EECE 4790, Capstone Design

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Instructor:	Prof. Masoud Salehi
Office:	314 Dana
E-mail:	salehi@ece.neu.edu

Instructor:	Prof. Waleed Meleis
Office:	320 Dana
E-mail:	wmeleis.capstone@westernfog.com

Course Description

EECE 4790 is the first of a two-course sequence that aims to give undergraduate engineering students significant experience in dealing with a large design project from the beginning to end. In ECE 4790 you will select a project and prepare a detailed proposal describing the work to be done for completing it. In EECE 4792, you will implement the project and provide the final report.

This semester 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 before the start of the second phase in ECE 4790.

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 semester is to formulate and write 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,

6. A project organization plan identifying individual responsibilities, team work, status report, realistic schedule for the next quarter with milestones to the project completion.

7. An analysis of the cost of implementing the project an an estimate of the final product price.

Grading Scheme

Your grade will be based both on group and individual work.

Attendance and participation at weekly meetings:	15%
Weekly written progress reports:	15%
Evaluation of your contributions by your group members:	15%
Final written proposal:	20%
Final oral presentation:	20%
Evaluation of your oral presentation by your classmates:	15%

A Sample of Past Projects

- 4x8 MIMO LTE TRANSCEIVER Fast Wireless Internet

- goCAD (Gesture Operated Computer Aided Design)

- SIGHT (Sight in Graphical Haptic Translation)

- Blind Guidance Object Detection for the Visually Impaired

- Vehicle Hit-and-Run Detection System

- PULSE: Pulse Uses Light Sequences for EEG

- Smart-Pods: An Intelligent Customizable Travel-Sized Medication Organization and Management Solution

- TRAQ: The Semi-Autonomous Radio Tracking Quad-Rotor Helicopter

- LobsterComm: Reinventing the Art of Lobster Trapping

- Board Games over IP

- In-Home Memory Prompt

- iCRAFT (eye Controlled Robotic Arm Feeding Technology)

- Semi-Autonomous Wi-Fi Mapping System

- Universal Vision Based Robotic Platform (UVBRP)

- Cloud Driven Home Automation System

- Ruggedized Autonomous Modular Reconnaissance Oktokopter Design (RAMROD)

- CD-6: Elbow Rehabilitation Range of Motion Device

- Autonomous Mine Detecting and Mapping Robot

- Smart Aftermarket Motorcycle Monitoring System

- Find Me: An Object Locator For the Blind and Visually Impaired

- IRemote: Universal Remote Accessory for iPhone

- A Non-Contact Breathing Detector

- Foot Operated Electric Wheelchair Controller

- System of Cooperative and Autonomous Tracking Robots (SCATR)

- Digital Wireless Instrument Transmitter

- FreeFlow: Three-Dimensional Controller Interface

- Body Position System (BPS)

- Watt Watcher Energy Monitoring and Control System

- The Wireless Electronic Charging Station - The WE Charging Station

- Clean and Sustainable Storage of Solar Power

- 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

- 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

- Visual Aid for Visually Impaired People

- Heart Ailment Prediction Device

- E-Clock

- Store Product Location System

- iCADE: The Next Generation Arcade Machine

- Ambient Noise-Sensitive Volume Control

- Intelligent Collision Avoidance System

- MediaRx: Streaming Video

- Accident Warning System

- Hybrid Motorcycle (Joint Project with ME)

- Automatic Snow Melting Machine

- ePhonebook

- Bluetooth to Infrared Multipoint Hub

- Personal Portable Security Device

- Pothole Detection System

- The Saint (Skier Access and Identification NeTwork)

- Swarming Robots

- Autonomous Decentralized Coordinated Robotic Search

- Wireless Mobile Robotics Control via TCP/IP

- Microchip Controlled DC-DC Power Converter

- VITAS (Visually Impaired Traffic Alert System)

- Movie Theater Seating System

- Portable Confocal Microscope

- Automated Storage/Retrieval System

- Heartbeat or Cadence Beat-Matching iPod Accessory

- All-in-One Signal Processing Analysis Resource

- Face Finder

- Optimized Radiologist Workstation

- Configurable, Airborne, Ad-hoc Network of Sensors

- Medication Dispensing System

- Interactive Easy Menu

- The Bar Buddy

- Wi-Drive: USB Flash Drive with Integrated Wireless File Sharing