# MUSIC VISUALIZER

ABSTRACT & PROJECT GOALS

This project was part of the Software Design class at Olin College of Engineering. The goal was to create a physical visualization out of LEDs given a song or sound clip. To do this we used python to manipulate sound files in a mathematical space, then output them to be represented on individually addressable led strips controlled with a Raspberry Pi processor.

DESIGN OVERVIEW/ SPECS
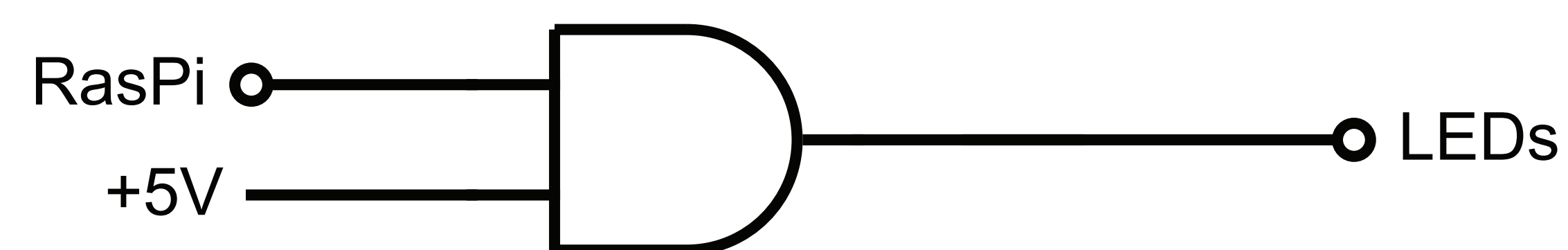
To build this sculpture we used 280 LEDs arranged in a helix structure with 14 bars each representing a different frequency. The LEDs are configured in two parallel strips running in parallel across the helix that allows for a synchronized visualization. Because the strips require 5 volts but the Raspberry Pi only outputs 3.3 volts we used an And Gate to convert to the correct voltage.

CODE STRUCTURE & FLOW
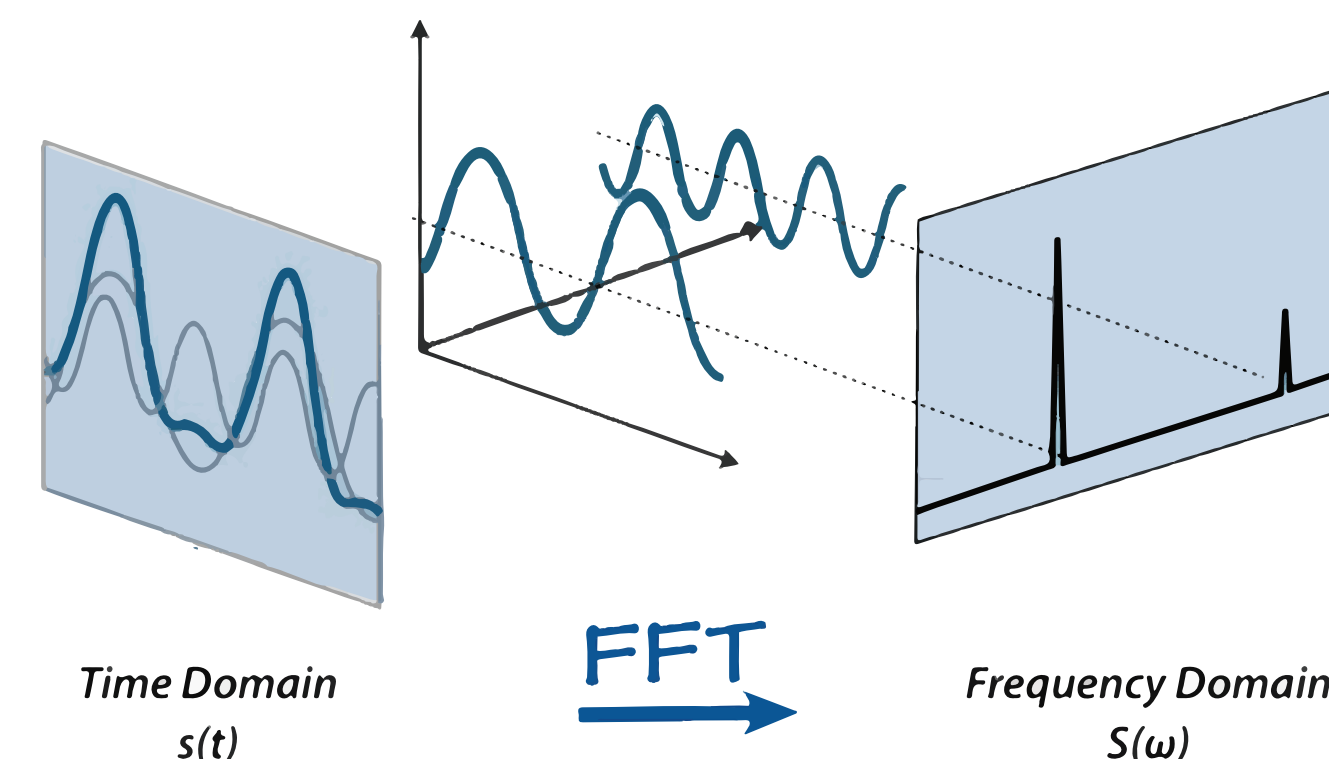
Our code is broken up into three main parts. The FFT, or Fast Fourier Transform, brings the sound file from an audio domain to a time/frequency domain, allowing it to be analyzed mathematically and exported as a sequence of values corresponding to how many LEDs should be lit up. From there it moves into the visualization program that inputs those values and maps them to individual LEDs for exporting to the hardware. The user is able to control which song is played through the GUI (Graphical User Interface) hosted on the Pi.
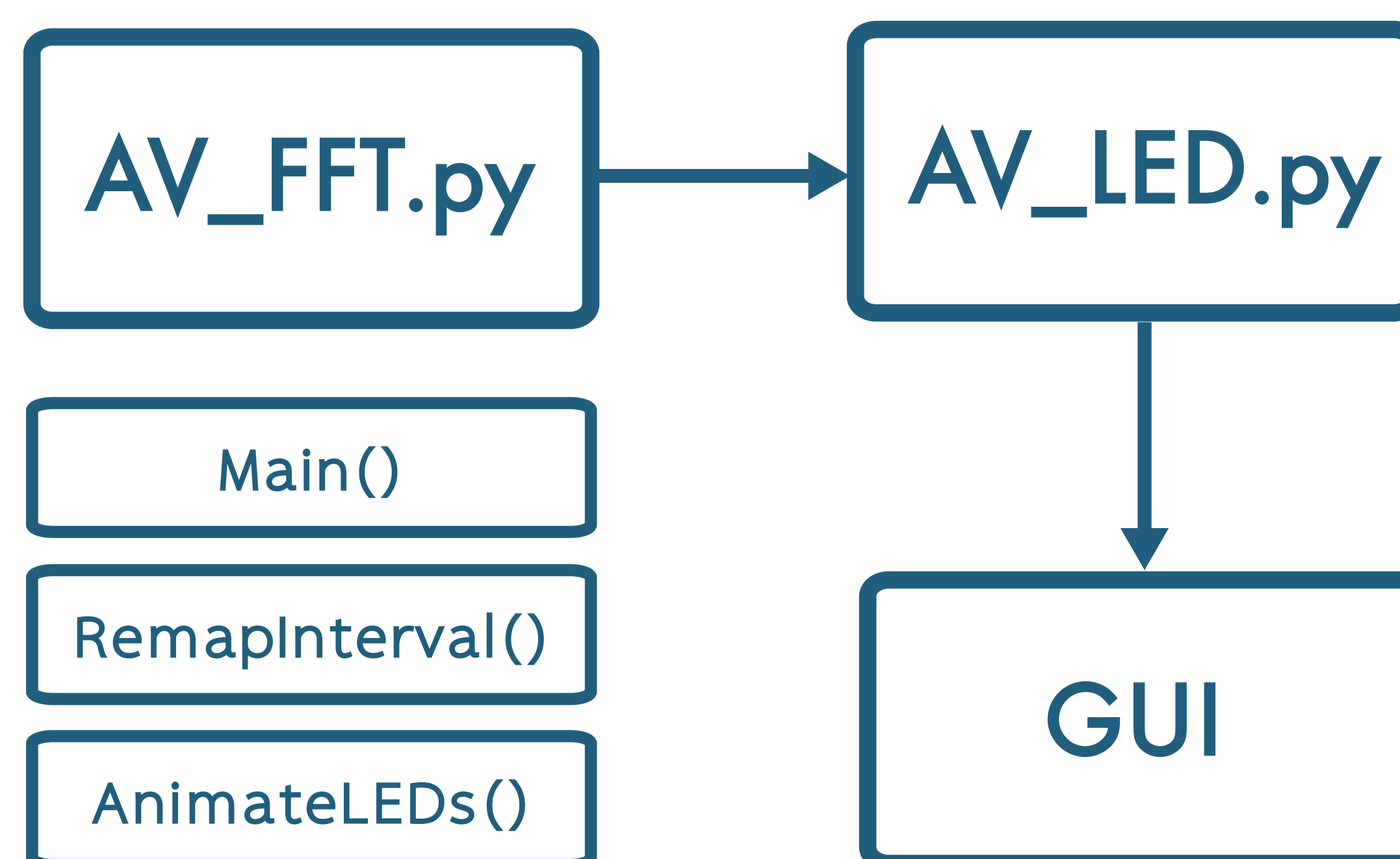
UML DIAGRAM

RESULTS & APPLICATIONS

We reached all of our learning goals over the course of this project. The GUI was functional, we implemented color modulation, and the sculpture was a real time music player & visualizer. Future work may include using libraries to map color to frequency, mood, tempo, or beat of the song. Implementing live music analysis is another avenue of future work.

The applications of this sculpture are mainly educational. It could be used to show the difference between different styles of music or certain aspects of songs (such as the chorus, bridge, and verses). It could also potentially be used as a tool to analyze the frequencies of various types of human conversation such as speeches or public conversations.

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