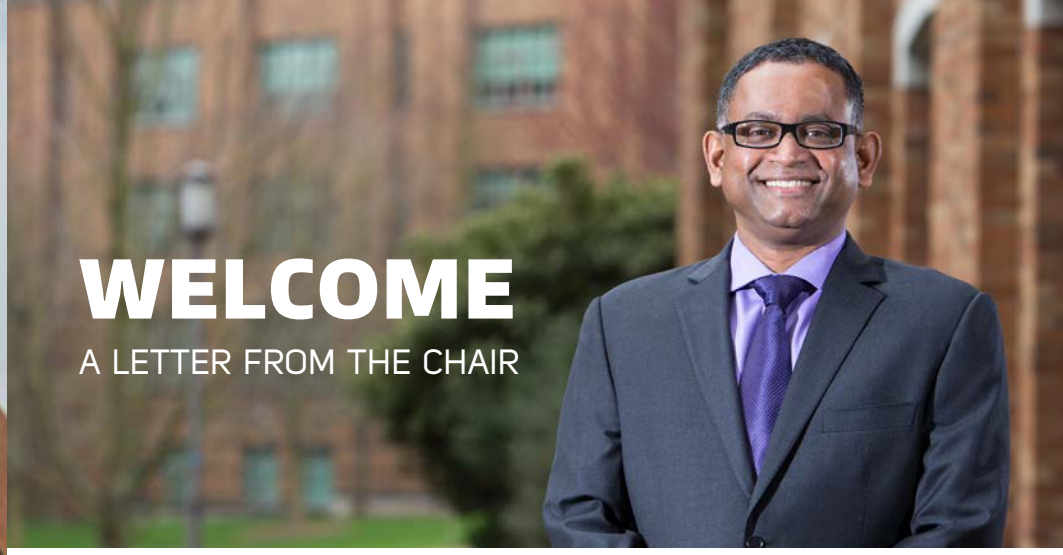
ELECTRICAL ENGINEERING
UNIVERSITY of WASHINGTON

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,

Radha Poovendran
Professor and Chair

EE 400

CONTACT
bruced@uw.edu

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PLACEMENT **24**

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 448/449

CONTACT
bruced@uw.edu

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Kenworth

PLACEMENT **3**

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 400

CONTACT
bruced@uw.edu

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PLACEMENT **31**

MUUGUZI Fetal Monitor

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

CONTACT
uwtcat@uw.edu

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Taskar Center for Accessible Technology

PLACEMENT **6**

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 mutli-sensor module for autonomous wheelchairs.

EE 443

CONTACT
hwang@uw.edu

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PLACEMENT **26**

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 448/449

CONTACT
chizeck@uw.edu

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PLACEMENT **9**

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

Neutron Therapy Precision Platform

CONTACT
chizeck@uw.edu

SPONSOR
UW Medicine

PLACEMENT **15**

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.

EE 448/449

Automated Juvenile Fish Counter

CONTACT
chizeck@uw.edu

SPONSOR
Tacoma Power

PLACEMENT **27**

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.

EE 448/449

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

CONTACT
chizeck@uw.edu

SPONSOR
Powerlight Technologies

PLACEMENT **29**

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.

EE 448/449

Precision Delivery Device for Sensors and/or High Value Cargo

CONTACT
chizeck@uw.edu

SPONSOR
Applewhite Aero

PLACEMENT **35**

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.

EE 497/498

Low-cost Physical Shopping Cart Content Tracking

CONTACT
jdsahr@uw.edu

SPONSOR
Xinova

PLACEMENT **1**

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.

EE 497/498

Video Analytics of Pedestrian Traffic using Deep Neural Networks

CONTACT
arka@uw.edu

SPONSOR
Sound Transit

PLACEMENT **2**

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.

EE 497/498

Scalable Quality Control with Machine Vision for Home Smart Lighting Systems

CONTACT
denisew@uw.edu

SPONSOR
Deako

PLACEMENT **4**

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

Spacecraft Radio Receiver Signal Detector

CONTACT
bruced@uw.edu

SPONSOR
Millennium Space Systems

PLACEMENT **8**

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

A Smartphone Voice-Command Query App for Your Genetic Report

CONTACT
ksreeram@uw.edu

SPONSOR
BGI

PLACEMENT **5**

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

Portable Platform for Image/Video Annotation

CONTACT
hwang@uw.edu

SPONSOR
Volvo

PLACEMENT **10**

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

High Throughput Droplet Scanning for Limited Resource Bacterial Infection Monitoring

CONTACT
anantmp@uw.edu

SPONSOR
Intellectual Ventures

PLACEMENT **7**

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-throuput infection scanning system.

EE 497/498

Crowd Sensing

CONTACT
shlizee@uw.edu

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PLACEMENT **11**

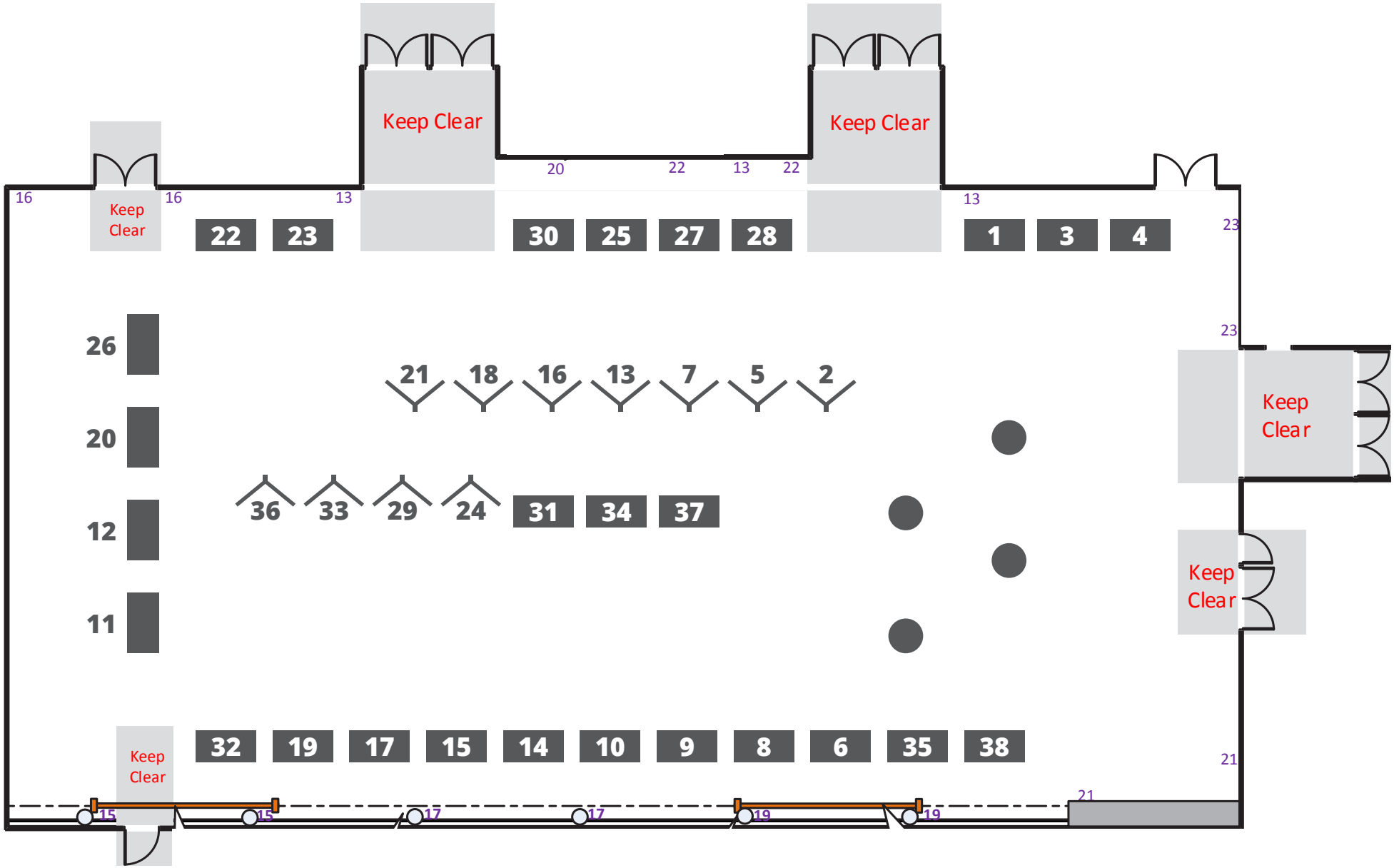
FACULTY ADVISERS
Eli Shlizerman, Jeff Riffell

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

SPONSOR
Tupl

PLACEMENT **12**

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.

EE 497/498

Cloud Based Machine Learning Portable Inference Models Using NeoPulse AI Studio

CONTACT
blake@uw.edu

SPONSOR
DimensionalMechanics

PLACEMENT **13**

FACULTY ADVISER
Blake Hannaford

STUDENTS
Griffin Wu, James Guo

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

EE 497/498

Web Platform for Management of Data Science as a Service

CONTACT
paymana@uw.edu

SPONSOR
Sonos

PLACEMENT **14**

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.

EE 497/498

Device-to-Device (D2D) Offline Communicattions App

CONTACT
jar7@uw.edu

SPONSOR
M87

PLACEMENT **16**

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.

EE 497/498

Wearable Heart Rate Monitor

CONTACT
bruced@uw.edu

SPONSOR
Oculus

PLACEMENT **17**

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.

EE 497/498

RF Fingerprinting Using OneRadio MVP Platform

CONTACT
jdsahr@uw.edu

SPONSOR
OneRadio

PLACEMENT **18**

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.

EE 497/498

A Platform for Evaluating the Benefit of Virtual Travel for Clinical Conditions (Alzheimer's or Pain Management)

CONTACT
paymana@uw.edu

SPONSOR
Booz Allen Hamilton

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.

PLACEMENT **19**

EE 497/498

Wearable Medical Device for Bladder Volume Monitoring

CONTACT
tcchen@uw.edu

SPONSOR
Verathon

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.

PLACEMENT **20**

EE 497/498

Advanced Driver Assistance Systems Radar Blindspot Monitoring

CONTACT
mamishev@uw.edu

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Daimler

FACULTY ADVISER
Alexander Mamishev

STUDENTS
Matthew Lee, Jerrold Erickson, Yi-Ting Tsai

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

PLACEMENT **21**

EE 497/498

Wirelessly Powered Left Ventricular Assist Device (LVAD)

CONTACT
jrs@cs.uw.edu

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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.

PLACEMENT **22**

EE 497/498

A Smart Light Trap for Zooplankton Monitoring

CONTACT
lylin@uw.edu

SPONSOR
NOAA

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.

PLACEMENT **25**

EE 497/498

Industrial Wireless Network

CONTACT
jkp@uw.edu

SPONSOR
Fluke

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.

PLACEMENT **28**

EE 497/498

Using RAIN (RFID) to Locate a Lost Person

CONTACT
jcrudell@uw.edu

SPONSOR
Impinj

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.

PLACEMENT **30**

EE 497/498

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

CONTACT
shlizee@uw.edu

SPONSOR
Spoken Communications

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.

PLACEMENT **34**

EE 497/498

Car Repositioning System for Staff, Users, and Autonomous Vehicles

CONTACT
sburden@uw.edu

SPONSOR
BMW ReachNow

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.

PLACEMENT **32**

EE 497/498

6LoWPAN HTTP Client-Server

CONTACT
ksreeram@uw.edu

SPONSOR
Kirio

FACULTY ADVISER
Sreeram Kannan

STUDENTS
Pezhman Khorasani

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

PLACEMENT **36**

EE 497/498

Cancer Medical Record Time Slicer and Classifier

CONTACT
paymana@uw.edu

SPONSOR
All4Cure

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.

PLACEMENT **33**

EE 497/498

Interactive Spectrum Management Tool

CONTACT
sroy@uw.edu

SPONSOR
T-Mobile

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.

PLACEMENT **37**

EE 497/498

Pothole Detection Using Smartphones

CONTACT
manisoma@uw.edu

SPONSOR
Uber

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.

PLACEMENT **38**

CSE 548

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

CONTACT
prof.taylor@gmail.com

SPONSOR
UW Computer Science and Engineering

FACULTY ADVISER
Michael B. Taylor

STUDENTS
Gaohong Liu, Yongqin Wang

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

PLACEMENT **23**

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PATRONS OF ENTREPRENEURSHIP

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.

SUPPORTING ENGINE

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 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).

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