Technology Transfer, Entrepreneurship and Innovation

The College of Engineering at UH Mānoa has a strong tradition of technology transfer and entrepreneurship that supports the University of Hawai‘i’s innovation and technology transfer initiative. Principal units are mechanical engineering, electrical engineering, civil and environmental engineering and Hawai‘i Center for Advanced Communications.
Past and Present College Faculty Entrepreneurial Activity

- EDWARD J. WELDON founded Adtech. The company lives on in the form of the high technology company Spirent, and continues to have offices in Honolulu.
- NORMAN ABRAMSON former EE and ICS faculty member responsible for ALOHA net, the first wireless packet data network, and a precursor to the Internet.
- Many faculty members have interests in consulting companies. As an example mechanical engineering emeritus faculty member Ronald Knapp founded the company Structural Solutions and was instrumental in designing the previous versions of the power cables intended to link the islands in the last energy crisis.

A significant proportion of Hawai’i’s state agencies and engineering companies are headed and staffed by College graduates. While these alumni do not usually claim to be entrepreneurs, the growth and leadership of these companies through many economic cycles clearly demonstrates many of the attributes of entrepreneurship.

College Faculty Members Who Have Been Engaged in Start-up Company Activity Include

- ADAMA MATERIALS: Mehrdad Ghasemi Nejhad (ME and current ME Chair)
- LEADING LITE COMPOSITES: Mehrdad Ghasemi Nejhad (ME and current ME Chair)
- RENEWABLE WATER TECHNOLOGIES: Weilin Qu (ME)
- MICROCAP: Aaron Ohta (EE) and David Garmire (EE)
- PIPELINE MICRO: Weilin Qu (ME)
- SMARTUMMY: Scott Miller (ME)
- SENSORP / KAI SENSORS: Olga Boric-Lubecke (EE), Victor Lubecke (EE) and Anders Host-Madsen (EE)

Current College Activity Includes

- Invention disclosures from College faculty members in the years 1996-2009 numbered over 150. The College led all UH Mānoa units in this category by a large margin.
- The UH Technology Transfer Office presented ten “Technology Showcases” since 2009 in downtown Honolulu with a significant number of appearances by College faculty members.
- The College has engaged the Hogan Entrepreneurial program at Chaminade.
- The College offers a bio-medical entrepreneurial graduate course jointly with JABSON. The course was created and is run by faculty members Scott Miller in ME and Russell Woo in pediatric surgery.

The College’s Entrepreneurial Alumni Tradition

The College has enjoyed a tradition of being associated with entrepreneurial faculty and students:

- ANURAG BIST (EE, PhD): Co-founder of VxTel, currently CEO and founder of MOXAIR and AshmariP.
- JOHN DAVIDSON (EE, PhD): Co-Founder of Ungermann-Bass, founded Network TeleSystems Inc. and founding general partner of Startup Capital Ventures.
- ATUL GARG (EE, MS): Co-founder and CTO of Proactive Networks.
- BRENDA MCCAFFERY (EE, BS): Founder of White Mountain Labs.
- PRADEEP SINDHU (EE, MS): Co-founder of Juniper Networks.
- LANCE TOKUDA (EE, BS & MS): CEO and Co-Founder of Rockyou. CTO of Iconix and Open Harbor.

Recent College SBIR/STTR Activity in the College Includes

- MARCELO KOBAYASHI (ME): Phase I & II SBIR.
- MEHRDAD GHASEMI NEJHAD (ME): Phase I & II SBIR – with TREX Enterprises.
- BRIAN BINGHAM (ME): Phase II STTR - Underwater vehicle for environmental monitoring collaboratively with Makai Ocean engineering and SPAWAR.
- OLGA AND VICTOR LUBECKE (EE): Seven SBIRs (three going to Phase II) – with various companies including Archionetics, and Kai Sensors
- DAVID GARMIRE (EE): with Oceanit - Medical Devices (PI is a graduated MS student Luke Joseph)
- MAGDY ISKANDER (HCAC): with MiWa Sensors Technologies, LLC
Some Faculty Member Centric Case Studies

Most of the College faculty members are entrepreneurs in their role in generating and prosecuting research projects, funded externally by state, federal and private organizations. We feature a sample of these faculty members:

BRIAN BINGHAM (ME): Dr. Bingham has four federally funded projects as a junior faculty member with DHS, NAVY, NSF and NOAA. Most of these are in conjunction with SOEST and the CIMES DHS Center. He has developed an unmanned port security vehicle that images and records the port’s subsurface autonomously and has developed a product prototype that is especially important in exploring disaster zones in harbor ports before first-responder personnel. Under a memorandum of understanding with UH, Battelle will work with Dr. Bingham and CIMES to evaluate and transition this and other technologies to the commercial realm. Dr. Bingham also has a collaborative project with Stevens Institute of Technology, funded by NSF as part of the National Robotics Initiative to develop ocean robots for environmental monitoring. This follows interest motivated by the Deepwater Horizon incident. He also had collaborative work with NOAA and software companies to develop embedded vehicle command and control systems for NOAA’s Ocean Exploration and Research ROV platforms. Dr. Bingham received his PhD from Massachusetts Institute of Technology.

DAVID GARMIRE (EE): No other College junior faculty member epitomizes the notion of innovation and entrepreneurship than David Garmire. While he is intimately involved in coaching students in the many student teams for the Shidler College of Business, he was able to license technology around microencapsulation of single cells to the company Microcap. He advised doctoral student Michelle Zhang who is now with Global Foundries, Inc., as featured on KITV television channel. His former doctoral student Eric Saint-Georges is now the chief technology officer of AOptix, Inc. Dr. Garmire received his PhD from the University of California at Berkeley.

MEHRDAD GHASEMI NEJHAD (ME): Dr. Ghasemi Nejhad is director of the College’s Hawai‘i Nanotechnology Laboratory. The laboratory has developed nanofoams as well as nanobrush (featured in 2007 Guinness Book of World Record) and land-mark world-wide patented nanoforest and nanoresin technologies which received world-wide news media publicity (such as BBC World News, DER SPIEGEL, Spectrum der Wissenschaft, De Ingenieur, De Standaard, El Mundo, Kyodo News, China Daily, Times of India, National Geographics, Nature Group, Science News, NetComposites, Materials Today, Nanotechnology Now, Popular Science, Science Daily, SPACEMART, PHYSORG, The A to Z of Materials, The A to Z of Nanotechnology, MSNBC/CBS/ABC News, Hawai‘i Business News, Star Bulletin, KITV News 4, etc.). These science and technologies have been published in highly reputed journals such as Science and Nature Materials, and have been licensed to Adama Materials, Inc. (a Hawai‘i-based start-up founded by Dr. Nejhad). His research has been supported NRL, ONR, DOE, TREX/ NASA, and Adama. Dr. Nejhad received his BS in ME from the Sharif University of Technology and his MS and PhD in ME from the University of Delaware.

LLOYD HIHARA (ME): Dr. Hihara is director of the College’s Hawai‘i Corrosion Laboratory. Hawai‘i is a natural test bed for corrosion studies, just as Hawai‘i is a natural test bed for UH’s studies of the oceans and the universe. Dr. Hihara’s laboratory manages nine test sites in and around Hawai‘i and the laboratory synthesizes corrosivity sensors and coatings to monitor and prevent corrosion. The laboratory has developed a ceramic-polymer coating SiLoXel, that has been licensed to a large mainland company and has been the subject of interest by Northrop Grumman Corp, among many other interested companies, in the development of their high energy laser weapon systems. He leads ten active projects with federal agencies including the Army and Marines. Dr. Hihara was brought up in Hawai‘i, went to College of Engineering for his BS, M.I.T. for his PhD, and is now a professor in the College.

MAGDY ISKANDER (HCAC): Dr. Iskander is director of HCAC. In this role he generates nearly a million dollars a year in extramural funding. He is a founding member of the NSF consortium of universities focused at telecommunications, currently involving the universities: Arizona State University, University of Arizona, UH Mānoa, RPI, the Ohio State University. He collaborates with JABSOM on development of remote monitoring of patients, a microwave stethoscope patented technology that monitors lung water content and other vital signs. He leads projects involved with antenna design and funded by ONR (SPAWAR), NSF, the U.S. Army in ultra wide band antenna array technology of foliage penetrating radiators, and compact HF radar technology. One of the HCAC projects, the “Microwave Stethoscope for Vital Signs Monitoring and Measuring Changes in Lung Water Content,” was selected by the National Science Foundation to participate in the i-CORPS program which aims at the commercialization of academic research. A Team from HCAC, Shidler College of Business, and JABSOM joined a cohort from 20 other universities from across the U.S. and developed marketing and commercialization strategies for the microwave stethoscope project. After the six-week training program that included two trips to Washington D.C. and presentations to different customer segments and potential business partners, the University of Hawai‘i project was awarded first place prize. This NSF i-CORPS promoted commercialization program also resulted in establishing the start-up company MiWa Sensors Technologies, LLC.

AARON OHTA (EE): Dr. Ohta is a recent junior researcher and recipient of the 2012 UH Regents Medal of Excellence in Research. One of his projects involves optically controlled micro robots for assembly of living cells, a project joint with JABSOM. In this project the simplest are micro air bubbles where light is used to heat the bubbles and thermal gradients generate forces that move living cells to investigate intercellular communications. Students working on this project have come in second twice in NIST sponsored international competitions: the Micro-Robots Challenge, part of the National Robotics Initiative. Dr. Ohta was brought up in Hawai‘i, went to College of Engineering for his BS and then the University of California at Berkeley for his PhD and is now a professor in the College.

H. RONALD RIGGS (CE): Dr. Riggs studies the tsunami loading of coastal structures and enjoys federally funding as part of a nationwide study. These studies will become standards for the American Society of Civil Engineers and then adopted by states as building codes… and yes here in Hawai‘i. He works with the Department of Ocean and Resources Engineering in SOEST. UH Mānoa has invested in a Coastal Communities Cluster Hire with five new hires in different Colleges including the College of Engineering. Dr. Riggs and many CEE researchers have contracts with the Hawai‘i Department of Transportation (HDOT). Note that UH Mānoa College of Engineering does most of the R&D work for HDOT. Dr. Riggs received his PhD from the University of California at Berkeley.

WAYNE SHIROMA (EE): Dr. Shiroma directs the College’s small satellite program in which over 250 students have engaged in training for design and development of satellites. These students have themselves garnered over $1M in federal support. The program has produced four winners of the nationalEta Kappa Nu (EE honor society) most outstanding national EE student, including the 2012 winner Larry Martin, who recently interned at NGC, but did not accept their job offer in favor of doing graduate work in the College. At a recent ONR S&T conference the strategic importance of small satellites was underlined as a mechanism to ensure the U.S. Navy’s space presence. Dr. Shiroma was brought up in Hawai‘i, went to College of Engineering for his BS and then the University of Colorado at Boulder for his PhD and is now a professor in the College.

College’s Student and Faculty Participation in UH Mānoa Entrepreneurial Competitions

The College of Engineering is a vigorous participant in the two entrepreneurial competitions held by the Shidler College of Business at UH Mānoa: the Business Plan Competition (BPC) and the Breakthrough Innovation Challenge (BIC). Its record includes:

2014 BIC

1ST PLACE: Cloud Catcher; Namib beetle inspired building material: An energy-saving, water-harvesting wall that employs hydrophilic and hydrophobic relationships to remove water from outside air and pass clean, fresh air to building occupants. Team: Monica Umeda and Francis Newton Parks, III.
2ND PLACE: Organ Assembly In Vitro; Human cell and cellular microenvironment inspired organ assembly technology: A microbubble robot system that assembles single living cells to form tissues and organs outside of the body. Team: QiHui Fan, Wengi Hu, Aaron Ohta.

3RD PLACE: Fly-Sailing: Basilisk lizard inspired hydrofoiling catamaran: A high-speed sailboat inspired by the Jesus lizard to provide more stability and make it more usable for a broader range of markets including personal, commercial and military applications. Team: Jon White.

2013 BPC
1ST PLACE: SmarTummy: The SmarTummy team developed a training tool for abdominal palpation exams. The device is a manikin of the torso region capable of physical simulation of different ailments with a user friendly interface. Team: Larry Martin, John Salle, David Yarber, Dr. Walton Shim, and Dr. Scott Miller. Subsequently Larry Martin, John Salle, and Walton Shim co-founded the Start-up Company “SmarTummy LLC”.

2012 BPC
1ST PLACE: Unique Lite Design(ULD): The ULD team developed a PCT patent-pending lightweight Unit Load Device (ULD) entirely made of composite materials, used for compartmentalizing cargo and check-in baggage on wide body aircraft. This all-composite ULD is more than 50% lighter than the current aluminum based ULD providing substantial fuel savings for the airlines. Team: Christian Daoud, Alanna James and Dr. Mehrdad Ghasemi Nejhad. Subsequently Dr. Nejhad and his team co-founded the Start-up Company “Leading Lite Composites”.

2ND PLACE: Surgical Lighting Solutions: A company that licenses and markets advanced semi-autonomous lighting for the medical industry. Team members: Justin Carland, Aaron Cates, Greg Judd, Karol Zemier. Dr. Scott Miller (ME) and Dr. Russell Woo (JABSOM) advised the team.

2012 BIC
1ST PLACE: Chameleon Skin: An affordable method to control temperature in any building structure. Team: Trent Richardson, Cody Hayashi, John Hirano, Richard Ordonez.

2011 BPC
1ST PLACE: InFLOWmation, Inc.: Dr. David Garmire (EE) and Researcher John Hirano (EE) provided the technology for a small and accurate, low-cost and self-contained anemometer to measure wind speed. Team: Dr. David Garmire, John Hirano, Kuenzang Dorji, Firaas Hakim, Jenna Nishita and Josiah Nishita. (Under review to be licensed to Met. One Instruments Inc.)

2011 BIC
1ST PLACE: Nanosatellite: A shoebox-sized nanosatellite that provides reliable means of effective calibration for the U.S. military’s radar systems. Team: Nicholas Fisher and Larry Martin.

2010 BIC
1ST PLACE: Flycopter: A low-cost, small flying multi-rotor platform that can be used to survey dangerous environments utilizing mounted high-definition or thermal imaging cameras. Members: Jeremy Chan, Elizabeth Gregory, David Hummer, Zachary Lee-Ho, Michael Menendez, Miguel Nunes, Reid Yamura.

2ND PLACE: Mini Baja: A safe off-road vehicle that is environmentally-friendly, Mini Baja integrates the use of seat belts and a roll cage with a 10-horsepower, four-stroke engine. Members: Matthew Asada, Willy Diguc, Rob Grimmet, David Hummer, Lance Kimura, Michael Menendez, Ross Mukai, and Kyle Wong.

2008 BPC
1ST PLACE: NanoGreen Innovations: Based on nanoresin and nano-prepreg technologies to produce high-performance composites. Team Members: Dr. Mehrdad Ghasemi Nejhad (ME), Dr. Richard Russ, Dr. Atul Tiwari (ME), Donavan Kealoha (Shidler College of Business), and Lee Taylor (OTTED). Later Dr. Nejhad founded Adama Materials Inc. a start-up company based on the patented nanoresin and nanofores technology to produce high-performance nanocomposites.

The College is also proud that some of its recent student entrepreneurs have gone beyond College entrepreneurial contributions and activities to develop as real-world entrepreneurs: Michael Menendez (ME) is a graduate of the University of Hawai’i at Mānoa College of Engineering and founded Pacific Mechanical Technology LLC (PMT) to help develop technologies in Hawai’i. PMT is a specialized research and development company that offers many different services from advanced concept generation and design, to rapid prototype and small batch production. PMT excels in electric vehicle technology, renewable energy, transportation technology, personal defense systems, and unmanned aerial vehicle development. (see www.pacmechtech.com) Michael Menendez is also a co-founder of Volta Industries, one of Hawai’i’s premier electric vehicle charging station companies who won the Pacific Business News’ most innovative business of the year award in 2012-2013.

For Further Information Concerning the College’s Activities Contact: Assistant Dean: Song Choi schoi@hawaii.edu, (808) 956-6597

NATIONAL COMPARISONS: To gauge the impact of the College of Engineering in the area of technology transfer and entrepreneurial activity, it is important to recognize the size of the College relative to UH Mānoa as compared with other colleges of engineering nationally: The College of Engineering is approximately 5 percent of the size of UH Mānoa by students which has a total of 20,000 students, and only 2.6 percent of the size of UH Mānoa in terms of faculty, with approximately 55 total tenure track faculty in the College of Engineering. For a comparison with a more typical large mainland university, at Arizona State University (ASU) the combined Schools of Engineering constituting the Ira A. Fulton School of Engineering comprise 13 percent of the students on the ASU Tempe (main) campus, which has a total of nearly 60,000 students, while their faculty comprises approximately 215, or 7 percent of the total ASU faculty. Thus, while the ratio of student percentage to faculty percentage is approximately the same at both universities, the size of the College of Engineering at UH Mānoa is of course a much smaller in absolute terms, but more importantly the College of Engineering at UH Mānoa is a factor of approximately 2.5 times smaller in terms of student and faculty percentages of the University totals.