

# Audio/Visual Resampler

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## Introduction

This project was prompted off an 18 hours hackathon with a focus on music and technology. We aimed to create a program that generated visuals off of a continuous stream of audio from a performer. This idea involved into a fully immersive experience where music was also resampled to create new compositions based off a performance. Previously, the practice of sampling was limited by controllers such as MPCs or DAWs. Our project showed the possibility of real time sampling via an alternative controller, an instrument. This controller allows for musical expression in a non traditional sense, where the notes played on the instrument (program controller) correlated to a response not typically possible through traditional instruments.

## Audio Processing

The program's interface allows the user to choose a musical piece to be resampled. After selecting a piece, the program then uses a Fast Fourier Transform (FFT) on short chunks from the piece and stores the "footprint" in memory. Then, the user plays an instrument. In real time, the program performs an FFT on the audio signal and matches it to a footprint stored in memory. The program then plays that chunk on repeat until a better match is found. We prototyped this concept in python using PyAudio but quickly learned it would not be fast enough for real time processing. We then built it in JUCE (C++) to allow for a more friendly interface and faster processing.

## Visuals

The visual element to this program was built in Max/MSP. We used a [playlist] object to store many different short clips of video. Max then receives a stream of audio from the output of the audio processing and uses a [snapshot~] object to measure the amplitude of the signal. This amplitude is then used to quickly select between the videos within the playlist and also allows for modification such as play back speed and direction. To add one more layer of complexity we layered two of these video playback systems together. This created complex visual patterns.

## Hackathon Success

At the end of the 18 hour "Music Makethon", we presented our project to all the attendees and a panel of 3 judges (all professionals in audio software/hardware). Our team of college freshman ended up winning first prize over upper-classman and grad students in audio technology. We were extremely encouraged by the results and feedback. While our project was novel, it proved that sampling and audio reactive visuals were possible without having to spend hours editing and animating in a traditional sense.

## More Info

Featured in this EECS Department Article - <https://bit.ly/3f9aGae>

Source Code - <https://github.com/nacgarg/music-makeathon>