

Ask Milo: An AI-Powered Business Consulting Platform Using Generative AI and Full-Stack Web Technologies

Deep C Patel, Prof. Ziyam Khan, Jigar M Patel

Department of Information and Technology, Parul Institute of Engineering and Technology(PIET),
Vadodara, Gujarat, India
Email: deep.patel1597@gmail.com

Abstract: In the age of rapidly developing technology, artificial intelligence plays a significant role in facilitating user interaction with computers. The current research introduces Askmilo, a conversational chatbot created by utilizing the technologies of MERN stack and integrating natural language processing. As the purpose of the application is to create a tool that would be able to efficiently communicate with the user via real-time conversation, it is equipped with an ability to generate context-dependent responses, maintaining chat history and thus creating the most comfortable experience for the user. The program implements such aspects as secure authentication, responsiveness, and scalability in order to provide a seamless experience when receiving multiple simultaneous requests from the users. The solution may also be easily updated with such functions as emotion detection and multimodality in the nearest future.

Keywords: Artificial Intelligence, Conversational Agent, Chatbot System, Natural Language Processing (NLP), MERN Stack, Machine Learning, User Interaction, Web Application, Real-Time Communication, Chat History Management, API Integration, Intelligent Systems.

I. INTRODUCTION

The fast evolution of Artificial Intelligence (AI) and Natural Language Processing (NLP) revolutionized the way humans interacted with computers. AI chatbots can be effectively used to automate processes, improve the engagement of users, and give users real-time support. However, there is no doubt that the process of developing a chatbot involves a combination of several components such as frontend frameworks, backend infrastructure, database technology, and AI components. The presented research introduces Askmilo, an AI chatbot designed based on the MERN stack framework in combination with up-to-date AI

APIs. Askmilo provides features such as security, managing chat history, and responsive user interfaces. The introduced system has the potential of being extended in the future and may involve emotional awareness and personalized responses.

The research emphasizes the potential of AI chatbots in increasing efficiency and productivity while minimizing the amount of required human effort.

II. LITERATURE REVIEW

The advancement of intelligent conversational agents is due to AI and NLP technology. Traditional bots were not intelligent and used rule-based approaches to generate

appropriate responses. They could not interpret complicated questions and required constant updating. However, the emergence of machine learning techniques has enabled chatbots to be more flexible and accurate in answering complex queries. Using natural language processing algorithms, intelligent chatbots can comprehend the context, and machine learning technologies help build sophisticated models that can generate responses. The integration of AI with web services provides a platform for easy interaction.

The use of AI technologies allows chatbots to generate human-like responses. Chatbots are applied in various fields, including education, healthcare, and customer service. They provide instant answers and personalized solutions to specific problems. Multimodal and emotionaware chatbots analyze various inputs to determine the user's sentiment.

However, current chatbots face some challenges, such as providing appropriate replies to ambiguous questions and ensuring accuracy. Askmilo contributes to existing literature through the use of AI and an advanced web framework that facilitates instant interaction and manages information efficiently.

III. PROBLEM STATEMENT

In the contemporary digital world, users require interactive platforms for searching information and communicating. However, existing web applications do not incorporate intelligent interactions. For instance, users have to go through multiple web pages or deal

with static information, making interactions inefficient and disengaging. While modern chatbot systems aim to solve this problem, most of them work under rule-based operations and cannot solve difficult queries and maintain contexts. In some cases, even advanced AI chatbots cannot offer reliable context maintenance and dynamic interaction.

Moreover, current users require secure and scalable real-time chatbot systems capable of handling multiple requests. Existing solutions lack a reliable history management system, efficient authentication mechanisms, and backend operations. To solve the aforementioned problems, this research proposes the Askmilo project, which incorporates advanced artificial intelligence features with the MERN stack architecture to provide reliable responses.

IV. METHODOLOGY

As such, the implementation of the Askmilo AI Chatbot System goes through a process of systematic analysis, which combines modern web programming practices with artificial intelligence technology to create an effective conversational tool. There are several stages involved in the methodology, including the proper design, development, and evaluation of the system.

System Design and Architecture

Overall, the system will use a client-server design approach, which relies on the MERN stack (MongoDB, Express.js, React.js, Node.js). While the frontend will be used to interact with the users, the backend will handle request processing, APIs, and databases.

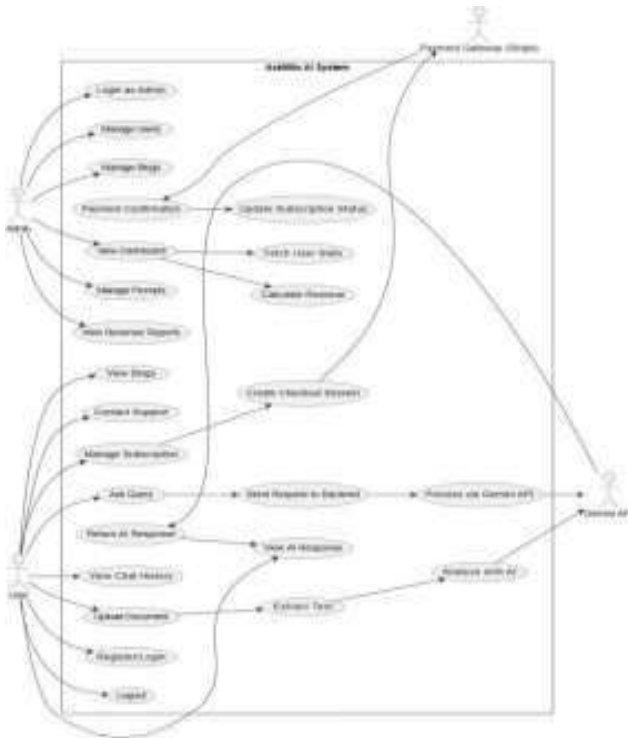


Fig. 1: Use Case Diagram of Askmilo System

Data Collection and Input Processing

User input is obtained via a responsive webbased UI created using React.js. The system supports queries in natural language format, which are preprocessed and then passed onto the back end for processing. Various validation methods are utilized to make sure that data being processed is valid.

Back-end Processing and API Usage The back end, built using Node.js and Express.js, serves as an intermediary between the UI and the AI algorithm. Upon receiving a query from the user, the back end:



Fig. 2: Activity Diagram of Chatbot Workflow

- Receiving the request at the server
- The processing and formatting of the request
- Forwarding the request to an external AI API (e.g., Language Model API)
- Processing and receiving the response from the AI API and sending it to the frontend

This ensures that there is a real-time connection between the users' request and the system response, even when dealing with many user requests at once.

Natural Language Processing (NLP)

The chatbot uses advanced NLP techniques through AI APIs to:

- Interpret user intention
- Creating appropriate responses
- Keeping the conversation flowing

This way, the chatbot gives contextually appropriate and natural human responses rather than canned answers to the user.

Database Management

User data and chatbot responses are stored in MongoDB, allowing:

- Data persistence
- History retrieval
- Having a better user experience since of history keeping

User Authentication and Authorization

Authentication features are provided in order to guarantee the protection of user information and security of the system itself. The system provides:

- User registration/login functionality
- Password encryption
- Session/token-based authentication

This makes sure that users' personal information is safe and that there are no unauthorized access attempts.

Frontend Development

The chatbot user interface is built using React.js to offer:

- Chat interactions
- Real-time messaging
- Responsiveness on different devices

UI development aims to make the interface userfriendly and intuitive.

Testing and Evaluation

The chatbot system is evaluated through testing in a number of ways, including:

- Measuring response accuracy
- Evaluating system performance

- Conducting user experience testing
- Functional and non-functional testing is used for this purpose.

Modeling and Analysis

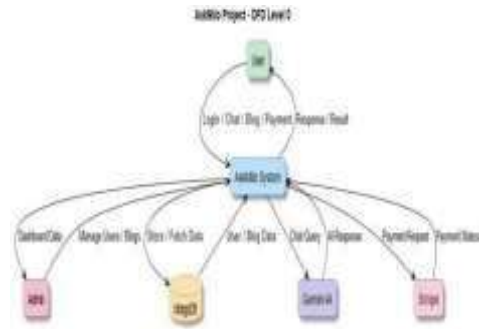


Fig. 3: DFD Level 0

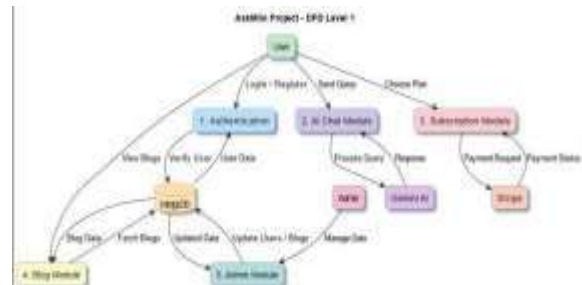


Fig. 4: DFD Level 1

V. RESULTS AND DISCUSSION

The Askmilo AI Chatbot System successfully demonstrates the effective incorporation of

Artificial Intelligence into modern web technologies that provide a conversational platform. Askmilo operates by processing user input requests almost instantly without significant delay, which results in high efficiency and scalability. Due to using the natural language processing technology based on artificial intelligence, the chatbot is able to interpret user requests correctly and provide proper responses. Thanks to React.js, the application interface is friendly and convenient to use, and the data stored in the database is protected by means of authentication. In comparison with the rule-based approach, Askmilo has more flexible and more sophisticated capabilities to generate contextaware responses.

VI. CONCLUSION

The Askmilo AI Chatbot System successfully demonstrates the integration of Artificial Intelligence into modern web technologies that allow developing an effective intelligent conversational platform. As a result, the chatbot provides users with a quick response to their request in real time and with proper interpretation. By providing features such as authentication, chat history, and interactive interface, Askmilo enhances user interaction. Moreover, being developed within the framework of a scalable MERN stack architecture, Askmilo is suitable for practical usage in any environment.

Although there are some limitations, such as dependence on external AI services and occasional

failures when processing complex questions, the overall performance of Askmilo can be considered satisfactory.

Acknowledgment

I would like to thank prof. Ziyam Khan, Jigar M Patel for his guidance during work on the implementation of these techniques and while writing this paper.

REFERENCES

1. Mariani, M., Hashemi, N., & Wirtz, J. (2023). Artificial Intelligence-
2. Empowered Conversational Agents: A Systematic Literature Review and Research Agenda. *Journal of Business Research*.
3. Papneja, H., & Yadav, N. (2024). Selfdisclosure to Conversational AI: A Literature Review and Future Research Directions. *Personal and Ubiquitous Computing*.
4. Jain, H. K., et al. (2023). Conversational AI: A Comprehensive Study on Building and Enhancing Chatbot Systems. *International Journal of Intelligent Systems*.
5. Dobbala, M. K., & Lingolu, M. S. (2024). Conversational AI and Chatbots: Enhancing User Experience on Websites. *American Journal of Computer Science and Technology*.
6. Adamopoulou, E., & Moussiades, L. (2022). An Overview of Chatbot Technology. *Artificial Intelligence Review*.
7. Kushwaha, N., & Singh, P. (2022). Artificial Intelligence Based Chatbot: A Case Study. *Journal of Management and Service Science*.
8. Sharma, Y., et al. (2024). AI Chatbot using Machine Learning. *International Journal for Research in Applied Science and Engineering Technology*.
9. Gao, J., Galley, M., & Li, L. (2018).

Deep C Patel, 2026, 14:2
ISSN (Online): 2348-4098
ISSN (Print): 2395-4752

International Journal of Science,
Engineering and Technology
An Open Access Journal

Neural Approaches to Conversational AI. arXiv.