

Science News

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THE MONTHLY NEWSLETTER OF RENSSELAER POLYTECHNIC INSTITUTE'S SCHOOL OF SCIENCE

Martin Hardwick named Acting Head of Computer Science



Martin Hardwick joined Rensselaer in 1985 as an assistant professor, coming to Rensselaer from Texas Tech University. He received his Ph.D. from Bristol University in the United Kingdom. Martin is the author of numerous papers and articles on engineering database systems and concurrent engineering. He has traveled internationally to present numerous public lectures on these topics.

Martin supervised the Model Driven Intelligent Control of Manufacturing program, known as the "Super Model" Project, which was supported by an Advanced Technology Program (ATP) Award issued by the National Institute of Standards and Technology (NIST). This program developed STEP-NC, a technology that is being evaluated by the aerospace and automotive industries as the next generation language for manufacturing control. Dr. Hardwick has worked on several industrial information infrastructure programs including the DARPA Initiative in Concurrent Engineering (DICE), which was a joint program between General Electric, RPI, CMU and West Virginia University, and the National Industrial Information Infrastructure Program (NIIP), which was a joint program between IBM, Electric Boat, NIST and RPI. He is currently the team leader for ISO TC184/SC4 T24, more commonly known as STEP-Manufacturing.

In 1991 at the request of DARPA, he started a small software company called STEP Tools, Inc. with a team of graduate students. This company is headquartered in downtown Troy and develops and markets software for sharing engineering data using ISO standards. In its first ten years it developed software for sharing solid model CAD data that it estimates is included in

more than one million CAD seats including some in the Siemens NX and Bentley Microstation software systems used by Rensselaer. STEP Tools is now working on new software for sharing machining data that includes the original CAD data but also new data about machining processes and manufacturing tolerances. If successful this software will make machining faster, safer and more flexible by allowing machining data to be shared between enterprises, and by enabling new tools on the CNC control for verification and optimization. For example the aerospace industry estimates that the software could make their machining tasks on average 15% faster.

Martin and his wife, Lesli Hardwick, live in Loudonville and have two daughters and a son. Their eldest daughter, Sarah, is studying Neuroscience at Kings College in London and has been participating in many activities related to stem cell research including the London Regenerative Medicine Network and preparing legislation for the House of Lords. Their second daughter, Claire, is a two time "All American" runner and a business major at Southern Methodist University in Dallas where she earned an athletic scholarship. Both daughters were highly successful cross country and middle distance runners for Holy Names high school. Their third child George is currently a Junior at Shaker High School and is a member of the Shaker Crew team.

Lemelson Prize

The \$30,000 Student Prize is awarded to a Rensselaer senior or graduate student who has created or improved a product or process, applied a technology in a new way, redesigned a system or in other ways demonstrated remarkable inventiveness. Award winners gain invaluable exposure to the science, business and investment communities through national press around this award. For more information about the award and the ceremony held at Rensselaer on March 4, 2009, go to <http://www.eng.rpi.edu/lemelson> . Two of the three finalists were science graduate students.

Yuehua “Tony” Yu Wins 2009 Lemelson-Rensselaer Prize for his research “Binary Guanosine Gels: Revolutionary Media for Nano and Bio Technology”

Yuehua “Tony” Yu, a doctoral student in the Department of Chemistry and Chemical Biology, won the prestigious Lemelson-Rensselaer award for his research on binary guanosine gels – “G-Gels”. These gels that have the potential to lead to new medical devices and delivery techniques for drugs are based on nanoparticles.

Tony, whose research advisor is **Linda McGown**, William Weightman Walker Professor of Chemistry and Head of the Department of Chemistry and Chemical Biology, has filed for two patents and published two articles on his work. He received his bachelor's and master's degree from Nankai University in China.

See <http://news.rpi.edu:80/update.do> for further details about Yu's work.

**Mei-Ling Kuo Named a Finalist in the 2009 Lemelson-Rensselaer Prize for her research
“Photonic Nanostructures Impact on Solar Harvesting”**

Mei-Ling Kuo, graduate student in the Department of Physics, Applied Physics and Astronomy was selected as a 2009 **finalist** for the Lemelson-Rensselaer student prize. Her research advisor is **Shawn Yu Lin**, Constellation Professor of Physics in the Future Chips Constellation.

Mei-Ling Kuo's innovation could bring the world a step closer to realizing efficient, cost-effective solar energy harvesting. Her new antireflective coating overcomes two major hurdles hampering the development and more widespread use of solar panels for power generation.

Kuo has co-authored a journal paper and has a patent pending for her broadband antireflective coating. Kuo earned her bachelor's degree in physics from National Taiwan Normal University, attended the University at Buffalo, and is currently working toward her master's degree and doctorate in physics at Rensselaer.

**Raganath Teki Named a Finalist in the 2009 Lemelson-Rensselaer Prize for his research
“Nanorod Structures for Energy Conversion Applications”**

Rangnath Teki, graduate student in Chemical Engineering, did research with **Nikhil Koratkar**, Associate Professor of Mechanical, Aeronautical and Nuclear Engineering. Teki is committed to applying his expertise in nanomaterials to develop much-needed solutions for an energy-starved world. His group of four innovations, connected under the common theme of efficient energy conversion, stands to boost the cost-effectiveness and hasten more widespread adoption of next-generation green technologies. At the heart of Teki's research is the technique of oblique angle deposition (OAD) using sputtering, which allows him to grow vast forests of nanoscale

structures of different materials. The process is relatively fast, inexpensive, and allows single-step creation of unique nanostructures with controllable shape, size, and symmetry.

Teki has co-authored eight journal papers, and in 2005 received the Department of Chemical and Biological Engineering Howard. P. Isermann Fellowship. Teki received his bachelor's degree in chemical engineering from the Indian Institute of Technology Madras, and his master's degree in chemical engineering from Johns Hopkins University.

Fund Raiser For The American Heart Association

To help raise funds for the American Heart Association staff and faculty of the School of Science made soups and desserts, and held a 50-50 raffle. All donated items were homemade. A total of \$410 was raised.



In conjunction with the American Heart Association
National Wear Red Campaign and Valentines Day

The School of Science Heartwalk Team
is sponsoring a
"SOUPER LUNCH DAY!!"

 Friday, February 13, 2009
12:00 -1:30 (or until we run out of food)
1C13 Science Center
Donation: \$5.00

Warm up with a Hot Homemade Soup Lunch
on a Cold Winter Day!!

Desserts will be available for a nominal fee.
We will also be holding a 50/50 raffle
Please support the American Heart Association

The School of Science Heartwalk Team

- ♥ Deans Office
- ♥ Biology
- ♥ Physics
- ♥ E&ES
- ♥ Chemistry
- ♥ Computer Science
- ♥ Mathematical Science
- ♥ IT
- ♥ Biotech



The event was organized by Jody Malm and Bonnie Carson. Those contributing soups and desserts or otherwise assisting were: Richard Bopp, Bonnie Carson, Jacky Carley, Karen Coonrad, Pamela Fuller, Karen Hardik, Linda Kramarchyk, Michele Kronau, Jody Malm, Susan Mangione, Joan Perras, Dawnmarie Robens, Jayne Taylor, and Kim Watson.

The School of Science Heart Walk Team will also participate in the "Start Heart Walk" on

October 17, 2009 at The Crossings of Colonie, 580 Albany Shaker Road, Loudonville, N.Y.

Your participation or sponsorship of a walker is strongly encouraged.

Science Students Gain International Experience

Julie Beaudet at Warwick Castle



Julie Beaudet, a junior chemistry student, is spending the 2008/2009 school year at the University of Sussex in Brighton, England. Julie is part of the Accelerated BS/PhD program and wanted to broaden her cultural and education horizons before starting her graduate work at RPI. She chose Sussex for its reputation as one of the top five chemistry schools in the United Kingdom, as well as for its proximity to London. Studying and living in another country has been an unprecedented learning experience for Julie.

In addition to the challenges associated with moving across an ocean and adapting to a new culture, the University of Sussex presented an entirely different school system. The most pronounced differences are a 3-year university plan instead of a 4-year plan and the administration of final exams at the end of the school year regardless of which term the classes were taken. Elective options are also much more limited as there are no “general education,” or humanities requirements for the chemistry students.

Outside of class, Julie has been involved in C60, the University of Sussex chemical society, and some stage crew work for various student productions. C60, named for the fullerene molecule which was co-discovered by a professor at University of Sussex, organizes lectures, social events, and community outreach events to promote chemistry throughout the campus and community as well as build social bonds between undergraduates, graduates, and faculty members. Julie has also taken this opportunity to get involved with her long-forgotten hobby of stage crew/lighting. She recently finished assisting with the musical theater society’s production of Fame and will be working at a student art performance in early March.

Julie’s learning experiences reach far beyond the walls of the classroom. She has had the opportunity to travel to many places within England as well as on the European continent, including a 2-week trip through five European countries over the winter holidays. Every trip, whether it was to the Czech Republic or ten minutes up the road to Rottingdean, has brought new experiences and perspective that can only be achieved by experiencing life as others do. Some of her favorite destinations include but are not limited to Liverpool, England, Madrid, Spain, and

Geneva, Switzerland. Julie is looking forward to collecting even more of these experiences as she continues to travel over spring break and any free weekends possible before the chaos of final exams begins.

Shaina Feldman and Emilie Butel at the Beach Near Melbourne



Cheers from Melbourne, Australia! Let me begin by saying that studying abroad is one of the best decisions I have ever made. Not only is it an opportunity to experience a new country and culture, but I am constantly meeting new people, not just from Australia, but from all over the world! I met my current roommate Emilie, who is from Paris, on orientation day. We have quickly become great friends. As an added bonus, she is helping me out with my French!

Life in Melbourne is so relaxed. It is completely normal to find a group of distinguished-looking businessmen and woman out for a drink in the middle of the afternoon, or taking an hour out of their day to sit down and have a coffee. No one seems to take life too seriously, and everyone has a perpetual smile on their face. There is always something to do in Melbourne no matter what time of day it happens to be. During the week, you can always sit back and watch the electric Didgeridoo player and many other street performers, go shopping, grab a coffee, or go for lunch at one of the many amazing sushi restaurants. Or, if you'd prefer, kick back at the rooftop bar for a drink, while sitting on a giant bean bag, overlooking the city.

Weekends are filled with things to do. During the summer, there are festivals along the beautiful Yarra River, where you will find free music, cultural performances, rides, fireworks, and food. You can hop on a tram and take the fifteen minute ride to St. Kilda Beach to surf, kite-board, swim, or just relax. If you're a history buff, you can visit the Melbourne Goul (jail for us American's), the immigration museum, and many other attractions that introduce visitors to Australia's roots as a penal colony as well as their famous Aboriginal history. My personal favorite is the multitude of sporting events and concerts. Just this weekend I am going to see the footy (Australian Rules football) and catch an all-day concert to benefit the victims of the Victoria bushfires. There is also the opportunity to see a game of cricket as well as rugby, field hockey, soccer, and Formula One racing.

Australia is a huge country but it is still fairly easy to take a weekend or day trip from Melbourne to one of the many surrounding destinations. For example, you can make a day trip to Phillip Island to see some of Australia's best wildlife or to the Yarra Valley for a tour of the wine

country. It is just as easy to plan a two day surfing trip, or hop on the ferry to Tasmania for the weekend! They even offer two day camping trips to the outback. Unfortunately, I have yet to experience many of these things, but they are all on my list of things to do!

I play varsity field hockey for RPI and was worried about the possibility of not playing for five months. Fortunately, I was able to join a hockey club where there is some serious competition and I should be able to keep my skills sharp. There are girls of all ability levels and they were very welcoming on my first day. Now I play twice a week with them, and competition against other clubs begins in a few weeks. There are no “university teams”; instead, there are club teams for many sports in each area of Victoria. Athletes from every ability level can join; there is opportunity for all ages.

As far as academics go, it has taken a little bit of adjustment to get used to the Australian way of doing things. Instead of three midterms and a final, plus lab reports, papers, presentations, and whatever else we have to do, Australian universities have one exam worth over 50% of your final grade and then one presentation and a paper. There might be a lab report (or two) also assigned. The fewer assignments mean each is worth a greater percentage of your final grade. There is no room for slacking or else you will have trouble passing the course.

I am taking classes at Victoria University which is a completely different experience from RPI. Instead of one main campus, it has about ten separate campuses, spread throughout the suburbs of Melbourne. Most Australian students still live with their parents, and it’s actually abnormal to go far away for college. Since VU is such an enormous university, I have the opportunity to take courses that really interest me, and ones that are not offered at RPI. They will even give you credit for taking bushwalking or scuba diving!

If you ever get the chance to study abroad or even just travel for awhile, in Australia or anywhere else, make the absolute most of your experience. Meet as many people as you can and challenge yourself! Do things you never thought you would do, because you may never get the chance again.

So, as the Aussies say, I’m heading off for a snag and a brew...hooroo!

Awards

James Crivello, Professor of Chemistry and Chemical Biology, has been selected by the International Conference of Photopolymer Science and Technology to receive The Photopolymer Science and Technology Outstanding Achievement Award. The award will be presented to Jim at the ICPST-26 meeting at Chiba University in Japan on June 30- July 3, 2009.

Michael Shur, Patricia W. and C. Sheldon Roberts Professor and Acting Director, Center for Integrated Electronics has been elected a Fellow of The Materials Research Society. The title of MRS Fellow honors MRS members who are notable for their distinguished research accomplishments and their outstanding contributions to the advancement of materials research, world-wide. The maximum number of new Fellow appointments each year is limited to 0.2% of the current MRS membership.

Faculty News and Notes

Kim Lewis, Assistant Professor of Physics, Applied Physics and Astronomy is the Recipient of 2009 Career Enhancement Fellowship for Junior Faculty given by the Woodrow Wilson National Fellowship Foundation.

Barbara Cutler, Assistant Professor of Computer Science, received a prestigious NSF Career Award valued at \$479,000. The award entitled Immersive Architectural Daylighting Design Experience” takes advantage of the Curtis R. Priem ’82 Experimental Media and Performing Arts Center (EMPAC).

K. V. Lakshmi, Assistant Professor of Chemistry and Chemical Biology, is co-chairing the 26th Eastern Regional Photosynthesis Conference to be held from April 17th – 19th, 2009 at the Marine Biological Laboratory, Wood Hole, MA. together with Prof. Philippe Juneau, the Canadian Research Chair on Ecotoxicology at the Université du Québec à Montréal. To keep with the state-of-the-art in photosynthesis and address current and future needs for sustainable energy, the focus of the conference this year is being expanded. Sessions will be held on the fundamental exploration of photosynthetic processes, including the photochemistry and photophysics of natural and artificial photosynthetic systems. There will also be plenary lectures on the evolutionary aspects of photosynthetic systems at the 26th ERPC.

SCIENCE STATISTICS

The table of statistics below comes from the School of Science performance plan for next year. This table was presented to the Board of Trustees last month. We are currently in Fiscal Year '09, so some of the numbers in this column and all of the numbers in subsequent columns are projections.

The numbers in the last column, FY '14, have been and continue to be the goals for the School of Science in the years ahead. We may not achieve them by Fiscal Year '14, but they remain our goals.

	FY' 02	FY' 07	FY' 08	FY' 09*	FY' 10*	FY' 14*
T&TT Faculty	103	116	114	111	111	149
New Hires	3	8	14	2	11	10
UG Students	1,505	1,172	1,152	1,269	1370	1,500
Grad Students	449	339	325	334	363	480
B.S. Degrees	280	329	215	300	310	375
Ph.D. Degrees	24	47	47	50	55	80
Research Expend. (\$M)	13.3	20.1	19.1	23.0	26.0	40.0
Research Awards (\$M)	17.8	18.3	21.3	24.0	27.0	40.0

* Estimated

There are several observations one can make from these numbers:

- The initial decline in the number of undergraduate students at the beginning of the row is the result of the declines in the enrollments of Computer Science and IT. The recent increase is the result of increasing enrollments in Biology, Physics and Mathematics.
- The initial decline in the number of graduate students at the beginning of the row is the result of the Computer Science department deciding to cut back on the size of its M.S. program to concentrate on Ph.D. education.
- Perhaps the most promising number in the table is the research awards number for Fiscal Year '08 (July 2007 through June 2008). Awards were up \$3M from the previous year. This suggests that research expenditures should be up this year. Since some of the increased research expenditures is support for graduate students, it also suggests that the number of graduate students should increase. As of now, research awards this year are about the same as received last year at this time. Hopefully, by the end of this year, research awards will exceed last year's total to allow us to continue the growth of our research programs.

We must continue to work hard to achieve the goals shown in the table. If we succeed, we will have a strong a vibrant school for the years ahead.

This newsletter is prepared monthly and distributed to School of Science faculty, staff, students and alumni to highlight accomplishments and events within the school. Please submit news items for the next newsletter to Samuel Wait, Associate Dean of Science, at waitsc@rpi.edu.

