



SPU  
ENGINEERING

Senior Design Projects  
June 10, 2010

4:00-4:30 pm: Otto Miller Hall Lobby  
4:40-6:00 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 2010! We are very proud to showcase the capstone achievements of the seniors in our engineering programs. In these presentations, you will see a small sample of the projects which came from years of training and thousands of hours of design and engineering in classes and experiences here at SPU.

## Senior Design 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 a unique printed circuit board, 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 complete and detail schematic and a set of printed-circuit boards for their system.

**EE 4212:** Teams populate their PCBs and bring them to life with software for their system. They also design a mechanical enclosure for their project.

**EE 4899:** Teams test and debug, test and debug, etc. They put the finishing touches on their project and prepare it for its debut. 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 within a supportive Christian community to develop appropriate and sustainable engineering solutions by skillfully serving, effectively leading and thoughtfully engaging the world with their lives.

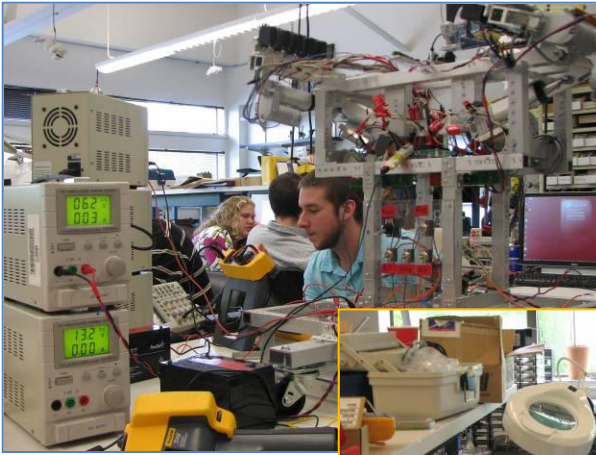
## SPU Engineering Program Goals

1. Alumni will purposefully demonstrate Christian ideals throughout their professional life.
2. Alumni will demonstrate abilities in the core competencies of engineering and be progressing toward excellence in their field.
3. Alumni will communicate effectively.
4. Alumni will engage in lifelong learning.
5. Alumni will demonstrate servant leadership skills.
6. Alumni will appropriately apply knowledge of contemporary issues to understand and be sensitive to the ethical and sustainable development, use and impact of engineering solutions in a global, societal and community context.
7. Alumni will succeed in a variety of postgraduate experiences.

# Project Demonstrations

4:00 – 4:30pm OMH Lobby

Take a few minutes to see live demonstrations of this year's four senior projects and congratulate all of the students on their successes. Demonstrations will be located around in the Otto Miller Hall Lobby.



# Scholarship Awards

OMH 109 4:40 – 4:50pm

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

# Team Ottobots

4:50pm OMH 109

PROJECT TITLE: SWITCH STRIP

TEAM MEMBERS AND FUTURE PLANS:

MARK COTTON: Peace Corps to teach Science and Math in Africa

KATHRYN IMLER: Going to San Diego. I'll be an engineer when I grow up

DANIEL JOHNSON: First earn 2nd degree, then Air Force or Army Corps

PAVEL SUSIN: Finishing next fall; Corps of Engineers afterward

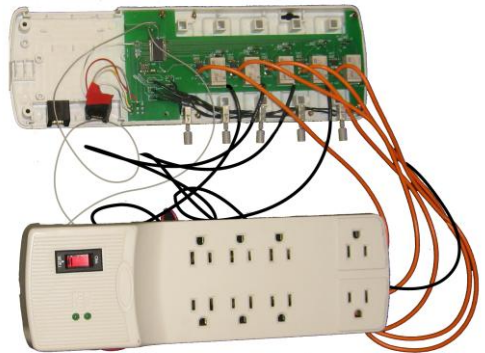


## PROJECT

### DESCRIPTION:

Switch Strip is an innovative power strip design that aims to reduce idle power consumption in the home. Idle power consumption is a form of energy waste that occurs when appliances are plugged in and turned off but still consuming power. The

Switch Strip combats this waste by disconnecting appliances when they are not in use. It accomplishes this through a unique combination of motion sensors and current sensors that monitor both the room occupancy and load occupancy on the outlet. The appliances return to their idle state when the motion sensor picks up movement in the room allowing the user can interact with their appliances as though nothing ever happened. This project would not be possible without the generous grant from the American Public Power Association's Department of Energy Efficient Development.



# Team Kitchen Sink

5:05pm OMH 109

PROJECT TITLE: EMERGENCY VEHICLE ALERT SYSTEM

TEAM MEMBERS AND FUTURE PLANS:

KEVIN BINZ: Getting married; taking a job at Cequent

KEVIN COSSANO: Graduating and will be looking for an engineering job

CHAD MEIS: Finishing a double-major at SPU in Computer Engineering

JONATHAN POST: Getting married moving to New Zealand for a year

RUTH SIMS: Entering Master's Graduate Program in EE at the UW



## PROJECT

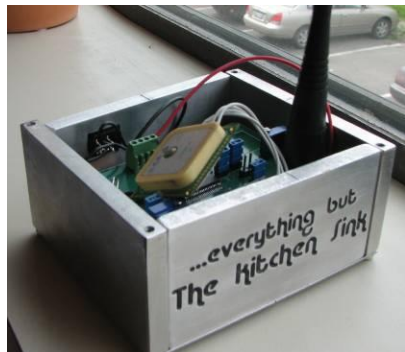
### DESCRIPTION:

Have you ever been sitting in traffic with your windows rolled up, all of a sudden realizing that an ambulance is directly behind you, waiting for you to merge? Or do you have difficulty hearing emergency sirens and they often catch you off-

guard? Our project is designed to alert motorists to the presence of an approaching emergency vehicle (EV) in an effective way. Though our project is primarily designed for the hearing impaired, our goal is that it will also be effective and useful for all drivers.

Our design consists of two units: one located inside the dashboard of the EV, and another on the dash of a personal vehicle (PV).

When the EV's siren is turned on, the device broadcasts its I.D. and coordinate info in every direction so that the PV can receive the information and display its relative distance and orientation on an array of LEDs.



# Team D.R.E.A.M.

5:25pm OMH 109

PROJECT TITLE: MIMICKING HUMANOID ROBOT

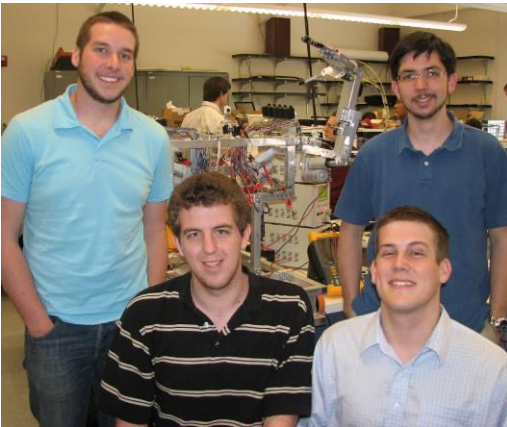
TEAM MEMBERS AND FUTURE PLANS:

ANDREW LESLIE: Research engineer at Korry Electronics

RYAN SCHIED: Product marketing engineer with PNW firm

JOSHUA WEITZ: Remain in Seattle and find an engineering-related job

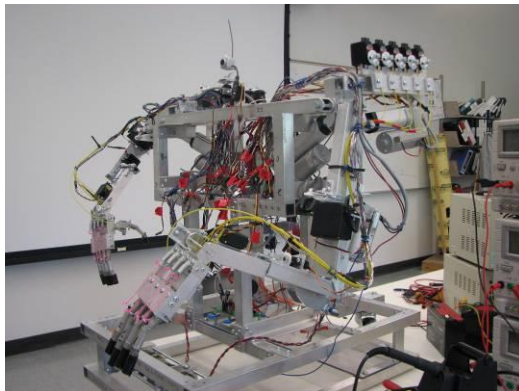
DAVID ZELMER: Graduate; Find a job in embedded systems or robotics



## PROJECT DESCRIPTION:

For their senior design project, D.R.E.A.M. Team built a remotely controlled humanoid robot. The robot is designed to perform tasks which require human-like hand dexterity in environments which are too dangerous for people. The system includes a robot

which has two fully articulated arms and hands and a control chair. The operator of the robot sits in the control chair and wears sensors, and the robot will mimic the movements of the operator's arms and hands.



# Team Zoned Out

5:40pm OMH 109

## PROJECT TITLE: MULTI-ZONE THERMOSTAT

### TEAM MEMBERS AND FUTURE PLANS:

JOEL BRADSHAW: Complete 2<sup>nd</sup> major in CS; perhaps Americorps after

JONATHAN CROSS: 2<sup>nd</sup> degree in physics; working at Pico Computing

LUKE DIETZ: Working in design and trying my luck in web development

HESAM MAZANDARINI: Hardware test engineer at Apple Inc.

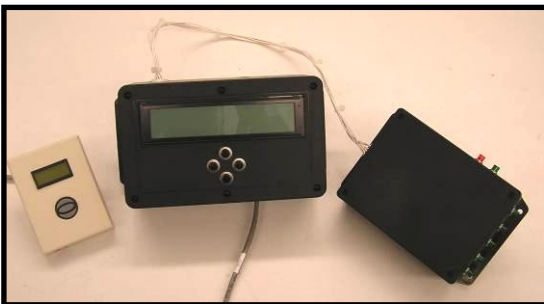
KEITH POINDEXTER: Raise my family in the PNW and a career at Boeing

### PROJECT DESCRIPTION:

This project was developed at the request of Dr. Hughson, Professor of Physics Emeritus, SPU. The objective of this project is to more efficiently and effectively control Dr. Hughson's home heating system.

The Multi-Zone Thermostat is a microprocessor based temperature monitoring and heat control system that is programmed by a PC based user interface. The user friendly PC interface is connected to a Cypress PSoC via Ethernet. The PSoC monitors individual zone temperatures, and controls the temperature of each

zone via a relay control unit that interfaces with control valves that are connected to a central boiler. The PSoC also controls the temperature of the hot water heater, and manages user defined schedules entered from the PC. The Multi-Zone Thermostat will allow for more efficient scheduling and control of the home and water heating system.



# 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

## Sponsors and Donors

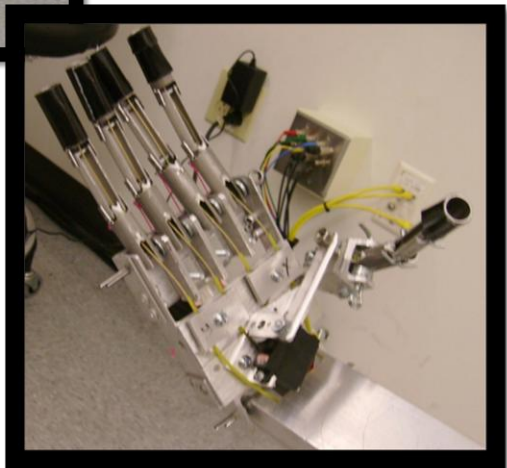
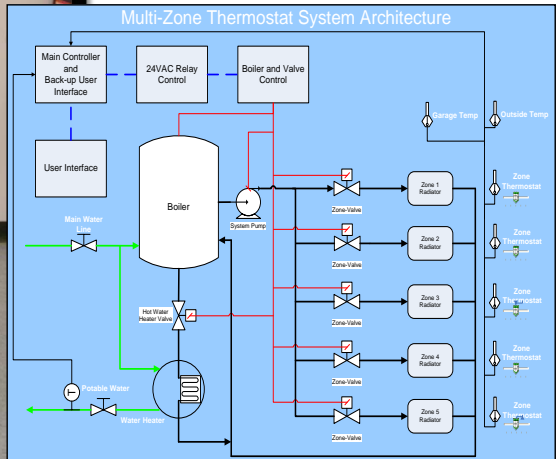
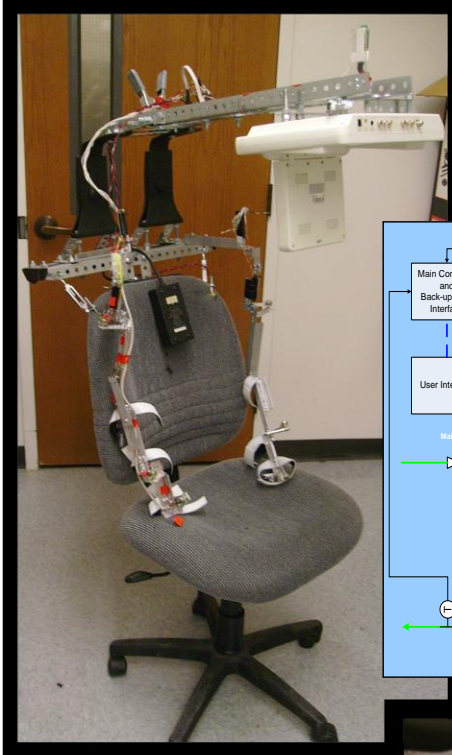
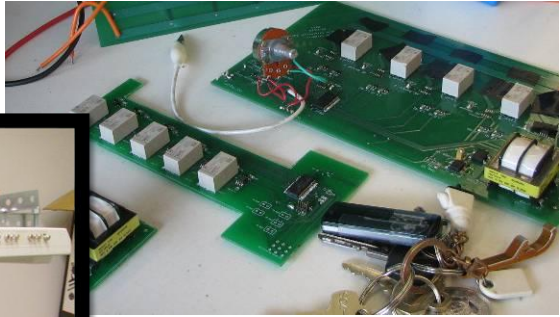
Cypress Semiconductor  
Robert Hughson, Ph.D.  
American Public Power Association

## Engineering Faculty

Kevin Bolding, Ph.D.	Melani Plett, Ph.D.
Robert Lindberg, P.E	Phil Prins, Ph.D.
John Lindberg, Ph.D.	Elaine Scott, Ph.D.
Donald Peter, M.S., P.E	

## Emeritus Faculty

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