

PiTunes is a system that converts real-time audio input into dynamic, color-reactive lighting using a Raspberry Pi 5 and an Arduino Uno. The objective is to develop an efficient framework for synchronized sound-to-light visualization that is open source and accessible to more users than professional grade systems. The Raspberry Pi 5 serves as the primary processing unit, performing digital signal processing tasks like amplitude tracking, frequency-domain analysis, and beat detection using Python-based Fast Fourier Transform (FFT) algorithms. Audio signals are captured through a small USB microphone, processed to extract key features, and transmitted via serial communication to the Arduino Uno. The Arduino functions as a lighting controller, interpreting incoming data to operate RGB LEDs (e.g., APA102-2020) with precise timing and color mapping. This division of computational and control responsibilities ensures both efficiency and stable performance. Experimental evaluation demonstrates that the system achieves perceptually synchronous light output with minimal latency (<50 ms) under typical conditions. The proposed framework fills the need for low-cost, open-source components to allow real-time multimedia interaction. It also offers the potential for future work in adaptive lighting, stage design, and immersive audiovisual environments.