

return true;

```
    tTransaction : functi  
    total -= this.lastTra  
    tTransactionAmount =
```

```
    : function(employee,
```

# PROJECTS DAY 2018

**SEATTLEU**

COLLEGE OF  
SCIENCE AND ENGINEERING

**“For 31 years, we have enjoyed the support of leading external partners. We continue to witness tremendous professional growth among the students as they complete their projects each year.”**

## **WELCOME TO PROJECTS DAY 2018**

You are about to meet an impressive group of students. In September, each student team received an assignment from a local industry partner. These are real-world challenges faced by the sponsoring companies. The sponsors expected results, and, as you'll see, the students delivered!

For our students, these year-long projects are about much more than the deliverable. As they have worked together to solve the challenges put before them, the students have learned about project management, team leadership, budgeting, technical writing, and oral communication. These are all crucial skills—and they put our students ahead of the curve when they begin their careers.



A handwritten signature in black ink that reads "Michael J. Quinn".

**Michael J. Quinn, PhD**  
Dean  
College of Science and Engineering



Learn more about sponsoring a project: Contact Corporate Relations Manager Rachael Brown at 206-296-2822 or email [ProjectCenter@seattleu.edu](mailto:ProjectCenter@seattleu.edu).

We encourage you to look through this booklet and identify the projects that interest you. Attend the team presentations and ask questions. Talk to the students and their industry liaisons during the poster sessions. We're confident you'll find their work fascinating, and you'll be impressed with the students' ability to think on their feet and discuss technical issues.

We are grateful to the companies, government agencies and non-profits who partner with us to make this important, award-winning educational experience possible. We also want to thank the industry liaisons and the faculty advisors who have worked with the teams throughout this academic year. Together, we are preparing a new generation of scientists, engineers and computer scientists who will make an impact throughout the Puget Sound region—and beyond.




*Jean Jacoby*

**Jean Jacoby, PhD**

Associate Dean and Project Center Director  
College of Science and Engineering





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<b>ENVIRONMENTAL SCIENCE</b>	<b>8</b>
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# PROJECTS DAY 2018

## EVENT SCHEDULE

### ➤➤➤ MASTER OF SOFTWARE ENGINEERING PRESENTATIONS

**THURSDAY, JUNE 7**

**ENGINEERING ATRIUM**

**6:00 P.M.** Social

**WYCKOFF AUDITORIUM**

**6:30 P.M.** Keynote - Tara Prakriya, General Manager Microsoft Business AI division

**7:30 P.M.** Student presentations

- **EMERALD CITY PILATES** Pilates Planner / MSE 18.1
- **STARBUCKS** Threat Sensing Platform / MSE 18.2

### ➤➤➤ UNDERGRADUATE ENGINEERING AND COMPUTER SCIENCE PRESENTATIONS

**FRIDAY, JUNE 8**

**SULLIVAN HALL WEST ENTRANCE**

**11:15 A.M.** Early Check-in and Registration

**PIGOTT AUDITORIUM, PIGOTT BUILDING 1ST FLOOR**

**11:30 A.M.** Welcome to Projects Day 2018

Keynote - Bridget Brewer, '88, President NIC Global

**SULLIVAN HALL WEST ENTRANCE**

**12:00 P.M.** Check-in and Registration

**12:45 P.M. - 1:45 P.M. PRESENTATION SESSION 1**

**ROOM C5**

- **KING COUNTY: WATER AND LAND RESOURCES DIVISION** Black River Pump Station - Seismic Evaluation and Remedial Design / CEE 18.2
- **SEATTLE CITY LIGHT** Seismic Evaluation and Retrofit of Gorge Powerhouse / CEE 18.3
- **SEATTLE UNIVERSITY** Seismic Assessment of Seattle University Broadway Parking Garage / CEE 18.4

**ROOM C6**

- **NIC GLOBAL** Industrial Hardware Insertion Automation / ME 18.8
- **LIGHTHOUSE FOR THE BLIND** Cascade Designs Valve Assembly Station / ME 18.6
- **KENWORTH TRUCK COMPANY** Motor/Generator Application Mechanism for Semi-Truck HVAC System / ME 18.5

**ROOM 109**

- **MICROSOFT** Microsoft Mobile Check-In, a Customized Experience / CS 18.9
- **MY BIONIC BRAIN, LLC** Let Me Check My Notes™ app / CS 18.10
- **PEER ASSIST** OCR Invoice Recognition / CS 18.12

**ROOM 110**

- **ALDERWOOD WATER AND WASTEWATER DISTRICT** Energy Conservation Study / ECE 18.1
- **CHELAN COUNTY PUD NO. 1** Hydroelectric Generation Capability and Protection Coordination Model / ECE 18.3
- **KILOWATTS FOR HUMANITY** Raspberry Pi-based Data Acquisition System (DAS) / ECE 18.5

**1:45 P.M. - 2:00 P.M. BREAK**

## 2:00 P.M. – 3:00 P.M. PRESENTATION SESSION 2

### ROOM C5

- **MOUNTAINEERS FOUNDATION** Rhododendron Preserve Management / ENSC 18.1
- **COVINGTON WATER DISTRICT** Sugarloaf Well Corrosion Control Preliminary Design Project / CEE 18.1
- **SNOHOMISH COUNTY PUBLIC WORKS** Meadow Road Culvert Replacement at 137th St SW / CEE 18.5

### ROOM C6

- **LUNG TECHNOLOGIES** Therapeutic Incentive Spirometer: Valena 5000 with SMI Verifier / ME 18.7
- **BOEING** Development of Hypothetical Aircraft Windshield Wiper System / ME 18.1

### ROOM 109

- **PANTHERA** Project Spot Check / ECE 18.7
- **SEATTLE UNIVERSITY** Collegiate Wind Competition: Electrical Systems / ECE 18.4
- **SEATTLE UNIVERSITY** Collegiate Wind Competition: Mechanical Systems / ME 18.2

### ROOM 110

- **PACCAR CORPORATE QUALITY** Paccar Rapidfix - A Mobile Corrective Action Application / CS 18.11
- **KENWORTH TRUCK COMPANY** Customs Self-Assessment App / CS 18.8
- **KENWORTH TRUCK COMPANY** Engineering Dashboard / CS 18.7

## 3:00 P.M. – 3:15 P.M. BREAK

## 3:15 P.M. – 4:15 P.M. PRESENTATION SESSION 3

### ROOM C5

- **PACCAR, Inc.** RFID-based Autonomous Inventory Tracking with Drones and Robots / ECE 18.6
- **BOEING** Development of Power Quality Monitor for Aircraft / ECE 18.2
- **SOUND TRANSIT** Environmental Data Acquisition and Indirect Stress Measurement of the I-90 Floating Bridge / INT 18.1

### ROOM C6

- **T-MOBILE** Automated Mobile Device Testing Platform / INT 18.2
- **INGERSOLL RAND** Analysis & Redesign of an Air Gear Motor / ME 18.4
- **FLOW INTERNATIONAL** RFID Tracking / ME 18.3

### ROOM 109

- **ASTRONICS** CorePower® Planner / CS 18.2
- **COSTCO WHOLESALE** Warehouse Clustering and Member Relationships Clustering using Graph Databases / CS 18.4
- **PUGET SOUND ENERGY** Standards and Safety Manual Distribution App / CS 18.13

### ROOM 110

- **F5** Predicting System Performance Degradation using Machine Learning and AI / CS 18.5
- **AMAZON** Associate Cross Training Services / CS 18.1
- **JUBILEE REACH** Jubilee REACH Online Thrift Store / CS 18.6

## 4:15 P.M. – 5:00 P.M. POSTER SESSION

## 5:00 P.M. – 6:00 P.M. RECEPTION

**SUGARLOAF WELL CORROSION CONTROL  
PRELIMINARY DESIGN PROJECT CEE 18.1**



**SPONSOR:** Covington Water District  
**SPONSOR LIAISONS:** Thomas Keown, PE, Steve Lee, PE, Tom Malphrus, PE  
**FACULTY ADVISOR:** Michael Marsolek, PhD, PE  
**STUDENTS:** Jillian Gayler, Kristen Nakaoka, Lawrence Paltep, Evan Russell

Covington Water District (CWD) supplies water to the Sugarloaf Estates and Sugarloaf Mountain Estates subdivisions. Since 2014, CWD has observed a decrease in the measured pH of water pumped from Sugarloaf Well 3 and a concurrent increase in copper concentrations at residential taps, approaching Action Levels set by the federal Lead and Copper Rule. To ensure satisfactory and safe drinking water for their customers, CWD tasked CEE 18.1 with evaluating corrosion control treatment options and providing a preliminary design for the chosen option. During the evaluation of corrosion control treatment options, the team created informational summary sheets, eliminated infeasible options and selected a final treatment option through a decision matrix in collaboration with CWD. The team completed a 30% preliminary design including a process flow diagram, basis of design, process and instrumentation diagrams, engineering drawings, operation and maintenance schedules, and a cost estimate. Chris Stoll PE and Bobbie Gilmore, EIT from Kennedy Jenks also served as consulting engineers for the project.



**BLACK RIVER PUMP STATION - SEISMIC EVALUATION AND REMEDIAL DESIGN CEE 18.2**



**SPONSOR:** King County: Water and Land Resources Division  
**SPONSOR LIAISONS:** Tom Bean, PE, Jessy Hardy, EIT, Mark Ruebel, PE, David Webster, PhD, SE (Thornton Tomasetti)  
**FACULTY ADVISOR:** Joshua Pugh, PhD, PE  
**STUDENTS:** Mashayla Combs, Austin Dennis, Angelica de Jesus, Ellen Fisher, Moussa Tunkara

King County has requested that Team CEE 18.2 perform a seismic assessment and remedial design of their Black River Pump Station facility. The Black River Pump Station, constructed in 1972, is part of the Green River flood control system operated by King County. It consists of a steel-framed pumphouse (superstructure) and a reinforced concrete dam (substructure). The station lifts discharge from the Springbrook Creek basin into the Black River Channel, and protects property worth more than \$500 million from flood inundation in the cities of Renton, Kent, and Tukwila.



Team CEE 18.2 has performed a Tier 1/Tier 2 seismic evaluation of both the superstructure and substructure of the facility in accordance with ASCE 41-13 specifications. Through the code-based assessment, the team identified structural components that are not expected to meet the Immediate Occupancy performance objectives outlined in ASCE 41-13 during a seismic event with a 20% probability of exceedance in 50 years. The team designed retrofit options to mitigate these deficiencies, and performed an alternatives analysis with input from King County to select a final design concept. Team CEE 18.2 has submitted a 60% remedial design concept including structural drawings, calculations, and a basis of design report to King County.



## SEISMIC EVALUATION AND RETROFIT OF GORGE POWERHOUSE CEE 18.3



## Seattle City Light

**SPONSOR:** Seattle City Light

**SPONSOR LIAISON:** Robert Cochran, PE, SE

**FACULTY ADVISOR:** David Webster, SE

**STUDENTS:** Anthony Ayala, Abdoulaye Konate, Ben Monk, Matt Seidel, Edward Skewis

The Gorge Powerhouse is owned and operated by Seattle City Light (SCL) and is located in Newhalem, Washington along the Skagit River. The powerhouse is one of three hydroelectric facilities owned by SCL as a part of the Skagit River Hydroelectric Project that generates power and regulates flow in the Skagit River for salmon. The building itself was constructed in 1921 and had an addition built in 1948 that nearly doubled the footprint of the powerhouse without any structural connection, thus acting as a structurally independent adjacent structure. CEE 18.3, under the guidance of SCL, has been analyzing the structure in terms of its resilience in an earthquake. CEE 18.3 applied the methods described in ASCE 41-13 Seismic Evaluation and Retrofit of Existing Buildings to determine how the structure will perform in the event of an ASCE-factored earthquake. This process largely involved calculating the building's concrete walls and roof's ability to transfer the lateral forces induced in an earthquake and gauge the damage caused while considering various ground accelerations and design performance levels. The final deliverable of the project is a seismic report summarizing the performance of structural elements deemed noncompliant by analyses and concept designs of retrofit options to alleviate these deficiencies while maintaining operation of the facility and not changing the aesthetics of the building's historic exterior.

## SEISMIC ASSESSMENT OF SEATTLE UNIVERSITY BROADWAY PARKING GARAGE CEE 18.4

## SEATTLE UNIVERSITY

**SPONSOR:** Seattle University

**SPONSOR LIAISON:** Jeong-Beom Ihn, PhD (Boeing)

**FACULTY ADVISOR:** Jhon Paul Smith PhD, PE

**STUDENTS:** Conrad Beymer, Maddy McKenzie, Jeff Onorati, Danny Shaw

As Seattle structural engineers continue to upgrade the city's infrastructure in preparation for large earthquakes, the Seattle University Project Center tasked team CEE 18.4 with the seismic evaluation of the Broadway Parking Garage. The team approached this task with code-based and experimental analysis. For the code-based analysis, CEE 18.4 conducted a Tier 1 evaluation of the structure according to ASCE 41-13, which delineates the seismic assessment and retrofit of existing buildings. This analysis allows the team to identify structural deficiencies that warrant further investigation. For the experimental analysis, the team collected ambient and induced vibration measurements on the garage using high-sensitivity accelerometers. These data were used to identify dynamic properties of the structure, which in turn can be used to estimate its seismic response during an earthquake. Using the experience gained from instrumenting the garage, the team also developed recommendations for implementing structural health monitoring (SHM) in the new Center for Science and Innovation (CSI) building. SHM would allow real-time assessment of the facility's condition.

**“The environmental design project has given me insight into the challenges that come with implementing my coursework in the real world. Not only was I given guidance, but I was also encouraged to look for my own direction to solve the problems presented to me, which helped me grow in my projected profession.” TRUCQUAN DANG '18 ENSC**

MEADOW ROAD CULVERT REPLACEMENT AT 137TH ST SW CEE 18.5



**Snohomish County**

**SPONSOR:** Snohomish County Public Works  
**SPONSOR LIAISONS:** Ted Parker, Mike Randall, PE  
**FACULTY ADVISOR:** Mark Siegenthaler, PE, PLS  
**STUDENTS:** Sam Garcia, Jackie Hempstead, Paul Moskvitin, Elizabeth Simon, Caroline Umukobwa

Snohomish County Public Works requested a replacement design for three culverts located at the intersection of Meadow Road and 137th Street SW in Everett along an unnamed stream, which is a tributary to North Creek. The existing culverts block the natural migration of juvenile fish. In addition, Meadow Road will be widened under the Snohomish County Transportation Improvement Program. The design team used the stream simulation method to design a structure that imitates the natural processes of the channel while meeting Washington Department of Fish and Wildlife standards. The final design provides fish passage for the widened roadway. The team delivered a design report that included a 30% drawing set of the recommended structure, an alternative structure, and technical memos detailing field reconnaissance, hydraulic analysis, structure alternatives analysis, streambed design, cost estimates and the basis of design. The drawing set includes structure design details, roadway and stream alignment, streambed material, construction sequence, temporary erosion and sediment control, utility relocation, traffic control and detour plan, and embankment design.

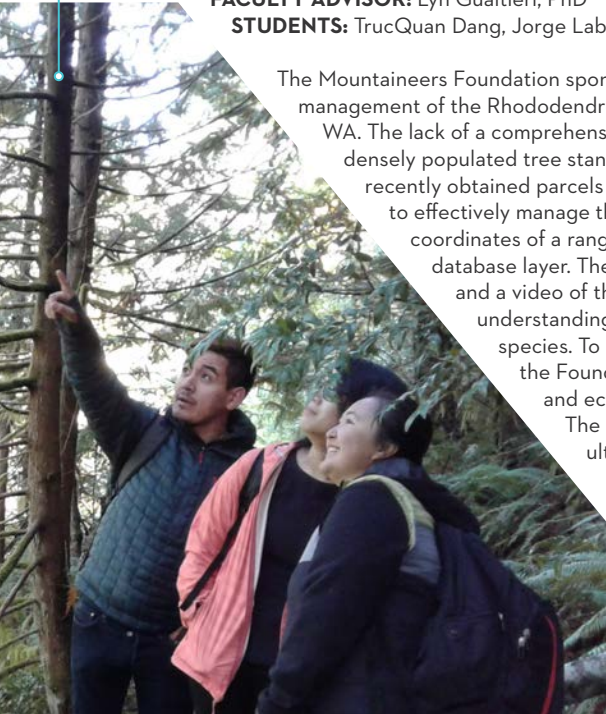
RHODODENDRON PRESERVE MANAGEMENT ENSC 18.1



**mountaineers**  
*foundation*  
 natural places.  
 sustainable practices.

**SPONSOR:** Mountaineers Foundation  
**SPONSOR LIAISON:** Jeff Wirtz  
**FACULTY ADVISOR:** Lyn Gualtieri, PhD  
**STUDENTS:** TrucQuan Dang, Jorge Laborico, Dorinda Wu

The Mountaineers Foundation sponsored a project on the biodiversity and vegetation management of the Rhododendron Preserve on the Kitsap Peninsula near Bremerton, WA. The lack of a comprehensive system to identify areas with invasive species and densely populated tree stands makes it difficult to monitor the health of the most recently obtained parcels at the preserve, limiting the ability of the Foundation to effectively manage the preserve. Team ENSC 18.1 has determined the coordinates of a range of invasive species and added them into a GIS database layer. The team has also created a user-friendly hard copy map and a video of the fieldwork accomplished to improve volunteer understanding and participation in the removal of the invasive species. To help mitigate competition between dense tree stands, the Foundation received a report on the favorable ecological and economic effects of manually thinning out the stands. The deliverables presented to the Foundation will ultimately aid in enhancing the growth of the native species at the preserve, as well as improve the habitat for wildlife.



## ASSOCIATE CROSS TRAINING SERVICES CS 18.1



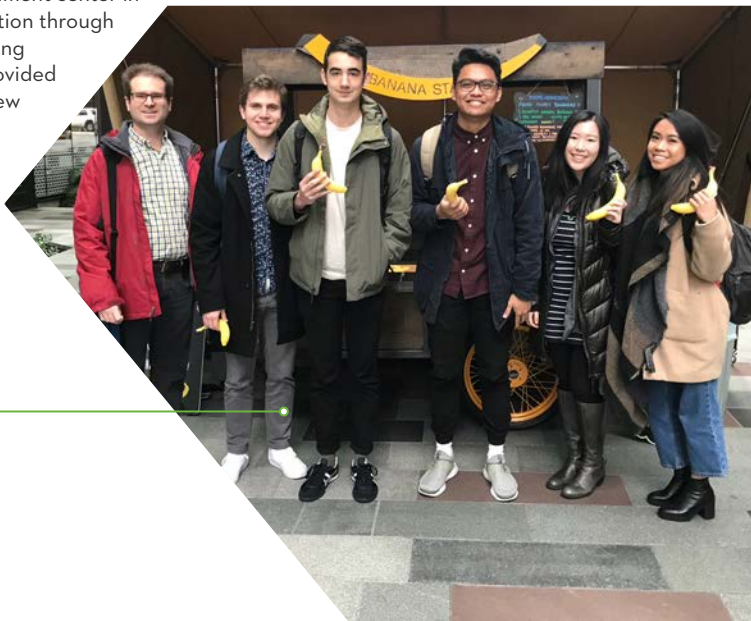
**SPONSOR:** Amazon

**SPONSOR LIAISONS:** Daniel Fang, Sanjaya Lansakaranayake, James Stewart, Dennis Tjandra

**FACULTY ADVISOR:** David Lillethun, PhD

**STUDENTS:** Jacqueline Au, Chloe Claridad, Bailey Ilagan, Tymon Schroeder, Andrew Torres

Associate Cross Training Services (ACTS) is a digitized cross training system that identifies, tracks, and communicates training opportunities for fulfillment and sort center employees, known as Associates. This online system builds upon Amazon's current cross training infrastructure to be a more visible and accessible interface for Associates and their managers. This allows for a more consistent and scalable system with high transparency into the cross training lifecycle for all involved. The requirements are modeled around the current implemented system at the fulfillment center in DuPont, WA but with the ease of facilitation through automation. ACTS is a web service utilizing Amazon Web Services. The team has provided Amazon with detailed plans, including new interfaces for Associates and their managers and a DynamoDB database that tracks the different requests that Associates will be making. Amazon will finalize the system and it will be put under further review for future integration with all fulfillment centers.



## COREPOWER® PLANNER CS 18.2



**SPONSOR:** Astronics Advanced Electronic Systems

**SPONSOR LIAISONS:** Michael Ballas, Doug Brown

**FACULTY ADVISOR:** Aditya Mishra, PhD

**STUDENTS:** Josh Christensen, Matthew Gower, Bethanie Johnson, Clare Mason, Morgan Rozman

Designing aircraft electrical systems is a complicated process. Astronics asked Team CS 18.2 to build an interactive web portal to help simplify the initial steps of this process. The team built a web application, which they dubbed The Astronics CorePower® Planner. The application shows potential Astronics customers an insightful overview of the power systems components that go into an aircraft, depending on the aircraft type and the customer need. The application's primary purpose is a marketing tool, which educates potential customers on Astronics' CorePower® products, and forwards customer contact information to the Business Development group. Astronics plans to launch the application on their website upon further internal inspection and development.

## WAREHOUSE CLUSTERING &amp; MEMBER RELATIONSHIPS CLUSTERING USING GRAPH DATABASES CS 18.4



**SPONSOR:** Costco Wholesale  
**SPONSOR LIAISONS:** Andy Bechtel, Shrikant Palkar  
**FACULTY ADVISOR:** Susan Reeder  
**STUDENTS:** Jacob Johnson, Cassidy Price, Justin Shields, Rueben Tiow, Vincent Yang

Costco sees the need to develop a solution that will allow grouping of its warehouses, as well as members, based on set of parameters. This will be very useful for buyers to better distribute the products and predict demand for similar warehouses. The ability to do so accurately will reduce surplus and out-of-stock situations at warehouses. The goal of the solution is to generate groupings of warehouses based on a set of parameters suggested by business users. The grouping will allow buyers to plan at a higher level without losing accuracy. The project team developed an application that centers around a graph database that will be a more accurate and precise alternative compared to the original experience-based system by creating accurate groupings. The system takes criteria from the Buyer, analyzes Costco's data with respect to the entered criteria, and displays the different warehouse and member groupings.

**“We have done multiple projects with SU undergrad and grad students. We enjoy the innovative thinking they bring to the projects, providing us with new insights.”**

**SRIKANT PALKAR** Costco Wholesale

## PREDICTING SYSTEM PERFORMANCE DEGRADATION USING MACHINE LEARNING AND AI CS 18.5



**SPONSOR:** F5 Networks, Inc.  
**SPONSOR LIAISONS:** Mariah Arnold, Jeremy Conner, Jon Gross, Sathesh Jayabal, Jordan Zebor  
**FACULTY ADVISOR:** Lin Li, PhD  
**STUDENTS:** Christy Han, Nils Fenske, William Luky, Masashi Schafer, Glenn Wintrode

The purpose of this project was to architect and build an end-to-end framework that predicts system degradation and anomalies before they happen in client BIG-IP devices. BIG-IP is an application delivery controller created by F5 and used by Fortune 50 companies. Given the levels of traffic these clients can receive daily, system failures and exhibitions of degraded performance can cause significant financial burdens. F5's BIG-IP devices have the ability to capture system diagnostic information on demand for troubleshooting issues. The system aims to transform this large data, identify and isolate important information, and apply machine learning models to detect anomalies and provide insight that can inform decisions about preventing system failures. The work done in the project will aid in preventing systems from crashing or experiencing degrading performance, in order to maximize F5 customers' uptime and to deliver a better customer experience.

“The relationship that PACCAR has with Seattle University is not just a sponsorship of senior projects, it is a true partnership that allows for collaboration between students and industry professionals. The students gain real-world experience, and PACCAR gains competitive product offerings and in many cases extremely competent longtime employees.”  
**PATRICK DEAN** Kenworth Truck Company

### JUBILEE REACH ONLINE THRIFT STORE CS 18.6



**SPONSOR:** Jubilee REACH

**SPONSOR LIAISONS:** Jason Bryant, Randy Eng, Lois Yi

**FACULTY ADVISOR:** Richard LeBlanc, PhD

**STUDENTS:** Austin Ishii, Hang Nguyen, Phi Pham, Tu Trinh Vu

Jubilee REACH is a Bellevue non-profit organization that strives to transform the lives and futures of children and their families by intentionally addressing their deeper social-emotional needs. One of Jubilee REACH's four pillars is the Jubilee REACH Thrift Store, which provides quality goods and a hospitable shopping experience, and also provides jobs to restore lives, while empowering families in need to lead healthy lives with furniture and household essentials through our Furniture Bank. All proceeds from the Thrift Store cycle back into Jubilee REACH services to the community.

After finding success selling highly valued thrift items on eBay, Jubilee REACH wanted a way to capitalize on this while mitigating costs. They originally commissioned a website last year that would emulate the scavenger feel of the thrift store experience at their brick and mortar store. The previous development team laid down a good foundation but Jubilee REACH came back this year with ideas to improve the website even further. Team CS 18.6 was able to utilize Agile and Scrum principles to improve the capabilities of the website to match Jubilee REACH's new vision for their e-commerce site. These capabilities include faster performance, enhanced shopping cart functionalities, as well as support for shipping orders and refinement of the user interface.



## ENGINEERING DASHBOARD CS 18.7



**SPONSOR:** Kenworth Truck Company

**SPONSOR LIAISONS:** Nick Grant, Ren Howell

**FACULTY ADVISOR:** Michael Koenig

**STUDENTS:** Asa Davidson, William Gross, Dominic Savio, Joshua Scherf

Kenworth Truck Company asked CS Team 18.7 to create a web application that provides a unified interface for several workflow applications to save engineers valuable time. Kenworth engineers manage hundreds of tasks every day across various internal applications. Tracking and prioritizing all the disparate tasks generates significant overhead, which the Dashboard alleviates. The student team communicated with engineers and discussed their biggest pain-points such as filtering and prioritizing engineering tasks, which directly informed design decisions. They then provided Kenworth with detailed documentation, including all agreed-upon requirements that the final product would satisfy and a rough timeline for the completion of the Dashboard's major components. Lastly, they leveraged Agile Development to adapt to shifting priorities from the business while delivering a product that satisfied the documented requirements. By providing a streamlined view and a modern interface, the Dashboard saves engineers time and effort by reducing the number of steps required to access and organize their workflow tasks.

## CUSTOMS SELF-ASSESSMENT APP CS 18.8



**SPONSOR:** Kenworth Truck Company

**SPONSOR LIAISONS:** Lynette Robinson, Sherry Sheline

**FACULTY ADVISOR:** Michael Koenig

**STUDENTS:** Erika Boettecher, Jason Esparza, Chuck Kuo, Conner McGrath, Troy Osland

Kenworth currently ships a large volume of truck parts from its St. Therese facility in Canada through the US Customs Customs Self-Assessment (CSA) program, where they can expedite the customs process provided that they have the proper paperwork. To make the documents for the CSA program, a user must manually compare the goods received at their facility with those accounted for by United Parcel Service (UPS.) Our team was tasked with creating an ASP.NET application that can automatically isolate shipping errors by querying Kenworth's existing database of goods received against UPS data using LINQ. We then compared the two tables to generate a list of records with discrepancies for the user. We allowed the user to easily edit and delete entries as appropriate, and included a feature to export the tables as Excel files so that they can more efficiently do their jobs. Lastly, we developed a separate table that tracks each operation on the database that occurs through our application that is accessible through our administrator portal.

## MICROSOFT MOBILE CHECK-IN, A CUSTOMIZED EXPERIENCE CS 18.9



**SPONSOR:** Microsoft

**SPONSOR LIAISONS:** Vishu Admal, Martin Lammers

**FACULTY ADVISOR:** Jason Wong

**STUDENTS:** Isabelle Butterfield, Jonell Gabriel, Nancy Mariano, Thomas Matsumiya, Nicolas Oman

Microsoft's mission is to empower every person and every organization on the planet to achieve more. The Lobby Experience Engineering team tasked Team CS 18.9 to apply this mission statement to their current self-service check-in system. They are actively building and deploying on the mobile platform to leverage its widely used accessibility features. To make this a reality, the team has utilized REACT Native to provide this feature on Microsoft REACH—a visitor and employee multi-platform application. Within the larger application, the check-in system will use barcode scanning technology to identify the location of the user. During implementation, the team has emphasized Test Driven Development, leveraging JavaScript testing frameworks JEST and Detox. To discover the most user-friendly interface, the team used Sketch (an application design tool) and performed multiple rounds of user surveying to ensure a consistent user-experience between the mobile check-in and the existing Kiosk check-in application. Having a well-tested product will empower users of any ability to check-in without assistance. The benefits of the mobile flow allows the lobby host to perform other tasks and provides visitors with a lasting impression of productivity and ease around navigating the Microsoft campus.



## LET ME CHECK MY NOTES™ APP CS 18.10



**SPONSOR:** My Bionic Brain, LLC

**SPONSOR LIAISON:** Kathy Moeller

**FACULTY ADVISOR:** Richard LeBlanc, PhD

**STUDENTS:** Duyen Cao-Hong, Joseph Koblitz, Brody Smith, Dashiell Wellott

My Bionic Brain LLC asked the team to create a stand-alone, mobile application called Let Me Check My Notes™ with features such as color-coding, sub-categorizing notes and ability to attach documents and images to notes. This application is meant to help users (especially those with cognitive impairments) organize their lives in a more effective manner. The team built the application from scratch using the Ionic 2 Framework, allowing them to create native apps for both iPhone and Android. With a heavy emphasis on usability for the intended audience, the team focused primarily on design, user interface and user experience so that the sponsor may deploy the application to users for User Acceptance Testing. The team has provided a detailed plan as to how to deploy the application.

## PACCAR RAPIDFIX - A MOBILE CORRECTIVE ACTION APPLICATION CS 18.11

# PACCAR

**SPONSOR:** PACCAR, Inc.

**SPONSOR LIAISON:** Ken Faith

**FACULTY ADVISOR:** Yingwu Zhu, PhD

**STUDENTS:** Jordan Eugenio, Max McDermott, Wesley Taylor, Jeff Thomas

In 2017, Paccar implemented the Global Corrective Action (GCA) system to handle the processing of non-compliant parts through an automated Corrective Actions (CA) process accessible by all stakeholders. Currently, plant workers identify non-compliant parts either upon receipt or during assembly and take notes/photographs, which are then processed in batch as time permits, sometimes taking up to two days.

The Paccar Rapidfix project provides a mobile web application that allows for a more efficient process of entering non-compliant component data into the Global Corrective Action system. Using the mobile application, quality personnel will be able to search for existing CAs to learn about past instances of non-compliance with specific parts. In addition, quality personnel will be able to take photographs using a mobile device on the plant floor and immediately append it and other required non-compliant data to an existing CA. Quality personnel will be able to edit specific information within an existing CA. The user interface for the application was developed with Human Centered Design (HCD) methodology to be intuitive and user-friendly. Finally, the team provided detailed documentation of the application to enable Paccar to continue development of the application.

**“I have taken my grandson to Projects Day a few times when he was in high school. It was the senior design projects that sold him on Seattle University. Last year, after he had been accepted and we were at Projects Day, he told me it was hard to believe that in three to four years he would be working on projects as complex as those he saw there.”**

**JOE BLASCHKA JR.** Owner, ADCOMM Engineering Co.



## OCR INVOICE RECOGNITION CS 18.12



**SPONSOR:** Peer Assist

**SPONSOR LIAISONS:** Theresa Jutagir, Matthew Wagoner

**FACULTY ADVISOR:** Adair Dingle, PhD

**STUDENTS:** Zachary Brooks, Hunter Garrett, Nicholas Pass, Charles Rothbacher

Peer Assist asked the Seattle University team to build a system for automatic invoice processing for one of its clients, California Drywall. Accounts payable processors had to manually enter all information for every invoice the company received before implementation of this system. The team used Optical Character Recognition software to read scanned invoices, export them to an externally linked database, and prepare the extracted data to be served to a web portal provided by Peer Assist. The team trained the OCR software to recognize the several varying formats of invoices used by California Drywall suppliers, resulting in over 90% accuracy among the most commonly seen invoice templates. The team built and linked a new database for the extracted information, connecting to existing infrastructure for California Drywall. The team also streamlined and documented the recognition and training process for the software so that in the future, new invoice formats can be rapidly applied to the software. Peer Assist will be able to maintain the system and connect it to a web portal in the future.

## STANDARDS AND SAFETY MANUAL DISTRIBUTION APP CS 18.13

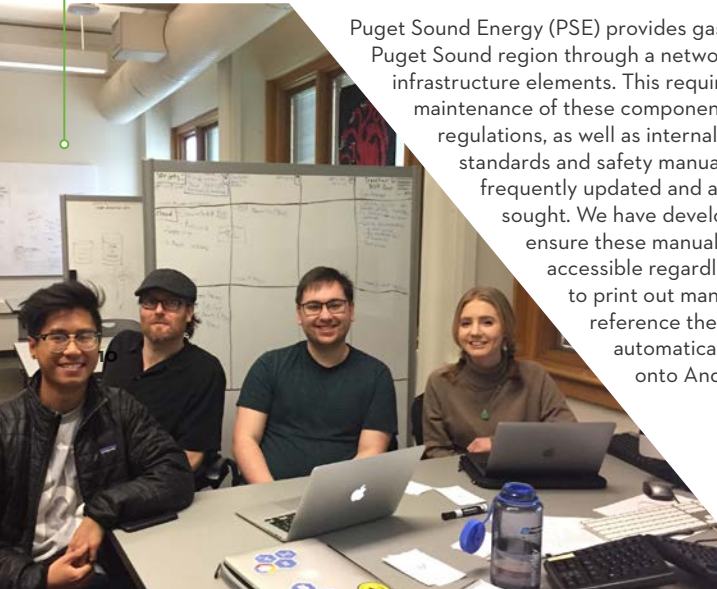


**SPONSOR:** Puget Sound Energy

**SPONSOR LIAISONS:** Sarah Creech, Travis Englehart, Jack Mullen, Kevin Murray, Chris O'Neill, Ronald White

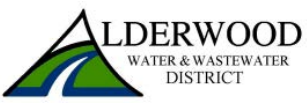
**FACULTY ADVISOR:** Jason Wong

**STUDENTS:** Julia Brostmeyer, Bryan Herr, Kriston Sanders, Denny Tran



Puget Sound Energy (PSE) provides gas and electric energy to much of the Puget Sound region through a network of piping, cabling, and supporting infrastructure elements. This requires the planning, installation, and maintenance of these components that must adhere to local and federal regulations, as well as internal PSE standards. An assortment of standards and safety manuals support this work, but they are frequently updated and an improved distribution method was sought. We have developed a suite of applications that will ensure these manuals are always up-to-date and easily accessible regardless of location, eliminating the need to print out manuals or to drive back to the office to reference the latest material. Manuals are now automatically downloaded from a cloud server onto Android, iOS, or Windows devices.

ENERGY CONSERVATION STUDY ECE 18.1



**SPONSOR:** Alderwood Water & Wastewater District  
**SPONSOR LIAISONS:** Josiah Hartom, David MacDonald, PE, Paul Richart, PE  
**FACULTY ADVISOR:** Kirk MacLearnsberry, PE  
**STUDENTS:** David Dean, James Huttlinger, Kendall Nishina, Leigh Norris

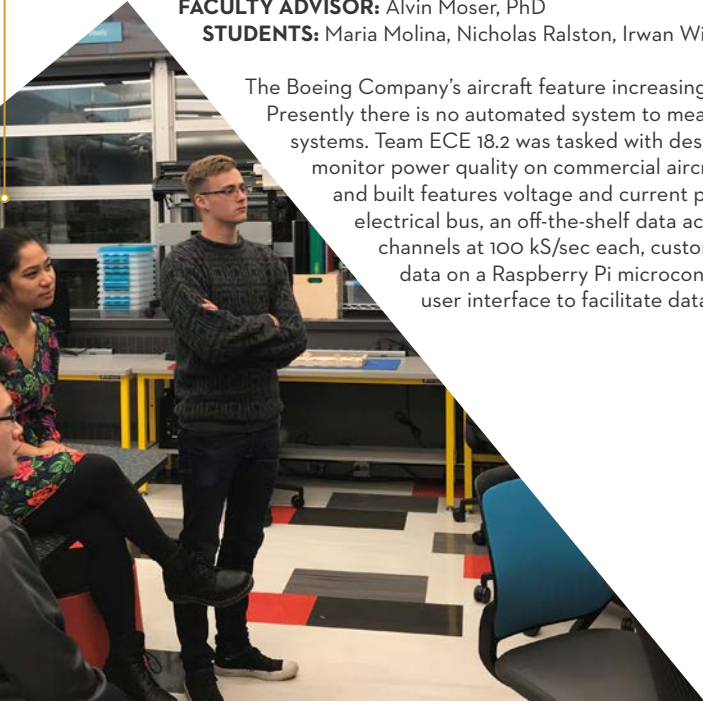
Alderwood Water & Wastewater District requested an analysis and evaluation of the solar power production potential for all 22 of the District's facilities. Solar power can improve the reliability of their equipment in cases where the local power grid goes down and offset the cost of grid-supplied electricity. The project included analyzing the physical and technological constraints of each property, as well as evaluating the economic feasibility of using solar power at each property. The final report contains a feasibility and cost/benefit evaluation of each facility and a 30% design and electrical drawing for a single representative facility.

DEVELOPMENT OF POWER QUALITY MONITOR FOR AIRCRAFT ECE 18.2



**SPONSOR:** The Boeing Company  
**SPONSOR LIAISONS:** Kamiar Karimi, PhD, Evelyn Matheson, Eugene Solodovnik, PhD  
**FACULTY ADVISOR:** Alvin Moser, PhD  
**STUDENTS:** Maria Molina, Nicholas Ralston, Irwan Winarto

The Boeing Company's aircraft feature increasingly complex electrical systems. Presently there is no automated system to measure and store power data from those systems. Team ECE 18.2 was tasked with designing a data acquisition system to monitor power quality on commercial aircraft. The device that the team designed and built features voltage and current probes that interface with the aircraft's electrical bus, an off-the-shelf data acquisition system that samples five channels at 100 kS/sec each, custom algorithms that selectively store data on a Raspberry Pi microcontroller, and a PC-based graphical user interface to facilitate data analysis.



## HYDROELECTRIC GENERATION CAPABILITY AND PROTECTION COORDINATION MODEL ECE 18.3



CHELAN COUNTY

**SPONSOR:** Chelan County Public Utility District

**SPONSOR LIAISON:** John Yale, PE

**FACULTY ADVISOR:** Paul Kostek

**STUDENTS:** Salman H. Alyami, Emily Boss, Jeffrey Eng, Han Tran

Chelan County Public Utility District No. 1 (PUD) generates hydroelectric power for their customer-owners and participates in the wholesale power market as an energy provider. They own and operate three hydroelectric power plants that produce 9 million megawatt hours per year. Chelan County PUD has upgraded their generators and must prove that they are compliant with standards developed by the North American Reliability Corporation (NERC). NERC standards assure reliability and security of the power system in North America. ECE 18.3 developed a tool called the Generator Compliance Coordination Tool (GCCT) to assist the engineers at Chelan County PUD in coordinating generator protection with generator capability and proving compliance with NERC standards. This tool uses the parameters of the generator to produce a diagram that outlines the safe operating region of the generation unit. The GCCT is faster and less error prone than the current method presently used by Chelan County PUD engineers.



**COLLEGIATE WIND COMPETITION:  
ELECTRICAL SYSTEMS ECE 18.4**

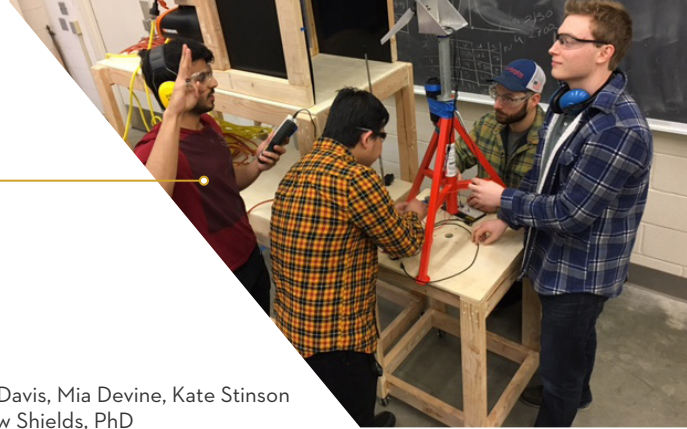
# SEATTLE UNIVERSITY

**SPONSOR:** Seattle University

**SPONSOR LIAISONS:** Alex Byrne, Ben Blaine Davis, Mia Devine, Kate Stinson

**FACULTY ADVISORS:** Kevin Lybarger, Matthew Shields, PhD

**STUDENTS:** Yahya Alyami, Ty Huot, Timothy LoPresto, Jack Nelson



Team ECE 18.4 is part of an interdisciplinary project that designed and built a small-scale wind turbine to compete in the Collegiate Wind Competition (CWC). The competition was created by the Department of Energy. Its primary goal is to encourage and prepare students for a career in the wind energy industry. The electrical engineering team was responsible for the design and implementation of the load system, control system, and generator while the mechanical engineering team designed and built the blades and nacelle of the turbine. The CWC was held in Chicago, IL from May 8-10, 2018. The team's wind turbine was judged for its ability to control rated power as well as its ability to maintain a constant five volts under variable load, wind speed and wind direction. In addition, the small-scale wind turbine needed to be representative of a marketable turbine. Therefore, the team was also tasked with creating and presenting a market-research-supported business plan.

**“My team had the opportunity to create a state-of-the-art and open source solution to improve the sustainability of power delivery to less economically developed regions in Africa. I was well prepared to manage such a cutting-edge project, thanks to my previous coursework, internships, research, and Junior capstone project. We successfully researched, designed, built, and delivered our solution.” CARRIE SMITH '18 ECE**

**RASPBERRY PI-BASED DATA ACQUISITION SYSTEM ECE 18.5**



**KILOWATTS  
FOR HUMANITY**

**SPONSOR:** KiloWatts for Humanity

**SPONSOR LIAISON:** Dave Goldsmith

**FACULTY ADVISOR:** Peter Dauenhauer

**STUDENTS:** Kevin Dao, Mahekdeep Singh, Carrie Smith, Hong Tran



KiloWatts for Humanity (KWH) is a non-profit organization that specializes in providing off-grid power to remote villages that lack access to the main power grid. KWH uses a Data Acquisition System (DAS) to monitor off-grid power systems and provide regularly updated information via an online repository. ECE 18.5 was tasked with designing a Raspberry Pi (RPi)-based DAS which replicates and optimizes the basic functionality of the presently used King Pigeon (KP)-based DAS, but at a lower cost. The design lifts the proprietary limitations associated with the KP-based DAS, while providing a reliable, flexible and safe solution. The design allows for the technical health and wellness of the system to be remotely monitored and ensures continuous power delivery.

## RFID-BASED AUTONOMOUS INVENTORY TRACKING WITH DRONES AND ROBOTS ECE 18.6

# PACCAR

**SPONSOR:** PACCAR, Inc.

**SPONSOR LIAISON:** Jerry Ross

**FACULTY ADVISOR:** Mehmet Vurkaç, PhD

**STUDENTS:** Jesse Batstone, Trung Doan, Jinyanzi Luo, Anna Keziah Pidong

PACCAR, Inc. is a global technology leader in the design, manufacture and customer support of premium light-, medium- and heavy-duty trucks under the Kenworth, Peterbilt, and DAF nameplates. As PACCAR's market share increases, inventory-tracking systems need to keep pace with manufacturing capacity. This year, Team ECE 18.6 was tasked with designing a prototype of an inventory-tracking system that increases the efficiency and accuracy of inventory management. The inventory-tracking system uses a drone, a wheeled robot, and radio-frequency identification (RFID) technology to store and update the locations of PACCAR outdoor assets in a central database. The collected data are displayed on a user-friendly graphical user interface allowing PACCAR employees to locate the assets with greater ease.

## PROJECT SPOT CHECK ECE 18.7



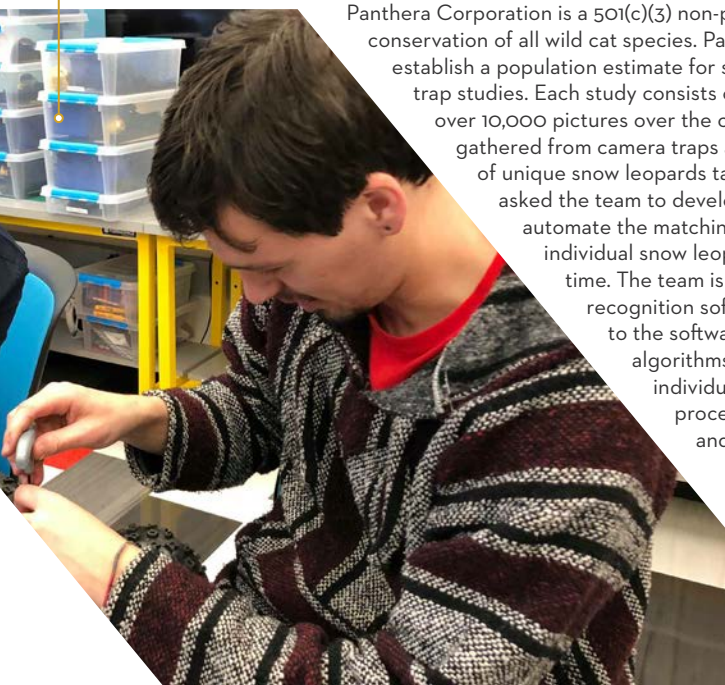
**SPONSOR:** Panthera Corporation

**SPONSOR LIAISONS:** Rana Bayrakçismith, Matthew Dioso

**FACULTY ADVISOR:** Agnieszka Miguel, PhD

**STUDENTS:** David Grob, Ross Hartley, Tim Nguyen

Panthera Corporation is a 501(c)(3) non-profit organization dedicated to the conservation of all wild cat species. Panthera's Snow Leopard Program seeks to establish a population estimate for snow leopards in the wild through camera trap studies. Each study consists of 40-50 camera traps, which can take over 10,000 pictures over the course of the study. Currently the images gathered from camera traps are sorted by hand and the identification of unique snow leopards takes hundreds of hours per study. Panthera asked the team to develop open-source software that could automate the matching of camera trap images to identify individual snow leopards, saving biologists a significant amount of time. The team is upgrading an existing patterned species recognition software known as HotSpotter. Improvements to the software include implementation of different algorithms to further improve recognition accuracy of individual snow leopards, parallelization of lengthy processes to reduce runtime, increased stability, and a redesigned graphical user interface.



**ENVIRONMENTAL DATA ACQUISITION AND INDIRECT STRESS MEASUREMENT OF THE I-90 FLOATING BRIDGE INT 18.1**



**SPONSOR:** Sound Transit  
**SPONSOR LIAISONS:** Dirk Bakker, Craig DeLalla, PE, Brian Holloway, PE, SE  
**FACULTY ADVISOR:** John Wesley Lauer, PhD, PE  
**STUDENTS:** Sari Kwee (CEE), Bronson Mirafuentes (ECE), Jason Snodderly (ECE), Zoe Vierling-Coulter (CEE), Jean-Paul Wallis (CEE)



Sound Transit's East Link Light Rail expansion from Seattle to Bellevue presents many technical engineering challenges. Among them is the addition of light rail to the Homer M. Hadley Memorial floating bridge across Lake Washington. Washington Department of Transportation (WSDOT) and Sound Transit have determined that wind and waves from extreme storm events from the north create load conditions on the bridge that could reduce the bridge's lifespan. However, wave data from Lake Washington near the bridge are limited and there is presently no real-time wave monitoring. Civil and electrical engineering students on INT 18.1 designed and implemented a wave monitoring system on the Homer M. Hadley Memorial floating bridge. Work included modeling analyses of existing wind and wave data, an internet application front-end, backend server design, relational database configuration, evaluation of various wave measurement and structural health monitoring technologies, and preliminary data validation. The project will help Sound Transit collect environmental data to improve light rail operations across Lake Washington.

**AUTOMATED MOBILE DEVICE TESTING PLATFORM INT 18.2**



**SPONSOR:** T-Mobile  
**SPONSOR LIAISONS:** Toaha Ahmad, Eric Christie, Zachary Powers  
**FACULTY ADVISOR:** Yen-Lin Han, PhD  
**STUDENTS:** Cody Brewer (ECE), Emily Mather (ME), Olsen Ong (ECE), Westin Saito (ME), Christopher Salsbury (ME)

In addition to providing mobile data and cellular service, T-Mobile resells mobile devices purchased from original equipment manufacturers. To improve customer satisfaction and reduce device return rates, T-Mobile performs testing to ensure that the functionality, usability, and durability of these devices meets their standards. INT 18.2 improved and constructed an automated testing platform based on a proof-of-concept design developed by last year's INT 17.5 team. INT 18.2 redesigned the power supply, migrated the control system to a more powerful processing system, and optimized safety and stability of the platform. To mimic a user interacting with the device, INT 18.2 developed a novel actuating mechanism, which provides force feedback and reliable quantitative data during testing.



## DEVELOPMENT OF HYPOTHETICAL AIRCRAFT WINDSHIELD WIPER SYSTEM ME 18.1



**SPONSOR:** The Boeing Company

**SPONSOR LIAISON:** Myles Brown

**FACULTY ADVISOR:** Frank Shih, PhD

**STUDENTS:** Frank Allen, Hyrum Emmett, Nicholas Wagner, Chay Weaver

Boeing is the world's largest aerospace company and leading manufacturer of commercial jetliners. Boeing tasked Team ME 18.1 with redesigning the windshield wiper mechanism currently in use on their 737 and 777 model aircraft. The new design needs to reduce the amount of time required to install the wiper arm and improve operation of the wiper system. Specifically, the new design needs to achieve greater wiping speeds and alleviate issues of the wiper arm being back-driven by aerodynamic forces while not in use. Team ME 18.1's design utilizes a servo motor and a self-locking gearset. The new design reduces the installation time required by three hours and eliminates the back-driving of the wiper arm through use of a redesigned wiper arm locking mechanism.

## COLLEGIATE WIND COMPETITION: MECHANICAL SYSTEMS ME 18.2

# SEATTLE UNIVERSITY

**SPONSOR:** Seattle University

**SPONSOR LIAISONS:** Ben Blainedavis, Alex Byrne, Matt Malkin, Sally Starnes, Kate Stinson

**FACULTY ADVISOR:** Matthew Shields, PhD

**STUDENTS:** Barbara Medina, Andrew Pfund, Alisha Piazza, Kyle Seeberger

The Department of Energy created the Collegiate Wind Competition (CWC) to prepare students from engineering, business, and related disciplines to enter the rapidly growing wind energy workforce. The competition tasked teams with researching and designing a theoretical, marketable wind turbine. Additionally, students designed and manufactured a small-scale, working turbine that was "representative of" the market turbine. The small-scale turbine was subjected to five tests that simulated important elements of full-scale wind turbines. Team ME 18.2 worked with other SU engineering and business students to meet the competition requirements. The team used open-source blade design and CAD software to design the test and market turbines. Additionally, the team took advantage of SU's 3D printing and machine shop resources to build the test turbine. The competition was held in May 2018.

**"Our ambitious Seattle University team greatly exceeded our expectation and went above and beyond to technically address our real-world engineering challenges at professional quality."**

**ZACHARY POWERS** T-Mobile Device Automation

## RFID TRACKING ME 18.3



**SPONSOR:** Flow International  
**SPONSOR LIAISONS:** Mohamed Hashish, Kurt Mueller  
**FACULTY ADVISOR:** Eric Gilbertson, PhD  
**STUDENTS:** Andrew Carducci, Zena-Maria Husler, Nhan Nguyen, Nick Redlew

Flow International is the founder and world leader in waterjet technology. Waterjets operate at high pressure using only water and an abrasive that allows for almost any material to be cut into a desired shape. Flow currently manufactures their parts without any form of tracking; users have no way of knowing when to make timely replacements before their parts wear down. Flow is also unable to protect users from counterfeit after-market parts that reduce the effectiveness and efficiency of the waterjets. Our team was tasked with researching and testing a Radio-Frequency Identification (RFID) tracking system that will accurately track the time each part has been in use. Additionally, any part that fails to register with the system upon startup will be recognized as a counterfeit part, which will assist Flow in troubleshooting customer difficulties. The team designed multiple different systems that all effectively track their components. These systems have been tested and validated to meet the design requirements presented by Flow. Flow will analyze these systems and choose one to implement based on comparisons of cost and performance.

## ANALYSIS AND REDESIGN OF AN AIR GEAR MOTOR ME 18.4



**SPONSOR:** Ingersoll Rand  
**SPONSOR LIAISONS:** Eric Lentz, Wayne Osborne, Christopher Home, Aaron Williamson, PE, Ja'Baree White  
**FACULTY ADVISOR:** Joshua Hamel, PHD, PE  
**STUDENTS:** Colleen Den Adel, Mauricio Gutierrez Amezcuita, Michael Lo, Ben Loveless

Ingersoll Rand is a material handling company that designs winches and pneumatic motors. One of the company's products is an air-powered gear motor winch. Air-powered gear motors are notoriously inefficient, but the reasons behind the inefficiencies are not well understood. Ingersoll Rand tasked Team ME 18.4 with gaining an understanding of the internal fluid physics of the gear motor, as well as designing gears to improve performance. To achieve a better understanding of the gear motor, both an analytical and physical model of the system were developed. The analytical model was a computational fluid dynamics (CFD) to simulate the fluid physics internal to the motor. The physical model was a testing apparatus used to validate the results seen in the CFD model.





## MOTOR/GENERATOR APPLICATION MECHANISM FOR SEMI-TRUCK HVAC SYSTEM ME 18.5



**SPONSOR:** Kenworth Truck Company

**SPONSOR LIAISONS:** Stan DeLizo, Brian Lindgren, Ted Scherzinger

**FACULTY ADVISOR:** Yen-Lin Han, PhD

**STUDENTS:** William Denney, Dillon Itai, Michael Moser, Akena Sponsler

Kenworth is a leading medium- and heavy-duty truck manufacturer that specializes in making efficient and ecofriendly trucks. Their T680 long-haul sleeper truck currently uses two HVAC systems, one in the engine block and the other in the sleeper cab, to control the environment while the engine is on and off, respectively. Kenworth tasked team ME 18.5 with consolidating the two HVAC systems using a motor/generator. The motor/generator will charge an array of high-density batteries while driving, and power the air conditioning while the driver is sleeping. The team designed a new clutching system and control system that will allow the motor/generator to facilitate the single HVAC system. Compared to the original design, the new design costs less to manufacture and is more fuel efficient.

**“Working with T-Mobile for my senior design project has provided me with invaluable knowledge outside the classroom. I have successfully carried multiple facets of the project through the entire design process, from concept through implementation with the necessary iterative steps mixed in. This project, which includes protected intellectual property, has proved not only to be challenging from an engineering perspective, but has also pushed me into a more professional state of mind due to its classified nature.”**

**CHRIS SALSBURY '18 ME**

## CASCADE DESIGNS VALVE ASSEMBLY STATION ME 18.6



The Lighthouse for the Blind, Inc.

**SPONSOR:** The Lighthouse for the Blind  
**SPONSOR LIAISONS:** Doug Lintz, Brent Weichers  
**FACULTY ADVISOR:** Robert Cornwell, PhD, PE  
**STUDENTS:** Gabe Guidroz, Collin Olson, Alyssa Pena, Cameron Sterne

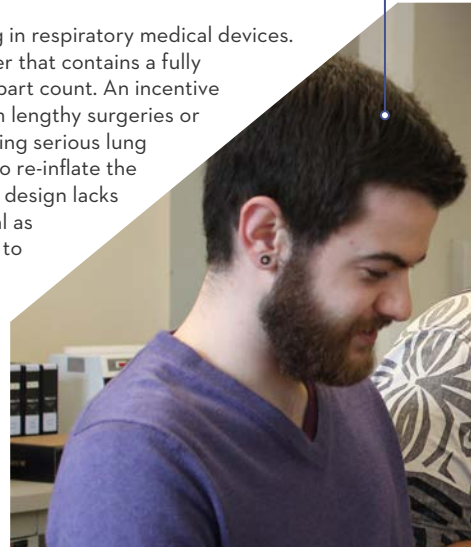
The Lighthouse for the Blind, Inc. is a not-for-profit organization that provides employment and training opportunities for people who are blind, deaf-blind, or blind with other disabilities. They currently have a contract with the Federal Government to assemble hydration systems for the military. The current valve assembly system requires frequent recalibration due to drift, and is unable to meet the required production rate. The team was tasked with increasing the production rate from 2,300 units to a minimum of 3,500 finished assemblies per day. Additionally, the assembly system needs to incorporate a sensor to verify the correct application of an o-ring onto the handle of every valve. The redesigned system improves upon the old system in three areas: dispensing the correct amount of silicone into a valve housing, checking for the correct installation of the o-ring onto the valve handle, and finally, pressing the valve housing and handle together. The redesigned system will allow The Lighthouse for the Blind, Inc. to increase production rates for the valve assembly while improving quality control.

## THERAPEUTIC INCENTIVE SPIROMETER: VALENA 5000 WITH SMI VERIFIER ME 18.7



**SPONSOR:** Lung Technologies, Inc.  
**SPONSOR LIAISON:** Kerry Curran  
**FACULTY ADVISOR:** Joshua Hamel, PhD, PE  
**STUDENTS:** John Downey, Allyne Meyer, Cameron Pudiquet, David (DJ) Traina

Lung Technologies, Inc. is a business and marketing firm specializing in respiratory medical devices. Team ME 18.7 was asked to design a therapeutic incentive spirometer that contains a fully mechanical counting system, a more modern look, and a minimized part count. An incentive spirometer is a device that is prescribed to a patient waking up from lengthy surgeries or surgeries in the thoracic region, to reduce the likelihood of developing serious lung conditions. The purpose of the therapeutic incentive spirometer is to re-inflate the alveoli, dislodge mucus buildup, and exercise the lungs. The current design lacks the ability to track the patient's prescribed inhalations. This is critical as patients are often disoriented post-surgery and cannot be relied on to accurately track their own progress. The team designed and prototyped the VaLena 5000 with SMI Verifier using the solid modeling software package SolidWorks and a stereolithography 3D printing system. The new design features an adjustable counting mechanism with a patient lockout as well as updated aesthetics. The design will be submitted for two patents and the Medical Device Excellence Awards pending market success.



INDUSTRIAL HARDWARE INSERTION AUTOMATION ME 18.8

# NIC Global

## Manufacturing Solutions

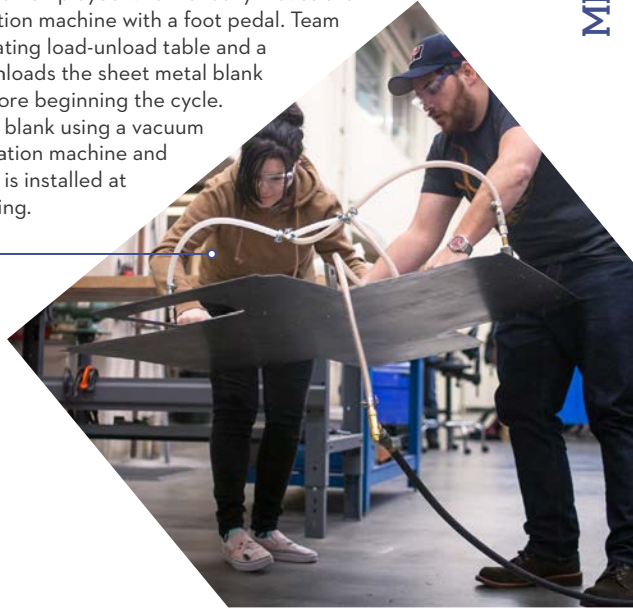
**SPONSOR:** NIC Global

**SPONSOR LIAISON:** Ted Wirsching

**FACULTY ADVISOR:** Greg Mason, PhD, PE

**STUDENTS:** Emma Ayubi, Nicole Greenheck, Aaron Key, Casey Martin, Cameron Peters, Mark Sifagaloa

NIC Global tasked Team ME 18.8 with improving the manufacturing process for a sheet metal cabinet. The cabinet starts as a flat sheet metal blank that has nearly 50 holes in which hardware is installed. This hardware is installed by an employee who manually moves the sheet metal blank and controls a hardware installation machine with a foot pedal. Team ME 18.8's design automates that process using rotating load-unload table and a material handling robot. The operator loads and unloads the sheet metal blank from a rotating two-position load-unload table before beginning the cycle. The material handling robot grabs the sheet metal blank using a vacuum gripper, positions the blank in the hardware installation machine and activates the machine. The new automated system is installed at NIC's facility and is currently undergoing final testing.



**“Be proactive, innovative and experimental. In my opinion, these things can be done by pushing oneself outside the comfort zone and by creating opportunities for both personal and professional growth.”**

**SUKHMAN GHUMMAN** '16 Business Analyst II, Bluetooth

**PILATES PLANNER MSE 18.1****PILATES PLANNER***get centered***SPONSOR:** Emerald City Pilates**SPONSOR LIAISONS:** Ross Bohner, Jessica Notman, STOTT Pilates Instructor, NSCA-CPT**FACULTY ADVISOR:** Mike McKee**STUDENTS:** Craig Fischer, Emmanuel Ogala, Abdul Ahad Shaikh, Iram Shaikh

Emerald City Pilates is a premier, private Pilates boutique that specializes in creating movement and wellness programs tailored to each client. Seeking to customize and enhance the overall process, the Emerald City Pilates sponsors asked our team to create the Pilates Planner tablet application. The purpose of the app is to enable Pilates instructors to quickly and easily collect customer postural data through an intuitive user interface, then have the app analyze that data and transform it into an appropriate workout plan for each customer. The instructors can use the app to track each workout, set goals and keep notes as they work to restore the client to a more neutral postural position. Instructors can also designate exercises for the clients to perform at home, where clients will download the app and use it to keep track of their own progress. Our team successfully created the app to meet the sponsor's specifications using the latest cross-platform mobile and cloud technologies.

**THREAT SENSING PLATFORM MSE 18.2****SPONSOR:** Starbucks**SPONSOR LIAISONS:** TJ Lunardi, Garrett Petraia**FACULTY ADVISOR:** Israel Hilerio**STUDENTS:** Michael Cheung, Venkat Nitish Chitturi, Kanav Gupta, Bhavenya Jayakumar, Arti Seshadri

Geo-political events can impact a number of aspects of a company's business. To help it assess the impact of such events on its business, Starbucks has been working with Team MSE 18.2 to develop a machine learning system that predicts geo-political events worldwide. By using artificial intelligence techniques, the system avoids injecting human subjectivity into the analysis and thus, generates more accurate predictions. Analysts can then use these more accurate predictions, in conjunction with their own knowledge and expertise, to make more informed business decisions related to supply chain management, new business opportunities, sales, etc.

The machine learning system that Starbucks and MSE 18.2 has developed relies on a client-server architecture, with R and Tableau clients and a node.js server. The machine learning model employed by the system uses data from a variety of sources, as well as multiple, independent algorithms, to generate accurate predictions in which we have a high degree of confidence.

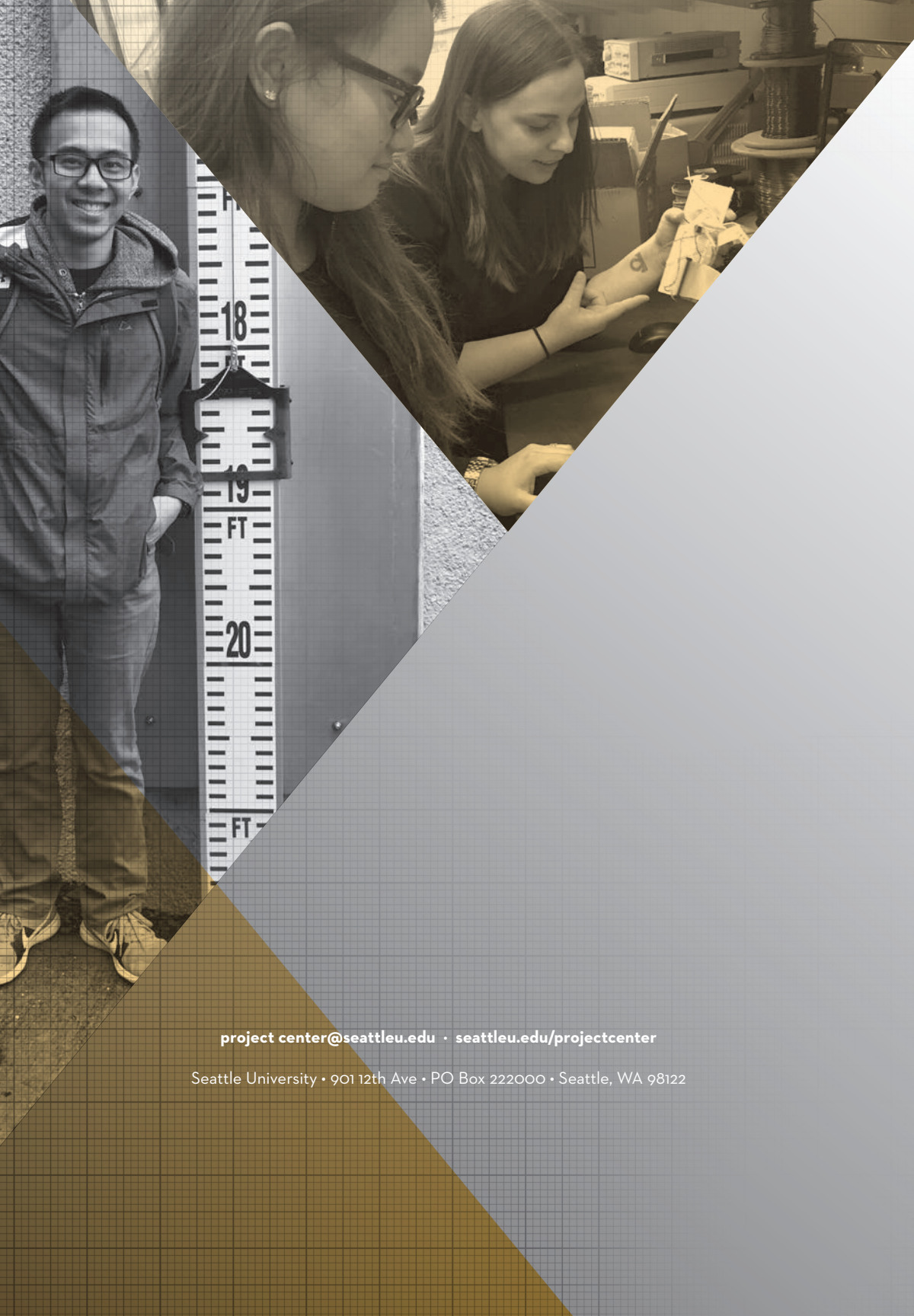


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**To find out more, contact Corporate Relations Manager Rachael Brown at 206-296-2822 or email [ProjectCenter@seattleu.edu](mailto:ProjectCenter@seattleu.edu).**



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