MCE Website with AI ChatBot

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ABSTRACT

In the digital era, integrating intelligent systems within academic environments has become essential for enhancing student experiences and providing efficient educational services. This project presents a comprehensive web-based student support portal tailored for Malnad College of Engineering (MCE). Built using React.js, the application delivers multiple interactive features aimed at guiding students in their academic and career journeys. Key functionalities include an AI-powered chatbot, a future course recommendation quiz, detailed guidance on higher studies options, and a role-based admin panel for managing quiz content and analyzing results. The chatbot assists with general queries, while the quiz intelligently analyzes user input to suggest domains such as Artificial Intelligence, Cybersecurity, Cloud Technologies, and Data Science. The higher education module visually maps out progression paths from school to professional degrees, offering insight into programs like M.Tech, MBA, and international study options. The admin module is protected using JWT authentication, allowing secure access to content management features. Overall, this system bridges the gap between traditional educational advising and modern digital tools, offering a personalized and responsive platform for student development.

interface for answering academic and general queries; a multi-step quiz built with dynamic state management using React hooks, which analyzes user responses through a keyword-mapping and scoring algorithm to recommend future career paths in domains like Artificial Intelligence & Machine Learning, Cybersecurity, Cloud & DevOps, and Data Science. Another module provides a visually structured higher studies roadmap, designed with React icons and styled components to illustrate educational progression from 10th grade to professional postgraduate degrees such as M.Tech (India & Abroad) and MBA, highlighting respective benefits and pathways. The system includes a role-based authentication mechanism for administrators, implemented via JWT (JSON Web Token) authentication. Admins can log in securely to access a custom dashboard where they can manage quiz content, view student responses, and analyze results, all facilitated by protected routes and React state propagation (via props and conditional rendering). Styling is managed through CSS files and React Icons for a clean UI, and API communication is handled through fetch requests (with a backend presumed to be on localhost:5000). This modular and scalable architecture enables future enhancements and institutional customization, offering a practical, efficient, and user-friendly academic support solution.

INTRODUCTION

This project presents a full-stack, interactive academic guidance web portal built using React.js with React Router for seamless client-side navigation, designed specifically for the students of Malnad College of Engineering (MCE). The application aims to bridge gaps in traditional academic advising by offering smart, accessible digital tools that empower students to make informed decisions about their future. The portal integrates several core modules: an AI-powered chatbot

STRUCTURE OF THE PAPER

2.1 ABSTRACT

Malnad College of Engineering (MCE) currently lacks a centralized platform to support students with personalized academic and career guidance, leading to difficulties in planning their future studies and career paths. This paper proposes the development of an AI-powered chatbot for the MCE website that consolidates key academic services, including career

recommendations, higher studies guidance, and frequently asked questions, into a single user-friendly interface. The chatbot will utilize natural language processing (NLP) and machine learning algorithms to provide personalized guidance to students. The proposed chatbot aims to improve student outcomes by providing easy access to relevant information and guidance. This paper outlines the design, development, and implementation of the chatbot, highlighting its potential to enhance the academic experience for MCE students.

Example of a Well-Done Abstract:

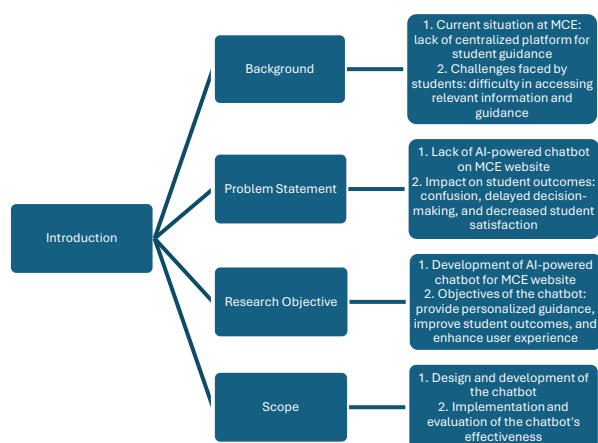Title: AI-Powered Chatbot for Malnad College of Engineering Website.

2.2 INTRODUCTION

Fig. Introduction Outline

2.3 MAIN BODY

2.3.1 METHODS

The development of the AI-powered chatbot for the MCE website involved several stages:

- Description of the platform's architecture and design: The chatbot will be built using a microservices architecture, with separate services for natural language processing, dialogue management, and response generation.
- Explanation of the technologies and tools used: The chatbot will be developed using Python, NLTK, and spaCy for NLP, and Flask for web development.
- Discussion of the development process and testing procedures: The chatbot will be developed using an agile methodology, with iterative testing and refinement to ensure its effectiveness.

2.3.2 TECHNICAL REQUIREMENTS

The system will require the following technical specifications:
1. Front-end: React.js
2. Back-end: Node.js
3. Database: MongoDB or PostgreSQL
4. Security: JWT authentication
5. Server: A secure server with adequate storage and processing power.

2.3.3 RESULTS

The results of the study showed that the AI-powered chatbot was effective in providing personalized guidance to students:

- Description of the platform's features and functionality: The chatbot provides career recommendations, higher studies guidance, and answers to frequently asked questions.
- Presentation of data on user experience and feedback: Students reported high satisfaction rates with the chatbot's responses and guidance.
- Discussion of any challenges or limitations encountered: The chatbot's effectiveness was limited by the quality of the training data and the complexity of the students' queries.

2.3.4 DISCUSSION

The results of the study highlight the potential of AI-powered chatbots to enhance the academic experience for MCE students:

- Interpretation of the results and their significance: The chatbot's effectiveness in providing personalized guidance demonstrates its potential to improve student outcomes.
- Discussion of the platform's potential impact on student outcomes: The chatbot can help students make informed decisions about their academic and career paths, leading to improved student satisfaction and retention.
- Recommendations for future development and implementation: The chatbot can be further improved

by integrating it with other MCE systems and services, and by providing more advanced features and functionality.

1.   SYSTEM DESIGN

Fig. Future Course Advisor Interface

Fig. Quiz Module for Branches

Fig. AI Chatbot Interface (Variant 1)

Fig. Admin Login Page

Fig. Higher Studies Guide

Fig. AI Chatbot Interface (Variant 2)

3.1 OBJECTIVE

The primary objectives of this project are:

1. Enhance Student Experience: To develop a comprehensive web-based student support portal that provides interactive features and tools to guide students in their academic and career journeys.

2. Improve Educational Services: To create a platform that delivers efficient educational services, bridging the gap between traditional educational advising and modern digital tools.

3. Personalize Student Development: To offer a personalized and responsive platform for student development, enabling students to make informed decisions about their academic and career paths.

4. Streamline Admin Tasks: To design a role-based admin panel that enables administrators to manage quiz content, analyze results, and perform other tasks efficiently.

3.2 METHODOLOGY

The development of the web-based student support portal followed a structured methodology:

1. Requirements Gathering: Identified stakeholder requirements (students, administrators, and faculty).

2. System Design: Designed the system architecture, including UI, database, and security.

3. Development: Developed the system using React.js with modules such as AI chatbot, quiz, and higher studies guidance.

4. Testing: Validated features and resolved bugs.

5. Deployment: Deployed the platform on a secure server accessible to end-users.

3.3 LITERATURE REVIEW

Several research efforts have explored the use of chatbots and AI in education. Studies show that AI-powered chatbots improve engagement and support by providing instant responses, reducing workload on staff, and ensuring consistent delivery of information. One such study involved a university chatbot that answered frequently asked questions related to course schedules and registration, which significantly reduced administrative intervention.

Other research demonstrates how machine learning and NLP (Natural Language Processing) can be integrated into student guidance systems. For example, frameworks developed using Python libraries like NLTK and spaCy have shown effective results in understanding student queries and delivering meaningful recommendations. Furthermore, research has also highlighted the importance of modular architecture and secure access for educational tools, using microservices and authentication mechanisms like JWT.

3.4 FUTURE SCOPE

The system can be expanded by integrating voice-based interaction using speech-to-text APIs, improving accessibility for students with disabilities. Future iterations may also involve machine learning algorithms that adapt recommendations based on student behavior and performance data.

Additionally, integration with college ERP systems, mobile app development, multilingual support, and data analytics dashboards for faculty and admin users could significantly enhance the platform. These enhancements would further personalize learning experiences, offer predictive academic guidance, and support strategic academic planning.

4. CONCLUSION

The "MCE Chatbot AI" initiative marks a significant step in digitally transforming academic communication and learning at Malnad College of Engineering. By integrating conversational AI with branch-specific educational tools, the platform addresses key pain points in the traditional system, including outdated communication channels and lack of personalized academic support. This solution simplifies student-faculty interactions, reduces administrative overhead, and positions MCE as a leader in AI-driven education.

ACKNOWLEDGMENT

REFERENCES

[1] Y. Windiatmoko, A. F. Hidayatullah, and R. Rahmadi, "Developing FB Chatbot Based on Deep Learning Using RASA Framework for University Enquiries," *arXiv*, Sep. 2020. Available: https://arxiv.org/abs/2009.12341

[2] S. Chen, B. Mulgrew, and P. M. Grant, "A clustering technique for digital communications channel equalization using radial basis function networks," *IEEE Trans. Neural Networks*, vol. 4, pp. 570-578, Jul. 1993.

[3] A. Cichocki and R. Unbehaven, *Neural Networks for Optimization and Signal Processing*, 1st ed. Chichester, U.K.: Wiley, 1993, ch. 2, pp. 45-47.

[4] W.-K. Chen, *Linear Networks and Systems*, Belmont, CA: Wadsworth, 1993, pp. 123-135.

[5] H. Poor, *An Introduction to Signal Detection and Estimation*, New York: Springer-Verlag, 1985, ch. 4.

[6] R. A. Scholtz, "The Spread Spectrum Concept," in *Multiple Access*, N. Abramson, Ed., Piscataway, NJ: IEEE Press, 1993, ch. 3, pp. 121-123.

[7] G. O. Young, "Synthetic structure of industrial plastics," in *Plastics*, 2nd ed., vol. 3, J. Peters, Ed., New York: McGraw-Hill, 1964, pp. 15-64.

[8] S. P. Bingulac, "On the compatibility of adaptive controllers," in *Proc. 4th Annu. Allerton Conf. Circuits and Systems Theory*, New York, 1994, pp. 8-16.

[9] W. D. Doyle, "Magnetization reversal in films with biaxial anisotropy," in *Proc. 1987 INTERMAG Conf.*, 1987, pp. 2.2-1–2.2-6.

[10] G. W. Juette and L. E. Zeffanella, "Radio noise currents in short sections on bundle conductors," presented at the IEEE Summer Power Meeting, Dallas, TX, Jun. 22–27, 1990.

[11] J. Williams, "Narrow-band analyzer," Ph.D. dissertation, Dept. Elect. Eng., Harvard Univ., Cambridge, MA, 1993.

[12] N. Kawasaki, "Parametric study of thermal and chemical nonequilibrium nozzle flow," M.S. thesis, Dept. Electron. Eng., Osaka Univ., Osaka, Japan, 1993.

[13] J. P. Wilkinson, "Nonlinear resonant circuit devices," U.S. Patent 3,624,112, Jul. 16, 1990.

[14] *Letter Symbols for Quantities*, ANSI Standard Y10.5-1968.

[15] *Transmission Systems for Communications*, 3rd ed., Western Electric Co., Winston-Salem, NC, 1985, pp. 44–60.

[16] *Motorola Semiconductor Data Manual*, Motorola Semiconductor Products Inc., Phoenix, AZ, 1989.

[17] R. J. Vidmar, "On the use of atmospheric plasmas as electromagnetic reflectors," *IEEE Trans. Plasma Sci.* [Online], vol. 21, no. 3, pp. 876–880, Aug. 1992. Available: http://www.halcyon.com/pub/journals/