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CECS eNEWS

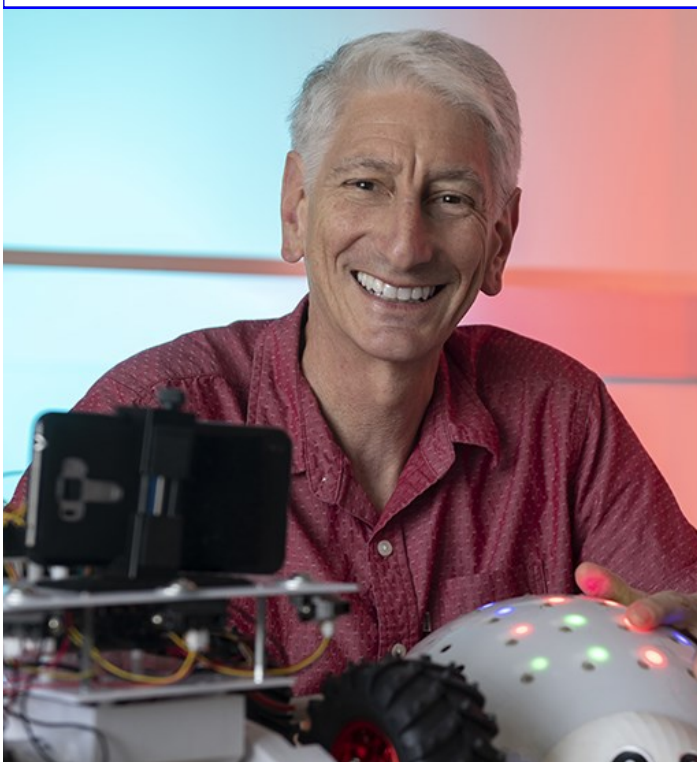


Center for Embedded and Cyber-physical Systems, University of California, Irvine

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Krichmar's Research with AI Featured on *Medium*



A groundbreaking project by CECS affiliated Professor of Cognitive Science and Computer Science Jeff Krichmar and the Neurorobotics Lab explored methods to bring primary consciousness into machines using Gerald Edelman's Extended Theory of Neuronal Group Selection.

Following the theory, which suggests that consciousness emerges through interactions among neuronal groups, similar to the process of natural selection, Prof. Krichmar and team aimed to mimic the evolutionary development of consciousness in artificial intelligence. The Neurorobotics Lab have initiated environments that simulate neuronal group selections, creating AI that can recognize its environment, make predictions, and learn from interactions without human intervention.

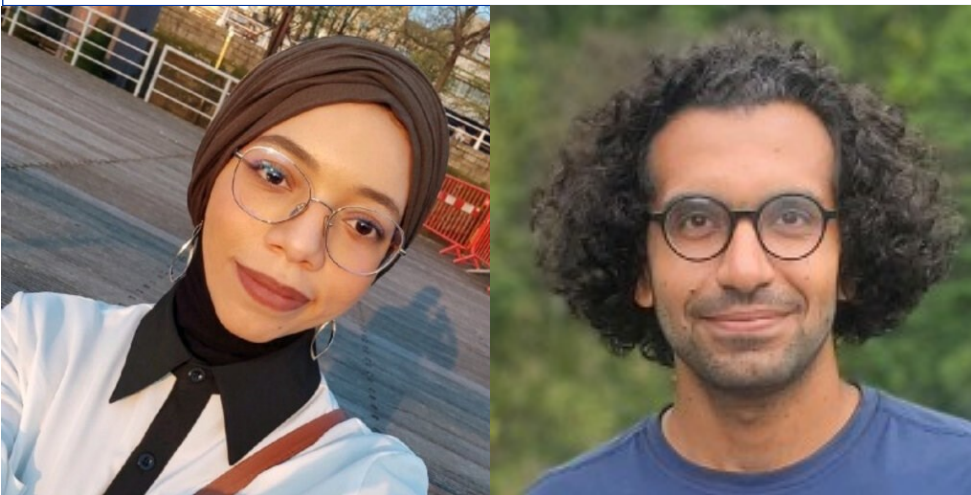
Prof. Krichmar and team's dictation and achievements were featured on popular article platform *Medium*.

NDSS'24 Best Technical Poster Award

At the Network and Distributed System Security Symposium (NDSS '24), CECS affiliated PhD student Fayzah Alshammari received Best Technical Poster Award for paper "On the Cyber-Physical Security of Commercial Indoor Delivery Robot Systems." Alshammari's research aimed to improve security through analysis on systems in real-world commercial settings. Alshammari is under the advisory of CECS affiliated Professor Alfred Chen.



HiPEAC '23 Paper Award



The Steering Committee of the European Network on High Performance, Edge, and Cloud Computing (HiPEAC) has awarded Paper Award for the paper "Map-and-conquer: Energy-efficient

mapping of dynamic neural nets onto heterogeneous MPSoCs" by CECS affiliated students Halima Bouzidi (left), Mohanad Odema (right), guided by CECS affiliated Prof. Mohammad Al Faruque.

ICCPS '24 Accepted Paper



Our paper, “Rampo: A CEGAR-based Integration of Binary Code Analysis and System Falsification for Cyber-Kinetic Vulnerability Detection” by student Kohei Tsujio, guided by Prof. Mohammad Al Faruque, was accepted to present at ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS) 2024.

ACM TCPS '24 Accepted Paper

Paper by students Trier Mortlock (left), Arnav Vaibhav Malawade (right), Kohei Tsujio, and Prof. Mohammad Al Faruque (middle) titled “CASTNet: A Context-Aware, Spatio-Temporal Dynamic Motion Prediction Ensemble for Autonomous Driving” was accepted by the ACM Transactions on Cyber-Physical Systems (ACM TCPS) 2024.



DAC '24 Accepted Paper



Paper “SMORE: Similarity-Based Hyperdimensional Domain Adaptation for Multi-Sensor Time Series Classification” by student Junyao Wang and Prof. Mohammad Al Faruque was accepted by Design Automation Conference (DAC) 2024. Congrats students!

Sani Nassif - “Modeling, Analysis, Simulation, and Optimization. The Bedrock of Engineering”

Title: Modeling, Analysis, Simulation, and Optimization. The Bedrock of Engineering

Speaker: Dr. Sani Nassif (right)

Date and Time: Friday, January 26, 2 p.m.

Location: EH 2430

Hosted By: Prof. Fadi Kurdahi (left)

**Naehyuck Chang - “Electrification of Mobilities, the Challenges and Opportunities”**

Title: Electrification of Mobilities, the Challenges and Opportunities

Speaker: Dr. Naehyuck Chang (middle)

Date and Time: Tuesday, February 6, 3 p.m.

Location: EH 2430

Hosted By: Prof. Fadi Kurdahi (left)

Irfan Ahmed - “Searching for Digital Evidence in Industrial Control Systems”

Title: Searching for Digital Evidence in Industrial Control Systems

Speaker: Prof. Irfan Ahmed (4th left)

Date and Time: Tuesday, February 20, 10:30 p.m.

Location: EH 2430

Hosted By: Prof. Shoukry and Prof. Al Faruque (3rd, 5th from left)



Visitor Profile: Dr. Abdulilah Mayet



Prof. Abdulilah Mayet received his PhD from King Abdullah University of Science and Technology. Currently, he is an Assistant Professor at King Khalid University in Saudi Arabia. Prof. Mayet is a founding member of the Saudi Leadership Society and a member of the 2030 Leaders Program for Misk Foundation.

Prof. Abdulilah Mayet joined CECS as a visiting scholar from September 1, 2023-June 30, 2023, hosted by Prof. Fadi Kurdahi, CECS director. Prof.

Mayet was selected in the 2023-2024 Fulbright Visiting Scholar Program. The Fulbright Program, sponsored by the US government, allows US institutions to host scholars from other parts of the world in order to increase mutual understanding, student engagement, collegial collaboration, and institutional capacity building. Prof. Mayet is one of the thousand annually-selected visiting scholar of the Fulbright Program, who collaborated UC Irvine and CECS.

Prof. Mayet is working with Prof. Kurdahi's group on collaborative research in NEMS switches.

Publications

The following papers were published by CECS affiliates from January 2024 through March 2024 (and unreported papers from previous eNews).

Author, Title, Publication

Conference Proceedings

Ahamed Al Nahian, Brian Demsky: **FlowProf: Profiling Multi-threaded Programs using Information-Flow**. CC 2024: 137-149, March 2-3, 2024, Edinburgh, United Kingdom

Chen Ma, Ningfei Wang, Qi Alfred Chen, Chao Shen: **SlowTrack: Increasing the Latency of Camera-Based Perception in Autonomous Driving Using Adversarial Examples**. AAAI 2024: 4062-4070, February 20-27, 2024, Vancouver, Canada

Nicholas Alonso, Jeffrey L. Krichmar, Emre Neftci: **Understanding and Improving Optimization in Predictive Coding Networks**. AAAI 2024: 10812-10820, February 20-27, 2024, Vancouver, Canada

Journal Articles

Amr M. Abdelhady, Abdulkadir Celik, Carles Diaz-Vilor, Hamid Jafarkhani, Ahmed M. Eltawil: **Laser-Empowered UAVs for Aerial Data Aggregation in Passive IoT Networks**. IEEE Open J. Commun. Soc. 5: 1609-1623, March, 2024

Riku Funada, María Santos, Ryuichi Maniwa, Junya Yamauchi, Masayuki Fujita, Mitsuji Sampei, Magnus Egerstedt: **Distributed Coverage Hole Prevention for Visual Environmental Monitoring With Quadcopters Via Nonsmooth Control Barrier Functions**. IEEE Trans. Robotics 40: 1546-1565, February, 2024

Mohanad Odema, Mohammad Abdullah Al Faruque: **PrivyNAS: Privacy-Aware Neural Architecture Search for Split Computing in Edge-Cloud Systems**. IEEE Internet Things J. 11(4): 6638-6651, February, 2024

Wenzhe Guo, Mohammed E. Fouda, Ahmed M. Eltawil, Khaled Nabil Salama: **Supervised Local Training With Backward Links for Deep Neural Networks**. IEEE Trans. Artif. Intell. 5(2): 854-867, February, 2024

Ahmet M. Elbir, Abdulkadir Celik, Ahmed M. Eltawil: **NEAT-MUSIC: Auto-Calibration of DOA Estimation for Terahertz-Band Massive MIMO Systems**. IEEE Wirel. Commun. Lett. 13(2): 451-455, February, 2024

Zheng Xiao, Weijie Chen, Yunchuan Qin, Fan Wu, Anthony Theodore Chronopoulos, Alex Nicolau, Kenli Li: **NGLIC: A Nonaligned-Row Legalization Approach for 3-D Interdie Connection**. IEEE Trans. Comput. Aided Des. Integr. Circuits Syst. 43(2): 404-416, February, 2024

Tatsuya Miyano, Justin Romberg, Magnus Egerstedt: **Globally Optimal Assignment Algorithm for Collective Object Transport Using Air-Ground Multirobot Teams**. IEEE Trans. Control. Syst. Technol. 32(1): 258-265, January, 2024

Kamilya Smagulova, Mohammed E. Fouda, Ahmed M. Eltawil: **Thermal Heating in ReRAM Crossbar Arrays: Challenges and Solutions**. IEEE Open J. Circuits Syst. 5: 28-41, January, 2024

Mingzhe Jiang, Riitta Rosio, Sanna Salanterä, Amir M. Rahmani, Pasi Liljeberg, Daniel Santos da Silva, Victor Hugo C. de Albuquerque, Wanqing Wu: **Personalized and adaptive neural networks for pain detection from multi-modal physiological features**. Expert Syst. Appl. 235: 121082, January, 2024

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The following papers were published by CECS affiliates from January 2024 through March 2024 (and unreported papers from previous eNews).

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Other Publications

Zhongqi Yang, Elahe Khatibi, Nitish Nagesh, Mahyar Abbasian, Iman Azimi, Ramesh C. Jain, Amir M. Rahmani: **ChatDi-et: Empowering Personalized Nutrition-Oriented Food Recommender Chatbots through an LLM-Augmented Framework**. CoRR abs/2403.00781, March, 2024

Kianoosh Kazemi, Iina Ryhtä, Iman Azimi, Hannakaisa Niela-Vilén, Anna Axelin, Amir M. Rahmani, Pasi Liljeberg: **Impact of Physical Activity on Quality of Life During Pregnancy: A Causal ML Approach**. CoRR abs/2402.16909, February, 2024

Francesco Malandrino, Giuseppe Di Giacomo, Marco Levorato, Carla-Fabiana Chiasserini: **Dependable Distributed Training of Compressed Machine Learning Models**. CoRR abs/2402.14346, February, 2024

Mike Heddes, Igor Nunes, Tony Givargis, Alex Nicolau: **Convolution and Cross-Correlation of Count Sketches Enables Fast Cardinality Estimation of Multi-Join Queries**. CoRR abs/2402.15953, February, 2024

Abdulkadir Celik, Ahmed M. Eltawil: **At the Dawn of Generative AI Era: A Tutorial-cum-Survey on New Frontiers in 6G Wireless Intelligence**. CoRR abs/2402.18587, February, 2024

Eugen Slapak, Matús Dopiriak, Mohammad Abdullah Al Faruque, Juraj Gazda, Marco Levorato: **Distributed Radiance Fields for Edge Video Compression and Metaverse Integration in Autonomous Driving**. CoRR abs/2402.14642, February, 2024

Junyao Wang, Mohammad Abdullah Al Faruque: **SMORE: Similarity-based Hyperdimensional Domain Adaptation for Multi-Sensor Time Series Classification**. CoRR abs/2402.13233, February, 2024

Christopher A. Johnson, Piyashi Biswas, Rubi Tapia, Jill See, Lucy Dodakian, Vicky Chan, Po T. Wang, Zoran Nenadic, An H. Do, David J. Reinkensmeyer: **The weak relationship between ankle proprioception and gait speed after stroke a robotic assessment study**. CoRR abs/2402.11110, February, 2024

Yang Ni, Zhuowen Zou, Wenjun Huang, Hanning Chen, William Youngwoo Chung, Samuel Cho, Ranganath Krishnan, Pietro Mercati, Mohsen Imani: **HEAL: Brain-inspired Hyperdimensional Efficient Active Learning**. CoRR abs/2402.11223, February, 2024

Wenjun Huang, Arghavan Rezvani, Hanning Chen, Yang Ni, Sanggeon Yun, Sungheon Jeong, Mohsen Imani: **A Plug-in Tiny AI Module for Intelligent and Selective Sensor Data Transmission**. CoRR abs/2402.02043, February, 2024

Yong Huang, Charles A. Downs, Amir M. Rahmani: **Optimizing Warfarin Dosing Using Contextual Bandit: An Offline Policy Learning and Evaluation Method**. CoRR abs/2402.11123, February, 2024

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Other Publications

Ziyu Wang, Zhongqi Yang, Iman Azimi, Amir M. Rahmani: **Differential Private Federated Transfer Learning for Mental Health Monitoring in Everyday Settings: A Case Study on Stress Detection**. CoRR abs/2402.10862, February, 2024

Mahyar Abbasian, Zhongqi Yang, Elahe Khatibi, Pengfei Zhang, Nitish Nagesh, Iman Azimi, Ramesh C. Jain, Amir M. Rahmani: **Knowledge-Infused LLM-Powered Conversational Health Agent: A Case Study for Diabetes Patients**. CoRR abs/2402.10153, February, 2024

Ali Rostami, Ramesh C. Jain, Amir M. Rahmani: **Food Recommendation as Language Processing (F-RLP): A Personalized and Contextual Paradigm**. CoRR abs/2402.07477, February, 2024

Mohamad Fakih, Rahul Dharmaji, Yasamin Moghaddas, Gustavo Quiros Araya, Oluwatosin Ogundare, Mohammad Abdullah Al Faruque: **LLM4PLC: Harnessing Large Language Models for Verifiable Programming of PLCs in Industrial Control Systems**. CoRR abs/2401.05443, January, 2024

Ziwen Wan, Yuqi Huai, Yuntianyi Chen, Joshua Garcia, Qi Alfred Chen: **Towards Automated Driving Violation Cause Analysis in Scenario-Based Testing for Autonomous Driving Systems**. CoRR abs/2401.10443, January, 2024

Takami Sato, Sri Hrushikesh Varma Bhupathiraju, Michael Clifford, Takeshi Sugawara, Qi Alfred Chen, Sara Rampazzi: **Invisible Reflections: Leveraging Infrared Laser Reflections to Target Traffic Sign Perception**. CoRR abs/2401.03582, January, 2024

Ahmet M. Elbir, Abdulkadir Celik, Ahmed M. Eltawil, Moeness G. Amin: **Index Modulation for Integrated Sensing and Communications: A Signal Processing Perspective**. CoRR abs/2401.08186, January, 2024

Mike Heddes, Narayan Srinivasa, Tony Givargis, Alexandru Nicolau: **Always-Sparse Training by Growing Connections with Guided Stochastic Exploration**. CoRR abs/2401.06898, January, 2024

Ye Qiao, Haocheng Xu, Yifan Zhang, Sitao Huang: **MicroNAS: Zero-Shot Neural Architecture Search for MCUs**. CoRR abs/2401.08996, January, 2024

Sanggeon Yun, Hanning Chen, Ryoza Masukawa, Hamza Errahmouni Barkam, Andrew Ding, Wenjun Huang, Arghavan Rezvani, Shaahin Angizi, Mohsen Imani: **HyperSense: Accelerating Hyper-Dimensional Computing for Intelligent Sensor Data Processing**. CoRR abs/2401.10267, January, 2024

Zhicheng Xu, Che-Kai Liu, Chao Li, Ruibin Mao, Jianyi Yang, Thomas Kämpfe, Mohsen Imani, Can Li, Cheng Zhuo, Xunzhao Yin: **FeReX: A Reconfigurable Design of Multi-bit Ferroelectric Compute-in-Memory for Nearest Neighbor Search**. CoRR abs/2401.05708, January, 2024

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Other Publications

Kianoosh Kazemi, Iman Azimi, Pasi Liljeberg, Amir M. Rahmani: **Robust CNN-based Respiration Rate Estimation for Smartwatch PPG and IMU**. CoRR abs/2401.05469, January, 2024

Joseph Bursey, Ardalan Amiri Sani, Zhiyun Qian: **SyzRetrospector: A Large-Scale Retrospective Study of Syzbot**. CoRR abs/2401.11642, January, 2024

Seyed Amir Hossein Aqajari, Sina Labbaf, Phuc Hoang Tran, Brenda Nguyen, Milad Asgari Mehrabadi, Marco Levorato, Nikil D. Dutt, Amir M. Rahmani: **Context-Aware Stress Monitoring using Wearable and Mobile Technologies in Everyday Settings**. CoRR abs/2401.05367, December, 2023

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

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