



CECS Professor Payam Heydari recognized by OC Business Council

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On February 14, 2018, CECS Professor Payam Heydari was recognized by the Orange County Business Council for his contributions in electrical engineering and computer science. His involvements and efforts as the lead investigator of the development of a silicon microchip-based component known as a “millimeter-wave radiator”.

The miniscule device is capable of emitting millimeter wave signals at high efficiency and high radiated output power, which can penetrate solid surfaces and provide extremely sharp resolution images. The radiator will allow the development of gadgets that used to be the fantasy of science fiction, such as Dr. McCoy’s tiny tricorder device in the 1960s television series, *Star Trek*.

In addition to his research contributions, he also directs The Nanoscale Communication IC (NCIC) Lab. This lab carries out research on silicon-based RF/millimeter-wave/terahertz integrated circuits design for imaging, sensing, and wireless communications as well as CMOS ultra-low power integrated circuits for brain-computer interface (BCI) systems. Heydari is currently a member of the Technical Program Committee of the International Solid-State Circuits Conference (ISSCC), an associate editor for the IEEE Solid-State Circuits Letters (SSC-L), and a member of AdCom for the IEEE Solid-State Circuits Society.



Awards and Honors

CECS Professor Gene Tsudik awarded by Technical University Dresden



Chancellor's Professor of Computer Science Gene Tsudik has been awarded the 2017/18 Visiting Professorship by the Technical University Dresden. This also comes with a \$25,000 grant from the TÜV SÜD Foundation. He will be invited to the university for a period up to three months to contribute to academia and collaborate with scholars and students.

This honorary award is given to those who are experts in the field of security. Tsudik's research interests align with privacy, computer and network security, and applied cryptography.

CECS Professors Nikil Dutt and Fadi Kurdahi awarded by National Science Foundation



CECS Professor's Nikil Dutt and Fadi Kurdahi have been awarded with a \$900,000 research grant from the National Science Foundation (NSF). This research will investigate the development of next-generation "information processing factory" chips. These build upon innovations in manufacturing in which network-connected tools, robots, sensors, and computers act in concert to perform complex processes.

This project is also in collaboration with the German Research Foundation and the Technical University of Munich. These chips will be designed to monitor and control performance and health such as keeping track of temperature, energy consumption, wear and tear, and security threats.



Dutt's research interests align with embedded systems and computer-aided design with a focus on the exploration of embedded-systems. Kurdahi's research interests are scaled towards computer aided design of VLSI circuits, high-level synthesis, and the design methodology of large scale systems.

Awards and Honors

CECS Professors Rainer Doemer, Mohammad Al Faruque, and Ian Harris recognized by Dean



CECS Professor's Rainer Doemer, Mohammad Al Faruque, and Ian Harris have been recognized by the Dean and awarded the Dean's Choice Award for their creations and contributions to science.

The "Roboeye," a robotic guide that helps the visually impaired cross an intersection, was created by a group of students advised by Rainer Doemer.

The "Autonomous Racecar," a project that creates commercial transportation controlled by software rather than human supervision, was created by a group of students advised by Mohammad Al Faruque.

The "Survivor Detection and Location Unmanned Aerial Vehicle," a project created to engineer a drone that can detect victims trapped underneath debris in a crash or natural disaster, was created by a group of students advised by Ian Harris.

Congratulations Professors!

CECS Assistant Professor Marco Levorato awarded \$3.7 Million Grant for Electricity Distribution Cybersecurity



CECS Assistant Professor Marco Levorato and his team have received a grant from the UC-National Laboratory Fees Research Program in order to enhance partnerships between UC researchers and laboratory scientists.

Through this grant, Levorato and his team will create new strategies to facilitate vulnerabilities and protect against system-wide attacks. They will also address practical challenges in electrical distribution cybersecurity such as the use of solar panels and energy storage devices for technological advancement.

Levorato's research interests align with software defined and cognitive networks, autonomous systems, and modeling of smart energy systems.

Visitor and Student Profile

Graduate Student Profile: Delaram Amiri



Delaram is a Ph.D. student of Electrical Engineering who began her coursework in Fall 2015. She is working with Professor Marco Levorato focusing on network optimization in Internet of Things (IoT). Her project is on control theory and optimization of health care sensor network . It is aimed toward a better performance in energy consumption while tracking one's physical activities.

She received her B.Sc. in Electrical Engineering at Shiraz University, Iran in Communications. Later, she got her M.Sc. in Electrical Engineering in Signal and Image Processing at Indiana University, Purdue University, Indianapolis (IUPUI), Master's thesis in video compression and implementation of image filtering in 3D High Efficient Video Coding (3D -HEVC) Standard resulted in publishing two papers in IEEE Signal Processing conferences. During her M.Sc. and PhD. Studies, she was a lecturer in "C programming course" for undergrad students at IUPUI and UCI. She believes that taking part in IoT research with the guidance of her advisor as intention of achieving engineering-related

experience has provided valuable practical knowledge at UCI.

Delegation from University of Valenciennes visits UCI



From February 26 to February 28, a high level delegation from University of Valenciennes visited UCI and was hosted by CECS professors Fadi Kurdahi, Ahmed Eltawil, and Mohammad Al Faruque. The delegation arrived to discuss strength exchange programs, the CNRS PICS project between UCI and IMEN (University of Valenciennes) and CECS (UCI), and other research collaborations.

There are long standing relations between our two institutions with collaboration and involvement in the Erasmus+ protocol which student and professor exchanges, bilateral professor visits, and PhD co-supervising and joint scientific papers. The

Valenciennes delegation consists of Professor Abdelhakim Artiba (President of the university), Professor Smail Niar, Professor Atika Rivenq, and Professor Sebastien Grondel (Vice President of International Relations).

CECS Lectures and Seminars

CECS Seminar—Prof. Pasi Liljeberg



On January 25, 2018, Professor Pasi Liljeberg held a seminar titled “Digital Early Warning Scoring – A Cognitive IoT based approach.” This talk involves the early warning score (EWS) procedure that detects the deterioration of a patient. Liljeberg is interested in the possibility of building an automated EWS health monitoring system to intelligently monitor vital signs and prevent health deterioration for in-home and hospitalized patients using Internet-of-Things technologies.

Pasi Liljeberg received his MSc and PhD degrees in electronics and information technology from the University of Turku, Turku, Finland, in 1999 and 2005, respectively. He received Adjunct professorship in embedded computing architectures in 2010. Currently he

is working as full professor in University of Turku in the field of Embedded Systems and Internet of Things. At the moment his research is focused on biomedical engineering and health technology.

CECS Seminar-Prof. Sergio Bampi



On February 15, 2018, CECS Professor Sergio Bampi held a seminar titled “Near-Threshold Computing: The bottom floor for Energy in IoT devices and its Vanishing Design Noise Margins.” This talk is centered around the heterogeneous Internet-of-Things (IoT) devices that lie at the energy-bottom floor. This seminar’s goal was to stimulate system-level and circuit-level design approaches for IoT nodes. Bampi’s research in 65nm CMOS has demonstrated energy and operation savings for applications that tolerate ultra-wide frequency scaling. His interest lies in finding the best technique to target near-threshold for the best energy-efficiency.

Sergio Bampi received his B.Sc in Electronics Engineering and his B.Sc in Physics from the Federal University of Rio Grande do Sul. He also received his M.Sc and Ph.D degrees in Electrical Engineering from Stanford University. His research interests are in the area of IC design, nano-CMOS devices, mixed signal and RF CMOS design, ultra-low power digital design, dedicated complex algorithms, architectures, and ASIC’s for image and video processing.

CECS Lectures and Seminars

CECS Seminar-Prof. Jongeun Lee



CECS Professor Jongeun Lee has led a seminar titled “Cost and Power Efficient Deep Neural Network Acceleration.” This seminar talk is centered around deep neural networks and how to efficiently implement the connectionist model for small, mobile devices. Lee addresses two different directions to solving this dilemma: one direction is based on FPGA, and the other direction is based on a new computing paradigm called stochastic computing (SC).

Jongeun Lee received his B.S. and M.S. in Electrical Engineering and his Ph.D. in

Electrical Engineering and Computer Science from Seoul National University, Korea. Prior to joining UNIST, he worked as a postdoctoral research associate at Arizona State University, and previously worked for Samsung Electronics. His current research interests include reconfigurable architectures, compilers, stochastic computing, and deep neural networks.

CECS Seminar-Prof. Mayandiambalam Balakrishnan



CECS Professor Mayandiambalam Balakrishnan has led a seminar titled “ASSISTECH: Assistive Technology for the Visually Impaired.” This talk revolved around finding technological solutions for the mobility and education of the visually impaired. It particularly addresses challenges present in India and other developing countries such as affordability. Balakrishnan summarizes how technologies and devices such as SmartCane, OnBoard, and Tactile Diagrams have made innovative success in the field of aiding the visually impaired.

Professor Mayandiambalam Balakrishnan obtained his Bachelor’s in Electrical Engineering from BITS Pilani and his Ph.D. in Electrical Engineering from IIT Delhi. He has also founded the ASSISTECH laboratory at IIT Delhi which is focused on finding affordable technology based solutions for education and mobility for the visually impaired. Balakrishnan has received two national awards for his work in the disability field.

Publications

Publications

The following papers were published by CECS affiliates from Jan 2018 through Mar 2018 (and unreported papers from previous eNews).

Author, Title, Publication

Conference Proceedings

Min Soo Kim, Alberto A. Del Barrio, Román Hermida, Nader Bagherzadeh:

Low-power implementation of Mitchell's approximate logarithmic multiplication for convolutional neural networks. ASP-DAC 2018: 617-622, January 22-25, 2018

Ahmad Albaqsami, Maryam S. Hosseini, Nader Bagherzadeh:

HTF-MPR: A heterogeneous TensorFlow mapper targeting performance using genetic algorithms and gradient boosting regressors. DATE 2018: 331-336, January 22-25, 2018

Khanh Nguyen, Lu Fang, Christian Navasca, Guoqing (Harry) Xu, Brian Demsky, Shan Lu:

Skyway: Connecting Managed Heaps in Distributed Big Data Systems. ASPLOS 2018: 56-69, March 24-28, 2018

Tim Schmidt, Zhongqi Cheng, Rainer Dömer:

Port call path sensitive conflict analysis for instance-aware parallel SystemC simulation. DATE 2018: 349-354, March 24-28, 2018

Amir M. Rahmani, Bryan Donyanavard, Tiago Műch, Kasra Moazzemi, Axel Jantsch, Onur

Mutlu, Nikil D. Dutt: **SPECTR: Formal Supervisory Control and Coordination for Many-core Systems Resource Management.** ASPLOS 2018: 169-183, March 24-28, 2018

Hamid Mirzaei Buini, Guni Sharon, Stephen D. Boyles, Tony Givargis, Peter Stone:

Enhanced Delta-tolling: Traffic Optimization via Policy Gradient Reinforcement Learning. IS-AIM 2018, January 3-5, 2018

Manish Gupta, Vilas Sridharan, David Roberts, Andreas Prodromou, Ashish Venkat, Dean M. Tull-

sen, Rajesh K. Gupta: **Reliability-Aware Data Placement for Heterogeneous Memory Architecture.** HPCA 2018: 583-595, February 24-28, 2018

Tianrui Peng, Ian G. Harris, Yuki Sawa: **Detecting Phishing Attacks Using Natural Language**

Processing and Machine Learning. ICSC2018: 300-301, January 31 - February 2, 2018

Mohsen Imani, Max Masich, Daniel Peroni, Pushen Wang, Tajana Rosing:

CANNA: Neural network acceleration using configurable approximation on GPGPU. ASP-DAC 2018: 682-689, January 22-25, 2018

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Nabeel Alzahrani, Frank Vahid, Alex D. Edgcomb, Kevin Nguyen, Roman Lysecky: **Python Versus C++: An Analysis of Student Struggle on Small Coding Exercises in Introductory Programming Courses**. SIGCSE 2018: 86-91, February 21-24, 2018

Alex D. Edgcomb, Frank Vahid: **Interactive, Language-neutral Flowcharts and Pseudocode for Teaching Core CS0/1 Programming Concepts: (Abstract Only)**. SIGCSE 2018: 1102, February 21-24, 2018

Roman Lysecky, Frank Vahid: **Teaching Students a Systematic Approach to Debugging: (Abstract Only)**. SIGCSE 2018: 1104, February 21-24, 2018

Juan José Besa Vial, William E. Devanny, David Eppstein, Michael T. Goodrich, Timothy Johnson: **Quadratic Time Algorithms Appear to be Optimal for Sorting Evolving Data**. ALENEX 2018: 87-96, January 7-8, 2018

Hossein Sayadi, Divya Pathak, Ioannis Savidis, Houman Homayoun: **Power conversion efficiency-aware mapping of multithreaded applications on heterogeneous architectures: A comprehensive parameter tuning**. ASP-DAC 2018: 70-75, January 22-25, 2018

Sudeep Pasricha: **Overcoming Energy and Reliability Challenges for IoT and Mobile Devices with Data Analytics**. VLSI Design 2018: 238-243, January 6-10, 2018

Mohamed Ayoub Neggaz, Hasan Erdem Yantir, Smail Niar, Ahmed M. Eltawil, Fadi J. Kurdahi: **Rapid in-memory matrix multiplication using associative processor**. DATE 2018: 985-990, March 19-23, 2018

Armin Sadighi, Bryan Donyanavard, Thawra Kadeed, Kasra Moazzemi, Tiago Muck, Ahmed Nassar, Amir M. Rahmani, Thomas Wild, Nikil D. Dutt, Rolf Ernst, Andreas Herkersdorf, Fadi J. Kurdahi: **Design methodologies for enabling self-awareness in autonomous systems**. DATE 2018: 1532-1537, March 19-23, 2018

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- Amir Fadakar Noghondar, Midia Reshadi, Nader Bagherzadeh: **Reducing bypass-based network-on-chip latency using priority mechanism.** IET Computers & Digital Techniques 12(1): 1-8 January 2018
- Armineh Arasteh, Mohammad Hossein Moaiyeri, MohammadReza Taheri, Keivan Navi, Nader Bagherzadeh: **An energy and area efficient 4: 2 compressor based on Fin-FETs.** Integration 60: 224-231 January 2018
- Fahimeh Danehdaran, Milad Bagherian Khosroshahy, Keivan Navi, Nader Bagherzadeh: **Design and Power Analysis of New Coplanar One-Bit Full-Adder Cell in Quantum-Dot Cellular Automata.** J. Low Power Electronics 14(1): 38-48 March 2018
- Zana Ghaderi, Nader Bagherzadeh, Ahmad Albaqsami: **STABLE: Stress-Aware Boolean Matching to Mitigate BTI-Induced SNM Reduction in SRAM-Based FPGAs.** IEEE Trans. Computers 67(1): 102-114 January 2018
- Ali Bozorgmehr, Mohammad Hossein Moaiyeri, Keivan Navi, Nader Bagherzadeh: **Ultra-Efficient Fuzzy Min/Max Circuits Based on Carbon Nanotube FETs.** IEEE Trans. Fuzzy Systems 26(2): 1073-1078 February 2018
- Zana Ghaderi, Ayed Alqahtani, Nader Bagherzadeh: **AROMA: Aging-Aware Deadlock-Free Adaptive Routing Algorithm and Online Monitoring in 3D NoCs.** IEEE Trans. Parallel Distrib. Syst. 29(4): 772-788 January 2018
- Khanh Nguyen, Lu Fang, Christian Navasca, Guoqing (Harry) Xu, Brian Demsky, Shan Lu: **Skyway: Connecting Managed Heaps in Distributed Big Data Systems.** ASPLOS 2018: 56-69 March 2018
- Mohammed E. Fouda, Ahmed M. Eltawil, Fadi J. Kurdahi: **Modeling and Analysis of Passive Switching Crossbar Arrays.** IEEE Trans. on Circuits and Systems 65-1(1): 270-282 January 2018
- Rajesh K. Gupta: **Editorial.** IEEE Trans. on CAD of Integrated Circuits and Systems 37(1): 1-2 January 2018
- Alireza Karimi-Bidhendi, Hossein Mohammadnezhad, Michael M. Green, Payam Heydari: **A Silicon-Based Low-Power Broadband Transimpedance Amplifier.** IEEE Trans. on Circuits and Systems 65-1(2): 498-509 January 2018

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Aviral Shrivastava, Fadi J. Kurdahi: **Guest Editorial: Special Issue on Accelerated Computing.** IEEE Trans. Multi-Scale Computing Systems 4(1): 1-2 January – March 2018

Mohsen Imani, Daniel Peroni, Tajana Rosing: **Nvalt: Nonvolatile Approximate Lookup Table for GPU Acceleration.** Embedded Systems Letters 10(1): 14-17 March 2018

Mohsen Imani, Abbas Rahimi, Pietro Mercati, Tajana Simunic Rosing: **Multi-Stage Tunable Approximate Search in Resistive Associative Memory.** IEEE Trans. Multi-Scale Computing Systems 4(1): 17-29 January – March 2018

Chuilu Kong, Amine Mezghani, Caijun Zhong, A. Lee Swindlehurst, Zhaoyang Zhang: **Nonlinear Precoding for Multipair Relay Networks With One-Bit ADCs and DACs.** IEEE Signal Process. Lett. 25(2): 303-307 February 2018

Sean M. O'Rourke, Pawan Setlur, Muralidhar Rangaswamy, A. Lee Swindlehurst: **Relaxed Biquadratic Optimization for Joint Filter-Signal Design in Signal-Dependent STAP.** IEEE Trans. Signal Processing 66(5): 1300-1315 January 2018

Mohammad Hossein Hajkazemi, Mohammad Khavari Tavana, Tinoosh Mohsenin, Houman Homayoun: **Heterogeneous HMC+DDR Memory Management for Performance-Temperature Trade-offs.** JETC 14(1): 4:1-4:21 March 2018

Amey M. Kulkarni, Colin Shea, Tahmid Abtahi, Houman Homayoun, Tinoosh Mohsenin: **Low Overhead CS-Based Heterogeneous Framework for Big Data Acceleration.** ACM Trans. Embedded Comput. Syst. 17(1): 25:1-25:25 January 2018

Maria Malik, Rajiv V. Joshi, Rouwaida Kanj, Shupeng Sun, Houman Homayoun, Tong Li: **Sparse Regression Driven Mixture Importance Sampling for Memory Design.** IEEE Trans. VLSI Syst. 26(1): 63-72 January 2018

Adwaya Kulkarni, Adam Page, Nasrin Attaran, Ali Jafari, Maria Malik, Houman Homayoun, Tinoosh Mohsenin: **An Energy-Efficient Programmable Manycore Accelerator for Personalized Biomedical Applications.** IEEE Trans. VLSI Syst. 26(1): 96-109 January 2018

Mohammad Khavari Tavana, Mohammad Hossein Hajkazemi, Divya Pathak, Ioannis Savidis, Houman Homayoun: **ElasticCore: A Dynamic Heterogeneous Platform With Joint Core and Voltage/Frequency Scaling.** IEEE Trans. VLSI Syst. 26(2): 249-261 February 2018

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Mark A. Oxley, Eric Jonardi, Sudeep Pasricha, Anthony A. Maciejewski, Howard Jay Siegel, Patrick J. Burns, Gregory A. Koenig: **Rate-based thermal, power, and co-location aware resource management for heterogeneous data centers.** J. Parallel Distrib. Comput. 112: 126-139 February 2018

Sai Vineel Reddy Chittamuru, Ishan G. Thakkar, Sudeep Pasricha:
HYDRA: Heterodyne Crosstalk Mitigation With Double Microring Resonators and Data Encoding for Photonic NoCs. IEEE Trans. VLSI Syst. 26(1): 168-181 January 2018

Fabiola Gonçalves C. Ribeiro, Carlos Eduardo Pereira, Achim Rettberg, Michel S. Soares:
Model-based requirements specification of real-time systems with UML, SysML and MARTE. Software and System Modeling 17(1): 343-361 February 2018

Sandeep K. Shukla:
Editorial: Trust and Security Must Become a Primary Design Concern in Embedded Computing. ACM Trans. Embedded Comput. Syst. 17(1): 1:1-1:3 January 2018

IEEE Task Force on Interfacing Techniques for Simulation Tools, Sven Christian Müller, Hanno Georg, James J. Nutaro, Edmund Widl, Yi Deng, Peter Palensky, Muhammad U. Awais, Moustafa Chenine, Markus Kuch, Matthias Stifter, Hua Lin, Sandeep K. Shukla, Christian Wietfeld, Christian Rehtanz, Christian Dufour, Xiaoyu Wang, Venkata Dinavahi, M. Omar Faruque, Wenchao Meng, Shichao Liu, Antonello Monti, Ming Ni, Ali Davoudi, Ali Mehrizi-Sani: **Interfacing Power System and ICT Simulators: Challenges, State-of-the-Art, and Case Studies.** IEEE Trans. Smart Grid 9(1): 14-24 January 2018

Khanh Nguyen, Lu Fang, Christian Navasca, Guoqing (Harry) Xu, Brian Demsky, Shan Lu:
Skyway: Connecting Managed Heaps in Distributed Big Data Systems. 56-69 January 2018

Anup Das, Paruthi Pradhapan, Willemijn Groenendaal, Prathyusha Adiraju, Raj Thilak Rajan, Francky Catthoor, Siebren Schaafsma, Jeffrey L. Krichmar, Nikil D. Dutt, Chris Van Hoof:
Unsupervised heart-rate estimation in wearables with Liquid states and a probabilistic read-out. 134-147 March 2018

Hong Linh Truong, Nanjangud C. Narendra, Kwei-Jay Lin:
Notes on ensembles of IoT, network functions and clouds for service-oriented computing and applications. Service Oriented Computing and Applications 12(1): 1-10 March 2018

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Jaganathan Venkatesh, Baris Aksanli, Christine S. Chan, Alper Sinan Akyurek, Tajana Simunic Rosing:

Modular and Personalized Smart Health Application Design in a Smart City Environment. IEEE Internet of Things Journal 5(2): 614-623 February 2018

Publications

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The following papers were published by CECS affiliates from Jan 2018 through March 2018 (and unreported papers from previous eNews).

Author, Title, Publication

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Jie Tang, Shaoshan Liu, Songwen Pei, Stéphane Zuckerman, Chen Liu, Weisong Shi, Jean-Luc Gaudiot: **Teaching Autonomous Driving Using a Modular and Integrated Approach**. CoRRabs/1802.09355 February 2018

Jeng-Hau Lin, Yunfan Yang, Rajesh K. Gupta, Zhuowen Tu: **Local Binary Pattern Networks**. CoRR abs/1803.07125 March 2018

Giordano Da Lozzo, David Eppstein, Michael T. Goodrich, Siddharth Gupta: **Subexponential-Time and FPT Algorithms for Embedded Flat Clustered Planarity**. CoRRabs/1803.05465 March 2018

David Eppstein, Michael T. Goodrich, Nil Mamano: **Reactive Proximity Data Structures for Graphs**. CoRR abs/1803.04555 March 2018

Oliver De Candido, Hela Jedda, Amine Mezghani, A. Lee Swindlehurst, Josef A. Nossek: **Reconsidering Linear Transmit Signal Processing in 1-Bit Quantized Multi-User MISO Systems**. CoRR abs/1802.10329 February 2018

Hessam Pirzadeh, A. Lee Swindlehurst: **Spectral Efficiency of Mixed-ADC Massive MIMO**. CoRR abs/1802.10259 February 2018

Hela Jedda, Amine Mezghani, A. Lee Swindlehurst, Josef A. Nossek: **Quantized Constant Envelope Precoding with PSK and QAM Signaling**. CoRR abs/1801.09542 January 2018

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