Course Description:
Real-time processor architectures and methods used for digital signal processing. Includes C and assembly language programming, modern DSP architectures, tools for real-time system development, and finite word-length effects. Laboratory includes implementation of hardware-based real-time systems.

Prerequisites:
ECE 3640 and ECE 3710

Textbook:
No textbook required

Course Outcomes:
1. Demonstrate understanding of the architectural features of modern DSP chips and FPGAs and the way these features are used in signal processing.
2. Demonstrate understanding of the advantages and disadvantages of different implementations for FIR, IIR, and multi-rate systems.
3. Demonstrate ability to program practical algorithms to run in real-time on a modern DSP system. Programming and debugging skills will be demonstrated in both the C language and at the assembly level.
4. Demonstrate understanding of the effects of finite word-length computation on the performance of fixed-point and floating-point implementations of systems and the FFT.

Topics Covered:
- Introduction to real-time processing hardware
- Structures for FIR systems
- Structures for IIR systems
- Introduction to general DSP architectures
- TMS320C67 DSP Development System
- The Celoxica FPGA design method
- Finite word-length effects
- Decimation/Interpolation structures

Outcome Assessments (Grades):
Homework and Quizzes 100 points
Midterm 100 points
Laboratory 300 points

Class Schedule:
Class Three times a week for fifty minutes.
Lab Once a week for two hours and forty-five minutes.
Contribution of course to meeting the requirements of Criterion 5:
3 credit hours of Engineering Topics and contains significant engineering design content

Relationship of course to student outcomes:
b. An ability to design and conduct experiments, as well as to analyze and interpret data.
c. An ability to design a system, component, or process to meet desired needs.
e. An ability to identify, formulate, and solve engineering problems.
k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Instructor:
Scott Budge, Associate Department Head and Associate Professor
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