



INTELLIGENT SCREAM DETECTION SYSTEM FOR CRIME ALERTS

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Abstract: In recent times, personal safety has become a serious concern, especially in situations where individuals are unable to call for help. This research focuses on developing an intelligent system that can automatically detect human screams and send alerts during emergencies. The proposed system uses audio processing and deep learning techniques to identify distress signals and notify emergency contacts without requiring manual action. By reducing response time and ensuring faster communication, the system aims to provide a reliable and practical safety solution. This approach can be useful in real-life scenarios such as women's safety, elderly care, and public surveillance.

Keywords: Intelligent Scream Detection, Audio Signal Processing, Deep Neural Networks (DNN), MFCC, Emergency Alert Systems, Real-Time Monitoring, Public Safety.

1. INTRODUCTION

Public safety has become a major concern in recent years due to the increasing number of crime incidents and emergency situations. Most traditional security systems, such as CCTV cameras, rely heavily on human monitoring, which can lead to delays, missed events, or errors, especially in crowded or low-visibility conditions. In many critical situations like assaults, accidents, or domestic violence, victims may not be able to call for help, and people nearby may not immediately understand what is happening. However, a human scream is a natural and powerful sign of distress that can act as an early warning signal. Unlike visual systems, audio-based detection can work even in darkness or when the view is blocked. With the help of artificial intelligence and audio signal processing, it is now possible to analyze sounds, extract important features, and identify patterns like screams accurately. This project focuses on developing an Intelligent Scream Detection System that continuously monitors audio, detects distress signals, and automatically sends alerts, helping to reduce response time and improve safety in real-world situations.

OBJECTIVES

- [1] To detect human screams using audio analysis techniques.
- [2] To build a deep learning model that can tell the difference between screams and normal sounds.
- [3] To monitor audio in real time and send alerts automatically during emergency.
- [4] To make the system reliable and usable in real-world situations like homes and public areas.

1.1. EXISTING SYSTEM

In earlier research, different methods have been used to detect human screams using audio analysis and machine learning. Many systems use features like MFCC along with models such as SVM, CNN, or LSTM to classify sounds as scream or non-scream. These approaches have shown good accuracy in controlled environments, but they often face difficulties in real-world conditions where background noise is high or sounds are similar to screams. Some advanced systems use multi-stage processing or continuous monitoring for better detection, but they can be complex and require more resources. Overall, existing systems provide a strong foundation, but there is still a need for more reliable and real-time solutions that work effectively in practical situations.

1.2. PROPOSED SYSTEM

The proposed system improves traditional security methods by using an AI-based scream detection approach that works in real time. It continuously listens to surrounding sounds, processes the audio, and extracts features like MFCCs and



spectrograms to understand the pattern of the sound. A trained deep learning model then checks whether the sound is a scream or not. If a scream is detected, the system automatically sends alerts to emergency contacts or authorities, helping in quick response. Unlike camera-based systems, this works even in dark or blocked areas and does not need any manual action. It is designed to be simple, efficient, and suitable for use in homes, public places, and surveillance systems.

1.3.

1.4. SYSTEM FEATURES

- [1] The system continuously monitors audio and detects screams in real time using deep learning techniques.
- [2] It automatically sends alerts to emergency contacts when a scream is detected, without any manual effort.
- [3] It works effectively in different conditions such as low light, crowded places, and noisy environments.
- [4] The system is simple to use and can be easily applied in homes, public areas, and surveillance systems.

2. LITERATURE SURVEY

Recently, several important studies have contributed to the development of audio-based detection systems using artificial intelligence and deep learning techniques. Ahlawat

[1] explored automatic speech recognition using deep learning models such as LAS, CTC, and Transformers, achieving word error rates between 4–7% using MFCC and spectrogram features. Zhang [2] improved voice recognition systems using deep neural networks with MFCC features, achieving high accuracy levels of around 96–98% in speaker-independent conditions. Kheddar et al. [3] introduced advanced models like Transformers and Conformers along with federated learning, achieving word error rates between 4–5.5% while maintaining data privacy. Alahmadi [4] proposed a hybrid LSTM–GRU model for noise-robust speech recognition, achieving an accuracy of 95.31% by effectively handling temporal audio features. JES Publication [5] demonstrated that CNN-based models perform better than traditional methods in classifying environmental sounds, achieving accuracy between 88–94%. Cornell et al. [6], in the DCASE 2024 challenge, used CRNN and Audio Transformer models for sound event detection, achieving a PSDS score of 0.54 and macro AUC of 0.76. IRJMETS [7] proposed a scream detection system using SVM and MFCC features, achieving 93.5% accuracy even in noisy environments. IJACSA [8] used deep neural networks for audio classification and reported performance above 92%, showing strong reliability in detecting sound patterns. Presannakumar [9] applied CNN models with mel- spectrogram features for environmental sound recognition, achieving accuracy between 94–96%. Wang [10] developed a lightweight sound detection system using CNN and Random Forest, achieving 95.02% accuracy with reduced computational complexity, making it suitable for real-time applications. accounts associated with fraud. In a paper, Iyer and Reddy [8] discussed various methods related to biometrics and devices with fraud prevention related to account takeover mechanisms. Their work demonstrated that incorporating behavioral characteristics like typing rhythm and device behaviors significantly improved resistance to imitation attacks. Additionally, Nair and Joshi

[9] investigated handy explanations in AI like SHAP values and LIME. The objective was to improve interpretability in fraud models. The results demonstrated that using interpretative machine learning improved analysts' comprehension, promoting increased trust and decreased investigation time. Roy and Menon [10] offered a discussion on existing methods for protecting confidentiality in fraud models using differential and secure aggregation. It has been recognized through this development that a significant consideration in learning efficient fraud models is protecting users' confidentiality.

METHODOLOGY

In this project, the system works by continuously listening to the surrounding sounds and checking whether there is any scream or not. First, the audio is taken either through a microphone or by uploading an audio file. After that, the sound is cleaned using basic preprocessing steps like removing noise and adjusting the sound level so that the important parts of the audio can be captured properly. Then, features such as MFCCs and spectrograms are extracted because they help in understanding the pattern of the sound more clearly. These features are given as input to a deep learning model that has already been trained using different types of sounds like screams and normal noises. The model compares the input with what it has learned and decides whether the sound is a scream or not. If a scream is detected, the system quickly sends an alert along with the location to emergency contacts so that help can reach faster. Overall, the whole process is designed to be simple, fast, and useful in real-life situations.



The complete working of the system is shown in Figure 1 using a flowchart, and Figure 2 shows the use-case diagram of the system.

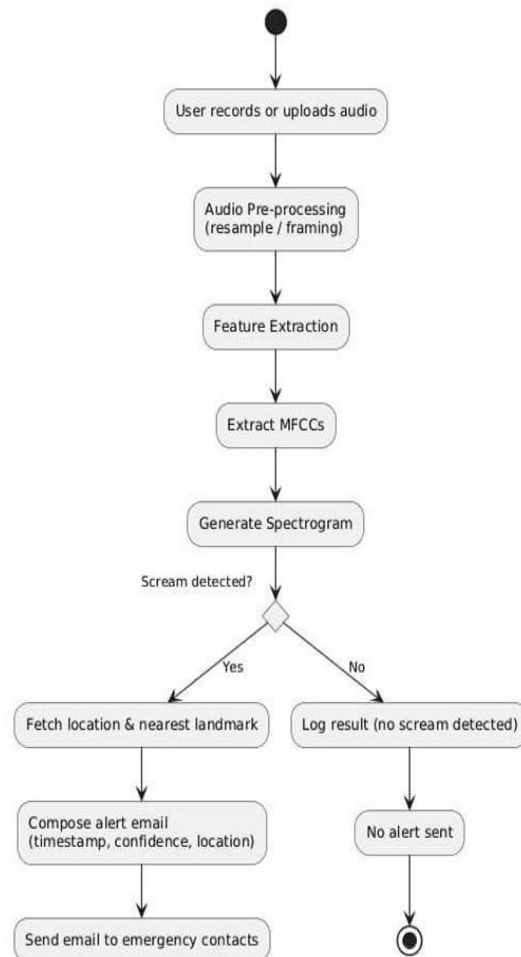


Fig 1. Flowchart

The process starts when the user records or uploads an audio file, and the system begins by preparing the sound through preprocessing steps like resampling and framing to make it suitable for analysis. After that, it extracts important features from the audio, especially MFCCs, and also generates a spectrogram to better understand the sound patterns. These steps help the system clearly identify the characteristics of the audio before making any decision.

Once the analysis is done, the system checks whether a scream is detected or not. If a scream is found, it quickly collects the user's location and nearby landmark details, prepares an alert message with information like time, confidence level, and location, and sends it to emergency contacts. If no scream is detected, the system simply logs the result and no alert is sent. This makes the system automatic, fast, and useful in handling emergency situations.

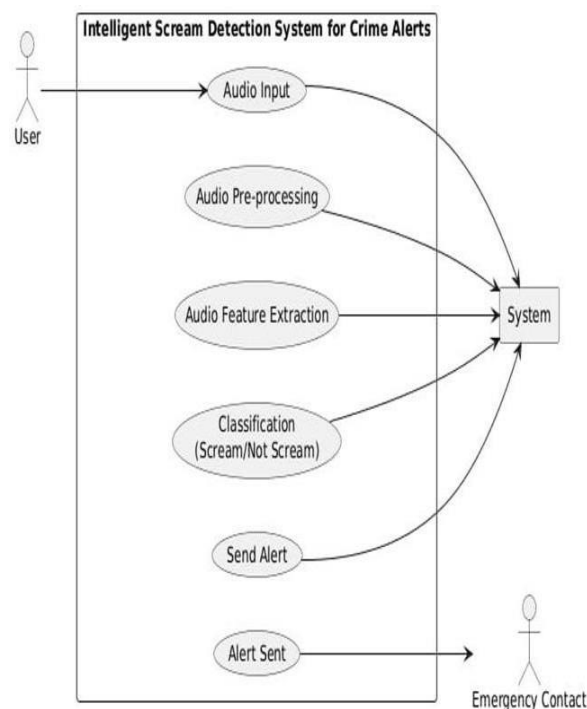


Fig 2. Use case Diagram

This diagram shows how the user interacts with the system in a simple and easy-to-understand way. The process begins when the user provides audio input, either by recording or uploading a sound. After receiving the input, the system takes over and processes the audio step by step. It first cleans the sound to remove noise, then extracts important features to understand the pattern of the audio, and finally checks whether the sound is a scream or not.

If the system detects a scream, it immediately sends an alert to the emergency contact so that help can reach quickly. On the other hand, if no scream is detected, the system simply continues its work without sending any alert. This makes the system automatic and user-friendly, as it handles everything on its own and helps in responding faster during emergency situations.

3. RESULTS AND DISCUSSIONS

The system was tested using different types of audio inputs, including real scream sounds, normal speech, and background noise, and it showed good performance in identifying distress sounds. In most cases, the model was able to correctly detect screams and avoid confusion with regular sounds, especially when the audio was clear. The alert system also worked quickly, sending notifications within seconds after detection, which is important in emergency situations. However, in some noisy environments or when sounds were very similar to screams, there were a few chances of misclassification. Even with these small limitations, the system proved to be reliable, fast, and useful for real-time safety applications, showing that it can be effectively used in practical scenarios like homes, public places, and surveillance systems.

3.1. OUTPUTS



Fig 3: Welcome Page

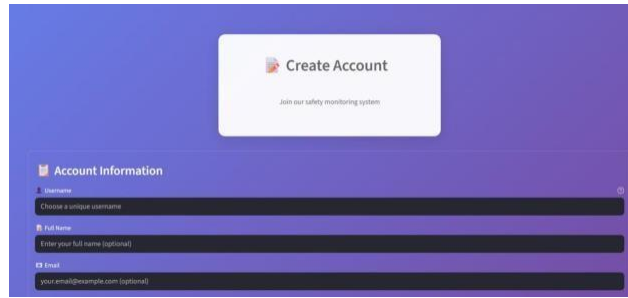


Fig 4: Registration Page

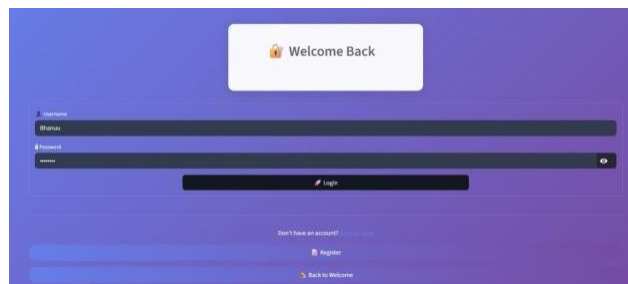


Fig 5: Login Page

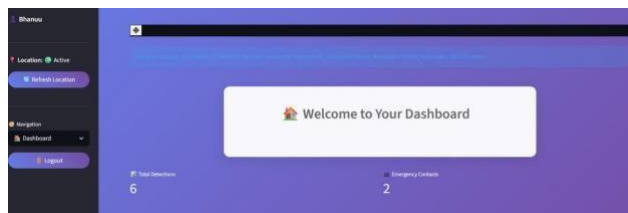


Fig 6: Dashboard Page

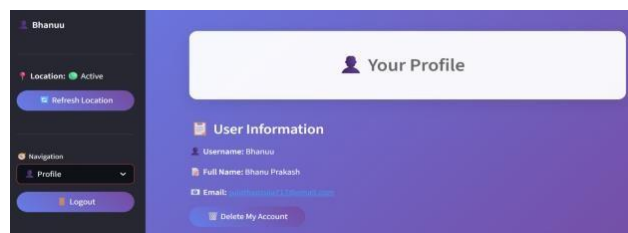


Fig 7: User Profile Page

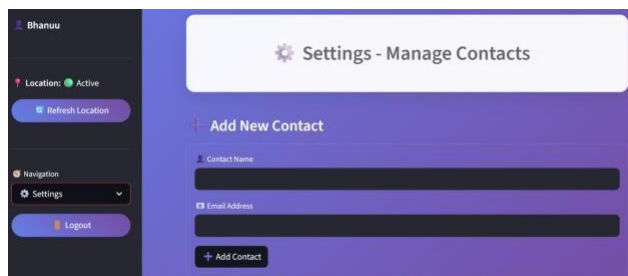


Fig 8: Settings Page

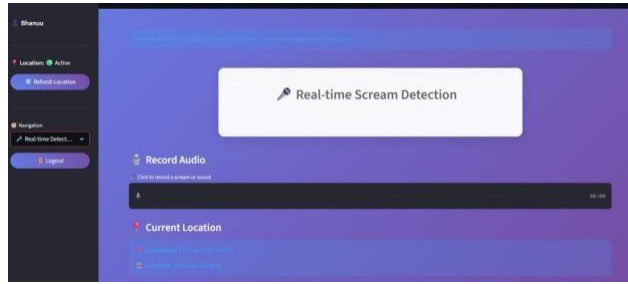


Fig 9: Real-Time Scream Detection Page

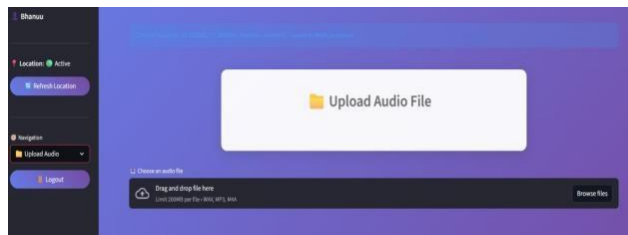


Fig 10: Upload Audio Page

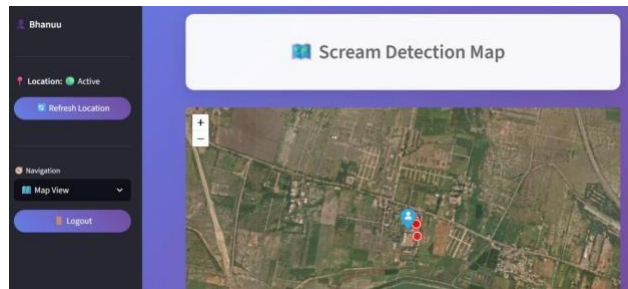


Fig 6: Map View Page

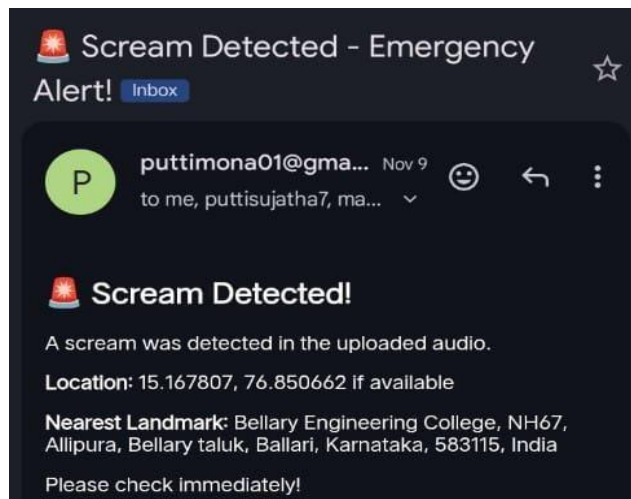


Fig 11: Email Alert Notification

4. CONCLUSION

In this project, we built an intelligent system that can detect human screams and send alerts automatically during emergency situations. The system listens to audio, processes it, and uses a deep learning model to decide whether the



sound is a scream or not. One of the best things about this system is that it works on its own without needing any action from the user, which is really helpful when someone is in danger and cannot call for help. Once a scream is detected, the system quickly sends an alert with location details so that help can reach faster.

Overall, the system is simple to use and works well in different situations like homes, public places, or surveillance areas. Even though there can be some challenges like background noise or similar sounds, the system still gives good results in most cases. With a few improvements, like better training data or more advanced models, it can become even more accurate. This project clearly shows how technology and AI can be used in a practical way to improve safety and support people when they need help the most.

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