KEVIN HUANG

Assistant Professor Of Engineering - Trinity College

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EDUCATION

Doctor of Philosophy, University of Washington, Seattle, WA (March, 2017)

Concentration: Electrical Engineering – Systems, Controls and Robotics
Master of Science *– awarded June, 2015*
Candidacy – *March, 2015*

Coursework:

- *Mathematical Foundations of System Theory*
- *Models of Robot Manipulation*
- *Linear Multivariable Control*
- *Computer Vision*
- *Scientific Computing*
- *Intelligent Control Through Learning and Optimization*
- *Digital Signal Processing*
- *Linear Systems Theory*
- *State Estimation and Kalman Filtering*
- *Advanced Topics in Sensors: Haptics*
- *Human Robot Interaction*

Cumulative GPA: 3.99/4.0

Bachelor of Science Degree, Optimus (Summa Cum Laude) Trinity College, Hartford, CT (May 2012)

Majors: Honors in Engineering, Honors in Mathematics

Engineering Courses:

- *Digital Circuits and Systems*
- *Linear Circuit Theory*
- *Microprocessor Systems*
- *Automatic Control Systems*
- *Digital Signal Processing*
- *Introduction to Engineering Design*
- *Semiconductor Electronics I*
- *Introduction to Sensors*
- *Digital and Analog Communications*
- *Engineering Mechanics I*
- *Semiconductor Electronics II*
- *Engineering of Materials*
- *VLSI Design*

Mathematics Courses:

- *Multivariable Calculus*
- *Linear Algebra*
- *Real Analysis*
- *Mathematical Modeling*
- *Differential Equations*
- *Probability*
- *Abstract Algebra*
- *Abstraction and Argument*
- *Numerical Analysis*
- *Complex Analysis*

Cumulative GPA: 4.09 **Engineering GPA:** 4.17 **Math GPA:** 4.11

AWARDS/HONORS

NSF Graduate Research Fellowship	(Spring 2013 – 2017)
Theodore R. Blakeslee II Award	(Spring 2012)
Phi Beta Kappa Inductee	(Spring 2012)
Engineering Presidential Fellow	(Fall 2011)
Engineering Junior Book Prize	(Spring 2011)
Pi Mu Epsilon Mathematics Honor Society	(Spring 2011)
Second Year Phi Gamma Delta Prize in Mathematics	(Spring 2011)
First Year Phi Gamma Delta Prize in Mathematics	(Spring 2010)
Trinity College Presidential Scholar	(Fall 2008 -2012)
DARPA C4C Combinator 1st Place	(Fall 2015)
Mary A. Terry Fellowship	(Fall 2012 – Fall 2014)
Phi Gamma Delta Senior Prize in Mathematics	(Spring 2012)
IEEE Best Robot in Connecticut	(Spring 2011, 2012)
Connecticut Space Grant Consortium Fellowship	(Spring 2011)
Irving K. Butler Prize in Mathematics	(Spring 2011)
Barry M. Goldwater Nominee	(Spring 2010, 2011)
Trinity College Deans' Scholar	(2009 Academic Year)
Trinity College Faculty Honors	(Fall 2008 – 2012)

TECHNICAL SKILLS

Programming Experience:

C /C++, MATLAB, ROS, MCS-51 Assembly, Labview, VHDL, Java, Python, Fortran, ExpressPCB, Android Studios

Instrument Training:

FEI Sirion SEM, Woollam Ellipsometer, Bruker Autoflex II MALDI Mass Spectrometer, X-Ray Diffraction

Robot Platforms:

KUKA youBot, Raven II, Willow Garage PR2, Sensable PHANToM Omni

Research Experience

Graduate Research

BioRobotics Lab, *University of Washington* **(Fall 2012 – Present)**

- Designed real-time haptic virtual fixtures for teleoperation architectures with the PR2, KUKA youBot and Sensable PHANToM Omni robots.
- Developed algorithms to integrate auxiliary sensor information from RGB-Depth, pretouch acoustic and IR-TOF sensor information.
- Conducted user studies to validate and evaluate performance effects of haptic virtual fixtures.
- Derived method towards general synthesis of haptic virtual fixtures using evolutionary computation.

Smart America Challenge **(Summer 2014)**

- Provided telerobot and haptic interface design and support for the Smart Emergency Response System (SERS) team.
- Team included members from: Mathworks, University of North Texas, National Instruments, North Carolina State University, Boeing, University of Washington, BluHaptics, Worchester Polytech Institute, MIT Media Lab.
- Technical demonstration at the Washington DC Convention Center on June 11, 2014

Undergraduate Research

NNIN iREU, *Forschungszentrum Jülich* **(Summer 2012)**

- Prepared high electron mobility transistors (HEMTs) and designed a HEMT-based, single-lithography-layer oscillator with active integrated antenna circuit. Target oscillation frequencies up to 100GHz.

NNIN REU, *University of Washington* **(Summer 2011)**

- Integrated glycan receptors with silicon nanophotonic biosensors through the development of an optimized (i.e. low cost and time) protein-carbohydrate conjugation and immobilization scheme. Validated efficacy with mass spectrometry.

Sensors! REU, *University of Maine* **(Summer 2010)**

- Designed and constructed a laser/LED driver PCB for a color vision study.

Trinity College Robot Study Team, *Trinity College* **(Fall 2009 – 2012)**

- Designed autonomous robots for the Trinity College RoboWaiter Contest and the Intelligent Ground Vehicle Competition.
- Led the Trinity College Firefighting Swarm robot team.

Digital Signal Processing Lab, *Trinity College* **(Summer 2009 – 2012)**

- Developed an instrument that tracks the gaze of a human subject on a computer monitor.
- Performed nonlinear dynamics analysis of chaotic systems.

Teaching Experience

Graduate Teaching Assistant

EE 547 Linear Control Theory **(Fall 2016)**

- Led weekly homework review lectures (20 min) to provide supplemental instruction and conducted midterm review lecture.
- Provided feedback for homework design, and helped create homework solutions.
- Graded homework and tests; held two weekly office hours.

EE 543 Models of Robotic Manipulation **(Spring 2014)**

- Led a four-hour lecture: An Introduction to Quaternions and Quaternion Representation of Rotations.

EE 400, 449 Controls Senior Capstone Design Project **(Winter – Spring 2013)**

- Provided technical and management guidance to the controls concentration undergraduate capstone teams.
- Designed and maintained class wikipage and graded final projects.

EE 447 Control System Analysis I **(Fall 2012)**

- Assisted students during in-class exercises to prepare them for homework assignments.
- Graded homework and tests; held weekly office hours.

Undergraduate Teaching Assistant

ENGR 108 The Science and Policies of Energy and Sustainability **(Spring 2012)**

- Graded homework and essays regarding sustainability, energy and engineering ethics.

ENGR 212 Linear Circuit Theory **(Spring 2012)**

- Conducted weekly lab section with students involving circuit theory experiments.
- Held weekly study sessions.

ENGR 323 Microprocessor Systems **(Fall 2011)**

- Worked in lab section with students on microprocessor system projects.
- Assisted students with MC51 Assembly software in addition to circuit design.

ENGR 232 Engineering Materials **(Spring 2011)**

- Worked in lab section with students conducting engineering materials experiments, including but not limited to semiconductors, electrical properties and X-Ray diffraction.
- Held weekly study sessions.

ENGR 221 Digital Circuits and Systems **(Fall 2010)**

- Worked in lab with students to help construct and test digital logic circuits.
- Held weekly study sessions.

Engineering Outreach

Early Engineering Institute, *University of Washington* **(Summer 2014)**

- Designed and taught course material to local 9th and 10th grade high school students, and hosted a short-term mini-research project involving basic programming and introduction to haptic enabled technologies.
- The program engages these students in math and science related fields and helps prepare students for college and college applications.

Math Academy, *University of Washington* **(Summer 2013, 2014)**

- Taught Washington State high school students and mentored a small-scale design project focusing on basic information about haptics and haptic enabled systems.
- The course intends to develop key skills, such as experimental design, analysis, programming and teamwork skills necessary to succeed in engineering related fields.

Lab Demo Coordinator, *University of Washington* **(Spring 2013 – Summer 2016)**

Organized and ran robotic demonstrations for guests (government, industry, academia, high school and grade school) of the BioRobotics Lab. Described and formulated research ideas and concepts to the guests' comprehension level and technical knowledge. Responsible for coordinating schedules, technical showcases and the occasional transportation of guests.

Additional Experience

Virtual Reality Developer, *Analytical Software Inc* **(Winter 2015 – Present)**

- Developed virtual reality software for smokejump and skydiving simulator/trainer, currently deployed at multiple smokejumper locations.
- Key hardware components used include Oculus Rift and Microsoft Kinect.

Marine Biology Research Intern, *Seattle Aquarium* **(Fall 2007 – Spring 2008)**

- Compiled over two decades worth of sea turtle rehabilitation cases into a single, comprehensive standard rehabilitation procedure.

Youth English Teaching, *AID Summer Program* **(Summer 2007)**

- Full-time English teacher at an elementary school in a small village in Matsu, Taiwan.
- Structured games and lessons to teach children new vocabulary, maintained classroom order and cleanliness
- Directed a small student play showcasing the students' handle of the English language

Youth Intern, *Fred Hutchinson Cancer Research Center* **(Summer 2006 – Winter 2007)**

- Prototyped standard operating procedure for cancer survivor biobehavioral sciences study and entered survey data.

PUBLICATIONS

PUBLISHED

- T. Ning, K. Huang and B. Poudel, "Nonlinear dynamical analysis of developmental changes in hippocampal REM sleep EEG," *2011 IEEE 37th Annual Northeast Bioengineering Conference (NEBEC)*, Troy, NY, 2011, pp. 1-2.
- K. Huang, S. Petkovsek, B. Poudel and T. Ning, "A human-computer interface design using automatic gaze tracking," *2012 IEEE 11th International Conference on Signal Processing (ICSP)*, Beijing, 2012, pp. 1633-1636.
- K. Huang, L. T. Jiang, J. R. Smith and H. J. Chizeck, "Sensor-aided teleoperated grasping of transparent objects," *2015 IEEE International Conference on Robotics and Automation (ICRA)*, Seattle, WA, 2015, pp. 4953-4959.
- J. Yan, K. Huang, T. Bonaci and H. J. Chizeck, "Haptic passwords," *2015 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Hamburg, 2015, pp. 1194-1199.
- K. Lindgren, K. Huang and B. Hannaford, “Towards Real-time Surface Tracking and Motion Compensation Integration for Robotic Surgery,” *2017 IEEE/SICE International Symposium on System Integration (SII)*, Taipei, 2017.

IN PREPARATION

- K. Huang, P. Lancaster, J.R.Smith and H. J. Chizeck, "Visionless tele-exploration of 3D moving objects”
- T. Heo, K.Huang and H.J. Chizeck, “The Effect of Haptic Feedback on Novel Input Channel Performance”
- K. Huang, F. Ryden and H.J. Chizeck, “Evaluation of Haptic Virtual Fixtures in Telemanipulation”
- Y.H. Su, K. Huang, and B. Hannaford, “Real-Time Vision-Based Surgical Tool Segmentation with Robot Kinematics Prior”

OTHER DOCUMENTS

- H. J. Chizeck and K. Huang, “Teleoperated Rescue Robots: Using Haptic Feedback to Save Lives,”. National Instruments, 2014
- K. Huang, “Monolithic integration of HEMT-based common gate oscillator with active integrated antenna in the GaN material system,” *2012 NNIN REU Research Accomplishments*, 2012, pp. 60-61.
- K.Huang, “Multiplexed silicon nanophotonic biosensing via immobilized protein glycoconjugates,” *2011 NNIN REU Research Accomplishments*, 2011, pp. 16-17.
- K. Huang “Principal Component Analysis in the Eigenface Technique for Facial Recognition”, B.S. thesis, Dept. Math., Trinity Coll., Hartford, CT, 2012.