

Electrical and Computer Engineering Department seeks Senior Project Ideas

Spring 2007

The Department of Electrical & Computer Engineering at the University of Maine is looking for electronic and computer related projects for this year's Senior Project course. The kinds of projects that are suitable are described below. The projects will be started this semester and will be complete and ready for delivery at the end of the spring semester on 2008. Any projects fitting the descriptions below will be considered and the department is ready to discuss with you the details of any ideas you may have. The projects will be designed by students as part of their Capstone Design Experience but will become the property of the project sponsors at the end of the course. Sponsors are asked to cover all costs for materials and equipment overhead costs.

The following two paragraphs describe the types of projects we are seeking.

Electrical Engineering Project

An Electrical Engineering design project is a small-scale system, device, or instrument, involving hardware design and construction. Hardware in this context means electronic components of the sort studied and used in the undergraduate curriculum. Examples of these components would include resistors, capacitors, inductors, transformers, transistors, op-amps, logic elements and other integrated circuit devices. Purchasing and using pre-made circuit cards with these components on them will not count as part of the design. The project can include but not consist solely of software development.

The project will be proposed, designed, constructed, debugged, tested and evaluated by a single student or a project team of two students. Teams may collaborate with students from other disciplines to develop larger design projects. The completed project will be presented to the class and a final report on the project will be submitted. The project concept does not have to be unique or original.

Computer Engineering Project

A Computer Engineering design project is a small-scale system, device, or instrument, involving both software design, and hardware design. Software in this context will require using concepts learned in the undergraduate curriculum. Examples of these concepts include object-oriented programming, data abstraction, modularity, portability, and optimization. Original code written with languages such as assembly, C, and C++ is more highly valued as it requires a greater attentiveness to detail and hence a more thorough understanding. Conversely, pre-compiled, off-the-shelf libraries are of less value than original software. Hardware in this context means electronic components of the sort studied and used in the undergraduate curriculum. Examples of these components would include microcontrollers, logic elements, integrated circuit devices, op-amps, resistors, capacitors, inductors, transformers, and transistors. Purchasing and using pre-made circuit cards with these components on them will not count as part of the design. Software developed solely on a PC may be acceptable but must have enough complexity and depth. Interfacing pre-written modules is not highly valued.

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Unacceptable as total projects for Electrical or Computer Engineering are:

- Pure research work
- System integration using off-the-shelf hardware or software
- Library research
- Market surveys
- Software evaluation

The following list of senior projects done in the past should help you understand the kind of projects that fit the descriptions above.

Wheel Chair Controller: A control box integrated into a wheelchair for a handicapped person that allowed the chair to be controlled using one finger and limited head movements. This project used a microcontroller and optical sensors to generate signals to control the chair motors.

Ultra-sonic Radar: This device uses ultra-sonic signals to measure the distance to an object. It's ultimate goal is to tell the driver of a car if an object is close behind their car while backing up.

DC Motor Controller: A DC motor position controller that can accurately position the shaft of a DC motor to any position within plus/minus one degree of motion. This circuit uses a keyboard to allow the user to enter a desired position and the direction of rotation.

On-Board Diagnostic Interface for a Car: This device plugs into a car's on board diagnostic computer and will display the vehicle's speed, the engine RPM, and the vehicles rate of fuel consumption in MPG. The device is compatible with many vehicle types.

Power Consumption Indicator: A small box into which you can plug a household appliance and measure the power used by the appliance. The device will also keep a running tally of the energy used by the appliance and display this tally in Watt hours or dollars. The monetary display is derived from the cost per kilowatt hour entered by the user.

Power Inverter: This device connects with a solar panel and produces a 120 Volt 60 Hz output signal with a max power out of 30Watts. The output is a modified sine wave with very little distortion. Digital displays indicate the voltage and current output. The device also optimizes the use of the solar panel by adjusting its operating point to maximize power.

Power Line Communication: A control system using household power lines. This system communicates via the house wiring to control appliances in remote locations. Lights or other appliances can be turned on and off from a central position. The central controller can operate up more than one remote site and can transmit data to the remote site if needed.

Audio Tube Preamplifier: For audio buffs, this tube amplifier adds the warm harmonics associated with tube amplifiers to modern stereo systems. Designed to be used with microphone or line-out signals.