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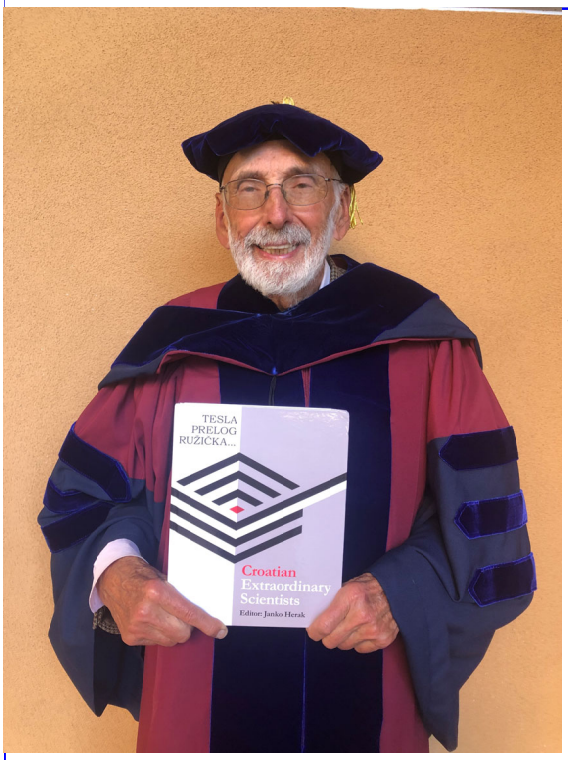
Center for Embedded and Cyber-physical Systems, University of California, Irvine

Inside this Issue:

Gajski in *Croatian Extraordinary Scientists*



Professor Emeritus Daniel D. Gajski is listed in the book *Croatian Extraordinary Scientists*, edited by Janko Herak. The book lists Prof. Gajski among famous Croatian scientists such as Vladimir Prelog and Nikola Tesla. The chapter on Prof. Gajski details his educational journey from Croatia to the United States, his scholarly work, and his great impact on the scientific community.

Prof. Gajski was born in 1938 in the city of Nova Gradiška, later moving to Zagreb, where he completed primary and high school. As a high school student, Prof. Gajski competed in track and field, becoming the Croatian champion in 800m in 1958. From this experience, Prof. Gajski learned that oftentimes the winner was decided at he last few moments of a race. He would apply this lesson to his scientific pursuits in the future.

Prof. Gajski attended the University of Zagreb, graduating in 1962 with a thesis on color television. He then worked on developing electronic telephone exchanges and received in MS degree in 1967 with a study on logic synthesis. Ultimately, Prof. Gajski received his PhD from the University of Pennsylvania in 1974, with a thesis on formal languages and automata theory. He then joined Burroughs Co, building and patenting the Burroughs Scientific Processor (BSP) in a team in 1976. He was invited to lecture about the BSP at the University of Illinois at Urbana-Champaign, world famous for their Supercomputers, and later joined as a faculty member in 1977.

At Illinois, Prof. Gajski researched parallel processing, creating the Center for Supercomputer Research and Development with colleagues at the university. This research led him to focus on making tools for Computer Aided Design (CAD), which then led him to develop the world renowned Gajski's Y-chart, a chart that categorizes different design abstraction levels and styles of representation for each abstraction level. The Y-chart is used worldwide due to its simplicity and practicality. Prof. Gajski moved to UCI to expand on this CAD research and founded the Center for Embedded and Cyber-Physical Systems.

Chen Receives NSF CAREER Award

Assistant Professor Qi Alfred Chen is faculty in the Center for Embedded and Cyber-Physical Systems (CECS) and in the Donald Bren School of Information and Computer Sciences. He had received the Faculty Early Career Development (CAREER) award from the National Science Foundation, an award given to early-career faculty who are emerging leaders in their department.

This award gives Prof. Chen funds for his proposal: "Securing the AI Stack in Autonomous CPS under Physical-Layer Attacks: A Systems Perspective." Prof. Chen's project will ultimately contribute to the field of artificial intelligence (AI) by making AI safer to use in autonomous vehicles.

Tseng Research Group Invents Digital Communication Fabric

Assistant Professor Peter Tseng, faculty in the Center for Embedded and Cyber-Physical Systems (CECS), and his research group—including CECS Director Professor Fadi Kurdahi—invented a fabric that has the same functions as a smart device, such as making payments. The research group used near-field communication (NFC) technology to achieve this. Typically, NFC devices have a range to a few inches, but the Tseng Research Group extended it to more than four feet.

The invention can be expanded to hospitals, where mere fabric can track a patient's health. The fabric also allows for more patient flexibility and comfort, since it replaces the need for particular devices the patient must wear with fabric. The project was supported by the National Science Foundation.

CECS Seminar - Masahiro Fujita

Professor Masahiro Fujita visited the Center for Embedded and Cyber-Physical Systems at UCI on January 14, 2022. Prof. Fujita's talk was titled "Partial logic synthesis and its application to automatic generation of parallel/distributed algorithms."

Prof. Fujita received his PhD in Information Engineering from the University of Tokyo in 1985 on his work on model checking of hardware designs by using logic programming languages. In 1985, he joined Fujitsu as a researcher and started to work on hardware automatic synthesis as well as formal verification methods and tools including enhancements of BDD/SAT-based techniques. Since March 2000, he has been a professor at VLSI Design and Education Center of the University of Tokyo.

CECS Seminar - Liron David

PhD candidate Liron David from Tel-Aviv University visited the Center for Embedded and Cyber-Physical Systems at UCI on March 12, 2022. Liron's talk was titled "Poly-Logarithmic Side Channel Rank Estimation via Exponential Sampling."

Liron David is a PhD candidate in Electrical Engineering under the supervision of Prof. Avishai Wool. She received her B.Sc. Degree in Computer Science and Electrical and Electronics Engineering from Tel-Aviv University and her M.Sc. Degree in Electrical Engineering from Tel-Aviv University. Liron has won the Weinstein award for excellence in studies in 2017, the Weinstein best paper prize in 2018 and the Tel-Aviv University excellence in teaching in 2018.

Student Profile

Student Profile: Berken Utku Demirel

Berken Utku Demirel is a second-year MS/Ph.D. student with a focus in Computer Engineering at The Henry Samueli School of Engineering at UC Irvine. He received his bachelor's degree from Middle East Technical University (METU) Electrical - Electronics Engineering with high honors. He has achieved the 11th rank nationwide in the National University Entrance Examinations among 2 million students. During the fourth year of his Bachelor's program, he participated in the Undergraduate Student Academic Research Program (STAR), where he developed an algorithm to assess the quality of the ECG signals for wearable devices. At the end of this program, he was awarded the People's Choice and Publication prize in as a result of his conference paper published in IEEE.

The European Commission also awarded him with the Erasmus+ intern scholarship for summer research at Helmholtz Institute for Biomedical Engineering at RWTH Aachen University in Germany, where he has designed real-time software for heart-monitoring devices using ECG signals.

Currently, he is working under the guidance of Professor Mohammad Abdullah Al Faruque in the Embedded and Cyber-Physical Systems Research Group at UCI. His current pursuit includes biomedical signal processing, machine learning, and their implementations in Health-IoT.

Publications

Publications

The following papers were published by CECS affiliates from January 2022 through March 2022 (and unreported papers from previous eNews).

Author, Title, Publication **Conference Proceedings**

Kenneth Stewart, Andreea Danielescu, Timothy M. Shea, Emre Neftci: **Encoding Event-Based Data With a Hybrid SNN Guided Variational Auto-encoder in Neuromorphic Hardware.** NICE 2022: 88-97, March 28-31, 2022, Virtual

Seyyed Ahmad Razavi, Hsin-Yu Ting, Tootiya Giyahchi, Eli Bozorgzadeh: **On Exploiting Patterns For Robust FPGA-based Multi-accelerator Edge Computing Systems.** DATE 2022: 116-119, March 14-23, 2022, Antwerp, Belgium

Emad Kasaeyan Naeini, Sina Shahhosseini, Anil Kanduri, Pasi Liljeberg, Amir M. Rahmani, Nikil D. Dutt: **AMSER: Adaptive Multimodal Sensing for Energy Efficient and Resilient eHealth Systems.** DATE 2022: 1455-1460, March 14-23, 2022, Antwerp, Belgium

Igor Nunes, Mike Heddes, Tony Givargis, Alexandru Nicolau, Alexander V. Veidenbaum: **GraphHD: Efficient graph classification using hyperdimensional computing.** DATE 2022: 1485-1490, March 14-23, 2022, Antwerp, Belgium

Igor Nunes, Mike Heddes, Tony Givargis, Alexandru Nicolau, Alexander V. Veidenbaum: **GraphHD: Efficient graph classification using hyperdimensional computing.** DATE 2022: 1485-1490, March 14-23, 2022, Antwerp, Belgium

Leon Li, Alex Orailoglu: **JANUS-HD: Exploiting FSM Sequentiality and Synthesis Flexibility in Logic Obfuscation to Thwart SAT Attack While Offering Strong Corruption.** DATE 2022: 1323-1328, March 14-23, 2022, Antwerp, Belgium

Emad Kasaeyan Naeini, Sina Shahhosseini, Anil Kanduri, Pasi Liljeberg, Amir M. Rahmani, Nikil D. Dutt: **AMSER: Adaptive Multimodal Sensing for Energy Efficient and Resilient eHealth Systems.** DATE 2022: 1455-1460, March 14-23, 2022, Antwerp, Belgium

Yang Ni, Yeseong Kim, Tajana Rosing, Mohsen Imani: **Algorithm-Hardware Co-Design for Efficient Brain-Inspired Hyperdimensional Learning on Edge.** DATE 2022: 292-297, March 14-23, 2022, Antwerp, Belgium

Justin Morris, Hin Wai Lui, Kenneth Stewart, Behnam Khaleghi, Anthony Thomas, Thiago Marback, Baris Aksanli, Emre Neftci, Tajana Rosing: **HyperSpike: HyperDimensional Computing for More Efficient and Robust Spiking Neural Networks.** DATE 2022: 664-669, March 14-23, 2022, Antwerp, Belgium

Yang Ni, Yeseong Kim, Tajana Rosing, Mohsen Imani: **Online Performance and Power Prediction for Edge TPU via Comprehensive Characterization.** DATE 2022: 612-615, March 14-23, 2022, Antwerp, Belgium

Yang Ni, Yeseong Kim, Tajana Rosing, Mohsen Imani: **Algorithm-Hardware Co-Design for Efficient Brain-Inspired Hyperdimensional Learning on Edge.** DATE 2022: 292-297, March 14-23, 2022, Antwerp, Belgium

Michael H. Ostertag, Jason Ma, Tajana Rosing**: Remote Sensing with UAV and Mobile Recharging Vehicle Rendezvous. DATE 2022: 538-543,** , March 14-23, 2022, Antwerp, Belgium

Yang Ni, Yeseong Kim, Tajana Rosing, Mohsen Imani: **Online Performance and Power Prediction for Edge TPU via Comprehensive Characterization.** DATE 2022: 612-615, March 14-23, 2022, Antwerp, Belgium

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Justin Morris, Hin Wai Lui, Kenneth Stewart, Behnam Khaleghi, Anthony Thomas, Thiago Marback, Baris Aksanli, Emre Neftci, Tajana Rosing: **HyperSpike: HyperDimensional Computing for More Efficient and Robust Spiking Neural Networks.** DATE 2022: 664-669, March 14-23, 2022, Antwerp, Belgium

Yizhou Wei, Minxuan Zhou, Sihang Liu, Korakit Seemakhupt, Tajana Rosing, Samira Manabi Khan: **PIMProf: An Automated Program Profiler for Processing-in-Memory Offloading Decisions.** DATE 2022: 855-860, March 14-23, 2022, Antwerp, Belgium

Saideep Tiku, Sudeep Pasricha: **Siamese Neural Encoders for Long-Term Indoor Localization with Mobile Devices.** DATE 2022: 1215-1220, March 14-23, 2022, Antwerp, Belgium

Ebadollah Taheri, Sudeep Pasricha, Mahdi Nikdast: **DeFT: A Deadlock-Free and Fault-Tolerant Routing Algorithm for 2.5D Chiplet Networks.** DATE 2022: 1047-1052, March 14-23, Antwerp, Belgium

Abhijitt Dhavlle, Setareh Rafatirad, Houman Homayoun, Sai Manoj Pudukotai Dinakarrao: **CR-Spectre: Defense-Aware ROP Injected Code-Reuse Based Dynamic Spectre.** DATE 2022: 508-513, March 14-23, 2022, Antwerp, Belgium

Han Wang, Syed Mahbub Hafiz, Kartik Patwari, Chen-Nee Chuah, Zubair Shafiq, Houman Homayoun: **Stealthy Inference Attack on DNN via Cache-based Side-Channel Attacks.** DATE 2022: 1515-1520, March 14-23, 2022, Antwerp, Belgium

Ramtin Afshar, Michael T. Goodrich, Pedro Matias, Martha C. Osegueda: **Mapping Networks via Parallel kth-Hop Traceroute Queries.** STACS 2022: 4:1-4:21, March 14-18, 2022, Marseille, France

Sanmitra Banerjee, Mahdi Nikdast, Sudeep Pasricha, Krishnendu Chakrabarty: **CHAMP: Coherent Hardware-Aware Magnitude Pruning of Integrated Photonic Neural Networks.** OFC 2022: 1-3, March 6-10, 2022, San Diego, CA, USA

Hamed Gorjiara, Guoqing Harry Xu, Brian Demsky: **Yashme: detecting persistency races.** ASPLOS 2022: 830-845, February 28-March 4, 2022, Lausanne, Switzerland

Xiyuan Zhang, Ranak Roy Chowdhury, Jingbo Shang, Rajesh K. Gupta, Dezhi Hong: **ESC-GAN: Extending Spatial Coverage of Physical Sensors.** WSDM 2022: 1347-1356, February 21-25, 2022, Tempe, AZ, USA

Rahmadi Trimananda, Weiyu Luo, Brian Demsky, Guoqing Harry Xu: **Stateful Dynamic Partial Order Reduction for Model Checking Event-Driven Applications that Do Not Terminate.** VMCAI 2022: 400-424, January 16-28, Philadelphia, PA, USA

Febin Sunny, Mahdi Nikdast, Sudeep Pasricha: **SONIC: A Sparse Neural Network Inference Accelerator with Silicon Photonics for Energy-Efficient Deep Learning.** ASP-DAC 2022: 214-219, January 17-20, 2022, Taipei, Taiwan

Publications

Publications

The following papers were published by CECS affiliates from January 2022 through March 2022 (and unreported papers from previous eNews).

Author, Title, Publication

Conference Proceedings

Sooryaa Vignesh Thiruloga, Vipin Kumar Kukkala, Sudeep Pasricha: **TENET: Temporal CNN with Attention for Anomaly Detection in Automotive Cyber-Physical Systems.** ASP-DAC 2022: 326-331, January 17-20, 2022, Taipei, Taiwan

Jaeyoung Kang, Behnam Khaleghi, Yeseong Kim, Tajana Rosing: **XCelHD: An Efficient GPU-Powered Hyperdimensional Computing with Parallelized Training.** ASP-DAC 2022: 220-225, January 17-20, 2022, Taipei, Taiwan

Yoshitomo Matsubara, Ruihan Yang, Marco Levorato, Stephan Mandt: **Supervised Compression for Resource-Constrained Edge Computing Systems.** WACV 2022: 923-933, January 3-8, 2022, Waikoloa, HI, USA

Journal Articles

Hyunjin Kim, Mohammed Alnemari, Nader Bagherzadeh: **A storage-efficient ensemble classification using filter sharing on binarized convolutional neural networks.** PeerJ Comput. Sci. 8: e924, March, 2022

Sahand Salamat, Hui Zhang, Yang-Seok Ki, Tajana Rosing: **NASCENT2: Generic Near-Storage Sort Accelerator for Data Analytics on SmartSSD.** ACM Trans. Reconfigurable Technol. Syst. 15(2): 16:1-16:29, March, 2022

Changsheng You, Qingqing Wu, Yuanwei Liu, Robert Schober, A. Lee Swindlehurst: **Guest Editorial Special Issue on Intelligent Reflecting Surface for Green Communication, Computing, and Sensing.** IEEE Trans. Green Commun. Netw. 6(1): 160-162, March, 2022

Gui Zhou, Cunhua Pan, Hong Ren, Petar Popovski, A. Lee Swindlehurst: **Channel Estimation for RIS-Aided Multiuser Millimeter-Wave Systems.** IEEE Trans. Signal Process. 70: 1478-1492, March, 2022

Gongjin Sun, Seongyoung Kang, Sang-Woo Jun: **BurstZ+: Eliminating The Communication Bottleneck of Scientific Computing Accelerators via Accelerated Compression.** ACM Trans. Reconfigurable Technol. Syst. 15(2): 21:1-21:34, March, 2022

Sultangali Arzykulov, Abdulkadir Celik, Galymzhan Nauryzbayev, Ahmed M. Eltawil: **UAV-Assisted Cooperative & Cognitive NOMA: Deployment, Clustering, and Resource Allocation.** IEEE Trans. Cogn. Commun. Netw. 8(1): 263-281, March, 2022

Liping Wang, Saideep Tiku, Sudeep Pasricha: **CHISEL: Compression-Aware High-Accuracy Embedded Indoor Localization With Deep Learning.** IEEE Embed. Syst. Lett. 14(1): 23-26, March, 2022

Hasan Erdem Yantir, Ahmed M. Eltawil, Khaled N. Salama: **A hardware/software co-design methodology for in-memory processors.** J. Parallel Distributed Comput. 161: 63-71, March, 2022

Nisha Panwar, Shantanu Sharma, Guoxi Wang, Sharad Mehrotra, Nalini Venkatasubramanian, Mamadou H. Diallo, Ardalan Amiri Sani: **IoT Notary: Attestable Sensor Data Capture in IoT Environments.** ACM Trans. Internet Things 3 (1): 3:1-3:30, February, 2022

Marc Reichenbach, Matthias Jung, Alex Orailoglu: **Guest Editorial: Special Issue on 2020 IEEE International Conference on Embedded Computer Systems: Architectures, Modeling and Simulation (SAMOS 2020).** Int. J. Parallel Program. 50(2): 187-188, February, 2022

Publications

Publications

The following papers were published by CECS affiliates from January 2022 through March 2022 (and unreported papers from previous eNews).

Author, Title, Publication — Journal Articles

Jaya Singh, Ayush Sinha, Priyanka Goli, Venkatesan Subramanian, Sandeep Kumar Shukla, Om Prakash Vyas: **Insider attack mitigation in a smart metering infrastructure using reputation score and blockchain technology.** Int. J. Inf. Sec. 21(3): 527-546, February, 2022

Nisha Panwar, Shantanu Sharma, Guoxi Wang, Sharad Mehrotra, Nalini Venkatasubramanian, Mamadou H. Diallo, Ardalan Amiri Sani: **IoT Notary: Attestable Sensor Data Capture in IoT Environments.** ACM Trans. Internet Things 3(1): 3:1-3:30, February, 2022

Kevin Choi, Luca Bedogni, Marco Levorato: **Enabling Green Crowdsourced Social Delivery Networks in Urban Communities.** Sensors 22(4): 1541, February, 2022

Qingrong Huang, Dayane Reis, Chao Li, Di Gao, Michael T. Niemier, Xiaobo Sharon Hu, Mohsen Imani, Xunzhao Yin, Cheng Zhuo: **Computing-In-Memory Using Ferroelectrics: From Single- to Multi-Input Logic.** IEEE Des. Test 39(2): 56-64, February, 2022

Aidin Shiri, Arnab Neelim Mazumder, Bharat Prakash, Houman Homayoun, Nicholas R. Waytowich, Tinoosh Mohsenin: **A Hardware Accelerator for Language-Guided Reinforcement Learning.** IEEE Des. Test 39(3): 37-44, February, 2022

Cunhua Pan, Ying-Chang Liang, Marco Di Renzo, A. Lee Swindlehurst, Vincenzo Sciancalepore: **Ieee Access Special Section Editorial: Reconfigurable Intelligent Surface Aided Communications for 6G and Beyond.** IEEE Access 10: 19443-19446, February, 2022

Maximilian Götzinger, Arman Anzanpour, Iman Azimi, Nima TaheriNejad, Axel Jantsch, Amir M. Rahmani, Pasi Liljeberg: **Confidence-Enhanced Early Warning Score Based on Fuzzy Logic.** Mob. Networks Appl. 27(2): 691-708, February, 2022

Arnab Neelim Mazumder, Haoran Ren, Hasib-Al Rashid, Morteza Hosseini, Vandana Chandrareddy, Houman Homayoun, Tinoosh Mohsenin: **Automatic Detection of Respiratory Symptoms Using a Low-Power Multi-Input CNN Processor.** IEEE Des. Test 39(3): 82-90, February, 2022

Nima TaheriNejad, Paolo Perego, Amir M. Rahmani: **Mobile Health Technology: From Daily Care and Pandemics to their Energy Consumption and Environmental Impact.** Mob. Networks Appl. 27(2): 652-656, February, 2022

Amr M. AbdelAty, Mohammed E. Fouda, Ahmed M. Eltawil: **Parameter Estimation of Two Spiking Neuron Models With Meta-Heuristic Optimization Algorithms.** Frontiers Neuroinformatics 16: 771730, February, 2022

Tongsheng Geng, Marcos Amaris, Stéphane Zuckerman, Alfredo Goldman, Guang R. Gao, Jean-Luc Gaudiot: A Profile-Based AI-Assisted Dynamic Scheduling Approach for Heterogeneous Architectures. Int. J. Parallel Program. 50(1): 115-151, February, 2022

Amr M. AbdelAty, Mohamed E. Fouda, Ahmed M. Eltawil: **On numerical approximations of fractional-order spiking neuron models.** Commun. Nonlinear Sci. Numer.Simul. 105: 106078, February, 2022

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Amr M. AbdelAty, Mohamed E. Fouda, Ahmed M. Eltawil: **On numerical approximations of fractional-order spiking neuron models.** Commun. Nonlinear Sci. Numer.Simul. 105: 106078, February, 2022

Shantanu Sharma, Sharad Mehrotra, Nisha Panwar, Nalini Venkatasubramanian, Peeyush Gupta, Shanshan Han, Guoxi Wang: **Quest: Privacy-Preserving Monitoring of Network Data: A System for Organizational Response to Pandemics.** IEEE Trans. Serv. Comput. 15(3): 1233-1250, January, 2022

Mohammed E. Fouda, Hasan Erdem Yantir, Ahmed M. Eltawil, Fadi J. Kurdahi: **In-Memory Associative Processors: Tutorial, Potential, and Challenges.** IEEE Trans. Circuits Syst. II Express Briefs 69(6): 2641-2647, January, 2022

Rang Liu, Ming Li, Qian Liu, A. Lee Swindlehurst: **Joint Waveform and Filter Designs for STAP-SLP-Based MIMO-DFRC Systems.** IEEE J. Sel. Areas Commun. 40(6): 1918-1931, January, 2022

Surong Yan, Kwei-Jay Lin, Xiaolin Zheng, Haosen Wang: **LkeRec: Toward Lightweight End-to-End Joint Representation Learning for Building Accurate and Effective Recommendation.** ACM Trans. Inf. Syst. 40(3): 54:1-54:28, January, 2022

Elham Shamsa, Anil Kanduri, Pasi Liljeberg, Amir M. Rahmani: **Concurrent Application Bias Scheduling for Energy Efficiency of Heterogeneous Multi-Core Platforms.** IEEE Trans. Computers 71(4): 743-755, January, 2022

Charles Steinmetz, Greyce N. Schroeder, Ricardo Nagel Rodrigues, Achim Rettberg, Carlos Eduardo Pereira: **Key-Components for Digital Twin Modeling With Granularity: Use Case Car-as-a-Service.** IEEE Trans. Emerg. Top. Comput. 10(1): 23-33, January, 2022

Ozcan Ozturk, Sabri Pllana, Smaïl Niar, Kaoutar El Maghraoui: **Special issue on recent advances in autonomous vehicle solutions in the digital continuum.** Computing 104(3): 459-460, January, 2022

Maryam Hemmati, Morteza Biglari-Abhari, Smaïl Niar: **Adaptive Real-Time Object Detection for Autonomous Driving Systems.** J. Imaging 8(4): 106, January, 2022

Eberle A. Rambo, Bryan Donyanavard, Minjun Seo, Florian Maurer, Thawra Kadeed, Caio Batista de Melo, Biswadip Maity, Anmol Surhonne, Andreas Herkersdorf, Fadi J. Kurdahi, Nikil D. Dutt, Rolf Ernst: **The Self-Aware Information Processing Factory Paradigm for Mixed-Critical Multiprocessing.** IEEE Trans. Emerg. Top. Comput. 10(1): 250-266, January, 2022

Mohammed E. Fouda, Hasan Erdem Yantir, Ahmed M. Eltawil, Fadi J. Kurdahi: **In-Memory Associative Processors: Tutorial, Potential, and Challenges.** IEEE Trans. Circuits Syst. II Express Briefs 69(6): 2641-2647, January, 2022

Abhijitt Dhavlle, Setareh Rafatirad, Khaled N. Khasawneh, Houman Homayoun, Sai Manoj Pudukotai Dinakarrao: **Imitating Functional Operations for Mitigating Side-Channel Leakage.** IEEE Trans. Comput. Aided Des. Integr. Circuits Syst. 41(4): 868-881, January, 2022

Publications

Publications

The following papers were published by CECS affiliates from January 2022 through March 2022 (and unreported papers from previous eNews).

Author, Title, Publication

Journal Articles

Omid Assare, Rajesh K. Gupta: **Performance Analysis of Timing-Speculative Processors.** IEEE Trans. Computers 71(2): 407-420, January, 2022

Pawel Ladosz, Eseoghene Ben-Iwhiwhu, Jeffery Dick, Nicholas Ketz, Soheil Kolouri, Jeffrey L. Krichmar, Praveen K. Pilly, Andrea Soltoggio: **Deep Reinforcement Learning With Modulated Hebbian Plus Q-Network Architecture.** IEEE Trans. Neural Networks Learn. Syst. 33(5): 2045-2056, January, 2022

Haoran Pu, Omid Malekzadeh-Arasteh, Ahmad Reza Danesh, Zoran Nenadic, An H. Do, Payam Heydari: **A CMOS Dual-Mode Brain-Computer Interface Chipset With 2-mV Precision Time-Based Charge Balancing and Stimulation-Side Artifact Suppression.** IEEE J. Solid State Circuits 57(6): 1824-1840, January, 2022

Haoran Pu, Omid Malekzadeh-Arasteh, Ahmad Reza Danesh, Zoran Nenadic, An H. Do, Payam Heydari: **A CMOS Dual-Mode Brain-Computer Interface Chipset With 2-mV Precision Time-Based Charge Balancing and Stimulation-Side Artifact Suppression.** IEEE J. Solid State Circuits 57(6): 1824-1840, January, 2022

Saransh Gupta, Mohsen Imani, Joonseop Sim, Andrew Huang, Fan Wu, Jaeyoung Kang, Yeseong Kim, Tajana Simunic Rosing: **COSMO: Computing with Stochastic Numbers in Memory.** ACM J. Emerg. Technol. Comput. Syst. 18 (2): 37:1-37:25, January, 2022

Justin Morris, Roshan Fernando, Yilun Hao, Mohsen Imani, Baris Aksanli, Tajana Rosing: **Locality-Based Encoder and Model Quantization for Efficient Hyper-Dimensional Computing.** IEEE Trans. Comput. Aided Des. Integr. Circuits Syst. 41(4): 897-907, January, 2022

Mohsen Riahi Alam, M. Hassan Najafi, Nima Taherinejad, Mohsen Imani, Raju Gottumukkala: **Stochastic Computing in Beyond Von-Neumann Era: Processing Bit-Streams in Memristive Memory.** IEEE Trans. Circuits Syst. II Express Briefs 69(5): 2423-2427, January, 2022

Congmiao Li, Jean-Luc Gaudiot: **Detecting Spectre Attacks Using Hardware Performance Counters.** IEEE Trans. Computers 71(6): 1320-1331, January, 2022

Shaoshan Liu, Jean-Luc Gaudiot: **Rise of the Autonomous Machines.** Computer 55(1): 64-73, January, 2022

Asmaa Abdallah, Abdulkadir Celik, Mohammad M. Mansour, Ahmed M. Eltawil : **Deep Learning-Based Frequency-Selective Channel Estimation for Hybrid mmWave MIMO Systems.** IEEE Trans. Wirel. Commun. 21(6): 3804-3821, January, 2022

Trier Mortlock, Deepan Muthirayan, Shih-Yuan Yu, Pramod P. Khargonekar, Mohammad Abdullah Al Faruque: **Graph Learning for Cognitive Digital Twins in Manufacturing Systems.** IEEE Trans. Emerg. Top. Comput. 10(1): 34-45, January, 2022

Onat Güngör, Tajana Rosing, Baris Aksanli: **DOWELL: Diversity-Induced Optimally Weighted Ensemble Learner for Predictive Maintenance of Industrial Internet of Things Devices.** IEEE Internet Things J. 9(4): 3125-3134, January, 2022

Justin Morris, Roshan Fernando, Yilun Hao, Mohsen Imani, Baris Aksanli, Tajana Rosing: **Locality-Based Encoder and Model Quantization for Efficient Hyper-Dimensional Computing.** IEEE Trans. Comput. Aided Des. Integr. Circuits Syst. 41(4): 897-907, January, 2022

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Abdulkadir Celik, Khaled N. Salama, Ahmed M. Eltawil: **The Internet of Bodies: A Systematic Survey on Propagation Characterization and Channel Modeling.** IEEE Internet Things J. 9(1): 321-345, January, 2022

Galymzhan Nauryzbayev, Orken Omarov, Sultangali Arzykulov, Khaled M. Rabie, Xingwang Li, Ahmed M. Eltawil: **Performance limits of wireless powered cooperative NOMA over generalized fading.** Trans. Emerg. Telecommun. Technol. 33(4), January, 2022

Daniele Jahier Pagliari, Frank Schirrmeister, Nader Bagherzadeh, Enrico Macii: **Guest Editorial: Thematic Section on Applications of Emerging Computing Technologies in Smart Manufacturing and Industry 4.0.** IEEE Trans. Emerg. Top. Comput. 10(1): 6-8, January, 2022

Eberle A. Rambo, Bryan Donyanavard, Minjun Seo, Florian Maurer, Thawra Kadeed, Caio Batista de Melo, Biswadip Maity, Anmol Surhonne, Andreas Herkersdorf, Fadi J. Kurdahi, Nikil D. Dutt, Rolf Ernst: **The Self-Aware Information Processing Factory Paradigm for Mixed-Critical Multiprocessing.** IEEE Trans. Emerg. Top. Comput. 10(1): 250-266, January, 2022

Eberle A. Rambo, Bryan Donyanavard, Minjun Seo, Florian Maurer, Thawra Kadeed, Caio Batista de Melo, Biswadip Maity, Anmol Surhonne, Andreas Herkersdorf, Fadi J. Kurdahi, Nikil D. Dutt, Rolf Ernst: **The Self-Aware Information Processing Factory Paradigm for Mixed-Critical Multiprocessing.** IEEE Trans. Emerg. Top. Comput. 10(1): 250-266, January, 2022

Jeffrey Miller, Charles Wallace, Frank Vahid: **Member spotlight.** ACM SIGCSE Bull. 54(1): 8-9, January, 2022

Other Publications

Sankha Baran Dutta, Hoda Naghibijouybari, Arjun Gupta, Nael B. Abu-Ghazaleh, Andres Marquez, Kevin J. Barker: **Spy in the GPU-box: Covert and Side Channel Attacks on Multi-GPU Systems.** CoRR abs/2203.15981, March, 2022

Onat Güngör, Tajana Rosing, Baris Aksanli: **RES-HD: Resilient Intelligent Fault Diagnosis Against Adversarial Attacks Using Hyper-Dimensional Computing.** CoRR abs/2203.08148, March, 2022

Zhihao Yao, Seyed Mohammadjavad Seyed Talebi, Mingyi Chen, Ardalan Amiri Sani, Thomas Anderson: **A Personal Computer for a Distrustful World.** CoRR abs/2203.08284, March, 2022

Takami Sato, Qi Alfred Chen: **Towards Driving-Oriented Metric for Lane Detection Models.** CoRR abs/2203.16851, March, 2022

Mohammed E. Fouda, Hasan Erdem Yantir, Ahmed M. Eltawil, Fadi J. Kurdahi: **In-memory Associative Processors: Tutorial, Potential, andChallenges.** CoRR abs /2203.00662, March, 2022

Ang Li, Chao Shen, Xuewen Liao, Christos Masouros, A. Lee Swindlehurst: **Block-Level Interference Exploitation Precoding without Symbol-by-Symbol Optimization.** CoRR abs/2203.12502, March, 2022

Publications

Publications

The following papers were published by CECS affiliates from January 2022 through March 2022 (and unreported papers from previous eNews).

Author, Title, Publication

Other Publications

Mohammed E. Fouda, Hasan Erdem Yantir, Ahmed M. Eltawil, Fadi J. Kurdahi: **In-memory Associative Processors: Tutorial, Potential, and Challenges.** CoRR abs/2203.00662, March, 2022

Xunzhao Yin, Franz Müller, Qingrong Huang, Chao Li, Mohsen Imani, Zeyu Yang, Jiahao Cai, Maximilian Lederer, Ricardo Olivo, Nellie Laleni, Shan Deng, Zijian Zhao, Cheng Zhuo, Thomas Kämpfe, Kai Ni: **An Ultra-Compact Single FeFET Binary and Multi-Bit Associative Search Engine.** CoRR abs/2203.07948, March, 2022

Ulices Santa Cruz, Yasser Shoukry: **NNLander-VeriF: A Neural Network Formal Verification Framework for Vision-Based Autonomous Aircraft Landing.** CoRR abs/2203.15841, March, 2022

Jinane Bazzi, Jana Sweidan, Mohammed E. Fouda, Rouwaida Kanj, Ahmed M. Eltawil: **Efficient Analog CAM Design.** CoRR abs/2203.02500, March, 2022
Yoshitomo Matsubara, Ruihan Yang, Marco Levorato, Stephan Mandt: **SC2: Supervised Compression for Split Computing.** CoRR abs/2203.08875, March, 2022

Chenxi Wang, Yifan Qiao, Haoran Ma, Shi Liu, Yiying Zhang, Wenguang Chen, Ravi Netravali, Miryung Kim, Guoqing Harry Xu: **Canvas: Isolated and Adaptive Swapping for Multi-Applications on Remote Memory.** CoRR abs/2203.09615, March, 2022

Junjie Shen, Ningfei Wang, Ziwen Wan, Yunpeng Luo, Takami Sato, Zhisheng Hu, Xinyang Zhang, Shengjian Guo, Zhenyu Zhong, Kang Li, Ziming Zhao, Chunming Qiao, Qi Alfred Chen: **SoK: On the Semantic AI Security in Autonomous Driving.** CoRR abs/2203.05314, March, 2022

Arnav Vaibhav Malawade, Trier Mortlock, Mohammad Abdullah Al Faruque: **EcoFusion: Energy-Aware Adaptive Sensor Fusion for Efficient Autonomous Vehicle Perception.** CoRR abs/2202.11330, February, 2022

Salma Elmalaki, Bo-Jhang Ho, Moustafa Alzantot, Yasser Shoukry, Mani B. Srivastava: **VindiCo: Privacy Safeguard Against Adaptation Based Spyware in Human-in-the-Loop IoT.** CoRR abs/2202.01348, February, 2022

Emmanouil Alimpertis, Athina Markopoulou, Carter T. Butts, Evita Bakopoulou, Konstantinos Psounis: **A Unified Prediction Framework for Signal Maps.** CoRR abs/2202.03679, February, 2022

Hieu Le, Salma Elmalaki, Athina Markopoulou, Zubair Shafiq: **AutoFR: Automated Filter Rule Generation for Adblocking.** CoRR abs/2202.12872, February, 2022

Ang Li, Chao Shen, Xuewen Liao, Christos Masouros, A. Lee Swindlehurst: **Practical Interference Exploitation Precoding without Symbol-by-Symbol Optimization: A Block-Level Approach.** CoRR abs/2202.09830, February, 2022

Zhangjie Peng, Ruisong Weng, Cunhua Pan, Gui Zhou, Marco Di Renzo, A. Lee Swindlehurst: **Robust Transmission Design for RIS-assisted Secure Multiuser Communication Systems in the Presence of Hardware Impairments.** CoRR abs/2202.11860, February, 2022

Sina Shahhosseini, Dongjoo Seo, Anil Kanduri, Tianyi Hu, Sung-Soo Lim, Bryan Donyanavard, Amir M. Rahmani, Nikil D. Dutt: **Online Learning for Orchestration of Inference in Multi-User End-Edge-Cloud Networks.** CoRR abs/2202.10541, February, 2022

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Other Publications

Sina Shahhosseini, Tianyi Hu, Dongjoo Seo, Anil Kanduri, Bryan Donyanavard, Amir M. Rahmani, Nikil D. Dutt: **Hybrid Learning for Orchestrating Deep Learning Inference in Multi-user Edge-cloud Networks.** CoRR abs/2202.11098, February, 2022

Ender Ayanoglu, Filippo Capolino, A. Lee Swindlehurst: **Wave-Controlled Metasurface-Based Reconfigurable Intelligent Surfaces.** CoRR abs/2202.03273, February, 2022

Hieu Le, Salma Elmalaki, Athina Markopoulou, Zubair Shafiq:
AutoFR: Automated Filter Rule Generation for Adblocking. CoRR abs/2202.12872, February, 2022

Sina Shahhosseini, Dongjoo Seo, Anil Kanduri, Tianyi Hu, Sung-Soo Lim, Bryan Donyanavard, Amir M. Rahmani, Nikil D. Dutt: **Online Learning for Orchestration of Inference in Multi-User End-Edge-Cloud Networks.** CoRR abs/2202.10541, February, 2022

Sina Shahhosseini, Tianyi Hu, Dongjoo Seo, Anil Kanduri, Bryan Donyanavard, Amir M. Rahmani, Nikil D. Dutt: **Hybrid Learning for Orchestrating Deep Learning Inference in Multi-user Edge-cloud Networks.** CoRR abs/2202.11098, February, 2022

Sina Shahhosseini, Dongjoo Seo, Anil Kanduri, Tianyi Hu, Sung-Soo Lim, Bryan Donyanavard, Amir M. Rahmani, Nikil D. Dutt: **Online Learning for Orchestration of Inference in Multi-User End-Edge-Cloud Networks.** CoRR abs/2202.10541, February, 2022

Sina Shahhosseini, Tianyi Hu, Dongjoo Seo, Anil Kanduri, Bryan Donyanavard, Amir M. Rahmani, Nikil D. Dutt: **Hybrid Learning for Orchestrating Deep Learning Inference in Multi-user Edge-cloud Networks.** CoRR abs/2202.11098, February, 2022

Min-Yih Hsu, David Gens, Michael Franz: **MCAD: Beyond Basic-Block Throughput Estimation Through Differential, Instruction-Level Tracing.** CoRR abs/2201.04804, January, 2022

Amira Guesmi, Khaled N. Khasawneh, Nael B. Abu-Ghazaleh, Ihsen Alouani:
ROOM: Adversarial Machine Learning Attacks Under Real-Time Constraints. CoRR abs/2201.01621, January, 2022

Davide Callegaro, Francesco Restuccia, Marco Levorato: **SmartDet: Context-Aware Dynamic Control of Edge Task Offloading for Mobile Object Detection.** CoRR abs/2201.04235, January, 2022

Junchen Zhao, Yurun Song, Junlin Wang, Ian G. Harris: **GAP-Gen: Guided Automatic Python Code Generation.** CoRR abs/2201.08810, January, 2022

Salar Jafarlou, Jocelyn Lai, Zahra Mousavi, Sina Labbaf, Ramesh C. Jain, Nikil D. Dutt, Jessica L. Borelli, Amir M. Rahmani: **Objective Prediction of Tomorrow's Affect Using Multi-Modal Physiological Data and Personal Chronicles: A Study of Monitoring College Student Well-being in 2020.** CoRR abs/2201.11230, January, 2022

Milad Asgari Mehrabadi, Seyed Amir Hossein Aqajari, Amir Hosein Afandizadeh Zargari, Nikil D. Dutt, Amir M. Rahmani: **Novel Blood Pressure Waveform Reconstruction from Photoplethysmography using Cycle Generative Adversarial Networks.** CoRR abs/2201.09976, January, 2022

Publications

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The following papers were published by CECS affiliates from January 2022 through March 2022 (and unreported papers from previous eNews).

Author, Title, Publication **Other Publications**

Upendra Bartwal, Subhasis Mukhopadhyay, Rohit Negi, Sandeep K. Shukla: **Security Orchestration, Automation, and Response Engine for Deployment of Behavioural Honeypots.** CoRR abs/2201.05326, January, 2022

Wenzhe Guo, Mohammed E. Fouda, Ahmed M. Eltawil, Khaled Nabil Salama: **Efficient Training of Spiking Neural Networks with Temporally-Truncated Local Backpropagation through Time.** CoRR abs/2201.07210, January, 2022

Vipin Kumar Kukkala, Sooryaa Vignesh Thiruloga, Sudeep Pasricha: **Roadmap for Cybersecurity in Autonomous Vehicles.** CoRR abs/2201.10349, January, 2022

Ziwen Wan, Junjie Shen, Jalen Chuang, Xin Xia, Joshua Garcia, Jiaqi Ma, Qi Alfred Chen: **Too Afraid to Drive: Systematic Discovery of Semantic DoS Vulnerability in Autonomous Driving Planning under Physical-World Attacks.** CoRR abs/2201.04610, January, 2022

Qingzhao Zhang, Shengtuo Hu, Jiachen Sun, Qi Alfred Chen, Z. Morley Mao: **On Adversarial Robustness of Trajectory Prediction for Autonomous Vehicles.** CoRR abs/2201.05057, January, 2022

Kenneth Stewart, Emre Neftci: **Meta-learning Spiking Neural Networks with Surrogate Gradient Descent.** CoRR abs/2201.10777, January, 2022

Abhishek Balasubramaniam, Sudeep Pasricha: **Object Detection in Autonomous Vehicles: Status and Open Challenges.** CoRR abs/2201.07706, January, 2022

Salar Jafarlou, Jocelyn Lai, Zahra Mousavi, Sina Labbaf, Ramesh C. Jain, Nikil D. Dutt, Jessica L. Borelli, Amir M. Rahmani: **Objective Prediction of Tomorrow's Affect Using Multi-Modal Physiological Data and Personal Chronicles: A Study of Monitoring College Student Well-being in 2020.** CoRR abs/2201.11230, January, 2022

Milad Asgari Mehrabadi, Seyed Amir Hossein Aqajari, Amir Hosein Afandizadeh Zargari, Nikil D. Dutt, Amir M. Rahmani: **Novel Blood Pressure Waveform Reconstruction from Photoplethysmography using Cycle Generative Adversarial Networks.** CoRR abs/2201.09976, January, 2022

Arnav Vaibhav Malawade, Trier Mortlock, Mohammad Abdullah Al Faruque: **HydraFusion: Context-Aware Selective Sensor Fusion for Robust and Efficient Autonomous Vehicle Perception.** CoRR abs/2201.06644, January, 2022

Arthi Padmanabhan, Neil Agarwal, Anand P. Iyer, Ganesh Ananthanarayanan, Yuanchao Shu, Nikolaos Karianakis, Guoqing Harry Xu, Ravi Netravali: **GEMEL: Model Merging for Memory-Efficient, Real-Time Video Analytics at the Edge.** CoRR abs/2201.07705, January, 2022

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