DSP Final Projects

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※ Please draw lots to determine your project.

※ For the following projects, you had better use Matlab to prove it.

※ The hints shown below are just for your reference.

※ The final exam will be cancelled if all the following projects are well finished.

※ Please email your electronic file to your instructor one week before your presentation.

1. **Digital Filter Design:** Please design a digital filetr（FIR or IIR）according the desired specification and verify its performance both in time and frequency domain.

   Hint: For time domain, you should input a signal and observe its output.

2. **Correlation:** Please first introduce the concept of cross-correlation and try to apply it.

   Hint: In [1], Sec. 4.8.2: 'Echo Detection' is a simple and practical example.

3. **Voice and Music Synthesis、DCT Compression in JPEG :** Interesting topics in DSP.

   Hint: In [3], Sec. 14.3 and Sec. 15.8 has respective related discussion. [5] is strongly recommended!

4. **Oversampling ADC（Sigma-Delta Quantization）:** Please introduce its concept and show an example.

   Hint: In [4], Sec. 15.11 has a related topic.

5. **Adaptive Filter:** Please briefly introduce its concept and show an example.

   Hint: In [1], the 'Active Noise Control in an Air Duct' is a practical application.

6. **Wavelet Transform:** An important tool with many applications, such as compression.

   Hint: In [2], the author said 'I have no doubt that future generations of DSP teachers will rank it second only to the Fourier Transform in terms of importance…'. [5] is strongly recommended!

Ref:

[1] "Fundamentals of Digital Signal Processing using MATLAB," Schilling and Harris, THOMSON, 2005.
[2] "Digital Signal Processing Using MATLAB and Wavelets," Michael Weeks, Infinity Science Press, 2007（ISBN: 0-9778582-0-0）
[3] "Fundamentals of Digital Signal Processing," Joyce Van de Vegte , Prentice Hall, 2002.
[4] "Digital Signal Processing – A computer-based approach," Sanjit K. Mitra, McGraw-Hill, Ver. 3, 2006.
[5] "Introduction to Digital Image Precossing with Matlab," Alasdair McAndrew, THOMSON, 2004.