A
Mini Project Report on

CHATBOT AI WITH AUGMENTED REALITY

Submitted in partial fulfillment of the
requirementsfor the degree of
BACHELOR OF ENGINEERING
IN
Computer Science & Engineering
Artificial Intelligence & Machine Learning

by

SANSKRITI SHUKLA (23106128)
PRACHI SINGH (23106020)
ATHARVA WADEKAR (23106063)
PALAK UPADHYAYA (23106086)
Under the guidance of

Prof. TARUNA SHARMA

Department of Computer Science & Engineering
(Artificial Intelligence & Machine Learning)
A. P. Shah Institute of Technology
G. B. Road, Kasarvadavali, Thane (W)-
400615
University Of Mumbai
2024-2025

A. P. SHAH INSTITUTE OF TECHNOLOGY

CERTIFICATE

This is to certify that the project entitled "AI **CHATBOT WITH AUGMENTED REALITY"** is a bonafide work of Sanskriti Shukla (23106128), Prachi Singh (23106020), Atharv Wadekar (23106063), Palak Upadhyaya (23106086) submitted to the University of Mumbai in partial fulfillment of the requirement for the award of **Bachelor of Engineering** in **Computer Science & Engineering (Artificial Intelligence & Machine Learning).**

_____   _____

Prof. TARUNA SHARMA   Dr. Jaya Gupta

Mini Project Guide   Head of Department

A. P. SHAH INSTITUTE OF TECHNOLOGY

Project Report Approval

This Mini project report entitled "AI **CHATBOT WITH AUGMENTED REALITY**" by **SANSKRITI SHUKLA, PRACHI SINGH, ATHARV WADEKAR and PALAK UPADHYAYA** is approved for the degree of *Bachelor of Engineering* in *Computer Science & Engineering*, (AI&ML) *2024-25*.

External Examiner: _____

Internal Examiner: _____

Place: APSIT, Thane

Date: 03/10/24

Declaration

We declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission hasnot been taken when needed.

Sanskriti Shukla   Prachi Singh   Atharv Wadekar   Palak Upadhyaya

(23106128)   (23106020)   (23106063)   (23106086)

ABSTRACT

1. Introduction to the Proposed System: The integration of Chatbot AI with Augmented Reality (AR) creates an immersive and interactive user experience by combining natural language processing with spatially aware visualizations. This system aims to enhance engagement and efficiency in domains such as education, healthcare, and customer service by providing contextually relevant, multimodal interactions. It addresses the limitations of traditional chatbots and aligns with current trends towards smart environments and immersive technologies.

2. Problems or Issues with Existing Systems: Existing systems without chatbot and augmented reality (AR) integration face several limitations, including lack of interactive and engaging user experiences, inefficient information delivery, and insufficient real-time assistance. These systems often fail to provide personalized and contextual interactions, making it difficult to visualize complex information and reducing overall user satisfaction and productivity. Additionally, scalability and accessibility issues further hinder their effectiveness.

3. Functionality of the Proposed System:The proposed system integrates chatbot AI with augmented reality (AR) to offer interactive, real-time, and personalized assistance through natural language processing and visual overlays. It uses AR for contextual guidance, NLP for conversational interaction, and cloud-based infrastructure for scalability. The system enhances user experience by providing relevant, immersive, and secure support tailored to individual needs and environments.

4. AI integrated with Augmented Reality (AR) offers enhanced user experiences by overlaying digital information onto the real world, providing immersive, interactive, and context-aware applications. This combination improves data visualization, real-time feedback, training, and decision-making, making it more suitable for environments that benefit from spatial computing and natural interfaces. In contrast, AI without AR relies on traditional interfaces and is more suited for backend processing and analysis.

5. Performance and Benchmark Comparison: AI systems integrated with Augmented Reality (AR) outperform non-AR AI in accuracy, real-time processing, and user engagement, making them ideal for tasks requiring spatial awareness and immersive interaction. However, AR-AI systems demand higher computational resources and power. In contrast, non-AR AI systems are more resource-efficient, making them suitable for backend processing and applications where real-time, spatial interaction is less critical.

Keywords: AI,AR,Immersive Interaction , Real-time Assistance, Contextual Awareness.

Index

CHAPTER 1

INTRODUCTION

1. INTRODUCTION

What is a Chatbot AI with Augmented Reality?

Chatbots are software applications designed to simulate human conversation using text or voice, often leveraging natural language processing (NLP) and machine learning. Augmented Reality (AR) is a technology that overlays digital information—such as images, videos, or 3D models—onto the real world, typically viewed through devices like smartphones, tablets, or AR glasses. Integration of Chatbots and ARA chatbot with AR leverages both these technologies to enhance user interaction and engagement. Here's how they work together: Enhanced Interaction: Users can converse with the chatbot using text or voice. The AR component can display contextual digital information in the user's environment, such as guiding them through complex tasks or providing visual answers to their queries. Businesses are increasingly recognizing the potential of integrating AI and AR to streamline operations, enhance customer experiences, and stay ahead in a competitive market. Imagine a retail scenario where customers can try on clothes virtually through AR while an AI chatbot assists them in choosing the perfect outfit. This not only provides a personalized shopping experience but also boosts customer engagement and satisfaction.

Practical Applications:

Customer Service: Virtual agents can guide customers through product setups, troubleshooting, or provide interactive product demonstrations.

Education and Training: AR chatbots can deliver immersive learning experiences, guiding users through practical exercises with visual aids.

Retail and E-commerce: Customers can visualize products in their own space before making a purchase, with the chatbot providing additional information and answering questions.

Tourism and Navigation: Tourists can get interactive tours with AR overlays providing historical information, directions, and recommendations, all facilitated by a conversational agent.

Benefits of AR-Enhanced Chatbots Improved User Engagement: The combination of visual and conversational interactions makes the experience more engaging and intuitive. Better Understanding: Visual aids can help users understand complex information more easily. Personalized Experiences: Chatbots can offer personalized AR experiences based on user preferences and interactions.

Efficiency: Users can get real-time assistance and information in a visually compelling way, improving satisfaction and efficiency.

Challenges Development Complexity: Creating seamless AR and chatbot integration requires sophisticated technology and expertise.

Device Compatibility: Ensuring the experience works well across different AR-enabled devices can be challenging.

Data Privacy: Managing user data securely in AR environments is crucial. By combining the strengths of chatbots and AR, these hybrid systems have the potential to transform various industries, offering more interactive, engaging, and efficient user experiences.

AR in Enterprise: Enterprise augmented reality project is likely of strategic importance to each organization. Every organization has different use cases in mind for the integration of AR and VR technology into their ecosystem of products and services.

CHAPTER 2
LITERATURE SURVEY

1. LITERATURE SURVEY

2.1-HISTORY

The integration of chatbot AI with augmented reality (AR) is a relatively recent development, emerging as both technologies matured and became more accessible. Here's a brief overview of the timeline and key milestones in this area:

Early Developments

1. **Chatbots:**
   - **1960s-1990s**: The concept of chatbots began with early programs like ELIZA (1966) and PARRY (1972), which were limited to text-based interactions.
   - **2000s**: Advances in natural language processing (NLP) and machine learning led to more sophisticated chatbots. This era saw the rise of chatbots in customer service and online support.

2. **Augmented Reality**

   - **1960s-1990s**: AR technology began with early experiments and prototypes. One of the first AR systems was developed in the 1960s, and the term "augmented reality" was coined in the early 1990s.
   - **2000s**: AR technology started gaining traction with advancements in computer vision,mobile devices, and gaming.

Emergence of Integration

1. **2010s:**
   - **Early Integration**: The concept of integrating chatbots with AR began to take shape as both technologies matured. Early applications were experimental and mostly confined to academic research or niche use cases.
   - **Mobile AR and Chatbots**: With the advent of mobile AR platforms like ARKit (Apple, 2017) and AR Core (Google, 2018), there were increased opportunities to combine AR with interactive technologies, including chatbots.

2. **Late 2010s to Early 2020s:**
   - **Commercial Applications**: Companies began to explore practical applications of AR chatbots in various domains such as retail, education, and tourism. AR chatbots started appearing in apps that combined virtual assistance with AR elements, like virtual shopping assistants or interactive educational tools.

Recent Developments

1. **2020s:**
   - **Increased Adoption**: As AR technology became more mainstream with the proliferation of AR-enabled devices and apps, the integration with chatbots became more prevalent. Innovations include virtual customer service representatives, interactive guides, and personalized AR experiences.

   - **Enhanced AI Capabilities**: Advances in AI, including more sophisticated NLP and machine learning models, have further improved the functionality and user experience of chatbots in AR environments.

2. **Ongoing Trends:**
   - **Immersive Experiences**: There is a growing focus on creating highly immersive and contextually aware AR chatbot experiences. This includes integrating chatbots with AR glasses and other wearables to provide seamless, hands-free interactions.
   - **Cross-Platform Integration**: Development efforts are increasingly directed towards integrating AR chatbots with other emerging technologies, such as VR (Virtual Reality) and IoT (Internet of Things), to enhance their capabilities and applications.

2.2-LITERATURE REVIEW

1.Veena Chattaraman , WiSuk Kwon , Kassandra Ross , Jihyun Sung , Kiana Alikhademi , Brianna Richardson , Juan E. Gilbert, " ('Smart' Choice ? Evaluating AI based mobile decision bots for in-store decision- making"," Journal of Business Research (ELSEVIER)",vol .183 ,11 July ,2024.

2. Bhavana Tiple,Chirag Bulchandani, Isha Paliwal, Deepak Shah, Adamy Jain, Chirag Dhaka, & Vaibhav Gupta, "AI based Augmented Reality Assistant", "International Journal of Intelligent Systems and Applications in Engineering(IJISAE)",vol.12, March 6,2023.

3.Mamatha Mekala, Menda Sandhya, Munnangi Anudeepika Divyasree Nallabani, Hima Keerthi Sagiraju," AUGMENTED REALITY CHATBOT USING UNITY"," Dogo Rangsang Research Journal",vol.11, pp no.11, 01- 2021.

4.Chi-Hung Chuang,Jung-Hua Lo,Yan-Kai Lu," Integrating Chatbot and Augmented Reality Technology into Biology Learning during COVID-19 ","Multidisciplinary Digital Publishing Institute"vol.12, January 2, 2023.

5. Zahraa Bassyouni * and Imad H. Elhajj," Augmented Reality Meets Artificial Intelligence in Robotics: A Systematic Review","frontiers",vol.8, pp no. 20, September 21,2021.

6. Xuhai Xu, Mengjie Yu, Tanya Jonker, Kashyap Todi, Feiyu Lu, Xun Qian, João Belo, Tianyi Wang, Michelle Li, Aran Mun, Te-Yen Wu, Junxiao Shen, Ting Zhang, Narine Kokhlikyan, Fulton Wang, Paul Sorenson, Sophie Kahyun Kim, and Hrvoje Benko," XAIR: A Framework of Explainable AI in Augmented Reality","Association for Computing Machinery(ACM)",ARTICLE NO.202, pp no.30, April 19,2023.

7.Michael McTear," Chatbots and Conversational AI: A Complete Guide" ,"Provides a comprehensive overview of the design and implementation of chatbots and conversational AI systems","The Handbook of Natural Language Processing", "Springer" ,1st Edition ,September 18, 2020.

8. Sumit Raj, "Building Chatbots with Python: Using Natural Language Processing and Machine Learning", " A hands-on guide for developing chatbots using Python, NLP, and machine learning techniques.", "Packt Publishing", 1st Edition, May 31, 2019.

CHAPTER 3

Problem Statement

3. Problem Statement

In an increasingly digital world, user interactions with technology have become more dynamic, requiring solutions that provide meaningful, context-aware, and engaging experiences. Traditional chatbots offer textual or auditory responses to user inquiries but often lack the immersive and contextual capabilities that modern applications demand. On the other hand, augmented reality (AR) enhances user experiences by overlaying digital information onto the real world but does not inherently provide interactive conversational capabilities.

The problem addressed by this project is the lack of a seamless integration between chatbot AI and augmented reality that combines the strengths of both technologies. Specifically:

1. **Limited Contextual Understanding**: Existing chatbots may struggle to provide contextually relevant responses based on the user's real-world environment. Traditional chatbots operate in isolation from the physical context in which the user is situated, limiting their ability to offer situationally appropriate assistance.

2. **Suboptimal User Engagement**: AR provides immersive experiences, but without interactive conversational capabilities, it often fails to engage users fully. Users may find AR experiences engaging but lack effective interaction mechanisms to get personalized assistance orsit tightfor help at the site, and a postpone costs them their life.

3. **Fragmented User Experience**: Integrating chatbot AI with AR often involves complex technical challenges, leading to fragmented user experiences. Users may face difficulties navigating between AR interfaces and chatbot interactions, reducing the overall effectiveness and fluidity of the application

4. **Design and Usability Challenges**: Designing intuitive and effective AR interfaces that incorporate chatbot functionality is challenging. Ensuring that the AR elements and chatbot interactions are seamlessly integrated and user-friendly requires sophisticated design and development approaches.

CHAPTER 4

Experimental Setup

4.Experimental Setup

4. Software Setup:

1.Software Tools:

- Operating System:-Windows
- Web Browsers:-Chrome Browser, Edge Browser
- Text Editors :- VS code

2.Augmented Reality (AR) Implementation:

- Our project utilizes the A-Frame JavaScript library to deliver immersive AR experiences.

3. Key Features Implemented

- Marker-based tracking: Utilized image markers for precise object tracking
- Light estimation: Adapt AR lighting to match real-world environments.
- Plane detection: Enable AR objects to interact with real-world surfaces.
- Physics engines: Integrate physics for realistic interactions.

4.Troubleshooting Common Issues:

- Camera permissions: Ensure proper camera access and permissions.
- Rendering issues: Check WebGL support and graphics drivers.
- Marker detection: Verify marker quality and lighting conditions.
- Performance optimization: Monitor FPS and adjust settings.

5.Frontend Development:

- **HTML (Hypertext Markup Language):** This will be used to structure the chatbot interface, including the chat window, input fields, and buttons.
- **CSS (Cascading Style Sheets):** CSS is used to style the chatbot, making it visually appealing with custom designs, animations, and responsive layouts.
- **JavaScript:** JavaScript is the main programming language for handling user interactions, sending requests to the server, processing responses, and updating the chat interface dynamically.

CHAPTER 5

Proposed System & Implementation

5. Proposed system & Implementation

5.1 Block diagram of proposed system:
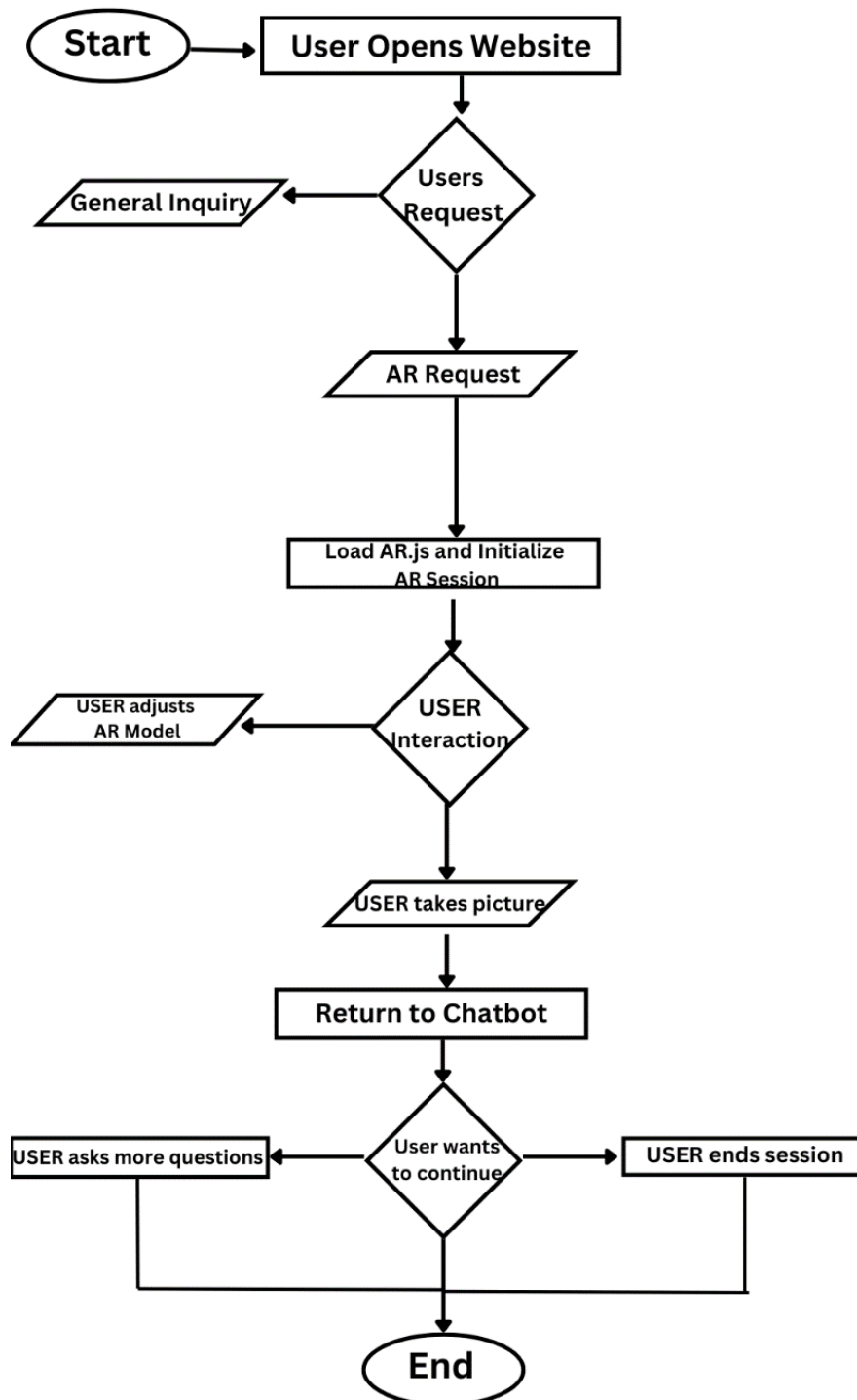
5.2:Block diagram explanation:

Users access a website integrating AR and chatbot features.

The homepage displays available features and instructions for AR activation.

Users grant camera access and activate their device's camera.

The system checks and displays the camera feed.

Successful activation overlays virtual products onto the live view.

Products include sunglasses, hats, and earrings.

Users interact with AR items, moving devices for different angles.

Clicking an item displays detailed information.

Information includes descriptions, features, and style suggestions.

A chatbot interface opens for questions or assistance.

Users type messages or questions in the chatbot interface.

The chatbot processes input using natural language processing.

Relevant responses are generated and sent to the user.

Users decide to continue or exit the interaction.

Continuing leads to further questions or exploration.

Exiting leads to the homepage or conclusion.

The experience combines AR content interaction and chatbot assistance.

This streamlined process enhances user engagement and information accessibility.

Users can explore virtual products in a immersive environment.

The chatbot provides personalized support and recommendations.

Enhancing user experience and product understanding.

Users can share AR experiences on social media platforms.

Increasing engagement and brand visibility.

The AR and chatbot integration offers a cutting-edge solution.

For e-commerce and retail industries aiming to innovate.

Providing an interactive and informative customer experience.

5.3 Implementation

1. **HTML**: This file defines the structure of the chatbot. It includes a chat box to display messages and an input area for user interaction.

2. **CSS**: This file styles the chatbot, making it look visually appealing and ensuring the layout is user-friendly. It includes styles for the chat container, chat messages, and input area.

3. **JavaScript**: This file contains the logic for handling user input and generating responses. It checks for specific keywords in the user's message and provides simple predefined responses.

Features

- **User Interaction**: Users can type messages into a text input and click a button to send their messages.

- **Chat Display**: Messages from both the user and the chatbot are displayed in the chat box.

- **Predefined Responses**: The chatbot responds based on specific keywords detected in the user's message.

Advantages :-

~ AR can make interactions more engaging by overlaying digital information onto the real world, making the chatbot experience more immersive.

~Users can interact with 3D models or animations provided by the chatbot, which can be particularly useful for product demonstrations.

CHAPTER 6

Conclusion

6. Conclusion:

The combination of chatbot AI and augmented reality (AR) enhances user experience and efficiency.

Immersive and interactive experiences make information more engaging and accessible.

AI-powered chatbots offer personalized advice and guidance, while AR provides visualizations.

This fusion unlocks innovative marketing strategies, training methods, and customer service approaches.

Virtual assistants could become ubiquitous, helping with daily tasks and decisions.

Interactive learning experiences make education more enjoyable and effective.

Remote support is enhanced, enabling experts to guide users through complex tasks.

Immersive entertainment experiences emerge, transforming storytelling and gaming.

As these technologies evolve, innovative applications and transformative experiences unfold.

The integration of chatbot AI and AR has far-reaching potential across industries.

It revolutionizes the way we interact, learn, and experience information.

References

Research paper

1.Veena Chattaraman , WiSuk Kwon , Kassandra Ross , Jihyun Sung , Kiana Alikhademi , Brianna Richardson , Juan E. Gilbert, " ('Smart' Choice ? Evaluating AI based mobile decision bots for in-store decision- making"," Journal of Business Research (ELSEVIER)",vol .183 ,11 July ,2024.

2. Bhavana Tiple,Chirag Bulchandani, Isha Paliwal, Deepak Shah, Adamy Jain, Chirag Dhaka, & Vaibhav Gupta, "AI based Augmented Reality Assistant", "International Journal of Intelligent Systems and Applications in Engineering(IJISAE)",vol.12, March 6,2023.

3.Mamatha Mekala, Menda Sandhya, Munnangi Anudeepika Divyasree Nallabani, Hima Keerthi Sagiraju," AUGMENTED REALITY CHATBOT USING UNITY"," Dogo Rangsang Research Journal",vol.11, pp no.11, 01-2021.

4.Chi-Hung Chuang,Jung-Hua Lo,Yan-Kai Lu," Integrating Chatbot and Augmented Reality Technology into Biology Learning during COVID-19", "Multidisciplinary Digital Publishing Institute", vol 12, January 2, 2023.

5. Zahraa Bassyouni * and Imad H. Elhajj," Augmented Reality Meets Artificial Intelligence in Robotics: A Systematic Review","frontiers",vol.8, pp no. 20, September 21,2021.

6. Xuhai Xu, Mengjie Yu, Tanya Jonker, Kashyap Todi, Feiyu Lu, Xun Qian, João Belo, Tianyi Wang, Michelle Li, Aran Mun, Te-Yen Wu, Junxiao Shen, Ting Zhang, Narine Kokhlikyan, Fulton Wang, Paul Sorenson, Sophie Kahyun Kim, and Hrvoje Benko," XAIR: A Framework of Explainable AI in Augmented Reality","Association for Computing Machinery(ACM)",ARTICLE NO.202, pp no.30, April 19,2023.

7.Michael McTear," Chatbots and Conversational AI: A Complete Guide" ,"Provides a comprehensive overview of the design and implementation of chatbots and conversational AI systems","The Handbook of Natural Language Processing", "Springer" ,1st Edition ,September 18, 2020.

8. Sumit Raj, "Building Chatbots with Python: Using Natural Language

Processing and Machine Learning", " A hands-on guide for developing chatbots using Python, NLP, and machine learning techniques.", "Packt Publishing", 1st Edition,May 31, 2019.

URL

[10] https://www.inderscience.com/info/ingeneral/forthcoming.php?jcode=ijbir
[11]
https://www.researchgate.net/publication/350367477_Augment_reality_chatbot_using_cloud