



iJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 14 **Issue:** IX **Month of publication:** September 2026

DOI: <https://doi.org/10.22214/ijraset.2026.84861>

www.ijraset.com

Call: ☎ 08813907089

E-mail ID: ijraset@gmail.com

AI Powered College Enquiry Chatbot

G. Vamsi¹, N.Charan²

¹ Assistant Professor ² MCA Final Semester, Master of Computer Applications, Sanketika Vidya Parishad Engineering College, Vishakhapatnam, Andhra Pradesh, India

Abstract: Educational institutions receive numerous enquiries from students and parents regarding admissions, courses, fees, examinations, and placements. Handling these enquiries manually increases the workload of administrative staff and may lead to delayed or inconsistent responses. To overcome this problem, this project presents an AI-Powered College Enquiry Chatbot that automates common college-related queries using Retrieval-Augmented Generation (RAG). The system is developed using a three-tier architecture consisting of a React frontend, Node.js/Express.js backend, and MongoDB database. The chatbot uses LangChain and Google Generative AI to understand user queries and generate relevant responses. Frequently Asked Questions (FAQs) are converted into vector embeddings and stored in a vector store. When a user submits a query, the system performs similarity search to identify the most relevant FAQ. If the similarity score satisfies a predefined confidence threshold, the retrieved information is provided to the language model to generate a suitable response. If no relevant information is found, the chatbot provides a safe fallback response, reducing the possibility of incorrect or hallucinated answers. The system also provides an administrative dashboard for managing FAQ content and monitoring chatbot performance. JWT authentication and bcrypt password hashing are used to secure administrator access. User conversations and feedback are stored in MongoDB along with useful metadata such as category, confidence score, and fallback status. This helps administrators identify missing information and improve the chatbot's knowledge base.

The proposed chatbot provides fast, consistent, and reliable responses while reducing the workload of college administrative staff. The project demonstrates the practical use of RAG and conversational AI in the educational domain. Future enhancements include multilingual support, persistent vector storage, advanced analytics, and cloud deployment.

Keywords: College Chatbot, RAG, LangChain, Google Generative AI, MongoDB, React, Express.js, Conversational AI.

I. INTRODUCTION

The rapid development of Artificial Intelligence (AI), Natural Language Processing (NLP), and web technologies has changed the way educational institutions provide information to students and parents. Colleges receive many enquiries related to admissions, courses, fees, examinations, eligibility, placements, and academic activities. Traditionally, these enquiries are handled through college offices, phone calls, emails, and websites. These methods may require more time and human effort, and users may not always receive immediate responses. To overcome these limitations, the AI-Powered College Enquiry Chatbot is proposed as an intelligent and automated solution. The chatbot allows students and other users to communicate with the college through a simple conversational interface. Users can ask questions in natural language, and the system processes the query and provides a relevant response. This makes accessing college information faster, easier, and more convenient. The system uses Natural Language Processing (NLP) to understand different forms of user queries. It can also use a Retrieval-Augmented Generation (RAG) approach to retrieve relevant information from the college knowledge base and generate appropriate responses. Information related to admissions, courses, fee structures, examination schedules, placements, and other frequently asked questions can be maintained in the system. The proposed chatbot can be implemented using a web-based frontend and backend architecture. The frontend provides an interactive chat interface, while the backend handles user queries, AI processing, information retrieval, and database operations. A database such as MongoDB can store FAQs, college information, conversation records, and user feedback. An admin dashboard can also be provided to allow authorized administrators to add, update, or delete information. The chatbot reduces the repetitive workload of college staff by automatically answering frequently asked questions. Conversation logs and feedback can further help administrators identify common enquiries and improve the knowledge base. Overall, the AI-Powered College Enquiry Chatbot provides a smart, efficient, and user-friendly approach to college information services. By combining AI, NLP, RAG, web technologies, and database management, the system aims to reduce manual effort, provide quick responses, and improve communication between educational institutions and their users.

II. LITERATURE SURVEY

The development of Artificial Intelligence (AI), Natural Language Processing (NLP), and conversational systems has led to the creation of various chatbot applications in the education sector. Researchers have explored chatbots as a means of providing automated information, improving communication, and reducing the workload of administrative staff. Several existing educational chatbot systems focus on answering frequently asked questions related to admissions, courses, fees, examinations, and college facilities. These systems generally use predefined questions and answers or keyword-matching techniques. Although such systems can provide quick responses to common queries, they may have difficulty understanding questions when users use different words or sentence structures. NLP-based chatbots have been introduced to overcome some of the limitations of traditional rule-based systems. NLP techniques allow chatbots to identify the intent and meaning of user queries and provide more appropriate responses. However, many basic NLP chatbot systems depend on a limited dataset and may not provide accurate answers when a query is outside their predefined knowledge. Recent research has focused on Large Language Models (LLMs) and Retrieval-Augmented Generation (RAG) to improve chatbot performance. RAG-based systems retrieve relevant information from a knowledge base before generating a response. This approach is particularly useful for college enquiry systems because institutional information can be stored and updated in a dedicated knowledge base. It helps the chatbot provide responses based on relevant college information instead of relying only on predefined responses. Modern educational chatbot systems also include web interfaces, databases, administrator dashboards, conversation history, and feedback mechanisms. These features improve system usability and allow administrators to update information according to changing college requirements. However, some existing systems are limited in their ability to maintain updated information, understand natural language queries, or provide a complete administrative management facility. Based on the limitations identified in existing approaches, the proposed AI-Powered College Enquiry Chatbot combines NLP, AI-based response generation, and RAG-based information retrieval with a web-based interface and database. The system is designed to provide quick and relevant answers to common college enquiries while allowing administrators to manage and update the knowledge base. Thus, the proposed system aims to provide a more flexible, efficient, and user-friendly solution for college information services.

III. CHALLENGES

The development of an AI-Powered College Enquiry Chatbot involves several challenges. One of the major challenges is understanding natural language, as users may ask the same question in different ways. The chatbot must correctly identify the meaning and intent of each query.

Another challenge is maintaining accurate and updated college information. Details such as fees, admission dates, examination schedules, and placement information may change frequently. The knowledge base must therefore be updated regularly. Handling queries that are outside the chatbot's available knowledge is also a challenge. The system should avoid providing incorrect information and should appropriately respond when relevant information is unavailable. Another important challenge is integrating AI models with the web application and database. Proper communication between the frontend, backend, AI services, and database is required for smooth operation. Security is also a concern, particularly for administrator accounts and stored conversation data. Proper authentication and access control are required to protect the system. Finally, improving response accuracy and reducing response time are important challenges. The chatbot should provide relevant answers quickly while maintaining a simple and user-friendly interface.

IV. PROPOSED METHODOLOGY

The proposed system follows an iterative and modular methodology for developing the AI-Powered College Enquiry Chatbot. The development process begins with identifying the requirements of students, parents, and college administrators. The major enquiry areas such as admissions, courses, fee structure, examinations, placements, eligibility, and college facilities are identified and organized as the initial knowledge base. The database is then designed to store frequently asked questions, administrator details, conversation records, and user feedback. After designing the database, the backend system is developed to manage the major operations of the application. APIs are created for administrator authentication, FAQ management, chatbot communication, feedback collection, and analytics. The backend is connected with MongoDB to store and retrieve information efficiently. Each module is tested individually to ensure that the required operations are working correctly before integrating it with the other components. The AI and RAG components are then developed to provide intelligent responses to user queries. When a user enters a question, the system processes the query using Natural Language Processing techniques and searches the college knowledge base for relevant information.

The retrieved information is provided to the AI model to generate a meaningful and contextually relevant response. This approach helps the chatbot answer different forms of user queries while reducing irrelevant or inaccurate responses. The frontend is developed after the backend and AI services are established. It provides a simple and interactive chat interface through which users can communicate with the chatbot. An administrator interface is also provided for managing FAQs and monitoring system activities. The frontend communicates with the backend through APIs, allowing users to send queries and receive chatbot responses efficiently. Finally, the complete system is integrated and tested to verify the interaction between the frontend, backend, database, and AI components. Functional testing, integration testing, and performance testing are performed to evaluate the accuracy, response time, reliability, and usability of the chatbot. Based on the testing results, necessary improvements are made to the system. This methodology provides a systematic approach for developing a reliable, scalable, and user-friendly AI-Powered College Enquiry Chatbot.

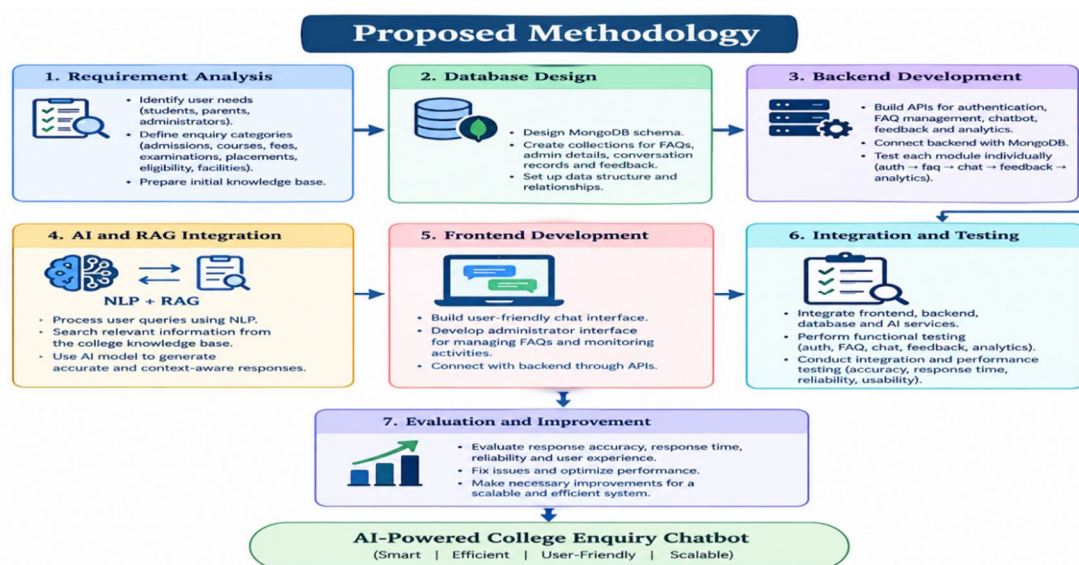


Figure 1: Flow chart of the proposed methodology

V. ALGORITHMS AND TECHNIQUES

The AI-Powered College Enquiry Chatbot uses a combination of Artificial Intelligence, Natural Language Processing, information retrieval, and web development techniques to understand user queries and provide relevant responses.

Natural Language Processing is used to process and understand the text entered by the user. It helps the chatbot identify the meaning and intent of different types of questions, even when users use different words or sentence structures.

Retrieval-Augmented Generation is the main technique used for retrieving relevant college information. When a user submits a query, the system searches the college knowledge base for relevant information and provides the retrieved content to the AI model. The model then generates a suitable response based on the retrieved information.

Text Embedding is used to convert user queries and FAQ information into numerical vector representations. These vectors help the system compare the meaning of the query with stored information and identify the most relevant content.

Vector Similarity Search is used to find information that is semantically similar to the user's question. Instead of depending only on exact keyword matching, the system can identify relevant information based on the meaning of the query.

Large Language Model is used to generate natural and context-aware responses from the retrieved information. This allows the chatbot to communicate with users in a conversational manner.

CRUD operations are used for managing frequently asked questions and college information. Administrators can create, read, update, and delete FAQ records through the admin interface.

Authentication and Authorization techniques are used to protect administrative functions. Only authorized administrators can access and modify the college knowledge base.

Conversation Logging and Feedback techniques are used to store user interactions and collect feedback. These records can help administrators understand common enquiries and improve the chatbot's performance. Together, these algorithms and techniques enable the proposed system to provide accurate, interactive, and efficient responses to college-related enquiries.

VI. ARCHITECTURE

The AI-Powered College Enquiry Chatbot follows a layered architecture in which the frontend, backend, AI and RAG services, and database work together to provide an efficient enquiry system. The frontend provides a simple web-based chat interface through which students, parents, and other users can enter their college-related questions. The backend acts as the main processing layer and manages authentication, FAQ management, chatbot requests, feedback, conversation records, and analytics. When a user submits a query, the backend sends the query to the AI and RAG components, where Natural Language Processing techniques are used to understand the user's question. The RAG mechanism searches the college knowledge base and retrieves relevant information related to the query. The retrieved information is then provided to the AI model, which generates a meaningful and context-aware response. MongoDB is used as the database layer to store FAQs, administrator details, conversation history, feedback, and other college-related information. Administrators can manage and update the stored information through the admin interface. Finally, the generated response is returned through the backend API and displayed to the user through the chatbot interface. This architecture provides proper separation between different system components and makes the application easier to maintain, update, and scale.

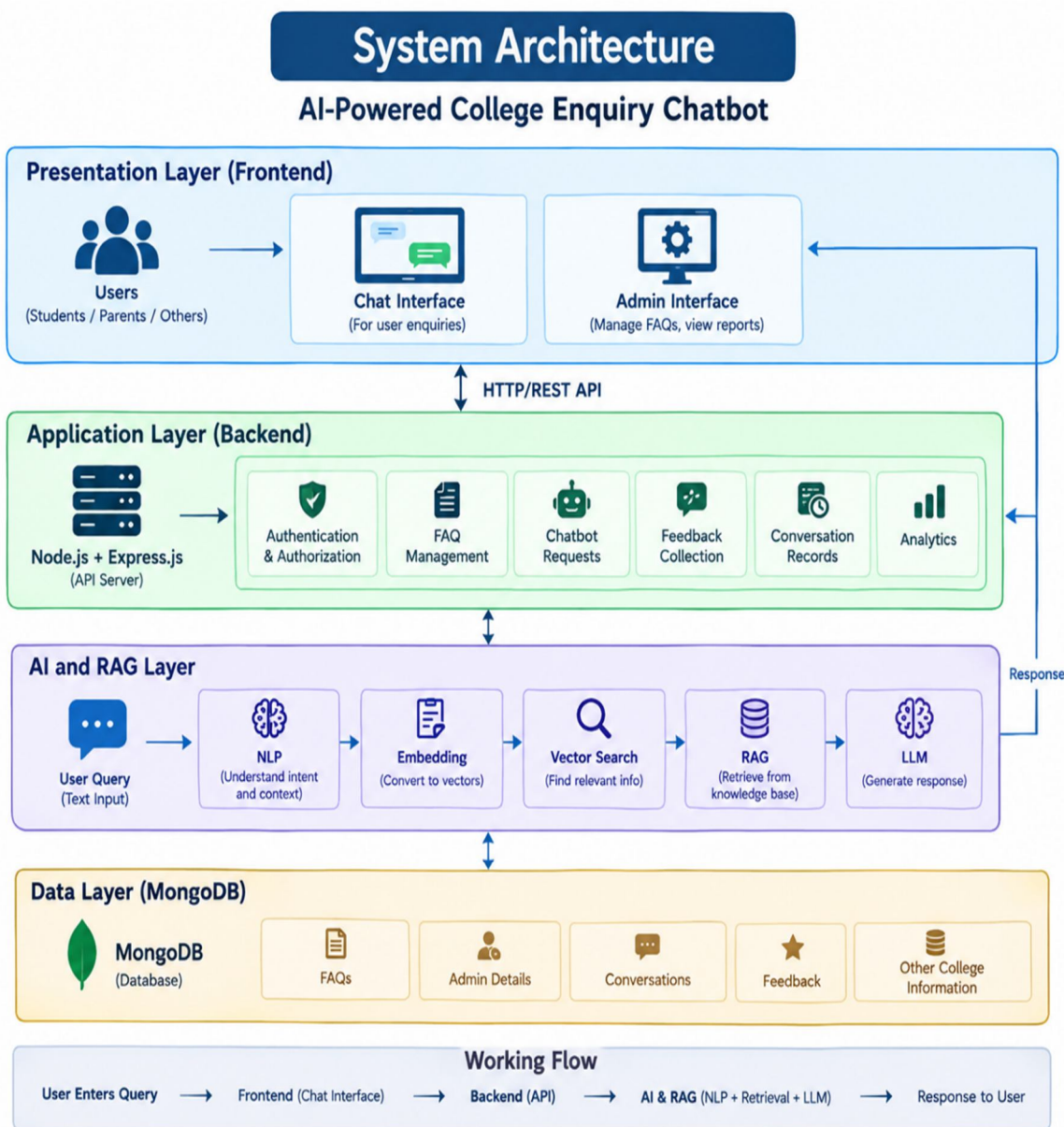


Figure 2 System Architecture

VII. OUTPUTS

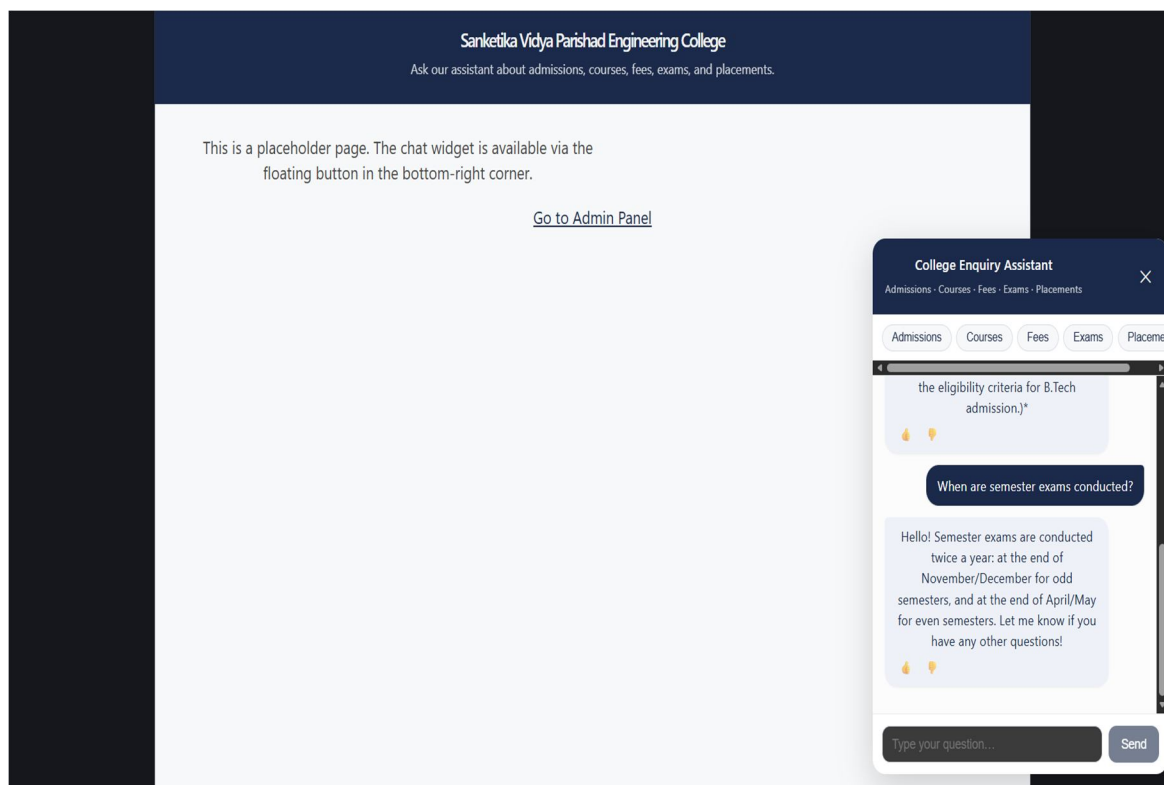


Figure 3: AI-Powered College Enquiry Chatbot User Interface

The figure shows the user interface of the AI-Powered College Enquiry Chatbot. The system provides information about admissions, courses, fees, examinations, and placements through an interactive chat window. Users can enter their questions and receive quick responses from the chatbot. An Admin Panel is also provided for managing college information and chatbot content.

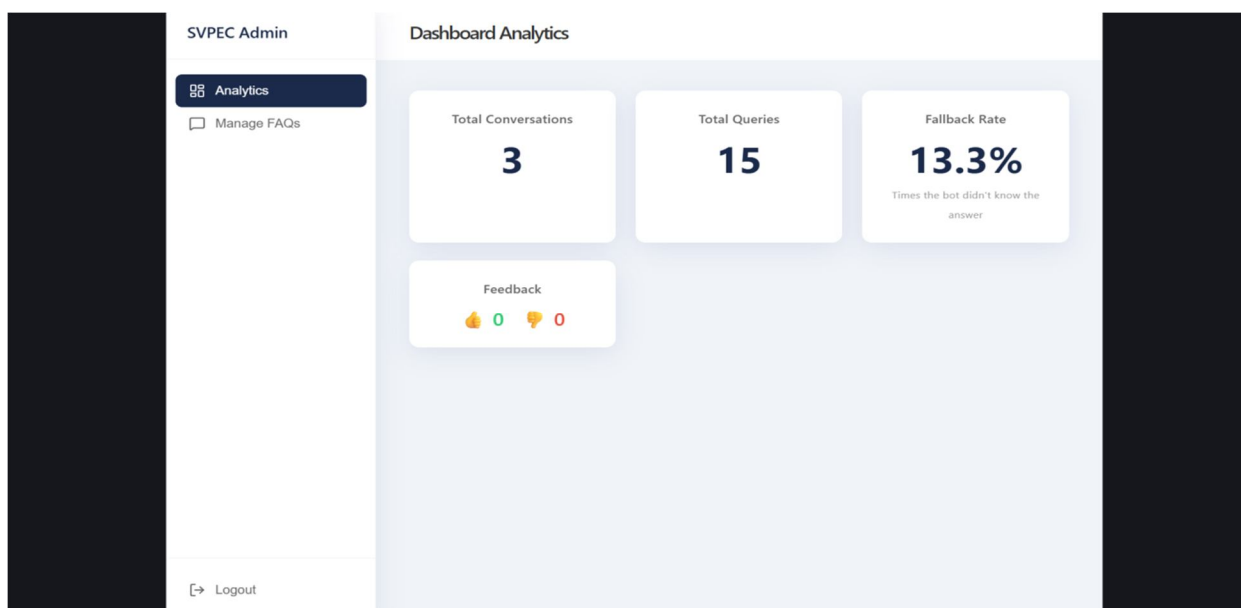


Figure 4: Admin Dashboard Analytics of the AI-Powered College Enquiry Chatbot

The Admin Dashboard provides an overview of chatbot activities and performance. It displays the total number of conversations, total user queries, fallback rate, and user feedback. The dashboard helps administrators monitor chatbot usage, identify unanswered queries, and evaluate the overall.

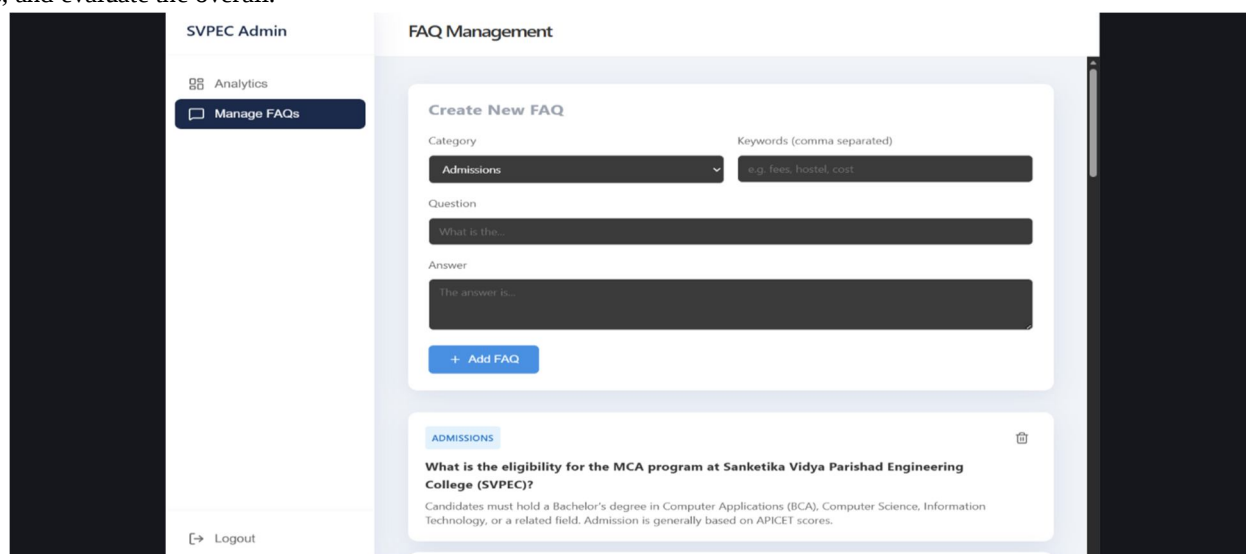


Figure 5: FAQ Management Interface of the AI-Powered College Enquiry Chatbot

The FAQ Management page allows the administrator to create and manage frequently asked questions. The administrator can enter the category, keywords, question, and answer, and add the FAQ to the chatbot knowledge base. Existing FAQs can also be viewed and managed from the same interface. This helps keep the chatbot information updated and enables it to provide relevant responses to user enquiries.

VIII. CONCLUSION

The AI-Powered College Enquiry Chatbot provides an efficient and intelligent solution for handling common college-related enquiries. The system uses Artificial Intelligence, Natural Language Processing, and Retrieval-Augmented Generation to understand user queries and provide relevant information about admissions, courses, fees, examinations, placements, and other college activities. The chatbot reduces the repetitive workload of administrative staff and allows users to access information quickly through a simple conversational interface. The admin dashboard enables authorized users to manage FAQs, update information, monitor conversations, and analyze chatbot performance. Overall, the proposed system improves the accessibility, efficiency, and user experience of college enquiry services and provides a strong foundation for future enhancements such as multilingual support, voice interaction, and integration with other college management systems.

REFERENCES

- [1] A. Vaswani et al., "Attention is all you need," in Proc. 31st Int. Conf. Neural Information Processing Systems (NIPS), Long Beach, CA, USA, 2017, pp. 6000–6010.
- [2] P. Lewis et al., "Retrieval-augmented generation for knowledge-intensive NLP tasks," in Proc. 34th Int. Conf. Neural Information Processing Systems (NeurIPS), 2020, pp. 9459–9474.
- [3] J. Weizenbaum, "ELIZA — a computer program for the study of natural language communication between man and machine," Commun. ACM, vol. 9, no. 1, pp. 36–45, Jan. 1966.
- [4] T. Mikolov, K. Chen, G. Corrado, and J. Dean, "Efficient estimation of word representations in vector space," in Proc. Int. Conf. Learning Representations (ICLR) Workshop, 2013.
- [5] J. Devlin, M.-W. Chang, K. Lee, and K. Toutanova, "BERT: Pre-training of deep bidirectional transformers for language understanding," in Proc. NAACL-HLT, Minneapolis, MN, USA, 2019, pp. 4171–4186.
- [6] LangChain, "LangChain documentation," LangChain Inc. [Online]. Available: <https://docs.langchain.com>. Accessed: Aug. 2026.
- [7] Google, "Google AI for Developers — Gemini API documentation," Google LLC. [Online]. Available: <https://ai.google.dev>. Accessed: Aug. 2026.
- [8] MongoDB Inc., "MongoDB manual," MongoDB, Inc. [Online]. Available: <https://www.mongodb.com/docs/manual/>. Accessed: Aug. 2026.
- [9] OpenJS Foundation, "Express.js — Node.js web application framework," [Online]. Available: <https://expressjs.com>. Accessed: Aug. 2026.
- [10] Meta Platforms, Inc., "React — the library for web and native user interfaces," [Online]. Available: <https://react.dev>. Accessed: Aug. 2026.

BIBLIOGRAPHY



G.Vamsi Krishna is serving as an Assistant Professor at Sanketika Vidya Parishad Engineering College. He has one year of teaching experience in the field of Computer Science and Engineering. He is committed to academic excellence and is actively involved in guiding and mentoring students in their academic and project work. His areas of interest include Machine Learning and emerging



Narava Charan is currently pursuing the final semester of Master of Computer Applications (MCA) at Sanketika Vidya Parishad Engineering College, accredited with an 'A' grade by NAAC, affiliated with Andhra University, and approved by AICTE. With a keen interest in Artificial Intelligence and Natural Language Processing, the project titled “AI-Powered College Enquiry Chatbot” is carried out under the guidance of G. Vamsi Assistant Professor, SVPEC.



10.22214/IJRASET



45.98



IMPACT FACTOR:
7.129



IMPACT FACTOR:
7.429



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089  (24*7 Support on Whatsapp)