

Real Projects. Real Sponsors. Real Learning.

COLLEGE OF SCIENCE AND ENGINEERING



PROJECT CENTER

UNDERGRADUATE
PROJECTS DAY
JUNE 3, 2005

GRADUATE PROGRAM
PROJECTS NIGHT
JUNE 7, 2005



SEATTLE UNIVERSITY

WELCOME FROM THE DEAN



It gives me great pleasure to welcome you to Projects Day 2005. This is the eighteenth year of the Science and Engineering Project Center, and I would like to congratulate everyone both within the college and outside for making the Project Center the success it is today. Your dedication, skill, and hard work are greatly appreciated.

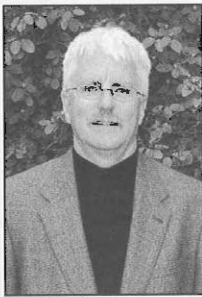
We present to you the results of our students' endeavors, which have been sponsored by industry, government, and other agencies, and developed by students in the science and engineering program at Seattle University. Our students are very excited at this opportunity to share the results of their hard work with you.

This capstone experience is perhaps the most important learning experience for our students and is the culmination of their studies at Seattle University. Working in teams of four or five, they have to solve open-ended problems that may not have a unique solution while adhering to strict timelines, budgets, and the needs of outside agencies. This is an excellent preparation for the professional positions our students will fill upon graduation.

We are most grateful to our corporate sponsors, those who are veterans at sponsoring our projects and those who are new this year. It is a tribute to your faith in our students, and in the quality of their work, that you choose to invest your time and resources in these projects. Thank you.

Finally, a big thank you to everyone whose hard work has brought these challenging projects to fruition. Our faculty, students, and professional mentors have worked together for this past year to achieve the results you will see here today. Congratulations!

George Simmons, Dean
College of Science and Engineering



I also extend to you, on behalf of our faculty and students, a warm welcome to Projects Day 2005, 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 year this printed program includes both undergraduate and graduate projects. The undergraduate projects will be presented the morning of Friday, June 3, in the Student Center and A.A. Lemieux Library. The Masters of Software Engineering projects will be presented the evening of Tuesday, June 7, in Schafer Auditorium in the A.A. Lemieux Library.

I would also like to acknowledge the coordination efforts of professors Nirmala 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 Sheridan Botts, contracts manager, and Michael Mabie 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.

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

SCHEDULE

Undergraduate Projects Day Seattle University Student Center and A.A. Lemieux Library June 3, 2005

9:00 a.m. LeRoux Conference Center, Student Center Room 160
Projects Day Registration and Project Displays

9:30 a.m. LeRoux Conference Center, Student Center Room 160
Welcome, Susan L. Secker, Provost and
George Simmons, Dean

9:40 a.m
Concurrent Sessions

Student Center Room 130, ECE Teams

AREVA T&D	Serial Communication Testing
The Boeing Company	Passenger Area Wireless Network

Student Center Room 210, CSSE Teams

The Boeing Company	Network Mobility Demonstration
Citrix Systems, Inc.	Audio Data Transmission System

A.A. Lemieux Library Schafer Auditorium, CEE Teams

Herrera Environmental Consultants	Gyirong River Pedestrian Crossing
Parsons Brinckerhoff Quade & Douglas	Hylebos Waterway Bridge Approach

A.A. Lemieux Library Stimson Room, ME Teams

The Boeing Company	Aisle Chair
The Boeing Company	Boeing 787 Galley Food Cart

10:30 a.m
Break

10:45 a.m.
Concurrent Sessions

Student Center Room 130, ECE Teams

Honeywell Aerospace	Analog Signal Conditioner
Kenworth Truck Company	Advanced Truck Features
Nova Ray, Inc.	Control Console Upgrade

SCHEDULE

Student Center Room 210, CSSE Teams

Microsoft Corporation	Microsoft Artificial Intelligence
Two Degrees and EADS	EADS Knowledge Portal
Washington Mutual, Inc.	Customer Satisfaction Data Mart

A.A. Lemieux Library Schafer Auditorium, CEE Teams

Seattle Public Utilities	Tank Cleaning System Retrofit
Triad Associates	Low Impact Development
WSDOT	Coordination for Highway Improvements

A.A. Lemieux Library Stimson Room, ME Teams

The Boeing Company	Servovalve Calibration System
Kenworth Truck Company	Fan Shroud Redesign
Seattle City Light	SU Solar Array Installation

12:00 p.m. Buffet Lunch
Served in Student Center 160

Master of Software Engineering Projects Night A.A. Lemieux Library Schafer Auditorium June 7, 2005

6:00 pm
Social Hour

6:20 pm
Introductory Remarks

6:30 pm
Team Presentations

The Boeing Company	Flight Visualization Group
The Boeing Company	Linux Cluster GUI Operator Interface
Cisco Systems	Software Test Automation Suite

7:50 pm
Coffee and Snack Break

8:00 pm
Robert Musson, Microsoft, The Science of Software Development

STUDENT CENTER ROOM 130

TITLE: Serial Communication Testing: Error Simulation
NUMBER: ECE 05.1
SPONSOR: AREVA T&D
SPONSOR LIAISONS: David Allen
FACULTY ADVISOR: Prof. Robert Heeren
STUDENTS: Ronnie Abad, Mark Chesney, Hedy Hartoko, Kim Il Kyum

AREVA T&D currently uses many low speed serial communication lines to retrieve remote data. Errors on the lines are hard to recreate and test in the development lab. To help AREVA T&D reduce the amount of field testing and debugging required, the team designed an error injecting device to recreate these errors in a predictable way. This device is an embedded microprocessor programmed into a Field Programmable Gate Array (FPGA) board. The device sits between the data gathering computer and the Remote Terminal Unit (RTU). It monitors and modifies the data transmitted through the EIA-232 cables, allowing a user to select error parameters for the FPGA software to generate.

TITLE: Passenger Area Wireless Network (PAWN)
NUMBER: ECE 05.2
SPONSOR: Boeing Commercial Airplanes
SPONSOR LIAISON: William E. Whitesell, IV, Dr. Sudhakar Shetty, Sean R. Sullivan
FACULTY ADVISOR: Prof. Agnieszka Miguel
STUDENTS: Steven Lee, Bryan Peterson, David Thach, Shannon Vaughn

Cabin Systems Technology Division of Commercial Airplanes at The Boeing Company sought a solution to the problem of audio and video cable consuming space and weight on an airplane. The goal of the project was to make the system wireless. In the wireless infrastructure, the video and audio signals are directed to different areas of the plane. The team designed a working prototype called the Passenger Area Wireless Network (PAWN). In this prototype the team designed a player to ensure the synchronized showing of movies and allowing the user to play, pause, rewind, and stop the VCR.

TITLE: Analog Signal Conditioner
NUMBER: ECE 05.3
SPONSOR: Honeywell Aerospace
SPONSOR LIAISON: Rory Kestner
FACULTY ADVISOR: Prof. Alvin Moser
STUDENTS: Alex Cross, Karla Okawa, James Thorne, JJ Zabkar

Honeywell Aerospace manufactures avionics equipment for aircraft manufacturers, military, and space operations. The Test Engineering Department of Honeywell Aerospace requires an adapter to extend compatibility of current avionics test equipment. This adapter must be on a PXI (eXtended PCI) card, with 16 channels, and convert industry standard $\pm 10\text{VDC}$ signals into 0 to +28VDC avionics-compliant analog signals with minimal loss in resolution and accuracy. To meet these criteria, the team designed a non-inverting summing amplifier powered by regulated DC sources, with design considerations for noise and accuracy.

STUDENT CENTER ROOM 130

TITLE: Advanced Truck Features
NUMBER: ECE 05.4
SPONSOR: Kenworth Truck Company
SPONSOR LIAISON: Ted Scherzinger
FACULTY ADVISOR: Prof. Paul Neudorfer
STUDENTS: Chris Harry, Michel Mallett, Robert Miracle, Balbir Singh

Kenworth builds high quality, custom heavy trucks. In order to maintain its position as a market leader, Kenworth is constantly looking for ways to improve its products. One of the ways Kenworth has decided to achieve this is by incorporating existing and new truck features into a central electronic control unit (CECU). In doing so, Kenworth aims to improve reliability, increase fuel efficiency, and reduce production line variability while offering a wider range of options to its customers. As a part of this ongoing improvement effort, the team was asked to develop new systems including electronic control of the headlights, door locks, and the windshield wipers. The solutions involve hardware changes, software design and implementation. The team developed prototypes, performed proof-of-concept testing, and then installed the components on a Kenworth truck and performed real-world testing to demonstrate the usefulness of the products.

TITLE: Control Console Upgrade
NUMBER: ECE 05.5
SPONSOR: Nova Ray, Inc.
SPONSOR LIAISON: Krist Geriene, Karl Kunkle
FACULTY ADVISOR: Prof. Alvin Moser
STUDENTS: Kenneth Mott, Elizabeth Safranski, Hiruy Woldegiorgis

Nova Ray, Inc. produces and markets an Inspection Class submersible remotely operated vehicle (ROV). The Company seeks to develop a smaller version of its ROV for the underwater Emergency Response market targeting police and fire diving units. A key requirement for the Emergency Response ROV includes revisions to the surface control console that regulates the movements and performance of the ROV. Requested revisions to the control console included reduced weight and size, improved integration of electronics and devices, enhanced ergonomics for the operator, increased water splashguard protection, and greater efficiency. The team focused on the main components; the computer, the joystick and the power supply; to make an enhanced version of the control console. The team created an OEM (original equipment manufacturer) computer to replace the laptop currently in use, which saved space and increased functionality. The team also chose a comfortable and practical joystick.

STUDENT CENTER ROOM 210

TITLE: Network Mobility Demonstration: Dynamic Internet Docking System
NUMBER: CSSE 05.1
SPONSOR: Connexion by Boeing
SPONSOR LIAISON: Terry L. Davis
FACULTY ADVISOR: Prof. Barbara Endicott-Popovsky, Prof. Bruce Duba
STUDENTS: Abraham Godong, Matt Johnson, Leigh Momii, Vlad Shegnagaev, Nam Vo

Connexion by Boeing provides high-speed, two-way Internet-based connectivity for mobile platforms. Boeing asked the team to design a high level architecture to enable seamless electronic communications between airline offices and aircrafts. The team utilized existing technologies and in-house assembled components to complete the project. This architecture will transform communications between airline offices and aircrafts from fixed static connections to a dynamic system, which will utilize alphanumeric labels and hostnames instead of an internet protocol-based addressing system. The team demonstrated the feasibility of such architecture, provided a prototype with functionality, and provided a set of documents outlining the road map of the project.

TITLE: Audio Data Transmission System
NUMBER: CSSE 05.2
SPONSOR: Citrix Systems, Inc.
SPONSOR LIAISON: Dr. Abolfazi Sirjani, Toby Opferman
FACULTY ADVISOR: Prof. Adair Dingle, Prof. Eric Larson
STUDENTS: Shawn Hickey, Sophia Hohing, Hadrian Lesmana, Heru Setiawan, Tuyen Vu

Citrix Systems, Inc. provides businesses and corporations with on-demand access to software applications from any Internet connection in the world. They provide this service through software called MetaFrame Presentation Server, which currently supports audio redirection at a high level using legacy application program interface (API). Applications using Direct Sound, for example, must then be emulated using this legacy API. Citrix asked the team to develop a prototype system that can relay audio data at a lower level. The team has investigated the use of a server-side virtual sound card (VSC) driver to oversee the receiving and sending of audio between a client sound application and a server. The VSC driver provides a method to natively intercept audio independent of the API used by user mode applications.

TITLE: Microsoft Artificial Intelligence
NUMBER: CSSE 05.3
SPONSOR: Microsoft Corporation
SPONSOR LIAISONS: Ivan Lumala, Mitch Walker
FACULTY ADVISOR: Prof. David Joslin
STUDENTS: Nick Buchanan, Evita Chang, Nathan Gray, Ruth Hackney, Sundeep Heer

Terrarium™ is a game developed by Microsoft for teaching object-oriented programming. Terrarium creates an environment in which simulated herbivores and carnivores compete to survive and reproduce. Because Microsoft is interested in expanding the use of Terrarium in academic environments, the team was asked to adapt the game to make it more useful for teaching artificial intelligence (AI). The project team modified the interface used by students to make it a better match to standard approaches for teaching AI algorithms. Also instructors now have more control over the available features and the types of information creatures receive about the environment, so that the game can be configured to be better suited to particular algorithms and objectives. The simulated environment created by Terrarium allows different algorithms to compete against each other, providing a graphic illustration of the strengths and weaknesses of those algorithms in that environment.

STUDENT CENTER ROOM 210

TITLE: EADS Knowledge Portal
NUMBER: CSSE 05.4
SPONSOR: Two Degrees and Elder and Adult Day Services (EADS)
SPONSOR LIAISON: Michele Bleser, Paula Hardy
FACULTY ADVISOR: Prof. Susan Reeder
STUDENTS: Emad Attallah, Brian McGuire, Chinwe Okeke, Minh Pham, Eddy Winata

Elder and Adult Day Services (EADS) offers structured comprehensive, non-residential adult day health programs for the elderly and persons with physical and mental challenges. In 1984, EADS started as a small social day center and has grown into a nationally accredited day health program with employees working across five centers in Washington State. Currently, EADS is using a Microsoft Access database to track participants' activities and information, but this database is accessible from only one computer in each center. To address the growing number of programs and activities at EADS, the agency asked the team to build a secure web-based extranet system. With the help of Two Degrees, a consulting company working with EADS, the team designed an easy-to-use portal and database system that can be accessed from any of the EADS centers. This system will facilitate communication, data collection, and reporting.

TITLE: Customer Satisfaction Data Mart
NUMBER: CSSE 05.5
SPONSOR: Washington Mutual, Inc.
SPONSOR LIAISON: Tracy Zerbin
FACULTY ADVISOR: Prof. Jeff Gilles
STUDENTS: DJ Adjamonov, Vicky Barrington, Kevin Gann, Heather Quitugua, Catrin Riggs

Washington Mutual is a financial institution with a long local history. Washington Mutual is dedicated to measuring and improving customer satisfaction ratings and contracted with a vendor for a Customer Satisfaction Data Analysis System. Although Washington Mutual owns the design of the work and the data, it pays the vendor to analyze and report on the data, which sit on a vendor proprietary data mart and web reporting tool. Any alteration to the tool or the data mart results in significant additional charges. The Seattle University team was asked to develop a data mart that meets the company's requirements in storing and analyzing the data. Using SQL Server Analysis Services and DTS and MDX technologies the team designed a data mart that is more flexible, less expensive, faster, and (more importantly) internally operated.

A.A. LEMIEUX LIBRARY SCHAFFER AUDITORIUM

TITLE: Gyirong River Pedestrian Crossing
NUMBER: CEE 05.1
SPONSOR: Herrera Environmental Consultants
SPONSOR LIAISONS: Court Harris, Kevin Houck, Mark Ruebel, Michael Spillane
FACULTY ADVISOR: Prof. Jeff Dragovich
STUDENTS: Alyaa Al-Houli, Kittrina McCourt, Gregory Sakamoto, Solihin

The small villages Gyibu and Jayng, in the Gyirong Region of Tibet, are separated from the major township by a deep gorge. The closest safe crossing site is a two to three hour trip down the river valley. As a result, the villagers are isolated from markets, health-care facilities, government offices, and most importantly - schools. Consequently, the village elders have requested that a bridge be designed and constructed over the 60 meter wide gorge. The non-profit relief agency World Concern, in cooperation with Herrera Environmental Consultants and Seattle University, answered the Tibetans' call for assistance. The Seattle University team designed a suspended bridge for the Gyirong crossing site that met both the functional and material availability restrictions at the site. The majority of the design was based on standards for trail bridges set by the Swiss Centre for Development Cooperation in Technology and Management (SKAT). The remaining bridge components were designed using United States standard specifications.

TITLE: Hylebos Waterway Bridge South Approach Replacement
NUMBER: CEE 05.2
SPONSOR: Parsons Brinckerhoff Quade & Douglas, Inc.
SPONSOR LIAISONS: Stephen H. Gleaton, Nina Olsson
FACULTY ADVISOR: Prof. Richard Schwaegler
STUDENTS: Santiago Báez, Nathan Canney, Nicole Cason

The Hylebos Waterway is one of several waterway inlets which comprise the Port of Tacoma in Tacoma, Washington. The Hylebos Waterway Bridge crosses the mouth of this inlet, bypassing a longer route around the inlet. The existing bridge fails to meet current Washington State Department of Transportation requirements for highway bridges; therefore, Parsons Brinckerhoff has asked us to design a replacement span for the southern approach of the bridge. The team designed a 300-foot prestressed concrete structure to current highway standards including seismic forces. The construction documents include shop drawings of major components of the bridge, notably the girders, slab, crossbeam and columns.

TITLE: Combined Sewer Overflow: Tank Cleaning System Retrofit
NUMBER: CEE 05.3
SPONSOR: Seattle Public Utilities
SPONSOR LIASON: Jason Sharpley
FACULTY ADVISOR: Prof. Tarek Kassim
STUDENTS: Noah Allen, Erika Brunson, Amanda Nodolf, Valerie Tokumoto

Seattle Public Utilities (SPU) currently operates 34 combined sewer overflow (CSO) storage tanks in the greater Seattle area. The purpose of these tanks is to provide temporary relief to wastewater treatment facilities during high flow periods (e.g., storms). These tanks hold the excess runoff from storm drains, as well as wastewater, until the treatment facilities are able to process the combined sewage. The CSO storage tank at the Delridge facility was designed to have an automated cleaning system. The existing system uses water jets to clean solid residue that accumulates in the storage tanks during high flow periods. However, this cleaning system has not been operational since 1984. The team developed an alternative automated cleaning system incorporating improved technology.

A.A. LEMIEUX LIBRARY SCHAFFER AUDITORIUM

TITLE: Mystery Knoll: Low Impact Residential Development Design
NUMBER: CEE 05.4
SPONSOR: Triad Associates
SPONSOR LIAISON: Rebecca Cushman
FACULTY ADVISOR: Prof. Mark Siegenthaler
STUDENTS: Ronen Assayag, Enoch Nicholson, Bernadette Visitacion

Mystery Knoll is a residential development design incorporating low impact development (LID) techniques. The project is being sponsored by Triad Associates, a land development consulting firm in Kirkland, WA. Low impact development is a comprehensive approach to managing urban stormwater. This approach combines a hydrologically functional site design with pollution prevention measures to compensate for land development impacts on water runoff and water quality. Stormwater is managed in small, cost-effective landscape features located on each lot rather than relying solely on large pond facilities located at the bottom of drainage areas. The primary goal of LID is to mimic the predevelopment site water flow patterns by using site design techniques that detain, store, infiltrate, and evaporate runoff. Triad Associates requested a residential site layout that incorporates LID principles and a cost-benefit analysis utilizing LID techniques compared to standard design methods for the Mystery Knoll development.

TITLE: State/Local Government/Developer Coordination for Highway Improvements
NUMBER: CEE 05.5
SPONSOR: Washington State Department of Transportation (WSDOT)
SPONSOR LIAISON: Ramin Pazooki
FACULTY ADVISOR: Prof. Nirmala Gnanapragasam
STUDENTS: Kevin Keith, Kim Silva, Sara West

Washington State Department of Transportation (WSDOT) wants to improve their set of standards and procedures for reviewing privately funded and local agency projects on state highways. WSDOT currently follows the 2003 WSDOT Development Review Manual to assess development impacts to the state highway system and determine appropriate improvements and developer contributions to mitigate the impacts. WSDOT asked the design team to research methods and practices in metropolitan cities similar to Seattle for private development review, local agency funded development review, and access management. The team completed the research, compiled the results, suggested changes, and applied the suggested procedures to a development project in Seattle. WSDOT will assess the team's recommendations and incorporate them into an updated development review manual.

A.A. LEMIEUX LIBRARY STIMSON ROOM

TITLE: Aisle Chair
NUMBER: ME 05.1
SPONSOR: Boeing Commercial Airplanes
SPONSOR LIAISON: Joel Peterson
FACULTY ADVISOR: Prof. Mike Larson
STUDENTS: Roberts Gaudins, Dan'l Knowles, Felix Sanjaya, Thuy Truong

The Boeing Company is a leading aerospace company. Boeing wants to redesign the aisle chair currently being used to transfer mobility-impaired passengers to and from airplanes. The aisle chairs being used in today's airports are uncomfortable, hard to use, and lack visual appeal. The team has designed a new aisle chair that not only solves the aforementioned problems, but incorporates new ideas that improve usability. Three key design improvements are adjustable vertical displacement of the aisle chair seat, enhanced comfort, and the option for self mobility by the passenger. Other design upgrades include Tempur-Pedic® padded cushions, tube frame design, and a 10-point restraint system.

TITLE: Boeing 787 Galley Food Cart
NUMBER: ME 05.2
SPONSOR: Boeing Commercial Airplanes
SPONSOR LIAISON: James Schalla
FACULTY ADVISOR: Prof. Mike Larson
STUDENTS: Brandon Baumgartner, Richard Calhoun, Wayne Lee, Edwin Widjaja

Serving customers in over 140 countries, The Boeing Company is one of the world's foremost aircraft manufacturers. Boeing is continuously researching opportunities that will assist airlines in lowering operating costs. One of these cost reduction opportunities is the galley food cart. The galley food cart in service today was designed solely on strict structural and safety regulations and is not well suited for chilled storage. Unfortunately the airlines absorb the costs associated with the poor thermal performance of these carts. These include the cost of dry ice placed in each cart to maintain low temperatures during transport to the aircraft and increased refrigeration load once these carts are placed in the aircraft food galley. The team has designed a new galley food cart based on rigorous temperature testing and analysis of the current cart design. The new cart design incorporates advances in material science as well as modifications to the existing cart geometry. The design modifications result in increased thermal efficiency over the existing cart and should assist airlines in lowering operating expenses.

A.A. LEMIEUX LIBRARY STIMSON ROOM

TITLE: Servovalve Calibration System
NUMBER: ME 05.3
SPONSOR: Boeing Commercial Airplanes
SPONSOR LIAISON: Norman Englund
FACULTY ADVISOR: Prof. Frank J. Shih
STUDENTS: John Cotter, Harun, Robert Phillips, John Ulmen

The Boeing Company uses servovalves, precision hydraulic flow control instruments, to conduct various tests on commercial aircraft components. Currently if a servovalve is suspected of malfunctioning Boeing returns the servovalve to the manufacturer for calibration, resulting in unwanted downtime. Boeing asked the team to complete a fully instrumented calibration fixture and design a computer software application for automated testing, allowing Boeing to test and calibrate servovalves in-house. Using a high-capacity hydraulic power supply, a test bench fixture with computer control and data acquisition, the team has developed a system for in-house testing of servovalves.

TITLE: Fan Shroud Redesign and Air Flow Management
NUMBER: ME 05.4
SPONSOR: Kenworth Truck Company
SPONSOR LIAISONS: Alec Wong
FACULTY ADVISOR: Prof. Teodora Rutar Shuman
STUDENTS: Brian Campbell, Kevin Chou, Adam Hailey, Tim Schick

Kenworth Truck Company, a division of PACCAR, the world's third largest manufacturer of heavy-duty trucks, asked for a redesign of its current fan shroud to improve airflow management and cooling efficiency. Solid modeling, computational fluid dynamics (CFD), and finite element analysis (FEA) were used to redesign the fan shroud. The new fan shroud is asymmetrical and has modular components to accommodate all Kenworth truck models. Each section of the shroud has a different geometry, depending on the specific cooling needs of the truck model. The new fan shroud also includes an underbody diffuser to decrease recirculation of heated air and debris into the radiator. The new design shows significant changes in airflow through the engine compartment.

TITLE: Seattle University Student Center Solar Array Installation
NUMBER: ME 05.5
SPONSOR: Seattle City Light
SPONSOR LIAISONS: Alex Byrne
FACULTY ADVISOR: Prof. Christopher Stipe
STUDENTS: Quang Dinh, David Kostelac, Harley Sandoval-Castillo, Walker Weitzel

Seattle University and Seattle City Light have partnered to bring solar electricity generation to Seattle University's campus. The motivation of this project was to provide a clean, renewable energy source and to develop public awareness and education about solar power. To meet these requirements, the team designed and installed three solar arrays, each with a different layout, to provide a peak of 5 kW to Seattle University. Two arrays will be mounted on the Seattle University Student Center and one on a nearby free-standing pole. The educational aspect of the project was addressed through the creation of an interactive web page and an informational kiosk in the Seattle University Student Center.

Master of Software Engineering Projects Night A.A. Lemieux Library Schafer Auditorium June 7, 2005

The undergraduate teams present their work the morning of Friday, June 3. Masters of Software Engineering classes are offered in the evening so that students can continue to work on their professional jobs during the day. Projects Night for Masters of Software Engineering teams is the evening of Tuesday, June 7, starting at 6:00 p.m. in Schafer Auditorium in the ground floor of the A.A. Lemieux Library. Following team presentations, Robert Musson will give a talk, "The Science of Software Development."

TITLE: Flight Visualization Group
NUMBER: MSE 05.1
SPONSOR: Boeing Commercial Airplanes
SPONSOR LIAISON: Peter Ryer
FACULTY ADVISOR: Prof. Jerry Williams
STUDENTS: Dave Augustine, Tan Nhat Che, Mathios Dejene, Dave Orr, Pablo Rincon, Erik Schneider

The Boeing Visualization Group manages geographic terrain and aircraft models to be used in both real-time and pre-determined flight path simulations. The project team provided two deliverables that directly support the development of the new 787 airplane. The first was a tool that incorporates third party graphic models into flight simulations. This tool allowed for the incorporation of commercial off-the-shelf graphic models into Boeing simulation models, which greatly decreased the cycle time to develop flight simulations. The second deliverable was a research and development effort. This research and development effort produced a working prototype that increased the efficiency of rendering three dimensional terrain data in real time flight simulations. This prototype will be analyzed by Boeing and considered for use in the development of the new 787 Flight Cab Simulations Display.

TITLE: Linux Cluster GUI Operator Interface
NUMBER: MSE 05.2
SPONSOR: Boeing Phantom Works
SPONSOR LIAISONS: David Kohn, Joe Laughlin
FACULTY ADVISOR: Prof. Jerry Williams
STUDENTS: Chris Beiter, Fred Hutto, Khanh Nguyen, Thomas Olsen, Ha Quan

Boeing Phantom Works currently uses a graphical user interface (GUI) and a simulation system on a single SGI supercomputer, which is expensive to maintain and upgrade. A Linux cluster has been picked as a possible replacement for the SGI system. A Linux cluster would be less expensive as well as easier to maintain and scale. The Seattle University team was asked to design and test a GUI to accompany the Linux-based simulation system currently in development. Since the simulation can be configured for a specific customer, the GUI and the business processes need to be modular. Also, user documentation is needed to aid future clients in their use and upgrading of the simulator and its processes. The team designed a new GUI for the Linux system. In this GUI the interface itself assigns tasks to cluster nodes to efficiently use CPU resources while still maintaining real-time performance of the aircraft. This allows the GUI's business processes to communicate directly with the hardware and thus the performance of the simulated craft will be similar to that of a real plane.

A.A. LEMIEUX LIBRARY SCHAFFER AUDITORIUM

TITLE: Development of Software Test Automation Suite
NUMBER: MSE 05.3
SPONSOR: Cisco Systems
SPONSOR LIAISON: Kian Shala
FACULTY ADVISOR: Prof. Barbara Endicott-Popovsky
STUDENTS: Ashley Elenjickal, Ock Keun Hwang, Sonika Kaul, Mala Munisamy, Sharmila Ramaraj, Amrita Satapathy

Cisco Systems is the worldwide leader in networking products. Cisco has built an internal software testing product called Unified Messaging Software, or Unity, that assists in developing their networking software. Cisco asked the team to improve and automate three features of Unity.

- In the current version of Unity, the graphical user interface (GUI) components are web-based, and utilize JavaScript code for menus and link generation. However, the current release of the HTTPUnit software lacks comprehensive JavaScript support. The team extended HTTPUnit, adding more complete JavaScript support, and increased functional coverage of automated tests for Unity GUI components.
- The current version of Unity stores product specific values in a registry, but the new version stores values in an SQL database. The team developed a tool that compares the values and shows the matches and differences.
- Cisco's Event Monitoring Service (ESM) utility is currently conducted manually. The ESM monitors Windows Event Logs and triggers a communication to end-users when a certain event or events transpire. The team automated the ESM so that it interacts with Windows Event Logs and the EMS GUI and verifies that an end user received a communication.

FEATURED SPEAKER ROBERT MUSSON



Robert Musson has over 25 years of software experience as a development engineer and in various management positions. He spent 15 years at Teradyne helping to bring to market a variety of products for the telecommunications industry. While there, he helped to deploy the Team Software Process as the first industry site. He was vice president of business strategy at a small startup before becoming a member of the technical staff at Carnegie Mellon's Software Engineering Institute. He currently is part of the Windows team at Microsoft. He has a master's degree in Computer Science from Illinois Institute of Technology and an MBA from Northwestern University's Kellogg School of Management.

THE SCIENCE OF SOFTWARE DEVELOPMENT ABSTRACT

Software development is often treated as an art seemingly different from other engineering disciplines. This leads people to act in a manner inconsistent with the current needs of the industry. More than ever, product development requires increased quality and developer productivity, yet most developers understand only the art of programming and not the science. This talk will present current thinking in practices that turn software development into a science leading to increased quality and productivity. Examples of usage from several Microsoft development teams will be used to illustrate the principles.

SPONSORING ORGANIZATIONS AND LIAISONS

We want to acknowledge with special thanks the organizations that sponsored projects in 2004-2005, and especially the 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 advisers. 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.

AREVA T&D, David Allen

The Boeing Company, Terry L. Davis, Norman Englund, David Kohn, Joe Laughlin, Joel Peterson, Peter Ryer, James Schalla, Dr. Sudhakar Shetty, Sean R. Sullivan, William E. Whitesell, IV

Cisco Systems, Kian Shala

Citrix Systems, Inc., Toby Opferman, Dr. Abolfazl Sirjani

Elder and Adult Day Services (EADS), Paula Hardy

Herrera Environmental Consultants, Court Harris, Kevin Houck, Mark Ruebel, Michael Spillane

Honeywell Aerospace, Rory Kestner

Kenworth Truck Company, Ted Scherzinger, Alec Wong

Nova Ray, Inc., Krist Geriene, Karl Kunkle

Microsoft Corporation, Ivan Lumala, Mitch Walker

Parsons Brinckerhoff Quade & Douglas, Inc., Stephen H. Gleaton, Nina Olsson

Seattle City Light, Alex Byrne

Seattle Public Utilities, Jason Sharpley

Two Degrees Consulting Services, Michele Bleser

Triad Associates, Rebecca Cushman

Washington Mutual, Inc., Tracy Zerbin

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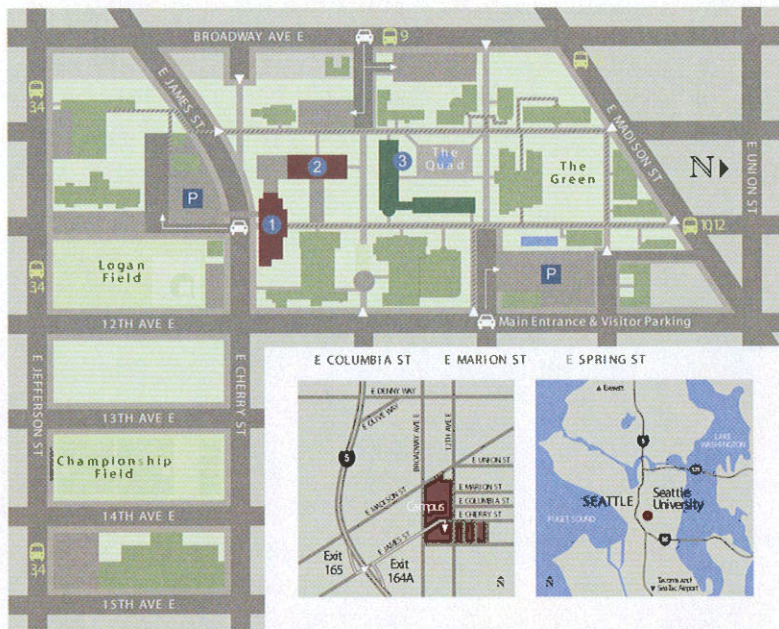
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- ▲ Campus Entry Point ♿ Accessible Route 🚗 King County Metro 🚗 Parking Entrance P Parking
 ① Student Center & LeRoux Conference Center ③ Bannan Center For Science & Engineering
 ② A.A. Lemieux Library

DIRECTIONS FOR PROJECTS DAY

- 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 on main stairs down to the first floor to room 160, the LeRoux Conference Center.



SEATTLE
UNIVERSITY

SCIENCE AND ENGINEERING PROJECT CENTER

901 12th Avenue
P.O. Box 222000
Seattle, WA 98122-1090

Tel. (206) 296-5661
Fax. (206) 296-2179
sciengpc@seattleu.edu

<http://www.seattleu.edu/scieng/engpc>