

WHATSAPP CHATBOT FOR INSTITUTIONAL AND ACADEMIC SERVICES

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Abstract: Educational institutions need to embrace digital solutions because the modern technological development requires better accessibility and improved efficiency together with enhanced student engagement. Modern communication has experienced a major transformation because people use smartphones with messaging applications extensively. The wide user base of WhatsApp together with its easy-to-use design makes it an ideal choice for SJBIT to launch a virtual presence that enables smooth delivery of various services. The WhatsApp bot operates as a digital aid to provide students both instantaneous details about course information and placement functions as well as admissions data and workshop and student welfare resources. The automation and artificial intelligence system used by the bot creates better user interaction while simultaneously boosting work speed and establishing an innovation-oriented culture at the institution.

Keywords: Artificial Intelligence, Virtual Assistance, WhatsApp bot.

1. INTRODUCTION

The current period of innovative technology development and educational transformation requires educational institutions to integrate digital solutions because they enhance both access and operational effectiveness and student participation. People now use smart phones together with messaging applications to shift their communication methods while obtaining information differently. WhatsApp, with its widespread adoption and

friendly interface, presents a compelling platform for SJBIT to establish a virtual presence and offer a range of services seamlessly. The WhatsApp bot serves as a virtual assistant, providing users with instant access to a myriad of information and services related to courses, placements, admissions, workshops, student welfare, and more. By harnessing the power of artificial intelligence and automation, the bot aims to enhance user experience, promote efficiency, and foster a culture of innovation within the institution. The introduction of the WhatsApp bot aligns with SJBIT's commitment to embracing technology-driven solutions to meet the evolving needs of its diverse stakeholders. It represents a paradigm shift in how educational institutions engage with their community, transcending geographical barriers and temporal constraints to deliver timely and relevant information round the clock. As SJBIT embarks on this transformative journey, the WhatsApp bot emerges as a catalyst for digital transformation, empowering users to navigate the complexities of academic life with ease and confidence. The research examines the transformative power of WhatsApp bots to revamp educational communication methods and information retrieval and academic service distribution systems.

Here we have taken the datasets from our college website we here have fed our model with the details present in SJBIT official website. It includes both academic as well as education related information of

the college which must be known for any related purpose.

A. STRUCTURE OF THE PAPER

In Section II, brings forth relevant studies about WhatsApp automation bots. Sections III and IV will present the system model followed by the proposed scheme. The evaluation of the proposed scheme and the paper's conclusion are presented in Section V.

2. LITERATURE SURVEY

Dhandayuthapani.et.al.,[1], A framework model regarding student support chatbots focused on higher education institutions (HEIs). The chatbot functions to answer the often-asked questions about students' academic matters beginning with enrolment and ending with payment and grading and review procedures. This system exists as a real-time communication platform which works on institutional websites and mobile applications and social media channels including WhatsApp Twitter Facebook Messenger and Instagram. The framework emphasizes the cognitive services the chatbot can provide, including support for multiple languages and different types of requests—text-based, voice-based, and graphical user interfaces. By automating responses to common inquiries, the chatbot aims to reduce the time faculty and advisors spend answering repetitive questions, allowing them to focus on other academic responsibilities. The paper discusses the benefits, challenges, and implementation strategies for integrating this chatbot into HEIs, ultimately enhancing student support and engagement.

Achmad Ram Aditiya.et.al.,[2] implemented a WhatsApp chatbot using Python programming to automate the broadcasting and replying of messages. It highlights the challenges of using Virtual Private Servers (VPS) in Indonesia, which can be costly. The chatbot system is designed to efficiently disseminate information to multiple users simultaneously. The process begins with the chatbot sending a message to users. The Python program then monitors incoming messages, checking if they match predefined conditions. If a match is found, the chatbot responds with the appropriate information. If not, it continues

to read incoming messages until a match occurs. The system is capable of handling up to 15 contacts at once, but the speed of message delivery and response is influenced by the server connection. One limitation noted in the research is that the chatbot cannot process messages containing stickers, emojis, or GIFs, as the Python program is unable to read these formats. The authors suggest that future developments could include features for sending random messages to enhance the chatbot's functionality.

Anna E. Stepanova.et.al.,[3] has addressed the automation of business processes within the financial services sector, focusing on how modern messaging applications can enhance client-company interactions. It explores the integration of the 1C: Enterprise system with the Telegram messenger to facilitate remote financial services. A key aspect of the research is the implementation of user role differentiation, ensuring that access to the chatbot is tailored based on the user's role. This integration aims to streamline communication and improve service delivery in the financial industry.

Marcos Baez.et.al.,[4] they have discussed the growing importance of chatbots in customer service and everyday life. According to research, a significant portion of customer support operations is expected to integrate chatbot technology, with billions of users engaging with digital assistants like Amazon Alexa and Google Assistant. As the demand for both text and voice chatbots increases, developing effective chatbots has become essential. While creating intelligent chatbots remains challenging, many user-friendly frameworks are now available to support their development. The focus is shifting from just building chatbots to integrating them smoothly into existing IT systems and business processes. This involves understanding the vocabulary and actions the chatbot should handle and how to implement them within current software.

K. Arun.et.al.,[5] developed an AI-based chatbot management system called AICMS, specifically designed for professional engineering colleges. A chatbot is a program that simulates human conversation using artificial intelligence, functioning as a virtual assistant. It helps promote products and services online and provides essential information to students through various platforms, including

college websites and social media like Facebook and WhatsApp. The AICMS system aims to enhance communication by automatically responding to student inquiries about important topics such as college information, class schedules, and exam dates. Students can ask questions related to their subjects and placement opportunities, and the system is designed to handle these queries efficiently. Built using Dialog flow and supported by Google API, the chatbot operates on Facebook Messenger, allowing users to interact through both text and voice inputs. This system offers quick and accurate responses, making it a valuable tool for students and staff in an engaging manner.

Nataliya Shakhovska.et.al.,[6] Based on Google API developed a speech-to-text chatbot interface using Google API, highlighting the potential of open APIs in creating integrated systems. Over the past decade, artificial intelligence (AI) technologies have become more accessible and widely used, with speech recognition emerging as a key area within natural language processing. This technology is expected to play a significant role in the future by allowing users to communicate more efficiently through voice instead of traditional text.

Florian Daniel.et.al.,[7] The article titled "Online Cognitive Services Bots Acting Like Humans: Understanding and Preventing Harm" explores the impact of algorithmically driven bots that mimic human behaviour in online conversations across various platforms such as Twitter, Facebook, and chat services. It highlights the rapid proliferation of these bots, with estimates suggesting that a significant percentage of active accounts on social media are automated. The authors categorize the potential harms caused by these bots into several types, including psychological, legal, economic, social, and democratic harm. They provide examples of incidents where bots have caused damage, such as spreading misinformation or engaging in inappropriate behaviour. The article emphasizes the need for awareness and strategies to prevent harm, discussing the challenges in detecting and regulating bot behaviour. The authors advocate for a foundational understanding of the types of harm and the sources of abuse as a precursor to developing ethical guidelines for bot usage. Overall, the article aims to raise awareness about the implications of bot

interactions in online environments and the necessity for preventive measures to mitigate potential risks.

Anupam Mondal.et.al.,[8] developed a chatbot for the educational domain using an ensemble learning approach, particularly random forest. It addresses key challenges such as data collection, preprocessing, response generation, and validation. The chatbot was trained on a dataset of 1000 question-answer pairs and achieved an F-measure score of up to 0.87, demonstrating its effectiveness. Additionally, the chatbot was deployed on the Telegram platform for practical use. The paper concludes with future goals to create open domain chatbots with enhanced features.

Mohammad Nuruzzaman.et.al.,[9] The study highlighted how chatbots address customer service challenges, such as long wait times and poor service quality, and emphasizes the potential of AI-driven systems to automate business processes, enhance user experience, and streamline operations. The paper identifies limitations in current chatbot systems, such as grammatical errors, lack of context understanding, and insufficient support for multiple languages and domains. It proposes utilizing advanced deep learning techniques to overcome these issues.

Bhaumik Kohli.et.al.,[10] implemented human-chatbot interaction using Python. It discusses the development of a platform to analyze and enhance chatbot communication. The paper covers the history and evolution of chatbots, such as ELIZA and ALICE, and introduces a Python-based architecture with web connectivity for chatbot interaction. Four personality-based chatbots—Eliza, Zen, Iesha, and Rude—are implemented to study varied user interactions. It highlights Python's user-friendly features and the system's ability to classify dialogue attributes like subjectivity, polarity, and offensiveness. The study also compares the proposed chatbot's efficiency with existing models, demonstrating improved conversational accuracy and flexibility.

3. OBJECTIVES

- To enhance communication and service delivery within the educational ecosystem by deploying an AI-powered WhatsApp bot that

provides instant, accurate, and accessible responses to student queries.

- To automate routine administrative tasks such as appointment scheduling, information dissemination, and feedback collection, thereby improving operational efficiency and reducing manual workload for institutional staff.

4. SYSTEM MODEL

The System Model for the WhatsApp bot at SJBIT is designed to streamline communication and service delivery by utilizing artificial intelligence and advanced automation. This model comprises several interconnected components that ensure efficient operation and seamless user experience.

1. User Interface Layer: WhatsApp Client Interface- The primary interface through which users interact with the bot. This leverages the WhatsApp Business API to handle incoming messages and send appropriate responses. **Chatbot Interface:** Designed to interpret user inputs, manage conversation flows, and provide relevant information or services.

2. Application Logic Layer: Natural Language Processing (NLP) Engine: Processes user inputs to understand intent and extract relevant information. Utilizes machine learning algorithms to improve accuracy over time. **Response Generation Module:** Generates appropriate responses based on user inputs and predefined templates. Ensures consistency and relevance in the information provided. **Workflow Automation Module:** Manages predefined workflows for various scenarios such as user onboarding, information dissemination, and support queries.

3. Data Management Layer: Centralized Database: Stores all relevant data including user profiles, course information, placement records, and appointment schedules. Ensures data integrity and quick retrieval. **Data Security Module:** Implements encryption and access control measures to protect sensitive data. Ensures compliance with regulatory standards. **Analytics and Reporting Module:** Tracks system usage, user interactions, and performance metrics. Generates reports to aid in continuous improvement.

4. Integration Layer: External APIs Integration: Connects with external systems and services such as academic databases, event management systems, and other relevant platforms. Facilitates data exchange and enhances functionality. **Internal Systems Integration:** Connects with internal SJBIT systems for seamless data flow and operational efficiency.

5. User Interaction Scenarios: Query Management: Handles common queries related to courses, admissions, placements, and more. Provides instant and accurate responses. **Appointment Scheduling:** Allows users to book appointments for academic advising, career counselling, and other services. Sends reminders and notifications to ensure users are informed. **Information Dissemination:** Broadcasts important announcements, event details, and updates to users. Ensures timely and effective communication.

6. Security and Compliance: Authentication and Authorization: Ensures only authorized users can access sensitive information. Implements robust authentication mechanisms. **Regulatory Compliance:** Adheres to relevant regulatory requirements to ensure data privacy and security.

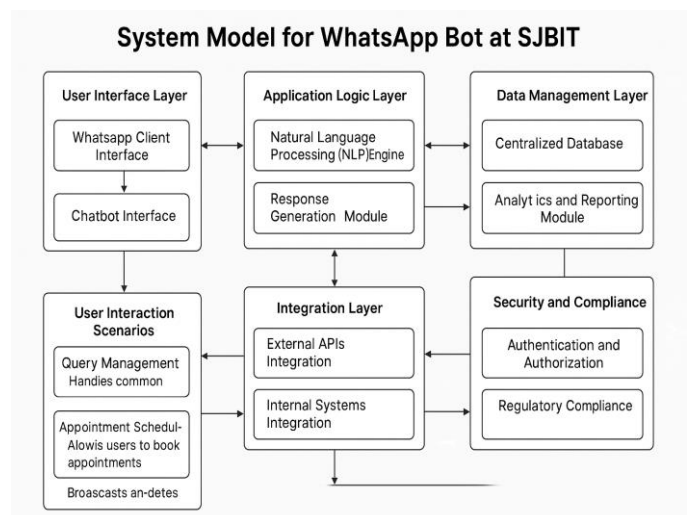


Figure 4.1: Layered Architecture

The Fig 4.1 illustrates a layered architecture connecting user interfaces, application logic, data management, integrations, user interactions, and security to deliver automated, AI-driven communication services.

5. PROPOSED SCHEME

The proposed scheme for the WhatsApp bot at GIMS aims to create a dynamic, efficient, and user-friendly

communication platform that addresses the needs of all stakeholders. This scheme outlines the core components and functionalities of the system, ensuring it aligns with the institution's goals of enhancing user experience, streamlining processes, and fostering innovation.

Architecture Overview: Client-Side Interface: The WhatsApp user interface acts as the primary point of interaction for users. It leverages the WhatsApp Business API to enable seamless communication. Server-Side Processing: This component handles all incoming requests, processes them using AI algorithms, and generates appropriate responses. It integrates with various backend systems to fetch relevant data. Data Management: A centralized database stores all essential information such as user profiles, course details, placement records, and appointment schedules. Ensures data consistency and quick retrieval.

Key Functionalities: Query Handling: The bot is equipped to handle a wide range of queries related to courses, admissions, placements, and student support services. Utilizes natural language processing (NLP) to understand user inputs and provide accurate responses. Appointment Management: Automates the process of scheduling and managing appointments for academic advising, career counseling, and other services. Sends timely reminders and notifications to users. Information Dissemination: Broadcasts important updates, event details, and announcements to users. Ensures timely and effective communication. Feedback Collection: Incorporates mechanisms to collect feedback from users on their interactions with the bot, helping to continuously improve its functionality.

Security and Compliance: Encryption: All communications between users and the bot are encrypted to ensure data privacy and security. Access Control: Implements strict access control measures to protect sensitive information. Regulatory Compliance: Adheres to relevant regulations and standards to ensure compliance and build trust with stakeholders.

Workflow Automation: User Onboarding: Streamlines the onboarding process for new users, providing them with all necessary information and guidance. Support Queries: Manages various support scenarios, offering quick resolutions to

common issues. **Promotional Activities:** Sends promotional messages and updates about upcoming events, workshops, and training sessions to users.

Performance Monitoring and Analytics: Usage Analytics: Tracks user interactions, response times, and overall system performance. Provides insights to improve efficiency and user satisfaction. Reporting: Generates detailed reports on system usage, user feedback, and other key metrics. Helps in making data-driven decisions for continuous improvement.

Benefits: Enhanced User Experience: Provides a seamless and intuitive interface for users to access information and services. Increased Efficiency: Automates routine tasks, reducing administrative workload and improving response times. Scalability: Can be easily scaled to accommodate growing user base and expanding functionalities. Data Security: Ensures the privacy and security of user data through robust encryption and access control measures.

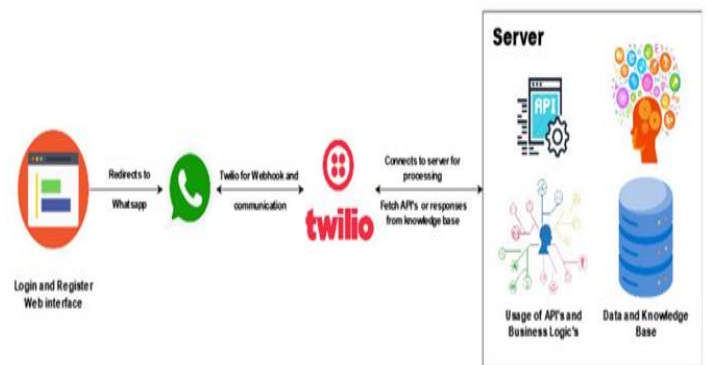


Figure 5.1: System Architecture

The Fig 5.1 represents system architecture where user first login or register on web interface which redirects us to WhatsApp then on Twilio chat we can connect to server for processing response from knowledge base.

6. Steps to Whatsapp ChatBot

Input: User query via WhatsApp Business API
Output: Relevant processed response or action to the user

Begin

1. Receive the incoming message via WhatsApp Business API.
2. Preprocess the message by removing whitespace, special characters, and normalizing the text.
3. Pass the pre-processed message to the NLP model for intent classification.
4. Detect the user's intent from the message.
5. Extract required entities such as course name, date, or user information using Named Entity Recognition.
6. Match the detected intent and extracted entities to the corresponding database fields or workflows.
7. Query the Centralized Database to retrieve relevant information based on the user's intent and entities.
8. Generate an appropriate response using predefined templates or dynamic sentence construction.
9. If the query relates to booking or updates, automate appointment scheduling or information broadcasting accordingly.
10. Encrypt the communication and secure the message transfer using TLS protocols.
11. Authenticate and verify user identity if sensitive data is requested.
12. Send the final response back to the user through the WhatsApp Business API.
13. Collect user feedback after completing the interaction.
14. Log the interaction and feedback into the Analytics Module.
15. Update the NLP model periodically using collected feedback and usage data.
16. Monitor system performance and generate analytics reports for improvement.

End

7. RESULTS and SNAPSHOTS

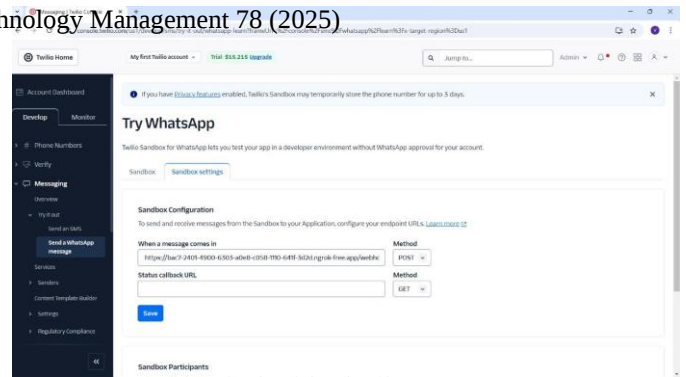


Figure 7.1: Creating Twilio Account

In the above Figure 7.1, it represents creating a twilio account that allows the automation bot to seamlessly connect with the WhatsApp platform

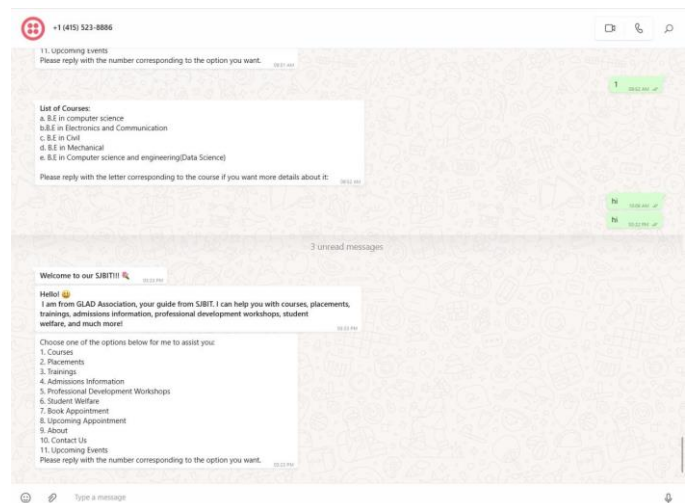


Figure 7.2: Chatbot interface

In the above Figure 7.2 it represents the SJBIT chatbot interface, once a user sends the passcode and gets connected to the sandbox environment if they send any message like hi , hello to initiate the bot and can access all the information which is provided in the menu by choosing the corresponding options.

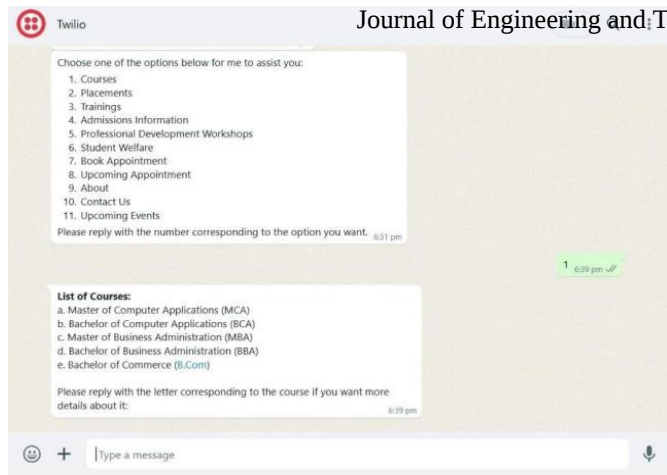


Figure 7.3: List of courses

In the above Figure 7.3 it represents the SJBIT chatbot interface, if the user selects option 1 from the menu it displays the list of courses.

8. CONCLUSION

The integration of a WhatsApp bot within GIMS represents a significant step forward in leveraging technology to enhance communication, accessibility, and efficiency within the educational ecosystem. By automating routine tasks, providing 24/7 support, and offering instant access to a wide range of information and services, the bot not only improves the overall user experience but also fosters a culture of innovation and digital transformation. This system addresses the limitations of traditional communication methods, such as manual processes and fragmented information access, by centralizing data and streamlining interactions. It ensures data security and compliance with regulatory standards, thereby building trust among stakeholders. The implementation of the WhatsApp bot aligns with GIMS's commitment to embracing cutting-edge solutions that cater to the evolving needs of its diverse community. Through continuous monitoring and feedback, the system will evolve, ensuring it remains responsive and relevant in a dynamic educational landscape. In conclusion, the WhatsApp bot stands as a testament to the potential of artificial intelligence and automation in revolutionizing the way educational institutions

engage with their stakeholders, ultimately paving the way for a more connected, efficient, and innovative future.

9. FUTURE ENHANCEMENT

Future enhancements for the WhatsApp chatbot could include implementing a more secure user authentication system, integrating natural language processing (NLP) for better understanding of user queries, and enhancing appointment management to allow modifications and cancellations. Adding real-time notifications for updates and reminders, providing more detailed course and workshop information, and incorporating interactive elements like buttons and quick replies can significantly improve user experience. Multilingual support would cater to a broader audience, while a feedback mechanism would enable users to rate their interactions and suggest improvements. Integrating with external systems for real-time data, implementing analytics for tracking interactions, and introducing voice recognition capabilities would further enhance functionality. Lastly, ensuring robust security measures to protect user data and comply with regulations is essential.

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