticket handling procedures that allow users to raise tickets by sending emails or using service portals. However, this approach has been found to be time-consuming and inefficient in managing user tickets. The authors proposed that automated ticket management could be employed to enhance response time.

In the study by M. D. O'Leary (2019), the researcher discussed the significance of Artificial Intelligence (AI) in service management systems. The researcher emphasized that AI-powered systems are capable of processing the input provided by the users, identifying the problem categories, and providing automated responses. AI-powered chatbots were presented as a solution to the problem of helpdesk staff being overworked.

Research undertaken by A. Kumar & S. Sharma (2020) was centered on Natural Language Processing (NLP) technology as it is applied to customer support services. The research revealed that Natural Language Processing technology is able to comprehend customer queries as expressed by users and respond appropriately. The technology is useful for troubleshooting as it enhances user experience.

Another notable contribution was made by L. Chen and H. Zhang (2021), who proposed a smart ticket management system that incorporates AI algorithms in complaint classification and prioritization. This ensures that complaints are assigned priority levels depending on how severe and urgent they are. This study showed that service efficiency and reduced system downtime can be achieved through the use of AI algorithms in prioritization.

Furthermore, in recent research by S. Patel et al. (2022), a cloud-based help desk management system was developed by using MERN Stack architecture. This research showed that modern web technologies, such as MongoDB, Express.js, React.js, and Node.js, offer a flexible and scalable framework for developing web-based services management applications. Moreover, the system also integrated Role-Based Access Control and JSON Web Tokens for secure data access and authentication.

III. PROBLEM STATEMENT

In a modern organization, employees face various technical problems related to hardware, software, network connectivity, and access. These problems are generally solved through a traditional IT help desk system in which users report problems manually and the problems are solved through a simple ticket management system. However, most of the help desk systems available in the market have a number of limitations related to response time, ticket prioritization, lack of automated support, and effective communication between users and support staff.

In traditional systems of managing complaints, users are usually not given any immediate guidance and are not suggested any troubleshooting measures while submitting a ticket manually. This results in a greater workload for the IT support group, as even small problems that could be resolved by providing users with proper guidelines are submitted as a support request. There is no intelligent routing and prioritization of the complaints.

Hence, there is a need to design an intelligent and automated help desk system that can increase efficiency in complaint resolution while minimizing manual effort. The proposed AI Powered Intelligent System for Complaint Resolution in IT Help Desk is intended to resolve these challenges through the integration of an AI-based chatbot for automated support systems, a smart ticket management system with priority-based queue orchestration, and secure role-based dashboards for employees, IT support staff, and administrators. This system will improve response time, increase efficiency in service delivery, and offer a better solution to resolve IT-related complaints within organizations.

IV. OBJECTIVE

The major aim of the AI Powered Intelligent System for Complaint Resolution in IT Help Desk is to design an intelligent and automated system that increases the efficiency of IT support services within an organization. The system is intended to ease the process of reporting and resolving IT-related problems through the application of modern web technology and intelligent systems. The system is designed to offer a user-friendly environment to help employees easily report their IT-related problems.

Another significant aim that has been included in the project is to implement an AI chatbot that can communicate with users, comprehend their problems, and offer some basic suggestions for resolving those problems. If the issue cannot be resolved, it will create a support ticket and forward it to the appropriate support agent. This will not only reduce the burden on IT support agents but also enable timely resolution of user complaints.

The project also intends to develop role-based dashboards for the employees, IT support staff, and system administrators to facilitate the management of the system. Secure authentication techniques such as JSON Web Tokens (JWT) and bcrypt password hashing are employed to maintain the security of the system. Moreover, the system incorporates a smart ticketing system and prioritization of the queue to facilitate the handling of complaints based on the severity and urgency of the issues.

V. SYSTEM ANALYSIS

It is an important phase in the development of any software system, as it involves studying the existing processes, identifying the problems, and determining the requirements for the proposed system. In the context of the AI Powered Intelligent System for Complaint Resolution in IT Helpdesk, system analysis involves understanding how IT complaints are being handled currently in organizations and identifying the limitations of existing help desk systems.

In most cases, IT-related complaints are handled manually, for example, by sending emails, making phone calls, and using simple ticketing systems. However, these conventional methods may not be automated and may not offer intelligent support. This may cause problems for the support team in managing

a large number of complaints, resolving urgent complaints, and responding quickly. On the other hand, users may also experience inefficiencies in communication, leading to delayed resolution of complaints. Moreover, these conventional systems may not offer automated support for users.

5.1 SYSTEM STUDY

It is an important phase in the development of a software system in which existing processes and requirements are analyzed to understand the problems faced by users or organizations. The purpose of system study is to analyze the existing system to identify its limitations and requirements to develop a more efficient and effective system.

One of the biggest issues with the current system is that there is a delay in response time due to manual handling of tickets and lack of proper prioritization. There can be a huge volume of complaints that IT support groups have to manage on a day-to-day basis. Moreover, there is no immediate support and guidance provided to users in case they face any technical issues. This creates a burden on IT support staff and also on employees who have to use IT support for their work.

5.2 EXISTING SYSTEM

In the existing systems, there is a lack of intelligent prioritization as well as the management of queues. The complaints are generally dealt with on a first-come, first-served basis, without taking into consideration the level of urgency of the complaint. This leads to serious issues remaining unsolved while minor issues are resolved first. In addition, the users are not updated in real-time about the status of the complaint, which leads to poor communication as well.

Moreover, most of these traditional help desk systems may not have modern security features and role-based access control mechanisms. This may cause difficulties in managing user access and securing sensitive system data. Further, most of these existing systems may not have artificial intelligence technologies such as chatbots and automated problem detection systems.

5.3 PROPOSED SYSTEM

an AI Powered Intelligent IT Helpdesk Complaint Resolution System designed to automate and improve

the process of handling IT-related issues. It provides a user-friendly platform where employees can report problems and receive instant support through an AI-powered chatbot. The chatbot offers troubleshooting suggestions and automatically generates tickets if the issue is not resolved.

To ensure effective management and safe access, the system has role-based dashboards for administrators, IT support agents, and staff. Additionally, it has an intelligent ticket management system with real-time complaint status tracking and priority-based queue handling. The system, which was developed using the MERN stack, guarantees scalability, security, and cloud deployment readiness, assisting businesses in lowering manual labour and increasing helpdesk productivity.

5.4 SYSTEM DESIGN AND ANALYSIS

The goal of the system analysis of the suggested AI-powered IT helpdesk system is to pinpoint the shortcomings of conventional complaint management systems, including the lack of automated support, delayed responses, manual ticket handling, and lack of prioritisation. This analysis is used to define the system requirements, which include secure access, intelligent automation, real-time tracking, and effective complaint handling.

The MERN stack is used to develop the system design as a web-based application. Because the architecture adheres to the MVC pattern, data, business logic, and user interface are clearly separated. Role-based dashboards are implemented by the system for administrators, staff, and IT support agents, allowing for effective management and restricted access.

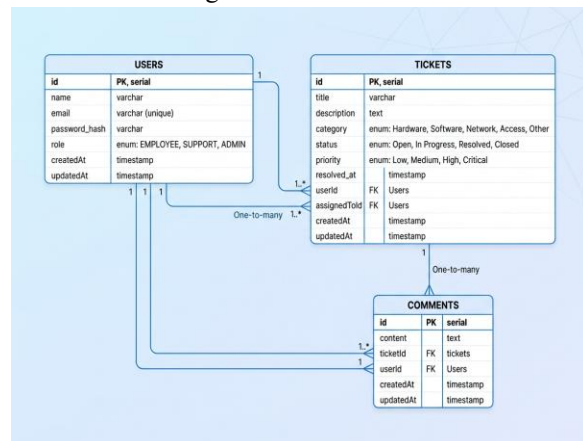


Fig 1 System Design

VI. METHODOLOGY

The methodology for AI Powered Intelligent System for Complaint Resolution in IT Helpdesk involves a structured approach for resolving complaints in an automated manner. First, users are authenticated using JWT authentication and are provided access to role-based dashboards. Employees can report complaints using traditional methods or through an AI-based chatbot that uses basic NLP techniques to understand the problem and provide suggestions for resolving complaints.

In case the problem is not resolved, the system automatically generates a ticket and stores it in the database. The importance of the ticket is assigned using a priority-based algorithm based on the severity and urgency of the problem. The ticket is then placed in a queue management system and assigned to an available IT support agent.

The status of tickets, such as 'Open,' 'In Progress,' 'Resolved,' etc., is updated by agents, and users receive real-time updates through the system. This methodology ensures efficient handling of complaints, reduced manual intervention, and quick resolution of issues.

VII. API IMPLEMENTATION

The API implementation of the AI Powered Intelligent System for Complaint Resolution in IT Helpdesk is developed using Node.js and Express.js following a RESTful architecture. The APIs serve as an interface between the frontend application and the backend database. All API endpoints are secured using JSON Web Token authentication and follow Role-Based Access Control to ensure that only authorized users can access specific functionalities.

7.1 AUTHENTICATION APIs

The authentication module is responsible for user registration, login, and session management. When a user logs in, the system verifies the credentials and generates a JWT token, which is used for accessing protected routes.

POST /api/auth/register – Registers a new user

POST /api/auth/login – Authenticates user and returns JWT token

GET /api/auth/profile–Retrieves logged-in user det.

7.2 TICKET MANAGEMENT APIs

Tickets for complaints are created, updated, retrieved, and deleted by this module. Details like the issue description, category, priority, and status are all included in each ticket.

POST /api/tickets/create – Create a new ticket

GET /api/tickets – Retrieve all tickets

GET /api/tickets/:id – Retrieve ticket by ID

PUT /api/tickets/update/:id – Update ticket status

DELETE /api/tickets/delete/:id – Delete a ticket

7.3 CHATBOT APIs

This module responds to user enquiries automatically. If the problem is not fixed, it also helps create tickets.

POST /api/chatbot/message – Send user query to chatbot

GET /api/chatbot/history – Retrieve chat history

7.4 ADMIN APIs

System-level controls like managing users, roles, and analytics are provided by the admin module.

GET /api/admin/users – Retrieve all users

PUT /api/admin/role/:id – Update user role

DELETE /api/admin/delete/:id – Delete a user

GET /api/admin/analytics – View system analytics

7.5 API WORKFLOW

The API workflow is initiated when a user makes a request from the frontend. The request is received and processed by the Express server, where authentication and authorization are checked using middleware functions. The request is then received and processed by the relevant controller, which interacts with the database and sends a response back to the client.

VIII. SYSTEM TESTING

It is carried out in order to ensure that the AI Powered Intelligent System for Complaint Resolution in IT Helpdesk functions properly and meets all the requirements. The testing process includes the testing of critical modules like user authentication, interaction with the chatbot, and real-time updates.

There are various testing processes involved in the testing of the software, like unit testing, integration testing, and user acceptance testing (UAT). Security testing includes the testing of JWT authentication and role-based access control, and the testing of the efficiency of the system.

Test cases like user authentication, creation of tickets, interaction with the chatbot, and the updating of the status of the tickets are included in the testing process.

IX. IMPLEMENTATION & RESULT

IMPLEMENTATION

The Intelligent System for Complaint Resolution in IT Helpdesk, which is powered by AI, is implemented using the MERN technology stack. The front end of the application is implemented using React.js/Angular, HTML, CSS, and JavaScript.

The back end of the application is implemented using Node.js and Express.js. The back end is implemented following the MVC architecture. It also supports JWT and bcrypt for security.

The database of the application is implemented using MongoDB and Mongoose. An AI chatbot module is implemented to help the end user and automatically generate tickets. The application also supports live updates using Socket.io and can be deployed on the cloud using Vercel and Render.

RESULT

The AI powered intelligent system for complaint resolution in the IT helpdesk was successfully developed and implemented. The system would allow the employees to easily report their complaints and interact with the chatbot.

The chatbot would be effective in suggesting the initial trouble-shooting ideas and would be able to generate the tickets as and when needed. The priority-based queue would be effective in resolving the critical complaints in a faster manner.

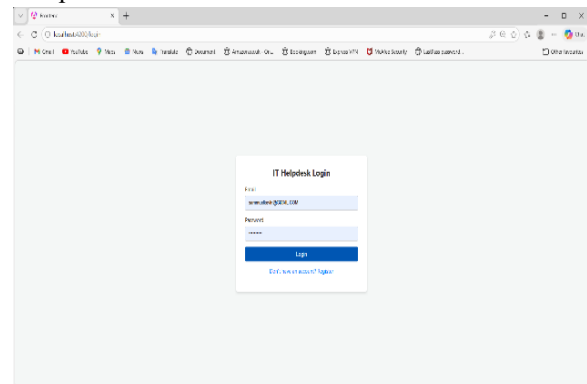


Fig 2 Login Page

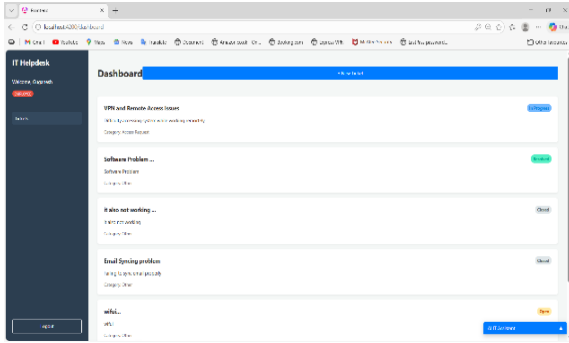


Fig 3 Employee Dashboard

It provides an interface with a user-friendly design that includes all complaint tickets along with important details like issue title, description, category, and status. The sidebar includes user details, identification of user roles, access to tickets, and logout options for easy and secure access.

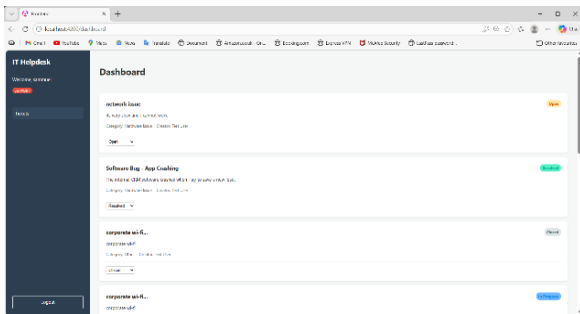


Fig 4 Technical Support Dashboard

IT provides IT support agents with a centralized interface through which they can manage user complaints. It shows all the tickets, including the description of the complaint, category, creator, and status. It shows the status as 'Open,' 'In Progress,' 'Resolved,' or 'Closed.' It allows the status of each ticket to be updated through a dropdown, facilitating the efficient management of the workflow, improving the response time, and enhancing coordination.

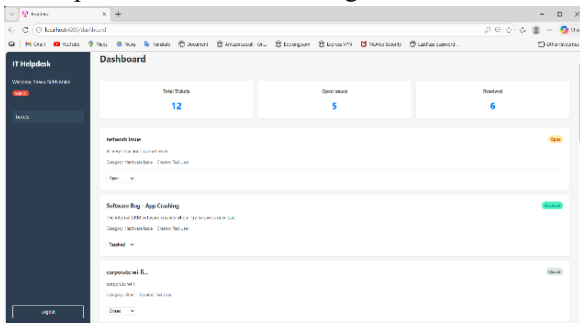


Fig 5 Admin Dashboard

The entire IT help desk system can be viewed from the Admin Dashboard. It shows the total tickets, open tickets, or the number of tickets already solved. It provides a quick overview of the entire system. It shows all the tickets, including the description of the problem, category, and status. It also allows the status of the tickets to be updated if required. It allows monitoring, management, and control of the entire help desk system.

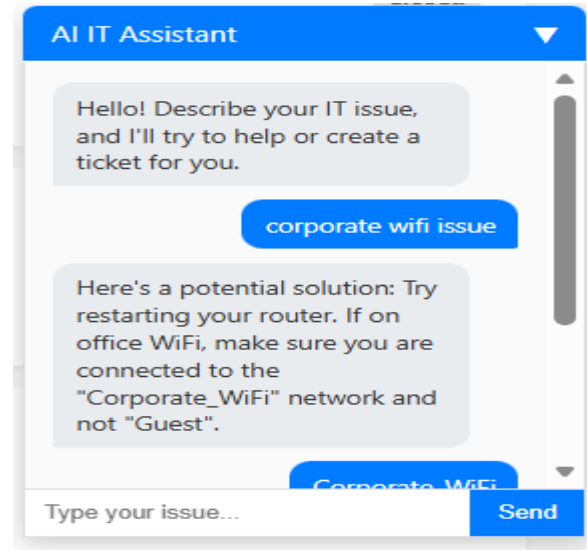


Fig 6 AI Chatbot

X. FUTURE ENHANCEMENT

The AI Powered Intelligent System for Complaint Resolution in IT Helpdesk can be further enhanced by incorporating more features into this system for better performance and user experience. The AI chatbot in this system can be upgraded using more sophisticated machine learning and NLP techniques for better and more intelligent responses. Voice support can also be incorporated in this system for better user experience. The Intelligent System for Complaint Resolution can be enhanced to include predictive analytics to help the users prevent common issues before they arise. Furthermore, the system can be enhanced to include email and mobile notifications to keep the users updated. Additionally, the system can be enhanced to include a mobile application to provide the users with easy access to the system.

It can be further enhanced to include advanced features to improve the performance of the system. For example, the system can be enhanced to include the assignment of tickets to the users. Additionally, the

system can be enhanced to include reporting and analytics tools. Furthermore, the system can be enhanced to include integration with third-party tools such as enterprise software systems.

XI. CONCLUSION

The AI Powered Intelligent System for Complaint Resolution in IT Helpdesk is successful in providing an efficient and automated solution for the management of IT-related issues within an organization. The use of an AI-powered chatbot, role-based dashboard, and smart ticket management system makes it easier to handle complaints.

It will help in reducing the workload for IT support teams, provide a better user experience through real-time tracking, and provide a secure access solution through modern authentication technologies. Overall, the solution appears to be efficient, effective in terms of resource management, and scalable for a modern helpdesk IT solution.

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