SoundByte Project

PROJECT OVERVIEW:

This project aims to expand upon SoundByte's existing pitch visualization app by developing a comprehensive music loading and processing tool tailored for vocalists. While the current app displays real-time pitch accuracy, our goal is to transform it into a robust practice and performance enhancement platform. By allowing users to load sheet music and audio, compare their vocals to the intended melody, and receive targeted feedback, we're building a tool that bridges technology and vocal training.

KEY FEATURES:

The proposed software will include the following core features:

- Sheet Music Import & Processing: Load standard notation files (e.g., MusicXML) and visualize them alongside vocal input.
- Pitch Matching & Scoring: Automatically compare the singer's pitch to the song's melody and generate a performance score.
- Problem Section Detection: Identify and highlight difficult or off-pitch sections for targeted practice.
- Backing Track Integration: Allow users to sing along with instrumental tracks to simulate real performance scenarios.
- Visual Feedback Enhancements: Improved UI for note accuracy, pitch stability, and rhythmic timing.

TECHNOLOGY:

To build this software application, we propose utilizing the following technologies:

General UI:

- SwiftUI – The core UI framework used for building the iOS app, offering a seamless and responsive user experience.
- AVFoundation – For handling audio recording and playback within the app.
- AudioKit – A powerful open-source audio processing library that integrates well with Swift for pitch detection, audio effects, and signal analysis.
- MusicKit / CoreMIDI – For working with music files, MIDI input, and possibly sheet music integration.

Backend / API:

- Node.js or Python (Flask/FastAPI)
- Firebase or AWS Amplify (data storage)

Sheet Music Rendering:

- VexFlow (via WebView) – Render dynamic sheet music within the app using a WebView
- MusicXML Parsing – Either server-side or in-app parsing of MusicXML files to extract note data for pitch comparison.

PROJECT DETAILS:

- 4 person team
- Music experience or knowledge not required, but encouraged!
- 1 Mac-book provided