

# The Integrator

## UW EE's Raven Robot Makes its Big Screen Debut in 'Ender's Game'

The Raven II robot of UW EE's BioRobotics Lab has been in the spotlight on many occasions, from fulfilling an 11 year old's wish experience through the Make-a-Wish Foundation, to becoming the first open-source platform for surgical robotics research for 11 universities across the country. But Hollywood?

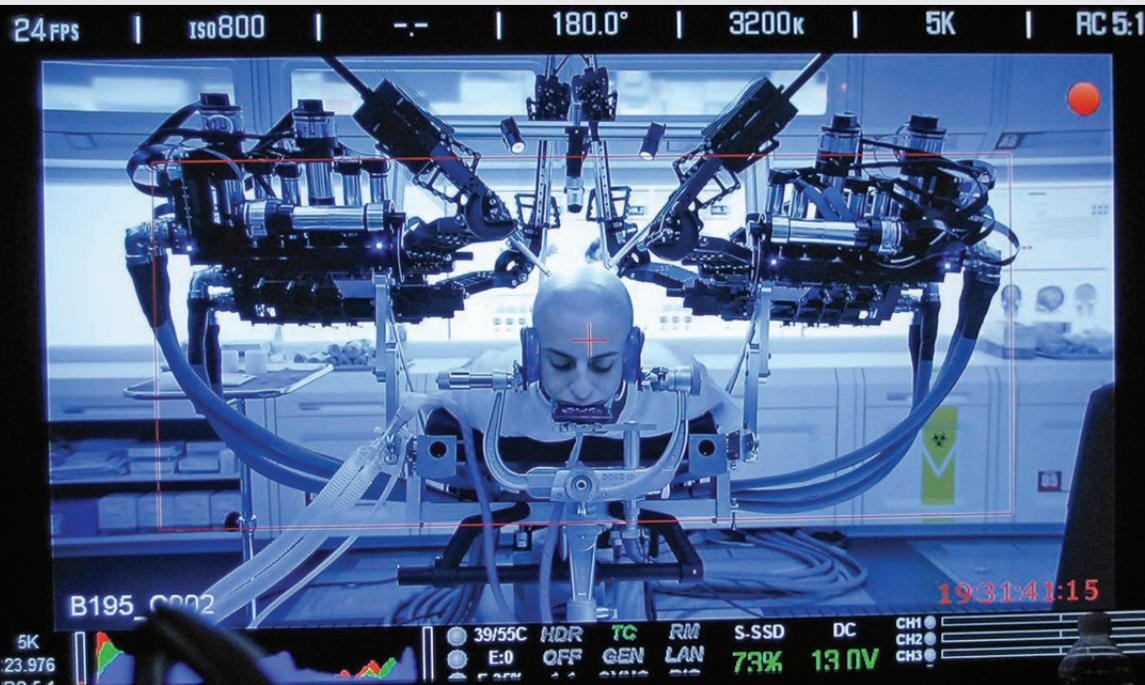
The surgical robot made its big screen debut around the 58-minute mark in the movie adaptation of Orson Scott Card's novel, "Ender's Game," which hit theaters on November 1st. The all-star cast directed by Gavin Hood included Harrison Ford, Asa Butterfield (as Ender), Ben Kingsley, Hailee Steinfeld, Viola Davis and Abigail Breslin.

The scene that shows the Raven II was filmed over a year ago at a New Orleans NASA facility that builds rockets. Hawkeye King, who received his EE PhD last quarter, and then-UW bioengineering doctoral student Lee White were the sole operators of the robot during filming. They also prepared its exterior to look less like a lab machine and helped decide how the robot would operate to make it look as realistic as possible. "We were really part of the creative process of getting the robot on the set," said King.

King and White sat just off-set behind a curtain where they used several computer monitors and controllers to move the robot's four arms. The robot simulated open-

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A close-up shoot of the UW's Raven II robot as it simulates brain surgery on actor Moisés Arias during the filming of "Ender's Game."

## Message from The Chair

Last November marked a unique experience for members of the UW EE's BioRobotics (BRL) Lab as they sat in the movie theater on opening day of Ender's Game to watch their Raven II surgical robot make its big screen debut. The movie was directed by Gavin Hood, and cast members of the Raven robot included Harrison Ford and Asa Butterfield. For the filming of the movie, students of the BRL spent an entire day on set to operate the Raven robot for the scene.

During our annual visit to the Bay Area, our external relations team met with alumni at the Verizon Innovation Center. Alumnus Jack Tang graciously hosted a luncheon for everyone to come together, and it was great to participate in an interactive tour of the center. We also had the opportunity to meet alumni working at Google at a lunch hosted by alumnus Harvey Ho.

Alumnus Simon Sze was recently recognized for his distinguished achievement in academia with the College of Engineering's Diamond Award during our trip to Taiwan and Shanghai. Sze has made a profound impact on today's consumer electronics as the co-inventor of nonvolatile semiconductor memory. We also signed an MOU for a combined BSEE and MSEE degree program with Shanghai Jiao Tong University (SJTU) where three of our PhD alumni are professors.

Our guest speaker for EE's graduation celebration on June 13th is an outstanding entrepreneur, Thomas Clement (MSEE '81). With over 30 years of experience in product development engineering, engineering management and senior management, we are honored to have Clement share his wealth of knowledge and inspire our UW EE class of 2014.

**Vikram Jandhyala**  
Professor & Chair  
vj@uw.edu



## Tom Clement to Speak at 2014 EE Graduation Celebration

*With nearly one-third of all UW startups emerging from EE in 2013, it seems fitting that the academic year will end with a graduation speaker who has been a leader in supporting UW startups. Tom Clement, a serial entrepreneur and former director of New Ventures – Life Sciences for C4C, has been selected as the department's 2014 graduation speaker.*

*Clement has over 30 years of experience in product development engineering, engineering management, and senior management. He is currently the CEO of Aqueduct Neurosciences, Inc., a start up company that develops products to treat hydrocephalus, a condition where the cerebral spinal fluid is not re-absorbed by the human brain. He was also the CEO of Cardiac Insight, Inc., a start up company, which addressed the "silent" a-fib market by developing a highly accurate atrial fibrillation monitor for patients with undiagnosed, difficult to detect atrial fibrillation.*

*In 2009, Clement joined UW C4C, and became the Director of New Ventures – Life Sciences to help identify technologies that have the potential for commercialization via a new start up. In his role, he worked with researchers and UW personnel to advance the business plans for the identified commercial prospects in areas spanning market strategy, regulatory strategy, identification of management teams, and early stage financing.*

*In 1998, Clement co-founded Pathway Medical Technologies, Inc. and served as CEO until September 2008. He led a talented management team, which developed and brought to market its flagship product, the Jetstream™ System for treatment of peripheral arteries. Clement previously was a founding employee and held senior management roles at Heart Technology, which grew to more than \$100 million in revenue and 550 employees. When Heart Technology was acquired by Boston Scientific, Clement became responsible for the emerging cardiovascular technologies group of the Scimed Division.*

*Clement earned his BSEE in 1979 and his MSEE in 1981, both from the UW. He sits on the boards of several start up companies. He is the immediate past Chairman of the Board of Directors for the Washington Biotechnology and Biomedical Association (WBBA), and is a founder and the current co-Chairman of the Board of Directors for the Medical Technology Angel Network, WINGS. Clement was also appointed by Governor Gregoire to the Washington Global Health Technologies Competitiveness Board. He is also on the Visiting Committee for the UW's Educational Outreach Programs.*



# Raven Robot in 'Ender's Game'

(Continued from page 1)

ing the character Bonzo Madrid's skull for brain surgery which was injured in a fight with Ender Wiggin at the battle school. The scene deviated from the book's plot, King said, and nearly all of the main characters are present.

Though the robot's screen time is brief, the students spent more than 14 hours maneuvering the robot

for the scene. "Everything had to be working perfectly from 8 a.m. to 10 p.m. on the set," said King. During a close-up shot, the students maneuvered the robot's arms around and behind the actor's head. King devised an emergency "off" button (which was never used) for the actor to hold in case of a close call. "At the end of the day, I asked the props director how we did," King

recalls with a laugh. "He said, 'Let me put it this way, if they didn't like it, it wouldn't get a close-up.'"

After a week hanging out with the movie's props team, exploring New Orleans and even joking around with Harrison Ford, the UW students returned to campus, where they had to stay tight-lipped about their robot's stardom until the movie's release date.



Hawkeye King, left, and Lee White operate the robot seen in "Ender's Game." It takes two people to move the robot's four arms. They watched several cameras and used nonverbal signals to communicate with each other during the shoot. King will soon start a post doc at Imperial College in London, and White is now a medical student at Stanford University.

At right, actors Asa Butterfield and Harrison Ford during the filming of a scene from "Ender's Game." The UW robot can be seen on the left.



On the movie set with the University of Washington's Raven II surgical robot. From left to right: Hawkeye King, director Gavin Hood, Harrison Ford, robotics expert Joanne Pransky and Lee White.



## Alumnus Simon Sze Wins 2014 COE Diamond Award for Distinguished Achievement in Academia

Congratulations to alumnus Dr. Simon Sze (MSEE '60) for receiving the prestigious College of Engineering's 2014 Diamond Award for Distinguished Achievement in Academia. Diamond Awards honor outstanding alumni and friends who have made significant contributions to the field of engineering. The award was presented on April 11 to Dr. Sze by UW President, Michael Young and UW EE Professor and Chair, Vikram Jandhyala at a reception in Taiwan.

Dr. Sze reflected on his fond memories at UW with his advisor Professor Emeritus John Bjorkstam. He noted that Professor Bjorkstam was one of the best teachers he ever encountered and heavily influenced his own teaching style as he went on to forge a career in academia. Professor Sze's prolific work continues as he takes on his first MOOC (Massive Open Online Course) at NCTU on Physics of Semiconductor Devices this year.

Memory storage in cell phones,

digital cameras, GPS devices, and even refrigerators used today are possible because of Dr. Sze, co-inventor of the nonvolatile semiconductor memory (NVSM) popular in today's consumer electronics. His contributions to semiconductor physics revolutionized the development of modern electronic systems. His book, "Physics of Semiconductor Devices," is one of the most cited works in contemporary engineering and science publications with over 22,000 citations and has been translated into six languages.

Dr. Sze has made a profound impact on semiconductor devices, including transport processes in metal-semiconductor contacts, operational principles of microwave and photonic devices and the insulating properties of silicon nitride and silicon dioxide. With co-inventor Dawon Kahng, he fabricated the world's first floating-gate NVSM device, able to record and retain data without consuming power. Today, NVSM, has given

rise to a large family of memory devices including EEPROM and flash memory. NVSM is one of the most popular embedded-memory and mass-storage applications and can be found in more than 40 billion electronics products.

Dr. Sze received his MSEE from the UW and his PhD from Stanford. After working at Bell Labs, he went on to faculty positions at National Chiao Tung University (NCTU), Stanford and National Taiwan University. He has consulted or directed at research centers around the globe, and is currently honorary chair professor at NCTU. He has authored or co-authored over 300 articles, and written and edited 16 books. Dr. Sze is the recipient of the IEEE J.J. Ebers Award, the Sun Yet-sen Award, National Endowed Chair Professor Award, and the National Science and Technology Prize. He is a life fellow of IEEE, academician of the Academia Sinica, a member of the Chinese Academy of Engineering and a member of the U.S. National Academy of Engineering.

## UW EE Visits Shanghai Jiao Tong University

*UW EE Professor and Chair Vikram Jandhyala and UW EE Professor and Associate Chair for Research Jenq-Neng Hwang visited with one of the top universities in China, Shanghai Jiao Tong University (SJTU), where three UW EE PhD alumni are professors. The department's ties to the region were further strengthened with the signing of an MOU for a combined BSEE and MSEE degree program between UW EE and SJTU School of Electronic, Information and Electrical Engineering.*



From left to right: Manyuan Shen (PhD '04), Professor, SJTU; Wiyao Lin (PhD '04), Associate Professor, SJTU; Xiaoyong Li (PhD '04), Associate Professor, SJTU; Junfa Mao, Dean & Professor, SJTU; Vikram Jandhyala, UW EE Professor & Chair; Shaoyuan Li, Vice Dean of SEIEE, SJTU; Jenq-Neng Hwang, UW EE Professor & Associate Chair for Research; Mahnaz Sherzoi, Associate Director of Advancement, UW.

## New Student Awards

**Congratulations to the following UW EE students who have received these prestigious fellowship awards. These achievements are a strong indicator of the exceptional quality of students at UW EE.**

### Hydro Research Foundation Award

**Kelly Kozdras**

Faculty Advisor – *Daniel Kirschen (EE)*

### Intel Foundation/SRCEA Graduate Fellowship

**Chong Li**

Faculty Advisor – *Richard C.J. Shi (EE)*

### Microsoft Research PhD Fellowship

**Rishabh Iyer**

Faculty Advisor – *Jeff Bilmes (EE)*

### NSF Graduate Research Fellowship

**Palma London**

Faculty Advisors - *Maryam Fazel (EE), Daniela Witten (Biostatistics) & Su-In Lee (CSE & Genome Sciences)*

### Edward Wang

Faculty Advisor – *Shwetak Patel (EE & CSE)*

### Sunny Rao

Faculty Advisor – *Eric Klavins (EE) & Georg Seelig (EE & CSE)*

## 2014 Graduate Visit Days

Last March, the department held its annual Graduate Student Visit Days and hosted over 50 prospective graduate students. Students came from across the United States and Canada for this event, which focused on introducing our newly admitted grads to the department, campus and city. Highlights included a spaghetti dinner at professor John Sahr's home, a sightseeing tour of the Seattle waterfront and Seattle Center, lab tours, a poster session highlighting research by current EE graduate students, and many opportunities to meet our faculty. Admission to the program was highly competitive this year, with over 1200 applications and only 170 students admitted for an overall admission rate of just 14%. UW EE continues to attract some of the most outstanding emerging scholars from the US and around the world.

## Honoring Professor Emeritus David L. Johnson

The department was saddened by the death of Professor Emeritus David L. Johnson at the age of 90. He passed away in the arms of his loving family in Seattle on January 19, 2014.

Johnson received his BSEE from the University of Idaho in 1948, the same town in which he was born and raised and where his father was chair of the EE department. In 1955, he received his PhD from Purdue University, and then joined the UW EE faculty as an Associate Professor. Johnson worked with digital computer technology including computer translation, and was the principal faculty member in the department in the area of computers prior to the creation of the Computer Science program in 1968.

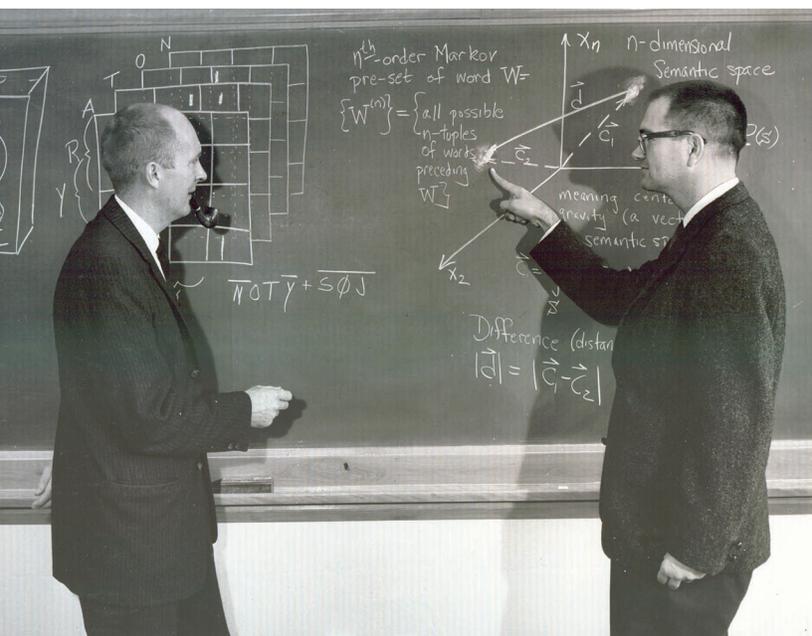
Johnson's research transitioned to computer engineering and artificial intelligence (AI) where his career path took him on some interesting and unique journeys. He conducted influential research with dolphins in Florida, which was funded by the Navy to learn more about how they communicate. He went to Scotland as a Senior Fulbright Scholar where he worked with Jim Howe, a leading AI researcher at the University of Edinburgh. Johnson also played an integral role in founding the graduate program for The Institute of Research and Higher Education of Technical Electron-



ics (IRESTE) in Nantes, France with Yves Thomas in 1985. IRESTE is an engineering college with a public institution status, which is now a part of the Polytechnic School of the University of Nantes. Johnson even served as an escort for the Queen of England and Prince Phillip during their trip to Washington State in the 1980's, and was interviewed for an article on AI for Playboy magazine.

Complementing his active research career, Johnson was an avid and committed teacher. He trained numerous doctoral students, master's degree students, and undergraduates over his academic career. "David was an excellent teacher who routinely challenged his students to think and to explore new ideas and areas within the field," says Principal Lecturer, Jim Peckol. Although an electrical engineer by training, his interests ventured into psychology, childhood learning, problem solving, art, and literature. Johnson retired from UW EE in 1989.

As dedicated as he was to his research and teaching, Johnson was even more devoted to his family. In fact, Johnson was offered two impressive jobs, a senior director of IBM and President of University of Idaho, but he turned them down because family was always his first priority. Johnson enjoyed boats and even lived in a very interesting house—a converted coastal schooner turned house on Lake Washington. He enjoyed camping, hiking and was an avid traveler, touring Russia and China with his wife Corinne. Johnson is survived by his wife Corrine, two sons, and four grandchildren.



The late professor emeriti David L. Johnson (left) and Dean Lytle (right).

## Alumni on the Radar - EE Class Notes

We'd like to hear from you! Check out our Alumni Connections web page to read a complete list of updates from your former classmates, or to provide your own:

[www.ee.washington.edu/people/alumni/index.html](http://www.ee.washington.edu/people/alumni/index.html)

**Shain-Ru (Alex) Ke, PhD '14**

**Seattle, WA** – Ke will join Qualcomm as a senior engineer this spring. He thoroughly enjoyed his time in Seattle, and the research he conducted at UW EE on computer vision and machine learning during the pursuit of his PhD.

**Christina Vasquez, MSEE (PMP) '14**

**Snohomish, WA** – This summer, Vasquez will be doing some research collaboration with the mechanical engineering department as a UW Affiliate.

**Jae Young Jang, BSEE '13**

Because the UW EE program was challenging, it came with a lifelong reward for Jang that will stay with him for the rest of his life. It provided him with opportunities to meet wonderful people from diverse backgrounds, which only helped him grow to become a better person.

**Anna Pyayt, PhD '09**

Pyayt and fellow collaborator Howard Kaplan received the People's Choice Award in the photography category of the International Science & Engineering Visualization Challenge. The purpose of the competition is to communicate science, engineering and technology for education and journalistic purposes. Pyayt is a professor at the University of South Florida, and her work focuses on nano-instruments and bio-sensors applied to advanced diagnostics, imaging and treatment. Pyayt's award-winning image showed a microstructure of a 2-millimeter-long fragment of self-assembled polymers, which she is using to build miniature "lab-on-a-chip" devices for biomedical diagnostic applications.

**Zach Rasmor, BSEE '09**

**Bethesda, MD** – Rasmor is working for Lockheed Martin in Gaithersburg, MD performing embedded payload software development for the Iridium NEXT satellite constellation. In 2013, he graduated from the Lockheed Martin Engineering Leadership Development Program (ELDP), and is on track to earn an M.Eng in Electrical/Computer Engineering in Spring 2014 from the University of Colorado Boulder. In his spare time, he enjoys Brazilian Jiu Jitsu, running, traveling, snowboarding (when he can get away from the East Coast), and closely following Husky football from afar. Go Dawgs!

## Alumni Luncheon at Verizon

Jack Tang (BSEE '87, MSEE '94) hosted an alumni lunch at the new Verizon Innovation Center in San Francisco, Calif. The lunch provided a great opportunity for alumni to come together and meet EE Leadership—EE Chair Vikram Jandhyala and EE Professor and Associate Chair John Sahr—as well as participate in an interactive tour of the center. "It's wonderful to have Huskies in Bear (UC Berkeley) and Tree (Stanford) country," said Tang. "The Verizon Innovation Center is here to inspire future technologists and they do this by providing tours to students spanning many grade levels. It's a part of our program that is near and dear to me because we are giving these eager minds exposure to reality and to possibilities."

To find out more about opportunities to network with EE alumni or host an alumni event please contact Kelly Williams at [kww9880@uw.edu](mailto:kww9880@uw.edu) or (206) 221-5072.



UW Electrical Engineering Alumni Lunch at Verizon Innovation Center. Pictured: Sharon Cheung (BSEE '06), David Burnett (BSEE '05, MSEE '07), Stanley Dorst (BSEE '50), Rita Dorst, Eugene Fairbanks (BSEE '70, MSEE '72), Rolf Fromm (BSEE '60, BSISE '61), Beate Fromm, George Huang (EE PhD '73), Sam Huynh (BSEE '94, MSEE '96, EE PhD '99), Barna Ibrahim (BSEE '04, MSEE '05), Vikram Jandhyala (EE Chair), Greg Koskovich (EE PhD '88), Jennifer Leng (BSEE '98), Sam Lo (BSEE '96), John Sahr (EE Associate Chair), Jack Tang (BSEE '87, MSEE '94), Kelly Williams (EE Advancement).

**Vikram Jandhyala**  
Professor & Chair

**Jenq-Neng Hwang**  
Associate Chair for Research

**R. Bruce Darling**  
Associate Chair for Education

**John Sahr**  
Associate Chair for Advancement

**Laura J. Haas**  
Publications Manager

**Contributors**  
Mahnaz Sherzoi  
Kelly Williams

Send address corrections to:  
[alumni\\_relations@ee.washington.edu](mailto:alumni_relations@ee.washington.edu)

University Of Washington  
Department of Electrical Engineering  
Paul G. Allen Center - Room AE 100R  
Box 352500  
Seattle, Washington 98195-2500



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The program typically takes three years to complete, with students taking one class per quarter in the evening as well as a quarterly seminar.

**Upcoming Admission Deadline:**  
**June 1st** (for domestic students)

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**Contact Us:**  
Erin Olnon  
Paul Allen Center, CSE 224 | Box 352500 | Seattle, WA 98195  
206.616.4909 (Voice) | 206.543.3842 (Fax)  
[pmp@ee.washington.edu](mailto:pmp@ee.washington.edu)