D.K.T.E Society's Textile And Engineering Institute, Ichalkaranji.

(An Autonomous Institute, Affiliated to Shivaji University, Kolhapur)

Accredited with 'A+' Grade by NAAC

Department of Computer Science & Engineering (Artificial Intelligence)
2023-24

Promoting Excellence in
Teaching, Learning & Research

MINI-PROJECT-SRS

DEAF-WATCH

UNDER THE GUIDANCE OF

Mr. S.D. RANE sir

Team Members:

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CERTIFICATE

This is to certify that

Name of the students	**PRN No.**
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Have successfully completed the SRS and Design Work of the mini project entitled, **'DEAF WATCH'** , in partial fulfillment for T.Y.B.Tech. CSE(AI) academics. This is the record of their work carried out during the academic year 2023-2024.

Date: **Place: Ichalkaranji**

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ABSTRACT

The web application aims to address the needs of the deaf community, which constitutes approximately 5% of the world population, totaling around 466 million people. It employs artificial intelligence to recognize significant sound events such as car horns and baby cries, providing immediate alerts and continuous logging, crucial for users. Unlike existing apps focusing on sound amplification or text-to-speech/speech-to-text, this app is optimized for Android with low latency, ensuring real-time functionality. It utilizes Mel spectrogram images generated from sound waves captured by the microphone as the main feature input for a Convolutional Neural Network (CNN) to classify sounds into eight categories. With an average inference time of 15 milliseconds, users can rely on timely notifications without missing critical events. Additionally, the app can synchronize with wearable devices for added convenience and accessibility.

PROBLEM STATEMENT

Developing a website using AI (CNNs on Mel spectrograms) to provide real-time alerts for sound events like car horns and baby cries, addressing the needs of the 466M-strong deaf community with low latency and wearable device compatibility.

PROBLEM DESCRIPTION

The problem involves addressing the immediate needs of the deaf community, which constitutes approximately 5% of the global population, totaling around 466 million individuals. Current mobile applications cannot provide real-time alerts for critical sound events such as car horns or baby cries. To fill this gap, there's a demand for an Android-optimized application leveraging artificial intelligence specifically, Convolutional Neural Networks (CNNs) trained on Mel spectrogram images, to promptly identify and categorize sounds. This solution should deliver low latency and integrate seamlessly with wearable devices, ultimately enhancing awareness and accessibility for deaf individuals.

PURPOSE

The purpose of the Deaf Assistant Mobile App is to bridge the gap in sound perception for the deaf community by leveraging real-time AI-powered sound recognition. It aims to empower them with greater independence and awareness of their surroundings through features like critical event notifications and a user-friendly interface.

SCOPE OF PROJECT

The project scope involves implementing sound and speech recognition capabilities to provide corresponding outputs such as images, text, or alerts in real-time. Additionally, the application will save the recognized data for future reference. This requires developing a robust backend system with AI models for recognition, integration with suitable APIs for image and text generation, and secure data storage mechanisms. The deliverables will include a functional web application with user-friendly interfaces, documentation detailing the implementation process, and a scalable backend architecture to support future expansions.

REQUIREMENT ANALYSIS

Software requirement is a functional or non-functional need to be implemented in the system. Functional means providing particular service to the user.

Software requirement can also be a non-functional, it can be a performance requirement.

Following are the functional and non-functional requirements of DEAF-WATCH: A Continuous Sound Monitoring System

Functional Requirements:

1. Audio Input Handling
2. Image Retrieval and Arrangement
3. Audio Classification and Identification
4. Speech Recognition

Non-Functional Requirements:

1. Accuracy
2. Performance
3. Robustness
4. Language Support
5. Flexibility

Functional Requirements:

1. **Audio Input Handling**: The system should accept audio inputs in various formats, such as MP3 or WAV, enabling users to provide audio content easily for further processing.

2. **Image Retrieval and Arrangement**: Retrieve and arrange a sequence of images from the dataset that best represents the content of the given audio input, ensuring a coherent visual representation of the audio content.

3. **Audio Classification and Identification**: Classify and identify the type of audio input, distinguishing between human, animal, or bird sounds, and if applicable, specify the particular species or type of animal or bird.

4. **Speech Recognition:** Convert the audio input into text using robust speech-to-text conversion techniques, providing users with an accurate textual representation of the spoken content for further analysis or processing.

Non-Functional Requirements:

1. **Accuracy**: Ensure high accuracy in image selection, audio classification, animal/bird identification, and speech-to-text conversion to provide reliable results.

2. **Performance**: Process audio inputs efficiently with minimal processing time and delay, providing real-time or near-real-time responses.

3. **Robustness**: Develop robust systems capable of handling variations in audio quality, background noise, speech patterns, accents, and diverse image datasets.

4. **Flexibility**: Design the system to be flexible enough to accommodate different types of audio inputs, adapt to changes in the dataset, and support multiple languages for speech recognition.

5. **Language Support:** Support multiple languages for both audio classification and speech recognition to cater to diverse user needs.

System Requirements

System requirements are the required specifications a device must have in order to use certain software.

Software Requirements:

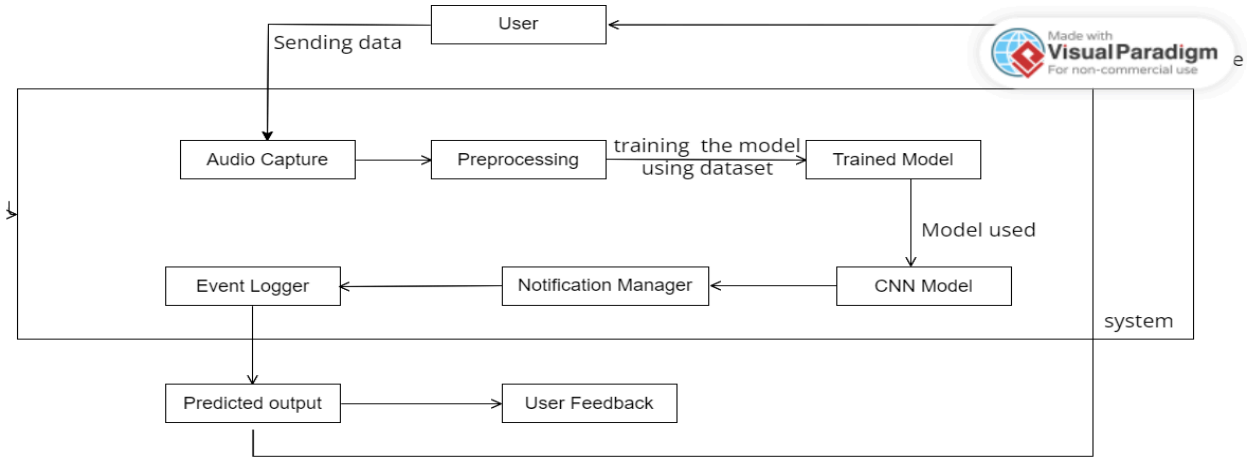
Windows: 10 or newer

Backend: ML Models (SVM) ,Node JS

Frontend: HTML, CSS, React JS

Database : Firebase or MySQL

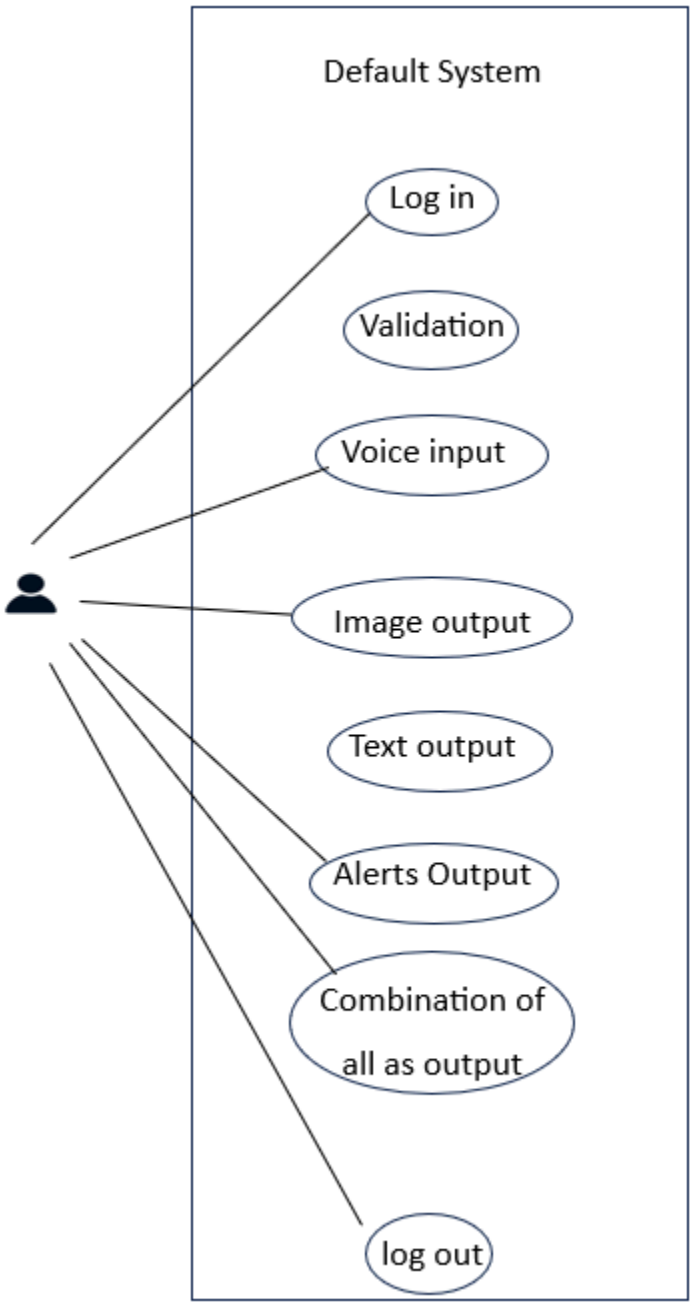
SYSTEM ARCHITECTURE



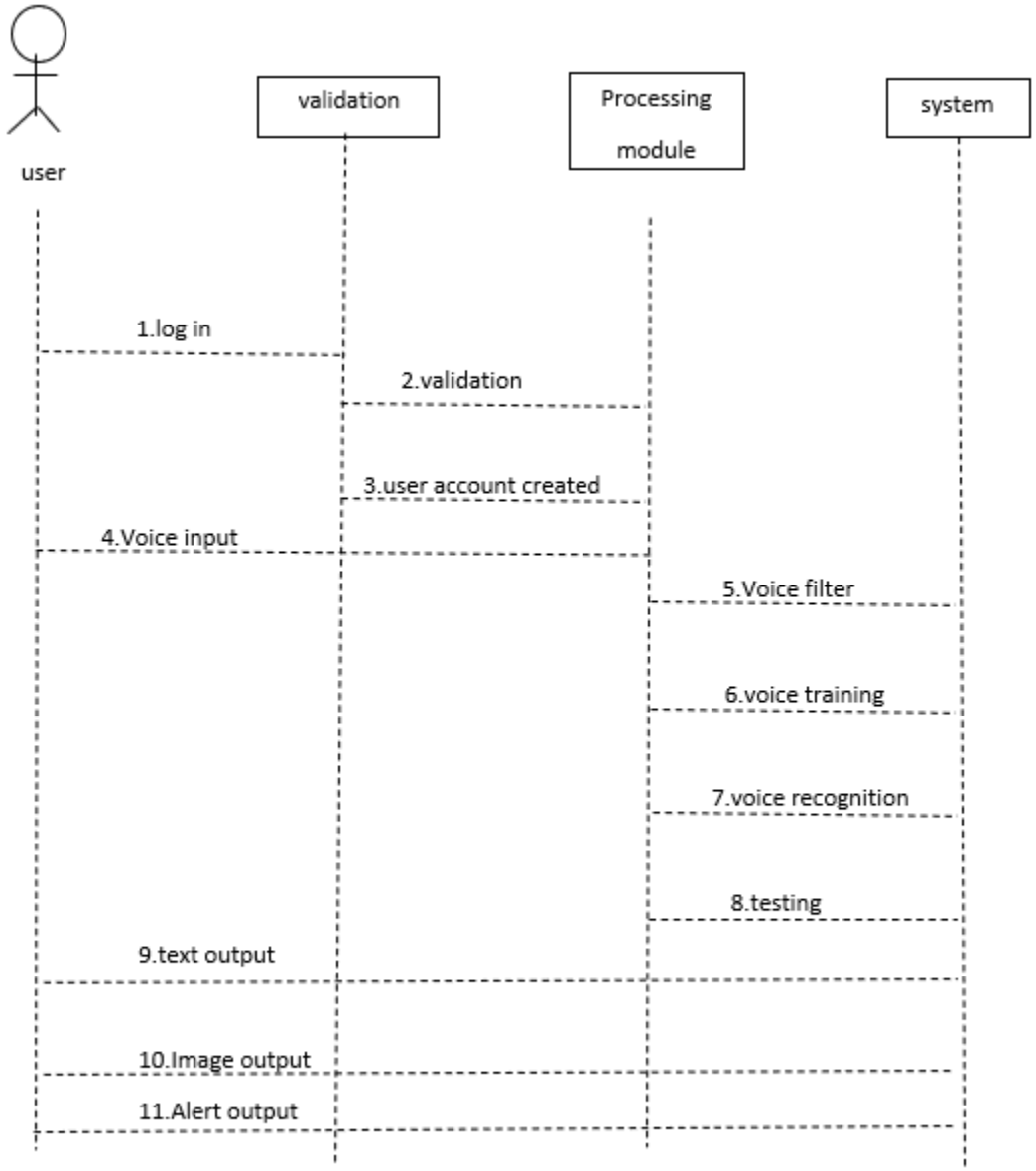
Following are the system designs for the mentioned project:

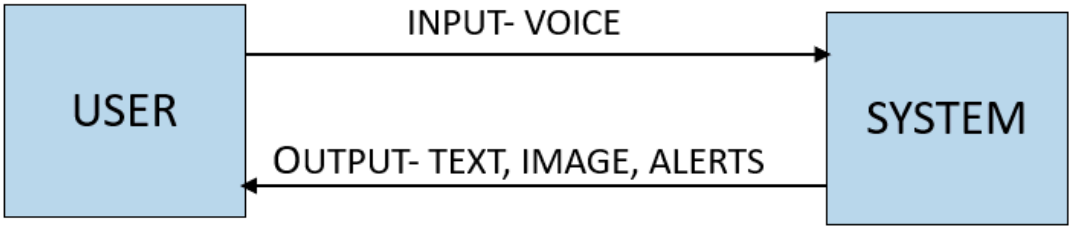
- Use case Diagram
- Sequence Diagram

USE CASE DIAGRAM:



SEQUENCE DIAGRAM:





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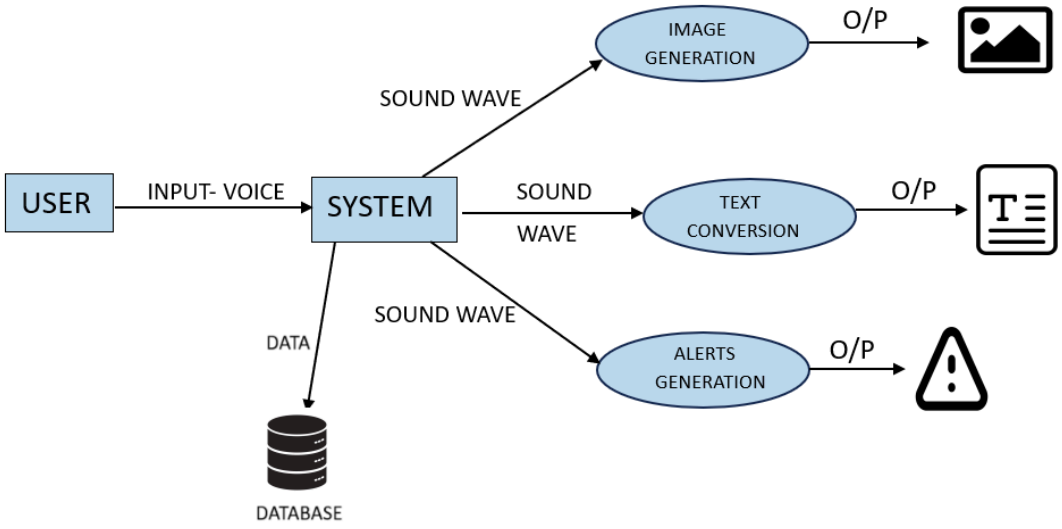

Fig . DFD 1

CONCLUSION

The Deaf Assistant Mobile App, leveraging AI for sound recognition, offers real-time awareness of critical events for the deaf community. By combining a CNN model for classification with user-friendly features and prioritizing performance and accessibility,

this app has the potential to significantly improve the lives of deaf and hard-of-hearing individuals.

REFERENCES

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https://www.youtube.com/@ThapaTechnical

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