

# **SMARTBOT: STUDENT HELPDESK**

## **PROJECT SYNOPSIS**

OF MAJOR PROJECT

### **BACHELOR OF TECHNOLOGY**

Computer Science & Engineering

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## INTRODUCTION

The SMARTBOT: Student Helpdesk is an AI-driven chatbot system designed to assist students with academic, administrative, and technical queries in real time. It ensures seamless communication by integrating both text and voice-based interactions, making it accessible to all users. This project aims to enhance communication efficiency, automate responses to frequently asked questions, and provide seamless support for students in educational institutions. The chatbot will handle inquiries related to course details, examination schedules, fee structures, technical issues, and general student support. By leveraging advanced technologies, the project ensures a faster and more efficient response system, reducing the workload on human helpdesk staff.

The development of SMARTBOT involves cutting-edge technologies such as Artificial Intelligence (AI) and Natural Language Processing (NLP) for understanding and responding to student queries intelligently. The backend is developed using Python with Node.js to manage requests, store data, and integrate with institutional databases, while the frontend is built with React.js for a user-friendly interface. For data management, MySQL is used to store queries, chatbot responses, and analytics data. Security is ensured through OAuth, JWT authentication, and HTTPS encryption to protect student information.

The project is falling under the EdTech (Educational Technology) and Artificial Intelligence domains, SMARTBOT leverages AI-powered automation to improve student support services. The project incorporates technical aspects such as Natural Language Processing (NLP) for understanding human language, Sentiment Analysis to determine the tone and urgency of queries, Live Chat Escalation for complex issues requiring human intervention, and Multi-Platform Integration to ensure accessibility across web, mobile, and messaging applications.

The primary aim of this project is to develop an intelligent, efficient, and user-friendly chatbot system that enhances student support services by providing quick and accurate responses, reducing dependency on human helpdesk staff, and improving the overall student experience in academic institutions.

## **RATIONALE**

In educational institutions, students often face difficulties in obtaining timely responses to their academic, administrative, and technical queries. Traditional helpdesk systems, which rely on human staff, are often overwhelmed by repetitive inquiries, leading to delays in response times and inefficiencies in handling student concerns. The SMARTBOT: Student Helpdesk is designed to address these challenges by providing an AI-powered, automated solution that ensures 24/7 availability, reduces response time, and streamlines communication between students and the institution. By integrating Natural Language Processing (NLP) and Machine Learning (ML), the chatbot can deliver accurate, context-aware responses while continuously improving based on user interactions.

This project is particularly essential in modern educational environments, where digital transformation is rapidly changing the way student's access information. With the rise of online learning, hybrid education models, and remote administrative processes, an intelligent chatbot can significantly enhance student engagement by offering instant support across multiple platforms, such as web, mobile, and messaging applications. Additionally, the automation of routine queries allows human helpdesk staff to focus on more complex and high-priority issues, ultimately improving overall efficiency and student satisfaction.

## **OBJECTIVES**

The objectives of SMARTBOT: Student Helpdesk are:

- 1) To develop an AI-powered chatbot that enables easy communication of CSE students.
- 2) To integrate the chatbot with departmental website.
- 3) To test the behaviour of Chatbot in real-time.

# LITERATURE REVIEW

The integration of AI chatbots in education has gained significant momentum in recent years, with studies from 2023 and 2024 highlighting their impact on learning outcomes and educational practices.

## **1. Impact of AI Chatbots on Student Learning Outcomes**

A meta-analysis by Wu and Yu (2023) examined the effects of AI chatbots on students' learning outcomes. The study concluded that AI chatbots have a substantial positive impact, particularly in higher education settings. Notably, shorter intervention durations were more effective, suggesting that the novelty of AI chatbots can enhance learning in the short term. The authors recommend incorporating human-like avatars, gamification elements, and emotional intelligence into chatbots to sustain student engagement over longer periods.

## **2. Transformative Effects of ChatGPT on Modern Education**

Gill et al. (2023) explored the transformative effects of ChatGPT, an AI-based chatbot, on modern education. The study found that ChatGPT can assist educators by creating instructional content, offering suggestions, and acting as an online tutor for learners by answering questions and promoting group work. However, the study also highlighted drawbacks, such as the possibility of producing inaccurate or false data and circumventing plagiarism detectors where originality is essential. The authors emphasize the need for educating teachers and students about ChatGPT's capabilities and limitations to effectively integrate it into the learning environment.

## **3. Integration of AI in College Education**

Song et al. (2024) investigated the integration of AI chatbots into higher education by developing a ChatGPT-based teaching application for an undergraduate medical imaging course. The study found that while ChatGPT offers significant advantages, such as improved information access and increased interactivity, its adoption is accompanied by concerns about the accuracy of the information provided and the necessity for well-defined guidelines to optimize its use.

#### **4. AI-Enabled Intelligent Assistants for Personalized Learning**

Sajja et al. (2023) introduced the Artificial Intelligence-Enabled Intelligent Assistant (AIIA), designed to provide personalized and adaptive learning in higher education. The AIIA system leverages advanced AI and Natural Language Processing techniques to create an interactive and engaging learning platform. Its capabilities include understanding and responding to student inquiries, generating quizzes and flashcards, and offering personalized learning pathways. The research findings suggest that such AI-enabled Virtual Teaching Assistants can significantly enhance student learning outcomes, engagement, and satisfaction.

These studies collectively underscore the potential of AI chatbots to enhance educational experiences by providing personalized, interactive, and accessible learning support. However, they also highlight the importance of addressing challenges related to information accuracy, user engagement, and the development of clear guidelines for effective implementation.

# FEASIBILITY STUDY

## 1. Technical Feasibility

The project is technically feasible due to the availability of advanced Artificial Intelligence (AI), Natural Language Processing (NLP) which provide robust chatbot frameworks that can be integrated with existing student portals. The backend can be efficiently managed using Python or Node.js, while a React.js which is frontend ensures a user-friendly interface. Database solutions like MySQL or Firebase provide reliable storage for chatbot interactions and student queries.

## 2. Economic Feasibility

Developing SMARTBOT requires an initial investment in AI model training, backend development and database management. However, the long-term cost savings outweigh the initial costs. The automation of routine queries reduces the need for extensive human support staff, lowering operational costs. Open-source technologies like Rasa and TensorFlow can be used to minimize licensing costs. Additionally, educational institutions can implement a phased deployment approach to manage budget constraints, ensuring economic feasibility.

## 3. Operational Feasibility

The chatbot will significantly improve student support services by providing 24/7 assistance, reducing workload for human helpdesk staff, and ensuring faster response times. Institutions can easily integrate the chatbot into their existing digital infrastructure, including university websites, mobile apps, and learning management systems (LMS). Additionally, the chatbot's ability to handle multiple queries simultaneously ensures smooth operations and an enhanced student experience. The system can also be updated over time with new FAQs, responses, and learning models to adapt to changing student needs.



## **METHODOLOGY/ PLANNING OF WORK**

### **Data Collection & Preparation:**

- Gather frequently asked questions (FAQs) from students, faculty, and administration.
- Collect academic schedules, course details, admission procedures, and exam guidelines.
- Prepare a structured dataset of queries and responses for training the chatbot.

### **Chatbot Development**

- Use Natural Language Processing (NLP) to understand and respond to student queries.
- Implement an intent-based system where the chatbot identifies user questions and provides relevant answers.
- Train the chatbot using AI models like Dialogflow, Rasa, or GPT-based models.

### **Integration & Deployment**

- Connect the chatbot to college databases, websites, and Learning Management Systems (LMS).
- Deploy the chatbot on platforms like college websites, mobile apps, and messaging apps (WhatsApp, Telegram, etc.).
- Ensure real-time responses with cloud hosting on AWS, Google Cloud, or a college server.

### **Testing & Evaluation**

- Conduct internal testing with students and faculty to check chatbot accuracy and response quality.
- Make improvements based on real interactions and user feedback.
- Ensure the chatbot handles different types of student queries efficiently.

## Monitoring & Maintenance

- Implement analytics tools to track chatbot performance and usage.
- Regularly update the chatbot to improve accuracy and add new features.
- Ensure security and privacy compliance to protect student data.

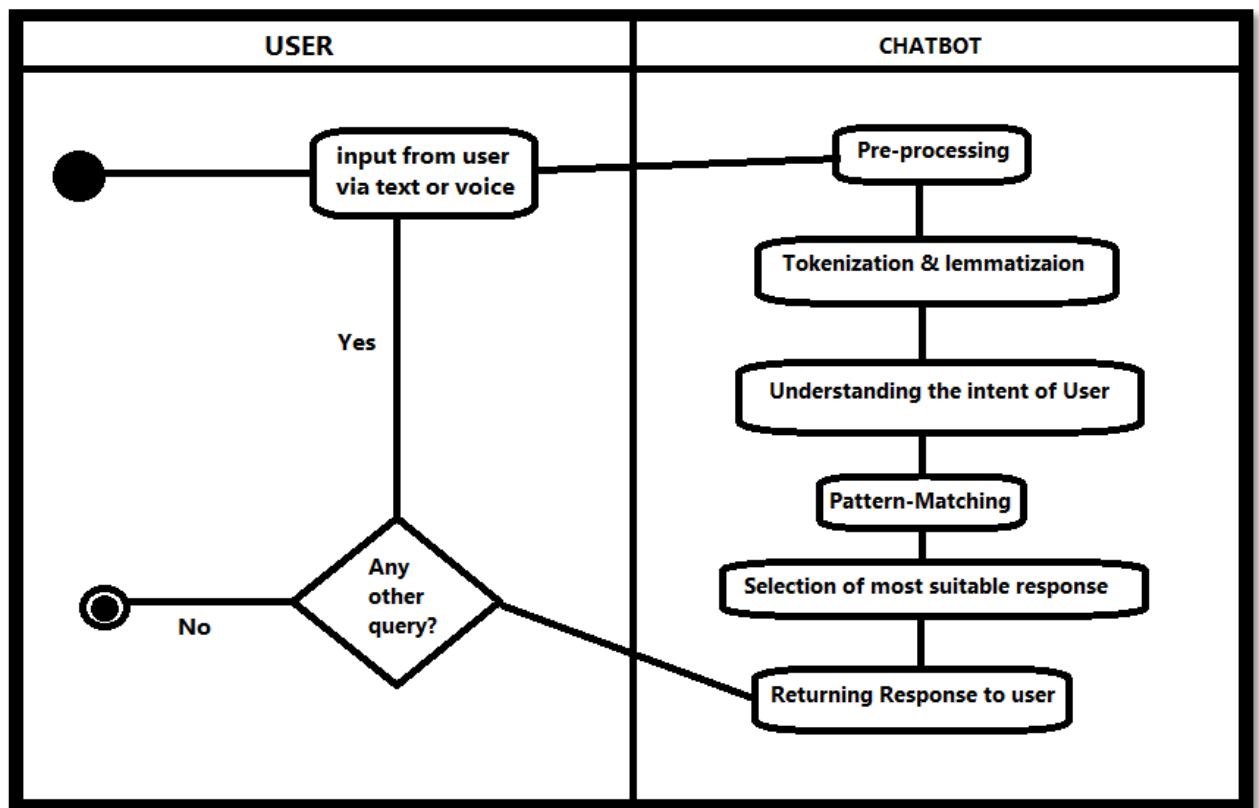


Figure 1: Flowchart for the project

## **FACILITIES REQUIRED FOR PROPOSED WORK**

- **Hardware Required –**

- > Operating System: Windows 8.1,10,11
- > RAM: Minimum 4 GB
- > Hard Drive: Maximum 1 TB

- **Software Required –**

- > HTML
- > CSS
- > React.js
- > Node.js
- > MySQL
- > Visual Studio Code (VS Code)
- > Python

## **EXPECTED OUTCOMES**

The SMARTBOT: Student Helpdesk is expected to enhance student support services by providing 24/7 automated assistance, reducing response times, and minimizing the workload on human helpdesk staff. It will improve accessibility to academic, administrative, and technical information through an AI-driven chatbot that understands and responds to student queries efficiently. The system will ensure seamless integration with institutional databases and student portals, enabling real-time support across web, mobile, and messaging platforms. Additionally, its machine learning capabilities will allow continuous improvement based on user interactions, leading to a more personalized and intelligent response system. Overall, SMARTBOT will contribute to higher student satisfaction, improved operational efficiency, and cost savings for educational institutions.

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