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CECS eNEWS



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

CECS Professors Nikil Dutt and Fadi Kurdahi awarded NSF grant

Highlights

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Researchers' from the University of California, Irvine, Germany's Technical University of Braunschweig, and the Technical University of Munich have collaborated to develop a joint project to meet the challenges of digitization. Chancellor's Professor of Computer Science Nikil Dutt and Professor of Electrical Engineering and Computer Science Fadi Kurdahi have received a \$900,000 research grant in order to investigate the development of next-generation "information processing factory" chips. This research collaboration will investigate a holistic methodology that encompasses hardware design, software development, and new approaches to network architecture. As a result, this methodology will find a way to keep track of health status such as temperature, energy consumption, wear and tear, and security threats.

Professor Kurdahi states "we are rapidly nearing a time when networked information technology components greatly outnumber humans, and the complexity of their operations strips anything people are capable of today." To create a successful component, the researchers will bring deeper explorations into new approaches in cyber-physical systems.



Technische
Universität
Braunschweig



Awards and Honors

Professor QV Dang receives Excellence in Undergraduate Teaching Award



Professor Quoc-Viet Dang has received the 2018 Excellence in Undergraduate Teaching award. This award, given by Michael Dennin, the Teaching & Learning Dean of the Division of Undergraduate Education, honors those who have excelled in teaching students. Winners are selected based on campus wide nominations from peers, colleagues, and students. This prestigious award has gained the respect of professors and leaders around the world.

Congratulations, Professor QV Dang!

UCI Chancellor's Professor of Computer Science Michael Goodrich elected to Royal Danish Academy of Sciences & Letters



UCI Chancellor's Professor of Computer Science Michael Goodrich has been elected to the Royal Danish Academy of Science & Letters. This honor opens a multitude of opportunities for further collaboration with Danish researchers. The Royal Danish Academy, founded in 1742, is known to be highly selective, with Albert Einstein and Marie Curie among former electees.

Professor Goodrich is highly recognized for his research in geometric computing, networking, geographic information systems, computer security and big data processing. He earned his Ph.D. in Computer Science at Purdue University in 1987. In 2001, he became a professor at UC Irvine, where he has advised 17 doctoral students and taught hundreds of undergraduates.

Congratulations, Professor Michael Goodrich!

Awards and Honors

Professor Payam Heydari elected to serve as Distinguished Lecturer of IEEE MTT-S



IEEE Fellow and Professor of Electrical Engineering and Computer Science Payam Heydari has recently been elected to serve as the Distinguished Lecturer of the IEEE Microwave Theory and Techniques Society (MTT-S) for a three-year period starting in 2019. MTT-S promotes the advancement of microwave theory and its applications, including RF, microwave, millimeter-wave, and terahertz technologies. The society is comprised of individuals who are recognized as world-renowned experts in their fields who are deeply knowledgeable and excellent communicators.

Professor Payam Heydari has formerly served as the Distinguished Lecturer of the IEEE Solid-State Circuits Society (SSCS). Only a handful of electrical engineering scientists around the world have served as the distinguished lecturer of more than one major IEEE society. Professor Heydari is among this selected group of scholars.

PhD Candidate Kasra Moazzemi Receives 2nd Place at SIGDA PhD Forum



Ph.D. Candidate in Center for Embedded and Cyber-Physical Systems and the Information of Computer Science Kasra Moazzemi has received 2nd place at the SIGDA PhD Forum for his outstanding presentation. This forum is a poster session co-sponsored by ACM SIGDA and IEEE CEDA for Ph.D. students to present and discuss their dissertation research with people in the EDA community. Participation in the forum is competitive with an acceptance rate around 30%.

The title of his presentation was “Dynamic Resource Management for Many-core Systems using Supervisory Control”.

Congratulations, Kasra Moazzemi!

Visitor and Student Profile

Graduate Student Profile: Michael Ayoub



Michael Ayoub, a Graduate Student of the Center for Embedded and Cyber-Physical Systems, is a second-year MS/PhD student in the EECS department at UC Irvine. He received his Bachelor's degree in Communications and Electronics Engineering from Ain-Shams University, Egypt in 2008. His research interests lie in processing and memory optimizations of WiFi 802.11g/n/ac/ah MAC layer. He has also worked on modeling multimedia compression, creating storage standards, and developing proprietary algorithms as well.

From 2014 to 2016, he worked as a Senior Systems Engineer in Atmel Inc., and worked on designing communication protocols and modeling security protocols for IoT provisioning and pairing.

In September 2016, he joined Professor Ahmed Eltawil's research group at UCI, in which he is focused on designing low-power secure wireless protocols for medical and wearable devices.

Graduate Student Profile: Emad Kasaeyan

Emad Kasaeyan, a Graduate Student for the Center for Embedded and Cyber-Physical Systems, is a double-major/PhD student in the Computer Engineering department at UC Irvine. He received his Bachelor's degree in Electrical Engineering and Computer Science from the Sharif University of Technology in Iran in 2017.

His research interests lie in the areas of Healthcare, Internet of Things (IoT), Embedded Systems, Medical Cyber-Physical Systems, and Machine Learning. He is currently a Research Assistant in the Dutt Research Group at UC Irvine, led by Ph.D. advisor Professor Nikil Dutt.

He is currently working on a project centered around self-aware pain assessment using wearables as a case study. This project uses a system based on IoT to detect and assess pain in a reliable and objective way by enabling the pain diagnoses in the case in which a patient is unable to communicate and express pain sensations.



CECS Lectures and Seminars

CECS Seminar—Prof. Yale Patt



On June 7, 2018, Professor Yale Patt held a CECS seminar titled “Are There Any Questions?” This talk was quite unique in that it focused more on audience questions rather than the lecture itself. Patt is interested in pursuing aggressive ILP, out-of-order, and speculative computer architecture, such as HPSm.

Professor Yale Patt is a professor of Electrical and Computer Engineering at the University of Texas at Austin. He holds the Ernest Cockrell, Jr. Centennial Chair in Engineering. He received his Bachelor’s Degree at Northeastern University in Electrical

Engineering, and he received his Master’s and Ph.D. at Stanford University in Electrical Engineering. He is also a co-author of *Introduction to Computing Systems*, in which LC-3 Assembly Language is introduced.

CECS Seminar—Roger Piqueras Jover



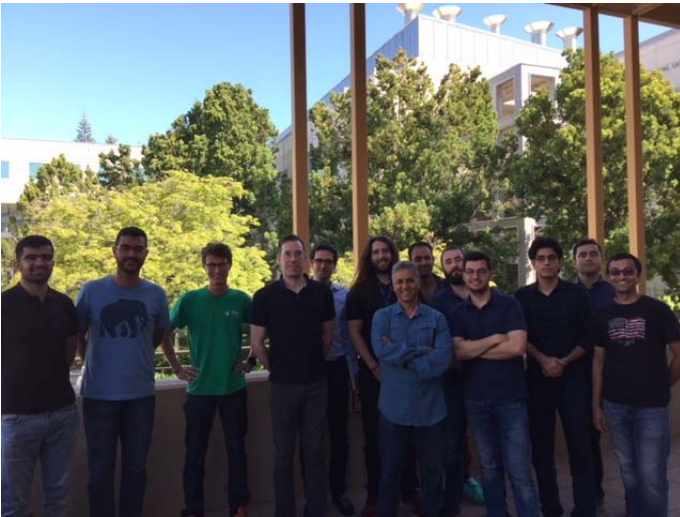
On May 15, 2018, Roger Piqueras Jover held a CECS seminar titled “Protocol-fuzzing mobile networks with open-source tools to enhance the security of LTE and 5G mobile networks.” This talk involves Long Term Evolution (LTE) and the concerning security threats due to large amounts of unauthenticated and unprotected messages exchanged between a base station and a mobile device. Jover is interested in protocol-fuzzing LTE mobile networks using open-software tools.

Roger Piqueras Jover is a Wireless Security Research Scientist and Security Architect at the

CTO Security Architecture team of Bloomberg LP. He received his Dipl. Ing from the Politechnical University of Catalunya, a Master’s in Electrical and Computer Engineering from the University of California, Irvine, and a Master’s/MPhil and EBD in Electrical Engineering from Columbia University.

CECS Lectures and Seminars

CECS Seminar—Prof. Hank Hoffman



On June 1, 2018, Associate Professor Hank Hoffman hosted a CECS seminar titled “Self-aware Computing: Combining Learning and Control to Manage Complex, Dynamic Systems.” This talk involved modern computing systems and how they must meet high-performance and low energy consumption. Professor Hank Hoffman’s research lies in building self-aware computing systems that address computing system goals and constraints in a fundamental way.

Professor Hank Hoffman is an Associate Professor in the Department of Computer Science at the University of Chicago. He received his SM degree in Electrical Engineering and Computer Science from MIT in 2003, and his Ph.D. in Electrical Engineering and Computer Science from MIT in 2011. He also received his Bachelor’s Degree in Mathematical Sciences with highest honors and highest distinction from UNC Chapel Hill.

CECS Seminar—Prof. Ahmed Hemani



On June 6, 2018, Professor Ahmed Hemani hosted a CECS seminar titled “One does not need a Village to make a Billion Gate ASIC, only a family if Synchoros VLSI Design Style is adopted.” This talk involved a proposition of a VLSI design method that can get the same work done with just a family. Professor Ahmed Hemani’s interests lay in synchronous systems and integrating these systems into a micro-architecture level.

Professor Ahmed Hemani is a Professor in Electronic Systems Design at the School of ICT, KTH, Kista, Sweden. He received his Ph.D. from KTH in 1993. He is also a senior member of the IEEE and was Philips Semiconductors representative in the Schema Working Group of the SPIRIT consortium in 2004-2005. He was also a principal architect of the test chip version of the Philips flagship Wireless Multi-media application processor in 65 nm technology.

Publications

Publications

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

Author, Title, Publication

Conference Proceedings

Nikil Dutt: **Self-Awareness for Heterogeneous MPSoCs: A Case Study using Adaptive, Reflective Middleware**. ACM Great Lakes Symposium on VLSI 2018: 3, May 23 – 25, 2018

Zhou Fang, Mulong Luo, Tong Yu, Ole J. Mengshoel, Mani B. Srivastava, Rajesh K. Gupta: **Mitigating Multi-tenant Interference in Continuous Mobile Offloading**. CLOUD 2018: 20-36, June 19, 2018

Vahideh Akhlaghi, Sicun Gao, Rajesh K. Gupta: **LEMAX: learning-based energy consumption minimization in approximate computing with quality guarantee**. DAC 2018: 161:1-161:6, June 24 – June 29, 2018

Payam Heydari: **Millimeter-wave frequency generation and synthesis in Silicon**. CICC 2018: 1-49, April 8 – 11, 2018

Mao-Cheng Lee, Alireza Karimi-Bidhendi, Omid Malekzadeh-Arasteh, Po T. Wang, Zoran Nedadic, An H. Do, Payam Heydari: **A CMOS inductorless MedRadio OOK transceiver with a 42 μ W event-driven supply-modulated RX and a 14% efficiency TX for medical implants**. CICC 2018: 1-4, April 8 – 11, 2018

Hossein Mohammadnezhad, Razieh Abedi, Amir Esmaili, Payam Heydari: **A 64-67GHz partially-overlapped phase-amplitude-controlled 4-element beamforming-MIMO receiver**. CICC 2018: 1-4, April 8 – 11, 2018

Jeffrey L. Krichmar, Ting-Shuo Chou: **A Tactile Robot for Developmental Disorder Therapy**. APAScience 2018: 20:1-20:6, April 5 – 7, 2018

Sajjad Taheri, Alexander Vedienbaum, Alexandru Nicolau, Ningxin Hu, Mohammad R. Haghghat: **OpenCV.js: computer vision processing for the open web platform**. MMSys 2018: 478-483, June 12 – 15, 2018

Mohsen Imani, Chenyu Huang, Deqian Kong, Tajana Rosing: **Hierarchical hyperdimensional computing for energy efficient classification**. DAC 2018: 108:1-108:6, June 24 – 29, 2018

Xavier Carpent, Karim Eldefrawy, Norrathep Rattanaivanon, Gene Tsudik: **Temporal Consistency of Integrity-Ensuring Computations and Applications to Embedded Systems Security**. AsiaCCS 2018: 313-327, June 4 – 8, 2018

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Conference Proceedings

Xavier Carpent, Karim Eldefrawy, Norrathep Rattanaivanon, Ahmad-Reza Sadeghi, Gene Tsudik: **Reconciling remote attestation and safety-critical operation on simple IoT devices.** DAC2018: 90:1-90:6, June 24 – 29, 2018

Xavier Carpent, Norrathep Rattanaivanon, Gene Tsudik: **Remote attestation of IoT devices via SMARM: Shuffled measurements against roving malware.** HOST 2018: 9-16, April 30 – May 4, 2018

Michael T. Goodrich: **Isogrammic-Fusion ORAM: Improved Statistically Secure Privacy-Preserving Cloud Data Access for Thin Clients.** AsiaCCS 2018: 699-706, June 4 – 8, 2018

David Eppstein, Michael T. Goodrich, Nil Mamano: **Reactive Proximity Data Structures for Graphs.** LATIN 2018: 777-789, April 16 – 19, 2018

Hosein Mohammadi Makrani, Setareh Rafatirad, Amir Houmansadr, Houman Homayoun: **Main-Memory Requirements of Big Data Applications on Commodity Server Platform.** CCGrid 2018: 653-660, May 1 – 4, 2018

Hossein Sayadi, Nisarg Patel, Sai Manoj P. D, Avesta Sasan, Setareh Rafatirad, Houman Homayoun: **Ensemble learning for effective run-time hardware-based malware detection: a comprehensive analysis and classification.** DAC 2018: 1:1-1:6, June 24 – 29, 2018

Venkata Yaswanth Raparti, Sudeep Pasricha: **PARM: power supply noise aware resource management for NoC based multicore systems in the dark silicon era.** DAC 2018: 62:1-62:6, June 24 – 29, 2018

Sai Vineel Reddy Chittamuru, Ishan G. Thakkar, Varun Bhat, Sudeep Pasricha: **SOTERIA: exploiting process variations to enhance hardware security with photonic NoC architectures.** DAC 2018: 81:1-81:6, June 24 – 29, 2018

Ayush Mittal, Saideep Tiku, Sudeep Pasricha: **Adapting Convolutional Neural Networks for Indoor Localization with Smart Mobile Devices.** ACM Great Lakes Symposium on VLSI 2018: 117-122, May 23 – 25, 2018

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Conference Proceedings

Sudeep Pasricha, Sai Vineel Reddy Chittamuru, Ishan G. Thakkar:

Cross-Layer Thermal Reliability Management in Silicon Photonic Networks-on-Chip. ACM Great Lakes Symposium on VLSI 2018: 317-322, May 23 – 25, 2018

Sudeep Pasricha, Davide Bertozzi, Hui Li:

Special session on overcoming reliability and energy-efficiency challenges with silicon photonics for future manycore computing. VTS 2018: 1, April 22 – 25, 2018

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Author, Title, Publication

Journal Publications

Atefehsadat Haghhighathoseini, Hossein Bobarshad, Fatehmeh Saghafi, Mohammad Sadegh Rezaei, Nader Bagherzadeh:

Hospital enterprise Architecture Framework (Study of Iranian University Hospital Organization). 88-100, June 2018

Ali Bozorgmehr, Mohammad Hossein Moaiyeri, Keivan Navi, Nader Bagherzadeh: **Ultra-Efficient Fuzzy Min/Max Circuits Based on Carbon Nanotube FETs.** 1073-1078, April 2018

Zana Ghaderi, Ayed Alqahtani, Nader Bagherzadeh:

AROMA: Aging-Aware Deadlock-Free Adaptive Routing Algorithm and Online Monitoring in 3D NoCs. 772-788, April 2018

Chen-Ying Hsieh, Jurn-Gyu Park, Nikil D. Dutt, Sung-Soo Lim:

MEMCOP: memory-aware co-operative power management governor for mobile games. Design Autom. for Emb. Sys. 22(1-2): 95-116 (2018), June 2018

Huajin Tang, Tiejun Huang, Jeffrey L. Krichmar, Garrick Orchard, Arindam Basu:

Guest Editorial Special Issue on Neuromorphic Computing and Cognitive Systems. 122-125, June 2018

Tiffany Hwu, Alexander Y. Wang, Nicolas Oros, Jeffrey L. Krichmar:

Adaptive Robot Path Planning Using a Spiking Neuron Algorithm With Axonal Delays. 126-137, June 2018

Chi-Sheng Shih, Jyun-Jhe Chou, Kwei-Jay Lin:

WuKong: Secure Run-Time environment and data-driven IoT applications for Smart Cities and Smart Buildings. 1-17, May 2018

Yuqi Li, Aditi Majumder, M. Gopi, Chong Wang, Jieyu Zhao:

Practical Radiometric Compensation for Projection Display on Textured Surfaces using a Multidimensional Model. 365-375, May 2018

Yuqi Li, Aditi Majumder, Hao Zhang, M. Gopi:

Optimized Multi-Spectral Filter Array Based Imaging of Natural Scenes. 1172, April 2018

Jagannathan Venkatesh, Baris Aksanli, Christine S. Chan, Alper Sinan Akyurek, Tajana Simunic Rosing: **Modular and Personalized Smart Health Application Design in a Smart City Environment.** 614-623, April 2018

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Jagannathan Venkatesh, Baris Aksanli, Christine S. Chan, Alper Sinan Akyurek, Tajana Simunic Rosing: **Modular and Personalized Smart Health Application Design in a Smart City Environment.** 614-623, April 2018

Shun-Chi Wu, A. Lee Swindlehurst: **Direct feature extraction from multi-electrode recordings for spike sorting.** 222-231, April 2018

Zihuan Wang, Ming Li, Qian Liu, A. Lee Swindlehurst: **Hybrid Precoder and Combiner Design With Low-Resolution Phase Shifters in mmWave MIMO Systems.** 256-269, May 2018

Kilian Roth, Hessam Pirzadeh, A. Lee Swindlehurst, Josef A. Nossek: **A Comparison of Hybrid Beamforming and Digital Beamforming With Low-Resolution ADCs for Multiple Users and Imperfect CSI.** 484-498, June 2018

Katayoun Neshatpour, Wayne Burleson, Amin Khajeh, Houman Homayoun: **Enhancing Power, Performance, and Energy Efficiency in Chip Multiprocessors Exploiting Inverse Thermal Dependence.** 778-791, April 2018

M. Mohamed Asan Basiri, Sandeep K. Shukla: **Low power hardware implementations for network packet processing elements.** 170-181, June 2018

Sandeep K. Shukla: **Editorial: Industry 4.0 - A Confluence of Embedded Artificial Intelligence, Machine Learning, Robotics and Security.** 29:1-29:2, April 2018

Sandeep K. Shukla: **Editorial: To Use or Not To? Embedded Systems for Voting.** 58:1-58:2, June 2018

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

Author, Title, Publication

Other Publications

Hamid Nejatollahi, Nikil D. Dutt, Indranil Banerjee, Rosario Cammarota: **Domain-specific Accelerators for Ideal Lattice-based Public Key Protocols**. IACR Cryptology ePrint Archive 2018: 608 (2018), June 2018

Yinheng Zhu, Wanli Chen, Xun Zhan, Zonglin Guo, Hongjian Shi, Ian G. Harris: **Head Mounted Pupil Tracking Using Convolutional Neural Network**. CoRR abs/1805.00311 (2018), May 2018

Mohsen Imani, Mohammad Samragh, Yeseong Kim, Saransh Gupta, Farinaz Koushanfar, Tajana Rosing: **RAPIDNN: In-Memory Deep Neural Network Acceleration Framework**. CoRR abs/1806.05794 (2018), June 2018

Ivan Oliveira Nunes, Gene Tsudik: **KRB-CCN: Lightweight Authentication & Access Control for Private Content-Centric Networks**. CoRR abs/1804.03820 (2018), April 2018

Tyler Kaczmarek, Ercan Ozturk, Gene Tsudik: **Thermanator: Thermal Residue-Based Post Factum Attacks On Keyboard Password Entry**. CoRR abs/1806.10189 (2018), June 2018

Gill Barequet, David Eppstein, Michael T. Goodrich, Nil Mamano: **Stable-Matching Voronoi Diagrams: Combinatorial Complexity and Algorithms**. CoRRabs/1804.09411 (2018), April 2018

Juan José Besa Vial, William E. Devanny, David Eppstein, Michael T. Goodrich, Timothy Johnson: **Optimally Sorting Evolving Data.**, May 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.**, May 2018

Hadi Mardani Kamali, Kimia Zamiri Azar, Kris Gaj, Houman Homayoun, Avesta Sasan: **LUT-Lock: A Novel LUT-based Logic Obfuscation for FPGA-Bitstream and ASIC-Hardware Protection**. CoRR abs/1804.11275 (2018), April 2018

Shervin Roshanisefat, Harshith K. Thirumala, Kris Gaj, Houman Homayoun, Avesta Sasan: **Benchmarking the Capabilities and Limitations of SAT Solvers in Defeating Obfuscation Schemes**. CoRR abs/1805.00054 (2018), May 2018

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

CECS Mission Statement:

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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