

# EE 502 Projects

Spring 2003

The reports are DUE at the start of class on Friday, May 2, 2003.  
No late reports will be accepted.

## ***Guidelines***

Choose a general topic from the list below, or propose a similar topic, and get my approval.

The “deliverable” for this project is a written report summarizing your findings and, if possible, demonstrating your new knowledge with suitable digital simulation results. The report should be written at a level suitable for your peers: smart ECE graduate students who have a DSP background, but probably do not already know the details of your topic. The report must be carefully organized, include full and complete references, prepared with a word processor for neatness, proper spelling, etc. The report should also include relevant figures, diagrams, tables, and simulation results. My expectation is that the reports will be perhaps 15 pages at most.

Find 4-6 published papers and/or books that contain relevant research results for your topic. Also, attempt to find a textbook or tutorial paper that includes a reasonably complete literature summary.

Read and understand each source. Get additional information as necessary.

## ***Topic Ideas***

Quantization:

- Modern design of a/d and d/a circuits
- High quality sample rate conversion
- The use of dither to linearize a quantizer

Practical Implementation:

- Comparison of FPGA implementations to conventional DSP chips
- Benchmarks for comparing different DSP architectures
- Floating point vs. fixed point issues

Filter Design:

- Comprehensive review of an optimized filter design procedures (e.g., McClellan-Parks)
- Examination of coefficient quantization sensitivity for several filter structures
- Parametric filters
- Savitsky-Golay smoothing filters

Adaptive Signal Processing:

- Delay estimation and beamforming
- Linear prediction
- Adaptive interference canceling
- Active noise control

Time-Frequency Analysis:

- Applications of the short-time Fourier transform
- Wavelet transforms
- Spectral estimation
- Generalized time-frequency distributions