

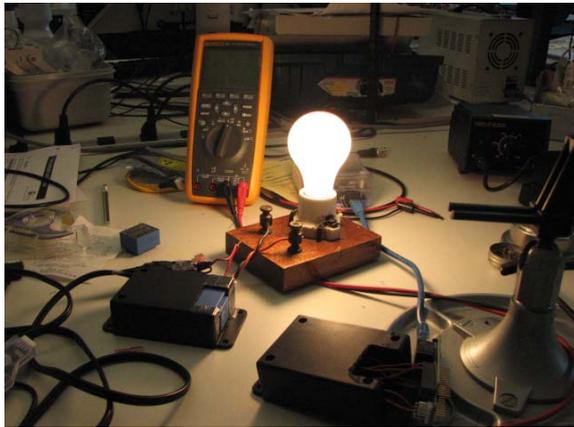
Seattle Pacific University
Electrical/Computer
Engineering/Engineering and
Applied Science

Senior Design Projects

June 11, 2009

4:00-6:15 pm

Otto Miller Hall 109



Engaging the culture, changing the world®



Seattle Pacific
UNIVERSITY

Welcome

Welcome to our celebration of the completion of our Senior Design Projects for 2009! We are very proud to showcase the capstone achievements of the seniors in our engineering programs. In these presentations, you will get a concise briefing of projects that reflect years of design and engineering training obtained in classes and other experiences at SPU, as well as real work experience in internships and related employment.

EE 4211, 4212, 4899 Overview

Each of the projects presented represents the culmination of a full year's worth of research, development, and testing of a unique solution to a design challenge. The design and prototyping of the project comes about in three classes. Representing the application of most of the knowledge gained in studying for an engineering degree, each project is based around a microcontroller-based embedded system. The projects vary greatly in purpose and scope, but all involve the use of both digital and analog systems, the design of unique printed circuit boards, and writing of hundreds of pages of documentation. The hundreds of hours of work for a senior design project are spread out among three one-quarter classes, EE 4211, 4212, and 4899 as follows:

EE 4211: Teams develop a design concept and then design and build a working prototype system including all hardware and rudimentary software.

EE 4212: Teams develop complete software for the system, while designing one or more printed circuit boards to be used for the final design.

EE 4899: Teams populate and power-on their newly-created PCBs and completely test and debug the entire hardware and software system. Through class discussions and writing students also reflect upon their vocation, or calling from God, as they make plans on where to go next in their lives.

Seattle Pacific University Mission

Seattle Pacific University seeks to be a premier Christian University fully committed to engaging the culture and changing the world by graduating people of competence and character, becoming people of wisdom and modeling grace-filled community.

SPU Engineering Program Mission

Preparing engineers with a Christian worldview who are called to serve, equipped to lead and sent to engage the world with their lives and through the appropriate use of technology.

SPU Engineering Program Goals

We believe that achievement and ongoing development of all of the engineering program goals are dependent upon a thorough understanding of the Christian worldview and its implications and relevance for the individual and their interaction with and service to humanity. Hence our first goal is foundational to all of the rest.

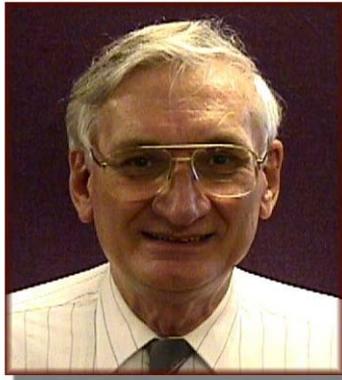
- I. Our graduates will have a thorough understanding of the Christian worldview and its implications and relevance for humanity.
- II. Our graduates will be competent in the core disciplines of engineering and progressing toward technical excellence.
- III. Our graduates will recognize the need for and have an ability to engage in lifelong learning.
- IV. Our graduates will exhibit servant leadership skills.
- V. Our graduates will demonstrate a knowledge of contemporary issues.
- VI. Our graduates will understand and be sensitive to the impact of engineering solutions in a global/societal/community context.
- VII. Our graduates will be prepared to be successful in a variety of postgraduate experiences which could include employment in industry, graduate school, missions, medicine and business.

Introductions, Scholarship Awards and Project Demonstrations

Thursday, June 11, 2009. 4:00 – 4:45pm

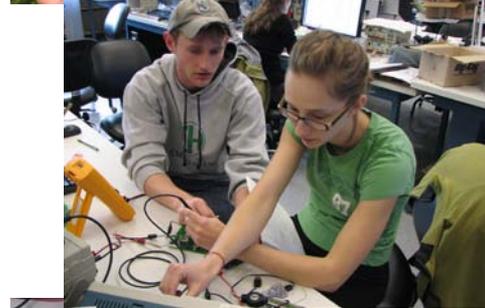
EDWARD J. BAUMAN ENGINEERING EXCELLENCE AWARD – Presented to this year's Edward Bauman Scholar. Awarded to the premier Electrical Engineering junior based on character, scholarship, and potential.

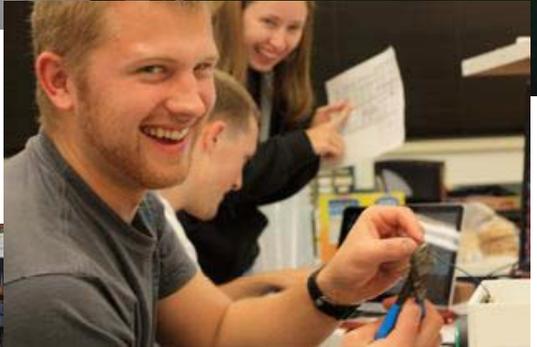
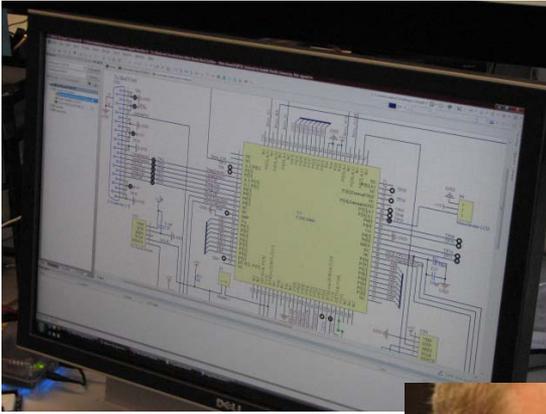
EDWARD J. BAUMAN ENGINEERING SERVANT LEADER AWARD – Presented to the graduating senior who most clearly demonstrates leadership with the humble attitude of a servant.



Edward J. Bauman
Founding Director of Engineering Programs
Seattle Pacific University
1985-2000

DEMONSTRATIONS – Take a few minutes to see live demonstrations of this year's six senior projects and congratulate all of the students on their successes. Demonstrations will be located around OMH 109.





Team Verna

Thursday, June 11, 2009. 4:45pm

PROJECT TITLE: VERNA SYSTEM

TEAM MEMBERS AND FUTURE PLANS:

YAOCHIEM CHAO: Teaching English in China.

ERICA CHRISTIANSEN: Working as a Systems Engineer at Boeing in Renton.

JOHANNES PAUL: Hoping to stay in Seattle to find an engineering job.

BRIAN PFLUGRATH: Pursuing a career in the medical device industry.

PROJECT DESCRIPTION:

The Verna System is an electronic pill dispenser, capable of alarm programming and pill dispensing. As we all get older and need help remembering to take medications and keeping track of dosages, the Verna System offers on-time reminders so that dosages are not forgotten or taken in excess. It has visual and audio alarms that are triggered at the dispensing time. The system is also linked to a network that provides remote access to the status of the Verna System. This way, any caregiver can check up on their grandmas or grandpas from their computer!



The idea for the Verna System resulted from a visit with Erica's Grandmother, Verna King. While visiting her grandma in Yakima, Washington, last summer they discussed her medications that many elderly people take and how monitoring and maintaining proper dosages can be difficult. This discussion sparked the idea of a machine with on-line monitoring. This would uphold the team's goal of helping people by



alleviating the stress the elderly feel at needing to remember when and how to take their medication.

Erica's Grandmother was born in 1918, still lives alone, regularly attends church, and is very proud to report that her doctor tells her she takes the least amount of medication of any of her patients over 80 years old.

Team Cheap Gates

Thursday, June 11, 2009. 5:00pm

PROJECT TITLE: HOME AUTOMATION SYSTEM

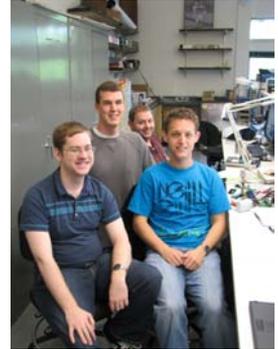
TEAM MEMBERS AND FUTURE PLANS:

DANIEL KOPPEL: Moving to Vancouver, WA and working

STEVEN PARSONS: Hoping to find the perfect software engineering job

BRENT PEEPLES: Working at BCE Engineers in Tacoma, WA

AUSTIN STEWART: Pursuing a career in Power Electronics in Seattle



PROJECT DESCRIPTION:

This project came about after reading about the home automation system that Bill Gates has installed in his house. This system uses individual user recognition to change the settings in each room of the house. We realized, there is no reason that only the rich, like Bill Gates (hence Cheap Gates), should benefit from having a home that responds to the people in it. No longer will we be slaves to the light switch, have to walk around the house without music accompanying us, or deal with not hearing a timer go off because it is in another room. This project is just another step towards making the house of tomorrow available and affordable today.

The design that we pursued for our system consists of three modules, a transmitter, receiver, control station, and one or more personal computers. The transmitter module is a battery powered device that is worn by each user in the house. It uses infrared communication to transmit a unique user ID number. This ID number is received by the receiver module. Each room in the house has one or more receiver module mounted on the wall. Once this ID number is received the module translates it and passes the ID and room number onto the control station via X10 communication, which is a form of communication over the power lines. The control station uses the ID and room number to implement the user's settings. Lights are controlled by X10 modules, while music and timer functions are handled by personal computers.

The reason we chose to use X10 communication to communicate between the modules and computers in our system is it allows easy communication without having to lay any wires. The user needs to simply plug the modules and lights or appliances to be controlled into the correct X10 module and plug this into an electrical outlet and the house is automated.

Team Engedi

Thursday, June 11, 2009. 5:15pm



PROJECT TITLE: THE ENGEDI SYSTEM

TEAM MEMBERS AND FUTURE PLANS:

JON BATTERSHELL: Caribbean Cruise and then work at Dynon Avionics

NATHANIEL DUPUIS: Work at Dynon Avionics while pursuing a career

AUSTIN CLARK: Getting married and starting a new job at Electroimpact

JORDAN WIRTH: Forest service work while looking for a CPE job.

BRAD ROGERS: Summer internship and finishing school

PROJECT DESCRIPTION:

The Engedi system provides customizable, more natural ways to wake up than traditional alarm clocks. In addition to the familiar wake-to-music mode, it also provides the option of heating or cooling a mattress pad, and gentle shaking via imbedded vibrators. The Engedi system can wirelessly control room lighting to simulate the rising sun, and can be set to turn on or off an outlet for any desired appliance (like a coffee maker). Just as the oasis, Engedi, serves as a refuge for travelers, the Engedi system seeks to provide a place of refuge in your home.

Team Eaglet

Thursday, June 11, 2009. 5:30pm



PROJECT TITLE: THE BIRDWATCHER'S ASSISTANT

TEAM MEMBERS AND FUTURE PLANS:

ELISE ECCLES: Short term mission trip to Central America, some work, then graduate school combining biomedical engineering and neuroscience

HUNG DANG: Continue working at Boeing and visit family in Vietnam

JANICE NG: Continue working at Boeing

ROSALIN ROSARIO-LIAM: Start electrical engineering job in Lacey, Wa

BEN WALKER: Take a year off before pursuing an MBA

PROJECT DESCRIPTION:

Based on an idea from SPU electrical engineering founder Dr. Ed Bauman, this product has the goal of wirelessly relaying outdoor sounds to the comfort of the indoors. With an indoor unit specifically build to detect, record, and play back bird calls, this product allows convenient and fun 'birding' without even having to step outside.

Team Shellohm

Thursday, June 11, 2009. 5:45pm



PROJECT TITLE: COXSWAIN'S MATE

TEAM MEMBERS AND FUTURE PLANS:

KENZIE BRISTER: Living in Seattle, hoping to explore jobs in the baking and engineering worlds and to learn more about sustainable engineering.

AMBER LUNDGREN: Pursuing an MA in teaching through SPU's Alternative Route to Certification program, with plans to teach high school physics and math.

ELI PETER: Returning to SPU next year to complete a minor in physics. Pursuing a career in alternative energies.

ZEKE SCHELLBERG: Looking for a job, searching for God's calling, traveling to Kenya.

PROJECT DESCRIPTION:

The Coxswain's Mate is a system designed to aid crew teams in training and competition. There are currently products on the market that perform similar functions as the Coxswain's Mate, but they are very expensive. The Coxswain's Mate is designed to ride with a coxswain on the water. It will aid the coxswain by keeping track of stroke rate, heart rates, interval timing, and providing audio assistance for the coxswain, including a voice amplifier and interfaces for a walkie-talkie and an audio recorder. Team Shellohm partnered with SPU's crew team to create a competitive system for less.

Team Vapor Chasers

Thursday, June 11, 2009. 6:00pm



PROJECT TITLE: FOG COLLECTORS

TEAM MEMBERS AND FUTURE PLANS:

ANTHONY (TWAAN) DUKES: Looking for a career in alternative energies or sustainable engineering, hanging out with friends, playing sepak bola and paying off college debt

JONATHAN VIDUCICH: Continuing to follow Jesus wherever He leads and applying for engineering positions in and outside of the United States

PROJECT DESCRIPTION:

This project was born out of a donation received by the Seattle Pacific University Physics department. Various parts for an active fog collector were donated by a retiring researcher and the physics department had plans to install the system at a new physics facility on Whidbey Island. After designing and building the system, we tested the whole system using an espresso machine to simulate fog and found that it functioned according to our specifications. From here, the system will be boxed up and sent to Whidbey Island to be installed and hopefully used for further research by later physics students.

SPU ENGINEERING ADVISORY COUNCIL

The SPU Engineering Advisory Council includes representatives from over a dozen companies in the Puget Sound region. Members of the Advisory Council meet regularly with the engineering faculty to help insure the quality of our program. We welcome representatives from any companies with business related to engineering. Each company that regularly sponsors projects or provide internships for our students is especially encouraged to participate. Please contact the Director of Engineering Programs if you are interested in more information.

Friends of SPU Engineering

People who believe in the mission of SPU Engineering, regardless of their background and training, are welcome to all official SPU engineering activities and are encouraged to meet personally with the director to find ways that they can partner in the vision and mission. This includes, among other things:

- Serving on the advisory board
- Promoting SPU engineering in local schools
- Speaking in our classes, cadre and society meetings
- Arranging tours of engineering companies
- Helping with intern placement
- Sponsoring student design and research projects
- Judging contests
- Providing contacts with local schools and businesses
- Donating equipment, books and training materials
- Supporting existing endowments for student scholarships, missions projects, faculty development and equipment
- Establishing endowments for distinguished speakers and professors

Corporate Sponsors/Donors

SPU Crew Team

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Engineering Faculty

Kevin Bolding, Ph.D.

Robert Lindberg, P.E.

John Lindberg, Ph.D.

Donald Peter, M.S., P.E.

Melani Plett, Ph.D.

Phil Prins, Ph.D.

Elaine Scott, Ph.D.

Emeritus Faculty

Edward Bauman, Ph.D., P.E.

Hugh Nutley, Ph.D., P.E. (deceased)

NOTES



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