ELE 452: REAL-TIME DIGITAL SIGNAL PROCESSING (elective)

Credit: 3 hours.

Catalog Description: In-depth presentation of the use of single-chip programmable signal processors. Hardware design aspects of digital signal processing (DSP) systems, architectural issues, and fixed versus floating pointing representations for implementing DSP algorithms. Applications to speech processing, adaptive filtering, and telecommunications.

Prerequisites: ELE 356 and ELE 451, or consent of department.

Textbooks(s) and/or Other Required Materials: Real-Time Digital Signal Processing by Sen M. Kuo and Bob H. Lee, Wiley, 2001.

Topics Covered:

1. Introduction to Real-Time Digital Signal Processing
2. Introduction to TMS320C55x Digital Signal Processor
3. DSP Fundamentals and Implementation Considerations
4. Experiments of Frequency Analysis
5. Experiments of FIR Filters
6. Experiments of IIR Filters
7. Experiments of Fast Fourier Transform
8. Experiments of Adaptive Filtering

Class/Laboratory Schedule:
Lecture: 1.25 hours/week
Lab: 2 hours/week

Course Objectives and Relationship to Program Outcomes:

2. Provides an introduction of the architecture, instruction set and programming of the TMS320C55x DSP processors from Texas Instruments. (Outcome B, C, I, K).
3. Covers many DSP applications including algorithm implementation examples. (Outcome A, B, C, E, I, K).
4. Performs many DSP experiments at lab sessions. (Outcome A, B, C, E, K).
5. Conducts final design (team) project that is devoted to DSP-based system design and real-time applications. (Outcome A, B, C, D, E, G, I, K).

Coverage (and level) of ABET Outcomes: A (2), B (3), C (2), D (2), E (3), G (2), I (2), J (2), and K (3).

Contribution of Course to meeting the Professional Component:
Engineering Topics: 100%
Date: June 2004.