Feedback from biannual student town hall meetings, comments to the equity adviser and other advisers, and suggestions from individual faculty members and students have encouraged the ME Department to reorganize the Student Services Office. Faculty Equity Adviser, Professor George Johnson, and Equity, Diversity, and Inclusion Student Adviser, Shareena Samson, join Director of Academic and Student Affairs Donna Craig, Graduate Student Services Adviser Yawo Dagbevi Akpawu, and Student Services Assistant Isabel Blanco, to make up the highly utilized and accessible offices in 6189/6195 Etcheverry Hall. They are joined by newly appointed ME Graduate Student Ambassadors Farzana Ansari and Daniel Talancon. “Appointing student ambassadors to the Student Services Office furthers the department’s commitment to create a climate where all students feel valued,” says Johnson. “Here students can feel comfortable raising concerns and offering suggestions as well as carrying out student-departmental collaborations.”

The Student Services Staff’s goal is to support the department’s collective mission of excellence and to monitor its continual progress.

George Johnson, Farzana Ansari, Shareena Samson, and Daniel Talancon

ME Student Services Office’s Reorganization
Welcome to our third issue of the newsletter. Our department continues to prosper in a challenging environment in California. We live in exciting times and, as I write this memo, I am pleased about the passage of Proposition 30 in California that promises, after a long period of decreasing investment in education, to provide much needed support to the educational system in California—including the Berkeley campus.

Technology and education are never stationary—they are always moving forward. The department continues to review our strategic long-term plans to ensure our programs and activities maintain a strong and vital educational program as well as addressing the areas of current importance. In February of this year our faculty came together in an all-day retreat to discuss specific areas of research and instructional priorities for our department. As a result of this retreat and continuing conversation with the faculty and students, we have refined our strategy and vision consistent with the view that Berkeley mechanical engineers impact our health (Berkeley mechanical engineers are at the forefront in creating new possibilities for improved health and patient care), our environment (external influences on a person related to the environment we depend on; sustainability and energy-efficiency are the watchwords of Berkeley’s mechanical engineering efforts across many fields) and our security and way of life (energy, transport, communications, engineering systems, etc. all impact our way of life and security). Look forward to seeing more about our work in these areas in this newsletter, at our website (www.me.berkeley.edu) and on Facebook (www.facebook.com/Berkeley.MechanicalEngineering).

In this newsletter you will see some new faces as we again welcome new faculty, Professors Mofrad and Yamazaki; celebrate the accomplishments of alumnus Archie Williams, a 1939 graduate of ME who competed in the 1936 Berlin Olympics followed by a distinguished oral history recorded in 1988, he says: “...I think that it was destined that I go to Cal. I could stand on my front porch on Telegraph Avenue and look at the Campanile at Cal, so I knew what Cal was all about. We used to go up, even before I got out of high school, and sneak into where the track guys were practicing and crawl under the fence and watch the real athletes perform. I was kind of born a Cal man.”

Despite initial discouragement from a counselor, Williams engaged in his engineering education with great enthusiasm. Additionally, he signed up for track under the guidance of legendary Cal coach and two-time Olympian, Brutus Hamilton, who quickly recognized Williams’ exceptional athletic talents. During the spring season of 1936, he won several races, continually improving upon his time. He won a gold medal for breaking the University of California record for the 440 yard sprint, and shortly thereafter, he set a new world record of 46.1 seconds for the 400 meter race at the NCAA Men’s Track and Field Championships in Chicago. He qualified in July for the Olympics and embarked on an ocean liner from New York City with Jesse Owens and other teammates for the voyage to Germany.

Cal athletes have a long tradition of participation in the Olympic Games. Most recently, 38 of our athletes competed in London, garnering 17 medals: 11 gold, 1 silver, 5 bronze. Similar levels of success were achieved in Beijing (2008) and Athens (2004).

Among Cal’s Olympians, a special place of honor must be reserved for Archie Williams, who arrived at Cal in the fall of 1935 aspiring to become an aeronautical engineer. Gifted with extraordinary athletic ability, this same young man went on to win a gold medal in the Berlin Games a year later.

Archie Franklin Williams was born on 1 May 1915 in Oakland, California, to middle-class African-American parents. As a youth, he was fascinated by airplanes. In fact, his name first appeared in public when he won several awards in the Oakland Tribune’s Model Airplane Contest, held at Oakland Airport in 1931.

Archie Williams attended University High School in Oakland where he also ran track. He began his college career at San Mateo Junior College. There he immediately became attracted to mathematics and physics, and also ran competitively. He transferred to the University of California as a sophomore in the fall of 1935. In an
Archie Williams Continued from page 1

The Berlin Olympics were designed on a spectacular scale with the intention of showcasing the Nazi regime and validating Hitler’s ideas on the superiority of the Aryan race. While German athletes performed well in the Games, the phenomenal speed of Jesse Owens left no doubt about the folly of Hitler’s racial views. Owens won four astonishing events. On Friday, 7 August 1936, Williams ran a magnificent 400 meter race, with a time of 46.5 seconds, longer than his own world record, but short enough to gain the gold.

Williams was welcomed home on 25 September 1936 with a parade to City Hall in Oakland and a noon rally on the steps of Wheeler Hall on campus. He returned to his studies in mechanical engineering. He participated in the 1937 athletic season, but due to a hamstring injury that he suffered in Europe shortly after the Olympic Games, he was not able to match his previous season. In 1937, he campaigned for a position on the student council, making it the first time in the history of the University that a black student had run for office. He lost by a narrow margin. In his senior year, he joined the newly established Civilian Pilot Training Program, which was intended to increase the number of potential pilots in case the U.S. were able to match his previous season. In 1937, he campaigned for a position on the student council, making it the first time in the history of the University that a black student had run for office. He lost by a narrow margin. In his senior year, he joined the newly established Civilian Pilot Training Program, which was intended to increase the number of potential pilots in case the U.S. were to get involved in the looming war. He graduated with a degree in mechanical engineering in December, 1939.

As a result of widespread discrimination against African-Americans, Williams could not find a job as an engineer. The best he could find was work as a “grease monkey,” servicing small airplanes for a flying school at Oakland Airport. It was here that he learned to fly and earned his pilot’s license. Again searching for work, his attention was drawn to the Tuskegee Army Flying School, at the Tuskegee Institute in Alabama. At this time, the armed forces were still segregated. In September 1941, he was hired as an instructor to teach civilian pilots and also some of the first of the famed Tuskegee Airmen.

Looking back in 1988, he remarked: “it was an experiment... Mrs. Eleanor Roosevelt was probably the main one behind it.... And, of course, there was a lot of opposition, especially in the military, because for some reason they had a bunch of “tests” that they’d given during World War I, which supposedly showed that black people were inferior mentally, they had no courage, and weren’t good enough to fly airplanes.”

The Air Corps sent Williams to study meteorology at UCLA. In 1943, commissioned, he returned to Tuskegee to work as a meteorologist and also as a flight instructor.

It was at Tuskegee that Williams met, and soon married, Vesta Young. As he recalls in 1988, “I met Vesta down at Tuskegee and took her for an airplane ride. And, I don’t know... I guess there was something about me that she liked, and there was a lot about her that I liked. So we just went ahead and talked it over, and about two or three months later we were married.” The couple had two children, Archie Williams, Jr., and Carlos K. Williams.

After World War II, Williams helped set up a weather station at Lockbourne Air Force Base in Ohio. Subsequently, he studied aeronautical engineering for two years at the Air Force Institute of Technology at Wright-Patterson Air Force Base, also in Ohio. During the Korean War, Williams served as a weather officer in Japan, and flew on combat missions over North Korea. Later, he and his wife lived in Japan for almost two years.

Williams’ subsequent assignments with the Army Air Corps Weather Service included the Air Defense Command 26th Air Division in New York, Elmendorf Air Force Base in Alaska, and March Air Force Base in California. He retired from the Air Force in 1964, holding the rank of lieutenant colonel.

Williams then started a new career. He earned a teaching credential and devoted his unbounded energy to teaching mathematics and computer science. He spent over 20 years at Sir Francis Drake High School in Marin County, California. He continued to fly private airplanes until the end of his life and co-owned an advertising company, Blue Sky Advertising. At the age of 78, Archie Williams died at home in Fairfax on 24 June 1993, from a heart attack.

As we approach the centenary of Archie Williams’ birth, we celebrate the accomplishments of this truly remarkable alumnus. His unsuppressible zest for life, as well as his courage and optimism in the face of all obstacles, inspires each of us to emulate his lifelong achievements.

To find out more about Archie Williams, visit:
http://www.la84foundation.org/6oic/OralHistory/OHWilliams.pdf
http://www.oac.cdlib.org/view?docid=hb3779n9gv&brand=oac4&doc.view=entire_text

Archie Williams, Tokyo 1950

Mechanical Engineering
In an office in west Berkeley, Mechanical Engineering/Ocean Engineering (ME/OE) alumni Dominique Roddier (PhD ’00) and Christian Cermelli (PhD ’95) designed a floating offshore wind turbine that operates off the coast of Portugal. Their company, Marine Innovation & Technology (Mi&T), is a consulting firm specializing in solving complex offshore engineering and hydrodynamic challenges. Mi&T created MiniFloat, a deep water floating platform designed for the development of offshore oil and gas fields. The same platform has been adapted to create WindFloat, which supports large wind turbines with up to 10MW of renewable power production per unit.

Offshore wind technology is a growing enterprise but is a complex operation because of environmental issues, the logistics involved in assembling the large structures, and the growing scarcity of good offshore sites in shallow water. WindFloat was designed to overcome these obstacles and to produce renewable electrical power in coastal areas where water depth exceeds 50m. After completing a feasibility study and creating a Portuguese joint company, WindPlus, Mi&T’s WindFloat team started work on the offshore project. The project had to comply with several requirements, including the use of a proven 2 to 2.3 MW offshore wind turbine, connection to the Portuguese National Grid, and completion of the project in 2011, leaving the engineers only two years to fabricate and install the platform and turbine. Following environmental and feasibility studies, construction started in December, 2010, and WindFloat’s installation and anchoring was completed in October, 2011. WindFloat produced its first electron on December 22, 2011. It has since withstood major storms, produced energy in all types of weather, and recently passed the 3 GWh mark of electricity produced.

Four other ME/OE alumni are members of the Roddier and Cermelli team at Mi&T: Alexia Aubault (MS ’05 in OE), Antoine Peiffer (MS ’09 in ME), Alireza Lahijanian (MS ’10 in ME), and Alan Lum (BS ’10 in ME) “The Ocean Engineering Program in the ME Department is creating engineering leaders with the breadth of technology and understanding necessary to tackle the most innovative and challenging offshore engineering projects,” says Roddier. “All of our engineers here at Mi&T are Berkeley alumni.”

The WindFloat technology has been sold to Principle Power, which plans to utilize the technology worldwide. The United States and Europe are considering new WindFloat installations in locations including Oregon, the UK, Spain and a new site in Portugal. The Mi&T team’s range of projects is vast and recently included work on Pirates of the Caribbean II & III. The film’s creators wanted the ship’s pitch and roll to look authentic. “We designed an underwater gimbal system so the ships would move in a realistic fashion without having to go out in a big storm and having all the actors get wet and seasick,” says Roddier. Four large aramid lines were connected underwater to the ship’s four corners. The lines connected to a fairlead on the seabed and back to the quay where they connected to large hydraulic cylinders. “We calculated the maximum forces to design all components and gave some time to the cylinders to get the ship moving,” adds Roddier. “Waves were later created by the computer animations guys.”

ME Professor Ronald Yeung, American Bureau of Shipping’s Inaugural Chair in Ocean Engineering, who was the adviser of Roddier and Cermelli in their Berkeley days, commented, “These graduates were very unique in several ways. They loved the oceans and were avid sailors. They enjoyed both theoretical and experimental works. In the latter case, they showed abilities to improvise readily and creatively. It is a remarkable achievement that their team, in just a short time, can go from mathematical modeling to a 160m prototype that produces electricity. WindFloat represents the first US entry into this emerging market. It is a vivid demonstration of the viability of the concept.”

To read more about Mi&T, see “Demonstrating Floating Wind Power” by Dominique Roddier and Christian Cermelli, Marine Technology, October, 2012, pp. 48-53.
To find out more about WindFloat, visit: http://www.youtube.com/watch?v=lO7GXR4YUo.
Professor Mohammad R. K. Mofrad joined the ME faculty in 2012. He works in the areas of molecular and cellular biomechanics, with the aim to understand how mechanical forces and biochemical signals interact in the cell to govern its biology and function in health and disease. In particular, Mofrad is interested in understanding the role of cellular mechanobiology in cardiovascular diseases like atherosclerosis (buildup of plaques in arterial walls, which is a leading cause of morbidity and mortality) and heart valve calcification. “Our specific attention is on the role of two macromolecular systems in cellular mechanobiology, namely the integrin-mediated focal adhesions and the nuclear pores, as related to human diseases”, Mofrad says. Focal adhesions are the immediate sites of cell interaction with the extracellular environment, and as such they play a key role in mechanosensing and mechanochanical signal transduction at the edge of the cell. Nuclear pores are nano-gateways that exquisitely control the material transport in and out of the nucleus, thereby regulating the gene expression and protein synthesis, hence playing a critical role in the overall process of cellular mechanobiology.

Mofrad grew up in Iran and completed his BS degree in mechanical engineering at Sharif University of Technology. He then moved to Canada where he earned his MS and PhD degrees in mechanical engineering at the Universities of Waterloo and Toronto, respectively. While his BS and MS projects were related to fluid mechanical processes involved in internal combustion and pulsating buoyant pool fires, for his PhD he studied fluid dynamics and advection-dominated transport phenomena in arterial blood flow, which are believed to play a key role in atherosclerosis by subjecting the cells of the arterial wall to abnormal stresses. Since then, Mofrad has increasingly concentrated on the role of cellular and subcellular mechanics in cardiovascular disease. Following post-doctoral work at MIT and Harvard Medical School, he spent two years as principal research scientist in mechanical and biological engineering at MIT, before joining the Berkeley faculty in the Department of Bioengineering in 2005. Effective July 2012, Professor Mofrad has been a joint faculty member in both Departments of Bioengineering and Mechanical Engineering. “Mechanics is at the heart of everything we do in my lab and I am excited about joining the Department of Mechanical Engineering, where I feel more at home academically and look forward to closer interaction with ME colleagues and students”, says Mofrad.

To find out more about Professor Mofrad, visit biomechanics.berkeley.edu.
Introducing Professor Kazuo Yamazaki

Professor Kazuo Yamazaki joined the ME faculty in 2011 as professor and executive director of the Precision Manufacturing Center. He holds a joint appointment with ME and the Department of Mechanical and Aeronautical Engineering at the University of California, Davis. His research focus is in state-of-the-art manufacturing engineering.

Professor Yamazaki received his BS, MA, and PhD degrees in engineering from Keio University in Yokohama, Japan. He was formerly a faculty member at Toyohashi University of Technology in Japan and became a faculty member at UC Davis in 1990. At Davis, he also serves as director of the Intelligent Manufacturing Systems Laboratory. He is credited with the development of the microprocessor-based CNC controller and the mini-computer-based adaptive control for CNC milling machines.

Professor Yamazaki’s manufacturing research specializes in the application of mechatronics technologies to high performance machining systems, including ultra-precision mechanical machining systems, design and fabrication of custom-designed micro diamond tools, as well as ultra-high resolution two-dimensional laser holographic scale system development and its application to ultra-precision machining. His goal is to provide society with proficient engineers equipped with manufacturing engineering knowledge and pragmatic skills and to develop easy-to-use manufacturing automation technologies.

Professor Yamazaki is the recipient of the 2000 Technology Award of Japan Society for Precision Engineering (JSPE); the 2001 Industry Lead Award of Society of Manufacturing Engineers (SME), and the 2009 SME F. W. Taylor Research Medal, and is a fellow of SME and the International Academy of Production Engineering Research. He has developed a solid educational program for encouraging undergraduates and graduates to pursue precision manufacturing studies and research. The philosophy he brings to the ME Department is “to educate the students with the newest knowledge and equipment.”

Dr. Kirsi Tikka Wins SNAME Award

ME External Advisory Board member

Dr. Kirsi Tikka has won the David W. Taylor Medal from the Society of Naval Architects and Marine Engineers (SNAME). This prestigious medal is awarded in recognition of notable achievement in naval architecture and/or marine engineering. Dr. Tikka is President and COO of the American Bureau of Shipping (ABS), a leading international marine and offshore classification society. ABS monitors and protects the marine environment by developing and verifying design, construction, and operational maintenance standards of marine-related facilities. Working out of ABS’s London office, Tikka is responsible for day-to-day operations throughout Scandinavia, Northern and Southern Europe, the British Isles, the wider Mediterranean region, and Africa.

A native of Finland, Tikka received a Masters in Mechanical Engineering and Naval Architecture from the University of Technology in Helsinki and is a UC Berkeley alumna receiving her MS and PhD degrees in Naval Architecture and Offshore Engineering under the guidance of Mechanical Engineering Professor Alaa Mansour and Emeritus Professor of Naval Architecture and Ocean Engineering Randolph Paulling, respectively. She has worked for Chevron Shipping in San Francisco and Wartsila Shipyards in Finland. Before joining ABS in 2001, Tikka was a Professor of Naval Architecture at Webb Institute in New York. Dr. Tikka is one of the youngest recipients and the first woman to receive this SNAME award.
BEARS in Singapore

The Berkeley Education Alliance for Research in Singapore (BEaRS) is a center for research, graduate education, and innovation. BEaRS is funded by the government of Singapore through its National Research Foundation’s Campus for Research Excellence and Technological Enterprise (CREATE).

BEaRS has launched two multi-million dollar interdisciplinary research projects: Singapore Berkeley Building Efficiency and Sustainability in the Tropics (SinBerBEST) and Singapore Berkeley Research initiatives in Sustainable Energy (SinBerRiSE). These projects are led by 20 UC Berkeley faculty whose research focuses on energy-efficient tropical buildings and materials for sustainable energy. A team of close to 100 members, including faculty, researchers, post doctorates, PhD students, and administrators, will contribute to the SinBerBEST and SinBerRiSE programs. Research and operations will take place primarily at the BEaRS laboratory facilities housed in the CREATE complex at the National University of Singapore.

SinBerBEST brings together researchers with diverse backgrounds in architecture and civil, mechanical, and electrical engineering. The unique program offers Berkeley researchers the opportunity to explore building efficiency and to seize the opportunity to be at the forefront of designing tomorrow’s super-efficient structures. The overall goal is to design buildings that balance maximum energy consumption efficiency with safety and comfort. The resulting “smart” buildings will interact with occupants to produce an environment of security, privacy, and productivity.

ME Professor Kameshwar Poolla is a Co-Principal investigator of SinBerBEST. “Buildings are energy hogs,” says Poolla. “Over 35% of our electricity is consumed in buildings: lighting, air-conditioning, ventilation. And the figure is closer to 50% in tropical countries like Singapore.”

Poolla adds, “Buildings are the front line in the war to combat global climate change. There are so many things we can do to raise building energy efficiency—intelligent facades, green materials, more efficient HVAC technologies, micro-climates for occupants, holistic sensing and control. My research is centered on the economic aspects of building efficiency—incentivizing participation in energy efficiency programs, extracting value by offering grid services, and rewarding socially optimal behavior. This research is at the intersection of engineering, economics, and consumer behavior. The real challenge is getting people to do the right thing when the individual rewards are small, but the systemic value is enormous.”

Team Cal Simraceway: UC Berkeley Formula SAE

By Anton Savinov

The Formula SAE program is running strong here at UC Berkeley. Our 2012 season was our best yet, culminating in a 15th place finish at the FSAE competition in Lincoln, Nebraska. This was the first year the car finished every dynamic event, including endurance, and this was mostly due to a much more rigorous testing schedule than in previous years. Simraceway’s continued support allowed us to train our drivers more thoroughly, both through virtual simulation and on-track karting lessons. We also benefited greatly from the involvement of our other sponsors, including KLA-Tencor, MUN Manufacturing, and Sonoma Raceway, who provided us with the monetary and facility support that we need in order to put together and test our car in time for competition.

For the 2013 season, our car is undergoing a complete redesign, which began with the development of a dynamic event simulation. Currently the car is nearing the end of the design stage, with many components already in the manufacturing process. The design process has been greatly assisted by a dedicated group of alumni who agreed to give their time and knowledge to help current designers with the new car. Since the past season’s success was so closely tied to the amount of time spent testing, we will begin this year’s testing even earlier. We are aiming to maintain our upward progress, and our goal this year is a top 5 finish at Lincoln!

To find out more about Team Cal Simraceway, visit fsae.berkeley.edu
Katie McKinstry began her graduate studies in mechanical engineering at Cal in 2010. She received her MA in May 2012 and is now working towards her PhD. She is part of Professor and Chair David Dornfeld’s Laboratory for Manufacturing and Sustainability (LMAS)—a lab that emphasizes research on sustainable technologies and manufacturing processes. “Katie is one of a new breed of mechanical engineers,” says Dornfeld. “She is passionate about working on problems with great social impact and is well educated in engineering fundamentals. She always brings a spirited mix of enthusiasm and innovation to these complex challenges.”

After completing her undergraduate studies at Yale, McKinstry was a volunteer for AmeriCorps VISTA, the national service program whose members serve full-time for a year at a nonprofit organization or local government agency. She spent her year of service in a local park in Montpelier, Vermont, where she engaged in grassroots conservation efforts and taught ex-offenders job skills that empowered them to be stewards of parks and communities. It was her year of local engagement that reinvigorated her passion for environmental activism and led her to pursue a career in reducing environmental impact through technological change. She is beginning her dissertation research on the environmental and human health impacts of global material flows of plastics. McKinstry believes that her research will identify opportunities to reduce energy consumption and waste in the production, use, and disposal of plastics.

McKinstry chose Cal for its academic excellence, positive ideals, and strong sense of community. McKinstry feels Cal students from across disciplines, “are incredibly smart, civic-minded, and so willing to learn from and teach one other.” She tries to give back to Cal by creating new communities around shared interests. Last year McKinstry, along with fellow ME student Heather Chiamori, co-founded the Graduate Women in Engineering (GWE) Seminar Series. Under the guidance of Professors Amy Herr, Bioengineering, and Lisa Pruitt, ME, and with financial support from Sandia National Lab, McKinstry and Chiamori started a series that brings outstanding women engineers to campus to share their stories and describe their professional and personal choices. The seminars were well attended and gave students the chance to learn more about professional opportunities from women in various fields and to collaborate and interact with leaders and peers.

McKinstry is also proud of her and fellow ME students’ commitment to local youth outreach. Last year she and several first-year ME graduate students formed Science and Engineering Community Outreach (SECO) to bring graduate students into elementary school classrooms to teach students about structures and gears. SECO connects with schools through the non-profit Community Resources for Science’s Bay Area Scientists in Schools (BASIS) program and has conducted dozens of lessons in Oakland, Berkeley, and Emeryville. As for Berkeley, McKinstry loves the culture, outdoors, and farmers’ markets and feels she was, “born to live here.”