Generative AI Chatbot using ChatGPT

Dr. Lowlesh Yadav[1], Prof. Shubhkirti Bodhke[2], Shubhangi Shankar Dhote[3], Papita Amrut Khadse[4], Samiksha Ravi Bagde[5], Masoom Jitendra Warade[6]

Head of Department, Department of Computer Science and Engineering[1]
Guide, Department of Computer Science and Engineering[2]
Students, Department of Computer Science and Engineering[3,4,5,6]
Abha Gaikwad-Patil College of Engineering, Nagpur, Maharashtra, India

Abstract: *This paper presents the development of an intelligent chatbot system using generative AI powered by ChatGPT. The system is designed to facilitate natural and context-aware interactions with users through a web interface. Leveraging the capabilities of OpenAI's language model, the chatbot is capable of engaging in dynamic conversations. The architecture of the chatbot integrates front-end and back-end technologies to manage user queries and responses efficiently. The study evaluates the chatbot's conversational quality and usability across multiple domains. The findings suggest that generative models like ChatGPT can significantly enhance user experience in digital communication tools.*

Keywords: Generative AI, Chatbot, ChatGPT

I. INTRODUCTION

Conversational agents, commonly known as chatbots, have become increasingly significant in automating dialogue-based services in sectors such as customer support, education, and e-commerce. Traditional chatbots operate using fixed rule-based systems, which limits their ability to handle complex or unexpected queries. In contrast, modern chatbots built on generative AI utilize large-scale language models that understand context and generate human-like responses.

One such advancement in conversational AI is OpenAI's ChatGPT, a language model based on the GPT (Generative Pre-trained Transformer) architecture. This model is trained on vast textual data and fine-tuned for dialogue using reinforcement learning. The present research aims to implement a functional web-based chatbot using ChatGPT to evaluate its performance in handling varied types of user input effectively.

II. LITERATURE REVIEW

The evolution of natural language processing (NLP) has led to the emergence of advanced models capable of generating coherent and context-sensitive text. The transformer model introduced by Vaswani et al. (2017) eliminated the need for sequential processing by applying self-attention mechanisms, improving scalability and accuracy in language modeling tasks.

Subsequent developments led to the GPT series by OpenAI, with each iteration achieving greater performance in text understanding and generation. GPT-3 and GPT-4, for instance, exhibit remarkable capabilities in text completion, translation, and dialogue. ChatGPT, derived from these models, is specifically fine-tuned for interactive dialogue, making it suitable for chatbot applications. Recent academic discussions emphasize the potential and limitations of these models, including concerns about factual inaccuracies and ethical implications.

III. METHODOLOGY

The proposed system architecture consists of a front-end client for user interaction and a back-end server responsible for handling communication with the OpenAI API. The backend is built using Flask, a lightweight Python web framework, while the frontend is designed using HTML, CSS, and JavaScript.

When a user inputs a message, it is sent to the server, where the message is passed to the OpenAI API. The API returns a response generated by the ChatGPT model, which is then displayed on the frontend. This interaction loop allows real-

time conversations between the user and the chatbot. The design ensures scalability and ease of integration with existing web applications.
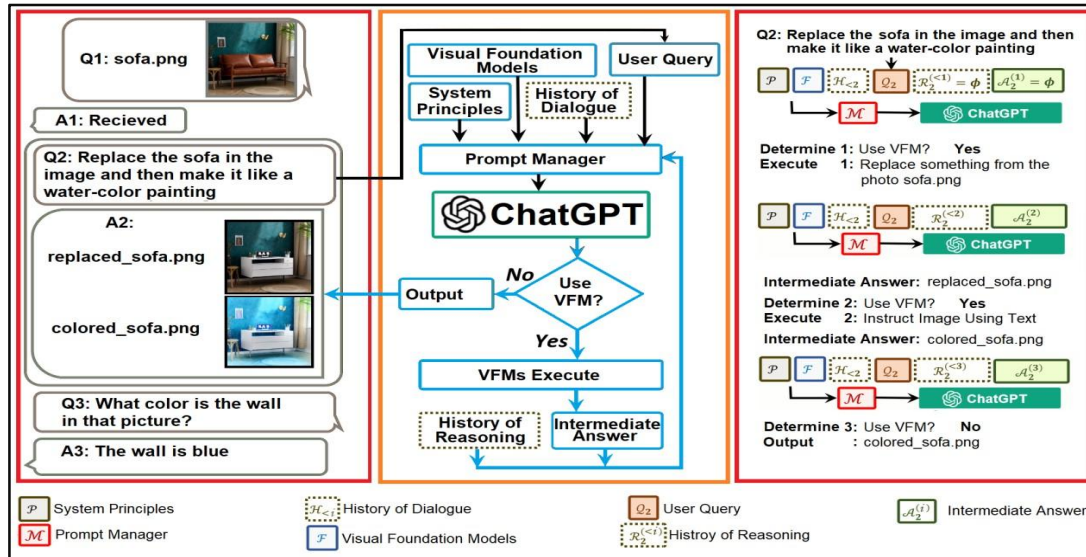

Figure.3.1.Architecture

IV. RESULTS AND DISCUSSION

The chatbot system was evaluated based on its ability to respond meaningfully to a range of user queries, including general knowledge questions, casual conversation, and technical assistance. In most cases, the chatbot demonstrated coherent and context-aware replies. User feedback indicated satisfaction with the system's responsiveness and relevance.

Nonetheless, certain limitations were noted. Occasionally, the chatbot provided responses that lacked factual accuracy or demonstrated inconsistencies when dealing with follow-up questions. These issues highlight known challenges in current generative models, which rely heavily on their training data and may hallucinate facts.

V. CONCLUSION

This study demonstrates the feasibility and effectiveness of implementing a generative AI chatbot using ChatGPT. The system is capable of providing interactive and human-like conversation experiences, showcasing the potential of AI in enhancing digital communication. While the model shows promise, areas such as fact verification and context retention over long conversations require further refinement.

Future work may explore domain-specific fine-tuning, enhanced memory retention for multi-turn dialogue, and integration of voice-based interaction. As generative AI continues to mature, its applications in chatbots and beyond will likely become more impactful and widespread.

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