



THE SIBLEY SCHOOL OF MECHANICAL & AEROSPACE ENGINEERING

NOVEMBER 2011

No. 1

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Cornell University



FROM THE DIRECTOR

Dear Sibley School Alumni and Friends:

Greetings from the Sibley School! This past year has seen a number of exciting developments in the School which we are pleased to share with you.

At the faculty level, we hired three outstanding new faculty. **Olivier Desjardins** works in the area of Fluid Dynamics and Turbulence, focusing on large-scale numerical modeling of turbulent reacting multiphase flows with application to spray combustion and multiphase reactors; **Perrine Pepiot** works in the area of Thermal Systems, focusing on complex chemical models for reactive flow simulations, with a special interest in biomass thermochemical conversion to biofuels; both joined us in the summer of 2011. And **Meredith Silberstein** is in the area of Solid Mechanics, and focuses on modeling and development of new materials for alternative energy; she will be joining us in January, 2013.

Our students have had another banner year, with continued success in project competitions as well as awards – both at and outside Cornell. For those who have been out of touch with the School recently, know that interdisciplinary project work has become ingrained in our culture in recent years, with collaborative research projects as well as project teams (Formula SAE; Underwater Vehicle; CUSat as just a few examples). The students and faculty of the School are typically the leaders of many of these projects and the Sibley School houses and supports them through our Experiential Learning Lab. In this newsletter, we highlight the Ranger walking robot setting world walking records, and Ph.D. student **Pranav Bhounsule**; the project is under the direction of **Prof. Andy Ruina**.

Likewise, our current faculty continue to promote excellence in research, teaching and service. The newsletter lists many notables, but let me highlight two. **Prof. Stephen Pope** has had a steady stream of awards in recent years, including his election to the National Academy of Engineering in 2010. **Prof. Hadas Kress-Gazit** recently received the NSF CAREER award for her research in the area of robotics. Insightful articles on the research, innovations and educational focus of these two professors are included in this newsletter.

As many of you know, our former Director **Lance Collins** became the Dean of the College of Engineering in 2010. One of his initial acts was to lead the College and Departments in a Strategic Planning process. This process is nearing completion, and I am pleased to report that MAE remains a key cornerstone of the College. The next few years will see a major turnover in faculty, as we anticipate nearly a third of the School to change. This process has already begun; in addition to the three new faculty hires, we had three retirements this past year: Professors Bing Cady, David Caughey, and Frank Moon. The School had a celebration of their contributions to the School this past spring, but we anticipate all to continue their collaborations with faculty and students in the near term.

Finally, let me say a few words to the Alumni specifically. As a faculty member in the School, I can tell you that nothing excites us more than receiving good news from Alumni. Whether it is a former student several years out who is moving on to a management position, or a former student who just accepted a faculty position – these bits of news get discussed amongst the professors and staff with the joy of good parents. I encourage you to continue to send us your good news – small or large – using the Alumni link off of our website, postal mail or simply a quick email to mae_alum_news@cornell.edu. In this newsletter, we highlight one of our star Alumni, **Prof. Nadine Aubry**, who is the current Head of Carnegie Mellon's Mechanical Engineering Department. In the future, we hope to highlight more of our Alumni news and successes, so please share!

We encourage you to visit the Sibley School website www.mae.cornell.edu and learn more about our students and faculty, from the project teams to the research to new changes in the School. Until next time... warmest regards.

Mark Campbell
Professor and Director

Hadas Kress-Gazit

Wants To Know How To Make Robots Do What They Are Supposed To

To program a robot today, you need to be an engineer. You have to think about what you want the robot to do, you have to implement it using low-level code and then you hope that what the robot does is actually what you had intended. Wouldn't it be better if you just told the robot 'what' it should do in a natural way, much like talking to another person? That's where Kress-Gazit comes in. Her research is focused on generating correct robot behavior from a description of 'what' the robot should do and not from the specifics of 'how' it should be done. "You want to say 'Search the rooms.' You don't want to say, 'Move five meters forward. Turn 30 degrees to the right,' and things like that," she explains. "You want to keep it at the high level."

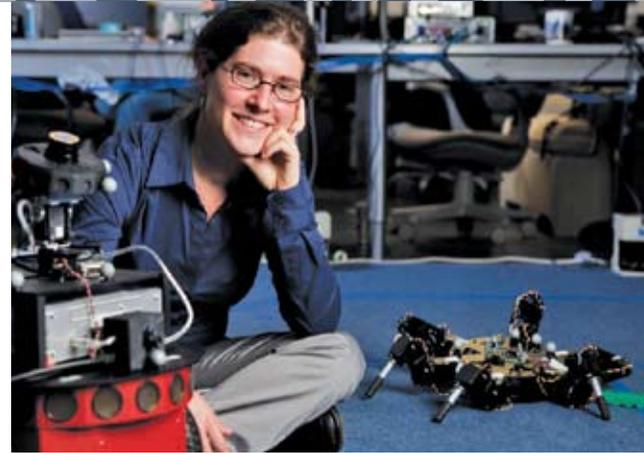
Before joining Cornell in 2009, Kress-Gazit was a research scientist at the GRASP lab at the University of Pennsylvania, where she earned an M.S. and Ph.D. in electrical engineering under George J. Pappas. She earned a B.Sc. cum laude from Technion, the Israel Institute of Technology, in 2002.

Kress-Gazit starts with structured language. "It's not natural language, but it's not logic either," she says. "We wrote a parser that automatically translates sentences in our grammar into logic, which is a formal way to describe tasks, and then from that we synthesize the controller."

To be useful, a robot must be reliable. "I want to have some kind of guarantees for the robot behavior, because anything can be hacked together," says Kress-Gazit, who in 2010 won a five-year, \$512,000 NSF Career grant for her research. "I want a systematic way of going from a high level description to a correct behavior. And if I can't, I want to know why I cannot."

There's no shortage of ways to tell a robot to simply go from point A to point B. What Kress-Gazit is interested in are tasks that require robots to react to their environment. "There is very little research out there for examples such as, if I want to say, 'OK. I want you to go through the rooms. If you see my daughter, stop there and call me,'" she says. "The behavior of the robot is going to change based on if my daughter is anywhere in the house or if she is moving around or if she's just not there. If she's not there, the robot is just going to continue searching. The behavior is reactive."

"For example," she continues, "consider if I tell the robot, 'Go search all the rooms and make sure you go into every single room,' but there are doors. I want the robot to tell me, 'Listen, I can't open doors. This is the reason I cannot do what you asked me to do.'"



Professor Hadas Kress-Gazit

Using Kress-Gazit's algorithms, getting a robot to communicate that it is unable to achieve a desired task is relatively simple, but explaining why it can't is trickier. Kress-Gazit's group has developed a tool it calls LTLMoP, for Linear Temporal Logic Mission Planner, which either creates robot controllers from structured English sentences or provides some feedback when it cannot guarantee the task will be done. "We can find the subset of sentences that are problematic," says Kress-Gazit. "We can tell if the problem is due to an inconsistency or if the environment is thwarting us somehow. And we can have the user play a game against the tool in which they try to control the robot and we show them what the environment can do to prevent the robot from succeeding."

There are many other questions she would also like to answer. "Right now I'm assuming that if the robot is searching for my daughter and my daughter is there, it will see her," she says. "Perhaps the robot doesn't see her at all because of a poor point of view and then tells me she's not here. What does that mean? Is that correct behavior? Is that incorrect behavior? There's a lot of uncertainty in the sensing that has to be incorporated."

Before she went to grad school, Kress-Gazit worked on chip verification at IBM in Israel. Now she is applying ideas she used there, like formal methods and logic, to her research. Her approach won Kress-Gazit a highly competitive Faculty Early Career Development award from the National Science Foundation on her first attempt. "It's kind of unconventional, using these techniques in the context of robotics," she says. "Because these tools are used to verify systems such as hardware designs and now we want to use these tools to verify or to synthesize controllers for robots."

Kress-Gazit chose to work in robotics because of their potential impact. "I think robots can contribute to society in many different areas, from disaster relief to space exploration to personal robots. But we still don't know how to make them safe, useful, and versatile," she says. "And to sound horribly superficial, robots are really cool."

Hadas Kress-Gazit (continued)

Now Kress-Gazit is using the coolness of robots to get more young women interested in science and engineering. In the summer of 2010, she designed and ran a project for the college's CURIE Academy, a one-week summer residential program for high school girls who excel in math and science. The program focuses on sophomores and juniors who may not have had prior opportunities to explore engineering, but want to learn more about the many opportunities in engineering in an interactive atmosphere.

Throughout the week, the girls spent 3.5 hours each afternoon first learning the basics of programming in MATLAB—more than 85 percent of the girls had never programmed in any language—and then programming the iRobot Create platform. By the end of the week, each of the 12 groups had programmed its robot to autonomously complete a given challenge.

“This experience was very rewarding and I plan to run the same program in the summer of 2012,” says Kress-Gazit.



Professor Steve Pope

Steve Pope

Chaired Professor Steve Pope Credits Achievements to Cornell's "Excellent Environment"

What does an eminent scientist and leader in computer simulation of combustion engines credit most for his following list of achievements: member of the National Academy of Engineering and fellow of the Royal

Society of the American Academy of Arts and Sciences, of the American Physical Society, of the Society of Industrial and Applied Mathematics and of the Institute of Physics? He is also the recipient of the Zeldovich Gold Medal from the Combustion Institute and of the Fluid Dynamics Prize of the American Physical Society.

Steve Pope, Cornell's Sibley College Professor of Mechanical Engineering (ME), says modestly: “These reflect the excellence of Cornell University. The university provides the environment and students that allow such achievements.”

British-born Pope came to the United States with a Ph.D. and post doc from Imperial College, London, to pursue another post doc at the California Institute of Technology. He then landed an academic position at MIT and in 1982 came to Cornell — “a fantastic place, especially for faculty,” he says.

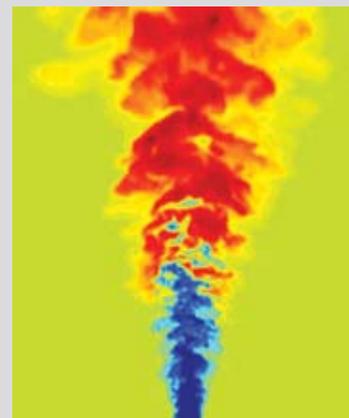
“Many institutions require faculty to bring in large amounts of research funds as the primary measure of success. Most of my career I have been in that mode, but Cornell also allows faculty to work in areas they choose, with the emphasis being on quality of research. Also, engineering departments tend to cluster on either the applied or fundamental sides of the spectrum. Cornell is to my taste because of its emphasis on fundamentals.”

Steve's research area is modeling and simulation of turbulent flows and turbulent combustion. He has made

various contributions to the statistical modeling of turbulent flows, including pioneering the use of probability density function (PDF) models for turbulent reactive flows. For combustion chemistry, he has developed a number of dimension-reduction and tabulation methodologies. These methods are now implemented in engineering simulation software such as ANSYS.

His widely-adopted textbook, *Turbulent Flows*, was published in 2000 and is now in its eighth printing.

Steve and his research group have worked with major companies, such as GM, GE, United Technologies and Rolls Royce. He explains, for example, that simulation is used in 90 percent of the design of cars, but because of the complicated physics and chemistry, engine combustion is extremely challenging to simulate. Lately Steve's group has been working with industrial scientists on developing simulation tools to be used to develop new and improved engines.



About Cornell, Steve says: “It's an exciting time now for the ME department. Having not hired for a while, we recently recruited three new faculty members and will be making more excellent hires going forward. This talent will take the department in new and even more exciting directions.”

Nadine Aubry, Ph.D. MAE '87

Cornell Alumni Heads ME at Top-Ranked Carnegie Mellon

The current Head of Carnegie Mellon's Mechanical Engineering Department, one of the top-ranked engineering schools in the country, has much to feel satisfied about these days. During her five-year term, the department has tripled its number of graduate students; added ten young faculty in state-of-the-art research areas; and established an interdisciplinary curriculum that reflects the chairperson's own experience as a Ph.D. student at Cornell in the 1980's. "I love my job!" says Department Head Nadine Aubry, Ph.D. MAE '87, who also continues her research in fluid dynamics.

"I had a wonderful experience doing my Ph.D. and a one year post doc in Mechanical and Aerospace Engineering (MAE) at Cornell," exclaims Nadine.

Nadine, who is French by birth, completed her B.Sc. at the National Polytechnic Institute and an M.S. equivalent at the Scientific and Medical University in Grenoble in 1984 to discover a fascination with the United States. "I wanted to continue my studies and thought I would come to the United States for one to three years. Never would I have thought I would stay here so long!" Twenty-seven years later, Nadine is married to American John Batton whom she met at Cornell (ME, Engineering Physics '86) and is the mother of two daughters and a son.

Not only was the US new to her, but in her professional life Nadine was also able to explore new fields of study thanks to Cornell's diverse curriculum. She describes her research thesis as being at the intersection of fluid mechanics and mathematics. With her adviser Professor John Lumley and in collaboration with Professor Philip Holmes from the Department of Theoretical and Applied Mechanics (now at Princeton), she pioneered the reduced modeling of open flow turbulence using advanced decomposition techniques and dynamical systems theory.

"It was a very good decision for me to work on this problem," she says. "Not only was it very rewarding, but it

opened my eyes to the power of working across traditional disciplines."

In the years between Cornell and Carnegie Mellon, Nadine has served on the faculty of the prestigious Levich Institute in New York City. Eight years, three children and a cramped Manhattan apartment later, she happily accepted the offer of a new endowed chair professorship at the New Jersey

Institute of Technology to assist its transformation from a teaching-based to a research-based institution.

Nadine soon started a new multidisciplinary research center and became chair of the Mechanical Engineering Department. Ten years later, in 2005, Carnegie Mellon approached her to head its ME department.

"My vision here at Carnegie Mellon is to always adapt ourselves to the evolving needs of society and innovate across fields," she says. "And my time at Cornell was the best possible preparation for this."

Nadine cites one of her major life challenges as balancing her professional career with her duties as a mother. "It was very hectic at times, meeting deadlines at work and providing for my children. I felt I was running all the time," she admits. Today, however, she takes

great pride in the assurance given by her oldest daughter, 22-year-old Gabrielle, who recently graduated with a B.Sc. in Chemical Engineering from Carnegie Mellon. "She tells me she is very proud of me and that I was a great mom." Nadine is also the mother of 19-year-old son Stéphane, a junior in Civil Engineering, and 18-year-old daughter Sophie, a freshman in Information Systems, both at Carnegie Mellon as well.

A more recent accolade for Nadine was her election last February to the National Academy of Engineering for which she has received congratulations from Cornell President David Skorton and Engineering Dean Lance Collins, whose field is also MAE.



Department Head Nadine Aubry

The Ranger Robot

Within a crowd of students and faculty walking an “ultra” marathon in Barton Hall on Cornell’s main campus is a stick figure a little over three feet tall – a robot. After 307 laps, the crowd on the indoor track has dwindled to a handful of enthusiasts -- and the “Cornell Ranger.” Finally, voltage seeps away and Ranger’s walk comes to a triumphant end. The robot has just walked some 186,000 steps non-stop, covering a distance of about 40 miles, setting a new robot walking record.

For the past five years, 60 Cornell undergraduate and graduate students and post-docs, as well as visiting students from Delft University in the Netherlands, have been developing and improving Cornell Ranger under the direction of Prof. Andy Ruina of the Sibley School of Mechanical and Aerospace Engineering (MAE).

Other robots typically are either energy efficient but fall down, or robust but energy greedy. The challenge is to achieve robustness and reliability without sacrificing energy efficiency. Hence the Cornell team’s delight with Ranger’s performance in the May 2011 marathon: it is a triumph of robustness – the robot did not fall down; reliability – the robot went the distance; and energy efficiency – the robot used only 5 cents worth of electricity.

A key player on the Ranger robot team is MAE Ph.D. student Pranav A. Bhounsule who has been developing, testing, and debugging walking algorithms. Says Pranav, “Ranger is at least an order of magnitude; more energy-efficient than present walking robots. Unlike other walking robots that control every joint at every instance of time, Ranger uses its momentum to walk. Every once in a while,

the Ranger’s computer brains tell the motors to push the legs here and there rather than trying to force them to move in un-natural ways.”

Pranav is a graduate of the Indian Institute of Technology and started his Ph.D. program in the Theoretical and Applied Mechanics Field at Cornell five years ago. He chose Cornell over other graduate programs not only because it offered him a fellowship but because of the opportunity to switch fields from solid mechanics to dynamics and controls.

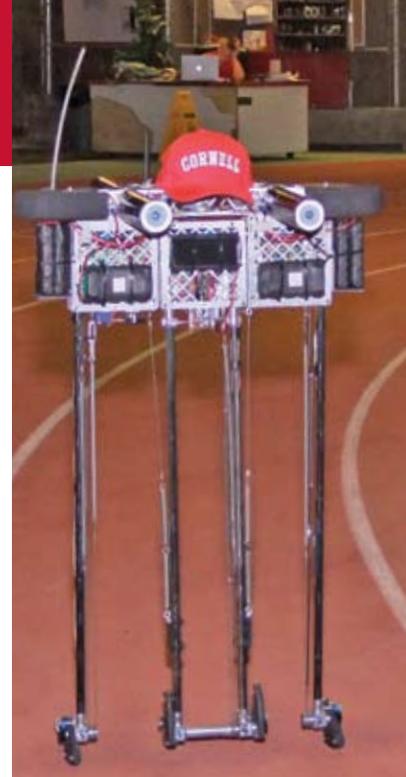
Pranav says of his time at Cornell, “It’s been very challenging.” He has been funded in part by a fellowship, a research assistantship, and various teaching assistantships. He says teaching preparation often competes with research time. And the research project itself has been very demanding.

Pranav emphasizes that it has been a team project, singling out lab manager Jason Cortell (ME ‘97) who oversaw project management, designed the mechanical and electrical hardware, and wrote substantial micro-controller codes.

Pranav will complete his Ph.D. program in a few months and has started a job hunt in industry. His work on the Ranger project should make him particularly marketable

because of its contribution to the understanding of how humans walk. Among the practical applications of his work could include better prosthetics thanks to improved ability to control devices.

With a stellar educational foundation from India and his Cornell Ph.D., Pranav is also considering a career in academia, which may well mean his next step is a research post doc.



REUNION 2011

Photos courtesy of Wolfgang Sachse



Fluid Mechanics and Thermal Systems Modelers: Pepiot and Desjardins

The Sibley School welcomed two new professors this July, fluid mechanics and thermal systems modelers Perrine Pepiot and Olivier Desjardins. She models the best way to make fuel; he models the best way to burn it.

This husband and wife team met in Lyon where they were taking preparatory classes for the French engineering school entrance exam and have been inseparable ever since.

At Boulder, Olivier worked on large-scale models of complex fluid dynamic problems associated with internal combustion engines. “I’m interested in developing methods to perform these simulations and I take the opportunity to learn more about the physics of complex fluid systems because there’s a lot of aspects to these problems that are not fully understood,” he says. “Most of what is really critical involves fluid dynamics, reacting flows with multiple phases, as well as turbulence, because with the scale of these systems we never get simple, easily predictable flows.

His goal is to help improve models to the point where design engineers can use them to make engines more stable, efficient, and cleaner burning. While most of the equations involved are known, says Desjardins, that alone is not enough to come up with an optimal design for an engine. “The problem we’re facing is that when you combine a chaotic process like turbulent mixing with a highly non-linear process like combustion, the tiniest little modification will have huge impacts,” he says. “You can describe a system that you’ve come up with, but at this point there’s really no one who can tell you what its true exact performance, stability, and pollutants produced are going to be without building and testing it.”



Perrine Pepiot



Olivier Desjardins

At NREL, Pepiot worked on modeling the interaction of chemical processes and fluid mechanics inside reactors that convert biomass into liquid fuels. She’s most interested in fluidized bed systems where wood chips are heated in hot sand to release gas that is collected in the first step in converting the wood into biofuel. “Biomass is incredibly complex. And there are tons of things happening inside the biomass. It’s porous. It’s the most amazing structure you have ever seen when you look at the biomass cells and how they connect to each other,” she says. “You have an infinitely complex system that’s decomposing to release gas. That involves a lot of chemistry that is not really known.”

Pepiot and Desjardins bounce ideas off each other all the time, and now that they are at the same institution, look forward to more formal collaboration, starting with the detailed chemical processes taking place inside an engine. “Right now those chemical processes are so complex that they are only taken into account in a very simplified form and if we want to go further, we need more details of what those chemical processes are in the context of the whole engine,” she says. “How can we introduce this chemistry aspect into these kind of simulations in an efficient manner in terms of computational resources?”

Both Desjardins and Pepiot are motivated by a desire to make transportation more sustainable. “Cars have been around for many decades, but what was enough 20 years ago is not sufficient today,” he says.

“We need something that does not contribute to global warming. We need something that is environmentally cleaner. That’s why we need all those details in our models,” says Pepiot. “We need something that is really the best.”

FACULTY HONORS

Professor Don Bartel received the 2011 Alfred Shands Award, from the Orthopaedic Research Society. This is the highest award given by the ORS and recognizes Don's 35 years of scientific contributions to orthopaedic and biomechanics research. The formal award was presented at the ORS Annual Meeting (Feb. 2011).

Professor Joe Burns was awarded an Honorary Doctor of Science degree from Webb Institute, Glen Cove, New York. Professor Burns was also the commencement speaker in 2011. He earned his B.S. from the Webb Institute in 1962. Though small, the school is a highly ranked engineering college that has remained tuition free. Further information can be found at <http://www.webb-institute.edu/867>. **Burns** won the Robert '55 and Vanne '57 Cowie Award for outstanding teaching in undergraduate engineering. The awards are selected from College-wide nominations based on student feedback and department recommendation. **Burns** was appointed January 12, 2011 to an indefinite term to the Celestial Mechanics Institute, an organization that oversees the editorial operation of the journal, *Celestial Mechanics and Dynamical Astronomy*.

Professor Mark Campbell was named the S. C. Thomas Sze Director of the Sibley School of Mechanical and Aerospace Engineering starting July 2011. **Campbell** was promoted to Full Professor effective July 2011 (from Associate Professor). **Campbell** won the Douglas Whitney '61 Award for outstanding teaching in undergraduate engineering. The awards are selected from College-wide nominations based on student feedback and department recommendation. In April 2011 **Campbell** selected as one of 20 faculty members nationwide to join the 2012-2013 Defense Science Study Group (DSSG), a 2-year program of education and study that introduces outstanding scientists and engineering professors to the challenges facing national security, with application either as government advisors or in their own research.

Associate Professor David Erickson was promoted to Associate Professor (from Assistant Professor) with indefinite tenure effective July 2011. His teaching and research is in the area of micro- and nano-fluidics.

Professor Ephraim Garcia won the Abe M. Zarem Educator Award for 2010. It was presented by the American Institute of Aeronautics and Astronautics.

Professor Herbert Hui is the recipient of the Award for Excellence in Adhesion Science. The award, given by the Adhesion Society and sponsored by 3M, includes a plaque, a cash award, and a symposium in his honor. Hui is presenter of the opening lecture of the symposium, which takes place on the first day of the Annual Meeting of the Adhesion Society.

Associate Professor Brian Kirby was promoted to Associate Professor (from Assistant Professor with indefinite tenure). He conducts research and teaching in fluid dynamics and micro-fluidics.

Assistant Professor Hadas Kress-Gazit received an Affinito-Steward research grant (\$5,000). She is 1 of 7 receiving the award based on scholarly merit, research design, feasibility and likely relevance to promotion to tenure.

Associate Professor Hod Lipson's team Fab@Home team wins Editor's Choice in Maker Faire 2010: The fab@home team presented their DIY 3D printer Model 2 at Maker Faire 2010 in

NYC. 450 makers exhibited their projects to over 10,000 visitors. At the conclusion of the exhibition, the Fab@Home team received an Editor's Choice blue ribbon.

Professor Michel Louge won the 2011 Kendall S. Carpenter Memorial Advising Award.

Professor Frank Moon won the Robert Henry Thurston Lecture Award, for "outstanding contributions to linear and non-linear dynamics of mechanical systems, magneto-solid mechanics, chaos theory and applications to mechanics, and the history of kinematics of machines". Formal presentation of the award will happen at the Robert Henry Thurston Lecture, ASME ME Congress and Exposition, Nov 11-17, 2011, Denver Colorado. Award established in 1925 in honor of Robert Henry Thurston, first ASME president and a leader in science & engineering.

Associate Professor Mason Peck promoted to Associate Professor with indefinite tenure. His teaching and research is in the area of space sciences. Peck's Satellite-on-a-chip launched with the space shuttle Endeavour from the Kennedy Space Center, FL.

Professor Steve Pope elected to the National Academy of Engineering.

Professor Mark Psiaki won the Robert '55 and Vanne '57 Cowie Award for outstanding teaching in undergraduate engineering. The awards are selected from College-wide nominations based on student feedback and department recommendation.

Professor Richard Rand won the Zellman Warhaft Commitment to Diversity faculty award, for outstanding involvement in and support of diversity initiatives in the College.

Professor Marjolein van der Meulen joins the Skeletal Biology Structure and Regeneration Study Section of NIH. **van der Meulen** will serve as a member of the Skeletal Biology Structure and Regeneration Study Section, National Institutes of Health Center for Scientific Review. The appointment, effective July 1, 2010, carries a four-year term. Selection to the study section is made based on demonstrated competence and achievement in the candidate's scientific discipline as evidenced by the quality of research accomplishments, publications in scientific journals, and other significant scientific activities, achievements and honors. **van der Meulen** was elected as a Fellow of the American Society of Mechanical Engineers.

Professor Zellman Warhaft has been named provost fellow for one year (Oct. 2010 - Sept 2011). He will assist Provost Kent Fuchs and Vice President Mary Opperman clarify roles related to diversity.

Professor Alan Zehnder appointed as Associate Dean for Diversity for the College of Engineering effective January 2012 for a 2-year term.

The Cornell **RoboSub** team won 1st place in the 13th International Autonomous Underwater Vehicle Competition. 22 teams competed in the recent competition held in San Diego, California. Engineers perform realistic missions in an underwater environment. The goal of the competition is to advance the development of Autonomous Underwater Vehicles (AUVs). Congratulations, team!

GRADUATE AWARDS

NDSEG Fellowships:

Riley Schutt, Ph.D. student in Aerospace Engineering w/Williamson

NSF Fellowships:

Michale Shafer, Ph.D. student in Mechanical Engineering w/Garcia
Cheryl Perich, M.S. student in Mechanical Engineering w/Lipson
Romy Fain, Ph.D. student in Mechanical Engineering w/Erickson

Churchill College, Cambridge, 3-year Fellowship:

Paolo Luzzato-Fegiz, January grad in Aerospace Engineering w/Williamson

John V. Breakwell Student Travel Award at the American Astronautical Society's Space Flight Mechanics Conference:

Michael Norman, recent grad in Mechanical Engineering w/Peck

Fullbright to study in Germany for the 2011-12 academic year:

Garrett Good, Ph.D. student in Mechanical Engineering w/Warhaft

SWE Salembier Memorial Scholarship

Romy Fain, Ph.D. student in Mechanical Engineering w/Erickson

Clare Booth Luce Fellowship:

Stacey Chan, Ph.D. student in Mechanical Engineering

New York Space Grant:

Lorraine Weis, Ph.D. student in Aerospace Engineering

NASA Space Technology Research Fellowship:

Benjamin Reinhardt, Ph.D. student in Mechanical Engineering w/Peck

UNDERGRADUATE AWARDS

Outstanding Achievement Award

Master of Engineering Program

Awarded to 3 graduating students who have achieved the highest academic standing in the Master of Engineering Program.

- **Ralph Caprio**
- **David Martin**
- **James Paulos**

Outstanding Senior Award

Richard Christopher Culver

Chris served the Mechanical Engineering undergraduates as president of the Cornell Chapter of the American Society for Mechanical Engineers for the 2010-2011 academic year. His efforts raised awareness of ASME via social and professional activities.

Walter Werring Excellence Studies Prize:

Walter W. Werring, for whom this prize is named, graduated from Cornell in 1922 with a degree in Mechanical Engineering. This award was established to recognize talented and dedicated undergraduate Sibley School of Mechanical and Aerospace Engineering students who have enhanced the Cornell Community, excelling in a manner befitting the reputation of the Sibley School.

Christopher Dembia

Chris helped design and install the Solar Decathlon team's solar house. His service as a valuable executive board member on ASME (American Society of Mechanical Engineers) included his contributions to Mechanicus, the M.E. undergraduate monthly newsletter, his mentoring undergraduates, and his key efforts towards the Class of 2011 Senior Video.

Jeremy Horwitz

Jeremy served as AIAA (American Institute of Aeronautics and Astronautics) chair and as the executive board member of ASME. He was a frequent contributor of articles and puzzles for

Mechanicus and contributed towards the making of the Class of 2011 Senior Video and organized a series of after-school programs for middle school students. Jeremy was also the commencement speaker for the class of 2011.

Matthew Monaghan

Matthew has been recognized by Cornell University for being selected as a Merrill Presidential Scholar and for his membership of the Meinig Family Cornell National Scholars. He served as subteam leader for the Minesweeper Project Team, and for serving two semesters as an Academic Excellence Workshop facilitator.

Frank O. Ellenwood Prize

This prize was donated by an alumnus who wishes to remain anonymous in honor of the late Sibley Professor Frank O. Ellenwood. Professor Ellenwood co-authored 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.

- **Paul Valle**
- **Amin Younes**

McManus Design Award

This award is named in honor of Howard N. McManus (BSEE '84, MEngEE '85 Cornell, PhD '97 Dartmouth), who was an outstanding Sibley professor in both the thermal and design side aspects of engineering. Professor McManus believed strongly in teaching engineering design. After his untimely death in 1974, his friends established a fund which supports this annual award, judged on ingenuity and engineering skills, as an original solution to a design problem or project.

Benjamin Oswald

"Development of an Experimental System for High-temperature X-ray Diffraction Studies with in-situ Loading."
Research with Professor Matthew Miller

R. N. Janeway Engineering Award

For the publishable paper submitted which presents the most promising proposal for an improvement in automotive vehicles.

• Obinna Ehirim

"Aerodynamic Under tray Design for Formula SAE Race Car using an Innovative Geometry and Simulation Optimization Configuration" Research with Professor Al George

Bart Conta Prize in Energy and the Environment

Best work on a research or design project dealing with energy and the environment; selection based on a review of project summaries.

• Ranjeev Mahtani

"Wake Effects and Synergies in Aeroelastic Wind Power Harvesting Systems" Research with Professor Ephraim Garcia

• William Temple

"Intelligent Electric Vehicle Charging: Rethinking the Valley-Fill" Research with Professor Max Zhang

Ralph Bolgiano, Sr. Outstanding Teaching Assistant Award

The Outstanding TA Award is given at the end of each Spring semester to the Teaching Assistant in the Sibley School who has been judged by the Sibley Awards Committee as deserving of this Award. Ralph Bolgiano, Sr., was a Sibley College graduate in the Class of 1909. This award was established by his wife as a memorial to her husband.

- Jayme Burket
- Riley Schutt

David Block Award

In recognition of outstanding performance by a Teaching Assistant in math Most Outstanding TA in Undergraduate Engineering Mathematics or Engineering Mechanics Courses as determined by faculty recommendations.

- Megan Suchorsky

Sibley Prizes

This award is named after Hiram Sibley and his son who were early benefactors of Cornell. The Sibley School is named after them. The Sibley prizes were established in 1884 for the two seniors with the highest scholastic averages. The prizes were endowed with \$25 each; this was one-third of the tuition, which was \$75. The prizes today are not one-third of the tuition, but the prize money will buy, at the very least, a good dinner.

- Christopher Lee Dembia
- Matthew Monahan

These students have been invited to participate in the AIAA Foundation International Student Conference, held next January in conjunction with the 50th Aerospace Sciences Meeting and Exhibit and will have their travel expenses paid.

Masters, Best Technical Paper and Presentation James Paulos and Alan Argondizza "Reduced Weight Hydraulic Actuation for Small Mobile Applications"

Undergraduate, Best Technical Paper and Presentation Ranjeev L. Mahtani "Wake Effects and Synergies in Aeroelastic Wind Power Harvesting Systems"

Team, Best Technical Paper and Presentation John Henry Harris and Jason Quint "A Duty Cycle Approach to Power Management in Self-Reliant Robots"

Additionally, Cornell's Human Flight Project secured second place in the Team Category on the strength of their paper and a presentation by Joshua Kusnitz and Nidhi Rathi. The paper was entitled, "Design of an Electric VTOL Personal Air Vehicle" and was authored by students Joshua M. Kusnitz, Yu Kambe, Alan D. Yamamoto, Nidhi Rathi, Ravi Surdhar, Robert J. Kelbe and Melanie A. Naman. The growing roster of the Human Flight Project may be found at their website, <<http://humanflight.engineering.cornell.edu/>>.

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 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.

Named, Endowed Lecturer

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

Research Seed Grants

Provide support for faculty to undertake new initiatives, new directions and collaborations.

Teaching Laboratory Specialist

Additional technical specialist in support of experiential learning, including instructional labs and shops.

Teaching Laboratory Fund

Add new and renew laboratory equipment used in student labs.

Distinguished Speakers Fund

Speakers for MAE Colloquium and courses.

Research Laboratory Renewal

Build 21st century labs for new initiatives in MAE.

Teaching Laboratory Renewal and Transformation

Build new experiments in key courses.

Digital Manufacturing Initiative

Modern approaches to the design and fabrication of engineered systems.

Faculty Start-up

Support MAE strategic areas such as energy, nanoscience and biomedical engineering.

Research Seed Grants

Instructional Laboratory Support

Student Projects

Renewal of Computational Laboratories

Student Organizations Such as ASME

Travel Grants for Students and Faculty

Support for On-Line Learning Initiatives



THE SIBLEY SCHOOL OF
**MECHANICAL
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