ECE 1503, Capstone Design

Spring 2003

Instructor and Coordinator:	Prof. Bahram Shafai
Assembly Meeting:	Friday, 1:35, 308 Snell
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Course Description

ECE1503 is the first of a two-course sequence that aims to give undergraduate engineering students (you) significant experience in dealing with a large design project from the beginning to end. In ECE1503 you will select a project and prepare a detailed proposal describing the work to be done for completing it. In ECE1504, you will implement the project and provide the final report.

This quarter as member of a design team you will be responsible for researching the project topic, identifying the tasks to be performed, determining the availability of all the tools and equipment needed, defining your milestones, and preparing and delivering written and oral presentations on the design proposal. The emphasis will be first on selecting an interesting and challenging project and then on explaining the design tradeoffs that exist at all stages of the project. In addition you should have all equipment that you will need identified and ordered by the end of the quarter so that you can complete your design by the end of the spring quarter.

Course Objectives

The main objective of the senior capstone design course is to provide a multidisciplinary experience, integrating knowledge from the core, intermediate, and advanced courses in electrical engineering. Most undergraduate engineering courses teach students problem solving in a particular area. Information is presented in organized lectures and students demonstrate their mastery of it through written problems and exams.

In contrast to this learning style, practicing design engineers are often given an open-ended problem, and they must seek the appropriate resources to solve it while they remain within certain budget constraints. These resources may include hardware and software tools, research papers and reports, books describing relevant ideas and other people with useful experiences. Part of their task may be to determine if any solution to the problem exists at all. They may work in teams, so they have to be able to organize themselves, decide who does what and meet regularly to check on progress and discuss the difficulties encountered in the process. Finally, at the end of the project they need to be effective in demonstrating their results and defending their design decisions. By taking part in this course, you will get experience with all these aspects of team work during the engineering design process.

Course Requirements

Your major task this quarter is to write and present a detailed proposal describing the work to be done on the project and defend it orally. The proposal should at least include:

1. A complete specification of the problem you will try to solve.
2. The results of a thorough literature survey of the appropriate topics and a bibliography.
3. A breakdown of the project into tasks and a description of how these tasks interact with each other.
4. The approach you will use to address the technical problems associated with each task and a description of work in progress.
5. A description of the tools and equipment that you think will be needed, and orders for all equipment parts you need to get.
6. A project organization plan identifying individual responsibilities, team work, status report, realistic schedule for the next quarter with milestones to the project completion.

Grading Scheme

Your grade will be based both on group and individual work and is out of 100 points.

Weekly Progress	20
Final Written Proposal	30
Final Oral Presentation	30
Individual participation	10
Teamwork	10
TOTAL	100 points

All members of a team receive the same score for all the parts except from the last one. The Class Participation score may vary among members of a team. It will be used to evaluate an individual's participation not only in the presentations of his/her own team, but also in the presentations of other teams.

Areas of Instructors' expertise

Prof. Bahram Shafai areas of expertise are in: *Control Systems and Signal Processing.* For more information on his current research and publications please check the web page:
http://www.cdsp.neu.edu/info/faculty/shafai/shafai.html

Prof. Waleed Meleis areas of expertise are in: *Computer Enginnering, Architecture, and Performance Optimization.* For more information on his current research and publications please check the web page:
http://www.ece.neu.edu/faculty/meleis

Examples of Project Areas of interest

- RoboSoccer Project
- Design of a Robot-Guided Mapping System
- Design of a Double Inverted Pendulum System
- Design of a Collision Avoidance System for an Unmanned Vehicle
- Trafic Light Control Systems
- A Communication-Based Motion Control System
- Web Camera Motion Control
- Motor Control Experiments for Crane Operation, Floating Ball, etc.
- Biomedical-based Control Systems

- CenSSIS Oriented Projects
- Motorized Scooter
- Design of a Wine Opener
- Other ideas will be shared with the students during the assembly meeting

List of Projects from 2002

- Library Book-Finder
- Digital Guitar
- Personal Area Network
- Source Localization Controlled System
- Wireless Home Automation System
- A Novel Rear-End Collision Avoidance System
- The Interactive Classroom
- Wireless PC
- Design for an Automated Door Locks (Smart Keyless Entry)
- Design of an Automatic Bottle Selection and Retrieval System
- Remote Control Vehicle with a Camera
- Automated Vehicle Detection System
- CadiJukebox: The Home Digital Jukebox
- Corner Adapting Motorcycle Headlight
- A Mobile Self-Guided Robot Firefighter
- Aquatic Quality Automation System
- Voice recognition lock
- Fingerprint-based ignition
- Bluetooth-based cellphone system
- Autotest fixture