



Heydari, Nenadic and Do Awarded 1M for Spinal Cord Injury Research

Highlights

- Heydari/NSF Award and IEEE Distinguished Lectures
- Dutt Keynote
- Mendelson Lecture
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Prof. Payam Heydari has recently received a \$1 Million Cyber-physical Systems Synergy award from the National Science Foundation for his collaborative research titled "A Signal-Aware-Based Low-Power, Fully Human Implantable Brain-Computer Interface System to Restore Walking after Spinal Cord Injury." His ground-breaking research is a collaborative project between UCI and the Rancho Los Amigos National Rehabilitation Center and focuses on implanting a cyber-physical system to bypass the spinal cord, enabling direct brain control of prostheses. This newly funded NSF research combines the efforts of CECS/EECS Prof. Payam Heydari, who serves as the PI, Biomedical Engineering Professor Zoran Nenadic, and Dr. An H. Do from the Department of Neurology who serve as Co-PIs on the project.

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Dutt Keynote Speaker at EUC 2014

Chancellor's Professor Nikil Dutt was invited to give a keynote speech titled "Towards Sentient Chips: Self-Awareness through On-Chip Sensemaking", at the Embedded and Ubiquitous Computing conference (EUC 2014), held in Milan, Italy, from August 26-28, 2014.



In this talk, Prof. Dutt presented the concept of Cyber-Physical-Systems-on-Chip(CPSoC), a new class of sensor-actuator rich many-core computing platforms

Keynote & Distinguished Lectures

Dutt Keynote (continued from page 1)...

that intrinsically couples on-chip and cross-layer sensing and actuation to enable self-awareness. Unlike the traditional MultiProcessor Systems-on-Chip (MPSoCs), CPSoC is distinguished by an intelligent co-design of the control, communication, and computing system that interacts with the physical environment in real-time in order to modify the system's behavior so as to adaptively achieve desired objectives and Quality-of-Service (QoS). The CPSoC paradigm is the first step towards a holistic software/hardware effort to make complex chips "sentient".

Heydari Presents IEEE Distinguished Lectures



diversity and multiplexing.

Owing to aggressive scaling in feature size and device maximum operation frequency, nanoscale (Bi)CMOS technology potentially enables the integration of sophisticated systems at THz frequency range, once only implemented in compound III-IV semiconductor technologies.

The Distinguished Seminar gave an overview of recent advances in designing silicon-based integrated circuits will be capable of operating close to the maximum operation limits of silicon-based transistors.

Organized by the IEEE Solid-State Circuits Society (IEEE SSCS), Prof. Payam Heydari gave seminars on "Millimeter-wave and Terahertz Integrated Circuits in Silicon Technologies: Challenges and Solutions" to the Engineering Schools at Lehigh, Columbia, and Princeton Universities.

Below is the short abstract of the seminar: The vastly under-utilized spectrum across millimeter-wave (mm-wave) and terahertz (THz) bands has generated a great deal of excitement to investigate futuristic systems for 10+ gigabit short-range wireless as well as wideband sensing/imaging applications. Simply put, the shorter wavelength associated with the mm-wave/THz band is appealing since the physical dimensions of the antenna and associated electronics are reduced in size, making it possible to design multi-antenna structures to achieve beam-forming, spatial

The Seminar then discussed, in depth, two case studies designed in UCI's Nanoscale Communication Integrated Circuits (NCIC) Lab; namely, the world's highest fundamental frequency fully differential transceiver in CMOS at 210 GHz, and the world's highest frequency PLL-based Synthesizer in Silicon at 300GHz with a wide tuning range.



CECS Lecture & Saudi Program

CECS Distinguished Lecture by Avi Mendelson



CECS was honored to host Prof. Avi Mendelson from Technion - Israel Institute of Technology, in Haifa, as a guest speaker for our Distinguished Lecture Series on October 8, 2014 at 3:00PM in the Donald Bren Hall, Rm. 3011. His talk titled "The Future of Heterogeneous Massive Parallel Systems," started with short historical notes on what make heterogeneous systems so popular recently and continued with a discussion on the current trends in developing such systems. This talk received overwhelming attendance by UCI faculty and students.

2014 Saudi Arabia International Summer Program Symposium

Continuing in its third year, the UCI / Saudi Arabia International Summer Program concluded its 10-week intensive technical and English language program with a Summer Program Symposium held at the Harut Barsamian Colloquia Room on September 2, 2014.

Through oral and poster presentations, the event showcased the research projects of the 13 undergraduate engineering students from Salman bin Abdulaziz University. Professor Ahmed Eltawil serves the program director, and CECS Director and Professor Fadi Kurdahi is the assistant director of the program. CECS graduate students, David Hovhannisyn and Ahmed Nassar served as peer mentors to provide guidance and advice to these international students.



Visitor & Student Profiles

Visitor Profile: Prof. Seong Yong Oum

Prof. Seong Yong Oum has joined CECS as a Visiting Researcher from February 2014 - February 2015 to engage in research on the development of smartphone applications and computer system convergence. Professor Seong Yong Oum is a Professor in the Department of Multimedia at Seoul Women's University, Seoul, Korea. He was Dean of the College of Information and Media at Seoul Women's University from 2010 to 2012.

He received the B.E., M.S., and Ph.D. degrees in Computer Engineering from Seoul National University, Seoul, Korea in 1985, 1987, and 1992 respectively.

From 1992 to 1993, he was a Senior Researcher in RIAC (Research Institute of Advanced Computer Technology), Seoul, KOREA. During his stay at RIAC, he was involved in several projects related to Mainframe Computer Development. From 1993 to 1995 and from 2002 to 2003,

he had been with the ECE department at University of California, Irvine as post-doctoral researcher and visiting researcher, respectively. During his stay at UCI, he worked with Prof.

Fadi J. Kurdahi, Prof. Nikil Dutt, and Prof. Douglas M. Blough,

being involved in several projects related to VLSI Design Automation, High Level Synthesis, and Fault-Tolerant System Synthesis.

His main research interests include High-level Synthesis, Embedded Systems, Flash Memory Systems, and Smart Home/Car/Health Systems.



New Student Profile: Maral Amir



My academic career started at Amirkabir University (Tehran Polytechnic) when I was admitted into a Mining Engineering program. Although I found it to be a fascinating field, I realized it wasn't a field I am passionate about. . I changed my school and

field of study and found my drive in Electrical Engineering. This to date has been the best decision of my life.

After finishing my undergraduate studies in Electrical Engineering, I came to the United States to do my masters at San Francisco State University. For my masters thesis I worked on a hardware and software model of bio-inspired visual system for edge detection and object recognition applications. This project models hierarchical levels of visual system as Ganglion, Simple and Complex Cells, which are responsible for detect-

ing edges and orientations.

Finishing my masters with honors in three semesters in Embedded Electrical and Computer Systems at San Francisco State, had provided me with captivating industrial opportunities. However, my dream was to pursue my studies in a prestigious university and become a professor after I get my PhD.

I am currently a first year Computer Engineering PhD student at UC Irvine working as a Graduate Research Assistant in the Center for Embedded & Cyber-Physical Systems (CECS). As for my masters thesis, where an embedded system integrates with a biological system, I get inspired. I have been lucky enough to be a member of the Cyber Physical Systems Group under the supervision of Dr. Tony Givargis and follow my passion in Cyber Physical Medical Systems. I am currently exploring models of the Heart to formulate a problem to work on this fascinating topic.

Meet & Greet and Publications

Embedded Systems Group Get-together

To kick-off the new school year, Prof. Tony Givargis and Dr. Steffen Peter hosted a fun and entertaining get-together event on September 25, 2014 in Bren Hall 3011. It provided an opportunity for graduate students, faculty and staff to get acquainted and mingle outside the lab.



Publications

The following papers were published by CECS affiliates between September 2014 through December 2014 (and unreported papers from previous eNews).

| Author, Title, Publication | Conference Proceedings |
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| Yuli Yang, Sonia Aïssa, Ahmed M. Eltawil, Khaled Nabil Salama, "An Interference Cancellation Strategy for Broadcast in Hierarchical Cell Structure," IEEE Global Communications Conference (GLOBECOM 2014):1792-1797, Austin, TX, USA, December 8-12, 2014 | |
| Marco Levorato, Pradeep Chathuranga Weeraddana, Carol Fischione, "Distributed Optimization of Transmission Strategies in Reactive Cognitive Networks," IEEE Global Communications Conference (GLOBECOM 2014):905-910, Austin, TX, USA, December 8-12, 2014 | |
| Yasaman Samei Syahkal, Rainer Dömer, "Automated Estimation of Power Consumption for Rapid System Level Design," IEEE 33rd International Performance Computing and Communication Conference (IPCCC 2014): 1-8, Austin, TX, USA, December 5-7, 2014 | |
| Tom Springer, Steffen Peter, Tony Givargis, "Adaptive Resource Synchronization in Hierarchical Real-Time Systems," The Embed With Linux 2014 Workshop (EWiLi 2014), Lisboa, Portugal, November 13-14, 2014 | |
| Tim Schmidt, Kim Grüttner, Rainer Dömer, Achim Rettberg, "A Program State Machine Based Virtual Processing Model in SystemC," The Embed With Linux 2014 Workshop (EWiLi 2014), Lisboa, Portugal, November 13-14, 2014 | |

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Mark Murphy, Per Larsen, Stefan Brunthaler, Michael Franz, **"Software Profiling Options and Their Effects on Security Based Diversification,"** The 1st ACM Workshop on Moving Target Defense on the Conference on Computer and Communications Security (MTD@CCS 2014):87-96, Scottsdale, Arizona, USA, November 7, 2014

Wen-Chan Shih, Pai H. Chou, Wen-Tsuen Chen, **"Empirical Validation of Energy-Neutral Operation on Wearable Devices by MISO Beamforming of IEEE 802.11ac,"** The 2nd International Workshop on Energy Neutral Sensing Systems (ENSsys'14):49-54, Memphis, Tennessee, USA, November 6, 2014

Baris Aksanli, Alper Sinan Akyurek, Madhur Behl, Meghan Clark, Alexandre Donze, Prabal Dutta, Patrick Lazik, Mehdi Maasoumy, Rahul Mangharam, Truong X. Nghiem, Vasumathi Raman, Anthony Rowe, Alberto L. Sangiovanni-Vincentelli, Sanjit A. Seshia, Tajana Simunic Rosing, Jagannathan Venkatesh, **"Distributed Control of a Swarm of Buildings Connected to a Smart Grid: Demo Abstract,"** The 1st ACM Conference on Embedded Systems for Energy-Efficient Buildings (BuildSys@SenSys 2014):172-173, Memphis, TN, USA, November 3-6, 2014

Balakrishnan Narayanaswamy, Bharathan Balaji, Rajesh K. Gupta, Yuvraj Agarwal, **"Data Driven Investigation of Faults in HVAC Systems with Model, Cluster and Compuar (MCC),"** The 1st ACM Conference on Embedded Systems for Energy-Efficient Buildings (BuildSys@SenSys 2014):50-59, Memphis, TN, USA, November 3-6, 2014

Arquimedes Canedo, Jiang Wan, Mohammad Abdullah Al Faruque, **"Functional Modeling Compiler for System-Level Design of Automotive Cyber-Physical Systems,"** IEEE/ACM International Conference on Computer-Aided Design (ICCAD 2014), San Jose, CA, USA, November 3-6, 2014

Marco Levorato, Nadia Ahmed, Yang Arthur Zhang, **"Consumer in-the-loop: Consumers as part of Residential Smart Energy Systems,"** IEEE International Conference on Smart Grid Communications (SmartGridComm 2014):758-763, Venice, Italy, November 3-6, 2014

Bengu Ozge Akyurek, Alper Sinan Akyurek, Jan Kleissel, Tajana Simunic Rosing, **"TESLA: Taylor Expanded Solar Analog Forecasting,"** IEEE International Conference on Smart Grid Communications (SmartGridComm 2014):127-132, Venice, Italy, November 3-6, 2014

Seungjae Lee, Jun Luan, Pai H. Chou, **"A New Approach to Compressing ECG Signals with Trained Overcomplete Dictionary,"** The 4th International Conference on Wireless Mobile Communication and Healthcare: "Transforming healthcare through innovations in mobile and wireless technologies", (MobiHealth 2014): 83-86, Athens, Greece, November 3-5, 2014

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| Mark A. Oxley, Eric Jonardi, Sudeep Pasricha, Anthony A. Maciejewski, Gregory A. Koenig, Howard Jay Siegel, "Thermal, Power, and Co-location Aware Resource Allocation in Heterogeneous High Performance Computing Systems," The International Green Computing Conference (IGCC 2014):1-10, Dallas, TX, USA, November 3-5, 2014 | |
| Reyhaneh Jabbarvand Behrouz, Houman Homayoun, "NVP: Non-uniform Voltage and Pulse Width Settings for Power Efficient Hybrid STT-RAM," The International Green Computing Conference (IGCC 2014):1-6, Dallas, TX, USA, November 3-5, 2014 | |
| Mishari Al Mishari, Dali Kaafar, Ekin Oguz, Gene Tsudik, "Stylometric Linkability of Tweets," The 13th Workshop on Privacy in the Electronic Society (WPES 2014), Scottsdale, AZ, USA, November 3, 2014 | |
| Gene Tsudik, "Challenges in Remote Attestation of Low-End Embedded Devices," The 4th International Workshop on Trustworthy Embedded Devices (TrustED@CCS'14):1, Scottsdale, Arizona, USA, November 3, 2014 | |
| Alireza Shahan Behbahani, Ahmed M. Eltawil, Hamid Jafarkhani, "Distributed Detection for Wireless Sensor Networks with Fusion Center Under Correlated Noise," The 48th Asilomar Conference on Signals, Systems and Computers (ACSSC 2014):2137-2141, Pacific Grove, CA, USA, November 2-5, 2014 | |
| Jana Krimmling, Steffen Peter, "Integration and Evaluation of Intrusion Detection for CoAP in Smart City Applications," IEEE Conference on Communications and Network Security (CNS 2014):73-78, San Francisco, CA, USA, October 29-31, 2014 | |
| Nishit Ashok Kapadia, Sudeep Pasricha, "PRATHAM: A Power Delivery-aware and Thermal-aware Mapping Framework for Parallel Embedded Applications on 3D MPSoCs," The 32nd IEEE International Conference on Computer Design (ICCD 2014):525-528, Seoul, South Korea, October 19-22, 2014 | |
| Pietro Mercati, Francesco Paterna, Andrea Bartonlini, Luca Benini, Tajana Simunic Rosing, "Dynamic Variability Management in Mobile Multicore Processors Under Lifetime Constraints," The 32nd IEEE International Conference on Computer Design (ICCD 2014):448-455, Seoul, South Korea, October 19-22, 2014 | |
| Fulya Kaplan, Clarlie De Vivero, Samuel Howes, Manish Arora, Houman Homayoun, Wayne Burleson, Dean M. Tullsen, Ayse Kivilcim Coskun, "Modeling and Analysis of Phase Change Materials for Efficient Thermal Management," The 32nd IEEE International Conference on Computer Design (ICCD 2014):256-263 Seoul, South Korea, October 19-22, 2014 | |

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Ishan G. Thakkar, Sudeep Pasricha, "**3D-Wiz: A Novel High Bandwidth, Optically Interfaced 3D DRAM Architecture with Reduced Random Access Time,**" The 32nd IEEE International Conference on Computer Design (ICCD 2014):1-7, Seoul, South Korea, October 19-22, 2014

Jurn-Gyu Park, Chen-Ying Hsieh, Nikil D. Dutt, Sung-Soo Lim, "**Quality-aware Mobile Graphics Workload Characterization for Energy-efficient DVFS Design,**" The 12th IEEE Symposium on Embedded Systems for Real-time Multimedia (ESTIMedia 2014):70-79, Greater Noida, India, October 16-17, 2014

Santanu Sarma, Nikil D. Dutt, "**FPGA Emulation and Prototyping of a Cyberphysical-system-on-chip (CPSoC),**" The 25th IEEE International Symposium on Rapid System Prototyping (RSP 2014):121-127, New Delhi, India, October 16-17, 2014

Yasaman Samei Syahkal, Rainer Domer, "**Powermonitor: A Versatile API for Automated Power-aware ESL Design,**" The 2014 Forum on Specification and Design Languages (FDL 2014):1-4, Munich, Germany, October 14-16, 2014

Mathias Soeken, Christopher B. Harris, nabila Abdessaied, Ian G. Harris, Rolf Drechsler, "**Automating the Translation of Assertions using Natural Language Processing Techniques,**" The 2014 Forum on Specification and Design Languages (FDL 2014), Munich, Germany, October 14-16, 2014

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Yi Xiang, Sudeep Pasricha, "**Fault-aware Application Scheduling in Low-power Embedded Systems with Energy Harvesting,**" The International Conference on Hardware/Software Codesign and System Synthesis (CODES+ISSS 2014):32:1-32:10, Uttar Pradesh, India, October 12-17, 2014

Omid Assare, Rajesh Gupta, "**Timing Analysis of Erroneous Systems,**" The International Conference on Hardware/Software Codesign and System Synthesis (CODES+ISSS 2014):7:1-7:10, Uttar Pradesh, India, October 12-17, 2014

Yong Zou, Sudeep Pasricha, "**HEFT: A Hybrid System-Level Framework for Enabling Energy-efficient Fault-tolerance in NoC based MPSoCs,**" The International Conference on Hardware/Software Codesign and System Synthesis (CODES+ISSS 2014):4:1-4:10, Uttar Pradesh, India, October 12-17, 2014

Bernhard Katzmarzki, Andreas Herrholz, Michele Paolino, Alvise Rigo, Wolfgang Nebel, "**Considering VM migration between IaaS Clouds and Mobile Clients: Challenges and Potentials,**" The 3rd IEEE International Conference on Cloud Networking (CloudNet 2014):327-332, Luxembourg, Luxembourg, October 8-10, 2014

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Mishari Almishari, Ekin Oguz, Gene Tsudik, **"Fighting Autorship Linkability with Crowdsourcing,"** The 2nd ACM Conference on Online Social Networks (COSN 2014):69-82, Dublin, Ireland, October 1-2, 2014

Xin Fan, Steffen Peter, Milos Krstic, **"GALS design of ECC against side-channel attacks - A comparative Study,"** The 24th International Workshop on Power and Timing Modeling, Optimization and Simulation (PATMOS 2014):1-6, Palma de Mallorca, Spain, September 29 - October 1, 2014

Codrut Stancu, Christian Wimmer, Stefan Brunthaler, Per Larsen, Michael Franz, **"Comparing Points-to Static Analysis with Runtime Recorded Profiling Data,"** the 2014 International Conference on Principles and Practices of Programming on the Java Platform Virtual Machines, Languages and Tools (PPPJ'14):157-168, Cracow, Poland, September 23-26, 2014

Yizhuo Wang, Laleh Aghababaie Beni, Alexandru Nicolau, Alexander V. Veidenbaum, Rosario Camarota, **"A Compilation and Run-time Framework for Maximizing Performance of Self-scheduling Algorithms,"** Network and Parallel Computing - 11th IFIP WG 10.3 International Conference (NPC 2014):18-25, Ilan, Taiwan, September 18-20, 2014

Blerim Cici, Athina Markopoulou, Enrique Frias-Martinez, Nikolaos Laoutaris, **"Assessing the Potential of Ride-sharing Using Mobile and Social Data: A Tale of Four Cities,"** The ACM Conference on Ubiquitous Computing (UbiComp'14):201-211, Seattle, WA, USA, September 13-17, 2014

Shin-Yi Chang, Jo-Ping Li, Hua-Min Tseng, Hen Pai Hsu, Pai H. Chou, **"Greendicator: Enabling Optical Pulse-Encoded Data Output from WSN for Display on Smartphones,"** IEEE International Conference on Internet of Things, IEEE Green Computing and Communications, and IEEE Cyber, Physical and Social Computing (iThings/GreenCom/CPSCoM 2014): 381-388, Taipei, Taiwan, September 1-3, 2014

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Yi-Lin Chen, Yi-Lung Tsai, Kailing Huang, Pai H. Chou, **"MobiRing: A Finger-Worn Wireless Motion Tracker,"** IEEE International Conference on Internet of Things, IEEE Green Computing and Communications, and IEEE Cyber, Physical and Social Computing (iThings/GreenCom/CPSCoM 2014): 316-323, Taipei, Taiwan, September 1-3, 2014

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Shih-Yuan Yu, Chi-Sheng Shih, Jane Yung-jen Hsu, Zhenqiu Huang, Kwei-Jay Lin, "**QoS Oriented Sensor Selection in IoT System**," IEEE International Conference on Internet of Things, IEEE Green Computing and Communications, and IEEE Cyber, Physical and Social Computing (iThings/GreenCom/CPSCoM 2014): 201-206, Taipei, Taiwan, September 1-3, 2014

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Alex Nicolau, "**Acknowledgment to Reviewers**," The International Journal of Parallel Programming (IJPP)42(6):873-874, December, 2014

Federico Librino, Marco Levorato, Michele Zorzi, "**An Algorithmic Solution for Computing Circle Intersection Areas and Its Applications to Wireless Communications**," Wireless Communications and Mobile Computing 14(18):1672-1690, December, 2014

Daphney-Stavroula Zois, Marco Levorato, Urbashi Mitra, "**Active Classification for POMDPs: A Kalman-like State Estimator**," IEEE Transactions on Signal Processing (TSP) 62(23):6209-6224, December, 2014

Syed Taha Ali, Vijay Sivaraman, Diethelm Ostry, Gene Tsudik, Sanjay Jha, "**Securing First-Hop Data Provenance for Bodyworn Devices Using Wireless Link Fingerprints**," IEEE Transactions on Information Forensics and Security 9(12):2193-2204, December, 2014

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Center for Embedded and Cyber-Physical Systems, University of California, Irvine



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To conduct leading-edge interdisciplinary research in embedded systems emphasizing automotive, communications, and medical applications, and to promote technology and knowledge transfer for the benefit of the individual and society.



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