



Electrical and Computer Engineering

Welcome ECE Students!

ECE Chair's Message



On behalf of the ECE faculty and staff I'd like to welcome our new students- freshmen, transfers and graduate students! As you start your UML career I hope that you consider getting engaged in activities that expand your participation beyond your course commitments. The ECE Department and the College of Engineering offer opportunities to extend yourself by participating in research, service learning and student groups. I assure you that your college experience will be richer if you get involved!

Our returning students may notice that we have revamped the ECE newsletter. Thanks to Prof. Yan Luo, the newsletter has an improved format and includes short stories about our faculty, staff and students. If you have a story about your experience as an ECE student let us know!

On the news front I'm happy to report that three ECE faculty have received approval for tenure. Please join me in congratulating Prof. Ibe, Prof. Margala and Prof. Mahd for their achievement and for reaching this important milestone in their careers. We also continue to improve the ECE facilities with new equipment and facility upgrades in some of our labs and classrooms.

As I mentioned earlier, participation in student groups can be an enriching experience. ECE has student chapters of two important organizations - the IEEE chapter and Eta Kappa Nu. I have been encouraged by the renewed activity in both of these groups, due in large part to a dedicated group of new officers. I encourage all ECE students to

consider IEEE membership as an important part of your career development. If you're not a member already, stop in Ball 302 and introduce yourself to the IEEE officers. All ECE students should aspire to be invited to join Eta Kappa Nu, an international honor society for electrical and computer engineers. If you have any questions about the requirements for membership contact Prof Joel Therrien, who is the faculty advisor for the UML chapter of Eta Kappa Nu.

Stop into the ECE Department office (Ball 301) if you have any questions.

Have a great semester!

Professor Craig Armiento

SEPTEMBER 2009

Research



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Got News? Please Contact Prof. Yan Luo
Tel:978-934-2592, Email: Yan_Luo@uml.edu

Prof. Tingshu Hu Advances Control System Research



Associate Prof. Tingshu Hu, whose research focuses on control systems, has been recently awarded a new NSF research grant on "Analysis of Nonlinear Oscillations via Lyapunov Approach". This project extends her ongoing research that has supported a number of graduate and undergraduate students and produced another two journal publications.

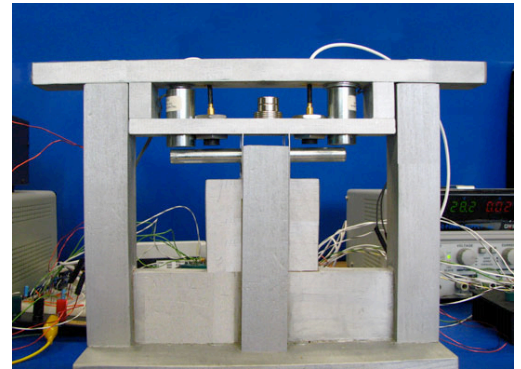
Journal publications:

D. Dai, T. Hu, A. R. Teel and L. Zaccarian, "Piecewise-quadratic Lyapunov functions for systems with deadzones or saturations," *Systems & Control Letters*, 58(5), pp.365-371, May 2009.

T. Thibodeau, W. Tong, and T. Hu, "Set invariance and performance analysis of linear systems via truncated ellipsoids," *Automatica*, 45(9), pp.2046-2051, Sept. 2009.

Funding:

T. Hu (sole PI), Analysis of Nonlinear Oscillations via Lyapunov Approach, NSF, \$286,824, Sept 2009- Aug. 2012.



A magnetic suspension system designed at Hu's Control Systems Lab with two degrees of freedom tracking and stabilization successfully achieved. The feedback control is implemented via a microprocessor. Project funded by NSF (Sept 2006-Aug. 2010). Students involved: Tom Thibodeau, Julie Bissell, Dipesh Patel and Yao Yao.

Prof. Samson Mil'shtein's Team Designs Contactless Fingerprinting

Students of the Advanced Electronic Technology Center, led by Prof. Mil'shtein, have designed a novel contactless fingerprinting system. The high quality of contactless fingerprints is enhanced by the image clarity of line scan cameras. Although line scanning requires additional electronic control, the resolutions of these cameras are much better than the so-called area view versions. The team has started to train the first group of UMass police officers to operate the stationary contactless fingerprinting equipment. At the end of the semester, the students will train the officers to use a hand-held mobile contactless fingerprinting system, which will communicate the information to a laptop to be located in the police cruisers. Three ECE undergraduate students advised by Mil'shtein, Mike Baier, Chris Granz and Paula Bustos, who worked on the design, won the first prize for best research paper at the IEEE International Conference on Homeland Security Technologies held on May 11-12, 2009 in Waltham, MA (see news on page 3.)



In addition, due to his contribution in this research, Prof. Sam Mil'shtein was elected to the organizing committee of the First International Symposium on Nanotechnology, Energy and Space, which is supported by NASA Symposium and held in Houston, TX on October 25 - 28, 2009.

Prof. Kanti Prasad Awarded Two Grants on VLSI Research



Prof. Kanti Prasad, whose recent research focuses on reliability analysis and enhancement for GaAs and silicon devices through novel techniques, has been awarded two grants during the summer of 2009.

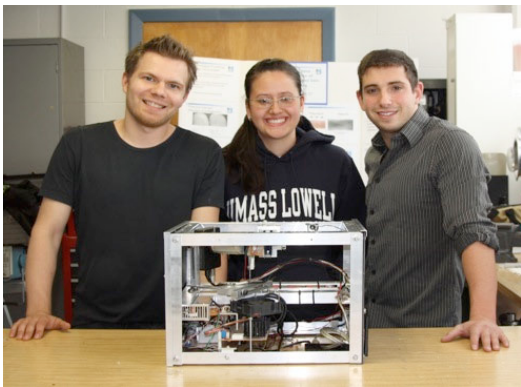
- 1) \$60K grant from Skywork Solutions Inc. for the proposal entitled "Enhancing the Performance of Mobile Switches Deploying Innovative Material and Electrical Characterization, Measuring, Modeling and Processing Techniques Towards pHEMTs and LNAs" for the academic year 2009-10.
- 2) \$60K grant from Analog Devices Inc. for the proposal entitled "Continuation of Built In Self Test and Built in Calibration Procedures for MEMS

Including Development of Algorithm Pertaining to No Shake Techniques" for the academic year 2009-10.

Prof. Prasad has recently published a number of papers with Ph.D. student Ambarish Roy in international conferences, including:

- 1) "RF-MEMS Resonator Design for Parameter Characterization", presented at 22nd IEEE International IEEE SOC Conference, Belfast, Northern Ireland, UK, Sept 2009.
- 2) "Thin Film Solidly Mounted Resonators for RF Devices", accepted to be presented at 12th International Symposium on Microwave and Optical Technology, New Delhi, India, Dec 2009.
- 3) "Material Sensitive MEMS Resonator Optimization", accepted to be presented at 2009 Fall Meeting of Materials Research Society, Boston, USA, Nov 2009.

ECE Undergraduate Students Win First Prize in International Conference



(from left to right): Chris Granz, Paula Bustos and Mike Baier, all ECE juniors preparing the fingerprint system for the

Mike Baier, Chris Granz and Paula Bustos (all ECE Dept. Dean's list juniors in Prof. S. Mil'shtein's research group) won first prize for best research paper at the IEEE International Conference on Homeland Security Technologies held on May 11-12, 2009 in Waltham, MA.

The development of a contactless fingerprinting method with anti-spoofing capability was summarized in the paper, titled "Mobile System for Fingerprinting and Mapping of Blood -Vessels across a Finger", by S. Mil'shtein, M. Baier, C. Granz and P. Bustos. Competing with all Ph.D. student presenters from both US and international universities, the UML team (M. Baier was the speaker) not only presented an extended study but demonstrated a prototype of the mobile fingerprinting system, which is designed to be installed in police and border control cruisers. It takes 1.5 - 2

seconds per finger to collect the information about both the fingerprint and the map of blood vessels. The mobile unit carries image-processing software compatible with FBI systems and wireless communication to have instant access to Police and FBI data centers.

In addition, Paula Bustos' picture was featured in May 2009 at the website of the HENAAC, the Hispanic Engineer National Achievement Awards Conference. This important society set the precedent for excellence in engineering and science, and it is run out of Baltimore, Maryland under Career Communications Group. Paula is a recipient of the HENAAC scholarship.

Prof. Ziyad Salameh Leads Renewable Energy Project



Professor Salameh, a leading researcher in the renewable energy area, attended the IEEE Power Engineering Society Annual Meeting held in Calgary Canada July 26-30, 2009. He presented a paper with Ph.D. student Bong Kim entitled "Advanced Lithium Polymer Batteries ". He also attended the IEEE working group on Renewable Energy, IEEE Working Group on Emerging Technology, IEEE Working Group on

Distributed Generation and Energy Storage and the IEEE Energy Development Subcommittee. Prof. Salameh is an active member of all four groups.

With sponsored research grants, Prof. Salameh supervised the installation of a new 2KW wind turbine on the roof of the ECE Building (Ball Hall). This wind turbine is of a new type, which has an integrated inverter.



Prof. Xingwei Wang Invents Miniature Sensors



Assistant Professor Xingwei Wang and her team conduct research in optical biosensing and biomedical devices. Her recent research has resulted in the invention of a miniature disposable blood pressure sensor. In addition,

she collaborates with Prof. Pei at Kansas State University on an NSF-funded project. Wang's research has attracted funding from both industry and federal government:

- 1) AfiSci, Inc., Standalone Feed and Water Feeder. March 2009 - August 2009, \$5400.
- 2) NSF Grant, "Fundamental Research on Titanium Drilling with Rotary Ultrasonic Machining", in collaboration with Professor Zhijian Pei of Kansas State University, 07/01/2009 - 06/30/2012, \$27,115.
- 3) CVIP Technology Development Fund, Miniature disposable blood pressure sensor for cardiologist use. May 2009 - April 2010, \$25,000.

Her work was recently published in well-known journals and conferences, including, for example: Wenhui Wang, Nan Wu, Ye Tian, Xingwei Wang, Christopher Niezrecki, and Julie Chen, "Optical pressure/acoustic sensor with precise Fabry-Perot cavity length control using angle polished fiber," *Optics Express*, Vol. 17, Iss. 19, pp. 16613-16618 (2009)

Nan Wu, Wenhui Wang, Xingwei Wang, Chunyang Liu, Chengyu Cao, Vineet Dua, and Sanjeev K. Manohar, "Nanotube coated optical fiber sensor for VOC (Volatile organic compounds) detection and its dynamic response modeling", *The Fifth International Workshop on Advanced Smart Materials and Smart Structures Technology*, Boston, MA, July 29-31, 2009.

In Prof. Wang's group, Ph.D. students Nan Wu and Ye Tian have been awarded NSF Student Scholarships for taking short courses offered by Asian-Pacific Network of Centers for Research in Smart Structures Technology.

Congratulations to Our Newly Tenured ECE Professors!



Dr. Oliver Ibe
Associate Professor of ECE
Expertise: Mobile and
Converged Communications

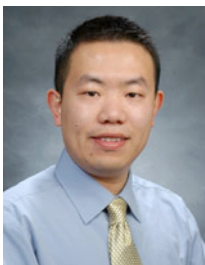


Dr. Mufeed Mah'd
Associate Professor of ECE
Expertise: Digital Signal and
Image Processing

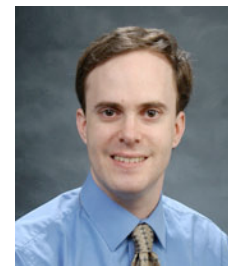


Dr. Martin Margala
Associate Professor of ECE
Expertise: Digital and Mixed-Signal
VLSI Design and VLSI Testing

ECE Teaching Award Winners for 2008-2009!



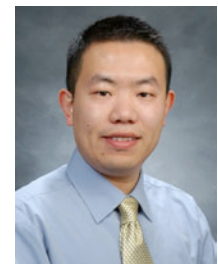
Dr. Yan Luo
Assistant Professor of ECE
Courses taught: Microprocessor I, Microprocessor II
and Advanced Computer Architecture



Dr. Joel Therrien
Assistant Professor of ECE
Courses taught: Electronics I, Quantum Electronics
for Engineers, Special Topics on Nanoelectronics

Prof. Yan Luo Applies Computer Architecture Expertise in Network Innovation

Assistant Prof. Yan Luo is leading an NSF funded project on building multicore processor-based programmable edge nodes for Global Environment for Network Innovations (GENI), a major NSF initiative on revitalizing the next generation Internet. Luo leverages his computer architecture expertise in designing high performance network systems, bridging the gap between the network research community and the computer architecture community. His research team currently includes one PhD, two MS and two undergraduate students. He and his students attended the 5th GENI Engineering Conference, held in Seattle, WA, July 20-22 2009.



During the conference, his team demonstrated a prototype programmable edge node and interacted with the teams from other universities and industries. His newly awarded NSF REU fund (total amount \$44,638) supported the research and travel of the undergraduate students.

ECE Assistive Technology Laboratory Brings Expertise to Indian Universities



Alan Rux was invited by three Indian universities to lead the establishment of their assistive technology laboratories during the summer of 2009. His trip brought ECE's 18-year expertise in research and development of assistive technology devices to overseas, helping the people in need in the other parts of the globe.



The Assistive Technology Program began in 1991 at UMass Lowell. The main purpose of the assistive technology program is to provide our ECE students with interesting and challenging problems which may be resolved by applying technologies that have been presented in our curriculum. The program also provides service to the disabled community.

B .V. Raju Institute of Technology (BVRIT) at Hyderabad and Shir Vishnu Engineering College for Women (SVECW) at Bhimavaram were among the institutions that Rux visited and helped setting up Assistive Technology Programs similar to the one at UML. According to Rux, the students met their clients and have started 16 projects at each institution. Forty students at BVRIT and sixty students at SVECW are working in teams of 3 to 5 on each project. They presented their project in both PowerPoint and poster format,



supervised by Rux during the visit. The projects are now in the working prototype stage and will be delivered to their clients in November 2009. After returning from India, Rux kept in contact with the students to make sure their projects are completed and delivered smoothly.

Rux's visit to India is a part of the Indo-US Collaboration for Engineering Education program led by Prof. Krishna Vedula, a Chemical Engineering faculty member and special assistant to the provost for international partnerships.

Alan Rux advising students at B .V. Raju Institute of Technology on their assistive technology projects