AI-POWERED CHATBOT FOR COLLEGE STUDENT SUPPORT

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Abstract

The AI-Powered Chatbot for College Student Support is an intelligent system designed to provide instant responses to student queries about college-related information, such as facilities, departments, faculty, and events. By leveraging NLP logic for natural language processing and MongoDB for structured data storage, the chatbot delivers context-aware and efficient responses.The system features a secure login/signup process, a real-time chat interface, and an automated password reset mechanism. The frontend, built using Bootstrap, HTML, CSS, and JavaScript, ensures a user-friendly experience, while the backend, powered by Node.js and Express.js, handles seamless communication between the AI and the user.

This project aims to simplify access to essential college-related information, reducing administrative workload and enhancing the student experience through AI-driven automation. Additionally, this chatbot can serve as a foundation for further AI-driven educational assistance, enabling better engagement and accessibility for students at all levels.

Keywords: AI Chatbot, NLP, Node.js, Express.js, MongoDB, College Student Support, Natural Language Processing (NLP)

1.INTRODUCTION

Students frequently require quick access to academic schedules, faculty details, examination dates, and institutional resources. Traditional methods, such as manual inquiries, emails, and static FAQs, often cause delays, inefficiencies, and an overwhelming burden on administrative staff.An AI-powered chatbot provides instant, automated responses, reducing wait times and improving efficiency. This chatbot, utilizing Natural Language Processing (NLP), will enhance the student experience by providing real-time answers to a wide range of queries, ensuring accessibility and reducing repetitive administrative tasks[1-24].

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2.Literature Survey

1. “INTELLIGENT SMART CHATBOT SYSTEM” (2020):Discusses AI-driven chatbot applications in universities for academic and administrative support.
2. “Chatbot for College Website” (2021):Explores chatbot integration with web portals to improve student interaction and automate query resolution.

These studies highlight the growing importance of AI chatbots in educational institutions, demonstrating their ability to provide quick, personalized responses and enhance accessibility.

3.Methodology

The development of our AI-powered college chatbot follows a modular and iterative methodology that prioritizes simplicity, clarity, and efficiency. The backend is built using Node.js with Express.js, and the frontend uses HTML and CSS, converted into EJS templates to support server-side rendering. User authentication, registration, and password reset via OTP are implemented with MongoDB for data persistence andNodemailer for email verification. The chatbot’s intelligence is driven by custom NLP logic, which interprets user questions and responds using data stored in a structured JSON file containing faculty info, events, labs, and department details. This design eliminates the need for third-party AI APIs, providing full control and better performance.

4.Existing System

In the existing college information system, students often rely on physical visits to administrative offices or manual searches on static web pages to get answers to their queries. This traditional approach leads to delays, miscommunication, and limited accessibility—especially outside office hours. The process is not only time-consuming but also inefficient when handling repetitive or frequently asked questions.

Additionally, current systems lack interactivity and real-time support. Students cannot have personalized conversations or get dynamic responses based on their unique queries. There is no centralized digital assistant that can offer consistent, instant, and automated help across a wide range of academic and campus-related topics. This limitation highlights the need for an intelligent chatbot system like ours, which bridges this gap with 24/7 automated support.

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5.Problem Statement

Many educational institutions face challenges in handling numerous student queries regarding faculty, departments, events, labs, and other campus-related activities. Traditional approaches like printed manuals, notice boards, or even manual assistance desks can be inefficient and

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delay response time. Moreover, integrating complex third-party APIs such as OpenAI for chatbot interactions can be costly, require constant internet access, and raise security or privacy concerns when handling internal data.

This project aims to build a lightweight, cost-effective, and AI-powered chatbot system specifically tailored for a college environment. Using basic NLP (Natural Language Processing) logic and a structured local dataset (JSON), the system interprets user queries and returns accurate responses instantly. By removing dependencies on external AI APIs and focusing on custom NLP logic, this chatbot provides a fast, secure, and scalable solution for educational institutions looking to automate student support and enhance communication.

6. PROPOSED SYSTEM

The proposed system is an AI-powered College Chatbot that delivers instant and accurate responses to students' queries using NLP (Natural Language Processing) logic. It eliminates the need for API integrations like OpenAI, instead utilizing a custom-built logic that maps common queries to appropriate answers. This project uses MongoDB as the backend database, Node.js with Express for backend logic, and HTML/CSS converted to EJS templates for the frontend.

Key Components:

1. User Authentication: Allows secure login and registration for students.
2. Chat Interface: Lets users ask college-related queries in a conversational format.
3. Query Processor: Uses NLP techniques to match the query with available data from a JSON file.
4. Response Generator: Returns a relevant and informative response fetched from the local college dataset.
5. Session Handling: Maintains user sessions securely during chat interaction.

7. PROJECT MODULES

1. Authentication Module
    - Handles user registration and login functionality.
    - Includes email verification via OTP using Nodemailer.
2. Chatbot Module
    - Takes user queries.
    - Processes them through a basic NLP parser.
    - Matches questions with pre-defined answers in a JSON file.

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3. Database Module
    - Stores user credentials securely.
    - Uses MongoDB for storing data.
4. Frontend Module
    - Designed using HTML, CSS and EJS templating engine.
    - Ensures a user-friendly interface for login, register, and chatbot.

8. PROJECT REQUIREMENTS

Hardware Requirements:

- A computer/laptop with minimum 4GB RAM
- Internet connection for development and testing

Software Requirements:

- Node.js and NPM
- MongoDB Atlas (Cloud database)
- Code Editor (VS Code)

Libraries Used*:*

- Express.js (for backend routing)
- Mongoose (for database connection)
- Bcrypt (for hashing passwords)
- Nodemailer (for sending OTPs)
- Body-parser, dotenv, session (middleware management)

9. SYSTEM ARCHITECTURE

1. User interacts via chatbot interface.
2. Query is sent to the Express.js server.
3. NLP logic processes the query.
4. If matched, relevant data is fetched from the JSON dataset.
5. Response is sent back to the frontend and displayed.

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6. If login or registration is initiated, MongoDB handles user data storage and validation.

10. DESIGN AND DEVELOPMENT

Design: The system is designed with a modular approach for scalability. User data is securely handled, and chatbot queries are interpreted using a lightweight NLP-based search.

Development:

1. Created all UI pages (login, register, chatbot) using EJS.
2. Created REST routes using Express.js for login, OTP verification, chat handling.
3. Designed a JSON dataset to serve as the chatbot knowledge base.
4. Developed NLP logic that tokenizes and matches input queries with the dataset.

11.Result

The chatbot successfully handles multiple types of student queries regarding faculty, departments, events, and labs. The NLP logic implemented is efficient for keyword matching and provides relevant responses.All backend functionalities such as registration, login, and OTP verification are working seamlessly. MongoDB securely stores and retrieves user data, and session handling ensures security during interactions. The chatbot provides instant and accurate responses in real-time

12.Future Scope

Expand Knowledge Base: Include more comprehensive datasets covering full academic and administrative information.

Multilingual Support: Implement regional language understanding for better reach.

Voice-based Chatbot: Integrate speech recognition and response features.

Admin Dashboard: Allow staff to manage FAQs, view student queries, and generate reports.

13.Conclusion

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This AI-powered chatbot project was designed to streamline the process of answering college-related queries through an intuitive and real-time interface. By utilizing NLP instead of external AI APIs, the system ensures fast, secure, and context-specific responses. With proper user authentication, modular design, and MongoDB for secure storage, the project serves as a robust, cost-effective, and scalable solution for educational institutions.

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