iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 13 **Issue:** V **Month of publication:** May 2025

DOI: https://doi.org/10.22214/ijraset.2025.70591

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 13 Issue V May 2025- Available at www.ijraset.com

Moodscape: Adaptive Environment Based on User Mood

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Abstract: ***In today's fast-paced world, stress and anxiety have become common challenges, often affecting mental well-being. Moodscape is an innovative AI-powered application designed to offer a personalized escape by creating immersive virtual environments based on a user's emotions. By analyzing facial expressions using OpenCV and interpreting voice input through microphone-based sentiment analysis, the system detects the user's mood in real time. Machine learning algorithms process these inputs to classify emotions, which then guide the generation of a corresponding virtual environment. Whether a user is feeling overwhelmed, sad, or joyful, Moodscape crafts a dynamic experience that aligns with their emotions, providing a sense of relaxation and mental relief. This approach makes emotional well-being more accessible, especially for those unable to take breaks due to work or financial constraints. By integrating AI, VR, and sentiment analysis, Moodscape presents a cost-effective and engaging solution to stress management, promoting mindfulness and emotional balance.***

I. INTRODUCTION

In an era where mental well-being is increasingly prioritized, technology is playing a vital role in providing innovative solutions for stress relief. Moodscape is an AI-driven application designed to enhance emotional well-being by creating virtual environments that adapt to a user's mood in real time. Traditional methods of relaxation, such as meditation or therapy, may not always be accessible due to time, financial constraints, or personal preferences. Moodscape bridges this gap by offering an immersive and personalized approach to relaxation. The application utilizes OpenCV and microphone input to capture both facial expressions and voice tone, which are analyzed using machine learning algorithms to determine the user's emotional state. Based on the detected mood, a corresponding virtual environment is generated, allowing users to experience a space that aligns with their emotions. For instance, a user feeling stressed may be transported to a serene beach setting, while someone experiencing joy may find themselves in a vibrant, energetic landscape. Moodscape not only serves as an escape from daily stressors but also introduces a new dimension of mental wellness through AI-powered emotional intelligence. By making mood-based relaxation more accessible, this technology offers a practical and affordable way for individuals to unwind, ultimately contributing to a healthier and more balanced lifestyle.

II. LITERATURE REVIEW

A. Video Conferencing

Video conferencing is a method of communicating between two or more locations in which sound, vision, and data signals are conveyed in an electronic way to enable continuous interactive communication. VC is much more personal and effective than audio conferencing, all the parties which are being involved in that meeting can see the expressions, especially facial expressions and body language which are so important and vital to the way we communicate. Video conferencing works by using various technologies. A Video conference can be between two sites, which means locations that are connected to each other via the video conference, or the conference can connect multiple locations. Video conferencing communication can take place in a special video conferencing studio or o a normal computer with a webcam or on a video call on mobile phones. Besides audio and video transmission of the meeting's activities, video conferencing technologies can be used to share data, and documents and display information.

B. Video Conferencing Web Application Using Webrtc

This project explains how to solve the problem by creating a similar web application that uses WebRTC. Web Real-Time Communications (WebRTC) is an Application Programming Interface that allows web developers to integrate Real-Time Communication (RTC) capabilities into their web-based applications without the need for plugins. Peer-to- peer (P2P) architecture is superior to client-server design in terms of scalability and reliability, as single nodes failure does not effect the entire system. In addition, the WebRTC system consists of a web server and browser that run on many operating systems, as well as workstations, tablets, and mobile phones. The Role of Lullabies in Emotional and Cognitive Development

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C. Quality of Experience in Telemeetings and Videoconferencing

Telemeetings such as audiovisual conferences or virtual meetings play an increasingly important role in our professional and private lives. For that reason, system developers and service providers will strive for an optimal experience for the user, while at the same time optimizing technical and financial resources. This leads to the discipline of Quality of Experience (QoE), an active originating from the telecommunication and multimedia engineering domains, that strives for understanding, measuring, and designing the quality experience with multimedia technology. This paper provides the reader with an entry point to the large and still growing field of QoE of telemeetings, by taking a holistic perspective, considering both technical and non-technical aspects, and by focusing on current and near- future services. Addressing both researchers and practitioners, the paper provides a comprehensive survey of factors and processes that contribute to the QoE of telemeetings, followed by an overview of relevant state-of-the art methods for QoE assessment. To embed this knowledge into recent technology developments, the paper continues with an overview of current trends, focusing on the field of extended Reality (XR) applications for communication purposes. Given the complexity of telemeeting QoE and the current trends, new challenges for a QoE assessment of telemeetings are identified.

D. Real-Time Video Conferencing Application

Mobile learning tools have facilitated authentic learning experiences, allowing students to forge meaningful connections while acquiring real-world knowledge. Mastering the skill of using mobile video conferencing applications is crucial but often complicated for users, such as students, teachers, and employers. In this study, the mobile video conferencing applications Zoom and Webex were compared with respect to their usability, using cognitive load theory as the conceptual framework. A systematic mapping approach was applied to obtain comparative descriptive information from surveyed literature. The available literature on communications support, accessibility and usability, and privacy and security of video conferencing technology was used for the systematic mapping process. The literature review revealed that Zoom and Webex usage can lead to cognitive fatigue, so users must avoid multitasking and schedule breaks between sessions to remain focused. Furthermore, video conferencing tools need to bridge the gap between usability and security for augmented safety of personal information alongside user comfort. Overall, the findings of this study are important for reducing the complexities of mobile video conferencing applications and enhancing the mobile learning experience.

III. PROBLEM DEFINITION

Mental stress and emotional fatigue have become significant concerns in today's fast- paced world, often leading to decreased productivity, anxiety, and overall mental exhaustion. Traditional relaxation methods, such as therapy, meditation, or vacations, may not always be feasible due to time constraints, financial limitations, or personal preferences. Many individuals struggle to find immediate and effective ways to manage their emotional well-being, leading to prolonged stress and its associated health risks.

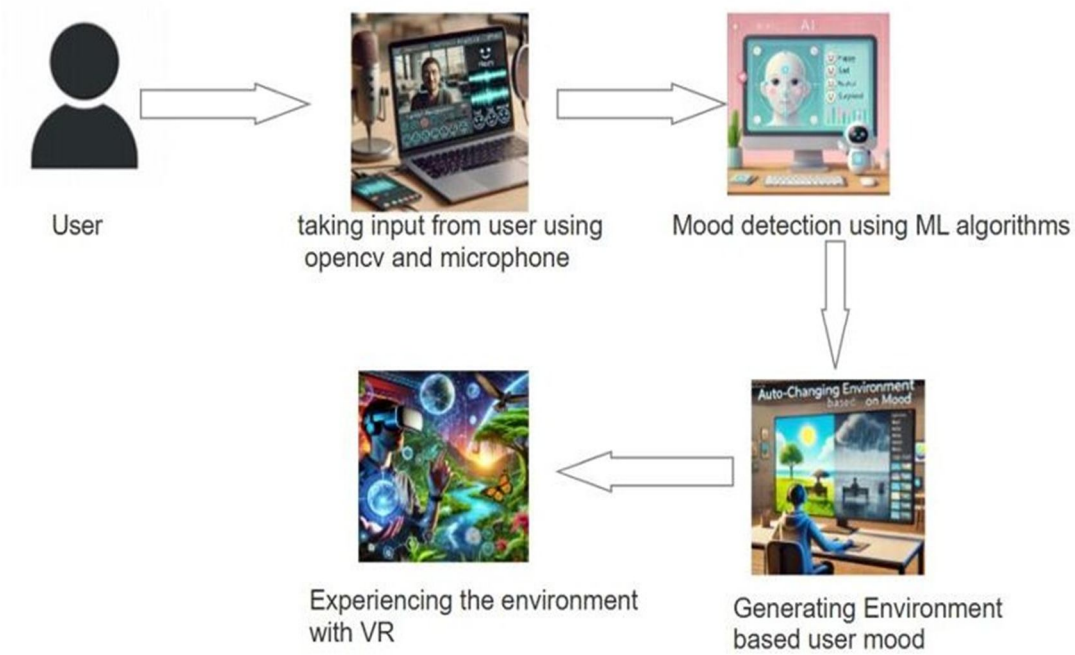
Moodscape addresses this issue by leveraging artificial intelligence and virtual reality to provide an accessible and personalized relaxation experience. By analyzing facial expressions and voice input, the system detects a user's emotional state and generates a virtual environment that aligns with their mood. This real-time, immersive experience offers users a unique way to de-stress and enhance their emotional well-being without requiring external resources or significant time investment.

The core problem that Moodscape solves is the lack of an intuitive, technology-driven solution for real-time emotional relief. By integrating AI, ML, and VR, the system provides an innovative approach to mental wellness, making stress management more engaging, efficient, and accessible.

IV. METHODOLOGY

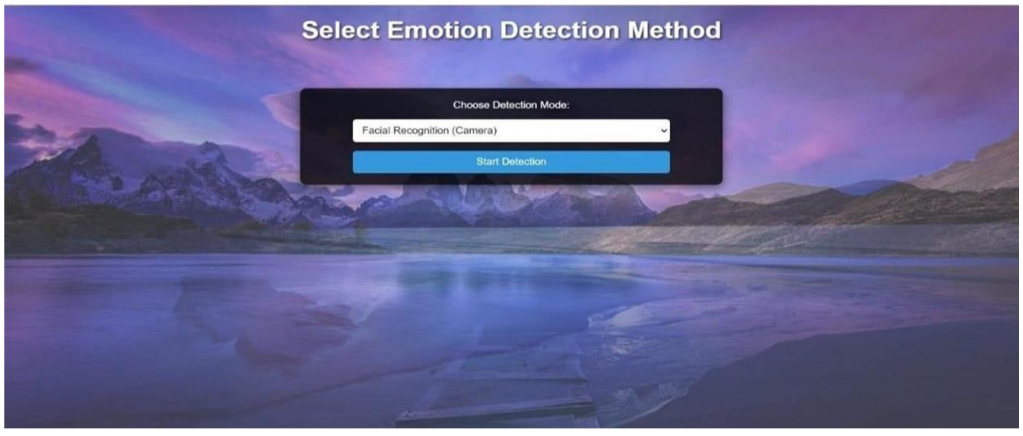
Moodscape follows a structured approach that integrates artificial intelligence, machine learning, and virtual reality to create immersive environments tailored to a user's emotional state. The process begins with user input acquisition, where real-time data is collected through a webcam and microphone. Facial expressions are analyzed using OpenCV, while speech patterns and tone are processed through sentiment analysis techniques. This dual- input approach ensures a comprehensive understanding of the user's mood. The collected data is then processed using machine learning algorithms trained on emotion classification datasets. These algorithms identify the user's current emotional state by analyzing facial features and vocal cues, classifying emotions such as happiness, sadness, stress, or excitement. Once the mood is detected, the system generates a corresponding virtual environment that aligns with the user's emotional state. For instance, if the user appears stressed, they may be placed in a calm and serene nature scene, while a joyful user might experience a vibrant and energetic landscape. The virtual environment is developed using Unity, ensuring high-quality visuals and an immersive experience. Finally, the generated environment is rendered in a VR-compatible format, allowing users to step into a space that reflects their mood.

This real-time immersive experience is designed to promote relaxation, reduce stress, and enhance emotional well-being. By integrating AI-driven mood analysis with VR-based relaxation techniques, Moodscape offers an innovative and accessible mental wellness solution tailored to individual emotions.

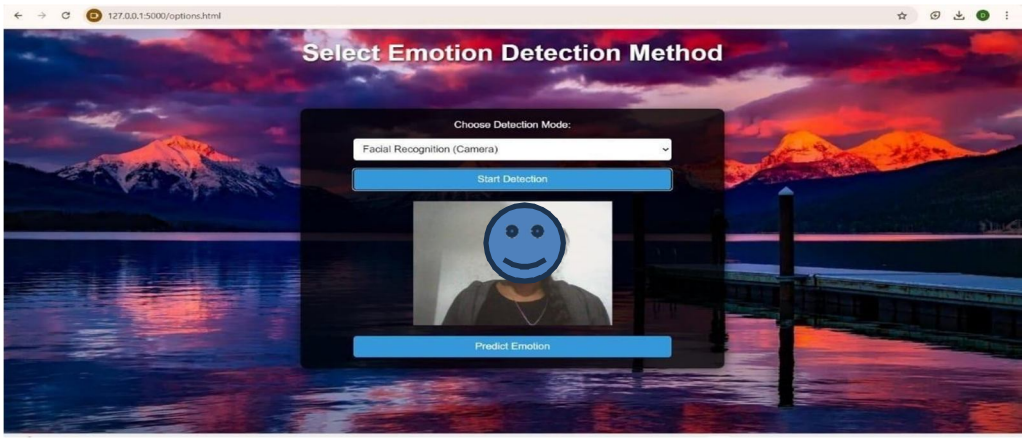


V. RESULTS AND EVALUATION

Moodscape was evaluated based on its accuracy in detecting user emotions, the effectiveness of its virtual environments, and overall user experience. The system's mood detection module, which integrates facial expression analysis and speech sentiment processing, was trained on publicly available emotion datasets. During testing, it demonstrated high accuracy in recognizing emotions like happiness, sadness, stress, and calmness, with multimodal input improving classification accuracy compared to using facial or voice analysis alone. User feedback played a crucial role in assessing the system's effectiveness, with most participants reporting that the generated virtual environments closely matched their emotional state and provided a sense of relaxation. Many users experiencing stress or anxiety found the immersive settings particularly calming, highlighting the potential of AI-driven emotional adaptation. Additionally, the system's real-time responsiveness and seamless transition into VR environments were appreciated. However, areas for improvement were identified, including refining emotion classification to detect more subtle emotional variations and enhancing the realism of virtual settings for deeper immersion. Despite these challenges, Moodscape successfully demonstrated its ability to provide a personalized and accessible stress-relief experience, making AI- powered emotional well-being more engaging and effective.









VI. CONCLUSION

Moodscape presents an innovative approach to mental wellness by leveraging artificial intelligence and virtual reality to create personalized relaxation experiences based on real- time emotion detection. By analyzing facial expressions and speech tone, the system accurately determines a user's mood and generates immersive environments that align with their emotional state, providing an accessible and effective way to manage stress and enhance well-being. User feedback and system evaluations demonstrated the app's ability to offer meaningful emotional relief, with participants experiencing a noticeable reduction in stress levels through AI-driven virtual experiences. While further refinements in emotion classification and environment realism can enhance its effectiveness, Moodscape has already proven its potential as a powerful tool for mental relaxation. By combining AI, machine learning, and VR, it offers a cost-effective and engaging solution for individuals seeking an escape from daily stress, making emotional well-being more interactive, intuitive, and accessible.

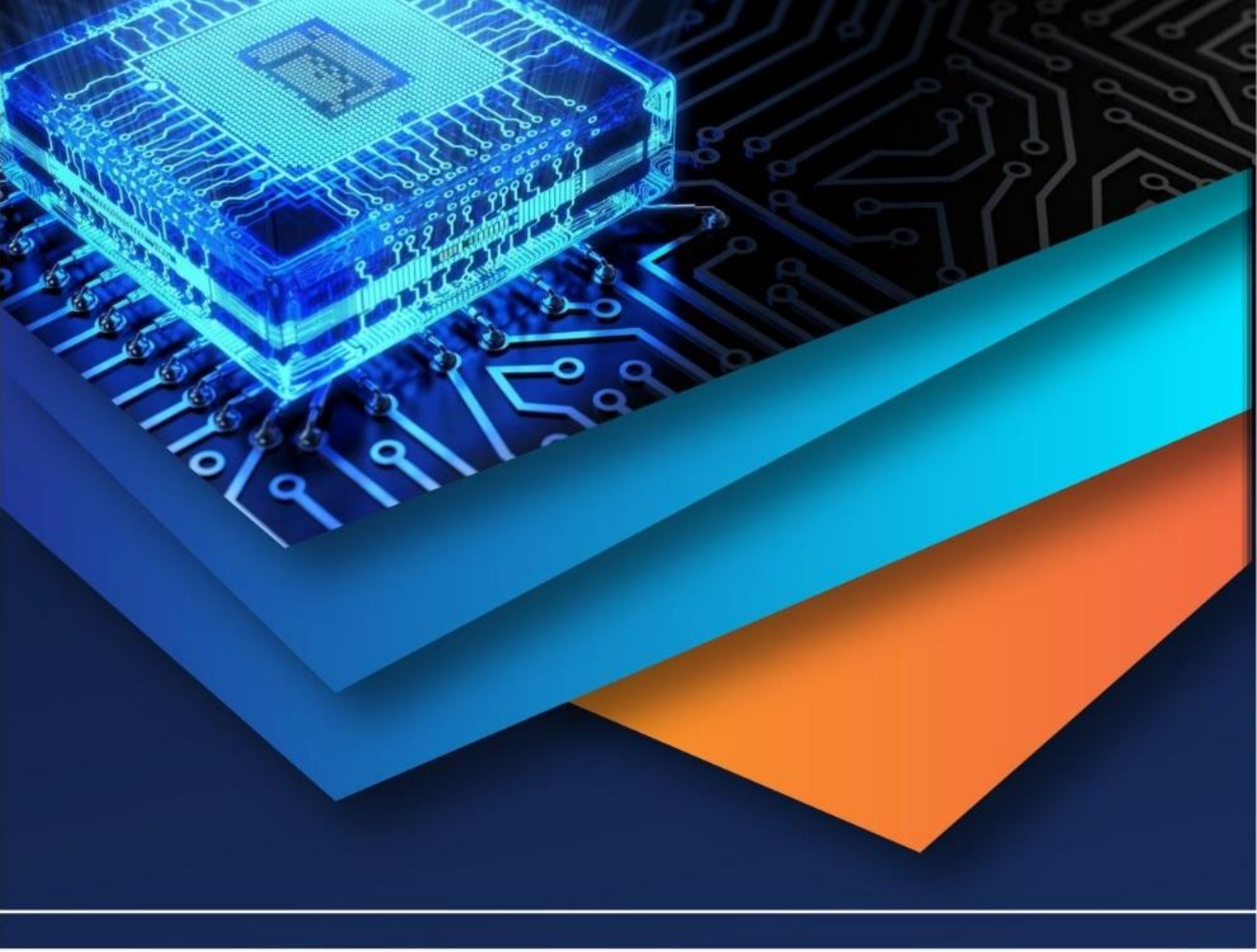
VII. FUTURE SCOPE

Moodscape can be enhanced by integrating deep learning models to detect complex emotions and incorporating physiological inputs like heart rate for better accuracy. Future versions may include adaptive environments that evolve over time and support for multiple languages and cultures. It also holds potential in therapeutic settings, offering personalized mental health support. With advancements in VR and wearable tech, Moodscape can become even more immersive and widely accessible.

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