Marwadi University Marwadi Chandarana Group NAAC A+	**Marwadi University** **Faculty of Engineering & Technology** **Department of Information and Communication Technology**	
Subject: Capstone	**Aim: Project Definition and Scope - Intermediate Review**	
Submission - 1	**Date:**	**Enrollment No: 92200133036**

Voice Data Management & Matching Application

Project Proposal

1. Introduction

This project is about developing a **Voice Data Management & Matching Application** that helps store, search, and compare voice samples. The aim is to create an affordable, lightweight, and user-friendly platform that can be useful for researchers, law enforcement, call centers, and organizations that need voice verification. The system provides a web-based interface where users can upload, manage, and match voice data effectively.

2. Problem Statement

Currently, voice verification systems face several challenges:

- Managing and searching medium-sized voice datasets is difficult.
- There are very few open-source and easy-to-use tools for voice verification.
- In fields like law enforcement or call centers, failure to verify voices can cause serious risks.

This project addresses these problems by building a simple application that combines storage, search, and matching in one solution.

3. Objectives

The objectives of the project are:

1. **Storage & Search**: Create a centralized system capable of storing at least 50 voice samples with quick search and retrieval.
2. **Matching Accuracy**: Use MFCC (Mel-Frequency Cepstral Coefficients), cosine similarity, and DTW (Dynamic Time Warping) to achieve 70% accuracy in voice matching.
3. **User Interface**: Provide a web-based interface using Streamlit for uploading, searching, and comparing voices.
4. **Evaluation**: Test the system with real voice data and measure accuracy, speed, and error rates.

4. Relevance to ICT Domain

The project is closely related to the ICT domain in the following ways:

- **Artificial Intelligence & Machine Learning**: Voice feature extraction and similarity algorithms.
- **Software Development**: End-to-end system using Python and SQLite database.
- **Data Analytics**: Measuring system accuracy, speed, and performance.

5. Feasibility Analysis

Technical Feasibility

- Tools: Python, Streamlit, Librosa, NumPy, SQLite.
- Easy to implement with available libraries.

Economic Feasibility

- Uses only free and open-source tools.
- No extra licensing costs.

Ethical & Privacy Considerations

- Voice is sensitive biometric data.
- System includes consent, option to delete files, and plans for database encryption.

6. Market and User Needs Analysis

Potential users of this system are:

- **Law enforcement and forensic teams** for suspect verification.
- **Banks and call centers** for fraud detection and customer verification.
- **Research labs** for speech and voice studies.

The project fills a need for a **low-cost and customizable voice verification tool**.

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7. Literature Review

- Fingerprint and face biometrics are widely used, but voice biometrics are still less standardized.
- Academic research highlights MFCC and DTW as strong methods for voice verification.
- Industrial solutions are often expensive and resource-heavy.
- This project uses proven techniques (MFCC + DTW + cosine similarity) in a lightweight, open solution suitable for small-scale use.

8. Conclusion

This project successfully demonstrates a **low-cost and practical solution** for storing, searching, and matching voice samples. It integrates feature extraction (MFCC), similarity algorithms (cosine similarity and DTW), a lightweight database, and a user-friendly web interface. The application has potential use in research, security, and service industries while maintaining ethical and privacy safeguards.