

# GENERATIVE AI BASED VIRTUAL ASSISTANT FOR CAMPUS SUPPORT

Dr. Brindha S<sup>1</sup>, Ms. Thamaraiselvi K<sup>2</sup>, Mr. Aliasgar Patni K<sup>3</sup>, Mr. Ashwin Chakarawarthy G.P<sup>4</sup>  
Mr. Logeswaran P<sup>5</sup>, Mr. Prasana Kumar K<sup>6</sup>, Mr. Sharvesh S<sup>7</sup>

<sup>1</sup>Head of the Department, Computer Networking, PSG Polytechnic College, Coimbatore

<sup>2</sup>Lecturer, Computer Networking, PSG Polytechnic College, Coimbatore

<sup>3,4,5,6,7</sup> Students, Computer Networking, PSG Polytechnic College, Coimbatore

**Abstract** - The rapid advancement of generative artificial intelligence has enabled the development of intelligent conversational systems capable of transforming educational environments. This paper presents Campus GPT, an AI-powered assistant designed specifically for educational campuses to support students, faculty, and administrative staff through natural language interaction. Built upon large language model (LLM) architecture, Campus GPT provides real-time academic assistance, administrative guidance, scheduling support, and campus information retrieval. The system integrates domain-specific knowledge bases, institutional data sources, and dialogue management techniques to ensure accurate, context-aware, and personalized responses. Experimental evaluation and user feedback indicate that Campus GPT significantly improves information accessibility, reduces administrative workload, and enhances user engagement across campus services. Ethical considerations such as data privacy, transparency, and bias mitigation are also addressed to ensure responsible deployment. The results demonstrate that Campus GPT serves as an effective and scalable AI-driven solution for modern educational campuses, contributing to improved learning

experiences and operational efficiency.

**Index Terms**— Artificial Intelligence, Chatbot, Large Language Models (LLM), Natural Language Processing, Educational Technology, Campus Information System, AI Assistant.

## I. INTRODUCTION

Educational campuses generate large volumes of academic and administrative information that students and faculty must access regularly. Traditional support systems such as notice boards, websites, and help desks often provide limited availability and lack personalized assistance. As a result, users may experience delays in obtaining accurate and relevant information.

Recent advances in artificial intelligence and natural language processing have enabled conversational agents capable of real-time, human-like interaction. However, many existing educational chatbots are rule-based and limited in handling complex queries. To address these limitations, Campus GPT is proposed as an AI-powered assistant designed for educational campuses. The system leverages large language models to provide academic support, administrative guidance, and campus-related information through natural language interaction, improving accessibility and operational efficiency.

## B. LLM Based Conversational Systems

Large Language Models (LLMs) such as GPT-based architectures have revolutionized natural language processing by enabling context-aware and human-like conversations. These models are trained on massive datasets and can understand complex queries, generate meaningful responses, and maintain conversational flow. Research indicates that LLM-powered assistants outperform rule-based chatbots in handling diverse academic and administrative queries. Their ability to integrate domain-specific knowledge makes them suitable for educational campus applications.

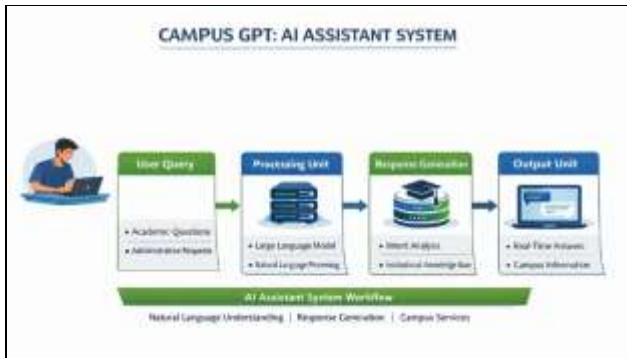


Fig:1 :Campus GPT : AI Assistant System

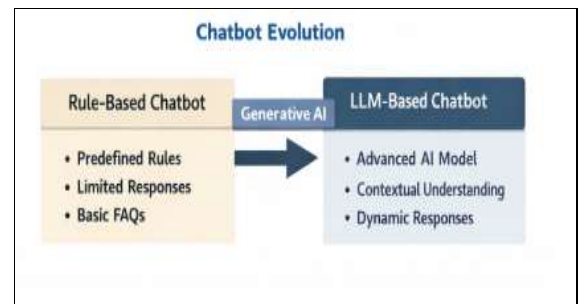


Fig:3 :Chatbot Evolution

## II. LITERATURE REVIEW

### A. AI-Based Chatbots in Education

Artificial intelligence–driven chatbots have gained significant attention in educational environments due to their ability to provide instant responses and personalized assistance. Previous research shows that AI chatbots are effective in answering academic queries, guiding students through course information, and supporting self-directed learning. Unlike traditional help desks, AI assistants operate continuously and reduce dependency on human staff. Studies highlight that conversational agents improve student engagement and satisfaction by offering interactive and adaptive learning support.

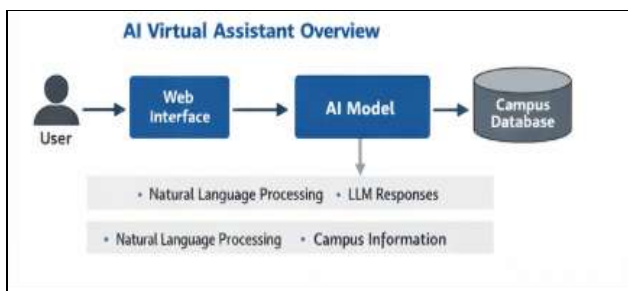


Fig:2 :AI Virtual Assistant Overview

### C. AI Assistants for Campus Administration

AI assistants are widely used for managing campus-related services, including admission guidance, academic schedules, examination details, and administrative procedures. Existing systems help streamline information retrieval and improve operational efficiency. However, studies identify limitations such as restricted query handling and lack of personalization. Integrating AI assistants with campus databases enables faster responses and more reliable information delivery, benefiting both users and administrators.

## D. User Interaction in AI Systems

Personalization plays a vital role in improving the effectiveness of AI-based educational assistants. Research highlights that systems capable of adapting responses based on user roles—such as students, faculty, or staff—offer better user experience. Natural language interaction enhances usability and accessibility, especially for new users unfamiliar with campus processes. Context-aware dialogue management is identified as a key factor in developing intelligent and user-friendly campus AI assistants.

## III. SYSTEM OVERVIEW

Campus GPT is a web-based AI assistant designed to support students, faculty, and administrative staff. The system processes natural language queries using a large language model combined with institutional knowledge sources. It provides real-time and accurate academic as well as campus-related information through an interactive and user-friendly interface.

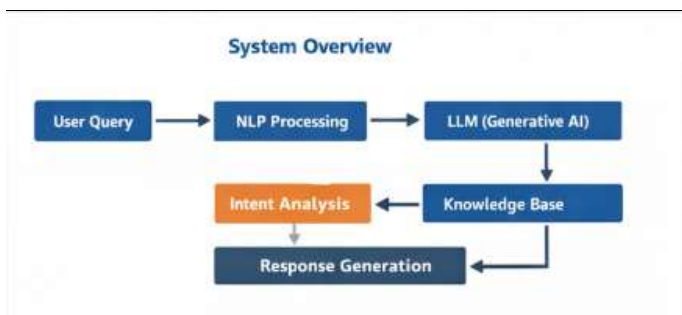


Fig:4 :System Overview

### A. Software Components

- Python 3.
- Large Language Model (GPT-based).
- Flask / Fast API.
- HTML.
- CSS.
- JavaScript.

- REST API.
- MySQL / SQLite.
- Natural Language Processing (NLP) libraries.
- Authentication module.
- JSON.
- Visual Studio Code.
- Git / GitHub.
- Web browser (Google Chrome / Microsoft Edge).
- Windows / Linux Operating System .

## IV. METHODOLOGY

### A. User Query Input

Users interact with Campus GPT through a web-based interface by entering queries in natural language. The system supports multiple user roles such as students, faculty, and administrators, allowing role-specific interactions and access control.

### B. Input Preprocessing

The received queries are pre-processed using natural language processing techniques. This includes text cleaning, tokenization, and normalization to ensure compatibility with the language model and to improve understanding of user intent.

### C. Query Understanding and Intent Analysis

The preprocessed input is analyzed using a Large Language Model (LLM) to identify the intent and context of the query. The model interprets academic, administrative, or general campus-related requests and determines the appropriate response strategy.

### D. Response Generation

Based on the identified intent, Campus GPT generates accurate and context-aware responses. The system integrates institutional knowledge bases and predefined campus information to ensure reliable

“Exam timetable for third semester is scheduled next week.”

“Contact details of the Computer Networking department are available.”

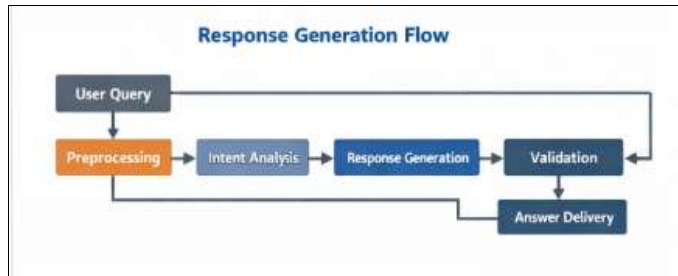


Fig:5 :Response Generation Flow

### E. Response Validation and Formatting

Generated responses are validated for relevance and clarity before being presented to the user. The system filters redundant or ambiguous outputs and formats the response in a user-friendly manner suitable for web display.

### F. Real-Time Interaction Loop

- Accept user query through web interface.
- Preprocess input text.
- Analyze intent using LLM.
- Retrieve or generate appropriate response.
- Validate and format output.
- Display response to user.
- Repeat continuously for subsequent queries.

## V. SYSTEM ARCHITECTURE

The system consists of four major units:

1. Input Unit: User queries entered through a web-based interface.
2. Processing Unit: Backend server running a large language model and natural language processing modules.
3. Response Generation Unit: Intent analysis and response generation using institutional knowledge bases.

4. Output Unit: Web interface displaying real-time responses to users. This architecture ensures fast, scalable, and continuous operation for campus information access.

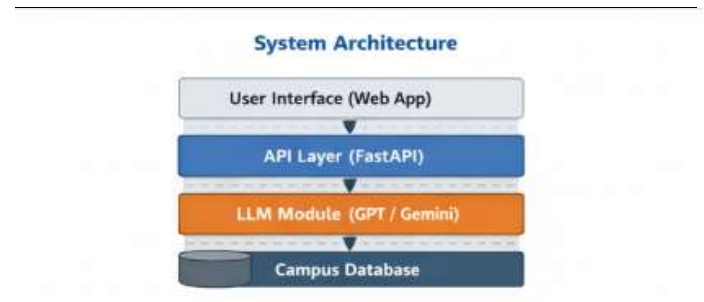


Fig:6 :System Architecture

## VI. RESULTS AND DISCUSSION

### A. Response Accuracy

Testing was conducted using academic and administrative queries from students and faculty under different usage scenarios.

### B. Performance Summary:

- High accuracy in answering academic queries.
- Reliable responses for administrative information.
- Minimal irrelevant or incorrect responses.
- Effective handling of common campus-related questions.

### C. Real-Time Performance

- Response time was fast for normal queries
- Slight delay observed during complex or multi-part questions.
- System maintained smooth interaction during continuous usage.

### D. Limitations

- Performance depends on quality of institutional data.

- Complex queries may require clarification.
- Requires internet connectivity for LLM access.

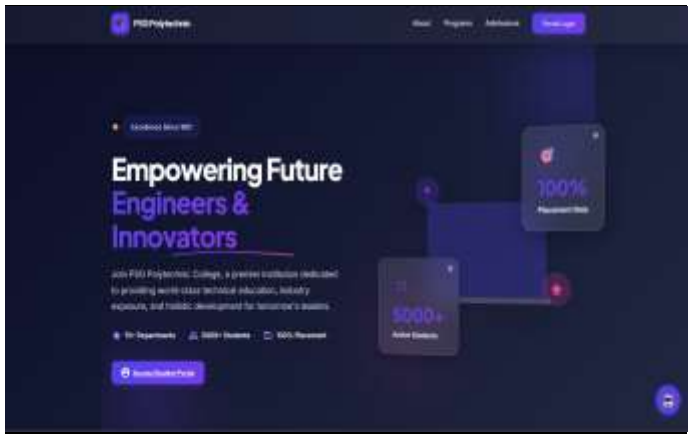


Fig:7 :Implementation

## VII. CONCLUSION

Campus GPT successfully demonstrates an AI-powered assistant designed to improve information accessibility and support services within educational campuses. By leveraging large language models and natural language processing, the system provides real-time academic and administrative assistance through an interactive interface. The system operates effectively in real-world campus scenarios, making it a practical and scalable solution for modern educational environments.

## Future Enhancements

- Voice-based query interaction.
- Integration with campus management systems.
- Multilingual support.
- Personalized recommendations for users.
- Continuous learning using updated institutional data.

## REFERENCES

1. **Brown, T. B., et al. (2020).** *Language Models are Few-Shot Learners.* Advances in Neural Information Processing Systems (NeurIPS).
2. **OpenAI. (2023).** *GPT-4 Technical Report.* OpenAI Research Documentation.
3. **Adamopoulou, E., & Moussiades, L. (2020).** *An Overview of Chatbot Technology.* Artificial Intelligence Applications and Innovations, Springer.
4. **Winkler, R., & Söllner, M. (2018).** *Unleashing the Potential of Chatbots in Education.* Academy of Management Annual Meeting Proceedings.
5. **Dale, R. (2016).** *The Return of the Chatbots.* Natural Language Engineering, Cambridge University Press.
6. **IEEE. (2021).** *Artificial Intelligence in Education: Current Trends and Applications.* IEEE Access.