# SEATTLE UNIVERSITY

COLLEGE OF SCIENCE AND ENGINEERING
PROJECT CENTER

## June 4, 2004
## Projects Day

Student teams, working with local corporate, government, and non-profit sponsors, design and implement solutions to real engineering and computer science problems. On Projects Day, teams present their senior year project results.

# WELCOME FROM THE DEAN

It gives me great pleasure to welcome you to Projects Day 2004. This is the seventeenth 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.

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

This senior 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

# WELCOME FROM THE PROJECT CENTER DIRECTOR

I also extend to you, on behalf of our faculty and students, a warm welcome to Projects Day 2004, 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.

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, Bob Cornwell, and Pierre Gehlen in Mechanical Engineering; and William Poole in Computer Science, as well as Sheridan Botts, contracts manager, and Kathy Fletcher and Michael Mabie, administrative assistants for the Project Center.

Your hosts here today are the 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 today are the 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

All Project Day displays and presentations will take place in the Seattle University Student Center located on the south edge of the campus.

**8:45 a.m. - 1:30 p.m. Student Center Room 160**
Projects Day Registration and Project Displays

**9:00 a.m. LeRoux Conference Center, Student Center Room 160**
Welcome, President Stephen V. Sundborg, S.J. and
Dean George Simmons

**9:10 a.m. - 10:50 p.m. Concurrent Sessions**

**Student Center Room 130**

| | |
|---|---|
| AREVA T&D | Wireless Communications in Substations |
| ELDEC Corporation | Portable Aircraft Diagnostic Interface |
| Honeywell Aerospace | Hardware Huffman Decompressor |
| Kensworth Truck Company | Power Vent Window Concept |
| Microscan Systems Incorporated | Industrial Protocol Connectivity |

**Student Center Room 160A**

| | |
|---|---|
| Herrera Environmental Consultants | Dza Chu River Pedestrian Bridge |
| Seattle Public Utilities | Monitoring Soil Stormwater Detention |
| US Army Corps of Engineers | Mapes Creek Daylight and Alignment |

**Student Center Room 210**

| | |
|---|---|
| The Boeing Company | Linux Cluster Monitor |
| The Boeing Company | Content Based Messaging Application |
| SU OIT (SunGard Collegis) | Seattle University Student Web Portal |
| Fred Hutchinson Cancer Research Center | Content Management System Architecture |
| Leadership Advancement International | Education Opportunity Web Portal |

**10:50 a.m. - 11:00 a.m. Break**

## 11:00 a.m. - 12:15 p.m. Concurrent Sessions

### Student Center Room 130

| | |
|---|---|
| Seattle City Light | Power Line Carrier Signal Detection |
| The Seattle Lighthouse for the Blind | Accessible Computer Interface |
| Siemens Medical Solutions / Xilinx | FPGA Implementation of Graphics |
| Terabeam Corporation | 4xT1 Multiplexer |

### Student Center Room 160A

| | |
|---|---|
| Electroimpact, Inc. | Robot Positional Accuracy |
| Ingersoll-Rand | Tension Applying Device for Winch |
| Kenworth Truck Company | Enhance Underhood Cooling |
| Pratt & Whitney Seattle Aerosciences Center | Non-Intrusive Fuel Measurement |

### Student Center Room 210

| | |
|---|---|
| Microsoft Corporation | Microsoft Assignment Manager |
| Microsoft Corporation | Microsoft Space Manager |
| National Bureau of Asian Research | Automated Data Sharing Tool |
| Two Degrees Consulting / Adult Day Services | Adult Day Services Web Portal |

## 12:15 p.m. Buffet Lunch
Served in the Student Center lobby

# STUDENT CENTER ROOM 130

| | |
|---|---|
| TITLE: | Wireless Communications in Power Substations |
| NUMBER: | ECE 04.1 |
| SPONSOR: | AREVA T&D |
| SPONSOR LIAISONS: | David Allen, Kevin Cheung |
| FACULTY ADVISOR: | Prof. Robert Heeren |
| STUDENTS: | Baha Alsamawi, Stephen Henning, Lindsay Pharmer, Lilian Ruwende |

AREVA T&D (previously ALSTOM EAI) offers a wide range of products for power transmission and distribution systems. AREVA T&D was interested in proving the feasibility of a wireless communication system in a power substation to allow a reliable and effective installation cost saving option for their products. The major obstacle was to overcome the radio frequency noise generated from the operation of high voltage equipment, such as the overhead power lines and actuation of power relays in the substation. The solution provided by the design team offers a commercial 2.4 GHz transceiver capable of point to multi-point communication for monitoring multiple pieces of equipment. A wireless connection was established in a power substation and, through data collection for a set period of time, the system proved to be feasible in the noisy environment of a power substation.

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|---|---|
| TITLE: | Portable Aircraft Diagnostic Interface for Proximity Sensing Systems |
| NUMBER: | ECE 04.2 |
| SPONSOR: | ELDEC Corporation |
| SPONSOR LIAISON: | Andrew V. I. Siguenza |
| FACULTY ADVISOR: | Prof. Robert Heeren |
| STUDENTS: | Dean Chandra, Roy Chang, Joe Hanchinamani, Amanda Quan |

Founded in 1957, ELDEC designs and manufactures electromechanical and electronic products for aerospace and defense applications. ELDEC, being a power solutions and sensing solutions specialist, has products in use on all major U.S. and European aircraft – both military and commercial. ELDEC's proximity sensors are the top of the line in the commercial market, and they provide testing equipment for the sensors currently installed on aircraft. The company requested that the team redesign the existing proximity tester to provide additional remote control through a laptop PC, while still retaining the ability to manually control the tester. The team implemented the new design using a USB 2.0 connection. The new design allows for both manual and remote control and allows for easier data manipulation.

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|---|---|
| TITLE: | Hardware Huffman Decompressor |
| NUMBER: | ECE 04.3 |
| SPONSOR: | Honeywell Aerospace |
| SPONSOR LIAISON: | Mark Barnett |
| FACULTY ADVISOR: | Prof. Alvin Moser |
| STUDENTS: | Do-Hoon Lee, Chris Civarra, Linda Chhim, Mandev Sidhu |

Honeywell specializes in aerospace, transportation, control systems and specialty materials. The company wishes to improve the Huffman decompression method used for terrain data in the navigation system of an airplane. Currently, the microprocessor is decompressing data using a software algorithm. The team used VHDL to design hardware to decompress Huffman encoded data. The new decompression design is more efficient and frees up microprocessor resources.

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|---|---|
| TITLE: | Power Vent Window Concept |
| NUMBER: | ECE 04.4 |
| SPONSOR: | Kenworth Truck Company |
| SPONSOR LIAISON: | Ted Scherzinger |
| FACULTY ADVISOR: | Prof. Xusheng Chen |
| STUDENTS: | Ruth Peterson, Keng-Han Chuang, Anthony Lowe, Matt Wendling |

Kenworth is one of the leading manufacturers of semi and heavy duty trucks. The trucks manufactured by the company are currently equipped with a hand crank used to open the vent windows in the sleeper. Kenworth asked the team to design and implement a mechanism for automating the opening and closing of the vent windows to eliminate the need for manual operation by the driver. The team created an electric switching mechanism and actuator assembly to open and close the window. The team also developed a climate control algorithm so that the onboard computer opens and closes the vent windows automatically when the temperature reaches a specified threshold.

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|---|---|
| TITLE: | Industrial Communications Protocol Connectivity |
| NUMBER: | ECE 04.5 |
| SPONSOR: | Microscan Systems Incorporated |
| SPONSOR LIAISON: | Bob Johnson |
| FACULTY ADVISOR: | Prof. Alvin Moser |
| STUDENTS: | Robert Lemmon, Imanuel Masman, Kit Tak Kwok, Remi Gunsett |

Microscan specializes in the design and manufacture of hands-free bar code scanners and decoders for automated systems. The communication protocol for all Microscan Systems products is serial. However, customers are demanding more specialized protocol communications such as Ethernet, USB, Devicenet, Profibus, and CANbus. Customers would like these capabilities integrated into the product, but the increase in cost and size makes that approach difficult. Microscan requested that the team design a single accessory to handle all protocols. Using a DSTni chip from Lantronic, the team designed an accessory that incorporated all the requested protocols except USB. This solution required LM2676 voltage regulators with a time delay to properly power up the DSTni chip. To provide USB communication, the team used Cypress chips. The team's device automatically selects and transfers the information to the customer's desired protocol.

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|---|---|
| TITLE: | Detection of Power Line Carrier (PLC) Signals in Seattle City Light (SCL) Cables |
| NUMBER: | ECE 04.6 |
| SPONSOR: | Seattle City Light |
| SPONSOR LIAISONS: | Hamed Zadehgol, Amanda Ha, John Li |
| FACULTY ADVISOR: | Prof. Xusheng Chen |
| STUDENTS: | Mari Fortes, Jayadi Ongkohardjo, Michael Phelan, Nathan Sommervold |

Seattle City Light is the utility company that serves the greater Seattle municipal area. It is recognized as a national leader in energy efficiency and environmental stewardship. Seattle City Light is in need of a portable system to monitor power line communication (PLC) signals on their existing power lines. The team developed a PLC Signal Analyzer system that detects, distinguishes, and saves PLC signals in the range of 40 to 70 kHz that are superimposed on SCL 600V cables. This system meets portability and functional requirements and will be used by field technicians and engineers in field environments to analyze signals and locate signal sources along the power cables. The team also studied the feasibility of using the system on 13kV high voltage shielded cables.

# STUDENT CENTER ROOM 130

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|---|---|
| TITLE: | Accessible Computer Interface For a CNC Machining Center |
| NUMBER: | ECE 04.7 |
| SPONSOR: | The Seattle Lighthouse for the Blind, Inc. |
| SPONSOR LIAISONS: | Norm Slader, Ken Wolford, Doug Case, Don Swaney |
| FACULTY ADVISOR: | Prof. Ward Silver |
| STUDENTS: | Shriram Reddy, Quyen Le, Diana Bonilla, Rionald Soerjanto |

The Seattle Lighthouse for the Blind is a non-profit organization that provides employment, training, and support to blind, deaf-blind, and otherwise visually impaired individuals. The organization uses a wide variety of robotic milling tools called computer numerically controlled (CNC) machines to manufacture parts. These tools are not easily operated by the visually impaired. The Lighthouse has asked the team to create a software and hardware system that will allow a visually impaired operator to easily send information to the CNC machine as well as provide audible and visual feedback to warn them if faults should occur during operation. The team used data acquisition technology to monitor system information in real-time and programmed a custom interface to process this data. The new interface system allows the user to send information to the CNC machine with the knowledge that all input is being checked for accuracy and that the operator will be alerted to problems that may arise during the manufacturing process.

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|---|---|
| TITLE: | FPGA Implementation of Graphics Acceleration Routines |
| NUMBER: | ECE 04.8 |
| SPONSORS: | Siemens Medical Solutions USA and Xilinx, Inc. |
| SPONSOR LIAISONS: | Niko Pagoulatos (Siemens), Mark Sasten (Xilinx) |
| FACULTY ADVISOR: | Prof. Paul Neudorfer |
| STUDENTS: | Bryan M. Hurt, Brian Shaflik, Chris Abate, Yan Loong Allen Chan, Mohammed Saeed |

The Ultrasound Group of Siemens Medical Systems wanted a reliable and stable graphics accelerator card that could provide 2D filtering, texture mapping and timing. This card would replace the existing ASIC-based graphics hardware. The central component of the new design was the Virtex II Pro FPGA by Xilinx. The team compared the speed of the FPGA and ASIC-based solutions. The team designed software-testing algorithms that enabled us to download data to the FPGA, filter images, and display them on a VGA monitor.

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| TITLE: | 4xT1 Multiplexer |
| NUMBER: | ECE 04.9 |
| SPONSOR: | Terabeam Corporation |
| SPONSOR LIAISONS: | Diane Wood, Ron Stieger |
| FACULTY ADVISOR: | Prof. Ward Silver |
| STUDENTS: | Aiman Al-Madani, Edgar Lobaton, Jennifer Teodoro, Michelle Tieder |

Terabeam Corporation specializes in the design and manufacture of wireless data transmission systems. In this context, multiplexing is a common process. Terabeam needs a device capable of multiplexing four T1 high-speed telecommunications lines to a single optical line. There are commercial devices that fulfill Terabeam's requirement; however, these devices are expensive and contain more features than those needed by Terabeam. The project objective was to design, build, and test a working prototype that performs multiplexing and demultiplexing while keeping the cost low. The design the team chose involves simple multiplexing and encoding algorithms implemented in an FPGA chip. These algorithms operate independently of the transmitted T1-format. The team also designed a printed-circuit board with the interfaces for T1 and optical connections.

# STUDENT CENTER ROOM 160A

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|---|---|
| TITLE: | Dza Chu River Pedestrian Bridge |
| NUMBER: | CEE 04.1 |
| SPONSOR: | Herrera Environmental Consultants |
| SPONSOR LIAISONS: | Michael Spillane, Mark Ruebel |
| FACULTY ADVISOR: | Prof. Jeff Dragovich |
| STUDENTS: | Khaled Al-Ghanim, Herb LeBeau, Josh Newell, Elisabeth Schumacher, Joshua Yunker |

The Dza Chu River, located in south central Tibet, flows between the village of Shoda and the nearest school. Currently residents can cross the Dza Chu River on a single cable using a body sling. Children however, are unable to cross the river safely. In order to attend school, children must walk more than three hours to the nearest safe river crossing point, then stay at school all week in squalid conditions. In response to this, Herrera Environmental Consultants, in cooperation with World Concern, asked the team to design a new river crossing at Shoda. The crossing will provide safer access to regional schools and markets. The team prepared construction drawings of two alternatives, a cable suspended pedestrian bridge and a cable cart type crossing. The construction documents include specifications, materials list, construction sequence, and a maintenance schedule. A cost benefit analysis was performed that identified the preferred alternative. Bridge construction is scheduled for August, 2004, to avoid the rainy season and so that children can attend school next fall.

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|---|---|
| TITLE: | Design a Monitoring Method for Soil Stormwater Detention |
| NUMBER: | CEE 04.2 |
| SPONSOR: | Seattle Public Utilities |
| SPONSOR LIAISONS: | David McDonald, Beth Schmoyer |
| FACULTY ADVISOR: | Prof. Nirmala Gnanapragasam |
| STUDENTS: | Katrina Hecimovic, Katie Jagt, Heidi Machel, Jamie Tomosada |

Seattle Public Utilities (SPU) is implementing an innovative approach to stormwater management that uses soil infiltration/retention methods along with natural drainage system designs to manage stormwater runoff as part of low impact development efforts. Use of compost-amended soils is being promoted as a way to reduce runoff by increasing infiltration and retention of stormwater in onsite soils at redevelopment sites and as a retrofit option for existing properties. In addition, natural drainage systems, which consist of a drainage swale underlain by compost-amended soils, are being constructed in certain areas of the city to convey and treat runoff. SPU requested that the team develop field methods to test the water retention and infiltration capacity of compost amended soils. The team started with an extensive literature review on the effects of compost amended soils and previously developed infiltration and runoff monitoring methods. The team then prioritized monitoring methods and researched suppliers to determine the cost of equipment. The team proposed two methods, one for installation in developed sites and another for future use in sites to be developed. The method proposed for current sites was field tested. The team then analyzed the field test data and recommended improvements.

# STUDENT CENTER ROOM 160A

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|---|---|
| TITLE: | Mapes Creek Daylight and Stream Alignment |
| NUMBER: | CEE 04.3 |
| SPONSOR: | US Army Corps of Engineers |
| SPONSOR LIAISONS: | Nancy Chin, Rebecca Jahns, Michael Deering, Doug Knapp |
| FACULTY ADVISORS: | Prof. Phillip Thompson, Prof. Jean Jacoby |
| STUDENTS: | Tyler Bernius, Erwin Cruz, Susan Fletcher, Michael Kosa |

The lower stream channel of Mapes Creek is currently piped underground through Beer Sheva Park (Seattle, WA) and then discharged into Lake Washington. The team worked with the US Army Corps of Engineers on a design that would daylight the stream channel of lower Mapes Creek. The daylighted creek was designed to provide critical refuge habitat for migrating juvenile salmon, especially Puget Sound Chinook salmon, which were placed on the endangered species list in 1999. The team collected baseline water quality, stream flow, sediment size, and survey data from Mapes Creek. The team also collected stream morphometry data from two reference sites, Kennydale Creek and John's Creek. The team used the field data to create a preliminary hydraulic design of the new Mapes Creek channel utilizing the US Army Corps of Engineers' HEC-RAS stream modeling software.

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|---|---|
| TITLE: | Robotic System Positional Accuracy Improvement Phase II |
| NUMBER: | ME 04.1 |
| SPONSOR: | Electroimpact, Inc. |
| SPONSOR LIAISON: | Russ DeVlieg |
| FACULTY ADVISOR: | Prof. Greg Mason |
| STUDENTS: | Jenna Kraft, Patrick Meinel, Victoria Templora, Haryady Tjokrokusumo |

Electroimpact is an aircraft tooling company that designs and manufactures assembly systems for the aerospace manufacturing industry. Electroimpact seeks to correct the errors in articulated arm robots. Being in a high-precision industry, a solution is needed to decrease the robots' error from 0.125 inch to industry standards of 0.040 inch. The team developed methods and software to improve the positional accuracy of an articulated arm robot when used in conjunction with a linear track unit. The methodology used consists of finding the correct kinematic definition of the robot and solving for the joint and track deflections using moment equations. The design approach is applicable to any articulated arm robot when used with the developed measurement procedure. The positional accuracy of the robot was improved from an eighth of an inch to less than forty one-thousandths of an inch.

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|---|---|
| TITLE: | Tension Applying Device for Wire Rope in Winch Applications |
| NUMBER: | ME 04.2 |
| SPONSOR: | Ingersoll-Rand |
| SPONSOR LIAISON: | Wayne Osborn |
| FACULTY ADVISOR: | Prof. Frank J. Shih |
| STUDENTS: | Marc Buenvenida, Dain Engebretsen, Peter Ford, Michael Frechette |

The Winch and High Capacity Hoists Group of Ingersoll-Rand Company supplies high-quality winches for use in a wide variety of industrial applications. In order for wire rope to properly spool onto a winch drum, a tensile force is required on the wire rope. When there is no load the winch operator pulls on the wire rope by hand. Ingersoll-Rand Company requested a device that will apply the necessary tensile force to the wire rope without using hands. The team designed and tested a roller-bearing device that applied the needed tensile force to the wire rope. In using this device, the operator can properly spool the wire rope without hands contacting the rope. In addition to performing the necessary task, the device is sturdy, safe, easy to implement, and cost-effective.

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|---|---|
| TITLE: | Performance Enhancements of Underhood Cooling Components |
| NUMBER: | ME 04.3 |
| SPONSOR: | Kenworth Truck Company |
| SPONSOR LIAISON: | Alec Wong |
| FACULTY ADVISOR: | Prof. Robert Cornwell |
| STUDENTS: | Eric Dolan, Francisca Garcia-Fritts, Jeff Fritts, Joel Hoksbergen |

The design team worked with Kenworth Truck Company, a leading manufacturer of heavy and medium duty trucks, to enhance the performance of underhood cooling components on the W900 truck model. Highway tractors in general have been increasing in power and heat output. As a result, Kenworth sought to increase cooling capacity without adversely affecting performance. The team developed and built a prototype system that relocates the air-conditioning condenser to the roof of the cab, underneath the roof fairing. Vents on the fairing direct air over the condenser, providing the necessary airflow needed to cool it. Relocating the current air-conditioning condenser helps create a more efficient cooling system in two ways. First, the relocation alleviates the pre-heating that occurs to the air used by the engine's cooling system. Second, the relocation reduces the amount of time the truck's engine fan needs to run.

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|---|---|
| TITLE: | Fuel Concentration Measurement using a Non-Intrusive Measurement Technique |
| NUMBER: | ME 04.4 |
| SPONSOR: | Pratt & Whitney Seattle Aerosciences Center |
| SPONSOR LIAISONS: | Dr. Michael Aarnio, Miguel Velasquez |
| FACULTY ADVISOR: | Prof. Teodora Shuman |
| STUDENTS: | Jon Felton, Eric Gruner, Kerrie Rohlfing, Shen-Hua Wu, Adrian Yusuf |

Pratt & Whitney designs and improves propulsion systems for various types of aircraft and spacecraft. One of their current endeavors is the development of a Pulse Detonation Engine (PDE). Pratt & Whitney believes that this technology has the ability to be more thermodynamically efficient than current propulsion products. Currently, no method is in place for measuring the fuel/air concentration inside the combustion chamber of the PDE. The team was asked to develop a non-intrusive measurement system to determine the concentration of gaseous fuel inside a PDE combustor. The team has responded with a design of a laser-measurement system that mounts to the combustion chamber. This system collects data during the fuel/air mixing cycle inside the PDE. This innovative system for taking fuel/air measurements allows Pratt & Whitney to conduct tests to improve the fuel/air distribution in future designs, ultimately leading to a more efficient PDE.

# STUDENT CENTER ROOM 210

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|---|---|
| TITLE: | Linux Cluster Monitor |
| NUMBER: | CSSE 04.1 |
| SPONSOR: | The Boeing Company |
| SPONSOR LIAISON: | David B. Kohrn |
| FACULTY ADVISOR: | Prof. Bruce Duba |
| STUDENTS: | Brandon Clausing, Dan Fitzgerald, Rob Gibran, Joe Laughlin, Emily Said |

Boeing is migrating one of their simulations from an SGI mainframe computer to a linux cluster. The application Boeing used to configure and initialize the simulation could not be easily ported to the new architecture, so the team was asked to design and implement a new graphical application that would allow users to easily configure and start the simulation. The application the team developed can be efficiently used simultaneously by multiple users and each user can configure the user interface via XML files.

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|---|---|
| TITLE: | Content Based Messaging Application to Situational Awareness |
| NUMBER: | CSSE 04.2 |
| SPONSOR: | The Boeing Company |
| SPONSOR LIAISONS: | Dale Karr, Scott Moody, Bruno Hoolboom |
| FACULTY ADVISOR: | Prof. Mitchell Spector |
| STUDENTS: | Jeffrey Wong, Rochelle Café, Eric Olson, Michael Clement, Omar Mohamed |

The team's project addresses Content-Based Messaging as part of Boeing Phantom Works' ongoing study of network bandwidth stress in existing systems. Content-Based Messaging is a technology that uses intelligent routers to forward messages only to those parties that want that information. This technology is relevant to a variety of commercial as well as military applications. A primary objective of this technology is to reduce the bandwidth stress on network systems and end users. This is particularly important as the volume of information being transmitted and the need for timeliness of key information is steadily increasing. The team's project goal was to evaluate Content-Based Messaging as an alternative to traditional broadcast and routing systems. The team developed a number of performance tests, created scenarios that showcased the systems' abilities, and investigated ways the technology could be applied to other existing networks. The team conducted a detailed analysis of the usefulness of Content-Based Messaging and of how to effectively implement the technology.

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|---|---|
| TITLE: | Seattle University Student Web Portal |
| NUMBER: | CSSE 04.3 |
| SPONSOR: | Seattle University Office of Information Technology (SunGard Collegis) |
| SPONSOR LIAISONS: | Cassy Beekman, Jim Fowler, Charles Wesley, Don Sullivan |
| FACULTY ADVISOR: | Prof. William Poole |
| STUDENTS: | Trent Rambo, Tim Sipos, Noritaka Takeuchi, Jeremiah Weeden, Arthur Will |

Seattle University implemented a new web portal for use by Seattle University students. The portal is to provide secure online access to many campus services and sources of information. The implementation of this portal is closely integrated with the policy work and goals of several Seattle University committees. The student team worked with the Seattle University Office of Information Technology (managed by Collegis, Inc.) to implement the portal. The student team researched existing portal products, conducted interviews with Seattle University community members to develop product requirements, wrote portal requirements, wrote some of the custom web code for the portal, integrated the portal with existing technologies, performed tests on the portal, designed and executed usability studies, participated in the implementation of the portal on the Seattle University web server, and

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| TITLE: | Fred Hutchinson Cancer Research Center Content Management System Architecture |
| NUMBER: | CSSE 04.4 |
| SPONSOR: | Fred Hutchinson Cancer Research Center |
| SPONSOR LIAISON: | Matt Briggs, Joseph Flahiff, Judy Maus |
| FACULTY ADVISOR: | Prof. Jeff Gilles |
| STUDENTS: | Kusnadi Chao, Huy Lam, Flor Mandujano, Theodore McCullough, Hilina Negede |

The Fred Hutchinson Cancer Research Center (FHCRC) is one of the foremost cancer research and treatment facilities in the world. One important task of the FHCRC Information Technology Department is to facilitate information sharing for everything from research papers to equipment request forms. To help with this goal, the SU team helped develop a new intranet website to assist FHCRC in managing their dynamic content. First the team created an overall architectural design that would support the required processes and content types. Next, the team created a site architecture and database schema. Finally, a content management system (CMS) was selected from which to develop a prototype to demonstrate both how dynamic content can be managed via a CMS and to illustrate a user's experience.

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|---|---|
| TITLE: | Education Opportunity Web Portal |
| NUMBER: | CSSE 04.5 |
| SPONSOR: | Leadership Advancement International |
| SPONSOR LIAISONS: | Katrina Haynes, Derek Haynes |
| FACULTY ADVISOR: | Prof. Everald Mills |
| STUDENTS: | Masaru Hirose, Lane Schafer, Haile Tensae, Bill Tollett, Ayako Yoshida |

Leadership Advancement International (LAI) is devoted to helping the nations of the developing world attain economic independence and political stability. To achieve this vision, LAI works to provide educational and business opportunities for students and leaders from developing countries in Africa. As part of this goal, LAI wished to have a web application developed that would allow students in the United States to create their own websites that would tell the stories of their experiences in this country. The team created a database, the html code that made up the overall look and feel of the web site, the web site designer for students to use, and a way for students to interactively create a resume for posting online.

# STUDENT CENTER ROOM 210

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|---|---|
| TITLE: | Automated Data Sharing Tool |
| NUMBER: | CSSE 04.8 |
| SPONSOR: | National Bureau of Asian Research |
| SPONSOR LIAISONS: | Karolos Karnikis, Erick Thompson |
| FACULTY ADVISOR: | Prof. Thomas E. Carpenter |
| STUDENTS: | Toan Nguyen, Chris Oh, Yosia Urip, Will Whitwell, Russel Wong |

The National Bureau of Asian Research (NBR) provides academic institutions, governmental bodies, public policy institutes, and the general public with statistical information concerning countries in Asia. NBR currently has a user interface which allows its users to locate information on those countries by year. NBR requested the SU project team to extend the functionality of their interface to allow their users the capability of integrating NBR data into the user's website. To do this, the SU team created the Data Sharing Tool consisting of a user registration system and a wizard. The wizard allows a user to easily indicate the information they wish to access. The wizard then automatically creates the code necessary to retrieve that data and provides that code to the user to be placed in the user's web application. This code is used to retrieve the desired data and place it into an easily accessible data table. The table allows the general public to access the NBR database information from any web browser.

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| TITLE: | Adult Day Services Web Portal |
| NUMBER: | CSSE 04.9 |
| SPONSORS: | Two Degrees Consulting Services and Elder and Adult Day Services |
| SPONSOR LIAISONS: | Michele Bleser, Erin Aten |
| FACULTY ADVISOR: | Prof. Susan Reeder |
| STUDENTS: | Alex Chang, Ryan Costiniano, Dedy Hendro, Hitomi Kawase, Kyleen MacGugan, Michelle Sarruf |

Two Degrees Consulting is a management consulting firm that helps clients manage technology and business enhancement projects. Elder and Adult Day Services (EADS) is a non-profit organization that provides health, social, rehabilitative, and related support services for people with physical or mental impairments. EADS asked Two Degrees Consulting and the Seattle University student team to help employees at multiple locations stay connected and informed and to develop a system to report and manage data and programs. To address these needs the team, under the guidance of Two Degrees Consulting, developed the EADS Intranet Portal and Donor Management Database. The team developed an intranet portal with an array of modules to connect EADS's employees at its four current centers and possible future centers. The team developed a donor management system to help EADS's track donations and volunteers, create reports and mailings, and support fundraising.

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|---|---|
| TITLE: | Microsoft Assignment Manager |
| NUMBER: | CSSE 04.6 |
| SPONSOR: | Microsoft Corporation |
| SPONSOR LIAISON: | Matthew Roland |
| FACULTY ADVISOR: | Prof. Barbara Endicott-Popovsky |
| STUDENTS: | Justin Saul, Jeffrey Robinson, Enes Pasalic, Melissa Allen, Jason Castro |

In classrooms across the country, faculty members are burdened by common tasks associated with teaching a course. To help ease the burden, Microsoft released Assignment Manager (AM), a component of Visual Studio.NET Academic. AM assists in the process of distribution, management, and grading of programming assignments. In 2003, Microsoft released the source code for AM under a shared source license. This enables the academic community to use, modify, and redistribute the source code for commercial and non-commercial purposes. Assignment Manager is composed of AM Server Faculty, Client for AM, and Student Client for AM. The current functionality of AM includes assignment tracking, automatic student project building, assignment grade notification, transmitting messages to students, and secure submission. This team added the following functionality: similarity testing, optional NT user authentication, and integrated message board. These features will help AM to become a more powerful tool as well as present a compelling argument for the use of Visual Studio.NET in academia.

| | |
|---|---|
| TITLE: | Microsoft Space Manager |
| NUMBER: | CSSE 04.7 |
| SPONSOR: | Microsoft Corporation |
| SPONSOR LIAISON: | Karie Hamilton |
| FACULTY ADVISOR: | Prof. Adair Dingle |
| STUDENTS: | Aaron Alquist, Yoshe Chandra, Adam Hasan, Dang-Khoa Truong, Eric Uhls |

Microsoft has over 50,000 employees, each needing office space close to others in their business group and to resources such as testing labs. Planning space allocation and assignments in Microsoft has been done by hand, a slow and laborious process. Microsoft asked the Seattle University team to automate this process by developing software to generate efficient space allocation scenarios. Using Microsoft .NET Platform and AI (artificial intelligence) heuristics, the team developed a prototype called Space Manager. Space Manager pre-generates a number of possible space allocations based on an initial allocation and also generates the intermediate steps required to reach each allocation scenario. Availability, cost of moving, adjacencies, move constraints and lab requirements are all factored into an evaluation of the space allocation scenarios. The software also interacts with the user for review and approval.

# SPONSORING ORGANIZATIONS AND LIAISONS

We want to acknowledge with special thanks the organizations that sponsored projects in 2003-2004, 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 and Kevin Cheung

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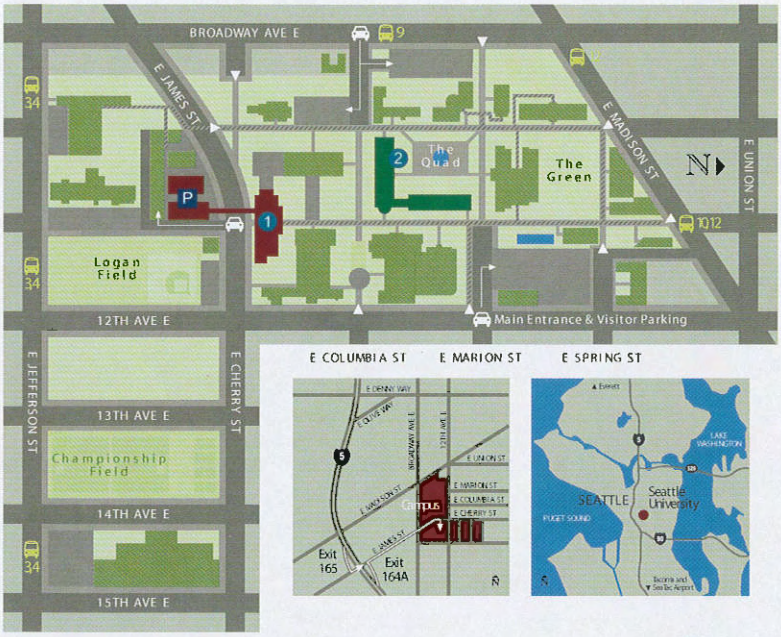


▲ Campus Entry Point  Accessible Route  King County Metro  Parking Entrance  P9 Parking Area

1 Student Center & LeRoux Conference Center  P 11th & E. Cherry Garage

2 Bannan Center For Science & Engineering

## DIRECTIONS

- 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 to room 160, the LeRoux Conference Center.

SEATTLE UNIVERSITY

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