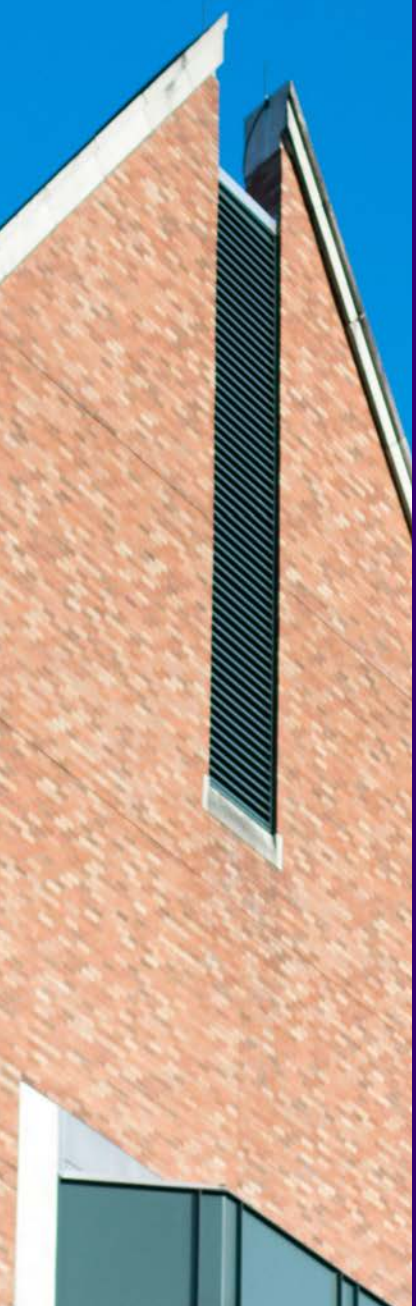
ELECTRICAL ENGINEERING
UNIVERSITY of WASHINGTON

UWEE CAPSTONE FAIR

May 30, 2017
Event Program

2017 EVENT PROGRAM



EVENT TIMELINE

4:30 p.m.

Fair Begins

5:15 p.m.

Chair's Welcome

5:20 p.m.

Dean's Welcome

5:25 p.m.

Fair Continues

6:30 p.m.

Fair Concludes

Join us at upcoming UW EE events!

www.ee.washington.edu/events/

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Connect with us!

chair@ee.washington.edu

www.ee.washington.edu/engage/

WELCOME

A LETTER FROM THE CHAIR

Dear Friends and Students,

Welcome to this year's UW Electrical Engineering Capstone Fair. This year marks the second showcase of our Electrical Engineering Entrepreneurial Capstone Program (ENGINE) projects. It marks the first year students will present their ENGINE projects alongside all UW EE senior capstone projects. This joint showcase illustrates the department's depth of innovation and vision.

Despite only being in its second year, ENGINE has seen significant growth. Over 40 percent of the UW EE graduating are enrolled in the course. This is five times as many students as last year. Industry partnership has grown to meet the demands of student interest, offering six times more projects in 2017 than 2016.

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. These connections have a big impact throughout the UW and beyond.

This year, the department is proud to present 38 projects from our graduating class. The range of project topics are impressive, covering numerous areas of impact, including health, power and energy, transportation, the environment and artificial intelligence.

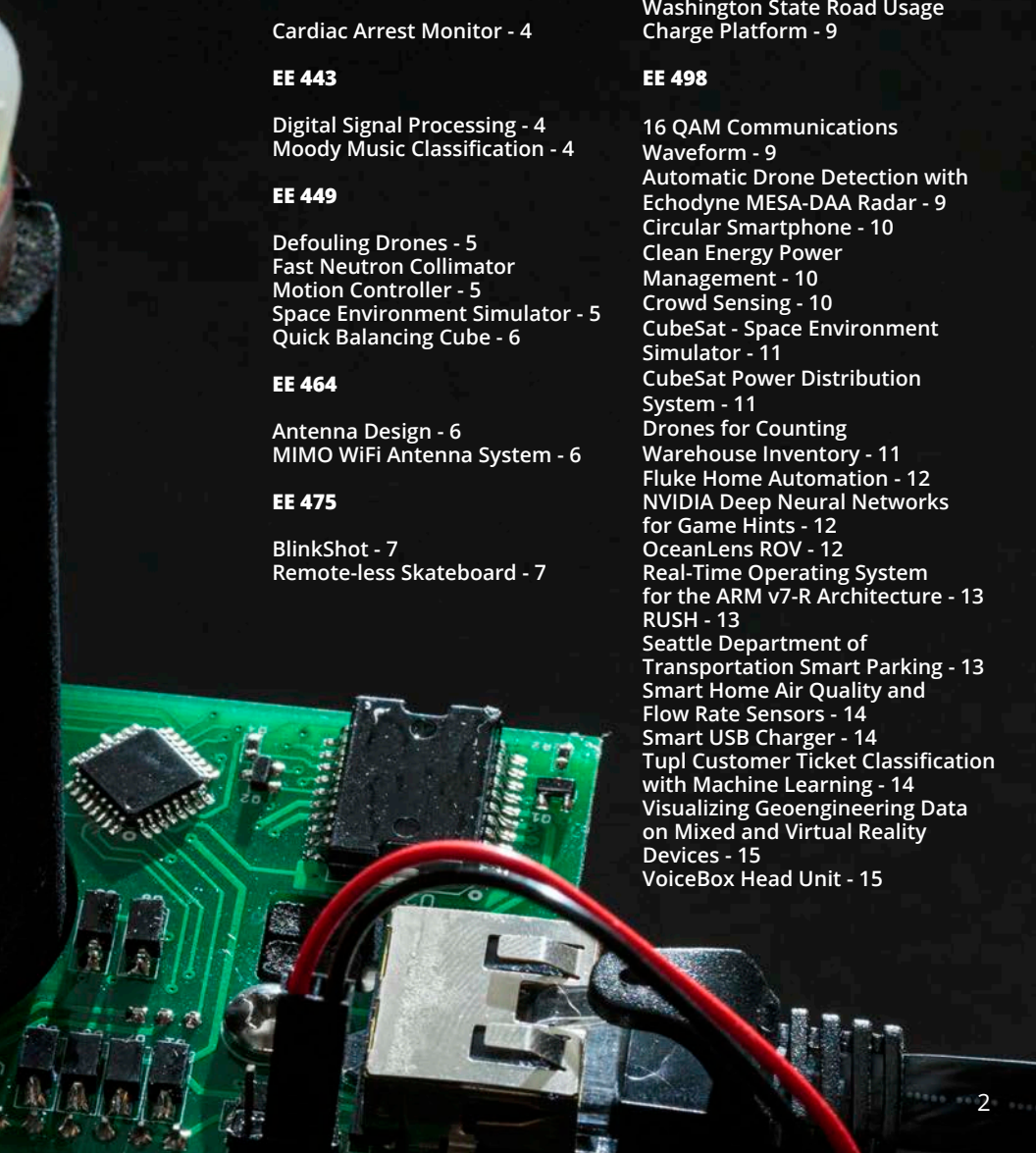
Congratulations to all students on the completion of your final capstone projects. The knowledge you have gained from this experience will serve you well in the coming years, and I have no doubt that you will build successful and rewarding careers.

We look forward to continuing to work with our industry partners and build an excellent collaborative ENGINE in the years to come!

Best to all,

Radha Poovendran
Professor and Chair

2017 CAPSTONE PROJECTS



EE 420

COMMUNICATIONS SYSTEM FOR STREAMING REAL-TIME VOICE

CONTACT:
zhouyuan@uw.edu

TABLE: **9**

FACULTY ADVISER
Payman Arabshahi

STUDENTS
Walker Kasinadhuni
Zhouyuan Xu

This project builds a communications system for streaming real-time voice using SDR technology in USRP N210.

EE 420

DIGITAL COMMUNICATION USING USRB BOARDS

CONTACT:
zz85@uw.edu

TABLE: **E7**

FACULTY ADVISER
Payman Arabshahi

STUDENTS
Hongyu Xiao
Zhuolun Zhou

This project enhances digital communication using Universal Software Radio Peripheral (USRP) boards.

EE 420

HARDWARE ACCELERATION FOR SOFTWARE-DEFINED RADIO

CONTACT:
sungk9@uw.edu

TABLE: **E6**

FACULTY ADVISER
Payman Arabshahi

STUDENTS
Sung Kim
Nathan Thorpe

EE 438

CARDIAC ARREST MONITOR

CONTACT:
pcieszki@uw.edu

TABLE: **1**

FACULTY ADVISER
Robert Bruce Darling

STUDENTS
Nate Broughton
Paula Cieszkiewicz
Han Baek Lee
Scott Yoshida

This project creates a real-time carotid arterial flow measurement system to aid in cardiac monitoring and resuscitation.

EE 443

DIGITAL SIGNAL PROCESSING

CONTACT:
yingkaiw@uw.edu

TABLE: **4**

FACULTY ADVISER
Jenq-Neng Hwang

STUDENTS
Yingkai Wang
Xinxin Zhang

EE 443

MOODY MUSIC CLASSIFICATION

CONTACT:
rosoffs@uw.edu

TABLE: **3**

FACULTY ADVISER
Jenq-Neng Hwang

STUDENTS
Youngjin Kang
Scott Rosoff

This project uses machine learning to classify the mood of a song in real-time and predict its genre.

EE 449

DEFOULING DRONES

CONTACT:
danzhu@uw.edu

TABLE: **15**

FACULTY ADVISER
Howard Chizeck

STUDENTS
Dave Anderson
Destiny Mora
Matt Valuet
Daniel Zhu

This project uses a custom-built drone to remove shoes from utility lines.

EE 449

FAST NEUTRON COLLIMATOR MOTION CONTROLLER

CONTACT:
thaij@uw.edu

TABLE: **14**

FACULTY ADVISER
Howard Chizeck

SPONSOR
UW Medical Center

STUDENTS
Matthew Dentinger
Marissa Kranz
Joey Thai

This project augments an existing neutron therapy system with a motion controller to improve performance.

EE 449

SPACE ENVIRONMENT SIMULATOR

CONTACT:
cpete5363@gmail.com

TABLE: **E5**

FACULTY ADVISER
John D. Sahr

SPONSOR
CubeSat

STUDENTS
Dawn Liang
Chris Peterson

This project constructs a space environment simulator through a Helmholtz cage and sun simulator.

EE 449

QUICK BALANCING CUBE

CONTACT:
ryan@ryanmills.info

TABLE: **5**

FACULTY ADVISER
Howard Chizeck

STUDENTS
Athina Ebert
Kyle Hess
Ryan Mills
Peter Zhang

This project creates a cube that uses reaction wheels and a feedback loop to balance.

EE 464

ANTENNA DESIGN

CONTACT:
liuyannan0721 @hotmail.com

TABLE: **13**

FACULTY ADVISER
John D. Sahr

STUDENTS
Max Bright
Yueyang Chen
Yannan Liu

Students design antennas at 2.4 and 5.8GHz for a dual frequency MIMO Wi-Fi router.

EE 464/ 574

MIMO WI-FI ANTENNA SYSTEM

CONTACT:
jamesdr@uw.edu

TABLE: **2**

FACULTY ADVISER
John D. Sahr

STUDENTS
Marvin Gonzalez
Rodney Linton
James Rosenthal

This project explores novel antennas to create a compact Wi-Fi MIMO system with nearly isotropic coverage.

EE 475

CONTACT:
xx28@uw.edu

TABLE: **E3**

BLINKSHOT

FACULTY ADVISER
Shwetak N. Patel

STUDENTS
Wenhan Tang
Xinyi Xu
Zhengjie Zhu

This project develops a glasses-like wearable device that can take pictures based on eye blinks.

EE 475

CONTACT:
huangqx@uw.edu

TABLE: **19**

REMOTE-LESS SKATEBOARD

FACULTY ADVISER
Shwetak N. Patel

STUDENTS
Clement Chung
Jianfeng Huang
Qixuan Huang
Yikun Li

This project builds a remote-less skateboard that is controlled by leaning forward and backward to move or stop.

EE 484

CONTACT:
colinm17@uw.edu

TABLE: **12**

THE BRUX BUSTER

FACULTY ADVISER
Denise Wilson

STUDENTS
Colin Morris

This project creates an intraoral orthotic sensor system to clinically diagnose sleep bruxism.

EE 484

LITE-SENSE

CONTACT:

michaelachoquer@gmail.com

TABLE: **E4**

FACULTY ADVISER

Denise Wilson

STUDENTS

Michael Choquer
Mert Polat
Justin Yantus

This project develops a wearable device that measures light intensity and blue light for adaptive lighting systems.

EE 484

TO PICK, OR NOT TO PICK: A WINEMAKER'S DILEMMA

CONTACT:

ceschae@uw.edu

TABLE: **7**

FACULTY ADVISER

Denise Wilson

STUDENTS

Paula Cieszkiewicz
Jeffrey Ludwig
Caitlin Schaefer

This project develops a sensing system that quantifies wine grape properties to evaluate harvest readiness.

EE 484

QUENCH ON THE BENCH

CONTACT:

vidb@uw.edu

TABLE: **8**

FACULTY ADVISER

Denise Wilson

STUDENTS

Vidhya Balaji
Jonathan Chen
Yi-hsin Jong

This project develops a wrist-wearable sensing system designed to detect and indicate dehydration for sedentary occupation.

EE 497

CONTACT:
trana19@uw.edu

TABLE: **20**

WASHINGTON STATE ROAD USAGE CHARGE PLATFORM

FACULTY ADVISER
Mani Soma

SPONSOR
D'Artagnan Consulting, LLP

STUDENTS
Ethan Lu
Quan Nguyen
Amanda Tran
Ruotong Yu

This project creates an Android app that can be used to implement a tax on road usage.

EE 498

CONTACT:
ekim1221@uw.edu

TABLE: **28**

16 QAM COMMUNICATIONS WAVEFORM

FACULTY ADVISER
Sumit Roy

SPONSOR
Millennium Space Systems

STUDENTS
Emerson Kim
Kevin Sadykhov

This project develops a 16 QAM communications waveform that will be used for high data-rate communications.

EE 497/ 498

CONTACT:
hjf007@uw.edu

TABLE: **21**

AUTOMATIC DRONE DETECTION WITH ECHODYNE MESA-DAA RADAR

FACULTY ADVISER
John D. Sahr

SPONSOR
Echodyne

STUDENTS
Jianfeng Huang
Skyler Martens
Huy Nguyen
Deniel Park

This project focuses on the development of tracking algorithms within a graphical user interface.

EE 449/ 498

CIRCULAR SMARTPHONE

CONTACT:
isharma@uw.edu

TABLE: **6**

FACULTY ADVISER
Robert Bruce Darling

SPONSOR
dToor

STUDENTS
Chelsea Ramos
Ishana Sharma
Yuqing Yin

This project builds a circular smartphone with communications, embedded systems and PCB design methods.

EE 498

CLEAN ENERGY POWER MANAGEMENT

CONTACT:
xh2018@uw.edu

TABLE: **18**

FACULTY ADVISER
Miguel Ortega-Vazquez

SPONSOR
Booz Allen Hamilton

STUDENTS
Jiawen Chen
Xin Hu
Westin Miller
Satbeer Singh

This project integrates a wind turbine and a generator to provide clean power for an underwater ROV.

EE 498

CROWD SENSING

CONTACT:
tingyu7@uw.edu

TABLE: **29**

FACULTY ADVISER
Eli Shlizerman

STUDENTS
Eric Berquist
Kevin Oktavian
Ting-Yu Wang

This project constructs a mobile multi-sensor device capable of measuring surrounding air quality in real time.

EE 499/ 498

CONTACT:
liangd7@uw.edu

TABLE: **31**

CUBESAT – SPACE ENVIRONMENT SIMULATOR

FACULTY ADVISER
John D. Sahr

SPONSOR
UW Cube Satellite

STUDENTS
Dawn Liang
Chris Peterson

This project constructs a magnetic field and sunlight vector generator for simulating low earth orbit environments.

EE 497/ 498

CONTACT:
chungc59@uw.edu

TABLE: **16**

CUBESAT – POWER DISTRIBUTION SYSTEM

FACULTY ADVISER
John D. Sahr

SPONSOR
UW Cube Satellite

STUDENTS
Christina Chung
Chad Prybell

This project generates a power distribution system to provide overcurrent protection 500mA to 8A for the CubeSat satellite.

EE 498

CONTACT:
alzuhair@uw.edu

TABLE: **26**

DRONES FOR COUNTING WAREHOUSE INVENTORY

FACULTY ADVISER
Sam Burden

SPONSOR
Fizikl Inc.

STUDENTS
Yikun Li
Shiyu Xia
Wenjing Xu

This project uses drones to navigate in warehouses to capture barcodes of items on different shelves.

EE 498

FLUKE HOME AUTOMATION

CONTACT:
khebach@uw.edu

TABLE: **24**

FACULTY ADVISER
Tai-Chang Chen

SPONSOR
Fluke Corporation

STUDENTS
Khe Bach
Ennis Dakhil
Yeojun Yoon

This project builds a handheld device that can collect multiple lighting parameters and pinpoint the issue of faulty LEDs.

EE 498

NVIDIA DEEP NEURAL NETWORKS FOR GAME HINTS

CONTACT:
benro@uw.edu

TABLE: **23**

FACULTY ADVISER
Brian Nelson

SPONSOR
NVIDIA

STUDENTS
Catherine Feng
Ben Robaidek
Devin Stoen
Haonan Wang

This project uses Deep Neural Networks to display walkthroughs to struggling gamers.

EE 498

OCEANLENS ROV

CONTACT:
jskubic@uw.edu

TABLE: **10**

FACULTY ADVISER
Payman Arabshahi

SPONSOR
Booz Allen Hamilton

STUDENTS
Will Butterton
Jared Nakahara
Justin Skubic
Yicheng Wang

This project designs and builds an underwater ROV to take sensor and video/imaging data to map the surrounding environment.

EE 498

CONTACT:
huongnvo@gmail.com

TABLE: **E1**

REAL-TIME OPERATING SYSTEM FOR THE ARM V7-R ARCHITECTURE

FACULTY ADVISER
Jim Peckol

STUDENT
Huong Vo

SPONSOR
Blue Origin

This project develops a simple, real-time, microkernel-based OS for avionics software.

EE 498

CONTACT:
mrjwhoughton@gmail.com

TABLE: **11**

RUSH

FACULTY ADVISER
Ming-Ting Sun

SPONSOR
Garth Bruce

STUDENTS
Justin Houghton
Adolfo Pineda
Mandeep Plaha

This project constructs a search and rescue drone designed to improve post-avalanche victim location capabilities.

EE 498

CONTACT:
robertyody@yahoo.com

TABLE: **E2**

SEATTLE DEPARTMENT OF TRANSPORTATION SMART PARKING

FACULTY ADVISER
Payman Arabshahi

SPONSOR
Lillian Ratliff

STUDENT
Pete Khine
Robert Yody
Harry Zhou

This project develops the framework for an app that forecasts the parking availability on a block.

EE 497/ 498

CONTACT:

wongjkevin@live.com

TABLE: **30**

SMART HOME AIR QUALITY AND FLOW RATE SENSORS

FACULTY ADVISER

Payman Arabshahi

SPONSOR

Wally Home

STUDENTS

Duong Nguyen Thai Bui
Sharyar Khalid
Sheng Li
Kevin Wong

This project focuses on the design and development of commercial smart home products.

EE 497/ 498

CONTACT:

jangrykr@hotmail.com

TABLE: **22**

SMART USB CHARGER

FACULTY ADVISER

Tai-Chang Chen

STUDENTS

Roy Jang
Yangming Ke
Long Hei Wong
Bolun Yan

This project builds a smart USB charger that has three ports and will support a "priority charge" function.

EE 498

CONTACT:

nghuy90@uw.edu

TABLE: **17**

TUPL CUSTOMER TICKET CLASSIFICATION WITH MACHINE LEARNING

FACULTY ADVISER

Payman Arabshahi

SPONSOR

Tupl

STUDENT

Swetha Kannan
Huy Nguyen
Ruolan
Yehao

This project employs machine learning to classify customer tickets automatically.

EE 498

CONTACT:
wujonath@uw.edu

TABLE: **27**

VISUALIZING GEOENGINEERING DATA ON MIXED AND VIRTUAL REALITY DEVICES

FACULTY ADVISER
Robert Bruce Darling

SPONSOR
LoooK

STUDENT
Travis Bailey
Michael Omori
Liyuan Wang
Jonathan Wu

This project uses GIS data to render 3D environments for viewing on the Microsoft HoloLens.

EE 498

CONTACT:
sleisle@uw.edu

TABLE: **25**

VOICEBOX HEAD UNIT

FACULTY ADVISER
Jenq-Neng Hwang

SPONSOR
VoiceBox

STUDENT
Sean Leisle
Max Mi
Dinggao Pan
Jiaqi Zhang

This project develops an automotive head unit, which can be installed into existing vehicles.

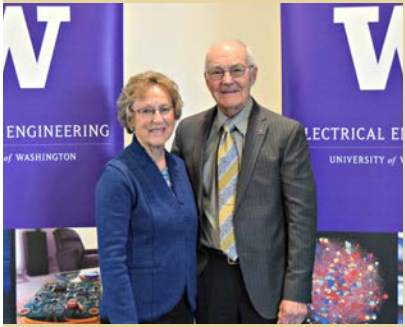
Thank you to our industry partners and faculty for your mentorship to our students.

Thank you to

Professors Payman Arabshahi and John D. Sahr

for their efforts in building the Electrical Engineering Entrepreneurial Capstone Program.

VISIONARY ALUMS



Milton and Delia Zeutschel sign the endowment, which grows an entrepreneurial ecosystem for current and future UW EE students.

Thank you to Milton and Delia Zeutschel for their generous contributions to the future of ENGINE.

The Zeutschels have a passion for innovation and a dedication to education. Through this vision, the Zeutschels have given $2 million to further advance the University of Washington Electrical Engineering Entrepreneurial Capstone Program (ENGINE).

As an entrepreneur and a philanthropist, there could be no better partner to ENGINE than Mr. Zeutschel. From the beginning, he has invested his resources into ENGINE, a program he says would have greatly benefited him while in college. Mr. Zeutschel's commitment to the program will endure.

"I want to continue to engage in the program every way I can," Mr. Zeutschel said. "I would love to be a resource for students and professors."

The value of the ENGINE program goes beyond student experience. ENGINE fosters an innovation ecosystem at the UW, which creates a ripple effect throughout the entire State of Washington.

ELECTRICAL ENGINEERING
UNIVERSITY of WASHINGTON