Overview
Choosing Frequency Bands

- Well populated midrange & sparsely populated highs and lows

- Selected Frequency Bands:
  - 0 - 131Hz
  - 132-262Hz
  - 263-523Hz
  - 524-1047Hz
  - 1048-3951Hz
Filtering

- Sallen-Key Topology for 2nd order response
- Lowpass, Highpass and Bandpass used.

\[
V_{\text{out}}(s) = \frac{1}{s^2 + s \left(\frac{1}{R_2C_1} + \frac{1}{R_1C_1}\right) + \frac{1}{R_1C_1R_2C_2}}
\]

\[
V_{\text{in}}(s)
\]

\[
H(s) = \frac{1}{R_1R_2 + sC_2R_2 + sC_1R_2 + C_1C_2s^2}
\]
Amplification!

- Raise Voltage Levels to drive MOSFETs
- Humans Hear on a Logscale
- Amplifier/LogAmplifier
- Not a lot of current draw!

\[ V_{out} = K \ln \frac{V_{in}}{V_{ref}} \]

\[ V_{out} = \left(1 + \frac{R_2}{R_1}\right) V_{in} \]
Light Organ: Driving and Board
Power Supply

- Using a simple laptop charger to create 20VDC from wall outlet
- Buck Converter will provide us with 12V DC for driving LED Strips
- LM805 Regulator will be used to power the 555
Capacitive Touch

\[ F \propto \frac{1}{C} \]

Detect change in frequency to toggle on/off
Timeline

Sat 4/19 Finalize Design

Mon 4/21 Breadboard

Wed 4/23 Debugging

Mon 4/28 Order PCB and Build LED Board

Thurs 5/1 Integration

Thurs 5/8 Working Light Organ
Potential Hiccups

- Many Op Amp comparators used so sizing will be difficult
- Current draw from power stage needs to be carefully monitored
- Designing an analog on/off toggle that works with the capacitive touch stage
- Choosing material for LED board
Looking Forward

- Creating multiple LED boards that are hot-swappable
- Using capacitive touch to control the brightness of the LEDs
- Using batteries as an optional power supply
Questions