

THE SIBLEY SCHOOL OF MECHANICAL & AEROSPACE ENGINEERING

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CORNELL ENGINEERING

inside

From the Director: pg. 2

Research in Cancer Detection pg. 3

Entrepreneurship:

Health and the Smartphone pg. 4

New Faculty: pg. 6

Alumni Profile: Dick Aubrecht pg. 7

New Innovative Design & Curriculum: pg. 8

Awards: pg. 10

Cornell University



From the Director



Mark Campbell
Professor and Director

Dear Sibley School Alumni and Friends:

"After graduation, I am going to become a 3D printing chef!"

This is a quote from one of our seniors in their exit interview, just before graduation. We all have a little fun with these interviews, conducted just as the stress of the undergraduate program winds down to graduation, so I have my doubts about this one. However, it nicely captures the new ideas and innovation that are the Sibley School.

The explosion of digital manufacturing technologies and associated creative ideas has certainly made its way into our research and education. You will find an article detailing our sophomore level design course, led by Professor Hod Lipson, which has begun to adopt these new manufacturing methods into the design philosophy, along with a new Innovative Design Course using Digital Manufacturing led by Professor Rob Shepherd. The latter course is focused on senior design and entrepreneurship — students interested in designing, manufacturing, and selling their creative ideas.

Certainly, the exciting Cornell NYC Tech campus has had an effect on the Ithaca campus, particularly when thinking about innovation and entrepreneurship. The Sibley School is in the process of searching for several professors who will have their tenure home in our school, but be leaders at the Cornell Tech campus. Also, a number of new start-ups have begun based on Sibley School research; you will find an article about a new start-up using lab on a chip and smart phone technology to track your health. Professor Brian Kirby's research on a microdevice that extracts cancer cells using the same blood samples drawn from patients for routine tests during annual physical exams or checkups is also detailed.

The Sibley School continued its track record of searching for and hiring strong faculty. This year we are pleased to welcome three new faculty members. Professor Dana Weinstein is an expert in MEMS, and comes to us by way of MIT where she was an Associate Professor. Dana will extend our Microsystems focus to include mechanical systems, and bring a key ingredient to Cornell's MEMS area, which is cross-disciplinary between Mechanical Engineering, Electrical Engineering, and Applied and Engineering Physics. Dana will start in January 2014.

A key strategic focus for the Sibley School this past year was in Space Systems. We wanted to build on our success in research and education in this area, including student built satellites, leadership (Professor Mason Peck as Chief Technologist at NASA) and the very high student interest. This year brought some exciting news on several fronts. Working with Cornell's Astronomy Department, we secured becoming a Strategic University Partner with NASA JPL, which opens up student/faculty/staff exchanges as well as funding and collaborative projects. Dr. Charles Elachi, the Director of JPL, will come to Ithaca this fall to deliver the Sears Lecture, and sign the agreement for this partnership with President

Skorton. We also hired two new professors in this area. Professor Dmitry Savransky is an expert in ground and space telescope design, providing an excellent connection between space engineering and space science. Professor Daniel Selva is an expert in systems engineering, with specialization in systems architecture. Dmitry will start in January 2014, and Daniel in July 2014.

Finally, I want to let you know that Professor Sid Leibovich retired in June after an illustrious career as one of the most influential people in the history of the Sibley School. Sid touched on nearly every element of the School—from research to teaching—to new directions in leadership. He was elected to both the American Academy of Arts & Sciences and National Academy of Engineering; he was Director for seven years when the department both grew and diversified, branching out into biomechanics, space systems, microsystems, energy and sustainability, and refortifying existing disciplines. Sid also led the way on many of Cornell's energy and sustainability efforts, including helping found the Atkinson Center, and developing a very successful wind power course. On a more personal level, Sid is an amazing and humble mentor to many of us in the School. I am pleased he, as the Jedi Master he is, will continue advising us.

You will find the newsletter full of other notables, including awards for students and faculty; the success of our project teams; a few reunion pictures; and a highlight of alum Dr. Dick Aubrecht, whose influence spans not just the Sibley School, but also Cornell and upstate New York. Our website gives you continual updates of these and other interesting tidbits. As always, please keep in touch with us about your news and successes through the Alumni link off of our website, or simply a quick email to mae_alum_news@cornell.edu. We look forward to hearing from you.

Warm regards,

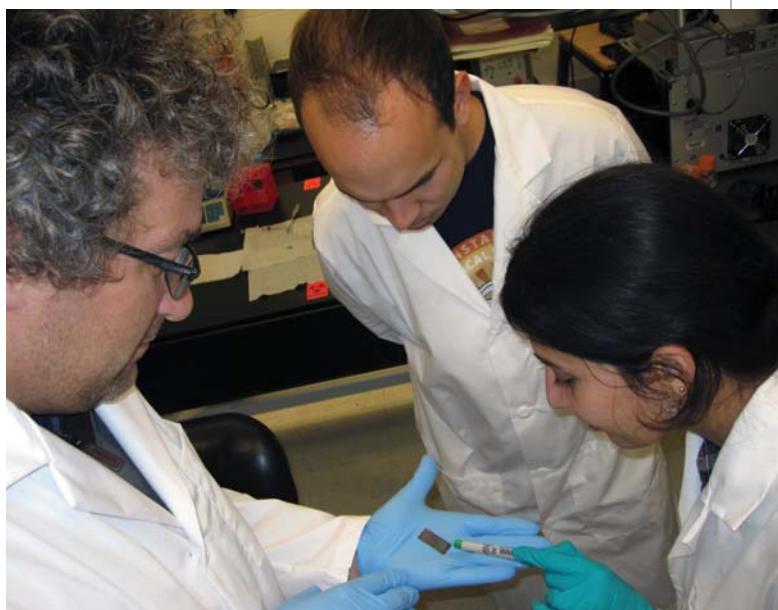
A handwritten signature in black ink that reads "M. E. Campbell".

Faculty Profiles / Research

Cancer is among the most complex challenges facing our society today. Although many advances have improved surgical techniques, therapeutic drugs, and cancer detection, still over 500,000 people die yearly in the U.S. from cancer.

Among the most exciting developments in recent years is personalized treatment, the idea that each patient's cancer demands different treatment, requiring advanced diagnostic techniques be used to inform patient care. For cancer patients, the challenge is that diagnosing and staging the disease often requires tissue samples that are simply unavailable. *"In the case of slowly progressing disease, such as late-stage prostate cancer, the extracted tumor samples that doctors have are so old that they are no longer relevant to the current disease. For many aggressive cancers, such as pancreatic cancer, doctors can't catch the disease early enough to design treatment,"* says Professor Brian Kirby, an Associate Professor in the Sibley School. *"We want to use microtechnology to access the most important cancer cells inside patients' bodies, and use that in concert with modern surgical and pharmaceutical techniques to improve patient care."*

Kirby historically has studied fluid mechanics in microfabricated and nanofabricated devices. He and his research group developed in 2008 what they call the GEDI microdevice, which uses micropatterned features and the resulting microscale fluid flow to extract cancer cells from the same blood that patients donate for routine tests during annual physical exams or checkups. *"We take advantage of the unique properties of these cells—their size, rigidity, or surface proteins—to extract them from blood despite their incredible rarity,"* said Kirby, who works with collaborators at Weill - Cornell Medical College, New York - Presbyterian Hospital, and Johns Hopkins Medical Center to oversee the TAXYNERGY multi-institutional clinical trial that is measuring the efficacy of two cancer drugs (Jevtana and Taxotere) on prostate cancer patients while also evaluating the GEDI device's ability to predict which drug will work better in patients.



From Left to Right: Professor Kirby with grad students Fredrik Thege and Shalu Suri examine a GEDI microdevice.



Brian Kirby

He isn't kidding when he says these cells are rare: *"We usually search for circulating tumor cells in these patients, which are typically as rare as one per hundred million cells in the blood."* Although these cells are incredibly rare, the GEDI device can often capture dozens or hundreds of these cells, which allow his team to attempt to predict the efficacy of drugs (in prostate cancer) or detect cancer earlier than previously possible (in pancreatic cancer). Kirby says *"We count these cells and interrogate their genetic signatures or their response to drugs. In this way, we can inform doctors as to the status of the patient's disease—effectively in real time."* He is actively implementing his devices on patients with prostate, pancreatic, breast, and gastric cancer.

Professor Kirby is driven to push his technology into the clinic: *"We have unique opportunities to change patient care in the near-term. We already analyze blood from patients in many medical centers, and if our current clinical trials go well, patients may be receiving treatment personalized informed by GEDI microdevices in just a couple of years."*

Although the study of cancer has not been part of the Sibley School's curriculum, at least three current Sibley School faculty (David Erickson, Brian Kirby, Ankur Singh) have research programs with at least some cancer focus, and this spring Professor Kirby developed a new graduate class, teaching cancer biology to over 70 engineers and physical scientists.

Kirby's application interests go beyond cancer, and include tuberculosis and biofuels. He also has a number of research thrusts on fundamental fluid mechanics at micro- and nanoscales, and is the author of *Physics of Micro- and Nanoscale Fluid Mechanics*, a leading textbook on the topic.

Student Highlight / Research



Matthew Mancuso

STUDENT WORK IN THE ERICKSON LAB: Smartphone Enabled Microfluidics for Health and Nutrition Applications

Ever dream of measuring and tracking your health using technology similar to a Star Trek medical tricorder?

Thanks to recent Cornell advances, now there's an app for that.

For decades, researchers at Cornell have developed microfluidic chips, small devices that use liquids like computer chips use electricity. These lab-on-a-chip devices exist for all sorts of health applications ranging from telling if water is safe to drink to detecting rare infectious diseases. However, because of the laboratory technology and expertise necessary to utilize the tests, very few of these advances have reached consumer markets. David Erickson, Associate Professor of Engineering in the Sibley School and his students are now working to change this. *"The now ubiquitous nature of smartphones is going to revolutionize point of care medical diagnostics. The technologies we are developing will allow you to test everything from your cholesterol—to vitamin D levels—in minutes using a device you already have in your pocket,"* said David Erickson.

In the laboratory, a number of David's students are actively developing new smartphone based technologies. Matthew Mancuso, a senior PhD student under

Professor Erickson, is working to create diagnostic technologies for the developing world. *"Delivering healthcare in the developing world requires overcoming so many challenges, from the obvious lack of resources and expertise to simply communicating the results of a test to a patient,"* Matthew observes. "Smartphones change all of that though," he goes on, "They enable simple point-of-care testing, immediate results, and even connectivity and display to simply communicate to patients what the outcome is, along with what they might consider doing next." In Matthew's work, he is showing how Kaposi's sarcoma associated herpes virus, an infectious cancer causing virus often associated with HIV, can be detected using a smartphone accessory and novel nanotechnology. "The benefits of mobile health don't have to stop at the patient," Mr. Mancuso says as he picks up an Android tablet. "Non-identifying information from mobile health tests like this one can be turned into map files right on a smartphone, uploaded to central servers, and viewed on all sorts of devices, like this tablet, enabling medical professionals to make decisions and triage healthcare in real-time and in ways previously unimaginable."



An Erickson Laboratory Smartphone application could one day be used to track your health in your own home.

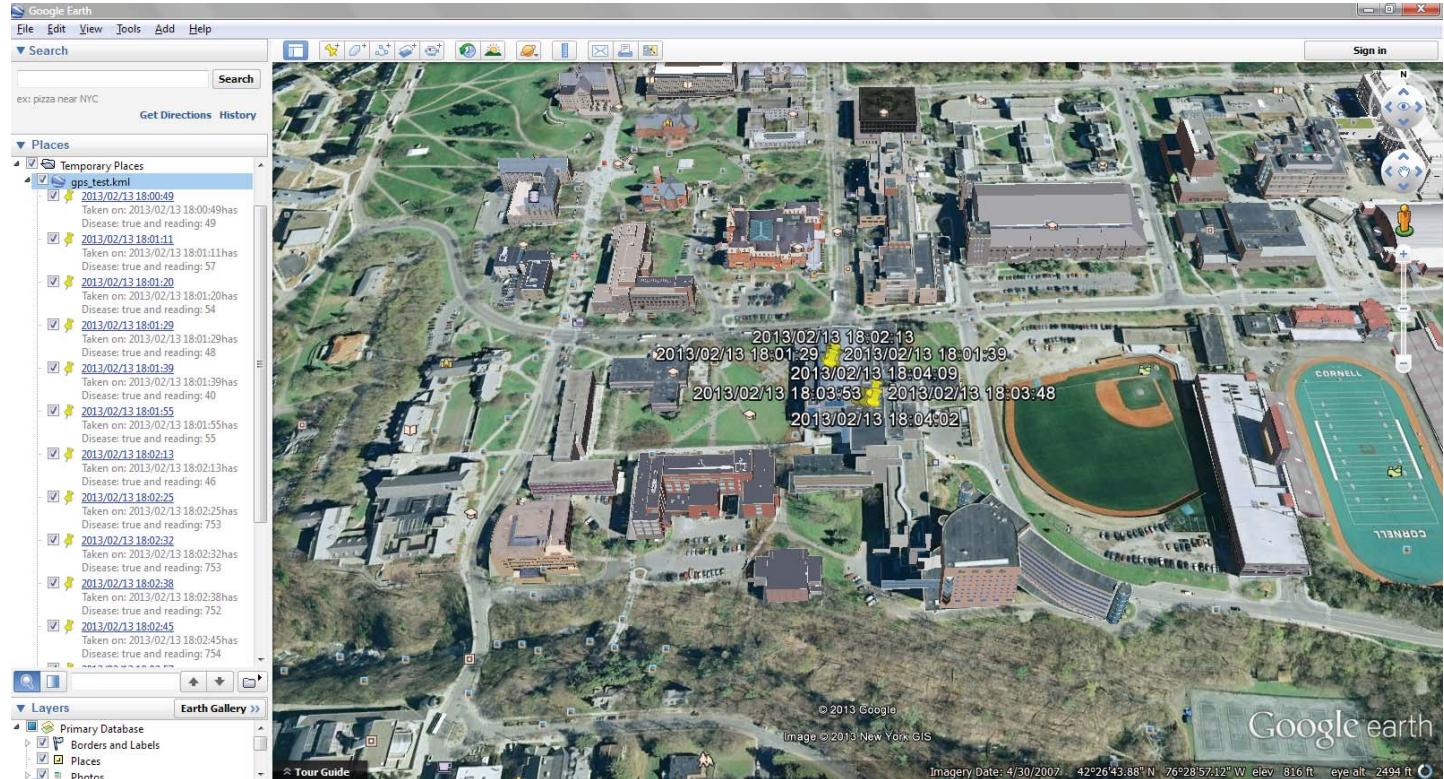


"What's really great about mobile health is it enables us to translate so many of our laboratory discoveries into real consumer products," notes Professor Erickson. Recently, Erickson and Mancuso have formed a start-up company, vitaMe Technologies, that Mancuso will run after he completes his PhD studies this fall.

vitaMe is seeking to commercialize smartphone-based diagnostics for measuring health and wellness, and has already won a prestigious award at a Pre-Seed business competition workshop and raised pre-seed funding from Excell Partners. “After I graduate, I’ll be taking the novel technologies I’ve developed during my PhD, and commercializing them. I really believe that by letting people know more about their health, we can help them improve it; and that’s the mantra vitaMe lives on: Informed health for improved health.”

In addition to Mancuso’s efforts, a number of other students are also working on new mobile diagnostics. Seoho Lee, a third year PhD student, says “I’m working on creating new tests for monitoring vitamin D levels. Three quarters of U.S. adults, many of whom work indoors, are vitamin D deficient, leading to bone-health issues later in life, as well as depression and other conditions. By enabling testing and closer monitoring, we hope to improve the quality of life of those affected.” In a third application, senior PhD candidate Vlad-Victor Oncescu is developing new smartphone readers for existing colorimetric tests, such as pH strips and urine tests. “So many color changing tests already exist, but are hard to quantify without expensive equipment. A smartphone camera, which nearly everyone already has, enables us to change that,” says Oncescu. “Next I’ll take similar test strips for cholesterol,” Vlad says, as if he’s describing some new magic trick, “and show that with only a finger prick of blood, users can track their blood lipid levels.”

Interesting in hearing more? Feel free to contact Matthew Mancuso at matt@vitametech.com



In addition to tracking your health at home, smartphone accessories can be used to monitor the spread of disease in the developing world. A prototype made by Mancuso demonstrates this, showing measurements taken on Cornell’s Ithaca Campus.



A Smartphone accessory developed by Vlad-Victor Oncescu and his colleagues can be used to measure the pH of different body fluids.

The Sibley School Welcomes: Ankur Singh

Ankur Singh is an Assistant Professor in the Sibley School. Singh manipulates synthetic materials and living cells to improve human health. Prof. Singh has strong expertise in the engineering of biomaterials-based platforms for cell and immune modulation, cell-biomaterial interactions, cell adhesion, stem cell engineering, and vaccines. The recruitment of Singh is strategic to the expansion of Cornell's Mechanical Engineering program towards interdisciplinary research within the College of Engineering in nanobioengineering, cellular biomechanics and tissue engineering.



Ankur Singh

Singh received his postdoctoral training at Georgia Institute of Technology where he employed engineering and molecular cell biology principles to understand human stem cell reprogramming and differentiation, stem and mature cell adhesion, force response and mechanotransduction. Singh received his PhD in Biomedical Engineering at The University of Texas at Austin. His research has established multi-modal, biomaterials-based functionalized hydrogels and microparticles to enhance the potency of Non-Hodgkin's Lymphoma and Hepatitis vaccines. *"My ultimate goal is to take this research to the clinical level and benefit patients,"* he says.

In his postdoctoral work, Singh looked into the process of stem cell reprogramming, a technique that allows adult specialized cells, such as skin from healthy or diseased patients, to be transformed into embryonic-like pluripotent stem cells. This represents a highly promising strategy to produce patient-specific cell sources for regenerative therapies. *"Unfortunately, the reprogramming process is inefficient (0.001-1% conversion) and the resulting cells cultures are highly heterogeneous with a substantial number of partially reprogrammed cells. As a result of this low reprogramming efficiency, the human induced pluripotent stem cells must be manually identified and separated,"* says Singh.

Working at Georgia Tech, he identified that reprogrammed human stem cells are mechanically weak in their ability to stick to a protein surface compared to partially reprogrammed or unreprogrammed cells. *"It appears most stem cells have a unique mechanical strength—neural cells are weaker than the sources from which they are derived, heart cells are stronger,"* says Singh. Singh developed a new microfluidic-separation technology termed μ SHEAR (micro stem cell high-efficiency adhesion-based recovery) that selectively isolates fully reprogrammed cells in a label-free, high throughput fashion by exploiting the differences in adhesive

signature. *"This work will have high impact on the human pluripotent stem cell field, not only towards standardized culture procedures for generating purified stem cells, but also more broadly in scale-up for lab-based research, clinical applications, and drug/toxicity screening applications of bona fide human pluripotent stem cells,"* says Ankur Singh.

At Cornell, Prof. Singh's 'Immunotherapy and Cell Engineering Lab (ICEL)' focuses on engineering immune and therapeutic cells by integrating innovative materials and core concepts of cell immunology, biomechanics, and force transmission. Singh wants to create biomaterial platforms that can act as surrogates for tissues, with applications in personalized medicine, understanding diseases, and screening drugs and vaccines. *"The problem with current approaches is you don't have a good control over the microstructure"*, says Singh. *"If you can do that, you can understand how cells survive, migrate in and out, and get programmed to perform their designated function."* His unique directions stem from his past efforts to develop muscle injectable immune priming centers for inducing protective immunity against Lymphoma.

The overall goal of ICEL is to understand the fundamentals of cell-material interactions, underlying cell mechanics, signaling, and to establish novel micro-nano-bioengineering strategies to generate therapeutic cells and engineered tissues. Singh is also looking into understanding the mechanism of stem cell reprogramming. Currently, scientists mostly program a mature cell into an induced pluripotent stem cell (iPS) before turning it into the desired cell type through a process called differentiation. *"This is a long but low-throughput process. I want to understand how to efficiently bypass the iPS stage and directly make therapeutic adult cells. It's a big research area, and not much is known about it."*



Alumni Profile: Dick Aubrecht

The Sibley School of Mechanical & Aerospace Engineering, founded in 1865, is proud to have many successful alumni who have both benefited from and given back to the educational environment so carefully nurtured here. Our alumni have changed the world at large and made a difference at Cornell.

Dick Aubrecht is Chairman and Vice President for Strategy and Technology at Moog Inc. where he has been employed since 1969. He studied at the Sibley School at Cornell from 1962 to 1969 where he earned his B.S., M.S. and PhD Degrees. Aubrecht began his career at Moog as a Design and Development Engineer in Germany and subsequently managed a Research and Development section from 1972 to 1974, and then served as Manager of the Special Products Division from 1974 to 1976. From 1976 to 1979, Aubrecht worked as Vice President of Research and Development for the Midwest American Dental Division of American Hospital Supply Corp. He returned to Moog Inc. in 1979 to serve in the Office of the President, and was named Vice President of Administration and elected a Director in 1980. In 1988, he was named Chairman of Moog Inc. and served in that capacity until 1996 when he was elected to his current position, so as to focus on developing the company's technology and strategic plans.

Moog Inc. is a worldwide designer, manufacturer, and integrator of precision motion control products and systems. Moog's high-performance systems control military and commercial aircraft, satellites and space vehicles, launch vehicles, missiles, industrial machinery, wind energy, marine applications and medical equipment.

Aubrecht and Moog Inc. have been supportive through gifts and grants to the Sibley School of Mechanical and Aerospace Engineering (MAE). Two of MAE's faculty members that have been recipients are Professor Ephrahim Garcia and Professor Mason Peck. Professor Garcia received funding to seed development of low pressure, hydraulic actuator systems. Motors were donated for the 2005 DARPA Grand Challenge which was a 'driverless car' competition that consisted of an off-road course of 132 miles. The Defense Advanced Research Projects Agency (DARPA) is an agency of the United States Department of Defense responsible for the development of new technologies for use by the military. DARPA has been responsible for funding the development of many technologies which have had a major effect on the world. Dr. Aubrecht collaborated on several proposals such as both the

NASA Edison mission with Professor Garcia and the NASA Technology Mission with Professor Peck that challenges academia to examine the theoretical feasibility of ideas and approaches that are critical to making science, space travel and exploration more effective, affordable and sustainable. The National Aeronautics and Space Administration (NASA) is the agency of the United States government that is responsible for the nation's civilian space program and for aeronautics and aerospace research.

Aubrecht became involved with the Formula SAE Team in the 1990's based on his interactions with Prof. Albert George and his Automotive Design course. Through their conversations, he became aware of a need to update the machine tools in the student machine shop. *"Over the years, I arranged for Moog Inc. to donate most of the manual mills in the student shop and prevailed on a fellow Moog Director to donate a three-axis Okuma CNC machining center. I am very pleased to see all the student project teams using these machines"* states Aubrecht. Because of him, MAE has been able to host and hire a number of students. With each student brings new ideas, new designs, and new techniques.

Aubrecht currently serves as Chairman for the Hauptman-Woodward Medical Research Institute and CUBRC. Both of these leading-edge research groups are associated with SUNY Buffalo. *"As Chairman, I am able to bring my Moog experience in developing new technologies to these companies. It is intellectually challenging to help others evolve new capabilities and solve new problems."*

In the education area, he has been a Trustee and Trustee Emeritus of the Nichols School since 1982. His Cornell involvements started in the 1980's as a member of the Sibley School Advisory Board and the Engineering College Council. *"These experiences served me well when I became a Cornell Trustee in 1991 and now as a Trustee Emeritus."* As a trustee, Aubrecht has been passionate about expanding Cornell's industrial relationships and finding additional models for Cornell to excel.

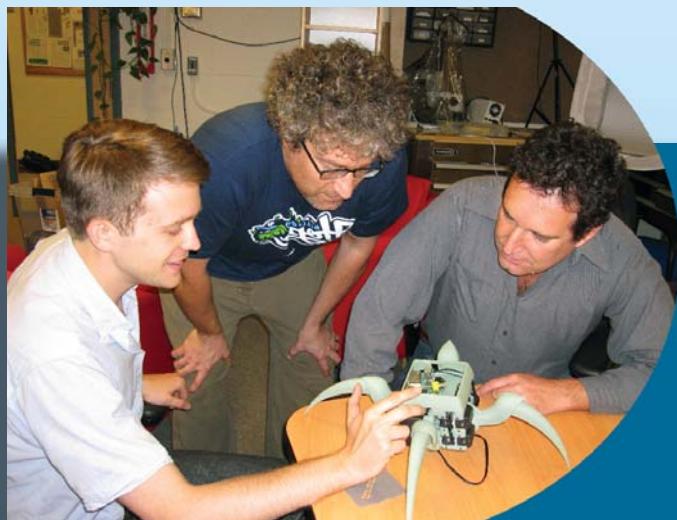
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New Innovative Design & Curriculum

MAE 2250: DESIGN-MAKE-SELL

What would you make if you could make anything? That's the question posted to last year's MAE 2250 course —'Mechanical Synthesis'. This course introduces fresh sophomores to the art and science of product design and manufacturing, from identifying customer needs, to generating, benchmarking and testing concepts. For many years, that's where the course ended: A working prototype. But this year, we took it one step further: Make and sell the real product online.

Like everything else, a products life cycle is accelerating. For many years, the time from design conception to mass production has taken years. But new computer aided design tools, online retail and marketing, and now digital manufacturing tools like 3D printers, are rapidly removing barriers of skill, time and cost, condensing the product life cycle into months, if not weeks.



From Left to Right: PhD Daniel Cellucci, from the Creative Machines Lab, shows Professors Kirby and Lipson the robot *Aracna* (designed by M.Eng student Sara Lohmann). All parts (minus the motor) were 3D printed in the lab.

For the first time, we offer students the thrill of designing and making a product that will actually be offered for sale online. Within one semester, they can go from a vague idea to an automatically produced product that can be sold in quantity. In teams of four, students designed a variety of household products, from a smartphone mount to new kinds of teacups, eyeglasses and camera lens mounts. The range of products was remarkable.

The open-market nature of this exercise brings a fresh new perspective to the challenge and a breath of realism. Prof. Lipson states, "*If I could, I would give an 'A+' to anyone who was able to sell a product to a paying customer who does not know them personally.*" But it also creates a challenge: If you are designing a smartphone case, it needs to be superior, in some way, to the thousands of other cases out there. The

market is real, but competition is real too and as one student said, "*Getting a low grade is not as bad as getting a phone call from an angry customer.*" One team was contacted by an investor to discuss mass production of their teabag-free teacup. Another team was able to design a pair of shutter shade glasses where the slats were shaped like the initials of the university. The design was such a hit, that fifty orders poured in from customers anxious to have their pair delivered by Slope day. The team, however, panicked as they could not guarantee on time delivery. It wasn't the instructors or TAs that created that priceless sense of a deadline—it was the paying customers.

The advent of accessible manufacturing tools also has some students stumbling. If the fear of the blank page creates the author's block, the fear of the open design canvas coupled with a constraint-free manufacturing tool leaves some students searching for ideas. When Prof. Lipson asked students what product they would buy if they could buy anything, hands shot up aplenty. But when asked what they would make if they could make anything, the more creative students—many of which had more than one answer—stood out.

For many students, the main reason for joining MAE is to learn how to design and make products. With new tools of design and production, we can bring the product design cycle into the classroom, unleashing a new kind of creativity, and a deeper educational experience.



3D printed earbud holder (designed by undergrads Christian Karakachian and Michael Dijamco).



teabag-free teacup
(designed by undergrads Amanda Bouman, Stephanie Fleischer, and Shaun Koh).



MAE 4340/4341: INNOVATIVE PRODUCT DESIGN VIA DIGITAL MANUFACTURING

MAE 4340 is a course about new product development that uses digital manufacturing tools (e.g., 3D printers and laser cutters) to rapidly produce physical prototypes of the product concept. In this course, we will fabricate functional prototypes of mechanical designs and iterate these concepts into final form by garnering information from mechanical testing, voice of consumer interactions, and considerations of their manufacturability and assembly potential.

In detail, the students will operate under the constraints of a fictitious company with existing product lines and limited manufacturing capabilities (e.g., solely injection molding of plastics). After a few



From Left to Right: Professor Rob Shepherd and visiting student John Whitehead test out a CubeX 3D printer.



From Left to Right: Professor Rob Shepherd and Matt Ulinski enjoy setting up an Objet 30 3D printer.

weeks of introductory topics and training on the prototyping tools, the students will be assigned teams via a computerized matching process. Using guided concept generation methods, the teams will build digital representations of their machine designs and estimate their feasibility using analytical and numerical methods. Once a digital design has been reached, the teams will create physical prototypes for mechanical testing, and reviews from potential customers. Using feedback from their testing, the students will change their digital design and iterate new prototypes for further testing.

Several guest lecturers will give the class perspective about market analysis, and product development in small-tech startups as well as billion dollar corporations. The students will give oral and written reports throughout the course as they move through design phases. A final project report and class presentation will allow the students to synthesize their new knowledge from the course into demonstrative routes to commercialization and production of their designs.

Faculty Awards



Professor Joseph Burns was elected as a Fellow by the Royal Astro Society.



Professor Mark Campbell received the Best Paper Award, AIAA Guidance Navigation and Control Conference and Best Conference Poster Award, 2012 International Symposium on Distributed Autonomous Robotic Systems.



Professor Paul Dawson was elected Joseph C. Ford Professor of Engineering.



Professor David Erickson was elected as Fellow of The Optical Society of America (OSA). He is being recognized for being one of the co-founders of "Optofluidics", a new research area that combines optics with microfluidics. He was also awarded with a grant from the Atkinson Center for a Sustainable Future (ACSF) and another grant from the U.S. Department of Energy to work toward revolutionizing how biofuels are produced from algae. <http://www.news.cornell.edu/stories/Nov12/arpa>.



Professor Elizabeth Mills Fisher is a recipient of the "2012 Excellence in Teaching and Advising Award". She was honored with the Dorothy G. Swanson Award, which is sponsored by John Swanson '61 ME.



Professor Ephrahim Garcia was elected as a Fellow by the ASME and the Institute of Physics. In 2012 he was Chair of the Board for the Guggenheim Medal Award and served as Editor-in-chief for the *Smart Materials and Structures Journal*.



Professor Chris Hernandez was promoted to Associate Professor with tenure from the Sibley School of Mechanical and Aerospace Engineering.



Professor Chung-Yuen (Herbert) Hui was elected Joseph C. Ford Professor of Engineering, and is a recipient of the 2012 Excellence in Teaching and Advising Award, and was honored with the Robert '55 and Vanne' 57 Cowie Award, College of Engineering.



Professor Hadas Kress-Gazit has been awarded one of the 2012 DARPA Young Investigator Awards. The goal of the DARPA Young Faculty Award program is to identify and engage rising research stars in junior faculty positions at U.S. academic institutions and expose them to Defense Department needs. **Professor Hadas Kress-Gazit** was one of three roboticists among the award winners.



Professor Hod Lipson was awarded the Annual Gilbreth Lecturer, U.S. National Academy of Engineering.



Professor Mark Psiaki, along with two of his students Ryan Mitch and Karen Chiang, were presented with two Best-Presentation-in-Session awards, Institute of Navigation GNSS Conference.



Professor Richard Rand was seated as a Plenary Speaker for the XII Pan American Congress of Applied Mechanics.



Professor Wolfgang Sachse was awarded the Golden Whistle Achievement Award by the International Congress on Ultrasonics.



Professor Ankur Singh received the International Conference on Stem Cell Engineering Travel Grant Award from the Society for Biological Engineering.



Professor Steven Strogatz received the Department of Mathematics Teaching Award from Cornell University.



Professor Marjolein van der Meulen, Swanson Professor of Biomedical Engineering, was appointed as Associate Dean for Research and Graduate Studies in the College of Engineering. She also received the American Society of Bone and Mineral Research (ASBMR) Young Investigator Award, as a co-author.



Professor Charles Williamson was selected by two Merrill Scholars from Cornell University as having the most impact on students' success.



Professor Alan Zehnder was elected as an American Society of Mechanical Engineers Fellow.



Professor Max Zhang was promoted to Associate Professor with tenure from the Sibley School of Mechanical and Aerospace Engineering. He also received Fellowship from the Oak Ridge Institute for Science and Education (ORISE).

Alumni Profile: Dick Aubrecht

'continued from page 7 - Alumni'

When asked of his fondest memory from his Cornell days Aubrecht responded, "My fondest memory is ongoing. Prof. John Booker was my M.S. and PhD Thesis Advisor in the 1960's. He is still a mentor and advisor 46 years later. We meet a couple of times a year and exchange many emails in between. In many ways, I have succeeded in my career and in life because of our relationship. The most valuable skill I learned from him was to 'Learn How to Learn'. In my PhD research, I needed to learn about several new technologies where I had little academic background. I am still learning about new fields and technologies today."

"The successes in my life are due in a large degree to my Cornell education. I have been very fortunate to have had the opportunities to help Cornell to continue to adapt and adjust to a global world while firmly holding to its founding values."

Graduate Student Awards

NASA 2013 SPACE TECHNOLOGY RESEARCH FELLOWS

- Daniel Cellucci, Mechanical Engineering and Cornell Creative Machines Lab with Professor Hod Lipson.
- Nicholas Chaney, Computational Biology and Cornell Creative Machines Lab with Professor Hod Lipson.
- Ethan Ritz, Computational Biology and Cornell Creative Machines Lab with Professor Hod Lipson.
- Jason Yosinski, Computer Science and Cornell Creative Machines Lab with Professor Hod Lipson.

ALICE H. COOK & CONSTANCE E. COOK AWARD AND FINALIST IN 2013 NSF INNOVATION IN GRADUATE EDUCATION CHALLENGE

- Natasha Udpa, Mechanical Engineering with Professor Gao.

SOCIETY OF TRIBOLOGISTS AND LUBRICATION ENGINEERS (STLE) SCHOLARSHIP

- Ed Bonnevie, Mechanical Engineering with Professor Bonassar.

OLIN FELLOWSHIP & CLYDE W. MASON SCHOLARSHIP (CU), MECHANICAL ENGINEERING OUTSTANDING RESEARCH POSTGRADUATE AWARDS (THE UNIVERSITY OF HONG KONG)

- Henry C.W. Chu, Chemical and Biomolecular Engineering with Professor Zia.

LIU MEMORIAL AWARD AND HSIEN WU & DAISY YEN WU SCHOLARSHIP

- Li Jiang, Mechanical Engineering with Professor Erickson.

LOCKHEED MARTIN STUDENT AWARD FOR ORAL PRESENTATION, AMERICAN SOCIETY FOR GRAVITATION AND SPACE RESEARCH (ASGSR)

- Yu Cheng (Frank) Liu, Mechanical Engineering with Professor Avedisian.

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.

- Adam Michael Trofa
- Chian Yeh Goh

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 was 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.

- John Lombard—"Engineering Components for the Construction of an Ultracold Lithium Machine in the Pursuit of Novel Low Temperature Physics," research with Professor Michel Louge.
- James R. Young, and Eric J. Ching—"Design, Testing and Analyses of a Low-noise Bridge Circuit for Microboiling Studies of Highly Superheated Liquids on Novel Thin Film Platinum Structures," research with Professor C. Thomas Avedisian.

SIBLEY PRIZE FOR EXCELLENCE IN OUTSTANDING TEACHING ASSISTANCE

This prize is awarded to PhD candidates who served as outstanding teaching assistant(s) for Sibley School undergraduate courses for this academic year. This prize recognizes their commitment to assisting undergraduates and is based on recommendations by students and endorsed by faculty.

- Andrew Poshadel
- Michael Meller

R. N. JANEWAY ENGINEERING AWARD

The Janeway award recognizes the best proposal for an improvement in automotive vehicles. The proposal must be described in a single or dual-author technical report of publishable quality.

- Owusu A. Agyeman Badu, Yongcheng Tai, and James Wu—"Design, Analysis and Testing of an Automotive Carbon Fiber Monocoque Chassis," research with Professor Albert George.
- David Waskie—"Integrated End Piece for Prop Rod," research with Professor John Callister.

BART CONTA PRIZE IN ENERGY & 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 in the mid 1960s was "Conventional and Direct Energy Conversion." He also introduced solar energy and societal impact of technology to his students.

- Al Jean-Francois, Henry O. Ekwaro-Osire, Peter J. Ingato, Oliver R. Kliewe, Nikhil B. Lal, and Yan Asta Li—"Wingmill Energy Harvesting," research with Professor Ephraim Garcia

OUTSTANDING SENIOR AWARD

- Rebecca Ventimiglia—Rebecca served the Mechanical Engineering undergraduates as president of the Cornell Chapter of the American Society for Mechanical Engineers for the 2012-2013 academic year. Her efforts raised awareness of ASME via outreach, social and professional activities.

WALTER WERRING EXCELLENCE STUDIES PRIZE

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.

- Matthew Lordahl—Matt served as Team Leader of CUAir (Cornell's Unmanned Air Systems) team and led the team to 2nd place overall finish. The aircraft he designed as chief designer of CUAir won the People's Choice Award at

Cornell's 2013 BOOM Competition. Matt was the Team Pilot for Cornell's Design Build Fly Team and he held aircraft training flights for radio controlled model airplanes. He served as a teaching assistant for two undergraduate classes and made contributions to the ASME and AIAA Cornell Chapters.

- **Sang Hoon Song**—As president of Encourage Young Engineers and Scientists, Sang Hoon has developed programs to inspire local young students. He has also started a program called Helping Exceptional Youth, which partners Cornell students with Ithaca High School students. He has served as a teaching assistant for an undergraduate course and has served as a peer advisor for two years.

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 was co-author of a classic three-volume text on heat-power. This award is presented to the senior with the highest composite average in heat and power-related engineering courses.

- Adam Michael Trofa

OUTSTANDING ACHIEVEMENT AWARD, MASTER OF ENGINEERING PROGRAM

Awarded to two graduating students who have achieved the highest academic standing in the Master of Engineering Program.

- Richard Merluzzi
- Andrew Tai-Pow

H.D. BLOCK AWARD

In recognition of outstanding performance by PhD candidates who served as an outstanding teaching assistant in math. Most outstanding TA in Undergraduate Engineering Mathematics or Engineering Mechanics Courses as determined by feedback from students and by faculty support.

- Anoop Grewal



2013 SENIOR CLASS REPRESENTATIVE: LAUREN MIN



The Sibley School of Mechanical and Aerospace Engineering Reunion 2013



Miscellaneous Awards

CUAir, Cornell University's Unmanned Air Systems Team, took second place at the 2012 Association for Unmanned Vehicle Systems International's Student Unmanned Air Systems competition in June and 1st place in 2013.

See both stories:

2012—<http://www.news.cornell.edu/stories/July12/cuAir2nd.html>

2013—<http://www.news.cornell.edu/stories/2013/08/cuauw-wins-robosub-competition>

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MAE alum Nadine Aubry named Dean of Northeastern's CoE - A widely respected scholar in the field of fluid mechanics, Aubry received her PhD from the Sibley School.

<http://www.northeastern.edu/news/2012/06/aub>

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Cornell's Autonomous Underwater Vehicle team took first place for the second consecutive year in the International RoboSub Competition in 2013, also winning a prize for technical merit in 2012.

See both stories:

2012—<http://www.news.cornell.edu/stories/Aug12/Robosub2012.html>

2013—<http://www.news.cornell.edu/stories/2013/08/cuauw-wins-robosub-competition>

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Inventors, **John Amend** and **Hod Lipson** received the first place award for the "best video" with their robotic gripper IP video at the Global Polymer Innovation Expo in Columbus. The competition was judged on "the ability to communicate IP to the non-scientific mind and to create a tool to accelerate the commercialization of the products." John Amend, a graduate student, made and submitted the video.

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Thomas Murray ME '10 chosen as 2013 New Faces of Engineering Finalist by the American Society of Mechanical Engineers. The New Faces of Engineering program highlights the interesting and unique work of young engineers and the resulting impact on society. Young engineers two to five years out of school are the focus of this recognition program. Thomas graduated from the Sibley School with a bachelor's degree in mechanical engineering from Cornell University.

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The Cornell Baja SAE Racing Team took first place along with other awards at the 2013 Baja SAE International Competition hosted by Tennessee Tech University in Cookeville, Tennessee. The team is advised by MAE's Assistant Professor Olivier Desjardins. The competition, which began in 1976 as the Mini Baja competitions, has 100 international collegiate teams design and build an off-road vehicle suitable for use in a variety of conditions.

# 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: <http://www.alumni.cornell.edu/fund/ways.cfm>.

#### Graduate Fellowships

Goal is to provide funding to each first-year PhD 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.

#### Online Learning Initiatives

Develop a new series of online 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 M.Eng 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.



# THE SIBLEY SCHOOL OF **MECHANICAL** **AEROSPACE** **ENGINEERING**

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