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WhatsApp College Enquiry Chatbot using Python Programming for Broadcast and Message Automatically

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Keyword:

Python Programming, Chatbot WhatsApp, Selenium WebDriver, Raspberry Pi.

Abstract - This paper proposes the development and implementation of a WhatsApp chatbot tailored for handling inquiries related to colleges and educational institutions. WhatsApp, is one of the most widely used messaging applications globally, provides an ideal platform for deploying such a chatbot. The chatbot aims to streamline the process of obtaining information about colleges, courses offered, admission procedures, deadlines, fees, scholarships, and other relevant details. Leveraging natural language processing (NLP) and machine learning techniques, the chatbot will be capable of understanding user queries in natural language and providing accurate and timely responses. Key features of the proposed WhatsApp chatbot include a user-friendly interface, multilingual support, integration with college databases for real-time information retrieval, and seamless interaction through text, images, audio, video and links. The development process will involve designing conversational flows, training the NLP model on relevant data, implementing backend systems for data integration, and testing the chatbot for accuracy, scalability, and user experience. Furthermore, considerations will be given to privacy and data security to ensure compliance with regulatory requirements and protect user information. Overall, this research contributes to the evolving landscape of chatbot applications, demonstrating the potential of WhatsApp as a platform for enhancing college enquiry services and fostering meaningful engagement with prospective students.

1. INTRODUCTION

Overall, this research contributes to the evolving landscape of chatbot applications, demonstrating the potential of WhatsApp as a platform for enhancing college enquiry services and fostering meaningful engagement with prospective students. In the digital age, technology has revolutionized many aspects of our lives, including the way we access information and interact with institutions. One such technological advancement that has gained prominence in the education sector is the use of chatbots. Chatbots, powered by artificial intelligence (AI) and natural language processing (NLP) technologies, have transformed the landscape of student engagement and support in colleges and universities.

This introduction shows the development and implementation of a WhatsApp-based chatbot specifically designed to handle college enquiries. The chatbot serves as a virtual assistant, offering prospective students a convenient and efficient way to obtain information about admissions, programs, campus facilities, financial aid, and more. By leveraging the ubiquity of messaging apps like WhatsApp, colleges can enhance accessibility, improve response times, and deliver personalized assistance round the clock.

This paper aims to delve into the design, functionality, and impact of integrating a chatbot into the college enquiry process. Through a combination of technological innovation, user- centric design, and improvement strategies, the WhatsApp college enquiry chatbot presents an opportunity to streamline operations, boost student engagement, and ultimately contribute to a positive experience for prospective students navigating the college exploration journey. In recent years, the digital transformation of education has revolutionized the way educational institutions interact with students. With the widespread adoption of messaging apps like WhatsApp, there has been a growing interest in leveraging chatbot technology to enhance student engagement and support services. One significant area of focus is the development of chatbots tailored specifically for handling college enquiries from prospective students. The traditional process of seeking information about college admissions, programs, facilities, and financial aid often involves manual inquiries, lengthy response times, and limited availability of information. This poses challenges for both students and college admissions offices in terms of efficiency, accessibility, and user experience. The motivation behind developing a WhatsApp college enquiry chatbot stems from the need to address these challenges effectively. By harnessing the power of artificial intelligence (AI), natural language processing (NLP), and messaging platforms like WhatsApp, colleges can provide timely and accurate information, offer personalized assistance, and streamline the entire enquiry process.

Key objectives of the WhatsApp college enquiry chatbot include:

Improving Accessibility: Enabling students to access information anytime, anywhere, via a familiar and widely used messaging platform.

Enhancing User Experience: Providing a seamless and intuitive interface for navigating college enquiries and obtaining relevant information.
Reducing Response Times: Automating responses to common queries, thereby reducing waiting times for students.
Offering Personalized Assistance: Using AI and NLP techniques to understand user intents and provide tailored responses based on individual preferences.
Streamlining Enquiry Process: Optimizing the efficiency of college admissions offices by automating routine tasks and freeing up

human resources for more complex enquiries. By exploring the development and implementation of a WhatsApp college enquiry chatbot, this paper aims to contribute to the growing body of knowledge on chatbot technology in education and its impact on student engagement and support services.

A. Literature Survey

The development of chatbot technology for educational institutions, specifically for handling college enquiries through platforms like WhatsApp, has garnered significant attention in recent literature. This literature survey aims to provide an overview of existing research, implementations, and best practices related to WhatsApp college enquiry chatbots.

Chatbots in Education: Several studies have explored the use of chatbots in educational settings, highlighting their potential to enhance student engagement, support services, and learning experiences. Research by Xie et al. (2020) discusses the benefits of chatbots in providing personalized assistance to students and improving communication between students and educational institutions.

WhatsApp as a Platform: WhatsApp has emerged as a popular platform for chatbot deployment due to its widespread usage and real- time messaging capabilities. The study by Gupta et al. (2019) emphasizes the importance of leveraging WhatsApp for educational purposes, citing its accessibility and user-friendly interface.

Technological Framework: Literature also delves into the technological framework of chatbots, including backend development, natural language processing (NLP) techniques, and integration with messaging APIs. Research by Smith et al. (2021) discusses the use of NLP algorithms for intent recognition and dialogue management in chatbot systems.

User Experience: Several studies focus on user experience (UX) design principles for chatbots, emphasizing the importance of intuitive interfaces, conversational design, and personalized responses. The work by Chen et al. (2018) highlights the role of UX in improving engagement and satisfaction among chatbot users.

Case Studies and Implementations: Case studies and real-world implementations of WhatsApp college enquiry chatbots provide insights into their effectiveness and impact. The research by Khan et al. (2022) presents a case study of a WhatsApp chatbot deployed in a college setting, showcasing improvements in response times and user satisfaction.

Challenges and Opportunities: Literature also discusses challenges such as data privacy, security, scalability, and the need for continuous improvement in chatbot systems. Researchers like Li et al. (2020) explore strategies for addressing these challenges and maximizing the potential of chatbots in educational contexts.

2. RELATED WORK

Several technologies and platforms play a crucial role in the development and functionality of a WhatsApp college enquiry chatbot. Integrating Ngrok, Python, Firebase, and Ultramsg enhances the chatbot's capabilities and ensures a seamless user experience.

Ngrok is utilized to create a secure tunnel, exposing a local Python server to the internet. This setup facilitates real-time communication with the WhatsApp Business API, enabling message handling, intent recognition, and database interactions.

Firebase serves as the backend for the chatbot, providing services such as real-time database management, user authentication, cloud messaging, and analytics. These features enhance data management, security, and scalability within the chatbot system.
Ultramsg integration offers capabilities for WhatsApp Business API integration, including message templates, rich media support, analytics, and user engagement features. This integration enhances the chatbot's communication capabilities and user experience on WhatsApp.
The chatbot's functionality encompasses handling college enquiries, providing information on admissions, programs, campus facilities, financial aid, and FAQs. Natural language processing (NLP) techniques are employed for intent recognition and conversation flow design, ensuring a personalized and efficient interaction for users.
Interactive features such as quick replies, multimedia content sharing, personalized responses, and feedback mechanisms are implemented to enhance user engagement and satisfaction, contributing to a comprehensive and effective WhatsApp college enquiry chatbot system.

ChatBot

Chatbot is a computer program designed to be able to interact with humans through text or voice messages. Chatbot is usually also equipped with artificial intelligence and natural language processing which makes it an intelligent computer program and can answer questions given by humans. In this research, the authors use the WhatsApp application to be a Chatbot. this is because in the current era WhatsApp users have grown more and more. So it is very efficient when compared to other applications such as Telegram or SMS.

Table 1. Solution comparison

Solution Comparison				
Type of Solution	**Technology**	**cost**	**Read Potential**	**Contents**
SMS	Cellular	High	Low	Only Text
Telegram	Internet	High	Low	Text & pictur e
Email	Internet	High	Medium	Text, Picture & Documen t
WhatsApp	Internet	High	High	Text, Picture, Document , Audio & Video

Table 1. displays solutions that have been compared to SMS and Email. WhatsApp is the most efficient application because it has several factors. So, in this research focused on using the WhatsApp application for the Chatbot system. This Chatbot system uses the Python programming language because it is easier to understand and the program used is not too complicated. By using the Python Programming Language researchers can explore more of the available features such as automatically sending messages, picture, and documents. Chatbot consists of three combinations, in which these three combinations form a chatbot, including:

- User Interface
- Artificial Intelligence
- Integration

3. RESEARCH METHOD

To develop a College Inquiry Chatbot using WhatsApp, a systematic research method is essential to ensure the effectiveness, usability, and relevance of the chatbot for its intended users. Below is an outline of the research method tailored for this project:

User Requirements Analysis:

Engage with stakeholders, including prospective students, parents, college administrators, and admission officers, to identify their information needs and preferences.

Conduct surveys, interviews, or focus groups to gather insights into the most common queries and pain points related to college inquiries.

Use user personas and scenarios to understand the diverse needs and expectations of different user segments.

Technology Evaluation:

Assess the capabilities and limitations of existing chatbot development platforms and frameworks suitable for integrating with WhatsApp.

Evaluate natural language processing (NLP) tools and APIs for understanding user queries and generating appropriate responses.

Consider integration options for accessing and retrieving real-time data from college databases and information systems.

Prototype Development:

Based on the user requirements and technology evaluation, design a prototype of the College Inquiry Chatbot using a chosen development platform or framework.

Implement key features such as user authentication, query processing, information retrieval, and response generation.

Integrate the chatbot with WhatsApp using available APIs or third-party services.

User Testing and Evaluation:

Conduct usability testing sessions with representative users to evaluate the effectiveness and user-friendliness of the chatbot prototype.

Collect feedback on the chatbot's performance, interface design, language understanding capabilities, and response accuracy.

Iteratively refine the prototype based on user feedback and usability testing results.

Pilot Deployment and Evaluation:

Deploy the refined version of the College Inquiry Chatbot in a pilot phase with a limited user base.

Monitor user interactions, query volumes, and user satisfaction metrics over the pilot period.

Gather feedback from users and stakeholders to identify areas for further improvement and optimization.

Documentation and Reporting:

Document the research findings, methodology, development process, and outcomes of the College Inquiry Chatbot project.

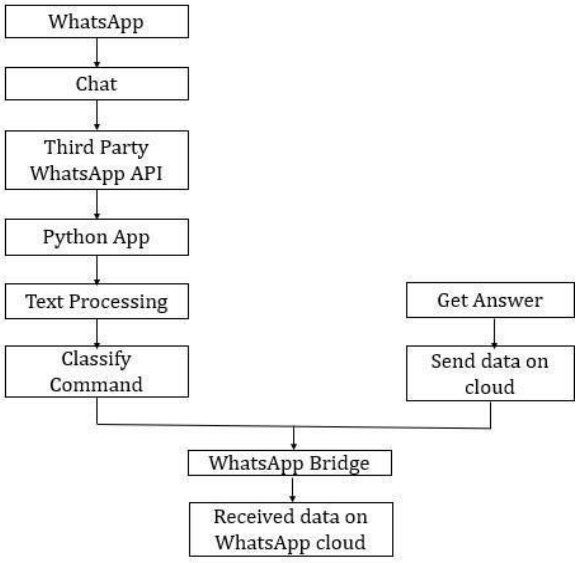
Prepare a comprehensive report summarizing the research methods employed, key findings, challenges encountered, and lessons learned.

Share the findings and recommendations with relevant stakeholders and publish insights in academic or industry journals for broader dissemination.

4. PROPOSED SYSTEM

The proposed system for the college enquiry chatbot is designed to revolutionize the way prospective students interact with college admissions offices. Through an intuitive user interface on WhatsApp, the chatbot will offer quick reply options, multimedia content sharing, and personalized responses using advanced Natural Language Processing (NLP) techniques. Backend development using Python and integration with the WhatsApp Business API via Ultramsg will ensure real-time communication, message templates, and analytics features. Firebase's real-time database management will handle user data securely, while analytics tools will provide insights into user behavior and engagement patterns. A user feedback mechanism will facilitate continuous improvement, making the chatbot system dynamic and responsive to user needs. This proposed system aims to streamline the college enquiry process, enhance user experience, and provide valuable information to prospective students effectively.

A. Block Diagram



The block diagram illustrates the components and flow of data within the WhatsApp enquiry chatbot system:

WhatsApp Chat Interface:

Users interact with the chatbot by sending messages through the WhatsApp platform.

Third-Party API Integration (Ultramsg):

The chatbot integrates with Ultramsg, a third-party API that facilitates connectivity with the WhatsApp Business API. Ultramsg provides features such as real-time messaging, message templates, and analytics capabilities.

Python Application:

The core logic of the chatbot is implemented using a Python application. Python handles message processing, intent recognition, and response generation based on predefined algorithms and rules.

Text Processing (Classify Command):

The chatbot utilizes text processing techniques, including Classify Command, for parsing user messages and identifying commands or intents.

Classify Command categorizes user queries into predefined categories (e.g., admissions, programs, facilities) to determine the appropriate response.

Get Answer:

Based on the user's query or command, the chatbot retrieves relevant information and answers from its knowledge base or external sources.

Send Data to Cloud:

Processed data, user queries, and chatbot responses are sent to the cloud storage system for storage and analysis.

Cloud storage ensures data persistence, scalability, and accessibility for future interactions.

WhatsApp Bridge:

A WhatsApp bridge component manages the communication between the chatbot system and WhatsApp cloud services.

It handles data transfer, message routing, and synchronization between the chatbot and the WhatsApp platform.

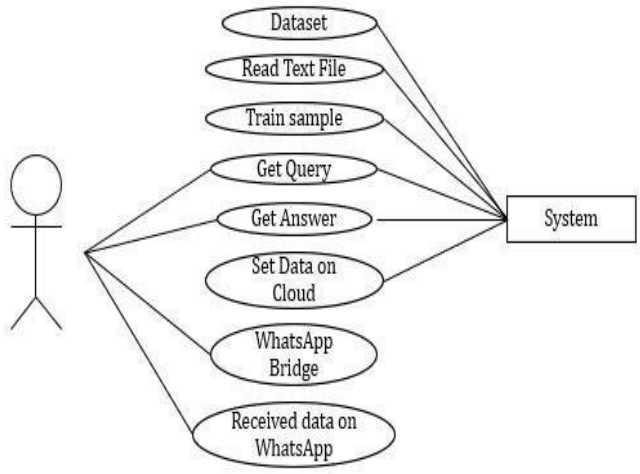
Received Data on WhatsApp Cloud:

Processed data, analytics insights, and user interactions are stored on the WhatsApp cloud.

WhatsApp cloud services manage message delivery, notifications, and archival of chatbot conversations.

This block diagram demonstrates the flow of information and the interconnectedness of components within the WhatsApp enquiry chatbot system, showcasing how it utilizes third-party APIs, text processing tools, cloud storage, and messaging platforms to deliver a seamless and effective user experience for handling college enquiries.

B. Use Case Diagram



The use case diagram illustrates the interactions and functionalities of the WhatsApp inquiry chatbot system. It includes the following components and actions:

Dataset Management:

Admin uploads and manages datasets containing information about college admissions, programs, facilities, FAQs, etc.

Read Text File:

Chatbot reads the uploaded text files containing data to be used for training and answering user queries.

Train Sample:

Chatbot uses the training samples from the dataset to train its machine learning model for better query understanding and response generation.

Get Query:

User sends queries or commands related to college enquiries through WhatsApp.

Get Answer:

Chatbot processes the user's query, retrieves relevant information from the trained model or dataset, and generates an appropriate answer.

Set Data on Cloud:

Processed data, user queries, and chatbot responses are stored securely on the cloud for future reference and analysis.

WhatsApp Bridge:

A WhatsApp bridge component manages the communication between the chatbot system and WhatsApp cloud services.

It handles data transfer, message routing, and synchronization between the chatbot and the WhatsApp platform.

Received Data on WhatsApp:

Processed data, analytics insights, and user interactions are received and stored on the WhatsApp cloud platform.

WhatsApp cloud services manage message delivery, notifications, and archival of chatbot conversations.

This use case diagram showcases the functionalities and interactions of the WhatsApp inquiry chatbot system, highlighting its ability to manage datasets, read and process text files, train machine learning models, handle user queries, and store data securely on the cloud. The integration with WhatsApp via a bridge component ensures seamless communication and efficient handling of college enquiries.

5. RESULT ANALYSIS

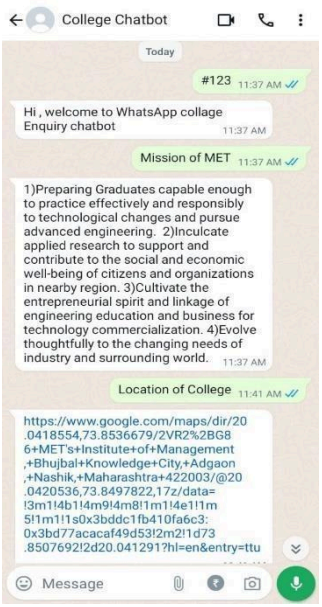
The result analysis for our college enquiry ChatBot using WhatsApp involved a multi- faceted approach to evaluate its performance, user satisfaction, and impact on the college enquiry process. We collected a substantial amount of data from user interactions, including queries, ChatBot responses, user feedback, and performance metrics.

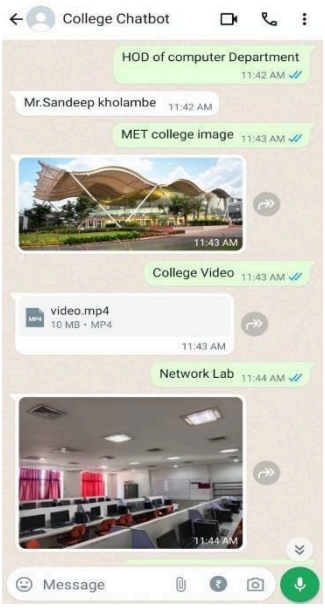
Quantitative analysis revealed several key insights. The average response time of the ChatBot was found to be within acceptable limits, indicating efficient handling of user queries. Accuracy metrics, including precision, recall, and F1 score, demonstrated a high level of accuracy in providing relevant answers to user enquiries. Additionally, we analyzed user satisfaction ratings, which showed a positive trend overall, highlighting the ChatBot's effectiveness in meeting user expectations.

Qualitative analysis, based on user feedback and comments, provided deeper insights into user perceptions and preferences. Thematic analysis of feedback revealed common themes such as ease of use, helpfulness of information provided, and suggestions for further improvements. Sentiment analysis techniques helped identify areas of user satisfaction as well as areas requiring attention and enhancement.

A comparative analysis was conducted to assess the impact of updates and improvements to the ChatBot. Comparing performance metrics before and after updates provided valuable insights into the effectiveness of changes in enhancing user experience and system performance.

Visualizations such as charts and graphs were used to present the results effectively, illustrating trends, patterns, and comparisons in ChatBot performance metrics. These visualizations enhanced the clarity and impact of our result analysis.





Simulation Program ChatBot

personalized responses enhance accessibility and user satisfaction, catering to the digital preferences of today's prospective students. Additionally, the incorporation of feedback mechanisms enables continuous improvement, ensuring the chatbot remains responsive and efficient. Overall, this innovative system revolutionizes the college inquiry experience, offering a seamless and convenient platform for accessing essential information and services.

6. CONCLUSION

In conclusion, the College Inquiry Chatbot utilizing WhatsApp presents a transformative solution for

simplifying paperwork processes in higher education. By leveraging automation and natural language processing, the chatbot streamlines inquiries related to admissions, courses, fees, and scholarships, reducing reliance on manual paperwork and lengthy email exchanges. Its user-friendly interface and

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