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AI Medical Kiosk for Remote Area

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ABSTRACT: In the era of advancing technology, access to quality healthcare remains a challenge, particularly in remote areas. To address this, we propose a Robotic AI Enabled Medical Kiosk for Remote Consultation. This innovative solution leverages robotic technology, artificial intelligence, and telemedicine to provide convenient access to medical consultation and essential healthcare services. To develop and deploy a robotic AI-enabled medical kiosk to provide remote consultations in underserved areas, improving access to healthcare and reducing disparities. Providing User-friendly interface with sensors and potential for robotic elements for enhanced accessibility. Usage of Artificial Intelligence for Symptom analysis, prioritize requests, chatbot interaction, and integration with medical databases for informed consultations. Leveraging technology to bridge the gap in access to quality care. It can serve as a model for wider implementation and contribute to achieving healthcare equity.

KEYWORDS: Artificial Intelligence, robotic, chatbot interaction

I. INTRODUCTION

Access to healthcare services is a fundamental right, yet millions of people around the world, especially those in remote and underserved areas, struggle to access quality healthcare. In India, the situation is particularly challenging, with a vast population residing in rural areas where healthcare facilities are limited. To bridge this gap, we have developed a Robotic AI Enabled Medical Kiosk, an innovative solution that brings health care services closer to the community. This kiosk serves as a point of contact for individuals seeking medical consultation, diagnosis, and treatment. The kiosk seamlessly integrates with existing health care infrastructure, allowing for easy adoption by healthcare providers and ensuring continuity of care for patients. Through a combination of robotic technology and artificial intelligence, the kiosk provides a user-friendly interface that enables users to interact with expert doctors remotely.

The Robotic AI Enabled Medical Kiosk for Remote Consultation is a cutting –edge healthcare solution designed to address the challenges of healthcare accessibility in remote and underserved areas. This innovative kiosk integrates robotic technology, artificial intelligence, and telemedicine to provide convenient access to medical consultation and essential healthcare services. By leveraging biometric identification and the kiosk ensures secure access to expert doctors, enabling timely diagnosis, treatment, and medication delivery. The user-friendly design and intuitive interface make it accessible to individuals with varying levels of technical expertise, bridging the gap between patients and healthcare providers. The kiosk offers a cost-effective alternative to traditional healthcare services, reducing the Financial burden on individuals in remote areas who may face challenges accessing affordable healthcare. The kiosk is designed to be scalable and sustainable, with the potential for expansion to serve more communities and adapt to evolving healthcare needs.

This paper outlines the design, development, and implementation of the Robotic AI Enabled Medical Kiosk, highlighting its potential to revolutionize healthcare delivery in rural India and other underserved areas.

II. METHODOLOGY

In the development of the Robotic AI Enabled Medical Kiosk for Remote Consultation, a comprehensive methodology was employed to ensure its effectiveness and relevance in addressing healthcare challenges in remote and underserved

areas. The methodology began with a thorough needs assessment, involving surveys and interviews in rural communities to understand the specific healthcare needs and preferences of the target population. Based on the findings of the needs assessment, a concept was developed for the kiosk, focusing on user-friendly design and accessibility. Extensive testing was conducted to ensure the functionality, usability, and reliability of the kiosk, with iterative optimizations made based on user feedback. Training and support were provided to healthcare providers and kiosk operators to ensure the effective use of the kiosk. An evaluation was conducted to assess the impact of the kiosk on healthcare accessibility, patient outcomes, and healthcare provider satisfaction. Based on the evaluation results, plans were made for the scale-up and expansion of the kiosk to reach more rural communities.

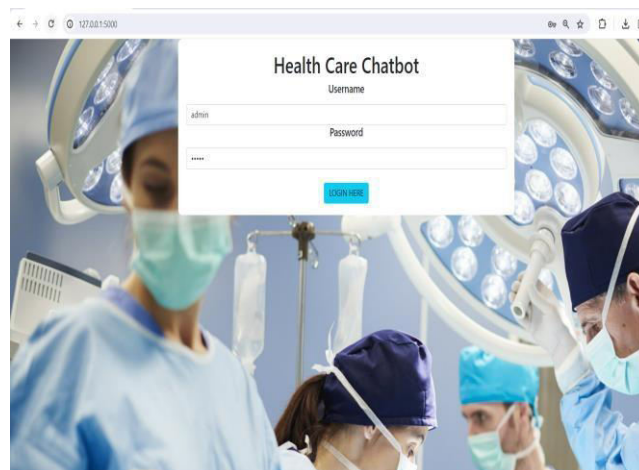


Fig1.HealthCareChatbot

III. LITERATUREREVIEW

Telemedicine and telehealth technologies have been rapidly evolving, offering innovative solutions to bridge the gap in healthcare accessibility, particularly in remote and underserved areas. Several studies have highlighted the potential of telemedicine to improve healthcare outcomes and reduce healthcare disparities. A study by Bashshur et al. (2016) demonstrated the effectiveness of telemedicine in improving access to care, patient satisfaction, and clinical outcomes[1].The study found that telemedicine interventions were associated with reduced hospitalizations and emergency department visits, particularly for patients with chronic conditions.

Another study by Dorsey and Topol (2016) discussed the role of telemedicine in revolutionizing healthcare delivery, particularly in neurology. The study highlighted the potential of telemedicine to improve access to specialist care, reduce travel costs, and enhance patient outcomes in neurological disorders. In the context of robotic technologies, a study by Keesara et al. (2017) discussed the potential of robotic telepresence in expanding access to care, particularly in rural and underserved areas [2]. The study emphasized the importance of user-friendly interfaces and seamless integration with existing health care systems to maximize the impact of robotic telepresence.

Furthermore, studies have also highlighted the importance of integrating telemedicine solutions with existing health care infrastructure and regulatory frameworks. A study by Perednia and Allen (1995) emphasized the need for regulatory reforms to support the widespread adoption of telemedicine, particularly in ensuring reimbursement for telemedicine services and maintaining patient confidentiality.

Overall, the literature review highlights the potential of telemedicine and robotic technologies to improve healthcare accessibility and outcomes, particularly in remote and underserved areas. However, challenges remain in terms of regulatory barriers, technological limitations, and user acceptance, which need to be addressed to fully realize the potential of these technologies in improving healthcare delivery.

IV. MODELLINGTECHNIQUE

For the Robotic AI Enabled Medical Kiosk for Remote Consultation, a suitable modelling technique would be a combination of system dynamics modelling and agent-based modelling.

System Dynamics Modelling: This technique can be used to model the overall healthcare system, including the interactions between different components such as the kiosk, healthcare providers, patients, and the broader healthcare infrastructure. System dynamics modelling can help in understanding the dynamics of healthcare delivery, identifying key variables and feedback loops, and simulating the impact of different interventions on health care outcomes.

Agent-Based Modelling: Agent-based modelling can be used to model the behavior of individual agents within the health care system, such as patients, health care providers, and kiosk operators. Agent-based models can simulate the interactions between the sea gents, allowing for a detailed analysis of how different factors, such as user behavior, resource allocation, and system design, impact the overall performance of the kiosk. By combining these modelling techniques, researchers can gain a comprehensive understanding of the complex interactions within the healthcare system and the potential effects of introducing the Robotic AI Enabled Medical Kiosk for Remote Consultation. This integrated approach can help in designing and implementing the kiosk more effectively, ensuring its success in improving health care accessibility and outcomes in remote and underserved areas.

A. Biometric Verification

In the Robotic AI Enabled Medical Kiosk for Remote Consultation, biometric verification and chatbot interaction are integral components that enhance the user experience and ensure the security and efficiency of healthcare service delivery. The biometric verification algorithm enables secure user authentication, allowing only authorized individuals to access the kiosk's services. This feature ensures the confidentiality of patient information and protects against unauthorized access.

Additionally, the chatbot interaction algorithm provides users with a user-friendly interface to interact with the kiosk and access health care services. The chat bot can assist users in scheduling appointments, providing basic medical information, and answering common healthcare questions. This feature not only enhances the accessibility of the kiosk but also helps users navigate the healthcare system more effectively, especially in areas with limited access to health career sources.

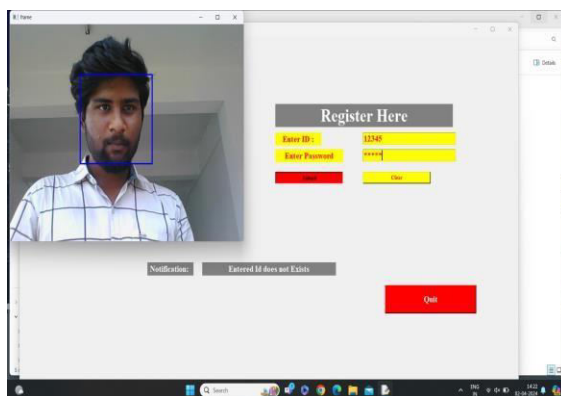


Fig2.BiometricVerification

This function a lity is particularly beneficial for users with limited healthcare knowledge, empowering them to navigate the healthcare system more confidently. Additionally, the chat bot can provide basic health education and information on common illnesses, promoting preventive care and healthier lifestyles. The chatbot serves as a virtual assistant, guiding users through the consultation process, scheduling appointments, and providing relevant medical information. Overall, the integration of biometric verification and chatbot interaction algorithms in the kiosk enhances its functionality and usability, making it a valuable tool for improving health care accessibility in remote and underserved areas.

B. Healthcare Chat bot inter action

One of the key functionalities of the chat bot is to assist users in scheduling appointments with healthcare providers. Users can simply input their preferred date and time, and the chat bot will facilitate the appointment booking process, ensuring a seamless experience for the user. This feature is particularly beneficial for individuals in remote areas who may have limited access to healthcare facilities or face challenges in scheduling appointments through traditional

means. Additionally, the chat bot provides users with access to basic medical information and health education materials. Users can ask questions about common health issues, medication, and treatment options, and the chat bot will provide relevant and accurate information. This feature empowers users to make informed decisions about their health and well-being, promoting proactive healthcare management.

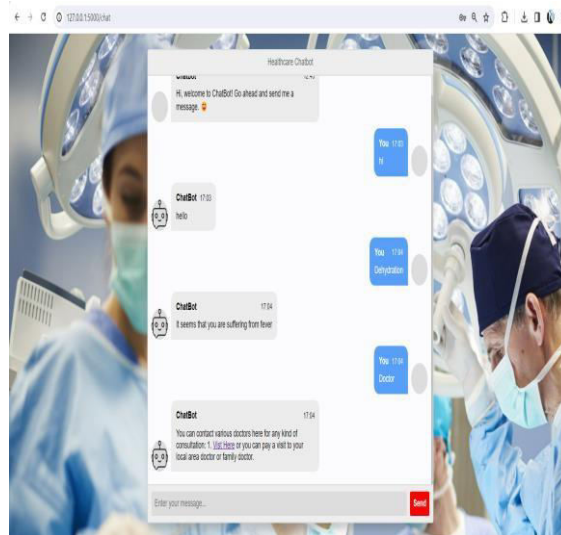


Fig3.ChatbotInteraction

Furthermore, the chatbot can assist users in accessing their medical records and updating personal information. Users can inquire about their past consultations, test results, and medication history, allowing for better continuity of care. By providing these services, the chat bot enhances the overall user experience and facilitates a more efficient and personalized healthcare service delivery model.

C. Algorithmic Approach

In the Robotic AI Enabled Medical Kiosk for Remote Consultation, the algorithmic approach plays a crucial role in facilitating secure and efficient access to healthcare services. The user registration and authentication algorithms ensure that only authorized users can access healthcare services, maintaining the confidentiality and security of patient information.

The doctor consultation algorithms enable users to request consultations with expert doctors in various specialties, facilitating timely and accurate diagnosis and treatment. The algorithms for accessing medical history and updating medical records allow users to manage their health information conveniently. Additionally, the algorithms for conducting diagnostic tests and accessing emergency services ensure that users can receive the care they need, even in remote areas. Overall, the seal gorithms are essential components of the kiosk's functionality, enabling it to provide high-quality healthcare services to individuals in remote and underserved areas. Symptom Analysis from user

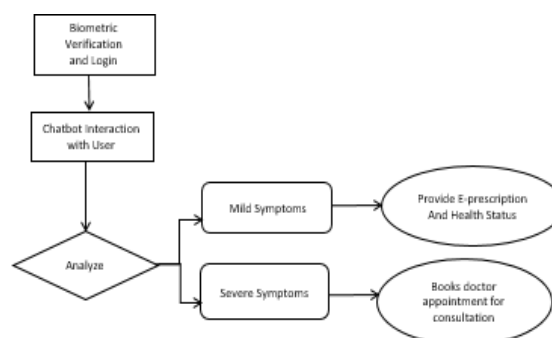


Fig4.ArchitecturalDiagram

D. Symptom Analysis from user

The symptom analyzer allows users to input their symptoms through a user-friendly interface, which is then analyzed using artificial intelligence algorithms to provide possible diagnoses or recommendations. This feature empowers users to take proactive steps towards their health by providing them with immediate access to information and guidance.

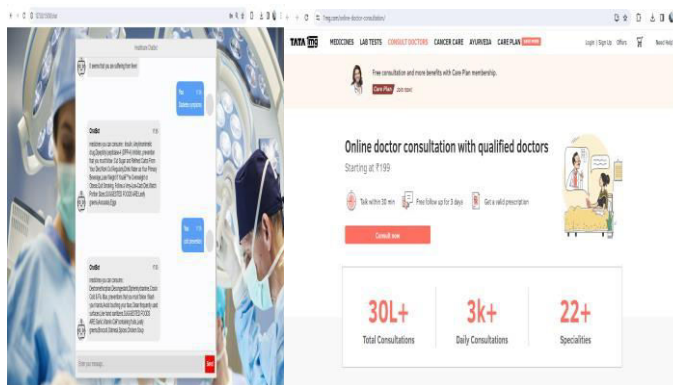


Fig5.SymptomAnalysis

By providing users with a tool to assess their symptoms and seek guidance, the kiosk enhances healthcare access and empowers individuals to take control of their health. Overall, the integration of a symptom analyzer enhances the kiosk's functionality and reinforces its role as a comprehensive and innovative healthcare solution for remote communities.

V. CONCLUSION

In conclusion, the Robotic AI Enabled Medical Kiosk for Remote Consultation represents a significant advancement in healthcare technology, offering a transformative solution to improve healthcare accessibility and delivery in remote and underserved areas. By integrating biometric verification, chatbot interaction, and telemedicine capabilities, the kiosk provides a user-friendly interface for individuals to access a wide range of healthcare services, including consultations with expert doctors, scheduling appointments, and accessing medical records.

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