Rave in a Box
6.111 Final Project F2018
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Project Checklist

Base Goals

- ❑ Output galvanometer control signals to DAC over SPI
- ❑ Physical assembly of galvanometer + laser
- ❑ Generate spectrogram from incoming audio
- ❑ Hash spectrogram data into scene addresses
- ❑ Store scenes in line-based vector format in FPGA memory
- ❑ Interpolate across straight line instructions
- ❑ Cycle through instructions to output to DAC

Main Goals

- ❑ Generate chromogram from spectrogram
- ❑ Hash chromograms into scene addresses
- ❑ Animated scenes with multiple frames

Stretch Goals

- ❑ Hanning window on spectrogram
- ❑ Structural novelty detection
    - ❑ Multiply chroma matrix against itself
    - ❑ Applying checkerboard kernel to matrix diagonal
    - ❑ Live peak finding on novelty curve
- ❑ Audio buffering and delaying for more advanced signal processing
    - ❑ Output audio via DAC rather than via PWM for higher fidelity
- ❑ Bezier laser instruction paths and live interpolation
- ❑ Beat detection using low-pass filtering or spectrogram low-frequency zones
- ❑ Fancy project enclosure
- ❑ Multicolor lasers