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Project Proposal

Motivated by our interests in music, we both decided to work on an audio manipulation device that will automatically tune an audio signal (make a bad singer sound like Mariah Carey). We found Matlab code for an autotune GUI program (https://www.mathworks.com/matlabcentral/fileexchange/26337-autotune-toy), which will serve as a primary source for our project. We will use this source code along with other possible sources to determine the steps needed to create an autotuned signal output. If that process is infeasible, we will instead create an audio synthesizer using different types of syntheses (subtractive, additive, frequency modulation).

Our hardware elements will include a microphone to record and generate an audio signal for approximately 10 seconds, speaker to playback autotuned signal for a duration of approximately, and hardware memory when applying filters (using Fourier/FFT) and other computational steps necessary to produce an autotuned signal.

The software will control the recording and playback of the audio signal. It will have controls for relevant parameter settings and some sort of signal visualization functionality. If controlling the signal in software is too difficult, we will try to use the controls on the FPGA. Once the sound sample is obtained, that file will be sent in its entirety to the hardware, which will perform all the processing and the audio output.

The audio synthezation alternate plan will be done along the same lines as the autotune device. Software will obtain the data of interest and send it to the hardware along with some control parameters. The hardware will then perform the signal processing and output audio generation.