



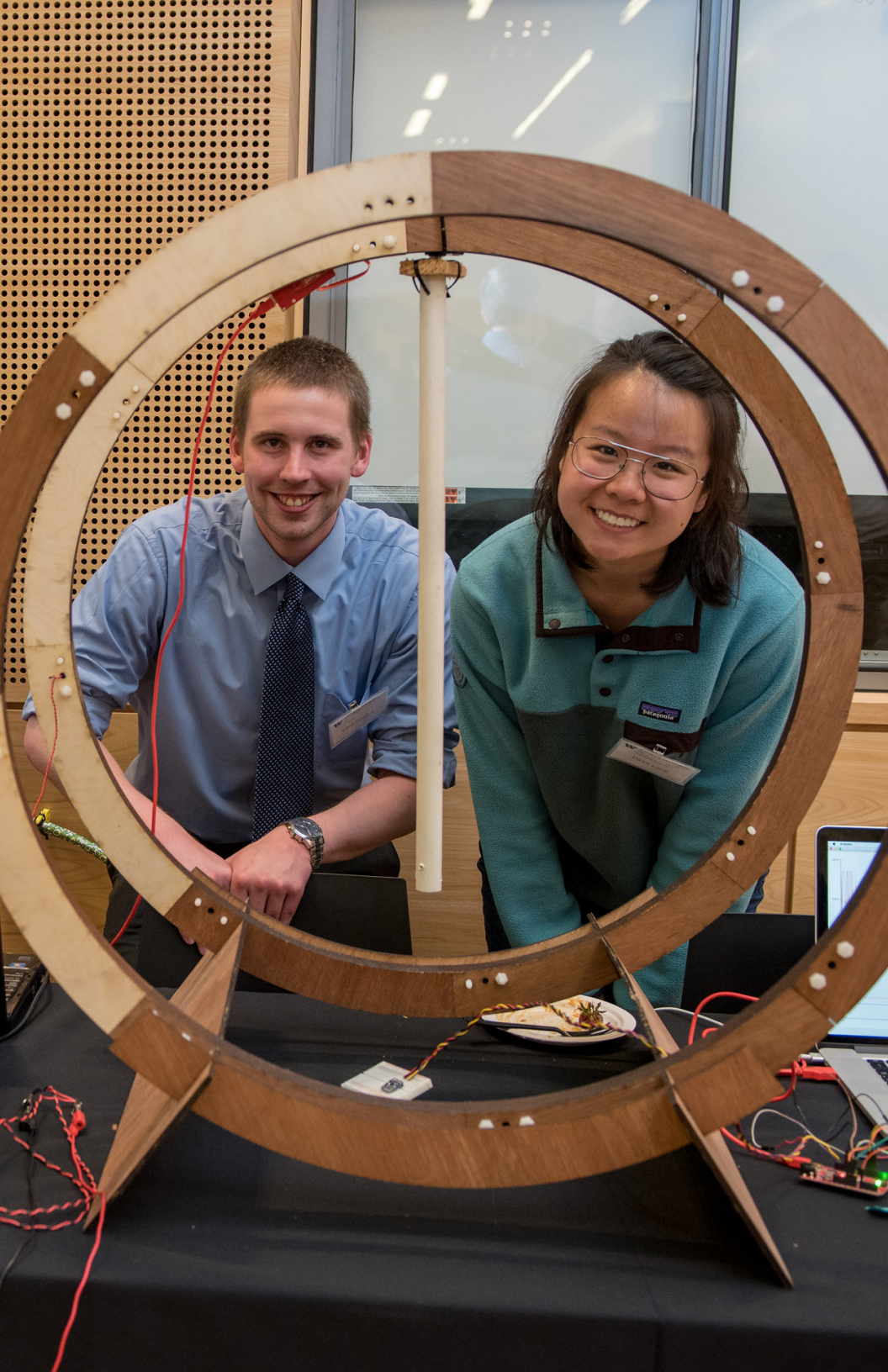
ELECTRICAL ENGINEERING

UNIVERSITY of WASHINGTON

INNOVATION
STARTS HERE

UWEE CAPSTONE FAIR

Friday, June 1, 2018
Event Program



WELCOME

A LETTER FROM THE CHAIR



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,

A handwritten signature in purple ink, reading "P. Radha Poovendran".

Radha Poovendran
Professor and Chair

**EE
400**

Pelvic Floor Biofeedback Platform

CONTACT
bruced@uw.edu

SPONSOR
UW Electrical Engineering

PLACEMENT **24**

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
448/449**

Automated Turn Signal Based on Trailer Dynamics

CONTACT
bruced@uw.edu

SPONSOR
Kenworth

PLACEMENT **3**

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
400**

MUUGUZI Fetal Monitor

CONTACT
bruced@uw.edu

SPONSOR
UW Electrical Engineering

PLACEMENT **31**

FACULTY ADVISER
Robert Bruce Darling

STUDENTS
**Carl Terrett, Jaclyn
Rainey, Ketan Mhetre,
David Rappaport,
Anton Nachmanson**

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

**EE
448/449**

Contextually Aware Autonomous Wheelchair

CONTACT
uwtc@uw.edu

SPONSOR
Taskar Center for Accessible Technology

PLACEMENT **6**

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
443**

Audio Classification Using Neural Networks

CONTACT
hwang@uw.edu

SPONSOR
UW Electrical Engineering

PLACEMENT **26**

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
448/449**

OceanLens ROV Underwater Recharging and Data Transfer

CONTACT
chizeck@uw.edu

SPONSOR
Booz Allen Hamilton

PLACEMENT **9**

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

Neutron Therapy Precision Platform

CONTACT
chizeck@uw.edu

FACULTY ADVISER
Howard J. Chizeck

STUDENTS
Preston Fowler, Fabian Sutandyo, Kelson Kaiser

SPONSOR
UW Medicine

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.

PLACEMENT **15**

EE
448/449

Precision Delivery Device for Sensors and/or High Value Cargo

CONTACT
chizeck@uw.edu

FACULTY ADVISERS
Howard J. Chizeck, Sumit Roy

STUDENTS
Jordan Coult, Samuel Scherer, Thomas Longanecker

SPONSOR
Applewhite Aero

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

PLACEMENT **35**

EE
448/449

Automated Juvenile Fish Counter

CONTACT
chizeck@uw.edu

FACULTY ADVISER
Howard J. Chizeck, Tai-Chang Chen

STUDENTS
George Foggin, Symone Griffin, Josh Walewander

SPONSOR
Tacoma Power

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

PLACEMENT **27**

EE
497/498

Low-cost Physical Shopping Cart Content Tracking

CONTACT
jdsahr@uw.edu

FACULTY ADVISER
John D. Sahr

STUDENTS
Attila Herrera, Alvin Cao, Hung Huynh

SPONSOR
Xinova

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.

PLACEMENT **1**

EE
448/449

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

CONTACT
chizeck@uw.edu

FACULTY ADVISERS
Howard J. Chizeck, Arka Majumdar

STUDENTS
Issac Huang, Qingrou Deng, Chenglong Li

SPONSOR
Powerlight Technologies

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

PLACEMENT **29**

EE
497/498

Video Analytics of Pedestrian Traffic using Deep Neural Networks

CONTACT
arka@uw.edu

FACULTY ADVISER
Arka Majumdar

STUDENTS
Chang Li, Jiwei Wang, Jiachen Zou

SPONSOR
Sound Transit

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

PLACEMENT **2**

EE
497/498

CONTACT
denisew@uw.edu

SPONSOR
Deako

PLACEMENT **4**

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.

EE
497/498

CONTACT
bruced@uw.edu

SPONSOR
Millennium Space Systems

PLACEMENT **8**

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.

EE
497/498

CONTACT
ksreeram@uw.edu

SPONSOR
BGI

PLACEMENT **5**

A Smartphone Voice-Command Query App for Your Genetic Report

FACULTY ADVISER
Sreeram Kannan

STUDENTS
Bassam Halabiya 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.

EE
497/498

CONTACT
hwang@uw.edu

SPONSOR
Volvo

PLACEMENT **10**

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.

EE
497/498

CONTACT
anantmp@uw.edu

SPONSOR
Intellectual Ventures

PLACEMENT **7**

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.

EE
497/498

CONTACT
shlizee@uw.edu

SPONSOR
UW Electrical Engineering

PLACEMENT **11**

Crowd Sensing

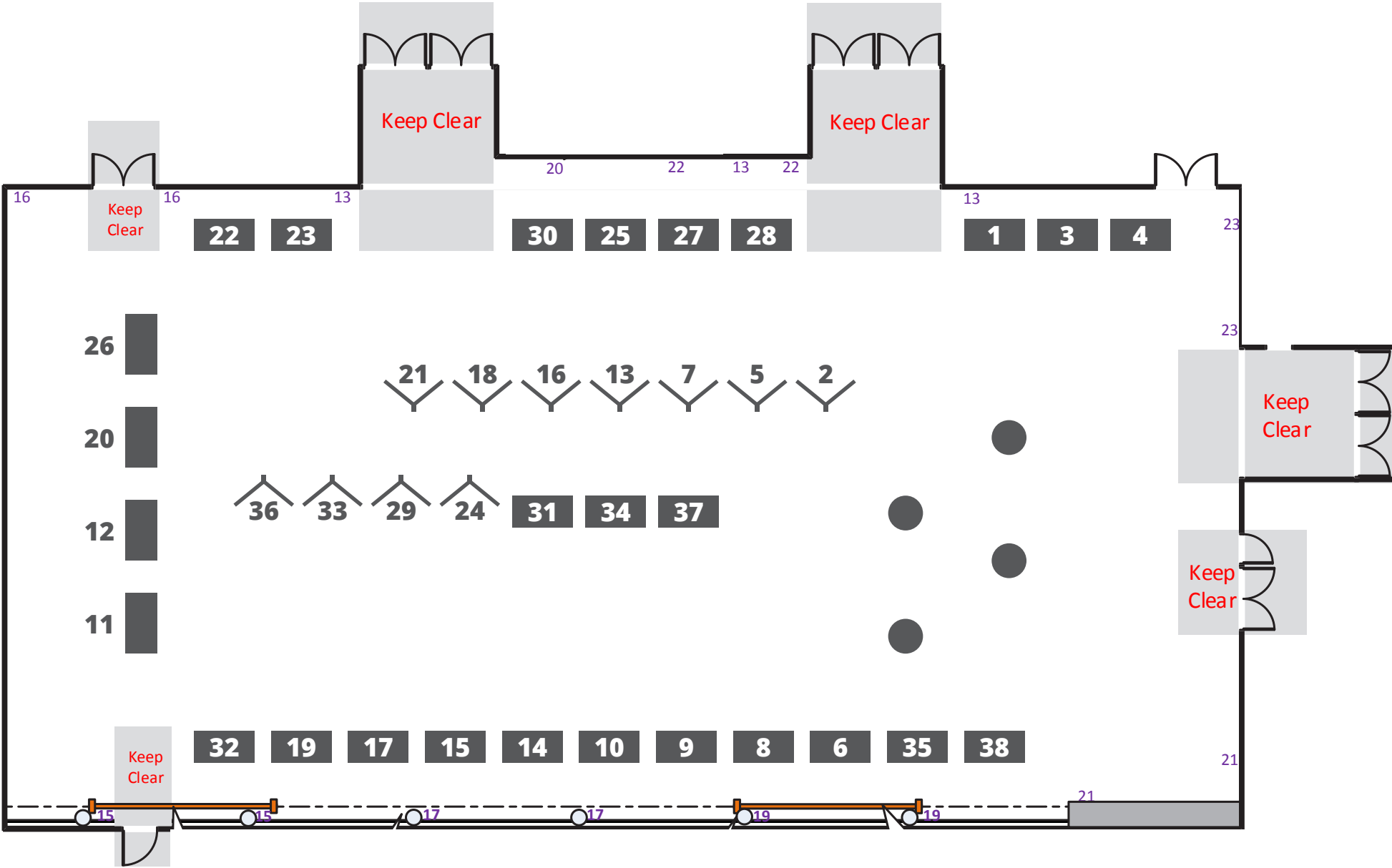
FACULTY ADVISERS
Eli Shlizerman, Jeff Riffell

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



EE
497/498

Utility Data Collection, Monitoring and Analytics System

CONTACT
zhangbao@uw.edu

FACULTY ADVISER
Baosen Zhang

STUDENTS
**Zihao Tao, Ryan Linden,
Sixiang He**

SPONSOR
Tupl

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

PLACEMENT **12**

EE
497/498

Device-to-Device (D2D) Offline Communications App

CONTACT
jar7@uw.edu

FACULTY ADVISER
James A. Ritcey

STUDENTS
**Ethan Tarr, Walker
Kasinadhuni, Abdulkader
Katanani**

SPONSOR
M87

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

PLACEMENT **16**

EE
497/498

Cloud Based Machine Learning Portable Inference Models Using NeoPulse AI Studio

CONTACT
blake@uw.edu

FACULTY ADVISER
Blake Hannaford

STUDENTS
Griffin Wu, James Guo

SPONSOR
DimensionalMechanics

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

PLACEMENT **13**

EE
497/498

Wearable Heart Rate Monitor

CONTACT
bruced@uw.edu

FACULTY ADVISER
Robert Bruce Darling

STUDENTS
**Denis Jivaikin, James
Goin, Camila Palacio**

SPONSOR
Oculus

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.

PLACEMENT **17**

EE
497/498

Web Platform for Management of Data Science as a Service

CONTACT
paymana@uw.edu

FACULTY ADVISER
Payman Arabshahi

STUDENTS
**Emi Harada, Alex Castro,
Haobo Zhang**

SPONSOR
Sonos

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

PLACEMENT **14**

EE
497/498

RF Fingerprinting Using OneRadio MVP Platform

CONTACT
jdsahr@uw.edu

FACULTY ADVISER
John D. Sahr

STUDENTS
**Alex Finestead,
Jesse Yang**

SPONSOR
OneRadio

Development of a system for algorithmically determining the identity of a radio frequency transmitter using a software defined radio platform.

PLACEMENT **18**

EE
497/498

CONTACT
paymana@uw.edu

SPONSOR
Booz Allen Hamilton

PLACEMENT **19**

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.

EE
497/498

CONTACT
jrs@cs.uw.edu

SPONSOR
UW Electrical Engineering

PLACEMENT **22**

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.

EE
497/498

CONTACT
tcchen@uw.edu

SPONSOR
Verathon

PLACEMENT **20**

Wearable Medical Device for Bladder Volume Monitoring

FACULTY ADVISER
Tai-Chang Chen

STUDENTS
**Harshit Kyal, 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.

EE
497/498

CONTACT
lylin@uw.edu

SPONSOR
NOAA

PLACEMENT **25**

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.

EE
497/498

CONTACT
mamishev@uw.edu

SPONSOR
Daimler

PLACEMENT **21**

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.

EE
497/498

CONTACT
jkp@uw.edu

SPONSOR
Fluke

PLACEMENT **28**

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.

EE
497/498

CONTACT
jcrudell@uw.edu

SPONSOR
Impinj

PLACEMENT **30**

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.

EE
497/498

CONTACT
shlizee@uw.edu

SPONSOR
**Spoken
Communications**

PLACEMENT **34**

Root Cause Analysis and Streaming Prediction of Call KPIs in Call Center Based on Transcription and Voice Features

FACULTY ADVISER
Eli Shlizerman

STUDENTS
**Titus Berndt, Kevin Hsu,
Ricky Zhang**

Development of machine-learning models for customer-service representatives to predict a call's duration within its first minute.

EE
497/498

CONTACT
sburden@uw.edu

SPONSOR
BMW ReachNow

PLACEMENT **32**

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.

EE
497/498

CONTACT
ksreeram@uw.edu

SPONSOR
Kirio

PLACEMENT **36**

6LoWPAN HTTP Client-Server

FACULTY ADVISER
Sreeram Kannan

STUDENTS
Pezhman Khorasani

Development of a low-power wireless client-server system for smart home connected devices and sensors.

EE
497/498

CONTACT
paymana@uw.edu

SPONSOR
All4Cure

PLACEMENT **33**

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.

EE
497/498

CONTACT
sroy@uw.edu

SPONSOR
T-Mobile

PLACEMENT **37**

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.

EE 497/498

CONTACT
manisoma@uw.edu

SPONSOR
Uber

PLACEMENT **38**

Pothole Detection Using Smartphones

FACULTY ADVISER
Mani Soma

STUDENTS
B. Kevin Ramada, Sam Shen, Jeremy Liem

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

CSE 548

CONTACT
prof.taylor@gmail.com

SPONSOR
UW Computer Science and Engineering

PLACEMENT **23**

Multi-Issue Risc-V Micro-processor Based on Ariane

FACULTY ADVISER
Michael B. Taylor

STUDENTS
Gaohong Liu, Yongqin Wang

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.

This space is intentionally blank.

PATRONS OF ENTREPRENEURSHIP



For UW alums Milton "Milt" and Delia Zeuschel, 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 Zeuschels have made an important endowment to the Department of Electrical Engineering.

SUPPORTING ENGINE

The first portion of the Zeuschels' 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 Zeuschel. "Over the years, I learned a lot of what to do and what not to do to run a company," Zeuschel 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 Zeuschel 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 Zeuschels' 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 Zeuschel at the investiture of Josh Smith (left) as the first Milton and Delia Zeuschel Professor for Entrepreneurial Excellence.

Below—Milt and Delia Zeuschel visit Josh Smith's lab with Professor and Chair Radha Poovendran (front left).





**Innovation
starts here.**