Final Project Abstract

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For our 6.111 final project, we intend to implement real-time Auto-Tune on the labkit. Users will be able to select a set of pitches (out of the twelve semitones in an octave), and the degree and rate of correction. We will use the built-in AC97 codec chip to sample and synthesize audio. After being acquired and before being reconstructed, the audio data will be low-pass filtered to remove frequencies above 20kHz, and windowed to avoid frequency-domain artifacts (producing input samples x(t)). The samples will be run through an FFT (generated by CoreGen or other generator) to determine the frequency content of the input F(x). This Fourier transform will be traversed to find the peak, and the peak frequency used to index into a lookup table encoding both the closest desired pitch and the ratio between the detected pitch and closest pitch. With this information, the Fourier transform F(x) can be multiplied by the degree of correction, a variable factor depending on the rate of correction, and the pitch ratio. This produces a scaled fix-point output that can be scaled down, inverse Fourier transformed, and output to the AC97.