

IEEE RTCSA 2022 Technical Program

Time	Aug. 23 (Tue)	Time	Aug. 24 (Wed)	Time	Aug. 25 (Thur)
08:45 09:00	Opening				
09:00 10:00	Live Keynote 1:	09:00 10:00		09:00 10:00	
10:00 10:30	Break	10:00 10:40	Keynote 2	10:00 10:30	
10:30 12:00	Session 1: Best Paper Candidates	10:40 10:50	Break	10:30 12:00	Sessions 6a, 6b: Purely Online Presentations
		10:50 11:30	Keynote 3		
12:00 13:30	Lunch	11:30 13:45	Banquet		
13:30 15:30	Session 2a: Real-time Systems (I) Session 2b: IoT, CPS, and Emerging Applications Track (I)	13:45 15:15	Session 4: Invited Papers		
15:00 15:30	Break	15:15 15:30	Break		
15:30 17:30	Session 3a: Real-time Systems (II) Session 3b: Embedded Systems Track (I)	15:30 17:00	Session 5a: Embedded Systems Track (II) Session 5b: IoT, CPS, and Emerging Applications Track (II)		
17:30~	Welcome Reception				

Keynote Speeches

Live Keynote 1 (Aug. 23, 09:00–10:00)

Title: Rethinking of Computing - Memory-Centric or In-Memory Computing

Speaker: Tei-Wei Kuo, National Taiwan University

Abstract:

Flash memory opens a window of opportunities to a new world of computing over 20 years ago. Since then, storage devices gain their momentum in performance, energy, and even access behaviors. With over 1000 times in performance improvement over storage in recent years, there is another wave of adventure in removing traditional I/O bottlenecks in computer designs. In this talk, I shall first address the opportunities of new system architectures in computing. In particular, hybrid modules of DRAM and non-volatile memory (NVM) and all NVM-based main memory will be considered. I would also comment on a joint management framework of host/CPU and a hybrid memory module to break down the great memory wall by bridging the process information gap between host/CPU and a hybrid memory module. I will then present some solutions in neuromorphic computing which empower memory chips to own new capabilities in computing. In particular, I shall address challenges in in-memory computing in application co-designs and show how to utilize special characteristics of non-volatile memory in deep learning.

Biography:

Prof. Kuo received his B.S.E. and Ph.D. degrees in Computer Science from National Taiwan University and University of Texas at Austin in 1986 and 1994, respectively. He is now Distinguished Professor of Department of Computer Science and Information Engineering of National Taiwan University, where he was an Interim President (2017.10–2019.01) and an Executive Vice President for Academics and Research (2016.08–2019.01). Between August 2019 and July 2022, Prof. Kuo took a leave to join City University of Hong Kong as Lee Shau Kee Chair Professor of Information Engineering, Advisor to President (Information Technology), and Founding Dean of College of Engineering. His research interest includes embedded systems, non-volatile-memory software designs, neuromorphic computing, and real-time systems.

Dr. Kuo is Fellow of ACM, IEEE, and US National Academy of Inventors. He is also a Member of European Academy of Sciences and Arts. He is Vice Chair of ACM SIGAPP and Chair of ACM SIGBED Award Committee. Prof. Kuo received numerous awards and recognition, including Humboldt Research Award (2021) from Alexander von Humboldt Foundation (Germany), Outstanding Technical Achievement and Leadership Award (2017) from IEEE Technical Committee on Real-Time Systems, and Distinguished Leadership Award (2017) from IEEE Technical Committee on Cyber-Physical Systems. Prof. Kuo is the founding Editor-in-Chief of ACM Transactions on Cyber-Physical Systems (2015–2021) and a program committee member of many top conferences. He has over 300 technical papers published in international journals and conferences and received many best paper awards, including the Best Paper Award from ACM/IEEE CODES+ISSS 2019 and ACM HotStorage 2021.

Live Keynote 2 (Aug. 24, 10:00–10:40)

Title: TBA

Speaker: K.S. Pua, Phison Electronics Corp.

Abstract: TBA

Biography: TBA

Live Keynote 3 (Aug. 24, 10:40–11:30)

Title: Overview of Arm Confidential Compute Architecture

Speaker: David Hsu, ARM Inc.

Abstract:

Confidential Computing is the protection of data in use, by performing computation within a trustworthy hardware-backed secure environment. This protection shields code and data from observation or modification by privileged software and hardware agents. In this talk, we will describe how the Arm Confidential Compute Architecture (Arm CCA) enables confidential computing in an Arm compute platform.

Biography:

David Hsu is FAE Director of Arm, leading FAE team of Taiwan for closer collaboration and communications internally and externally to accomplish partners and customers solutions. He has over 20 years of professional experience in the semiconductor industry. David Hsu joined Arm in 2011 as a CPU FAE as well as responsible for product marketing and sales project management and then left in 2017. After then, he joined Intelligo, a start-up invested by MediaTek, leading the business development team to explore opportunities in Japan, Korea, and US. In 2019 David was recruited by Arm again as FAE director to drive Arm's IP solutions adoption. In addition to Arm, David worked at Faraday, Alpha Imaging Technology (MediaTek subsidiary) and BenQ, focusing on IC design work ranging from architecture definition, RTL coding, front-end/back-end implementation to IC verification and testing. He has rich experience in pre-sales strategy set-up and sales enablement. David received a master's degree in Computer Science and Engineering at National Chiao Tung University.

Detailed Technical Program

DAY 1

Session 1: Best Paper Candidates

Session: Chair: Chao Wang, National Taiwan Normal University

1. (Real-time Systems Track)

A Concurrency Framework for Priority-Aware Intercomponent Requests in CAMkES on seL4

Marion Sudvarg (Washington University in St. Louis) and Chris Gill (Washington University in St. Louis)

2. (Embedded Systems Track)

Statistical Hypothesis Testing of Controller Implementations Under Timing Uncertainties

Bineet Ghosh (The University of North Carolina at Chapel Hill), Clara Hobbs (The University of North Carolina at Chapel Hill), Shengjie Xu (The University of North Carolina at Chapel Hill), Parasara Sridhar Duggirala (The University of North Carolina at Chapel Hill), Jim Anderson (The University of North Carolina at Chapel Hill), P. S. Thiagarajan (None) and Samarjit Chakraborty (The University of North Carolina at Chapel Hill)

3. (IoT, CPS, and Emerging Applications Track)

Agnostic Hardware-Accelerated Operating System for Low-End IoT

Miguel Silva (Centro ALGORITMI, Universidade do Minho), Tiago Gomes (Centro ALGORITMI, Universidade do Minho) and Sandro Pinto (Centro ALGORITMI, Universidade do Minho)

Session 2a: Real-time Systems Track (I)

Session: Chair: TBD

1. **Anytime-Lidar: Deadline-aware 3D Object Detection**

Ahmet Soyyigit (University of Kansas), Shuochao Yao (George Mason University) and Heechul Yun (The University of Kansas)

2. **IP Core for Cache and Memory Thrashing**

Michal Dobeš (Honeywell Aerospace), Pavel Zaykov (Honeywell Aerospace), Larry Miller (Honeywell Aerospace), Pavel Badin (Honeywell Aerospace) and Srivatsan Varadarajan (Honeywell Aerospace)

3. **Analyzing Fixed Task Priority Based Memory Centric Scheduler for the 3-Phase Task Model**

Jatin Arora (CISTER Research Centre, ISEP, Porto), Syed Aftab Rashid (CISTER Research Centre, ISEP and VORTEX CoLab, Porto), Cláudio Maia (CISTER Research Centre, ISEP, Porto) and Eduardo Tovar (CISTER Research Centre, ISEP, Porto)

Session 2b: IoT, CPS, and Emerging Applications Track (I)

Session: Chair: TBD

1. **An Open-World Time-Series Sensing Framework for Embedded Edge Devices**

Abdulrahman Bukhari (University of California - Riverside), Seyedmehdi Hosseinimotlagh (University of California - Riverside) and Hyoseung Kim (University of California - Riverside)

2. **Distributed Successive Packet Scheduling for Multi-Channel Real-Time Wireless Networks**

Dawei Shen (Northeastern University), Tianyu Zhang (Northeastern University), Jiachen Wang

(University of Connecticut), Qingxu Deng (Northeastern University), Song Han (University of Connecticut) and Xiaobo Sharon Hu (University of Notre Dame)

3. **QoS Guaranteed Resource Allocation for Coexisting eMBB and URLLC Traffic in 5G Industrial Networks**

Dawei Shen (Northeastern University), Tianyu Zhang (Northeastern University), Jiachen Wang (University of Connecticut), Qingxu Deng (Northeastern University), Song Han (University of Connecticut) and Xiaobo Sharon Hu (University of Notre Dame)

Session 3a: Real-time Systems Track (II)

Session: Chair: TBD

1. **The Role of Causality in a Formal Definition of Timing Anomalies**

Benjamin Binder (Université Paris-Saclay, CEA, List), Mihail Asavoae (Université Paris-Saclay, CEA, List), Florian Brandner (LTCI, Télécom Paris, Institut Polytechnique de Paris), Belgacem Ben Hedia (Université Paris-Saclay, CEA, List) and Mathieu Jan (Université Paris-Saclay, CEA, List)

2. **Building Time-Triggered Schedules for typed-DAG Tasks with alternative implementations**

Zahaf Houssam Eddine (University of Nantes) and Nicola Capodieci (University of Modena and Reggio Emilia)

Session 3b: Embedded Systems Track (I)

Session: Chair: TBD

1. **Exploiting Binary Equilibrium for Efficient LDPC Decoding in 3D NAND Flash**

Hsiang-Sen Hsu (National Yang Ming Chiao Tung University) and Li-Pin Chang (National Yang Ming Chiao Tung University)

2. **DeepPicarMicro: Applying TinyML to Autonomous Cyber Physical Systems**

Michael Bechtel (University of Kansas), Qitao Weng (University of Kansas) and Heechul Yun (The University of Kansas)

3. **DVFS Virtualization for Energy Minimization of Mixed-Criticality Dual-OS Platforms**

Takumi Komori (Nagoya University), Yutaka Masuda (Nagoya University) and Tohru Ishihara (Nagoya University)

DAY 2

Session 4: Invited Papers

1. **Performance Acceleration of Secure Machine Learning Computations for Edge Applications**
Zi-Jie Lin (National Taiwan University), Chuan-Chi Wang (National Taiwan University), Chia-Heng Tu (National Cheng Kung University) and Shih-Hao Hung (National Taiwan University).
2. **Segment-Level FP-Scheduling in FreeRTOS**
Robin Edmaier (TU Dortmund University), Jian-Jia Chen (TU Dortmund University) and Niklas Ueter (TU Dortmund University).

Session 5a: Embedded Systems Track (II)

Session: Chair: TBD

1. **IPDeN: Real-Time deflection-based NoC with in-order flits delivery**
Yilian Ribot González (CISTER Research Centre, ISEP), Geoffrey Nelissen (TU Eindhoven) and Eduardo Tovar (CISTER Research Centre, ISEP)
2. **Scalable and Bounded-time Decisions on Edge Device Network using Eclipse Zenoh**
Chi-Sheng Shih (National Taiwan University), Hsiang-Jui Lin (National Taiwan University), Yuyuan Yuan (National Taiwan University), Yi-Hung Kuo (National Taiwan University) and Wen-Yew Liang (ZettaScale Technology Inc.)
3. **Design Methodology for Deep Out-of-Distribution Detectors in Real-Time Cyber-Physical Systems**
Michael Yuhas (Nanyang Technological University), Daniel Jun Xian Ng (Nanyang Technological University) and Arvind Easwaran (Nanyang Technological University)

Session 5b: IoT, CPS, and Emerging Applications Track (II)

Session: Chair: TBD

1. **Segment-Level FP-Scheduling in FreeRTOS**
Robin Edmaier (TU Dortmund University), Jian-Jia Chen (TU Dortmund University) and Niklas Ueter (TU Dortmund University)
2. **Enabling Real-time AI Inference on Mobile Devices via GPU-CPU Collaborative Execution**
Hao Li (Hong Kong Baptist University), Joseph Ng (Hong Kong Baptist University) and Tarek Abdelzaher (University of Illinois at Urbana-Champaign)
3. **Energy-Adaptive Real-time Sensing for Batteryless Devices**
Mohsen Karimi (University of California Riverside), Yidi Wang (University of California Riverside) and Hyoseung Kim (University of California Riverside)

DAY 3

Session 6a: Short Paper Session (Embedded Systems Track)

Session: Chair: Po-Chun Huang, National Taipei University of Technology

1. **Controlling High-Performance Platform Uncertainties with Timing Diversity**
Robin Hapka (Technische Universität Braunschweig - Institute of Computer and Network Engineering), Anika Christmann (Technische Universität Braunschweig - Institute of Computer and Network Engineering) and Rolf Ernst (Technische Universität Braunschweig - Institute of Computer and Network Engineering)
2. **QoS-MAN: A Novel QoS Mapping Algorithm for TSN-5G Flows**
Zenepe Satka (Mälardalen University), Mohammad Ashjaei (Mälardalen University), Hossein Fotouhi (Mälardalen University), Masoud Daneshtalab (Mälardalen University), Mikael Sjödin (Mälardalen University) and Saad Mubeen (Mälardalen University)

Session 6b: Short Paper Session (Real Time Systems Track)

Session: Chair: TBD

1. **Using Trace Data for Run-Time Optimization of Parallel Execution in Real-Time Multi-Core-Systems**
Florian Schade (Karlsruhe Institute of Technology), Timo Sandmann (Karlsruhe Institute of Technology), Jürgen Becker (Karlsruhe Institute of Technology) and Henrik Theiling (SYSGO GmbH)