

# Snapshot Objectives

## Audio Visualizer

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December 11, 2025

## 1 Start Objective

The initial goal is to develop the basis of our Audio Visualizer project.

An audio visualizer is a dynamic graphic display that converts sound—such as music, podcasts, voice recordings, or ambient audio—into animated visuals. The visuals can be shapes, colors, lines, particles, or text, all of which change in real time based on the properties of the audio signal, specifically frequency (pitch) and amplitude (volume).

The purpose of this project is to provide a system similar to visualizers found in media players, video editing software, streaming overlays, and music production tools. These visualizers enhance the listening experience by making audio more interactive and visually expressive.

During this initial phase, our goal is to:

- Build the base system for capturing or importing audio.
- Implement basic audio analysis (frequency bands, amplitude levels).
- Create initial animated graphics that react to audio input.
- Establish the structure of the visualization engine.

We will divide tasks between audio processing and visual rendering to ensure the system can react to sound smoothly and responsively.

## 2 Checkpoint 1

With the core framework in place, the focus of Checkpoint 1 is to expand the visualizer's capabilities and introduce more sophisticated features that enhance responsiveness and visual diversity.

Planned additions include:

- Frequency Spectrum Visualization: Bars or waves that represent different frequency ranges.
- Amplitude-Based Animation: Shapes or colors responding to volume changes.
- Enhanced Color Mapping: Dynamic gradients based on audio intensity.
- User Controls: Options to adjust sensitivity, theme, color palette, and animation modes.

We will also begin working on a user interface that allows users to switch between visualization styles.

## 3 Checkpoint 2

For Checkpoint 2, the goal is to refine the visualization system and introduce more advanced graphic elements, making the visualizer feel more professional and expressive.

Planned features include:

- Waveform Visuals: Real-time drawing of the audio waveform.
- Particle Systems: Motion graphics driven by frequency peaks.
- Text Reactive Elements: Words or captions that pulse or distort with sound.
- Preset Library: A selection of unique visualization styles.

During this checkpoint, we will also refine animation smoothness and overall performance so visuals react fluidly to the audio.

## 4 Final Checkpoint

In the final phase of the project, our goal is to polish the Audio Visualizer and ensure it performs efficiently across different audio sources and visualization modes.

### 4.1 Front-End Improvements

- UI Enhancements: Smoother interaction and easier mode switching.
- Visual Polish: Better transitions, cleaner animations, improved color harmony.
- Accessibility Options: Adjustable contrast and simplified modes.

## 4.2 Back-End Improvements

- Performance Optimization: Faster rendering and audio processing.
- Low-Latency Response: Ensures visuals match the audio in real time.
- Improved Audio Analysis: Sharper detection of peaks and frequency changes.

## 5 Conclusion

We initially considered exploring advanced features such as AI-driven beat detection and generative visual patterns, but these will be part of a future development phase. Overall, the team is satisfied with the progress of the Audio Visualizer and is excited about the potential for future expansion.