IOB CYBERNOVA HACKATHON 2025

Problem Statement Title - Secured Voice Authentication

Theme- AI Powered Voice Auth for Enhanced Security

PS Category- Software

Team ID- 09

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Team Name (Registered on portal)- True Sight

Name of the Members and College Regn No

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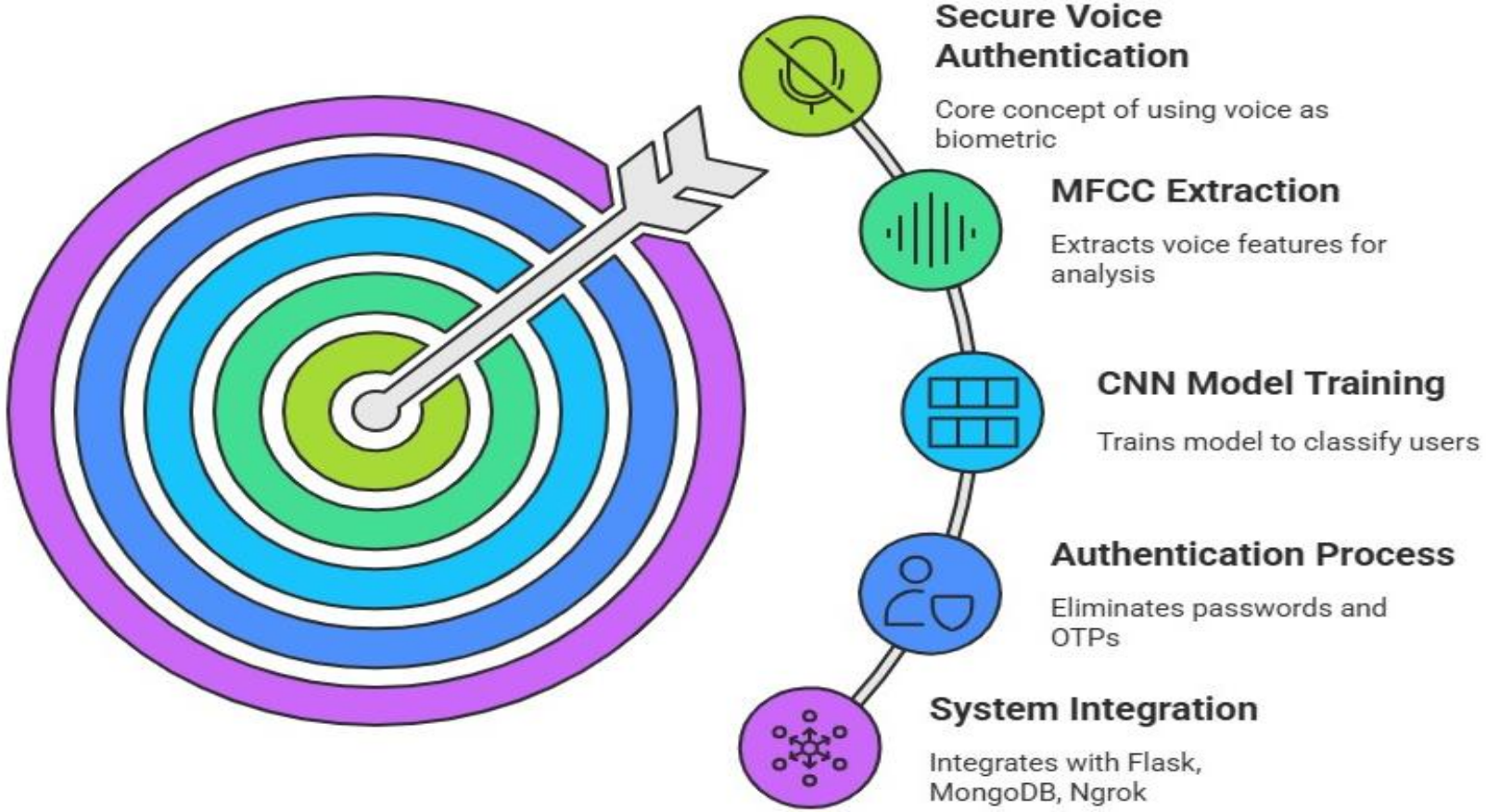
VOICE AUTHENTICATION SYSTEM



FEASIBILITY AND VIABILITY

Feasibility

- Runs efficiently on lightweight infrastructure.
- Mic-Only Access: Works on any device with a microphone—no need for smartphones or advanced tech.
- No Reading or Typing: Users simply speak a verification code to authenticate.
- Language & Literacy Friendly: Accessible to all users, regardless of language or literacy level.

Challenges & Risks

- Audio Variability: Noise and mic quality can affect accuracy.
- Cold Start: Limited data at launch may reduce performance.
- Already existing authentication method in Banking System.

Mitigation Strategies

- Use of CNN model instead of existing DNN model provides more accuracy than existing banking voice authentication model.
- Audio Preprocessing: Normalization and bandpass filtering for cleaner input.
- Strong Base Model: Trained on 197k+ voice samples from Kaggle.
- Ongoing Learning: CNN model updates with each new user.
- Consistent Input: MFCCs are padded/resized for uniformity.
- Verification Code: Spoken code removes language and literacy barriers.

TECHNICAL APPROACH

Building a Speech Recognition System

Keras Common Voice Dataset
Training dataset for base speech recognition model.

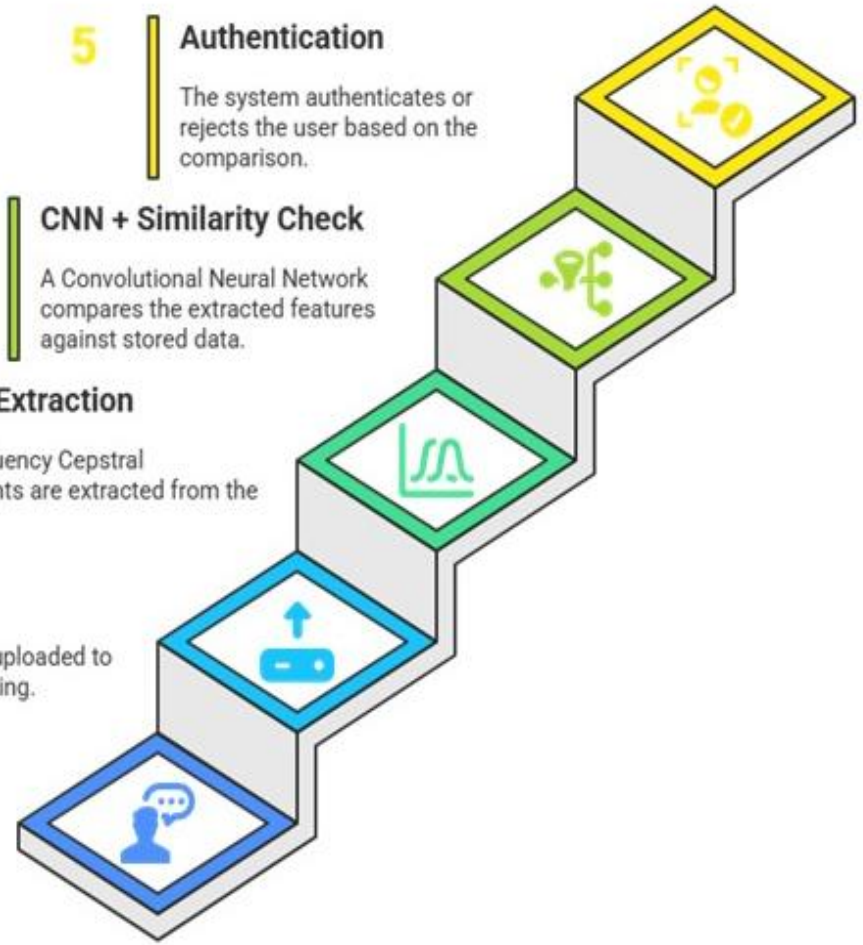
Librosa Documentation
Audio processing and MFCC feature extraction.

TensorFlow/Keras
Deep learning framework for CNN model development.

Pydub + FFmpeg
Audio format conversion and preprocessing tools.

FastDTW
Dynamic Time Warping for sequence alignment.

MongoDB
Database for storing and managing user inputs.



5 **Authentication**
The system authenticates or rejects the user based on the comparison.

4 **CNN + Similarity Check**
A Convolutional Neural Network compares the extracted features against stored data.

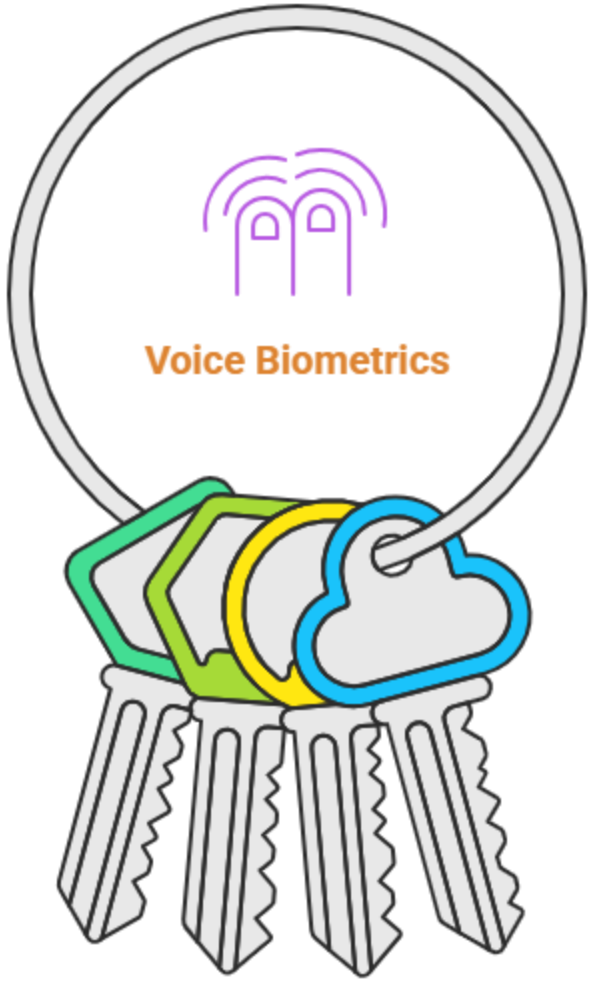
3 **MFCC Extraction**
Mel-Frequency Cepstral Coefficients are extracted from the audio.

2 **Audio Upload**
The recorded audio is uploaded to the system for processing.

1 **User Input**
User speaks into a microphone to initiate the process.

IMPACT AND BENEFITS

Revolutionizing Authentication with Secure, Accessible, and Sustainable Voice Biometrics



Security

Ensures secure and quick authentication for online banking and IoT.

Accessibility

Using the verification code for voice recording enhances accessibility by removing language barriers during authentication

Cost Savings

Reduces dependency on hardware tokens and smart cards.

Sustainability

Offers a sustainable solution by eliminating physical devices.

RESEARCH AND REFERENCES

Reference Link:

https://www.researchgate.net/publication/324031666_Voice_Biometric_A_Technology_for_Voice_Based_Authentication

https://www.researchgate.net/publication/361217651_Use_of_AI_Voice_Authentication_Technology_Instead_of_Traditional_Keypads_in_Security_Devices

https://www.researchgate.net/publication/379489115_Implementation_of_Voice_Biometric_System_in_the_Banking_Sector

https://pmc.ncbi.nlm.nih.gov/articles/PMC6425070/