

Data Acquisition System

Introduction

We are developing an underwater acoustic array to validate advanced signal processing algorithms. The array consists of a number of acoustic hydrophones (sensors) with associated pre-amplifiers and A/D converters. Data is packed and transmitted to a shore-side PC. The system has various operating modes that must be supported.

While the target test platform will include custom designed pre-amplifier and A/D circuit cards, the Capstone project will utilize A/D evaluation boards for the front end. The system is controlled by an FPGA (also provided on an evaluation board). Students will be responsible for the FPGA design, the software running in a soft processor in the FPGA and PC-based software (the FPGA-based processor and the PC will communicate over an Ethernet connection). The team will be responsible for integrating the FPGA, A/Ds, Ethernet and PC into a working system.

Learning Objectives

- Plan the project; monitor and report progress
- Understand the requirements
- Learn about the FPGA, evaluation boards and development tools
- Perform trade studies for various design approaches to see which best meets the requirements
- Design a product and learn a disciplined design process which still allows for creativity
- Build and test the design

Project Team and Desired Skills

This project will require a team of two Electrical Engineering students (FPGA design) and one or two Computer Engineering students (software). The team should have knowledge of some of the following:

- A PC-based software development environment
- Digital electronics
- FPGAs
- Analog electronics (A/Ds, D/As)
- Laboratory equipment

The FPGA design environment runs on a Windows platform and is licensed (locked) to one PC. Our experience indicates that the PCs in the Capstone lab are not adequate for this task. The team will have to provide a modern PC that will remain in the lab for the duration of the project (team members could connect to it remotely via Remote Desktop or similar application).

Contact Information

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