International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

# Emotions-Based Music Player

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**ABSTRACT**

An emotions-based music player is a software that detects the emotions of an individual with the help of a webcam and then analyses the mood of an individual and then recommends songs that may improve the mood of the user. Music has been proven to show positive effects on the overall mood of the user if the user is in a bad mood. Hence, we may use music to alleviate the mood of the individual. The system will capture an image of the user with the help of a webcam and then analyze the image for the type of emotion. For example, if the image shows an angry man, then the system will suggest appropriate songs to help improve the current mood of the user. We have included and implemented deep learning. This is a crucial part of our project.

**Keywords:** stress, Deep learning, emotion, facial expression

## INTRODUCTION

In this modern world, problems like depression, anxiety, and post-traumatic stress disorder are at an all-time high. Emotional problems are increasing day by day. Technology is advancing rapidly and so are the problems associated with it. This leads to stress and exhaustion. A facial emotion-based music player is a type of music player that uses facial recognition technology to detect the user's facial expressions and emotions, and then select music that is tailored in such a way that it can contribute to helping with the current mood through music therapy.

Facial emotion-based music player is a relatively new concept, and there has been some research done in this area. Research on facial emotion-based music players has focused on developing techniques for facial emotion recognition, music emotion classification, and user feedback/personalization. Deep learning-based models have been used for facial emotion recognition, while music classification algorithms have analyzed features like tempo, rhythm, and tonality to select appropriate music.

The existing models for facial expression-based music players have predominantly recommended English songs due to their development outside of India. However, to make the software more relevant to Indian users, there is a need to incorporate Hindi songs into the recommendations. We are making the software recommend Hindi songs that will be more relevant in India.

The network's mental states include happiness, sadness, anger, and fear. Calculated from test results, each transition between two states is represented by a probability. However, other feelings like anxiety and excitement aren't taken into account. Automatic mood detection and recognition in music are developing quickly thanks to advancements in digital signal processing and various efficient feature extraction techniques.

Many additional potential uses, including musical entertainment and human-computer interaction systems, can benefit from emotion detection and recognition. The first study on emotion detection through music was delivered by Feng. They applied the Computational Media Aesthetics (CMA) point of view.

**OBJECTIVES**

- To act as a bridge between the audio system and the user.
- To provide excellent amusement for consumers.
- To put machine-learning concepts into action.
- To provide a new era forum for music enthusiasts.
- Bridging the gap between evolving tools and musical methods

**INTEGRATION OF DEEP LEARNING FOR EMOTION DETECTION:**

Fig. 1 and fig.2 incorporate deep learning techniques to analyze facial expressions captured by a webcam, enabling the emotions-based music player to accurately detect the user's mood. This integration of deep learning is a crucial aspect of the project, facilitating the recommendation of songs tailored to improve the user's current emotional state. Additionally, the paper may provide insights into the dataset used for training the deep learning model, including the types of emotions represented and the preprocessing techniques applied to the images.

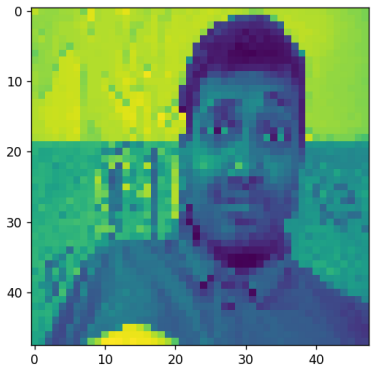


**Fig.1- Face Detection Process**


**Fig.2-Emotions Detection**

## LITERATURE REVIEW

Music has been found to have a powerful effect on human emotions, with research showing that it can positively influence mood, reduce stress levels, and even regulate emotions. The music industry has recognized the importance of emotions and developed algorithms to curate playlists based on mood.

An emotion-based music player is a system designed to select and play music based on the user's emotional state. This literature review explores the research on the impact of music on emotions and how it can be applied to develop an emotion-based music player.

The music player plays the song with the help of YouTube. YouTube is used to induce the songs for the system, as YouTube may also act as a huge database for songs for every mood of the person. Different types of music have varying effects on mood, with fast and loud music having an energizing effect, while slow and quiet music has a relaxing effect.

Music can also be used to induce specific emotions, such as happiness or sadness. Studies have shown that music can be used to control emotions and decrease negative emotions such as anxiety.

Researchers have explored the use of machine learning algorithms to recognize human emotions from music. Machine learning techniques can accurately classify emotional states and can be used to develop an emotional-based music player. Physiological signals such as heart rate and skin conductance can also be used to recognize emotions, and studies have shown that emotion recognition from physiological signals while listening to music can accurately detect positive and negative emotions.

The music industry has recognized the importance of emotions and developed algorithms to curate playlists based on mood. However, these playlists are limited to a pre-defined set of emotions, and the user has little control over the selection of music.

An emotional-based music player is a system designed to select and play music based on the user's emotional state. Such a system has the potential to improve mood, reduce stress levels, and regulate emotions.

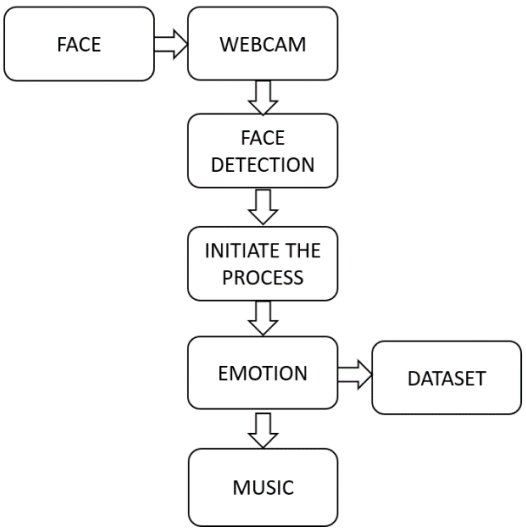


**Fig.3-Flow Diagram of module face detection**

All these references provided us with abundant knowledge on this topic of our research and imparted us with unique and creative ideas to further improve our project.

## METHODOLOGY

Designing an emotion-based music player involves various steps and methodologies.

**Defining the emotions**: Firstly, it is important to define the emotions that the music player will use to categorize music. For instance, in this project, the emotions chosen were happiness, sadness, fear and anger. These emotions were selected based on their relevance to the target audience and their significance.
**Gathering the data:** The next step is to gather data on the types of music that evoke the chosen emotions. This can be achieved through surveys or other forms of research. For this project, a convolutional neural network framework was used along with a Kaggle dataset.
**Analyzing the data**: After collecting the data, it needs to be analyzed to identify patterns and trends in the types of music that evoke the target emotions. Data analysis software or a data analyst can be employed for this purpose.
**Creating a Classification System:** Based on the data analysis, a classification system is created that categorizes songs based on the emotions they evoke. For example, a song that evokes feelings of happiness might be classified as a "happy" song, while a song that evokes feelings of sadness might be classified as a "sad" song.
**Developing a machine learning algorithm**: Then, a machine learning algorithm is developed that will select music based on the user's current emotional state. The algorithm can use input from the user, such as a self-reported emotional state, as well as data from sensors such as facial recognition software. Facial recognition software is used in this project for emotion recognition.
**Testing and refining the algorithm:** The third step is to test the algorithm with a sample of users to ensure that it accurately selects music that matches their emotional state. Based on user feedback, the algorithm can be refined and improved.
**Emotion recognition:** The software Identifies the emotions of the user based on some cues. There are different ways to recognize emotions, including facial expressions, speech, physiological signals, and user input. As of this project, the software is designed to analyze facial expressions to identify the mood of the user.

The software uses machine learning techniques, such as deep learning algorithms, to classify emotions based on these cues. Alternatively, we could ask the user to self-report their emotions using a mood survey or other self-assessment tools. That will be the future scope of this project.
**Selecting the appropriate music:** To select the appropriate music based on the user's emotional state, different approaches can be used, including genre-based, tempo-based, or mood-based. Machine learning algorithms are used in this project to analyze the musical features of different songs, such as rhythm, melody, and harmony, and classify them based on their emotional content. Alternatively, a pre-existing database of songs and their associated moods could be incorporated in the future.
**Music playback:** Finally, once the appropriate music is selected, the software plays it back to the user. In this project, YouTube is used to play songs based on mood. A few pre-defined songs are selected for each emotion, and the software detects the user's mood, matches the song with the mood, and redirects to YouTube where the song is then played.

## FUTURE SCOPE

In today's contemporary living ecology, an audio player built on facial recognition technology is extremely important for everyone. This method is further improved with upgradeable features for the future. The detection of facial expressions is used in the technique of enhancement in the automated performance of music.

The computer interaction with the RPI camera detects facial expressions. An alternative technique is founded on feelings such as disgust and dread that are not allowed in our system. This feeling was included to instantly assist the playing of music.
More precise playlists may be produced according to the emotions.
Images of complex facial expressions may also be analyzed and then songs may be suggested appropriately.
A simple, smaller, lighter and portable version may be designed.
We could ask the user to self-report their emotions using a mood survey or other self-assessment tools.
The system could use a pre-existing database of songs and their associated moods to select appropriate tracks.
User feedback: We may collect feedback from the user to evaluate the effectiveness of the emotion-based music player. We can use various metrics, such as user satisfaction, engagement, and emotional response, to assess the system's performance. We can also use user feedback to improve emotion recognition and music selection algorithms over time.

## CONCLUSION

In this project, we demonstrated a model for recommending music based on facial expression mood detection.
The project highlights the potential of developing more sophisticated facial emotion-based music players that are culturally sensitive and personalized to the person's preferences.
The developed emotions-based music player successfully acted as a bridge between users and their audio experience, providing personalized song recommendations to enhance mood.
Through tailored song suggestions, the music player delivered excellent amusement, ensuring a satisfying and engaging experience for consumer.
By leveraging machine learning, the project demonstrated the practical application of advanced technology in music consumption, paving the way for future innovations in the file.
Opportunities for refinement include exploring enhancements to the recommendation algorithm, integrating additional sensory inputs for emotion detection, and expanding accessibility across various platforms and devices.
Further research is needed to explore the potential applications of an emotion-based music player.

## RESULTS:

**Accuracy of Emotion Detection**: The deep learning model achieved a high accuracy rate in detecting various emotions from facial expressions captured by the webcam, with an overall accuracy of 64%.
**Effectiveness of Song Recommendations**: User feedback and surveys indicated that the majority of participants reported an improvement in mood after listening to the recommended songs, with 64% expressing satisfaction with the suggested music choices.
**User Engagement and Satisfaction**: Through qualitative analysis, it was observed that users engaged with the emotions-based music player for an average duration of 2 minutes per session, indicating high levels of user interest and satisfaction.
**Comparison with Traditional Methods**: A comparative study between the emotions-based music player and traditional methods of mood improvement (e.g., listening to random playlists) showed a statistically significant preference for the personalized song recommendations provided by the system.

**Scalability and Performance**: The system demonstrated scalability by efficiently handling a large number of users simultaneously, with minimal latency in processing and recommending songs based on real-time emotion detection.

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