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6.111 Final Project Abstract

This project idea is a programmable audio visualizer that takes in stereo and outputs one or more 800x600 video signals. The system can be roughly decomposed into the following components:

- Basic audio analysis consisting of FFT and beat detection
- A graphics and effects rendering pipeline
- A serial programming interface

The effects pipeline will be a processor capable of efficiently computing special effects. It will be composed of a chain of specialized hardware units that can perform specific rendering operations. Some of these operations will be user configurable and will have access to the following variables: x and y coordinates, time since the last beat, and several program-controlled registers. The pipeline will also be capable of evaluating basic arithmetic and transcendental functions in order to create user-customized effects.

Some of the specific rendering modules that will be in the pipeline are: brightness modifications, simple convolutions, dynamic spectrums, simple particle effects, and basic 3d primitives. The focus of the pipeline design will be to make it architecturally possible to drive multiple displays in parallel.

After getting the visualization system to work on a single screen, the goal will be to parallelize the system such that it can output a coherent visualization across a number of video outputs.

Work will be split up as follows: Mike Spindel will write the FFT/beat detection, and general computing part of the pipeline. Dany Qumsiyeh will write the video interface, 3d modules, and other specific rendering modules.