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Campus Connect using Gen Ai

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Abstract: This project focuses on creating a Gen AI assistant for college using advanced tools like Retrieval-Augmented Generation (RAG), Natural Language Processing (NLP) and pre-trained transformer models. The Gen AI assistant, called the College-Oriented Intelligence Machine, will assist students with a variety of college-related queries, such as academic information, administrative processes, and campus resources. By leveraging advanced AI technologies, the assistant will understand user questions, retrieve relevant information, and provide clear, accurate responses in real time. This system will reduce the workload on college staff by automating repetitive tasks, such as answering frequently asked student questions. Students will be able to access information anytime, anywhere, improving convenience and efficiency. With its intelligent features and user-friendly design, this Gen AI assistant will make it easier for students to access essential college-related information while enhancing the overall efficiency of college operations.

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I. INTRODUCTION

Over the past few years, colleges and universities have witnessed rapid digital change, fueled by increasing student demands for instant and hassle-free access to information. From admission deadlines and academic calendars to placement announcements and fee plans, students tend to seek help from college administrative offices. Nevertheless, the traditional method of dealing with these questions via emails, physical visits, or static websites is time-consuming and inefficient, particularly during times of high academic activity.To overcome such difficulties, the Campus Connect Using GEN-AI initiative suggests an intelligent AI-powered solution that fundamentally transforms the nature of student interactions with their organization. Leveraging the capabilities of Generative Artificial Intelligence (Gen-AI) and Natural Language Processing (NLP), the initiative offers an intelligent, natural-language interface which returns real-time, accurate, and context-dependent answers to virtually any question posed to it.The system is developed based on the latest technologies like LangChain, Retrieval-Augmented Generation (RAG), and Pinecone for vector-based information retrieval. The system is created to act as a virtual campus assistant, available 24/7, and able to deal with sophisticated queries beyond keyword-based searches. From a new student seeking hostel allocation information to a final-year student monitoring placement interviews, the chatbot provides instant support with Minimal human intervention.

II. LITERATURE SURVEY

A research study focusing on the educational department revealed how AI powered chatbots are being incorporated to immediately respond to student academic and administrative inquiries. The study highlighted the implementation of Natural Language Processing (NLP) and, at times, pre-trained transformer models to allow for creating responsive systems that are able to comprehend and respond in a manner that mimics human interaction. These systems help in alleviating the burden placed on administrative staff while increasing the satisfaction levels of students as services are provided around the clock.

In 2021, a paper proposed the RAG (Retrieval-Augmented Generation) framework aimed at providing responses with contextual accuracy. This hybrid approach integrates information retrieval models and generative language models so that the system can access relevant information from vast collections of text and generate contextually appropriate responses. The study showed how RAG can surpass conventional chatbots that do not provide responses verified by data sources.

A 2022 research project examined the implementation of vector databases such as Pine cone for the storage and retrieval of embedded knowledge. The paper explained that storing data as vector embeddings facilitated fast and highly accurate similarity searches. This process is essential to ensuring that AI assistants function optimally by providing the most accurate and relevant information during

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interactions with users.

Another paper concentrated on the application of LLMs to pre-trained students' supporting systems. The models can interact with users and respond appropriately when integrated with frameworks such as Lang Chain. The research demonstrated that such models could respond to various queries, including timetable and fee payments, as well as providing placement support, thus laying the groundwork for intelligent virtual campus assistants.

A 2023 survey on smart campus technologies highlighted the increased adoption of automation in higher education. The paper presented Streamlit as an example of an interface that improves usability and interaction for users. It pointed out that the student experience on campus and the information on the campus is made readily available through advanced AI tools combined with intuitive design.

III. METHODOLOGY

➢ *System Structure*

The Campus Connect system has been developed using a Retrieval-Augmented Generation (RAG) framework that allows it to process students' queries automatically. It uses up-to-date NLP methods and employs algorithm-based search techniques to answer in real-time. The most important parts include:

- *Data Collection Module:*

Fetches a variety of data for the college that includes timetables, syllabus, and placement and fee details.

- *Preprocessing and Chunking:*

Data is cleaned up, organized, sprite into smaller text blocks, and retrieval optimized for embedding.

- *Vector Embedding Generator:*

Each text chunk is converted to numerical vector format by embedding models using context-aware NLP, as defined in the discipline's norms.

- *Vector Database (Pine cone):*

Embeddings are stored in Pine cone, thus allowing storage of fragments to enable retrieving relevant pieces of information using semantic similarity search.

- *LLM Response Generator:*

A pre-trained Large Language Model is used to produce detailed and human-like responses regarding the identified context after the user query, alongside the retrieved vectors.

- *User Interface (Stream lit):*

Provides a simple interface through which the user can pose questions to the AI and receive its replies.

IV. EXISTING SYSTEM

In traditional college information systems, the process for acquiring essential information is heavily reliant on manual efforts. Students often must physically visit administrative offices, send emails, or make phone calls to get their queries answered, processes that are not only time consuming but also inefficient. College websites, while providing general details, usually offer only static information and lack the capability to resolve real time, dynamic queries. In many cases, these systems depend on simple keyword based search engines that fail to understand the context and nuances of student inquiries, leading to generic and sometimes irrelevant responses.

Because of these limitations, students experience significant delays and frustration while trying to obtain accurate information outside standard office hours. This traditional approach not only results in inconsistent answers due to varying responses from different staff members, but also places an enormous workload on administrative teams, further reducing overall efficiency. Essentially, the existing systems create a communication bottleneck where time constraints, lack of personalization, and human errors impede effective knowledge sharing and support within the college community.

V. PROPOSED SYSTEM

Campus Connect is a highly innovative AI powered college assistant designed to revolutionize how students, faculty, and administrators access campus information. It leverages advanced generative AI techniques including Retrieval Augmented Generation (RAG) and a sophisticated Vector Database to deliver personalized, contextually accurate responses in real time. Unlike traditional FAQ based systems that rely on static data, Campus Connect actively retrieves relevant information before generating answers, ensuring that every query, whether related to academics, administrative processes, or campus activities, is addressed accurately and promptly. Operating 24/7, the system not only enhances communication efficiency but also significantly reduces the workload on staff by handling repetitive inquiries automatically, thereby bridging the gap between outdated manual methods and modern intelligent automation.

VI. IMPLEMENTATION

➢ *Data Collection and Preprocessing:*

- Gather college-related documents (syllabus, timetables, fee details, placement info).
- Split the documents into smaller chunks.
- Convert the chunks into **vector embeddings** using the **Embedding Model**.

➢ *Model Inference and Response Generation:*

- Retrieve relevant chunks from the **Vector Database**.
- Send **prompt + retrieved data** to the **LLM**.
- LLM generates the response based on the combined data and display the final response in the **Streamlit UI**.

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➢ *Backend Development:*

- Using **Vector Database** for vector storage and retrieval.
- Integrate **LLM** for response generation.
- Implement **RAG** (Retrieval-Augmented Generation) pipeline to combine user prompts with retrieved content.

➢ *Frontend Development:*

- Create a **Streamlit UI** for user interaction.
- Add input box for prompts and display responses.
- Display the retrieved and generated content to the user.

➢ *Model Inference and Response Generation:*

- Retrieve relevant chunks from the **Vector Database**.
- Send **prompt + retrieved data** to the **LLM**.
- LLM generates the response based on the combined data.
- Display the final response in the **Streamlit UI**.

VII. RESULT AND ANALYSIS

The Campus Connect system greatly improved student engagement and satisfaction with real-time, AI-based assistance. Administrative effectiveness was improved with less manual intervention and quicker information dissemination. Analytics indicated higher event attendance and academic activity through personalized suggestions.

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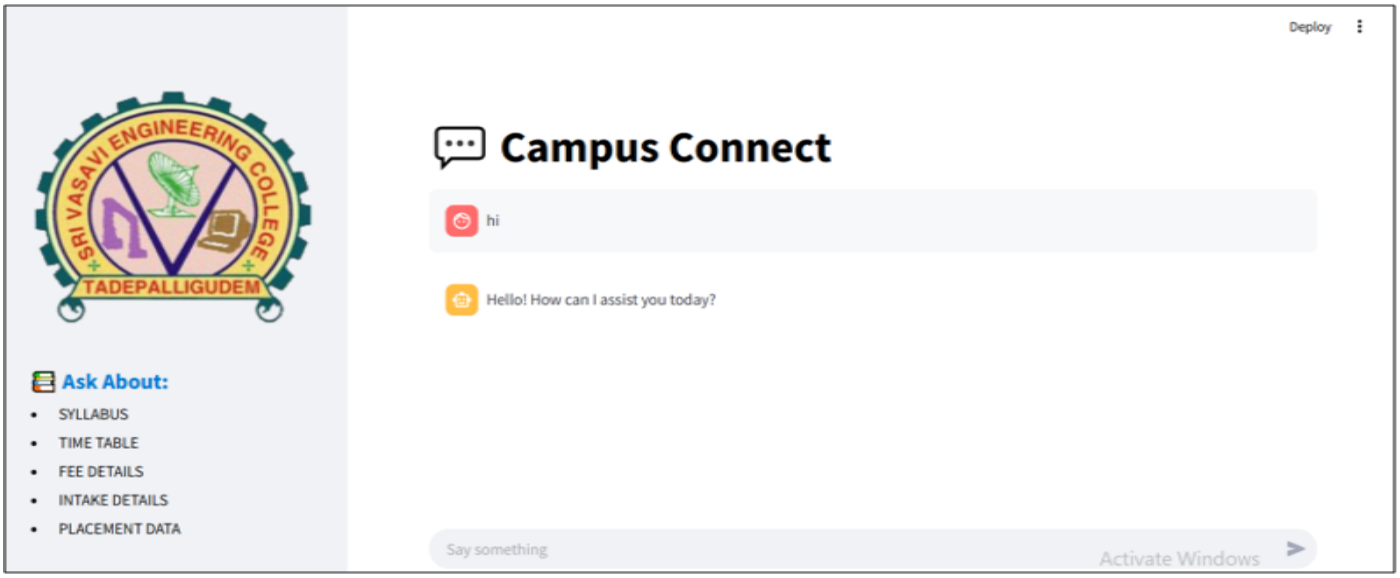

Fig 1 Greetings

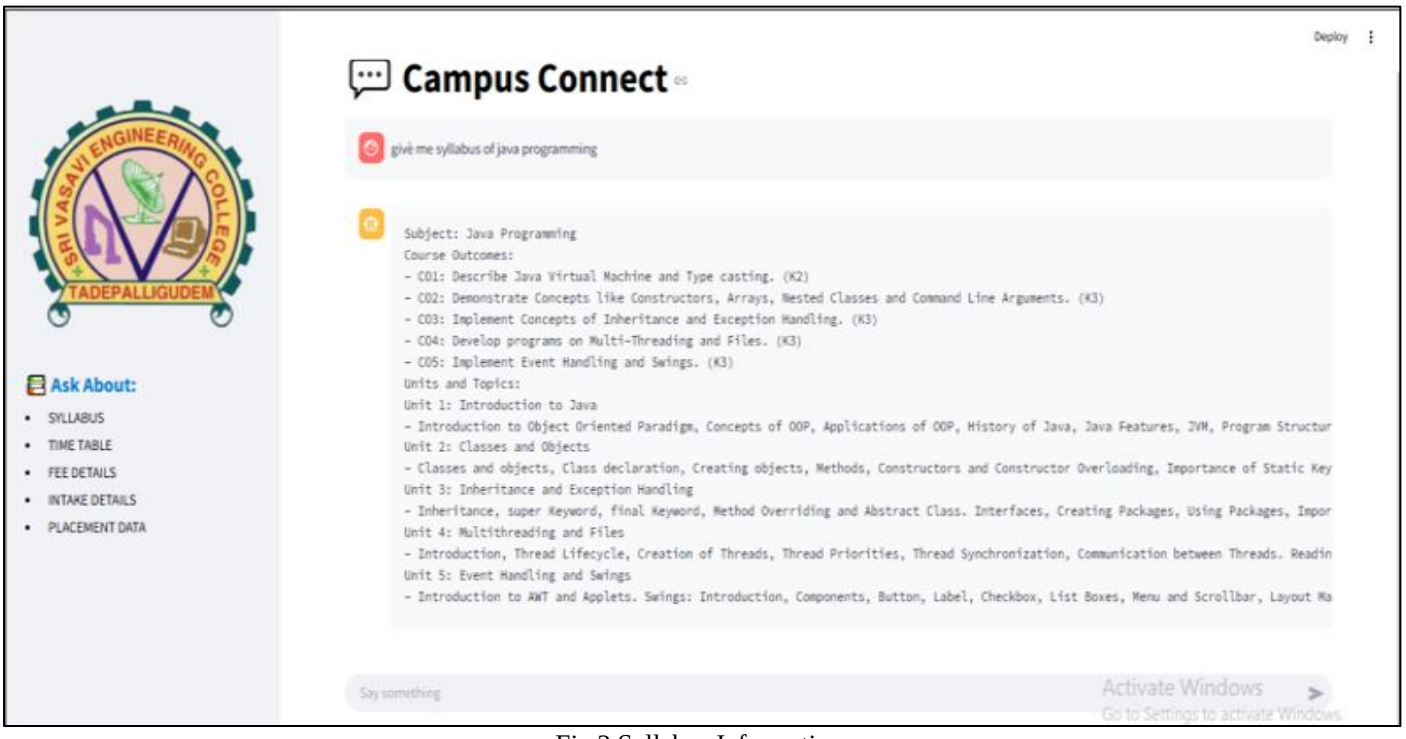

Fig 2 Syllabus Information

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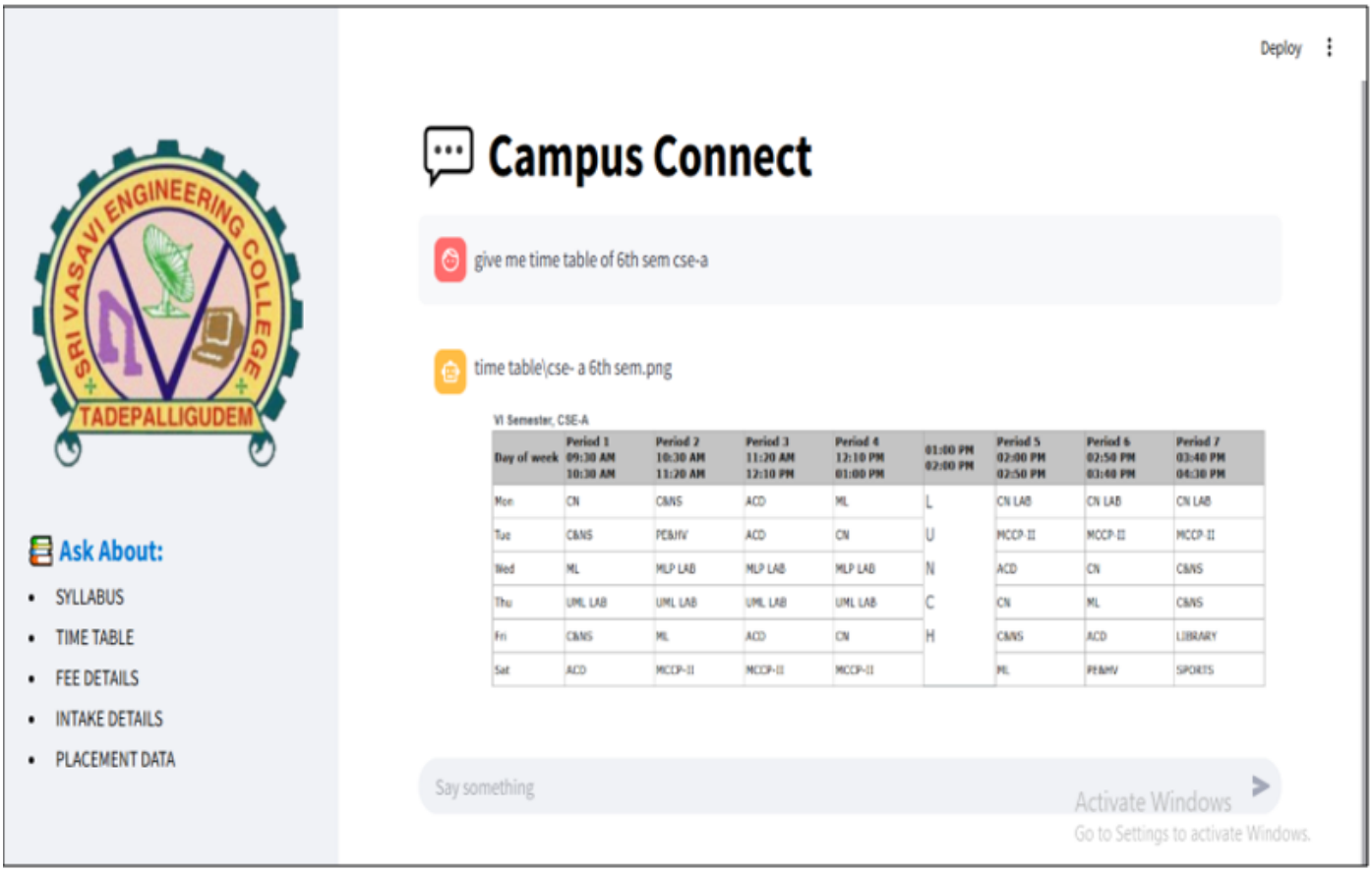

Fig 3 Time table

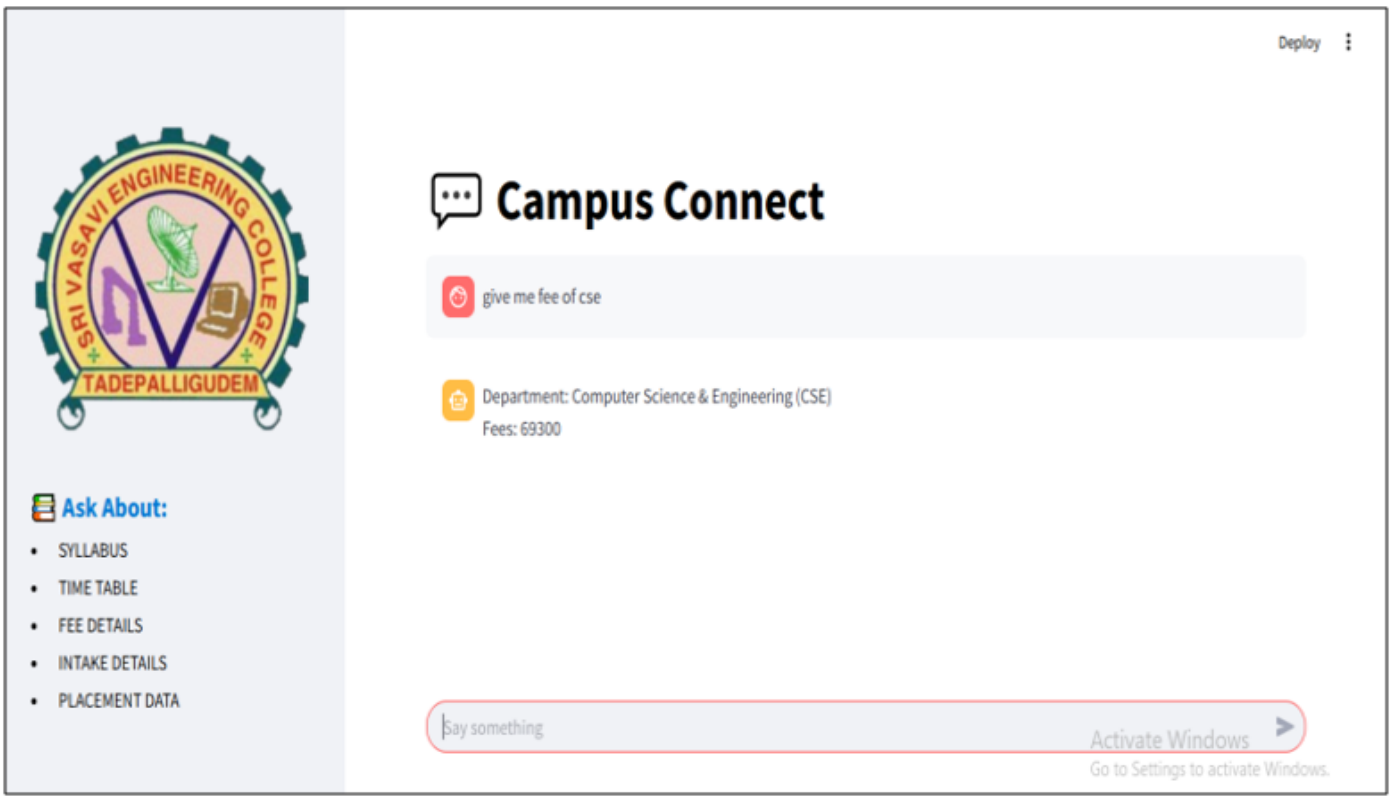

Fig 4 College Fee

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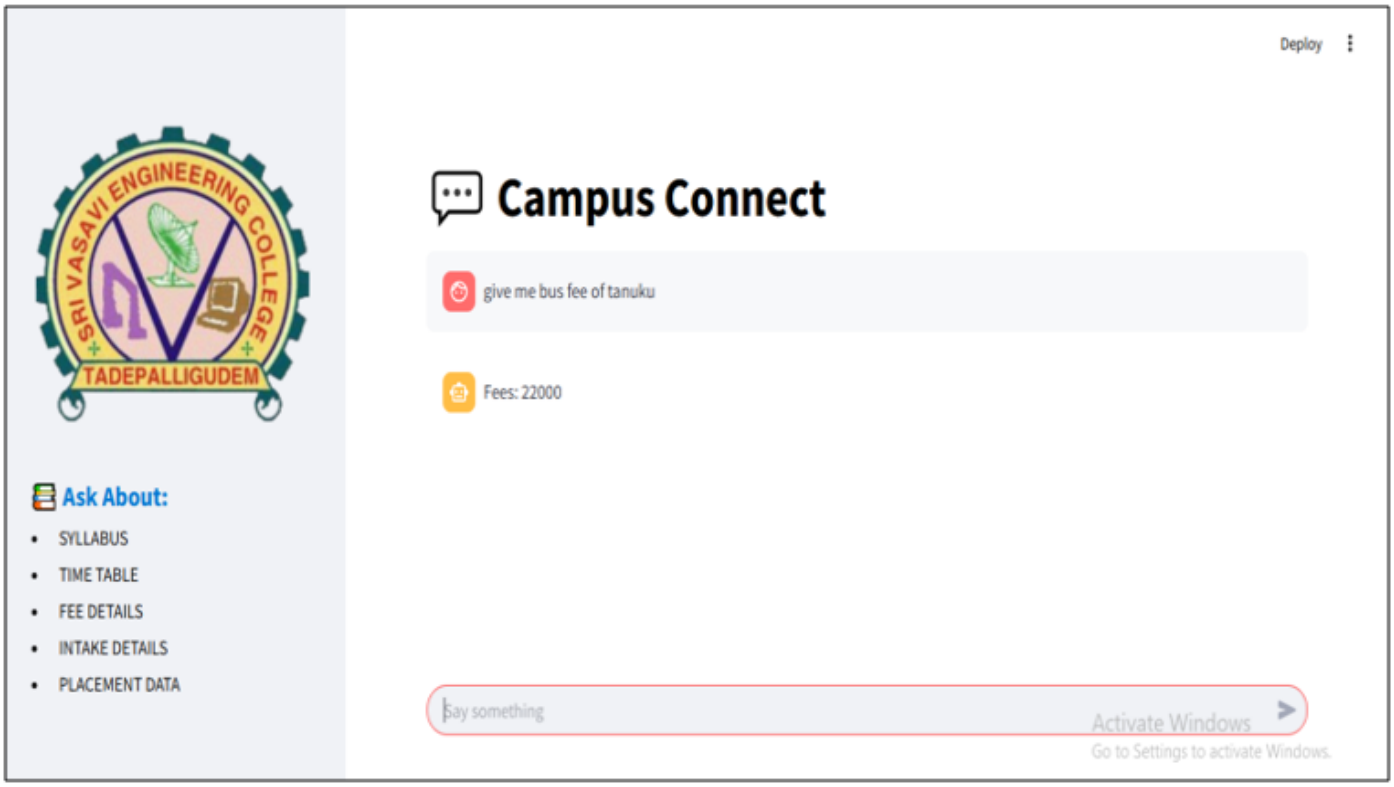

Fig 5 Transport Fee

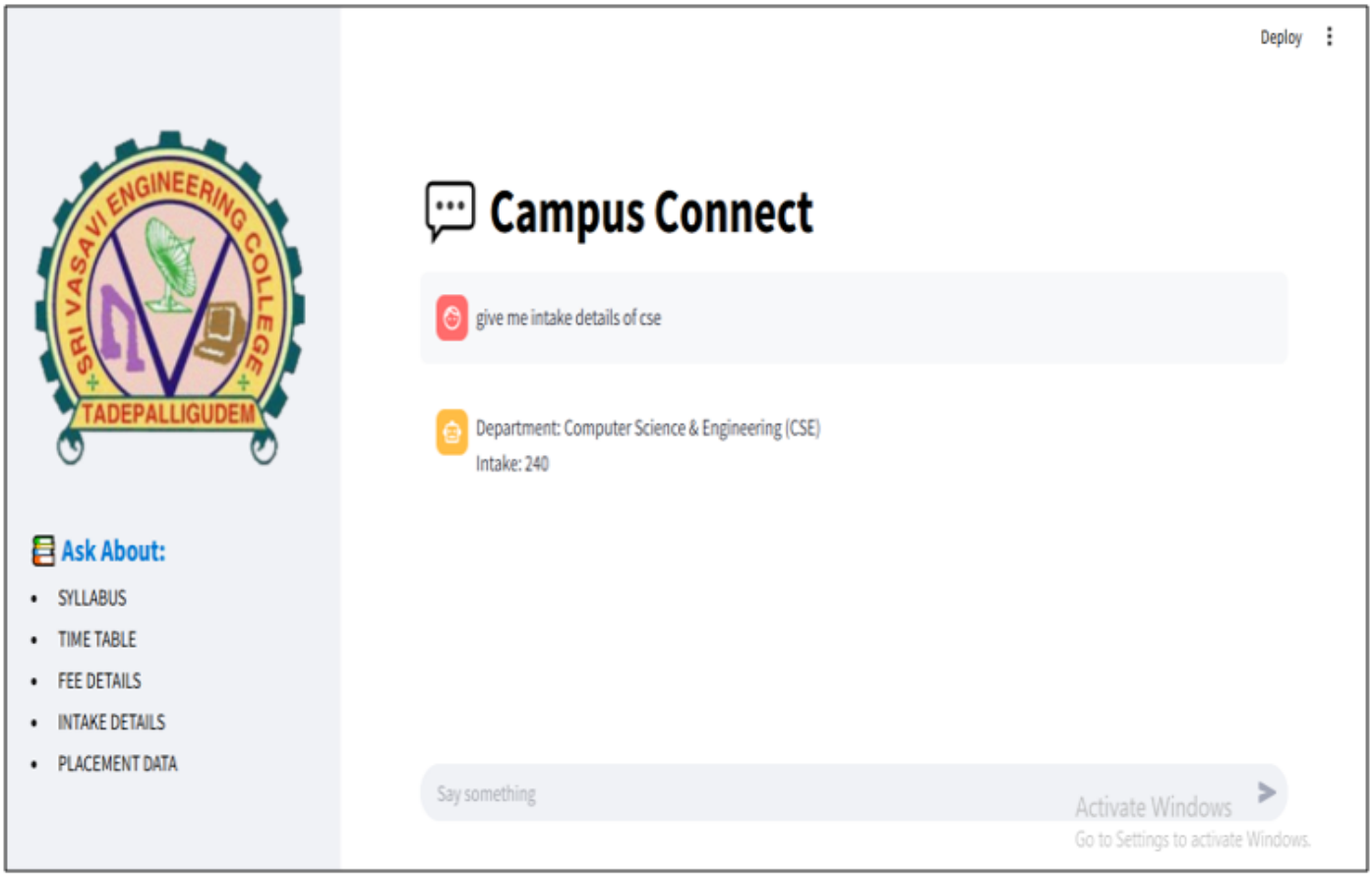

Fig 6 Intake Details

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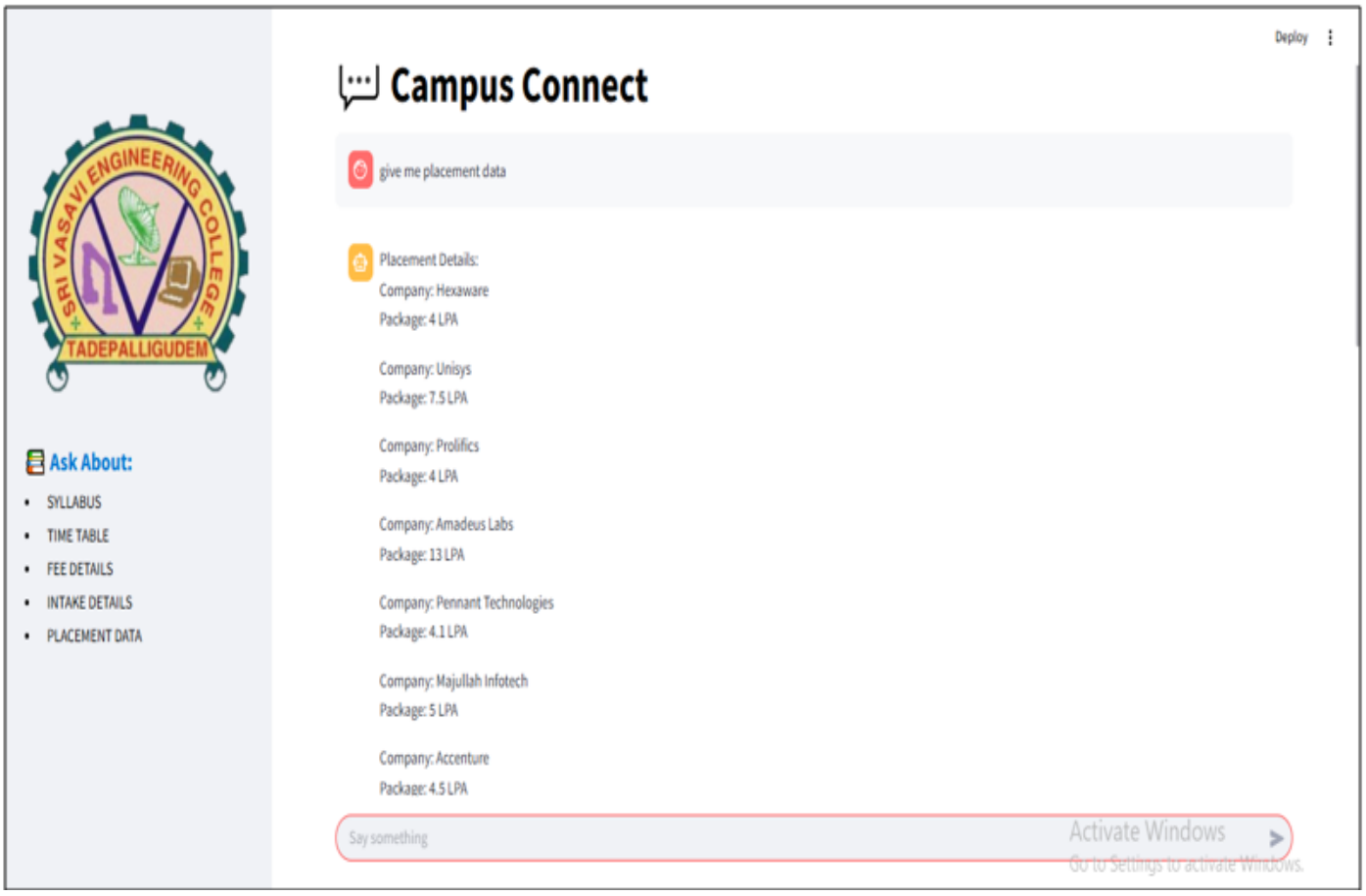

Fig 7 Placement Data

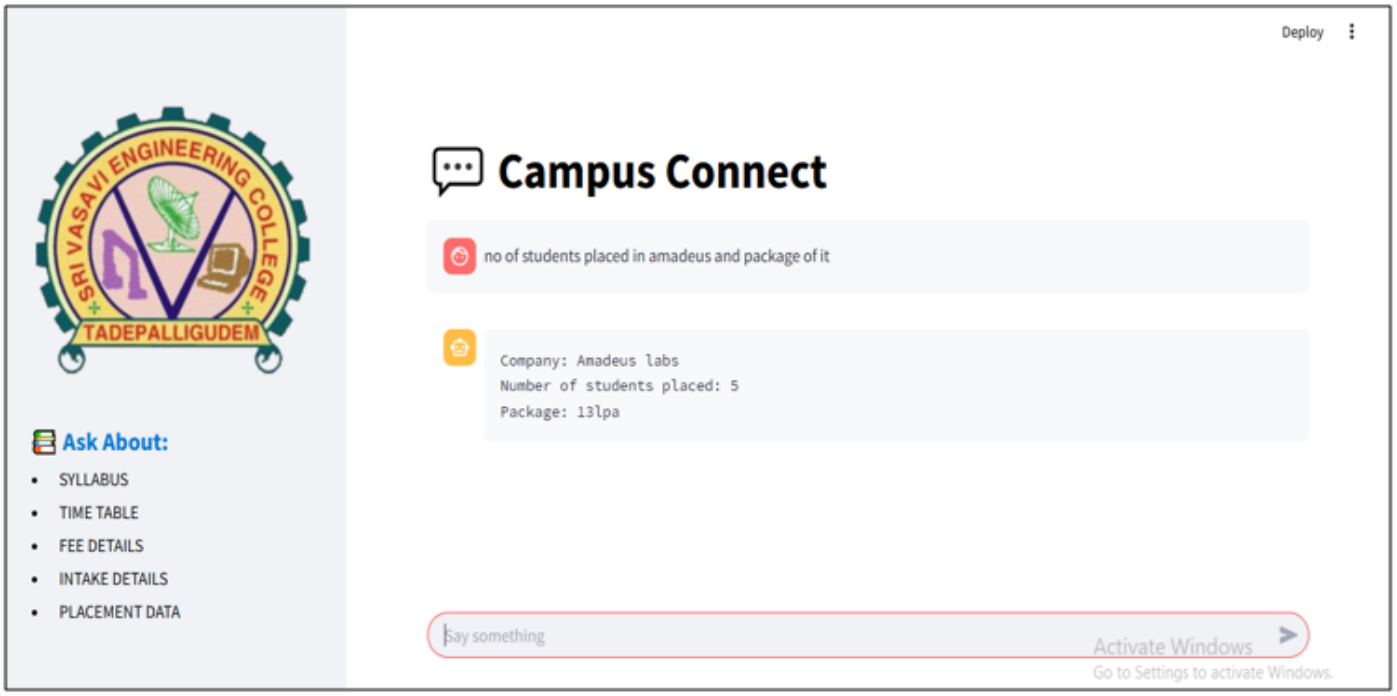

Fig 8 Specific Company Information

➢ *Analysis*

- *Project performance overview:*

Campus Connect is an AI-powered college assistant designed to transform student interactions with campus resources. By integrating advanced technologies such as Generative AI, Retrieval-Augmented Generation (RAG), and a Vector Database, it delivers real-time, contextually accurate, and personalized responses to student inquiries. This system effectively addresses common

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challenges in higher education institutions, including the need for immediate information access and the reduction of administrative workload. Operating 24/7, Campus Connect ensures that students receive timely assistance, thereby enhancing their overall campus experience. Moreover, by automating routine queries, it allows faculty and administrative staff to focus on more complex tasks, improving institutional efficiency. The implementation of Campus Connect signifies a significant advancement in leveraging AI to support and enrich the educational journey of students.

VIII. CONCLUSION

The Campus Connect project is an excellent example of how AI-based solutions can make college-related information retrieval easier. By combining Streamlit, HTML, CSS, vector databases, and LLMs, the system effectively manages syllabus information, fee structures, timetables, intake information, and placement statistics. This **Campus-Connec**t assistant offers live, precise answers, improving user experience and minimizing administrative overload. With its scalable design, the system can be easily upgraded with additional data, better AI algorithms, and new features.

Overall, Campus Connect provides a reliable, easy-to-use, and effective platform for students and employees to access college information easily.

FUTURE ENHANCEMENTS

To further enhance Campus Connect and enrich the user experience, several forward-looking improvements are planned. Expanding the system's knowledge base to encompass detailed faculty profiles, comprehensive event calendars, and a broader array of academic resources will provide users with a more complete and informative platform. Incorporating more advanced AI models will elevate the system's comprehension and response capabilities, ensuring more precise and contextually relevant answers to user inquiries. Establishing seamless integration with official college management systems will facilitate real-time data synchronization, granting students and staff immediate access to the latest information. Introducing voice-enabled assistance will offer a more natural and accessible mode of interaction, catering to diverse user preferences and making the system more inclusive. Finally, developing a dedicated mobile application will extend Campus Connect's reach, allowing users to conveniently engage with the platform via their smartphones, thereby promoting greater accessibility and engagement.

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