ARTIFICIAL INTELLIGENCE

AI-Based College Support Agent

Sure Mamatha, A. Srivalli, D. Anjali, D. Genelia, B. Rakesh

Department of Computer Science and Engineering, Hyderabad Institute of Technology and Management, Hyderabad, Telangana, India

Published November 2026

Abstract

The AI-Based College Support Agent is a web-based platform designed to provide centralized college information and student services. It uses the MERN stack and Retrieval-Augmented Generation (RAG) for document-based question answering, along with features such as attendance management, complaint registration, feedback collection, and event updates. The system allows students to access accurate and relevant information through an AI-powered chatbot. It reduces the effort required to search for college-related information manually and improves communication between students and the institution. Overall, the platform aims to make college services more accessible, efficient, and user-friendly.

Keywords: retrieval-augmented generation (RAG); educational chatbot; college support; MERN stack; artificial intelligence; student services

1 Introduction

College students often need information about attendance, complaints, feedback, events, academic activities, and college documents. However, this information is usually scattered across different sources and platforms, making it difficult for students to find the required details quickly. They may also need to contact different departments or faculty members for simple queries, which can be time-consuming. The AI-Based College Support Agent aims to solve this problem by providing a centralized platform for college information and student support.

The system uses the MERN stack and Retrieval-Augmented Generation (RAG) for document-based question answering. It allows students to ask questions through an AI-powered chatbot and receive relevant responses based on uploaded college documents. Along with AI-based assistance, the platform provides features such as attendance management, complaint registration, feedback collection, and event-related updates. It helps reduce repeated queries, improves access to important information, and makes college services more organized and accessible. Overall, the system aims to simplify communication and provide students with a convenient and efficient digital support platform.

2 Related work

Retrieval-Augmented Generation (RAG) has emerged as an effective approach for improving AI-based question-answering systems by combining information retrieval with large language models. It helps generate more accurate and contextually relevant responses by retrieving information from external documents and knowledge sources [1]. This approach is particularly useful in educational institu-

tions, where students frequently require information from academic materials, notices, guidelines, and other college-related documents.

Educational chatbots have also been developed to provide students with instant responses to university-related queries, assist in learning, and improve access to academic information [2], [3]. Previous studies have highlighted the role of conversational AI in higher education, including its benefits in improving student engagement, accessibility, and support services. However, these systems may face challenges such as inaccurate responses, limited information sources, and difficulties in handling different types of student requirements [4], [5].

The proposed AI-Based College Support Agent addresses these limitations by integrating RAG-based question answering with multiple college support services in a single web-based platform. Unlike systems that focus only on academic queries, it combines document-based AI assistance with attendance management, complaint registration, feedback collection, and event updates. This provides students with a more convenient and centralized way to access college information and services.

3 Methodology

The proposed AI-Based College Support Agent uses the MERN stack and Retrieval-Augmented Generation (RAG) to provide centralized college information and student support services. The system is designed to simplify access to academic information and reduce the need for manual communication. College documents are uploaded, processed, and used as knowledge sources to retrieve relevant information for answering student queries. The platform also integrates services such as attendance management, complaint registration, feedback collection, and event updates to improve the overall student experience.

3.1 System design

The system follows a web-based architecture consisting of a React.js frontend, Node.js and Express.js backend, MongoDB database, and an AI module. The React.js frontend provides an interactive and user-friendly interface through which students can access different college services. The Node.js and Express.js backend handles user requests, processes application data, and manages communication between the frontend, database, and AI module. MongoDB is used to store relevant application data, including student information, complaints, feedback, and event details.

The AI module is integrated with the backend to provide intelligent responses to student queries using information retrieved from college documents. This architecture allows different services to operate within a single platform, making the system more organized, accessible, and easier to maintain.

3.2 RAG-based question answering

The Retrieval-Augmented Generation (RAG) approach is used to improve the accuracy and relevance of responses generated by the AI chatbot. Initially, uploaded college documents are processed and divided into smaller text segments called chunks. These chunks are converted into numerical representations known as embeddings, which help identify relevant information based on the meaning of user queries.

When a student submits a question, the system searches for relevant information from the processed documents. The retrieved content is then provided to the AI model as additional context to generate an appropriate response. This approach helps the chatbot provide answers based on college-specific information rather than relying only on the model's general knowledge. It also reduces the chances of irrelevant responses and improves the reliability of document-based question answering.

4 Implementation

4.1 Frontend

The frontend is developed using React.js to create modules such as registration, login, AI chatbot, attendance, complaints, feedback, and events. CSS and Bootstrap are used for responsive design.

4.2 Backend

The backend uses Node.js and Express.js to handle requests and connect the frontend with the database through REST APIs, for example:

- POST /api/auth/register – register new students;
- POST /api/auth/login – authenticate users.

4.3 Database

MongoDB is used to store student details and college-related information. Records include userId, name, email, attendance, complaints, feedback and events.

4.4 AI integration

RAG retrieves relevant information from uploaded college documents and provides context to the AI model to generate accurate responses to student queries. The overall flow of the system is shown in Figure 1.

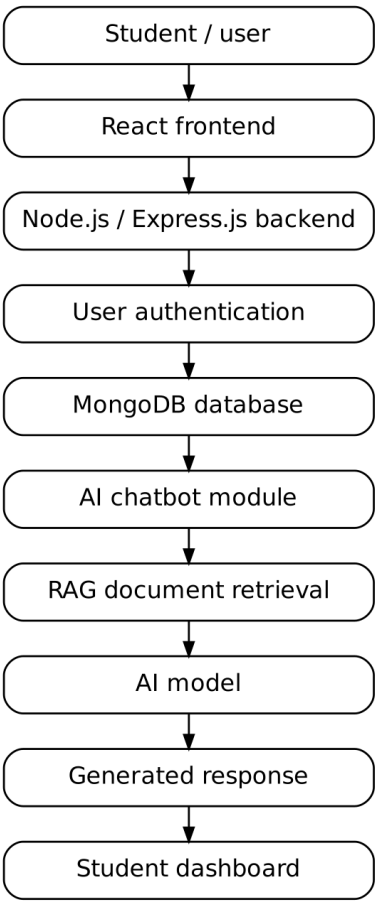


Figure 1. Flow chart of the AI-Based College Support Agent.

5 Results

The results of the system testing are given in Table 1.

Table 1. System testing results.

Module	Test Function	Result
Registration	Create new user	Successful
Login	Authenticate user	Successful
AI Chatbot	Answer student queries	Successful
RAG Module	Retrieve document information	Successful
Documents	Upload college documents	Successful
Attendance	Display attendance details	Successful
Complaints	Register complaints	Successful
Feedback	Submit feedback	Successful
Events	Display event details	Successful
MongoDB	Store and retrieve data	Successful
Backend API	Process API requests	Successful

Table 1 shows that the AI-Based College Support Agent successfully connects the frontend with the backend API and MongoDB database. The system supports student registration, login, attendance details, complaint submission, feedback collection, and event information. The RAG-based chatbot retrieves relevant content from uploaded college documents and generates responses to student queries.

The prototype therefore demonstrates the basic end-to-end data flow: student query → React frontend → Node.js/Express.js backend API → RAG document retrieval → AI model → generated response → student dashboard.

6 Discussion

The proposed AI-Based College Support Agent combines multiple college services into a single platform. This addresses the limitation of existing systems where information about attendance, complaints, events, and academic documents is available across different sources.

The integration of RAG-based question answering allows students to retrieve relevant information from uploaded college documents without manually searching through multiple files. The combination of AI assistance and student support services also reduces repeated queries and improves information accessibility.

However, the system depends on the quality and availability of uploaded college documents. Outdated or incomplete information may affect the accuracy of chatbot responses. The system is intended as a college information and student support platform, not a replacement for direct communication with college authorities. Future improvements can focus on enhancing AI response accuracy, document retrieval, and additional student-oriented services.

7 Conclusion

The AI-Based College Support Agent provides a centralized platform for college information and student support services. By combining MERN and RAG, the system enables document-based question answering along with attendance, complaints, feedback, and event services. The system improves accessibility and reduces the effort required to find college information.

Future work can focus on improving document retrieval, AI response accuracy, and adding more student support services.

Acknowledgment

The authors would like to express their sincere gratitude to the faculty and management of Hyderabad Institute of Technology and Management (HITAM) for their guidance and support throughout this project. The authors also thank their project guide, team members, and everyone who contributed to the successful completion of this work.

References

[1] Lewis P, et al. Retrieval-augmented generation for knowledge-intensive NLP tasks. *Advances in Neural Information Processing Systems (NeurIPS)*. 2020;33:9459–9474.

[2] Neupane S, et al. From questions to insightful answers: Building an informed chatbot for university resources. In: *Proc*. IEEE Frontiers in Education Conference (FIE); 2024. https://doi.org/10.1109/FIE61694.2024.10892994

[3] Thway M, Recatala-Gomez J, Lim FS, Hippalgaonkar K, Ng LWT. Battling Botpoop using GenAI for higher education: A study of a retrieval augmented generation chatbots impact on learning. *arXiv* preprint arXiv:2406.07796. 2024.

[4] Pereira DSM, et al. Here's to the future: Conversational agents in higher education—a scoping review. *International Journal of Educational Research*. 2023;122:102233. https://doi.org/10.1016/j.ijer.2023.102233

[5] Wollny S, et al. Are we there yet?—a systematic literature review on chatbots in education. *Frontiers in Artificial Intelligence*. 2021;4:654924. https://doi.org/10.3389/frai.2021.654924