In December of 1983, CECS Founding Director and Professor Daniel Gajski was the editor of a special issue of IEEE Computer on “New VLSI Tools”. In the “Guest Editor Introduction” he and co-editor Robert Kuhn introduced Gajski-Kuhn Y-Chart which became a popular in presenting and explaining the design strategies and tools. Y-Chart allows designers and tool creators to better visualize design hierarchies and design strategies by using the three branches: behavioral/functional, structural, and physical/geometric representation and several layers of granularity. The basic three views form the Y shape and thus created the name of Y-Chart.

The Y-Chart is widely used for design of computer components and developing design strategies and tools. Since 1983, Prof. Gajski’s introduction on Y-Chart has been cited over 46,000 times, and even now in 2024. It is frequently used at university’s courses and companies making design and tools for computer components. We would like to highlight how his work has transcended through time and spearheaded the way of business and use of different strategies for computer based system design all over the world.
MECPS Symposium 2023

On Friday December 9, 2023, MECPS hosted the annual end-of-year symposium to showcase the capstone projects of the MECPS graduating students as well as projects from the first year cohort. This year, three teams tied for second and one team won first place for the Best Project Award.

First Place Winner:
- Brain Padilla, Gabriel Rizko, and Andre Alain Tabourian - “Power, Communication, and Control using NFC and WPT”

Second Place Winners:
- Jeet Shah, Rushabh Patel, and Vandit Patel - “Autonomous UAV swarm for Extensive Surveillance”
- Jan Wojtkowski and Joe Huang - “AR Assistant”
Awards and Honors

Al Faruque Awarded 378K for Autonomous Vehicle Project

CECS affiliated Professor of Electrical Engineering and Computer Science Mohammad Al Faruque received $378K in award over three years for his project “Adaptive and Efficient Perception for Autonomous Ground Vehicle Operating in Highly Stochastic Environments under Sensing Uncertainties”. With the funding from the U.S. Army Automotive Research Center, Prof. Al Faruque and his team will study the computational constraints and sensor fusion methods to better military autonomous vehicle on uncertain roads.

Jun’s Paper Appears on 25-year Retrospective Edition of ISCA’23

Sang-Woo Jun, CECS affiliated Professor of Computer Science, explores the possibility of improving system efficient without sacrificing performance in his co-authored paper “GraFBoost: Using Accelerated Flash Storage for External Graph Analytics.” His paper from five years ago explained that using a solid-state drive instead of dynamic RAM for I/O intensive graph analytics can cut cost and power usage by four fold without significant loss of performance.

For his extraordinary discovery, Prof. Jun’s work was selected as one of the 98 papers to appear on the 25-year retrospective edition of the International Symposium on Computer Architecture (ISCA 2023).
Awards and Honors

Shoukry’s UAM Project Awarded 2M

CECS affiliated Associate Professor of Electrical Engineering and Computer Science Yasser Shoukry and team were awarded $2 million over four years by the Smart and Connected Communities and the National Science Foundation for their project “Community-Driven Design of Fair Urban Air Mobility Transportation Management Systems.” Prof. Shoukry and team will investigate and design durable Urban Air Mobility (UAM) infrastructures to help traffic congestion that will not discriminate or reinforce socioeconomic inequality.

Dang Won Excellence in Digital Learning

Quoc-Viet Dang, CECS affiliated Assistant Professor of Electrical Engineering and Computer Science, was honored with Excellence in Digital Learning at UCI Teach Day and the 31st Annual Celebration of Teaching. Prof. Dang proves to be an exceptional teacher with his usage in teaching technology and digital course engagement. He incorporated a single case study across multiple courses, which allows students to build on top of pre-existing knowledge and continue their investigation.

Imani Received Young Investigator Award

The Office of Naval Research (ONR) awarded CECS affiliated Assistant Professor in Computer Science Mohsen Imani with the Young Investigator Award. Prof. Imani, who also was also honored with Defense Advanced Research Projects Agency’s Young Faculty Award, is a pioneer in research on hyperdimensional computing as a neuro-symbolic AI technique. Him and his lab investigate the intersection of neuroscience, AI, and embedded systems. With this award, Prof. Imani will also receive a fund of $750K over three years for his brilliant effort.
Achim Rettberg - “Requirements and Applications of Cloud-based Services within the Automotive Edge”

**Title:** Requirements and Applications of Cloud-based Services within the Automotive Edge  
**Speaker:** Achim Rettberg, Professor for Human Machine Interface Technologies at the University of Applied Science Hamm-Lippstadt  
**Date and Time:** Friday, July 14, 10:00 a.m.  
**Location:** EH 2430  
**Hosted By:** Prof. Dutt  

Charles Steinmetz - “An Intergraded Environment for Modeling and Deploying Digital Twins”

**Title:** An Intergraded Environment for Modeling and Deploying Digital Twins  
**Speaker:** Charles Steinmetz, Ph.D. Student at the University of Oldenburg and Research Assistant at the University of Applied Science Hamm-Lippstadt  
**Date and Time:** Friday, July 14, 11:00 a.m.  
**Location:** EH 2430  
**Hosted by:** Prof. Dutt  

Jason Yu - “Capstone: A Capability-based Foundation for Trustless Secure Memory Access”

**Title:** Capstone: A Capability-based Foundation for Trustless Secure Memory Access  
**Speaker:** Jason Yu, Fourth-year Ph.D. Student at the School of Computing, National University of Singapore  
**Date and Time:** Monday, August 7, 11:00 a.m.  
**Location:** EH 2430  
**Hosted By:** Prof. Li
Francky Catthoor - “Pareto Exploration Methodology for Future Logic Technology Options in Domain-Specific Processors”

**Title:** Pareto Exploration Methodology for Future Logic Technology Options in Domain-Specific Processors

**Speaker:** Dr. Francky Catthoor, IMEC Fellow, Professor in the Department of Electrical Engineering at KU Leuven

**Date and Time:** Tuesday, September 26, 2:00 p.m.

**Location:** EH 2430

**Hosted by:** Prof. Dutt and Prof. Krichmar

Gustavo Quiros - ECPS 209 Seminar Series: Industrial Automation CPS

**Title:** ECPS 209 Seminar Series: Industrial Automation CPS

**Speaker:** Dr. Gustavo Quiros, Research and Technology Manager at Siemens Technology

**Date and Time:** Mondays and Wednesdays of October 2, 4, 9, 11, 16, 18, 2:00 p.m.

**Location:** SSPA 1165

**Hosted By:** Prof. Huang
Yuhao Zhu - “Human-Centered Visual Computing: Harnessing Symbiosis Between Computer Architecture, Imaging, and Biological Perception”

**Title:** Human-Centered Visual Computing: Harnessing Symbiosis Between Computer Architecture, Imaging, and Biological Perception

**Speaker:** Dr. Yuhao Zhu, Assistant Professor in the Department of Computer Science at the University of Rochester

**Date and Time:** Thursday, October 12, 11:00 a.m.

**Location:** EH 2430

**Hosted By:** Prof. Kwon

Judit Giró Benet - “Three Things I Learned Turning My Side Hustle into a FemTech Startup”

**Title:** Three Things I Learned Turning My Side Hustle into a FemTech Startup

**Speaker:** Judit Giró Benet, Co-Founder and CEO of The Blue Box

**Date and Time:** Monday, October 30, 9:30 a.m.

**Location:** SSTR 100

**Hosted By:** Prof. Kurdahi
Guohao Dai - “Sparse Computing and Large Language Model: from AI 1.0 to AI 2.0”

**Title:** Sparse Computing and Large Language Model: from AI 1.0 to AI 2.0

**Speaker:** Guohao Dai, Associate Professor at Shanghai Jiao Tong University

**Date and Time:** Friday, November 3, 10:30 p.m.

**Location:** ISEB 4020

**Hosted by:** Prof. Huang

Imtiaz Karim - “Systematic Security Analysis of Cellular Network Specifications and Implementations”

**Title:** Systematic Security Analysis of Cellular Network Specifications and Implementations

**Speaker:** Dr. Imtiaz Karim, Postdoctoral Research Associate in the Department of Computer Science at Purdue University

**Date and Time:** Thursday, December 7, 2:30 p.m.

**Location:** EH 2430

**Hosted By:** Prof. Li
## Author, Title, Publication

<table>
<thead>
<tr>
<th>Author, Title, Publication</th>
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<tbody>
<tr>
<td>Yurun Song, Junchen Zhao, Spencer Koehler, Amir Abdullah, Ian G. Harris: <strong>PCMID: Multi-Intent Detection through Supervised Prototypical Contrastive Learning.</strong> EMNLP (Findings) 2023: 9481-9495, December 6-10, 2023, Singapore, Singapore</td>
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<tr>
<td>Weixiao Zhou, Gengyao Li, Xianfu Cheng, Xinnian Liang, Junnan Zhu, Feifei Zhai, Zhoujun Li: <strong>Multi-Stage Pre-training Enhanced by ChatGPT for Multi-Scenario Multi-Domain Dialogue Summarization.</strong> EMNLP (Findings) 2023: 6893-6908, December 6-10, 2023, Singapore, Singapore</td>
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<tr>
<td>Hamza Errahmouni Barkam, Sanggeon Yun, Hanning Chen, Paul Gensler, Albi Mema, Andrew Ding, George Michelogiannakis, Hussam Amrouch, Mohsen Imani: <strong>Reliable Hyperdimensional Reasoning on Unreliable Emerging Technologies.</strong> ICCAD 2023: 1-9, October 28 – November 2, 2023, San Francisco, CA, USA</td>
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<tr>
<td>Jiyoung An, Esmerald Aliaj, Sang-Woo Jun: <strong>Barad-dur: Near-Storage Accelerator for Training Large Graph Neural Networks.</strong> PACT 2023: 225-237, October 21-25, 2023, Vienna, Austria</td>
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<tr>
<td>Jiaqi Bai, Hongcheng Guo, Jiaheng Liu, Jian Yang, Xinnian Liang, Zhao Yan, Zhoujun Li: <strong>GripRank: Bridging the Gap between Retrieval and Generation via the Generative Knowledge Improved Passage Ranking.</strong> CIKM 2023: 36-46, October 21-25, 2023, Birmingham, United Kingdom</td>
<td></td>
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<tr>
<td>Hanning Chen, Yeseong Kim, Elaheh Sadredini, Saransh Gupta, Hugo Latapie, Mohsen Imani: <strong>Sparsity Controllable Hyperdimensional Computing for Genome Sequence Matching Acceleration.</strong> VLSI-SoC 2023: 1-6, October 16-18, 2023, Dubai, United Arab Emirates</td>
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<tr>
<td>Walaa Amer, Mariam Rakka, Rachid Karami, Minjun Seo, Mazen A. R. Saghir, Rouwaida Kanj, Fadi J. Kurdahi: <strong>Hardware Implementation and Evaluation of an Information Processing Factory.</strong> VLSI-SoC 2023: 1-6, October 16-18, 2023, Dubai, United Arab Emirates</td>
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<tr>
<td>Foroozan Karimzadeh, Mohsen Imani, Bahar Asgari, Ningyuan Cao, Yingyan Lin, Yan Fang: <strong>Memory-Based Computing for Energy-Efficient AI: Grand Challenges.</strong> VLSI-SoC 2023: 1-8, October 16-18, 2023, Dubai, United Arab Emirates</td>
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Zhongqi Yang, Iman Azimi, Salar Jafarlou, Sina Labbaf, Jessica L. Borelli, Nikil D. Dutt, Amir M. Rahmani: **Loneliness Forecasting Using Multi-modal Wearable and Mobile Sensing in Everyday Settings.** BSN 2023: 1-4, October 9-11, 2023, Boston, MA, USA

Ruochen Jiao, Juyang Bai, Xiangguo Liu, Takami Sato, Xiaowei Yuan, Qi Alfred Chen, Qi Zhu: **Learning Representation for Anomaly Detection of Vehicle Trajectories.** IROS 2023: 9699-9706, October 1-5, 2023, Detroit, MI, USA

Junjie Shen, Yunpeng Luo, Ziwen Wan, Qi Alfred Chen: **Lateral-Direction Localization Attack in High-Level Autonomous Driving: Domain-Specific Defense Opportunity via Lane Detection.** IROS 2023: 9707-9713, October 1-5, 2023, Detroit, MI, USA


Jiaqi Bai, Zhao Yan, Ze Yang, Jian Yang, Xinnian Liang, Hongcheng Guo, Zhoujun Li: **KnowPrefix-Tuning: A Two-Stage Prefix-Tuning Framework for Knowledge-Grounded Dialogue Generation.** ECML/PKDD (2) 2023: 525-542, September 18-22, 2023, Turin, Italy

Mohammad Abdullah Al Faruque, Muhammad Shafique: **Message from the Program Chair.** CODES+ISSS 2023: viii, September 17-22, 2023, Hamburg, Germany


Liran Wang, Xunzhu Tang, Yichen He, Changyu Ren, Shuhua Shi, Chaoran Yan, Zhoujun Li: **Delving into Commit-Issue Correlation to Enhance Commit Message Generation Models.** ASE 2023: 710-722, September 11-15, 2023, Luxembourg, Luxembourg

Hanning Chen, Ali Zakeri, Fei Wen, Hamza Errahmouni Barkam, Mohsen Imani: **HyperGRAF: Hyperdimensional Graph-Based Reasoning Acceleration on FPGA.** FPL 2023: 34-41, September 4-8, 2023, Gothenburg, Sweden

Pere Vergés, Igor Nunes, Mike Heddes, Tony Givargis, Alexandru Nicolau: **Accelerating Permute and N-Gram Operations for Hyperdimensional Learning in Embedded Systems.** RTCSA 2023: 253-260, August 30 – September 1, 2023, Niigata, Japan
The following papers were published by CECS affiliates from July 2023 through December 2023 (and unreported papers from previous eNews).

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Yang Ni, Yeseong Kim, Tajana Rosing, Mohsen Imani: *Algorithm-Hardware Co-Design for Efficient Brain-Inspired Hyperdimensional Learning on Edge (Extended Abstract)*. IJCAI 2023: 6474-6479, August 19-25, 2023, Macao, SAR, China


Xiang Li, Chaoyi Lu, Baojun Liu, Qifan Zhang, Zhou Li, Haixin Duan, Qi Li: *The Maginot Line: Attacking the Boundary of DNS Caching Protection*. USENIX Security Symposium 2023: 3153-3170, August 9-11, 2023, Anaheim, CA, USA


Yifan Zhang, Arnav Vaibhav Malawade, Xiaofang Zhang, Yuhui Li, DongHwan Seong, Mohammad Abdullah Al Faruque, Sitao Huang: *CARMA: Context-Aware Runtime Reconfiguration for Energy-Efficient Sensor Fusion*. ISLPED 2023: 1-6, August 7-8, 2023, Vienna, Austria


Jamie Lohoff, Zhenming Yu, Jan Finkbeiner, Anil Kaya, Kenneth Michael Stewart, Hin Wai Lui, Emre Neftci: *Interfacing Neuromorphic Hardware with Machine Learning Frameworks - A Review*. ICONS 2023: 16:1-16:8, August 1-3, 2023, Santa Fe, NM, USA


Mohsen Imani, Yeseong Kim, Behnam Khaleghi, Justin Morris, Haleh Alimohamadi, Farhad Imani, Hugo Latapie: *Hierarchical, Distributed and Brain-Inspired Learning for Internet of Things Systems*. ICDCS 2023: 511-522, July 18-21, 2023, Hong Kong


Bing Wang, Yan Gao, Zhoujun Li, Jian-Guang Lou: *Know What I don't Know: Handling Ambiguous and Unknown Questions for Text-to-SQL*. ACL (Findings) 2023: 5701-5714, July 9-14, 2023, Toronto, Canada
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<td>Jingyao Zhang, Mohsen Imani, Elaheh Sadredini: BP-NTT: Fast and Compact in-SRAM Number Theoretic Transform with Bit-Parallel Modular Multiplication. DAC 2023: 1-6, July 9-13, 2023, San Francisco, CA, USA</td>
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<td>Halima Bouzidi, Mohanad Odema, Hamza Ouarnoughi, Smail Niar, Mohammad Abdullah Al Faruque: Map-and-Conquer: Energy-Efficient Mapping of Dynamic Neural Nets onto Heterogeneous MPSoCs. DAC 2023: 1-6, July 9-13, 2023, San Francisco, CA, USA</td>
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<td>Igor Nunes, Mike Heddes, Tony Givargis, Alexandru Nicolau: An Extension to Basis-Hypervectors for Learning from Circular Data in Hyperdimensional Computing. DAC 2023: 1-6, July 9-13, 2023, San Francisco, CA, USA</td>
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<td>Junyao Wang, Sitao Huang, Mohsen Imani: DistHD: A Learner-Aware Dynamic Encoding Method for Hyperdimensional Classification. DAC 2023: 1-6, July 9-13, 2023, San Francisco, CA, USA</td>
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<tr>
<td>Junyao Wang, Hanning Chen, Mariam Issa, Sitao Huang, Mohsen Imani: Late Breaking Results: Scalable and Efficient Hyperdimensional Computing for Network Intrusion Detection. DAC 2023: 1-2, July 9-13, 2023, San Francisco, CA, USA</td>
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<tr>
<td>Dongjoo Seo, Ping-Xiang Chen, Huaicheng Li, Matias Björling, Nikil D. Dutt: Is Garbage Collection Overhead Gone? Case study of F2FS on ZNS SSDs. HotStorage 2023: 102-108, July 9, 2023, Boston, MA, USA</td>
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<tr>
<td>Marc Titus Trifan, Alexandru Nicolau, Alexander V. Veidenbaum: Enhancing the Privacy of Machine Learning via faster arithmetic over Torus FHE. CSCloud/EdgeCom 2023: 46-52, July 1-3, 2023, Xiangtan, Hunan, China</td>
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<td>James Ferlez, Yasser Shoukry: <strong>Polynomial-Time Reachability for LTI Systems With Two-Level Lattice Neural Network Controllers</strong>. IEEE Control. Syst. Lett. 7: 1105-1110, December, 2023</td>
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<td>Amir Hosein Afandizadeh Zargari, Marzieh Ashrafiamiri, Minjun Seo, Sai Manoj Pudukotai Dinakarrao, Mohammed E. Fouda, Fadi J. Kurdahi: <strong>CAPTIVE: Constrained Adversarial Perturbations to Thwart IC Reverse Engineering</strong>. Inf. 14(12): 656, December, 2023</td>
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<td></td>
</tr>
<tr>
<td>Junchen Zhao, Yurun Song, Simeng Liu, Ian G. Harris, Sangeetha Abdu Jyothi: <strong>LinguaLinked: A Distributed Large Language Model Inference System for Mobile Devices</strong>. CoRR abs/2312.00388, December, 2023</td>
<td></td>
</tr>
<tr>
<td>Mojtaba Taherisadr, Mohammad Abdullah Al Faruque, Salma Elmalaki: <strong>ERUDITE: Human-in-the-Loop IoT for an Adaptive Personalized Learning System</strong>. CoRR abs/2303.04292, November, 2023</td>
<td></td>
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<tr>
<td>Jan Finkbeiner, Thomas Gmeinder, Mark Pupilli, Alexander Titterton, Emre Neftci: <strong>Harnessing Manycore Processors with Distributed Memory for Accelerated Training of Sparse and Recurrent Models</strong>. CoRR abs/2311.04386, November, 2023</td>
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<tr>
<td>Junyao Wang, Mohammad Abdullah Al Faruque: <strong>Robust and Scalable Hyperdimensional Computing With Brain-Like Neural Adaptations</strong>. CoRR abs/2311.07705, November, 2023</td>
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<tr>
<td>Neil Thanawala, Hamid Nejatollahi, Nikil D. Dutt: <strong>Accelerating Polynomial Multiplication for RLWE using Pipelined FFT</strong>. IACR Cryptol. ePrint Arch. 2023: 1815, November, 2023</td>
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</tr>
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<td>Yixin Zhang, Tianyu Zhao, Salma Elmalaki: <strong>Towards Behavioral-aware Crowd Management System</strong>. CoRR abs/2311.02228, November, 2023</td>
<td></td>
</tr>
<tr>
<td>Tianyu Zhao, Salma Elmalaki: <strong>FinA: Fairness of Adverse Effects in Decision-Making of Human-Cyber-Physical System</strong>. CoRR abs/2311.03468, November, 2023</td>
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<td>Arnav Vaibhav Malawade, Shih-Yuan Yu, Junyao Wang, Mohammad Abdullah Al Faruque: RS2G: Data-Driven Scene-Graph Extraction and Embedding for Robust Autonomous Perception and Scenario Understanding. CoRR abs/2304.08600 (2023), September, 2023</td>
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<td>Ulices Santa Cruz, Yasser Shoukry: <strong>Certified Vision-based State Estimation for Autonomous Landing Systems using Reachability Analysis.</strong> CoRR abs/2309.05167 (2023), September, 2023</td>
<td></td>
</tr>
<tr>
<td>Sercan Aygun, Mehran Shoushtari Moghadam, M. Hassan Najafi, Mohsen Imani: <strong>Learning from Hypervectors: A Survey on Hypervisor Encoding.</strong> CoRR abs/2308.00685 (2023), August, 2023</td>
<td></td>
</tr>
<tr>
<td>Takami Sato, Justin Yue, Nanze Chen, Ningfei Wang, Qi Alfred Chen: <strong>Intriguing Properties of Diffusion Models: A Large-Scale Dataset for Evaluating Natural Attack Capability in Text-to-Image Generative Models.</strong> CoRR abs/2308.15692 (2023), August, 2023</td>
<td></td>
</tr>
<tr>
<td>Mohanad Odema, Halima Bouzidi, Hamza Ouarnoughi, Smail Niar, Mohammad Abdullah Al Faruque: <strong>MaGNAS: A Mapping-Aware Graph Neural Architecture Search Framework for Heterogeneous MPSoC Deployment.</strong> CoRR abs/2307.08065 (2023), July, 2023</td>
<td></td>
</tr>
<tr>
<td>Sina Labbaf, Mahyar Abbasian, Iman Azimi, Nikil D. Dutt, Amir M. Rahmani: <strong>ZotCare: A Flexible, Personalizable, and Affordable mHealth Service Provider.</strong> CoRR abs/2307.01905 (2023), July, 2023</td>
<td></td>
</tr>
<tr>
<td>Nick Alonso, Jeff Krichmar: <strong>A Sparse Quantized Hopfield Network for Online-Continual Memory.</strong> CoRR abs/2307.15040 (2023), July, 2023</td>
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</tbody>
</table>
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To conduct leading-edge interdisciplinary research in embedded systems emphasizing automotive, communications, and medical applications, and to promote technology and knowledge transfer for the benefit of the individual and society.

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