

Real Projects. Real Sponsors. Real Learning.

## COLLEGE OF SCIENCE AND ENGINEERING



## PROJECTS DAY

JUNE 1, 2007



# SEATTLE UNIVERSITY

## WELCOME FROM THE DEAN

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Welcome to Projects Day 2007. We are completing our twentieth year for the Science and Engineering Project Center, and have plans to celebrate the successes of past students and sponsors, and to welcome our new graduates into the profession. This is truly a community effort involving our corporate sponsors, professional liaisons, and our faculty and students -- all in support of building stronger engineering and computer science professions.

Please see and hear as many of the presentations as you can, and don't be hesitant to ask our student presenters the hard questions. They can handle it!

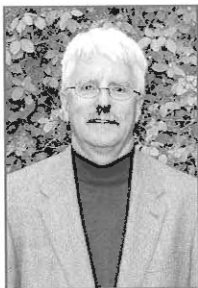
We are most grateful to our corporate sponsors, old ones and new ones alike. We couldn't do this without you! Thank you!

George Simmons, Dean  
College of Science and Engineering

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## WELCOME FROM THE PROJECT CENTER DIRECTOR

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I also extend to you, on behalf of our faculty and students, a warm welcome to Projects Day 2007, our annual presentation of design team results to sponsoring organizations, visitors, and friends. I am grateful for the encouragement and assistance provided by our Science and Engineering Advisory Board and the Project Center Advisory Committee in promoting the external sponsorship of our projects.

This printed program includes both undergraduate and graduate projects. The projects will be presented the afternoon of Friday, June 1, in Sullivan Hall (School of Law). Following the project presentations will be a celebration of the 20th anniversary of the Project Center. The anniversary party will be a time to reconnect with old friends and share thoughts about the future of the capstone projects of Seattle University.

I would also like to acknowledge the coordination efforts of professors Nir-mala Gnanapragasam in Civil and Environmental Engineering; Alvin Moser in Electrical and Computer Engineering; Teodora Rutar Shuman in Mechanical Engineering; and William Poole in Computer Science and Software Engineering, as well as Amy Haedt, corporate relationships manager, and Michael Mabie, Diannie Ran and Michael Smith, administrative assistants.

Your hosts for Projects Day are students from our engineering organizations, and special thanks go to them for the time and energy they put into the tasks associated with our Projects Day celebration. Student societies represented are: American Society of Civil Engineers (ASCE), American Society of Mechanical Engineers (ASME), Institute of Electrical and Electronics Engineers (IEEE), National Society of Black Engineers (NSBE), Society of Environmental Engineers and Scientists (SEES), Society of Women Engineers (SWE), and Tau Beta Pi. I also want to thank Dean Kellye Testy and Associate Dean Richard Bird of the School of Law for all their help with this year's presentation in their facility.

This is truly a day that can only happen when Seattle University and the larger community work together to support the scientists and engineers of tomorrow.

Jeff Gilles, Director  
Science and Engineering Project Center

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# SCHEDULE

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## Undergraduate Projects Day Seattle University Sullivan Hall June 1, 2007

1:00 p.m.

Projects Day Registration and Project Displays

1:30 p.m.

Welcome, Dean George Simmons

1:45 p.m.

Concurrent Sessions

### CEE Teams

Coughlin Porter Lundeen  
Group Four, Inc.  
Octaform Concrete Forming Systems

### Room 109

Shear Transfer in Composite Construction  
High Cedars Development  
Effect of PVC Formwork on Hydration

### ME Teams

Bioalgene  
The Boeing Company  
The Boeing Company

### Room 110

Design of an Algae Photobioreactor  
Boeing 747-8 Door-Five Closet Redesign  
Latory Redesign

### ECE Teams

The Boeing Company  
The Boeing Company  
Kenworth Truck Company

### Room C5

Smart Galley Project  
Low Energy Signal Conditioning  
Automated Telltale Identification System

### CSSE Teams

The Boeing Company  
PACCAR  
Washington Mutual

### Room C6

Web Simulation Command and Control  
Wireless Transmissions  
Project Tracking Database Prototype

3:00 p.m.

Break

3:15 p.m.

Concurrent Sessions

### CEE Teams

PACLAND  
Seattle Public Utilities  
Snohomish County Public Works

### Room 109

Civil Redesign of a Mixed-Use Building  
Eighth Ave. S. Streetscape Alternatives  
Snohomish County Bridge #546

# SCHEDULE

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## ME Teams

Potters for Peace  
Pratt & Whitney

## ECE/CSSE Teams

AREVA T&D  
Philips Ultrasound  
PACCAR

## MSE Teams

Cisco System  
Microsoft  
Net Result  
Microsoft

## Room 110

Ceramic Silver Water Filter  
Pulse Detonation Measurement

## Room C5

Mobile Human Machine Interface  
Persistent Digital Media  
Bluetooth Diagnostic Adapter

## Room C6

TUI Test Automation  
Non-Functional Requirements  
Automated Home Alarm System  
Optimizing Distributed Teams

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## Project Center 20th Anniversary Celebration

Following Projects Day, the Project Center will celebrate its 20th anniversary with an evening of music, appetizers, and drinks. Awards will be presented and a panel will discuss future directions of capstone projects.

4:30 p.m.

Arrival and Registration

5:00 p.m.

Welcome, Pat Cashman

5:10 p.m.

Project Center: Past, Present and Future, Jeff Gilles

6:00 p.m.

Awards and Recognition

6:15 p.m.

Panel Discussion (*optional*)

7:00 p.m.

Social and Music

# CIVIL AND ENVIRONMENTAL ENGINEERING

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**TITLE:** Horizontal Shear Transfer in Composite Timber and Concrete Construction  
**NUMBER:** CEE 07.1  
**SPONSOR:** Coughlin Porter Lundeen  
**SPONSOR LIAISON:** Chris Duvall  
**FACULTY ADVISOR:** Prof. Jeff Dragovich  
**STUDENTS:** William Frizzell, Katie Roberge, and Travis Welt

The retrofit of existing structures often requires that the load carrying capacity of the floor system be increased. Traditional solutions require the addition of floor joists or steel straps. Coughlin Porter Lundeen (CPL) is exploring a new solution using a timber-concrete composite floor system. The system consists of the existing floor, with shear connectors along the joists and a concrete topping slab. The team developed an experimental program to establish the basic parameters that affect the strength, stiffness and ductility of four different shear connector types. Based on the experimental test results the connectors were ranked according to ease of construction and cost.

**TITLE:** High Cedars Development  
**NUMBER:** CEE 07.2  
**SPONSOR:** Group Four Inc.  
**SPONSOR LIAISON:** Jeffrey Dye  
**FACULTY ADVISOR:** Prof. Mark Siegenthaler  
**STUDENTS:** Dustin DeKoekkoek, Craig Buitrago, Cale Regidor, Tiberiu Polocoser

Group Four, Inc. is a land planning, biological sciences, civil engineering and surveying firm, located in Bothell Washington, which specializes in both residential and commercial land development projects. Group Four requested the design team to develop a preliminary residential subdivision design for the High Cedars project using conventional methods, and a separate design using Low Impact Development (LID) techniques. LID is an innovative design approach for maintaining the natural hydrologic conditions of the development site by reducing impervious areas and mimicking natural drainage. The team researched the site for LID feasibility based on soil permeability and drainage criteria. The team compared the cost advantages or disadvantages of using LID instead of conventional design, along with the potential positive ecological impacts of LID. The High Cedars site is located in the City of Marysville, and the objective for the design team was to optimize the number of single family residence lots that could fit on the 5.4 acre site.

**TITLE:** The Effect of PVC Stay-In-Place Formwork on Hydration  
**NUMBER:** CEE 07.3  
**SPONSOR:** Octaform Concrete Forming Systems  
**SPONSOR LIAISON:** Rishi Gupta  
**FACULTY ADVISOR:** Prof. Katherine Kuder  
**STUDENTS:** Kristian Lowrie, David Sommer, Nicole Wheeler

Octaform Concrete Forming Systems manufactures PVC stay-in-place formwork for the construction of concrete walls. Temperature and compression tests were performed on laboratory-scale walls to determine the effect of the Octaform forming system on the hydration process of concrete. The temperature development of the concrete was measured over time and compression tests were conducted on concrete cores taken from the walls. These results were then compared to a wood forming system, which is more commonly used during construction of concrete walls. Variables of interest for this comparison included concrete composition, wall thickness, insulation, and stripping time. Based on the results, the team made recommendations to Octaform to maximize the benefits of their PVC encasement system.

# CIVIL AND ENVIRONMENTAL ENGINEERING

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TITLE: Civil Redesign of a Mixed-Use Building in Queen Anne  
NUMBER: CEE 07.4  
SPONSOR: PACLAND  
SPONSOR LIAISONS: Daniel Carmody, Jeff Chambers  
FACULTY ADVISOR: Prof. Nirmala Gnanapragasam  
STUDENTS: Jacob Collins, Richard Poirier, Kurt Truedson, Rachel Wiseman

PACLAND, a West Coast land development consulting firm, requested the team to assist them in the redesign of a building in the Queen Anne neighborhood. The redesign will replace a currently existing single story structure with a larger 4-story mixed-use office and retail building. The team prepared civil plans for the demolition of the existing structure, design of a storm water system accompanied by a drainage report, improvements to the sidewalk, and configuration of the underground parking garage. The civil engineering drawings for this new development were prepared per City of Seattle codes and guidelines given by the community group, Picture Perfect Queen Anne.

TITLE: Eighth Avenue South Streetscape Alternatives  
NUMBER: CEE 07.5  
SPONSOR: Seattle Public Utilities  
SPONSOR LIAISON: Shanti Colwell  
FACULTY ADVISOR: Prof. Mike Marsolek  
STUDENTS: Joshua Brewer, Heekyong Kang, Zohrah Saidy, Thadd Zehnder

Citizens of Georgetown community have expressed concerns about poor stormwater drainage and lack of safe pedestrian access along 8th Avenue South leading to Gateway Park North. In response, Seattle Public Utilities (SPU) is evaluating options for right-of-way improvements along 8th Avenue South in collaboration with the Seattle Department of Transportation, the Duwamish River Cleanup Coalition, the Georgetown community, and local businesses. SPU asked the design team to perform a survey, evaluate drainage code requirements, and investigate stormwater best management practices. The team evaluated several drainage and water quality treatment alternatives to determine the most cost effective and efficient method for controlling stormwater flow. The systems were designed using City of Seattle and Washington State Department of Ecology guidelines as well as site constraints and performance goals. Based on the analysis of these drainage system alternatives, a preferred alternative was presented to SPU and the Georgetown community based on the social, economic and environmental benefits of each option.

TITLE: Snohomish County Bridge #546  
NUMBER: CEE 07.6  
SPONSOR: Snohomish County Public Works  
SPONSOR LIAISONS: Lisa Wirt, Larry Brewer  
FACULTY ADVISOR: Prof. J. Wesley Lauer  
STUDENTS: Jimmy Jie, Monica Joyce, Brian Larmore, Timothy Tipton

Snohomish County Public Works proposes to replace County Bridge #546 that carries Carter Road over Swamp Creek. The existing 40-year-old structure is a double-span bridge that has a history of scour and debris build-up resulting in increased maintenance costs. The team completed a hydraulic study and a Type, Size and Location Report for Snohomish County Bridge #546. In this report the team developed bridge alternatives, evaluated existing and proposed hydraulic conditions, and presented an analysis of scour, streambank protection and debris build-up potential within the channel. The proposed bridge alternatives accommodate future growth of the project area and meet the requirements of Snohomish County Engineering Design and Development Standards and the WSDOT Local Agency Guidelines. Designing around an existing uninterrupted fiber-optic conduit and providing a three foot clearance over the existing 100-year-flood elevation were two of the many challenges that were faced on this project.

# MECHANICAL ENGINEERING

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TITLE: Design of an Algae Photobioreactor  
NUMBER: ME 07.1  
SPONSOR: Bioalgene  
SPONSOR LIAISONS: Stan Barnes, Andre Golard  
FACULTY ADVISOR: Prof. Teodora Shuman  
STUDENTS: Inri Haryono, James Krumwied, Julian Rodgers, Erika Tyler

Bioalgene is a company aiming to provide consumers with an alternative to traditional energy sources. It is currently seeking a photobioreactor that utilizes photosynthesis in algae to convert carbon dioxide in power plant exhaust into biodiesel fuel. The reactor must be of a practical design and be capable of producing fuel at a price that is competitive with the current market. In addition, the company has asked that the design be both scalable and patentable. The team approached the problem by first performing an initial round of experiments to determine which parameters would have the greatest effect on algae production. The new bioreactor was then designed to maximize algae production by optimizing the algae-gas interaction. This new design offers both flexibility and scalability while having the potential for economic viability.

TITLE: Boeing 747-8 Door-Five Closet Redesign  
NUMBER: ME 07.2  
SPONSOR: The Boeing Company  
SPONSOR LIAISON: Gene Lamb  
FACULTY ADVISOR: Prof. Robert Cornwell  
STUDENTS: Corey Torgerson, Christian Guerrero, Vernon Ibarra, Trevor Garrett

Boeing's new 747-8 aircraft will be larger, quieter, more environmentally friendly and more economical to both operate and manufacture than other airplanes. Historically, the interior components at the rear of the aircraft have been custom installed because of the variability of the airframe. The goal of this project was to develop both component design and installation process improvements for the current door five closet and crew rest stairwell. Design and installation process improvements will result in a more efficient installation of the components in terms of both time and manpower. The team conducted an investigation into the design and installation of the current components and identified the lower closet mounting bracket and modularization of the crew rest stairwell as the areas which would most benefit from further design analysis. The primary focus of this project was on the redesign of the lower mounting bracket for the closet, with a secondary focus on modularization of the crew rest stairwell. The team designed the lower mounting brackets that meet all FAA requirements and will significantly reduce the installation time of the door-five closet.



# MECHANICAL ENGINEERING

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TITLE: Lavatory Redesign  
NUMBER: ME 07.3  
SPONSOR: The Boeing Company  
SPONSOR LIAISONS: Bryan Moran, David Steindl  
FACULTY ADVISOR: Prof. Mike Larson  
STUDENTS: George Bacon, Brian Langhans, Christopher Norby, Yuichi Sugawara

The 787 Dreamliner is a new airplane for a new world. The Boeing Company is creating value through the use of breakthrough technologies ranging from the composite primary structure to the innovative, flexible interior, including the creation of an entirely new lavatory. In pursuit of additional visionary design ideas, Boeing asked the team to enhance the lavatory through the creation of a new faucet that is more innovative and universal to use, the development of new assist handle designs to ensure accessibility for passengers that are physically impaired, and for the growing number of aging travelers, and the identification of new ways to minimize deflection of the lavatory during a 9G (9 times the acceleration of gravity) loading event. The team accomplished these tasks by fabricating mockups of new faucet and assist handle concepts, which Boeing can integrate into the existing lavatory. In addition, the team performed finite element analysis to determine the most weight-efficient method to minimize deflection. By addressing these issues, the team contributed to Boeing's commitment to redefine the total passenger experience.

TITLE: Ceramic Silver Water Filter  
NUMBER: ME 07.4  
SPONSOR: Potters for Peace  
SPONSOR LIAISON: Burt Cohen  
FACULTY ADVISOR: Prof. Frank Shih  
STUDENTS: Ronald Haliman, Andrew Lybarger, Brianne Washington, Tresha White

Potters for Peace specializes in the design and manufacturing of ceramic silver water filters. These filters provide underdeveloped and devastated areas with clean drinking water. The porous filter medium is produced through a combination of clay and a combustible burnout material such as sawdust. Potters for Peace has requested that the team look into the feasibility of using paper in place of sawdust. The team produced test sized filters using sawdust as control samples and paper as experimental samples. The results of each sample batch were recorded. Potters for Peace also requested that the team design and manufacture a device to produce paper powder using a 0.5 hp motor. The team produced several different devices including shredding and pulping mechanisms and chose the most viable concept. With the completion of the project, the team's research will be added to the knowledge base for water filter production. Potters for Peace will then be able to adopt the research in communities in need.

# MECHANICAL ENGINEERING

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TITLE: Laser Absorption Spectroscopy Measurement Device for Pulse Detonation Engines  
NUMBER: ME 07.5  
SPONSOR: Pratt & Whitney Seattle Aerosciences Center  
SPONSOR LIAISON: Dr. Silvano Saretto  
FACULTY ADVISOR: Prof. Christopher Stipe  
STUDENTS: Andrew Eastman, Brian Hailey, Jesen Irwen, Nathan Heitzinger, Mochtar Wibowo

Pratt & Whitney Seattle Aerosciences Center, a United Technologies Company, performs research and development in the field of pulse detonation engine technology for use in aerospace and power plant applications. Pratt & Whitney asked that a measurement device be designed and constructed that measures the fuel concentration, equivalence ratio, mixedness, and time-of-arrival of a well-mixed charge of fresh reactants inside a pulse detonation engine. These measurements were made possible through a laser absorption spectroscopy method which correlates the intensity of the laser signal to the amount of hydrocarbon fuel molecules along its path length. The measurement device uses a 2.0mW, 3.39 $\mu$ m laser and an infrared detector coupled to an optical filter to detect the photons at 3.39 $\mu$ m. The laser beam is transported through a flexible hollow silica waveguide that allows the laser and detector to function without being rigidly attached to the system. A data acquisition program reads the laser intensity from the detector, the temperature and pressure inside the engine, and controls the flow of gases into the combustion chamber.

# ELECTRICAL AND COMPUTER ENGINEERING

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TITLE: Smart Galley Project  
NUMBER: ECE07.1  
SPONSOR: The Boeing Company  
SPONSOR LIAISON: Ken Henshaw, Jon Dhondt, Jecelin Centeio  
FACULTY ADVISOR: Prof. Al Moser  
STUDENTS: Joe Martin, James Okullo, Thomas Gaultier, Jim Collins

Reducing aircraft weight is a primary concern for all aircraft manufacturers. Wire accounts for a significant percentage of the weight in aircraft systems. Boeing has requested that the team design and build a prototype Galley Power Control system that will actively manage the power consumption in an aircraft galley installation. The benefit of actively managing the power is that the diameter of the power system wiring can be significantly reduced. The team has designed and built a Master Galley Control Unit. The control unit is a CAN bus enabled embedded control system based upon a Phillips-ARM processor. The processor has been programmed in accordance with the ARINC 812 specification. The ARINC 812 specification is an industry standard that defines the operational requirements for galley components and the CAN bus communication format between those components. All programming is in ANSI C as specified by the KEIL/ARM compiler we are using.

TITLE: Signal Conditioning for Low Level Energy Harvesting Devices  
NUMBER: ECE 07.2  
SPONSOR: The Boeing Company  
SPONSOR LIAISONS: Henry Fletcher, Brad Mitchell  
FACULTY ADVISOR: Prof. Paul Neudorfer  
STUDENTS: Martin Kearney-Fisher, Raedeit Kifle, Payton Thompson, Olivier Varin

Boeing is currently focusing efforts on a state-of-the-art family of airplanes, the Boeing 787 Dreamliner. As a result of Boeing's focus on innovative technology, a group known as the Boeing Systems Concept Center has been organized to develop new technology that can be used to improve the operation of commercial aircraft. One way in which the Concept Center has been attempting to increase efficiency of aircraft is to utilize energy harvesting devices to recover as much "unused" energy as possible. In response to Boeing's request, the team designed a passive signal conditioning system that boosts low voltages produced from a thermoelectric energy harvesting device to a voltage level capable of powering other electrical components. With this signal boosting and conditioning technology, the harvested energy from such devices can potentially be used to reduce the weight of power distribution wiring by placing small, light-weight power supplies near the point of use.

TITLE: Automated Telltale Identification System and Multicolor Telltales  
NUMBER: ECE 07.3  
SPONSOR: Kenworth Truck Company  
SPONSOR LIAISON: Chris Harry  
FACULTY ADVISOR: Prof. Robert Heeren  
STUDENTS: Nick McCarty, Justin Riel, Sonny Rowland, Ed Francisco

Kenworth Truck Company manufactures a wide range of trucks that are used in every trade. Truck owners sometimes need to adapt the trucks to new job requirements, requiring a change to the telltales (dashboard icons) configuration as well. The telltale system as it is now has limited flexibility, requiring custom programming to alter its configuration. Kenworth requested that the system be capable of automatically programming itself every time the telltale configuration is changed. Team ECE 07.3 implemented a prototype that uses a Radio Frequency Identification System to recognize the telltales' configuration. The prototype is capable of reprogramming itself automatically every time the truck is powered up, thus adding flexibility to the system.

# ELECTRICAL AND COMPUTER ENGINEERING

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**TITLE:** Persistent Digital Media  
**NUMBER:** ECE 07.4  
**SPONSOR:** Philips Ultrasound  
**SPONSOR LIAISONS:** Rob Trahms, Dale Chermak, Rick Weyrauch  
**FACULTY ADVISORS:** Prof. Agnieszka Miguel  
**STUDENTS:** Matthew Gnaneswaran, Mirweis Hazrat, Earl Manlangit, Leo Rodgers

Philips Ultrasound machines currently use a VCR for the recording and playback of video output after a patient exam. The company hopes to replace the VCR with a digital recording system which would enable the ultrasound exams to be recorded onto a DVD instead of a video cassette. The primary goal of the project is to create a client/server application, on a networked client Home Theater Personal Computer (HTPC). The HTPC would control the capture, playback and DVD burning of video stored on a host PC server. Using an HTPC with the full capabilities of a digital video recorder enables Philips Ultrasound to create a custom server application to run on the HTPC. This would allow a client application running on the Philips Ultrasound system to control the recording, playback and DVD burning functionality of the HTPC over a standard Ethernet network connection. In response to Phillip's request, the team has designed a graphical user interface which will provide the basic functionality required for controlling a networked HTPC from a Windows PC.

**TITLE:** Bluetooth Diagnostic Adapter  
**NUMBER:** ECE 07.5  
**SPONSOR:** PACCAR ITD  
**SPONSOR LIAISONS:** Wayne Winch, Rusty Lhamon  
**FACULTY ADVISOR:** Prof. Alvin Moser  
**STUDENTS:** David Wilson, Huy Vu, Philip Scougale

PACCAR ITD is one of the world's largest producers of heavy trucks. PACCAR requested a design for a Bluetooth wireless interface for heavy-duty truck diagnostics, due to the high cost and inconvenience of wired diagnostic connections. A solution was developed and designed around an 8-bit microcontroller that communicates with the truck diagnostic systems and relays information to a Bluetooth enabled PC. The design is capable of bidirectional communication over the J1708 and CAN networks by multiplexing messages on a serial transmission for both older and newer truck models.

# COMPUTER SCIENCE

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TITLE: Mobile Human Machine Interface for SCADA  
NUMBER: CSSE 07.1  
SPONSOR: AREVA T&D  
SPONSOR LIAISON: Kevin Cheung  
FACULTY ADVISOR: Prof. David Joslin  
STUDENTS: John Cline, Yi Jing, Stephen Lee, John Visneski

Areva T&D specializes in power grid management software. Currently, the company supplies its clients with e-terracontrol software to monitor and alter the various operations of its power stations. However, the software is run client-side, and is seen only by operators, not the actual technicians at the various substations. The company asked the team to design and implement a mobile interface for monitoring alarms, events and data tables, which could be used by technicians in the field. The team designed an application that utilizes mobile technology to display this information, primarily through the use of ActiveX and ASP.NET in conjunction with the SCADA software. The application developed by the team can be used by a field technician to view the alarms, events, and system data for a particular substation.

TITLE: Web Simulation Command and Control  
NUMBER: CSSE 07.2  
SPONSOR: The Boeing Company  
SPONSOR LIAISON: Steven Adkisson →  
FACULTY ADVISOR: Prof. Adair Dingle  
STUDENTS: James Lieurance, Aaron Griffith, Ky Phan, Jeffrey Martinez

Boeing is the world's leading aerospace company and the largest manufacturer of commercial jetliners and military aircraft combined, with capabilities in rotorcraft, electronic and defense systems, missiles, satellites, launch vehicles and advanced information and communication systems. The Simulation Control Center (SCC) is a software application that Boeing developed, in partnership with Seattle University that runs real-time simulations continuously. These simulations monitor various relevant players including planes, tanks, boats, missiles and bombs. This year's project team was asked to develop a web interface to the simulation that would allow remote users to examine and control the simulation from a remote location. The users would include both internal Boeing employees and external users. Seattle University's project team developed an initial version of the Web application interface. The functionality of the interface mirrors the main functionality of the SCC. The Web SCC allows the user to remotely monitor and control a SCC simulation.

TITLE: Wireless Transmissions Over an Interrupted Network  
NUMBER: CSSE 07.3  
SPONSOR: PACCAR  
SPONSOR LIAISONS: Mark Fredrickson, Rusty Lhamon, Mark McAtee  
FACULTY ADVISOR: Prof. Eric Larson  
STUDENTS: Evan Borlas, Jessica Przasnyski, Stephen Tuera, Christopher Youngs

PACCAR, a leading North American heavy duty truck manufacturer, performs vehicle testing and validation on the company test track to ensure high quality standards for their trucks. While the trucks drive through various terrains, onboard sensors monitor truck diagnostics and feed the data into an onboard data acquisition system. At the end of the tests PACCAR engineers download the test data from onboard the truck and take it back to their laboratory for analysis. To increase efficiency of the testing process, the team designed and implemented a system to allow trucks to perform tests while simultaneously transmitting test data wirelessly to the engineering laboratory through an onboard Windows Mobile application. The application has a very simple driver interface and more robust features for engineering users. It also includes data encryption to ensure confidentiality and a transmission protocol to handle data integrity during interruptions in the wireless connection.

# COMPUTER SCIENCE

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TITLE: Project Tracking Database Prototype  
NUMBER: CSSE 07.4  
SPONSOR: Washington Mutual  
SPONSOR LIAISONS: Tracy Zerbin, Aaron Wooster, Jay Newman  
FACULTY ADVISOR: Prof. Zhu Yingwu  
STUDENTS: James Frost, Tegan Mulholland, Charles Garrett, Nhat Le

The rapid growth of Washington Mutual (WaMu) has resulted in the adoption of multiple tracking tools to evaluate project information. The SU project team had two major objectives. One objective was to improve efficiency of project analysis. The second objective was to reduce operation costs by making duplicate project discovery more easily achievable. To accomplish these goals, executives need access to all WaMu project data in one uniform location. Currently, all data aggregation is done manually, which is time consuming and error-prone. The team was requested to create a prototype flexible data storage schema and create an ETL process which automates aggregation and normalization of the data. To accommodate the variable nature of project tracking information, the team decided to use a database schema coined by WaMu as "Name-Value Pairing". We used Microsoft Data Transformation Services to implement the ETL process.

# MASTER OF SOFTWARE ENGINEERING

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TITLE: TUI Test Automation  
NUMBER: MSE 07.1  
SPONSOR: Cisco System, Inc.  
SPONSOR LIAISON: Kian Shahla, Kelley Rogers, Son Duong  
FACULTY ADVISOR: Prof. William Poole  
STUDENTS: Craig Pendleton, Emad Attallah, Jimmy Muliawan, Maureen Stewart

Cisco Systems is a worldwide leader in networking products. One of Cisco's key products is Unity. Cisco Unity is a feature rich voice mail system that interacts with users through several entry points, such as the Telephony User Interface (TUI) and the Internet Message Access Protocol (IMAP). Each entry point adds more complexity to the system which requires significant verification. The objective of the project is to automate Unity Voice Processing system regression testing of the Telephony User Interface (TUI). The TUI is a large series of telephone menu options that users navigate. Prior to automation the Quality Assurance (QA) team would manually test these menus to verify new system changes did not break existing functionality. The manual process is time consuming, QA resource consuming, repetitive and error prone. Seattle University students' automation of these regression tests reduces Cisco's QA time and costs significantly and allows Cisco to increase the frequency of regression tests.

TITLE: Designing for Non-Functional Requirements  
NUMBER: MSE 07.2  
SPONSOR: Microsoft  
SPONSOR LIAISON: Eric Brechner  
FACULTY ADVISOR: Jeffrey Gilles  
STUDENTS: Ward Vuillemot, Wai Wong, David Yager

The cost of modifying software late in the software development lifecycle is high. In the case of non-functional requirements such as security, reliability, performance and usability, the impacts of not considering these factors early and in a formal manner can be devastating to a product's marketability and profitability. The team looked to gain an understanding of where in the development lifecycle companies such as Microsoft address different non-functional requirements and what methods, if any, they are taking to address these requirements earlier in the development lifecycle. This research highlights the sporadic industry acceptance of some popular yet theoretical methods for designing for non-functional requirements and suggests some practical approaches that are applicable for companies that also must consider the demands of schedule and cost.

TITLE: Automated Home Alarm System  
NUMBER: MSE 07.3  
SPONSOR: Net Result  
SPONSOR LIAISON: Andrew Aparico  
FACULTY ADVISOR: Prof. Roshanak Roshandel  
STUDENTS: Jay Barker, Josh Canfield, William Poindexter, Jason Taylor, Kyle Welling

The SamNet Alarm Management System (SAMS) is a central alarm management system, reducing manual call center traffic and adding value to existing services. Recipient responses are received via SMS, IMAP or POP3 and recorded to indicate acknowledgement. Recipients may also attach media recordings from a crime-scene, which are stored on the server. Alarm devices are periodically probed for status information, which may elicit email notifications to customers. Software to support remote photo operation is also supplied for installation as an embedded application on customer site cell phones.

# MASTER OF SOFTWARE ENGINEERING

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TITLE: Optimizing Distributed Teams  
NUMBER: MSE 07.4  
SPONSOR: Microsoft  
SPONSOR LIAISON: Eric Brechner  
FACULTY ADVISOR: Prof. Jeff Gilles  
STUDENTS: Anil Hashia, John Whelan, Ruchi Shewaramani

Our research focuses on understanding distributed teams, focusing on their salient characteristics, the communication issues they face, the technical issues involved, the cultural differences that arise and the managerial implications. We aim to identify the issues faced by distributed teams in the commercial and open source model. Suggestions would be made to address the issues identified based on key findings from what works in what model in real life situations.

In order to meet our objective we have identified issues with commercial distributed teams by meeting with industry managers. We have also contacted members of the open source community to understand the practices and issues of open source distributed teams. Through the use of surveys, interviews and questionnaires, we will compile a research paper defining a unique approach to guide distributed teams to success by suggesting key practices that have been proven right in open source and commercial model.



### Pat Cashman



Born and raised in Bend, Oregon, Pat Cashman had an interest in radio since he was ten years old. Therefore, after graduating from the University of Portland (Oregon), it was only natural for him to work at various small radio stations in Oregon. In the early 1980s, Pat moved to Seattle and was hired as a commercial writer and producer by KING TV. In 1984, he became the station's first-ever creative director and was honored with several awards including the Broadcasting, Marketing and Promotion Executives Gold Medallion from the International Film Festival of New York.

In 1991, he returned back to his radio roots hosting his morning drive time news and comedy show. In the summer of 2003, Pat joined the legendary KJR FM 95.7 as host of the morning show from 6 to 10 am. Along with being a radio host, Pat was a cast member, writer, director, producer and editor on the long-running comedy and multi emmy award-winning TV sketch program "Almost Live!" He also was a part of Disney's national Emmy winning "Bill Nye the Science Guy Show." Over the years, Pat has written and appeared in hundreds of radio and TV commercials.

Today, Pat is a busy emcee and keynote speaker for corporate gatherings, employee seminars, awards banquets, charity fundraisers and other events. He is a creator, writer and producer of video and audio productions of all kinds---especially those where a special touch of humor is desired. Though he works primarily in radio and television, he has been known to contribute to many different kinds of creative endeavors. Pat and his family live in the Seattle Area.

## SPONSORING ORGANIZATIONS, MANAGERS, AND LIAISONS

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We want to acknowledge with special thanks the organizations that sponsored projects in 2006-2007, and especially the managers and liaisons representing the sponsors, who worked with the students throughout the year. The time these liaison representatives spent in consultation with our teams is much appreciated by the students and their faculty advisors. It is the liaisons who provide the history and background of each project, its relationship to other work in the sponsoring organization, and much of the technical direction that makes a project successful.

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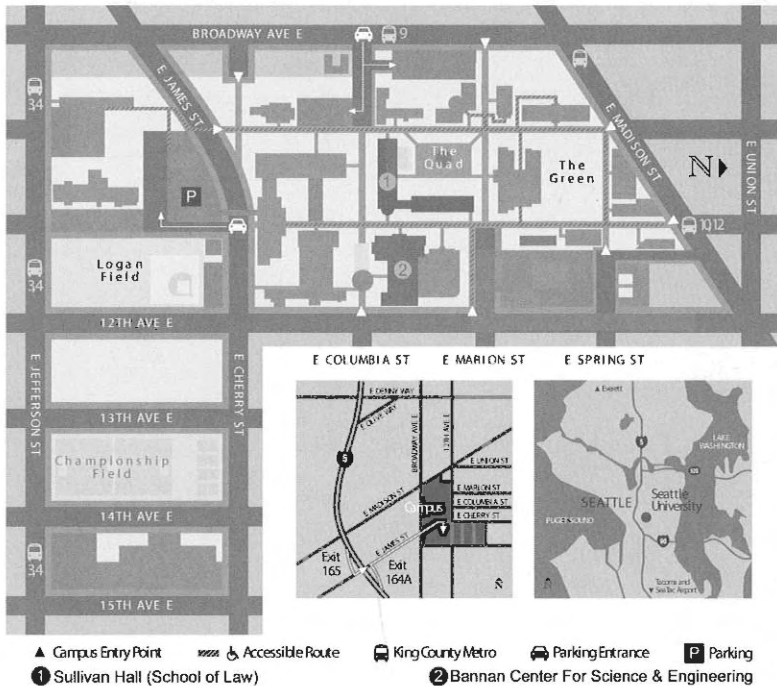
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- Take the James Street exit off I-5 (southbound exit #165, northbound exit #164A) and go east, up the hill.
- Continue east on James to Broadway. One block east of Broadway turn right into the Murphy Apartments Garage and park on the first level.
- Take the elevator in the northeast corner of the garage up to "SB" and take the skybridge across to the Student Center.
- Then take the elevator or main stairs down to the first floor and follow the "Projects Day" signs leading to Sullivan Hall.



## SEATTLE UNIVERSITY

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