

**Hilton**

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**From:** "Shannon, Bob" <BShannon@hei.org>  
**To:** "Hilton Kaplan" <hkaplan@usc.edu>  
**Sent:** Wednesday, September 08, 2004 3:56 PM  
**Attach:** Shannon SHAR Chapter April 03.PDF; Shannon et al Science 95.pdf  
**Subject:** RE: BME620L lecture

Hilton,

I enclose a copy of a an old Science paper and recent book chapter that is a broad overview of the issues I will cover in my lecture.

For a lab exercise it might be useful to have students program a noise-band vocoder in Matlab and test themselves on speech understanding. A noise vocodeer is pretty simple to set up - take an audio signal and filter it into N bands using N bandpass filters. From the filtered signals extract the envelope signal by half-wave rectification and low-pass filtering at about 200 Hz. Then use that envelope signal to modulate a wide-band noise and refilter each channel with the same band-pass filter set of N filters and used in the beginning. I don;t have code to do this myself but I think it can be done in less than 10 lines in Matlab ...

Bob