Welcome to UW Electrical Engineering’s annual Capstone Fair. It’s a pleasure every year to invite our industry and campus colleagues to join us as we showcase and celebrate the hard work of our students, who will soon be graduating as the next generation of electrical engineers.

This year’s fair features work from nearly 40 groups presenting capstones from courses as diverse as digital signal processing, computer systems architecture and robotics. The students here today comprise the majority of our graduating seniors.

Most of the projects here arise from ENGINE — our Engineering Entrepreneurial Capstone program. ENGINE was created to enable students to work in teams on industry sponsored projects. The program is designed to develop students’ skills in innovation, systems engineering and project management. Developed only three years ago, ENGINE has grown every year, from just four projects to 22 projects to 34. Last year 40% of our graduating seniors enrolled in this capstone program. This year we’re proud to say that 55% of our graduating students are participating.

ENGINE wouldn’t be possible without an engaged local innovation community. The department is very grateful for our valuable partnerships with industry. These collaborations yield wonderful outputs, from fostering student preparedness after college to fueling innovative research and design. Indeed, some of last year’s ENGINE projects were successful and complex enough that they were carried into this year’s class.

Congratulations to all students on the completion of your final capstone projects! The knowledge you have gained from this experience will serve you well in the coming years. I have no doubt that you will build successful and rewarding careers.

I hope everyone enjoys the Capstone Fair today. I look forward to having the chance to talk with you about future collaborations.

Best to all,

Radha Poovendran
Professor and Chair
Pelvic Floor Biofeedback Platform

FACULTY ADVISER
Robert Bruce Darling

STUDENTS
Wei-Hong Li, Cory Kelly, Xiaoyu Ye, Yicheng Hu

Development of an EMG biofeedback platform for treating pediatric urinary incontinence in the home.

EE 400

CONTACT
bruced@uw.edu

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PLACEMENT 24

Automated Turn Signal Based on Trailer Dynamics

FACULTY ADVISERS
Robert Bruce Darling, Howard J. Chizeck

STUDENTS
Madelyn Schneider, Michael Zeng

Development of a system for classification of complex semi-truck turns and lane changes using sensors and vehicle dynamics.

EE 448/449

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PLACEMENT 3

MUUGUZI Fetal Monitor

FACULTY ADVISER
Robert Bruce Darling

STUDENTS
Carl Terrett, Jaclyn Rainey, Ketan Mhetre, David Rappaport, Anton Nachmanason

Design, build, and test of an autonomous fetal-ECG and contraction monitoring system, with extendability to other vital signs.

EE 400

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PLACEMENT 31

Contextually Aware Autonomous Wheelchair

FACULTY ADVISER
Howard J. Chizeck

STUDENTS
Kun Su, Kevin Joshua Caravaggio, Jacky Cheng

Design, build, and test of a contextual awareness multi-sensor module for autonomous wheelchairs.

EE 448/449

CONTACT
uwtcat@uw.edu

SPONSOR
Taskar Center for Accessible Technology

PLACEMENT 6

Audio Classification Using Neural Networks

FACULTY ADVISER
Jenq-Neng Hwang

STUDENTS
Tianhang Gao, Yiran Fu

Development of models and a system to achieve highly precise, real-time audio classification of numbers and musical instruments.

EE 443

CONTACT
hwang@uw.edu

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UW Electrical Engineering

PLACEMENT 26

OceanLens ROV Underwater Recharging and Data Transfer

FACULTY ADVISER
Howard J. Chizeck

STUDENTS
Jeffrey Chrisope, Rachel Kominek

Design, build, and test of a system for wireless underwater charging and data transfer for a remotely operated underwater vehicle, including an autonomous self-docking module.

EE 448/449

CONTACT
chizeck@uw.edu

SPONSOR
Booz Allen Hamilton

PLACEMENT 9
Neutron Therapy Precision Platform

**FACULTY ADVISER**
Howard J. Chizeck

**STUDENTS**
Preston Fowler, Fabian Sutandyo, Kelson Kaiser

Development of a software system to control a robotic arm and design of a micro-collimator for a neutron beam, allowing UW Medicine to conduct experiments for cancer treatment.

**CONTACT**
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**SPONSOR**
UW Medicine

**PLACEMENT**
15

Automated Juvenile Fish Counter

**FACULTY ADVISER**
Howard J. Chizeck, Tai-Chang Chen

**STUDENTS**
George Foggin, Symone Griffin, Josh Walewander

Design, build, and test of an automatic fish counting system using a near-infrared camera and a debris recognition system.

**CONTACT**
chizeck@uw.edu

**SPONSOR**
Tacoma Power

**PLACEMENT**
27

Machine Vision System for Optical tracking of a Laser Power Beaming System

**FACULTY ADVISERS**
Howard J. Chizeck, Arka Majumdar

**STUDENTS**
Issac Huang, Qingrou Deng, Chenglong Li

Development of an optical tracking system to enable laser aiming for a laser powered aircraft.

**CONTACT**
chizeck@uw.edu

**SPONSOR**
Powerlight Technologies

**PLACEMENT**
29

Precision Delivery Device for Sensors and/or High Value Cargo

**FACULTY ADVISERS**
Howard J. Chizeck, Sumit Roy

**STUDENTS**
Jordan Coult, Samuel Scherer, Thomas Longanecker

Development of a motion controller and tablet application for directing a cargo-carrying drone to precise locations.

**CONTACT**
chizeck@uw.edu

**SPONSOR**
Applewhite Aero

**PLACEMENT**
35

Low-cost Physical Shopping Cart Content Tracking

**FACULTY ADVISER**
John D. Sahr

**STUDENTS**
Attila Herrera, Alvin Cao, Hung Huynh

Design, build, and test of a system for live content tracking of physical shopping carts, giving brick-and-mortar stores the same level of real-time consumer analytics afforded by online shopping.

**CONTACT**
jdsahr@uw.edu

**SPONSOR**
Xinova

**PLACEMENT**
1

Video Analytics of Pedestrian Traffic using Deep Neural Networks

**FACULTY ADVISER**
Arka Majumdar

**STUDENTS**
Chang Li, Jiwei Wang, Jiachen Zou

Development of a system for real-time pedestrian counting in Light Rail stations using image-based object detection methods.

**CONTACT**
arka@uw.edu

**SPONSOR**
Sound Transit

**PLACEMENT**
2
Scalable Quality Control with Machine Vision for Home Smart Lighting Systems

**Faculty Adviser:** Denise Wilson  
**Students:** Yang Zheng, Steven Huang, Radleigh Ang

Design, build, and test of an automated, scalable quality control system for smart lighting systems, ready for factory floor implementation.

---

A Smartphone Voice-Command Query App for Your Genetic Report

**Faculty Adviser:** Sreeram Kannan  
**Students:** Bassam Halabiya, Zhengjie Zhu, Sachi Verma

Development of an Android app using natural language processing to process a user’s genetic report and communicate with him/her in a chat format.

---

High Throughput Droplet Scanning for Limited Resource Bacterial Infection Monitoring

**Faculty Adviser:** M.P. (Anant) Anantram  
**Students:** Meejin Moon, Qinghao Meng, Yueyang Cheng

Development and testing of peak detection algorithms for counting the number of bacteria-infected droplets in a high-throughput infection scanning system.

---

Spacecraft Radio Receiver Signal Detector

**Faculty Adviser:** Robert Bruce Darling  
**Students:** Daniel Huynh, Nathan Thai, Nathan Hirsch

Design, build, and test of a low-power system that detects a radio frequency signal and wakes up the primary radio receiver on a satellite.

---

Portable Platform for Image/Video Annotation

**Faculty Adviser:** Jenq-Neng Hwang  
**Students:** Sujie Zhu, Max Pfeiffer

Development of a portable annotation platform for images and videos captured by a vehicle camera system.

---

Crowd Sensing

**Faculty Advisers:** Eli Shlizerman, Jeff Riffell  
**Students:** Yiyu Feng, Mihir Modi, Vinh Nguyen

Design, build, and test of a portable and low-cost air quality monitoring device for everyday use.
PROJECT LOCATIONS

North Ballroom

Keep Clear

20

Standard Set

Open Space,

Stacks of Chairs

Max Capacities

Lecture (East) - 797

Lecture (South) - 775

Banquet (East) - 480

Banquet (South) - 410

Exhibit - 84 Tables

Square Feet

8,288

Contact

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http://depts.washington.edu/thehub/

Scale

1 inch = 20 feet

All components of the diagrams are subject to change. Illustrated diagrams and their components are estimations only. Additional furnishings (stacks of chairs/tables) not indicated on diagram may be present in the room at the time of your reservation. Please contact our office with any additional questions.

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Keep Clear

Keep Clear

Keep Clear

Please sign below and return by listed due date on your confirmation. Only first contact's signature will be accepted.

Signature:_________________________________________________________   Date:________________________

By signing this diagram, you agree to this setup. Changes on the day of event MAY not be possible. All exits and hallways must remain clear and unblocked.
Utility Data Collection, Monitoring and Analytics System

**FACULTY ADVISER:** Baosen Zhang  
**STUDENTS:** Zihao Tao, Ryan Linden, Sixiang He

Development of a data collection, monitoring and analytics web application for utility data for easy visualization and discovery of problems associated with readings.

---

Cloud Based Machine Learning Portable Inference Models Using NeoPulse AI Studio

**FACULTY ADVISER:** Blake Hannaford  
**STUDENTS:** Griffin Wu, James Guo

Development of a cloud based platform that simplifies machine learning; using AI to build AI.

---

Web Platform for Management of Data Science as a Service

**FACULTY ADVISER:** Payman Arabshahi  
**STUDENTS:** Emi Harada, Alex Castro, Haobo Zhang

Development of a data science web platform to enable rapid scripting, data analytics, and data categorization.

---

Device-to-Device (D2D) Offline Communications App

**FACULTY ADVISER:** James A. Ritcey  
**STUDENTS:** Ethan Tarr, Walker Kasinadhuni, Abdulkader Katanani

Development and testing of a Wi-Fi Direct app on smartphones to allow them to communicate with each other without being online.

---

Wearable Heart Rate Monitor

**FACULTY ADVISER:** Robert Bruce Darling  
**STUDENTS:** Denis Jivaikin, James Goin, Camila Palacio

Design, build, and test of a wearable device to be worn on or around the facial region, specifically around the head or neck, to measure and monitor the user’s vitals.

---

RF Fingerprinting Using OneRadio MVP Platform

**FACULTY ADVISER:** John D. Sahr  
**STUDENTS:** Alex Finestead, Jesse Yang

Development of a system for algorithmically determining the identity of a radio frequency transmitter using a software defined radio platform.
A Platform for Evaluating the Benefit of Virtual Travel for Clinical Conditions (Alzheimer’s or Pain Management)

**FACULTY ADVISER**
Payman Arabshahi

**STUDENTS**
Niveditha Kalavakonda, Pinzhu Qian, Jamie Santos

Development of a virtual reality EEG system to study the potential of virtual travel for Alzheimer’s prevention.

---

Wirelessly Powered Left Ventricular Assist Device (LVAD)

**FACULTY ADVISER**
Joshua R. Smith

**STUDENTS**
Thaolam Ngo, Cloe Lee, Tin-tin Patana-anake

Design, build, and test of a wireless power system for left ventricular assist devices for heart disease patients.

---

Wearable Medical Device for Bladder Volume Monitoring

**FACULTY ADVISER**
Tai-Chang Chen

**STUDENTS**
Harshit Kyai, Liwen Zeng, Olivia Nelson

Design, build, and test of a wearable bladder monitor that allows for patient mobility, enables continuous bladder monitoring, and provides smartphone alerts.

---

A Smart Light Trap for Zooplankton Monitoring

**FACULTY ADVISER**
Lih Lin

**STUDENTS**
Elizabeth Zhang, Edmund Trinh, Yu-Hao Cheng

Design, build, and test of a smart light trap using an underwater camera system for capturing and imaging zooplankton species.

---

Advanced Driver Assistance Systems Radar Blindspot Monitoring

**FACULTY ADVISER**
Alexander Mamishev

**STUDENTS**
Matthew Lee, Jerrold Erickson, Yi-Ting Tsai

Development of a video analysis system to enhance the detection performance of truck mounted radar systems, specifically addressing issues with radar blindspots.

---

Industrial Wireless Network

**FACULTY ADVISER**
James K. Peckol

**STUDENTS**
Mitchell Orsucci, Tiffany Luu, Nesta Isakovic

Development and rollout of an internet connected network of 100 wireless nodes for industrial applications.
Using RAIN (RFID) to Locate a Lost Person

**Faculty Adviser:** Jacques “Chris” Rudell

**Students:** Marcus Deichman, Ben Nguyen

In a contained setting like an amusement park, our project uses Impinj’s RAIN (RFID) technology to provide a faster and more efficient way to locate a lost person.

---

Car Repositioning System for Staff, Users, and Autonomous Vehicles

**Faculty Adviser:** Samuel Burden

**Students:** Yaying Huang, Nguyen Lai

Development of a system to predict car demands based on various parameters (hour of day, day of week, day of month, weather, coordinates) to enable optimum car relocation and repositioning.

---

Cancer Medical Record Time Slicer and Classifier

**Faculty Advisers:** Payman Arabshahi, Arindam K. Das

**Students:** Cece Landau, Kevin Lau

Development of a machine learning system to capture and learn from the experiences of patients with myeloma, and using the gained knowledge to predict patient response to treatments.

---

Interactive Spectrum Management Tool

**Faculty Adviser:** Sumit Roy

**Students:** Fizza Aslam, Daniel Tran

Development of an interactive web tool that provides information on current state of FCC wireless spectrum bands including current and future band allocations.
Pothole Detection Using Smartphones

Development of an iOS application for geolocated pothole detection while driving a car, and creation of a citywide heat map of potholes.

Multi-Issue Risc-V Microprocessor Based on Ariane

Development of an enhanced multi-issue and out of order microprocessor based on the Ariane RISC-V, which is a single issue and in order microprocessor.

For UW alums Milton “Milt” and Delia Zeutschel, education and entrepreneurship are lifelong passions. Milt received his BSEE in 1960 and went on to found five companies, three of which — Zetec, Data I/O Corp. and Zetron, Inc. — were met with resounding success. After receiving her bachelor’s from the College of Education in 1958, Delia entered a career as a teacher. To support education of the next generation of entrepreneurs, the Zeutschels have made an important endowment to the Department of Electrical Engineering.

The first portion of the Zeutschels’ endowment went to support ENGINE, UW EE’s Entrepreneurial Capstone Program. Capstone projects have always been an important part of an electrical engineering education, but students who enroll in ENGINE get the significant advantage of mentorship from engineering professionals and a focus on project management and project development. This real-world focus was important to Milt Zeutschel. “Over the years, I learned a lot of what to do and what not to do to run a company,” Zeutschel said. “A lot of new engineers think that solid engineering sells a company. But it’s more than that. To be successful, you need to create a product that sells to the customer and that the customer is willing to pay for. Having interactions early on in your education about all that it takes is key.”

PROMOTING ENTREPRENEURIAL EXCELLENCE

In December 2017, UW EE Professor Josh Smith was named the first Milton and Delia Zeutschel Professor for Entrepreneurial Excellence. In his research, Smith has an affinity for developing groundbreaking technologies — his group revealed a prototype for a battery-less cell phone in the summer of 2017. As an entrepreneur, Smith and students from his lab have spun off many start-up companies over the years: WiBotic, Jeeva Wireless and eLoupes to name a few.

Of the partnership with Milt and Delia, Professor and Chair Radha Poovendran said, “We are very grateful for the Zeutschels’ contributions to UW EE. This gift will not only be a significant resource to our students; it will also give back to the university as a whole and to the State of Washington.”

Top left–Milt and Delia Zeutschel at the investiture of Josh Smith (left) as the first Milton and Delia Zeutschel Professor for Entrepreneurial Excellence.

Below–Milt and Delia Zeutschel visit Josh Smith’s lab with Professor and Chair Radha Poovendran (front left).
Innovation starts here.