Course Announcement:

EE 597 – Audio Signal Processing:
MPEG Coding and Restoration

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The processing power of modern DSP hardware allows the application of sophisticated signal processing techniques to the storage and retrieval of audio signals. We will study two important applications: the perceptual coding of high-quality digital audio and the restoration of old or damaged audio recordings. Perceptual coding is a key enabler of internet audio (e.g., "MP3") where limited network throughput demands high levels of source compression. The removal of clicks, gaps, noise, and other artifacts from old recordings or film material is of key importance as we archive our sonic history onto stable media.

1. Perceptual Coding of Digital Audio

    (a) overview of non-perceptual compression tools: quantization, PCM, companding, DPCM, entropy coding, transform coding, subband coding.

    (b) introduction to psychoacoustics and "masking".

    (c) putting it all together: MPEG-based (e.g., "MP3") perceptual coding.
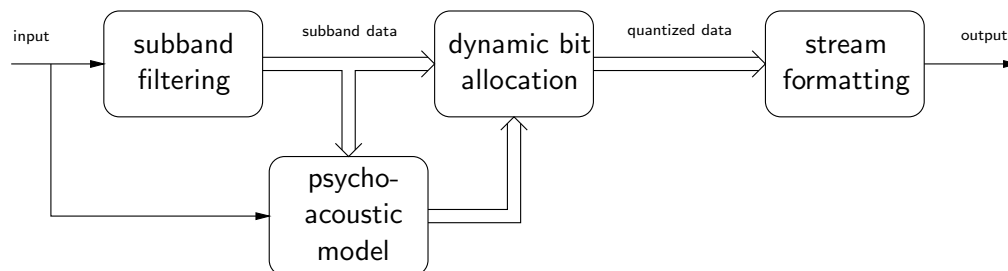
2. Digital Audio Restoration

    (a) estimation and removal (model-based and statistical) of pops, clicks, and noise.

    (b) filling in gaps – interpolation of missing samples

    (c) correction of pitch variations and reduction of non-linear amplitude distortion

Matlab-based projects will emphasize "hands-on" processing of audio signals.

Pre-reqs: EE310, EE425 (co-registration), MATLAB familiarity
Time: TR 1:25–2:40pm
Web: http://www.ee.cornell.edu/~ee597