Dear Sibley School Alumni and Friends:

Greetings once again from the Sibley School! We are pleased to share with you exciting news of this past year, drawing upon just some of the experiences of our wonderful students, faculty, staff, and alumni.

In January 2013, we will welcome Professors Meredith Silberstein and Robert Shepherd, continuing our recent trend of hiring outstanding new faculty. Meredith works in the area of mechanics of mechano-chemically active materials, with a focus on energy materials. Rob works in the area of material composites with a special focus on granular media and soft robotics. In July 2013, Ankur Singh will join us. Ankur works in the area of cellular biomechanics, with a focus on engineering immune cells from healthy cells. We must also thank two retiring professors who have devoted their lives to Cornell: Professors Fred Gouldin and Subrata Mukherjee. We anticipate that both will continue to engage the Sibley School with their usual energy and enthusiasm.

We had over 200 students graduate from the Sibley School this past year, including 121 undergraduates. Mechanical Engineering continues to be the major of choice in the College of Engineering. This year we welcome more than 160 new students to the program. The experiential learning in Mechanical Engineering, as well as the breadth the major brings, are important draws. This past year many of our historically strong project teams had good years, with CU-AUV (highlighted in this newsletter) placing second, Baja SAE finishing first out of 100 teams, and CU-Sat preparing for its launch in December 2012. We also saw several new teams start up and compete well, including the Design, Build, Fly team and the Mars Rover team. In all over 17 teams and 700 students across the University worked on these project teams, with over half led by Sibley School professors and students.

Our alumni are very excited about our experiential learning experiences as they integrate key technical disciplines into interdisciplinary projects students are most likely to encounter in industry and research. Two recent gifts from alumni have helped create new initiatives to support these project teams. As highlighted in this newsletter, Dr. John Swanson donated $10M to endow project teams, including Director of Project teams. John is a Sibley School alum, Class of ’61. Also, through an anonymous donation, a new leadership program has been created, led by Cornell alum Erica Dawson. The program is designed to support student leaders at all levels, including, of course, the project teams. We believe these new programs will help to institutionalize project teams for the University for years to come.

Our faculty continue their excellence in research with their students; a summary of some of the highlights is given at the end of this newsletter. We have also seen an emergence of important leadership roles for our faculty. This article highlights two. Professor Marjolein van der Meulen performs impactful research in the area of bone health as the Swanson Professor of Biomedical Engineering, and has also served as Associate Dean for Research and as Co-PI for the transformative ADVANCE program aimed toward increasing the numbers of women faculty in underrepresented departments. Professor David Erickson has distinguished himself and his research group in the area of Optofluidics and has also recently started a company with a former postdoctoral researcher which was named start-up of the year in Philadelphia. Finally, Professor Mason Peck is currently NASA’s Chief Technologist – a job that makes him the highest level engineer in NASA, working as the agency’s principal adviser and advocate on matters of technology policy and programs. This is exciting, not only for Mason, but also for recognizing the strength of Aerospace Engineering in the Sibley School.

As I end my first year as Director, let me say that one of the highlights for me was visiting our alumni, including of course our Reunion. The passion of our alumni for Cornell and the Sibley School was one of the big draws for me to Cornell. We look forward to hearing your good news and new adventures – using the Alumni link off of our website, postal mail or simply a quick email to mae_alum_news@cornell.edu. As always, please check back to the Sibley School website (www.mae.cornell.edu) to learn more about our students, faculty and exciting news. Warmest regards.

Mark Campbell
Professor and Director
From Alberta to Cornell

Erickson attended the University of Alberta in Edmonton, earning a degree in mechanical engineering before going on the University of Toronto for a doctorate degree, also in mechanical engineering. It was during his PhD studies in Toronto Erickson's focus turned toward nano scale. “My advisor worked in two areas,” Erickson said. “One was surface thermodynamics, using temperature to find oil in sand. That's where I started. The other was microfluidics (the study of the behavior of fluids on a nano scale) and that's where I ended up.” Even before he graduated, Cornell reached out to hire Erickson.

“I didn't know anything about the U.S., though,” Erickson said. “I had no contacts and I didn't understand the funding system here, so I asked Cornell if I could put off my start for a year while I did postdoctoral research for a year at CalTech (the California Institute of Technology). I came back to Cornell in 2005 and have been here ever since. I became a U.S. citizen last Wednesday (August 1st).”

Optofluidics

Erickson, Bernardo Cordovez, Ph.D. MAE ’10, and Robert Hart, B.S. Carnegie-Mellon, founded a company in 2011 and named it for the field pioneered in Erickson’s lab “and in about 100 others” in 2005. The use of fluids in optical devices dates as far back as the 18th century to telescope mirrors made of swirling mercury. The advances Optofluidics is banking on, however, are more recent and on a much smaller scale.

“There are changes in the fundamental physics at the nanoscale,” Erickson said. “The question is, how do we use this different physics to do interesting things that we can’t do at the macroscale?” The lab produced some 70 to 80 papers exploring various ways to take advantage of the nano scale, but the NanoTweezer stood out as one potential product with both clear technical advantage over existing technology and a low barrier to entry. “We considered other ideas as well, but many of those had higher hurdles on the way to market, like FDA approval.”

Optofluidics, Inc.

The first significant step came in 2011 as Erickson was making plans for a sabbatical leave from Cornell. “About a year before it started, I wrote two SBIR (Small Business Innovation Research) grants based on this idea and, to my surprise, both were funded. I had to turn down one and started work on the other immediately.”

“What we had at that point were some lab experiments that had proven interesting, a product idea, and an idea about the size of the market for this tool,” Erickson said. “What we didn't know was how to turn an idea into a product, how to find our customers, or even how to participate in a trade show. Fortunately, my co-founders proved to be really good at working those things out.”

Early investors and an incubator environment also were key to making Optofluidics a going concern, Erickson said. “I hadn't started a real business before,” he said, “but our investors turned out to be really good at helping us with the business and the incubator environment at the Science Center (a Philadelphia incubator) provides the infrastructure and contacts.”

Larger funding rounds since have netted $1.2 million from the Defense Advanced Research Projects Agency (DARPA) and about $700,000 from the National Science Foundation (NSF) to support the company’s growth. Private investors have contributed a similar amount. A prototype is scheduled to be ready in early 2013 according to Erickson, then tested in labs before full production starts.

The NanoTweezer

The tool itself consists of a desktop laser box connected by a cable to a microscope adapter. The adapter is a plate that sits on a microscope’s stage. Several waveguides, square tubes made of silicon nitrite, stretch across the face of the adapter. The waveguides measure 300 nanometers on each side and have holes in the sides spaced to create resonance for the light within the waveguide.
When the NanoTweezer is switched on, laser light is guided down the waveguides, traveling in two forms – the propagating part and the surrounding, aura-like, evanescent field. As the waveguide gets smaller, the relative size of the evanescent field becomes larger. The resonators amplify the light to further increase this effect. The relatively larger evanescent field allows the NanoTweezer to attract and immobilize smaller particles than previously possible (<100 nm), giving researchers a stable platform, a "vise," to hold their work steady, while leaving even smaller particles unaffected. When the NanoTweezer is turned off, the particles flow freely. The technology is licensed from Cornell.

Made at Cornell

Before the NanoTweezer can find its place accelerating research in pharmaceutical labs, the product must be built. According to Erickson, there was only one place he considered to make research instruments on a nano scale: The Cornell NanoScale Science & Technology Facility (CNF) down the hall from his Upson Hall office, in the adjoining building. “This place is celebrating its 35th anniversary this year. For most of its history, this facility was the only one of its kind in the U.S. Now there are more, but this is still the leading nano-fab in the U.S. It is critical to our work.”

Marjolein van der Meulen

The normal human skeleton has more than 200 bones. Those mineral-dense bones keep us erect, support our muscles, and protect our organs. Clearly, we would be nowhere without them.

Yet our bones can take a serious beating, resulting in breakage, pain, and lack of mobility:

Osteoporosis, a disease that weakens bones, making them prone to break, is a major public health threat for an estimated 44 million Americans, or 55 percent of the population 50 years of age and older.

Chemotherapy, which helps many of us survive any number of cancers, can eat at bone density, making survivors more prone to broken bones.

Simple overuse due to working conditions, sports, and the like can lead to the need for joint replacements. Osteoarthritis is the leading cause of disability among the elderly in the United States.

Orthopaedics, the branch of medicine that deals with bone health, is Marjolein van der Meulen’s stock in trade. As Cornell’s Swanson Professor of Biomedical Engineering, van der Meulen studies the biomechanics and mechanobiology of bone, with an eye toward finding out what makes a strong and healthy bone.

“It’s a fascinating field,” she says. “And the impact of the research is broader than just a purely academic exercise. Advances in the field will eventually benefit most of us.”

Bone studies were once the sole purview of physicians. A mechanical engineer via education (BS, MIT and MS and PhD, Stanford), van der Meulen uses basic mechanical engineering principles to aid in understanding and addressing the myriad health issues of the skeleton.

Her research looks at how every day forces are recognized by bone cells and how those cells react. One of van der Meulen’s favorite words is “load.” Her research uses the concept that bone responds as it bears more weight or load. Tennis players, for example, often have stronger bones in their playing arms.

Some of her experiments model breaking bones to understand how strong they are and what factors contribute that strength. The analyses usually involve models that allow the researchers to vary characteristics. The model predictions feed the experiments, and then the data contribute to further model development and validation.

“We live in a world of gravitational force that pulls on us,” van der Meulen says. “As we lift up and off, we unload and reload our limbs. The cells in the bones react to this push and pull, and the skeleton becomes stronger. In the lab, we simulate those forces to understand how these processes can be harnessed to form bone. What we want to know is the how and the why, and then, what to do with that knowledge.”

Eventually this research may help in clinical applications such as developing drugs to counteract osteoporosis, or improved joint replacements and bone grafting.

In high school, van der Meulen wanted to be a biologist; her family urged her to take on a seemingly more practical discipline, mechanical engineering. She discovered the two fields could be combined when she saw a television segment on helping paraplegics regain walking skills. As a mechanical engineer interested in biology, moving into the biomedical engineering area was a natural transition. “I never looked back,” she says.

Before joining Cornell in 1996, van der Meulen worked for three years as a biomedical engineer at the Rehabilitation R&D Center of the Department of Veterans Affairs in Palo Alto, California. She was thrilled to be working in her chosen field and hadn’t considered moving into academia. Friends talked her into applying for the Cornell position. She was surprised when she received the offer.
But moving east and being affiliated with Cornell had advantages she couldn’t ignore. Along with her teaching duties, van der Meulen is senior scientist in the Research Division at The Hospital for Special Surgery, a Cornell University-Weill Medical College affiliate in New York City. The hospital is rated first in the country for orthopaedics by U.S. News and World Report.

“I love being completely immersed in research,” she says. “The connectivity and opportunities for collaboration here and at the hospital help me do that.”

As a graduate student at Stanford University, van der Meulen received a NASA Graduate Student Researchers Fellowship and her experiments were conducted at NASA Ames Research Center, Mountain View. She has also collaborated with NASA researchers to investigate the changes in the load-bearing ability of bones in space using ground-based models.

Along with a National Institutes of Health FIRST Award, van der Meulen received an Early Career Development Award from the National Science Foundation. Her research is featured regularly at national conferences. She is a member of the American Society for Bone and Mineral Research, the American and European Societies of Biomechanics, American Society of Mechanical Engineers, and the Orthopaedic Research Society. van der Meulen earned teaching awards from the College of Engineering and Mechanical & Aerospace Engineering.

As an outstanding researcher, van der Meulen was featured in the book, “Changing Our World: True Stories of Women Engineers.” The book addresses the issue of female under-representation in the field of engineering. According to the book, of the estimated one million engineers in the United States today, approximately 100,000 of them are women.

At Cornell she has been a leader of CU-ADVANCE, a National Science Foundation-funded initiative aimed toward increasing the numbers of women faculty in underrepresented departments. As of September 2011, ADVANCE reported 72 hires of women among the 52 departments under the purview of the grant, which include engineering and physical, social and life sciences. Of those, 15 were hired with tenure. ADVANCE also sponsored programs and events designed to support existing women faculty and facilitate networking. “The number of people who participated in [events] was greater than expected, van der Meulen says. “I think many people had not thought about the great opportunities that come from interacting with other women across campus. I think that was a really big outcome.”

But van der Meulen’s primary occupation remains discovering what makes bones work. She sees that research as her life’s work. “The opportunity to improve human health is a big part of what motivates me,” she says. “And in this field there is always a new and fascinating idea to work with.”

Mason Peck, associate professor of mechanical and aerospace engineering, has been named NASA’s chief technologist, effective January 2012. Peck will serve as the agency’s principal adviser and advocate on matters of technology policy and programs.

Peck leads several Cornell spacecraft research programs including CUSat, an in-orbit inspection system consisting of a pair of twin satellites designed and built at Cornell. CUSat is scheduled to launch in 2013 on a Falcon 9 rocket through the U.S. Air Force Research Laboratory’s University Nanosatellite Program.

Peck also is principal investigator of the Violet satellite experiment, also a Cornell-built system that will provide an orbiting test bed for investigating better commercial Earth-imaging satellites. Violet carries an ultraviolet spectrometer that will be used as a precursor to understanding exoplanet atmospheres.

In his NASA role, Peck will help communicate how NASA technologies benefit space missions and the day-to-day lives of Americans. The office coordinates, tracks and integrates technology investments across the agency and works to infuse innovative discoveries into future missions.
Reunion 2012
Founded in 1865, the Sibley School of Mechanical and Aerospace Engineering is proud to have many successful alumni who have both benefited from and given back to the educational environment so carefully nurtured here. From Bill Nye “The Science Guy” to Nadine Aubrey, recently named Dean of the College of Engineering, Northeastern University, our alumni have changed the world at large and made a difference here at Cornell. Few, if any, have impacted our undergraduate program more than John Swanson, ME ’61.

After receiving his B.S. and M.S. in mechanical engineering from Cornell and his PhD in applied mechanics from the University of Pittsburgh, Swanson went to work for the Westinghouse Astronuclear Laboratory where, as a member of the stress analysis team examining NERVA rockets, he began to develop concepts and code instrumental to modern 3D modeling. Westinghouse was not ready to encourage Swanson’s streamlining and efficiency insights so he did what we should all do when confronted by an immovable object. He went around it. Swanson Analysis Systems, later renamed ANSYS, Inc. started like all good tech start-ups – in his home – and has gone on to redefine the way engineers design products for virtually every industry that forms the basis of our modern technological society. Today ANSYS software remains the gold standard for modeling and simulation and under his leadership as CEO has grown to employ over 1,400 people.

Cornell has benefited immensely because of the education it helped John Swanson achieve and from his continuing wish to give back to the students following him through the Sibley School. One his most important and lasting gifts to Cornell’s incoming engineering undergraduates is the Swanson Laboratory for Advanced Engineering Simulation. Dr. Rajesh Bhaskaran, the current Director of the Swanson Program for Engineering Simulation, has this to say about it: “John’s endowment of the Swanson Program for Engineering Simulation has enabled us to integrate industry standard simulation tools into eight diverse courses including four required courses. This has, for instance, allowed undergraduate students to compare experimental results in lab courses with corresponding simulation results.” Because of this generous gift the Sibley School is now recognized as one of the world leaders on the integration of simulation technology into the engineering curriculum or ISTEC.

In 2008 and 2011 the Sibley School hosted the ISTEC workshop which attracted nearly two hundred attendees from academia and industry. Bhaskaran explains that, “John has been instrumental in initiating the ISTEC workshop series.” He adds, “there was palpable excitement among attendees about the potential of simulation technology to transform engineering education. John’s interest, leadership and support have been key in establishing [the Sibley School] as the leader on this issue.” While it might seem obvious that course-work with modeling and simulation should be an integrated part of any undergraduate engineering degree, that is not currently the case at every institution. John Swanson’s visionary leadership has placed Cornell well ahead of the curve on this emerging trend in engineering education.

While Cornell has been a major recipient of Swanson’s philanthropy, he has always made the sharing of knowledge a top priority. Bhaskaran reports that, “John has always encouraged us to share resources developed for our courses freely with other institutions. The Simcafe wiki containing the simulation-related content being developed for Cornell courses is being accessed by more than 60,000 users from 129 countries.”

Recently Swanson made headlines by donating $10 million to help support undergraduate education in engineering at Cornell – with a focus on experiential learning opportunities. It is not difficult to see how these two gifts are motivated by a common belief, shared by the Sibley School and John Swanson: engineering graduates should be prepared to join the workforce as successful contributors.
Undergraduate project teams, run largely out of the Cornell Experiential Learning Lab, continue to be an essential part of the Sibley School's educational environment. Beyond their significant intrinsic value the teams have amassed up an impressive number of accomplishments over the past 30 years. Even taking into account more established project teams few have matched the sheer number of 1st place finishes achieved by the Cornell University Underwater Autonomous Vehicle team. Victories like this one prove once more that our undergraduates are driven, talented and destined to succeed in the real world. Katie Risvold '14, member of the CUAUV Business PR sub-group, puts it this way, "I have been fortunate enough to be a part of an engineering team that emphasizes a cross-disciplinary approach from the design phase up through the testing of the final product. My time with CUAUV has defined my engineering experience at Cornell. It gives team members an opportunity to fully utilize what we are learning in classrooms in a real-world situation."

The annual competition for UAV is the RoboSub Competition held each summer in San Diego, and is co-sponsored by the Association for Unmanned Vehicle Systems International and the U.S. Office of Naval Research. The focus of this 15 year old competition is to design and build a small submarine that can autonomously navigate an obstacle course, including firing torpedoes and retrieving objects. This year CUAUV won 1st place and was the only team out of 30 whose vehicle was able to complete every assigned task. First place prize includes a check for $8000, a 3rd generation Intel board and some serious bragging rights. CUAUV has placed 1st overall in three of the last four years, (and 2nd in the other year) establishing this entirely undergraduate run project as the premiere UAV team in the world.

While CUAUV is most definitely a collaborative endeavor there is one person repeatedly mentioned as the architect of the culture who continues to drive the team’s success: 2008 – 2010 team leader, Erin Fischell ’10. Now pursuing her Ph.D. at the Massachusetts Institute of Technology/Woods Hole Oceanographic Institute Joint Program, Fischell says, “CUAUV gave me a love of robotics and autonomy that has become my career.” The focus of Erin’s work in the Laboratory for Autonomous Marine Sensing Systems at MIT is on AUV decision-making, machine learning, and acoustics. She notes, “experiential learning through the project teams provides important lessons in systems engineering, project planning, problem solving, and leadership. You cannot get those experiences from books or from the canned, well-bounded projects in engineering classes. Since these things make up so much of ‘real world’ engineering, I feel that experiential learning is the most important part of an engineering education.”

As for the impact project teams have on a young engineer’s future success Fischell says, “no one from my year on CUAUV had trouble getting a job or getting into graduate school: working on CUAUV gave everyone things to talk about in interviews and skills that employers value. Being on one of the major Cornell teams means hands-on experience working with complex system design and implementation, something few engineering graduates can boast. Companies know this.”
Meredith Silberstein will be joining the Sibley School of Mechanical & Aerospace Engineering at Cornell University as an assistant professor in January of 2013. She received her Ph.D. from the Massachusetts Institute of Technology in 2011 and has since been working as a postdoctoral fellow at the Beckman Institute at the University of Illinois Urbana-Champaign investigating mechanochemically active materials. "As fossil fuel reserves become more difficult to access and concern grows for the environmental impact of carbon-based fuel consumption, alternative methods of energy harvesting and conversion are becoming increasingly important," she says. "Many of these methods rely on materials to perform electrochemical functions while maintaining mechanical integrity, [therefore we can expect that] material solutions will drive improvements in these technologies."

Her research strategy will involve concurrent modeling and experimental programs whose aim is focused on advancing the field of energy materials. She has identified unique opportunities to utilize microstructurally-based models which can facilitate system level design and in turn guide the design of new multifunctional composite materials. "Development of such models is challenging because of the relative infancy of experimental techniques to quantify the electro- and/or chemo-mechanical coupling," but, she adds, "since the electrochemical and mechanical properties derive from the underlying structure, they should be linkable in a non-arbitrary way." The research Dr. Silberstein will conduct at Cornell aims to bridge the gap between a theoretical framework and its materials application.

The long term goal is to make fundamental contributions to our understanding of mechanics. In the near term Dr. Silberstein has identified two primary, high-impact research programs that will be her initial focus at Cornell: "designing dye-sensitized solar cell composite materials for mechanical performance using microstructural modeling and modeling electroactive polymers for system level design of actuators or energy harvesters with an emphasis on experimental determination of electro- and chemo-mechanical coupling."

This coming January the Sibley School welcomes two new professors to our faculty. Dr. Robert Shepherd comes to us from Harvard University where his research has focused on the development of material composites with a special focus on the exciting potential fields of granular media and soft robotics. "During my post-doctoral work, I used soft-lithography to mold 'soft robots' that were capable of sophisticated locomotion and manipulation." He says. "The prototypical 'hard robot,' by contrast, requires much more complexity in design and assembly of motors and gears to achieve similar ranges of motion."

Dr. Sheperd's research into adaptive material composites using dissipative/time variant soft systems has a wide range of possible applications and he plans to use an interconnected approach that will leverage theoretical underpinnings to maximize real-world impact. The systems he expects to produce run all the way from flexible, impact resistant material that could be used to create earthquake proof structures, clothing that could protect soldiers from shrapnel and puncture resistant skins for soft robots to transparent coatings that convey information about high velocity impacts which can inform us about possibly concussive trauma or architectural failure.

His interconnected research philosophy has pointed the way to another avenue he intends to investigate at Cornell: the tuning of granular/colloidal composites to behave as lubricating fluids. Currently the oils and greases used to lubricate all manner of mechanical processes degrade rapidly and are unable to regulate linear or angular velocities. Ball bearings are also a tried and true method for reducing the friction in a given system but their size limits their applicability. Dr. Sheperd intends to use Stop Flow Lithography as a fabrication technique to produce granule/colloidal mixtures that behave as robust, microscopic ball bearings for lubrication.
Faculty Awards

Prof. Thomas Avedisian delivered the Rohsenow Distinguished Lecture at MIT’s Mechanical Engineering Department on April 20, 2012. His presentation was entitled “Liquefied Fuel Combustion in an Evolving Energy Environment”. The Rohsenow Lecturer is named for the late Warren M. Rohsenow, a professor at MIT for 50 years, founder of MIT’s Rohensow-Kendal Heat Transfer Laboratory, and a pioneer in boiling heat transfer, multiphase processes, and thermal power systems.

Dr. Rajesh Bhaskaran participated in the National Academy of Engineering’s (NAE) Frontiers of Engineering Education (FOEE) Symposium held November 13-16, 2011. According to NAE, “the FOEE Symposium brings together faculty members who are within 15 years of receipt of their doctorate and who have implemented innovative techniques in their teaching.”

Prof. Joseph A. Burns, the Irving P. Church Professor of Engineering and professor of astronomy, has been elected the new dean of the university faculty for a three-year term starting in July 2012.

Prof. Mark Campbell and his students won the AIAA Best Paper from the 2011 Guidance Navigation and Control Conference. The paper was entitled “Decentralized Information-Rich Planning and Hybrid Sensor Fusion for Uncertainty Reduction in Human-Robot Missions”. The work was led by Dr. Nisar Ahmed (PhD ME 2011) and was conducted in collaboration with Professor Jonathan How’s research group at MIT. Campbell was also an invited speaker at the 2011 Chinese-American Kavli Frontiers of Science symposium in Shenzhen, China. The Kavli symposium is co-sponsored by the U.S. National Academy of Sciences and Chinese Academy of Sciences, as the Academy’s premiere activity for distinguished young scientists. Attendees are selected by a committee of Academy members from among young researchers who have already made recognized contributions to science, including recipients of major fellowships and awards.

Prof. Olivier Desjardins received the 2011 Distinguished Paper Award for Spray & Droplet Combustion from the Combustion Institute. This was awarded for the paper “Analysis of three-dimensional n-heptane spray flames in a model swirling combustor”, co-authored by K. Luo, M. Pai, H. Pitsch and O. Desjardins, which was judged to be the best paper presented at the Colloquium on Spray & Droplet Combustion at the 33rd International Symposium on Combustion held in Beijing.

Prof. David Erickson has been awarded the 2010 Presidential Early Career Award for Scientists and Engineers (PECASE) through the Department of Energy. The Presidential early career awards embody the high priority the Obama Administration places on producing outstanding scientists and engineers to advance the Nation’s goals, tackle grand challenges, and contribute to the American economy. Sixteen Federal departments and agencies join together annually to nominate the most meritorious scientists and engineers whose early accomplishments show the greatest promise for assuring America’s preeminence in science and engineering and contributing to the awarding agencies’ missions. Erickson’s company Optofluidics was named Philadelphia’s Life Sciences start-up of the year by the Greater Philadelphia Alliance for Capital and Technologies (PACT). The Enterprise Awards “are the premier business awards ceremony in the Philadelphia Region and celebrate achievement, innovation, and the success of Technology, CleanTech, MedTech and Life Sciences companies, leaders and entrepreneurs”.

Prof. Elizabeth Fisher was named a Faculty Fellow in the Atkinson Center for Sustainable Future.

Prof. Yingxin Gao was among eight Cornell faculty members to receive a 2011 Affinito-Stewart Grant from the President’s Council of Cornell Women for her study of “The Effects of Platelet Rich Plasma on Muscle Strain Healing in Rats.” Winners were selected from 12 proposals reviewed for scholarly merit, research design, feasibility, and likely relevance to promotion to tenure. Gao also won the 2010-11 Michael Tien ’72 Teaching Award for outstanding teaching in the Sibley School and the College of Engineering.

Prof. Ephrahim Garcia was promoted to full professor. Garcia has run a vibrant research program in the areas of smart materials, bio-inspired robotics, energy harvesting vehicles and controlled biological systems, and led a number of student project teams. Garcia was also named as an ASME Fellow in 2011, as awarded by the ASME Board of Governors confers the Fellow grade of membership on worthy candidates to recognize their outstanding engineering achievements. Nominated by their peers, Fellows have had 10 or more years of active practice and at least 10 years of continuous active corporate membership
in ASME. Garcia was also appointed the representative from the American Society of Mechanical Engineers to the Daniel Guggenheim Medal Board.

**Prof. Timothy Healey** was awarded the Department of Mathematics Teaching Prize for outstanding teaching.

**Prof. Herbert Hui** was named the 2011 recipient of The Adhesion Society Award for Excellence in Adhesion Science “for his meritorious and creative contributions to the application of fracture mechanics in understanding the problems of adhesion science.”

**Prof. Hadas Kress-Gazit** is part of a five-year, $10 million National Science Foundation Expeditions in Computing project to make computer programming faster, easier and more intuitive. Dubbed ExCAPE (Expeditions in Computer Augmented Program Engineering), the project is a collaborative effort led by the University of Pennsylvania that will involve multiple institutions, industry partners and educational outreach programs for the next generation of computer scientists.

**Prof. Hod Lipson** and Michael Schmidt were recognized as the world’s 7th most powerful data scientists by Forbes magazine. Their AI program can distill the laws of motion merely by observing data from the swings of a pendulum, starting a field of robotic science in which AIs try to derive meaning from datasets too large or complex for humans to study. Popular Science ranks Prof. Hod Lipson’s CCML among “25 Most Awesome College Labs 2011.”

**Prof. Michel Louge** and collaborators at the Weill Cornell Medical College in Qatar won an award at the Annual Research Forum of the Qatar Foundation in Doha for a project to better understand microbes in sand dunes. The award included a $100,000 prize to extend the research. Louge also delivered the keynote address at the 2012 Multiphase Flow Workshop, organized by the U.S. Department of Energy - National Energy Technology Laboratory’s (NETL). This workshop brings together leaders from academia, industry and government to discuss current and future research projects in the multiphase flow area.

**Prof. Stephen Pope** was been selected to be the Hottel Lecturer for the 34th International Symposium on Combustion by the Combustion Institute. The International Combustion Symposia take place every two years and are attended by about 1,500 combustion scientists and engineers from around the world. The five-day meeting starts with the hour-long, plenary Hottel Lecture. Pope also received the 2012 American Institute of Aeronautics and Astronautics Propellants and Combustion Award “for original and substantive contributions to the modeling of turbulent reactive flows, in particular for the development of probability density function methods.”

**Prof. Steven Strogatz** has been elected a Fellow of the American Academy of Arts and Sciences. One of the nation’s most prestigious honorary societies, the Academy is also a leading center for independent policy research. Members contribute to Academy publications and studies of science and technology policy, energy and global security, social policy and American institutions, the humanities and culture, and education.

**Prof. Marjolein van der Meulen** was awarded the Robert ’55 and Vanne ’57 Cowie Teaching Award for outstanding teaching in the Sibley School and the College of Engineering.

**Prof. Charles Williamson** delivered the 21st Annual Wallace Prize Lecture at MIT, entitled “New Phenomena in Vortex-induced Vibrations.”
Graduate Student Awards

2011-12 Graduate Research and Teaching Fellowship:
Baijurja Ray, Ph.D. student in Mechanical Engineering w/Collins

Howard Hughes Medical Institute Med-into-Grad Scholar Fellowships:
Matthew Goff, Ph.D. student in Biomedical Engineering w/Hernandez
Fredrik Thege Ph.D. student in Biomedical Engineering w/Kirby

National Science Fellowship:
Timothy Lannin, Ph.D. student in Mechanical Engineering w/Kirby

CMM Young Investigator Award:
Erica Pratt, Ph.D. student in Biomedical Engineering w/Kirby

NASA Aeronautics Fellowship:
Daniel Asselin Ph.D. student in Aerospace Engineering w/Williamson

NSF Fellowships:
Edward Bonnevie, Ph.D. student in Mechanical Engineering w/Bonassar
Daniel Lee, Ph.D. student in Mechanical Engineering w/Campbell
Matthew Mancuso, Ph.D. student in Biomedical Engineering w/Erickson

Sloan Fellowships:
Alexander Bernstein, Ph.D. student in Theoretical & Applied Engineering w/Rand
John Palmore, 1st year Ph.D. student in Aerospace Engineering

Juan Gomez, Ph.D. student in Aerospace Engineering w/Garcia, whose paper “Morphing unmanned aerial vehicles” was selected by the editor of Smart Materials and Structures for inclusion in the ‘Highlights of 2011’ collection.

Undergraduate Awards

Sibley Prize
This award honors our first benefactor, Hiram Sibley, for whom the Sibley School of Mechanical & Aerospace Engineering is named, and his son. The Sibley prize was established in 1884 and is awarded to seniors with the highest scholastic averages.

• Tunc Ertan
• Nipun Jasuja

Tunc and Nipun have been invited to participate in the AIAA Foundation International Student Conference in January 2013, and will have their travel expenses paid. Nipun is a Merrill Presidential Scholar Recipient and 2012 Engineering Global Fellow, Engineering Degree Marshal, and CS Undergraduate TA of the year.

McManus Design Award
Howard N. McManus, B.S. ME ’51, M.S. ME ’52 U. of Iowa, PhD ’56 U. Minnesota, was a dedicated researcher and teacher in both the thermal and design side aspects of engineering. Professor McManus, past Head of the Mechanical Design Department (the ME component of MAE prior to 1972) was sought out nationally at conferences whose objective was returning educators’ attention to the fundamentals of engineering design. He serviced on a faculty committee in the mid-60s whose findings were largely instrumental in determining the role of design in engineering programs at Cornell. Friends established the prize fund after his death in 1974. Winners are judged on ingenuity and engineering skills used to propose an original solution to a design problem or project.

• Chun-Ti Chang for his project, “Toward visual capture of droplet vibrational spectra: The OmniView platform”
• Ritu Raman, for the project titled, “Bioreactor Design for Physiologic Loading of Tissue Engineered Meniscus”

R. N. Janeway Engineering Award
The Janeway award recognizes a publishable paper submitted which presents the most promising proposal for an improvement in automotive vehicles. Neal Applebee, “Design of a Rapid Prototyped Intake Manifold for Formula SAE Application using Computational Fluid Dynamics and Engine Simulation”
Benjamin Werner, “Baja SAE Vehicle Gearbox Design”

Bart Conta Prize in Energy and the Environment
Established in memory of Professor Bart Conta, 1914-1991, (MAE 1942-1991), the prize is awarded for the best work on a research or design project dealing with energy and the environment, with selection based on a review of project summaries. Bart Conta was ahead of his time in energy and environmental efforts. One of the courses he taught mid 60s was “Conventional and Direct Energy Conversion”. He also introduced solar energy and societal impact of technology to his students.
• Sarah Callanan, “Price Responsive ice storage systems”  
• Megan Rotondo, “Offshore wind turbine blade design”

Outstanding Senior Award
• David McCarey  
  David was president of the Cornell Chapter of the American Society for Mechanical Engineers during the 2011-2012 academic year, raising awareness of ASME through social and professional activities.

Walter Werring Excellence Studies Prize
Walter W. Werring, ME ’22, established this award to recognize talented and dedicated undergraduate students in the Sibley School who have enhanced the Cornell Community, excelling in a manner befitting the reputation of the Sibley School.

• Thomas Hayford  
  Thomas Hayford helped form the Mars Rover team then served as team leader, managing 50 students who successfully competed in the Mars Rover Competition in Utah. He founded the Club Sports Council, which serves 1000 Cornell students.

• Tricia Hevers  
  Tricia Hevers served as a leader and program manager for CUSat, overseeing 50 students’ technical work in preparation for the December 2012 launch. She was also a representative on the University panel.

• Christopher Peratrovich  
  Chris Peratrovich has held numerous leadership positions, including leading the mechanical team for the Cornell Autonomous Underwater Vehicle team. Chris participated in outreach activities beyond the Cornell community to involve youth in science and technology.

Frank O. Ellenwood Prize
The prize was donated in honor of the late Sibley Professor Frank O. Ellenwood by an alumnus who wishes to remain anonymous. Professor Ellenwood is co-author of a classic three-volume text on heat-power. This award is presented to the seniors with the highest composite average in heat and power-related engineering courses.

• Matthew Blair  
• Robert Greig  
• Christopher Jewison  
• David McCarey  
• Anthony Savas

Thomas J and Joan T Kelly Prize
This prize recognizes excellence in aerospace engineering as demonstrated through coursework or an innovative design project. The awardee must show tangible evidence of being a well-rounded person with outstanding non-engineering contribution to Cornell and/or the greater community.

• Laura Jones, for her research with Professor Mason Peck.

Outstanding Achievement Award, Master of Engineering Program
Awarded to 2 graduating students who have achieved the highest academic standing in the Master of Engineering Program

• Michael Goetz  
• Shikhar Mohan

David Block Award
In recognition of outstanding performance by a Teaching Assistant in undergraduate Engineering Mathematics or Engineering Mechanics Courses as determined by faculty recommendations.

• Igor Labutov

Sibley Prize for Excellence in Outstanding Teaching Assistance
The Sibley Prize is awarded annually to the Teaching Assistant(s) in the Sibley School and is decided by the Sibley Awards Committee.

• Timothy Lannin  
• Mitchell Walters
**Miscellaneous Awards**

**Top 25 Senior Athlete**  
Alexander Lavin

**Kessler Fellowship**  
Natasha Gangjee

**Certificate of Achievement in Arabic Recipient; Edwin Fitzpatrick Award for Outstanding IFC Leader**  
Brian Sherman

**GEM Fellowship Recipient**  
Neyvin De Leon

**KODAK: Engineering Ambassador Recognition**  
Kelly Marie Trepess

**McMullen Dean’s Scholarship recipient; DPE Award Recipient**  
Bianca Cha-Camp

**Rosa and Frank Rhodes Scholarship Recipient; Walter W Buckley Scholarship Recipient; Willis H Carrier Scholarship**  
Amanda Kuczun

**Quill and Dagger Society Member, Scabbard and Blade Member**  
John Crowers

**Engineering Global Fellows Honors 2008, 2010**  
Katarina Chang

**“Race to the Top” Scholarship Recipient**  
Elizabeth Vanderhoef

**Knight Scholarship Recipient**  
Danny Field

**National Science Foundation Fellowship**  
Jocelyn Kluger

**Co-op with Distinguished Honors**  
Nicholas Fuga

**Engineering Learning Initiatives Research Funding Award; Kessler Fellowship recipient**  
Ritu Raman

**Society of Women Engineers Emerging Leader Award**  
Jennifer Doughty

**Engineering Learning Initiatives**  
Jason Quint

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**Giving Opportunities**

Private gifts are essential and help to ensure the continued excellence, relevance, and impact of initiatives for MAE. To make a gift using the secure online gift form, please visit: [www.giving.cornell.edu](http://www.giving.cornell.edu) or a check made payable to Cornell University, may be mailed to: Cornell University Box 223623 Pittsburgh, PA 15251-2623. Please be sure to indicate your intention to designate your gift to MAE. Corporate matching gifts count as a gift from you and are a powerful way to double your giving. If your company has a matching gift program, please contact your HR director. Cornell’s financial advisors can assist you with a number of gift-giving tools designed to meet your family’s financial and philanthropic goals, including securities, trusts, bequests, and real estate. Please visit the Office of Trusts, Estates, and Gift Planning website.

**Graduate Fellowships**  
Goal is to provide funding to each first-year Ph.D. student and to provide fellowships as part of the startup for new faculty.

**Digital Manufacturing Initiative**  
Purchase and maintain new, modern equipment (e.g. 3D printing, laser cutters, etc.) for the design and fabrication of engineered systems, particularly for undergraduate research and project teams.

**Teaching Laboratory Specialist**  
Additional technical specialist in support of experiential learning, including instructional labs, shops, wind tunnels and digital manufacturing

**Teaching Laboratory Fund**  
Add new and renew laboratory equipment used in student labs, which serve as a cornerstone of the Sibley School courses.

**Design Lecturer**  
Professor of Practice to lead MAE design program, teach design courses, lead the M.Eng. program and provide liaison with industry

**On-line learning initiatives**  
Develop a new series of on-line materials (lectures, problems, interactive sessions, simulations), both for on-campus students and the community at large.

**Research Seed Grants**  
Provide support for faculty to undertake new initiatives, new directions and interdisciplinary collaborations

**Distinguished Speakers Fund**  
To enable highly distinguished speakers to visit the Sibley School for the Colloquium and courses such as Professional Practice

**Student Projects**  
Provide support for undergraduate and MEng student projects in design, project teams, or research.

**Student organizations such as ASME and AIAA**  
Provide support for outreach activities as well as travel to student conferences.
DNA molecules in a nanoscale channel get trapped by light.