

# Project Task Report: Audio Capture CLI Integration

**CLI Target:** `SystemCaptureCLI` **Objective:** Build and test a Swift-based command-line tool to capture audio and integrate it with an Electron frontend.

## Goals Achieved

Built a Swift CLI (`SystemCaptureCLI`) using `AVAudioEngine` to capture audio.

Successfully integrated the binary into the `electron-app/resources/` directory using the `scripts/dev-build.sh` script.

Tested CLI output by saving raw audio to a `.wav` file:

```
./electron-app/resources/SystemCaptureCLI > out.wav
```

Played the `.wav` file using: `open out.wav`

CLI correctly starts and stops audio capture upon `Ctrl+C`.

## Issue Identified

Captured audio was **fuzzy/static** and **did not contain system audio** (e.g., YouTube playback).

### Root Cause:

macOS restricts direct access to **system output audio** for privacy reasons. `AVAudioEngine` by default captures **microphone input, not system sound**.

## Solution

To capture **system audio**, a virtual loopback driver is required.

**Recommended Tool:** [BlackHole](#)

## Setup Steps:

1. Install via Homebrew:`brew install blackhole-2ch`
- 2.
3. Create a Multi-Output Device in **Audio MIDI Setup** including:
  - BlackHole
  - Your real audio output (e.g., MacBook Speakers)
4. Set the Multi-Output Device as the default system output.
5. Re-run:`./electron-app/resources/SystemCaptureCLI > out.wav`
- 6.
7. Playback confirms capture of actual system audio (e.g., YouTube sound).

## Learnings

Swift `AVAudioEngine` provides simple audio input capabilities, but **cannot access system audio directly**.

Workarounds require configuring macOS to **route output as input** using tools like BlackHole.

Swift CLI build compatibility can break due to:

- OS version restrictions (`seek(toOffset:)` requires macOS 10.15+)

- `Package.swift` manifest syntax errors (fixed in latest iterations)

## Conclusion

The Swift CLI works well for capturing microphone input.

With BlackHole, it can also capture system audio.

The tool is now integrated with the Electron app and can be expanded with features like format switching (AAC, WAV, etc.) or GUI triggers.