

Renato Mancuso | CV

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Updated: January 14, 2021

Affiliations

- **Assistant Professor** **Boston, MA, USA**
Boston University *Sept. 2017 - Present*
Department: Computer Science

Education

- **Ph.D. in Computer Science** **Urbana, IL, USA**
University of Illinois at Urbana-Champaign *2012 - May 2017*
Dissertation title: "Next-generation Safety-critical Systems on Multi-Core COTS Platforms"
Thesis advisor: Professor Marco Caccamo
- **M.Sc. in Computer Engineering** **Rome, Italy**
University of Rome Tor Vergata, Magna cum laude *2009 - Feb. 2012*
Thesis title: "Avoiding Memory Access Conflicts in Hard Real-time Multi-core Systems"
Advisor: Professor Marco Cesati
- **B.Sc. in Computer Engineering** **Rome, Italy**
University of Rome Tor Vergata, Magna cum laude *2006 - Nov. 2009*
Thesis title: "CoreBoot: the Open-source BIOS and Bootloader"
Advisor: Professor Daniel P. Bovet

Research Interests

Investigating, implementing and testing novel **OS designs** and corresponding **scheduling frameworks** to create robust, predictable and high-performance platforms for **safety-critical cyber-physical systems (CPS)**, with special focus on automotive, avionics and unmanned aerial vehicles.

Research Positions

- **Graduate Research Assistant** **Urbana, IL, USA**
Department of Computer Science, UIUC *2012 - 2014*
Supported by: Rockwell Collins Inc. and NSF
 - Evaluation of real-time predictability and performance degradation due to inter-core performance interference on shared memory hierarchy
 - Design and feasibility study of techniques to mitigate performance interference in shared CPU caches
 - OS-level implementation of proof-of-concept support for real-time oriented shared cache management
- **Graduate Research Assistant** **Urbana, IL, USA**
Department of Computer Science, UIUC *2014 - 2015*

Supported by: Rockwell Collins Inc. and NSF

In collaboration with: Department of Aerospace Engineering, UIUC

- Study of techniques to reduce performance interference due to DRAM bank sharing
- OS-level implementation of proof-of-concept support for real-time oriented DRAM bank management
- Integration of hardware resource management techniques for overall evaluation and theoretical scheduling
- Design of OS-level techniques for power adaptive CPU+GPU UAVs.
- Construction of a UAV testbed for live evaluation

Graduate Research Assistant

Urbana, IL, USA

- Department of Computer Science, UIUC

2015 - 2017

Supported by: Hitachi America Ltd. and NSF

- Predictability evaluation of new-generation multi-core automotive platforms for ASIL-D certification
- Re-design of OS-level resource management and scheduling to exploit heterogeneous memory layout
- Design of OS-level predictable strategies to recover from detectable memory errors
- Proof-of-concept implementation extending an existing AUTOSAR-compliant OS

Research Grants

Grant: Division of Computing and Communication Foundations (CCF)

- National Science Foundation Dec. 2020

Project: "Beyond Accelerators - Using FPGAs to Achieve Fine-grained Control of Data-flows in Embedded SoCs"

Funding: USD 500,000

Role: PI

Award Nr.: CCF-2008799

Start-End: July 15, 2020—June 30, 2023

Grant: Technologies for Next-Gen Integrated Automotive Platforms

- Bosch GmbH Dec. 2020

Project: "From Partitioning to Profiling-aided Shared Resource Management"

Funding: USD 80,000

Role: PI

Start-End: Feb. 10, 2021—Feb. 10, 2022

Grant: Collaboratory Support for Grad Student Research

- Red Hat Dec. 2019

Project: "Programmable Logic In-the-Middle: the Case for Relational Memory"

Funding: USD 136,000

Role: PI

Co-PIs: Prof. Manos Athanassoulis

Start-End: Feb. 1, 2020—Feb. 1, 2022

Grant: Technologies for Next-Gen Integrated Automotive Platforms

- Bosch GmbH Dec. 2019

Project: "Towards A Unified Virtualized Shared Resource Management Infrastructure"

Funding: USD 80,000

Role: PI

Start-End: Feb. 10, 2020—Feb. 10, 2021

Grant: Hariri Institute Research Incubation Award

- Boston University Feb. 2019

Project: "Data Driven, Inexpensive and Reusable Sensors for Water Contamination Detection"

Funding: USD 18,532

Role: PI

Co-PIs: Prof. Xi Lin

Honors, Awards, and Patents

- **Best Student Paper Award**
IEEE Real-Time Systems Symposium (RTSS) Dec. 2020
- **Best Paper Award**
IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS) Apr. 2020
- **Outstanding Paper Award**
Euromicro Conference on Real-Time Systems (ECRTS) July 2019
- **Best Presentation Award**
IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS) Apr. 2016
- **Best Student Paper Award**
IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS) Apr. 2013
- **Finalist, Qualcomm Innovation Fellowship**
Qualcomm Inc. Spring 2016
The QInF program is focused on recognizing, rewarding, and mentoring innovative PhD students across a broad range of technical research areas, based on Qualcomm's core values of innovation, execution and teamwork.
- **Computer Science Excellence Fellowship**
College of Engineering, University of Illinois Fall 2015, Spring 2016
The Computer Science Excellence Fellowship is funded thanks to the Graduate College's Block Grant Program, which provides funds to help departments recruit and retain outstanding graduate students.
- **Patent, Issued** Urbana, IL, USA
University of Illinois at Urbana-Champaign August 2016
Title: "Real-Time Scratchpad-Centric Operating System for Multi-Core Embedded System"
Issued on: May 12, 2020
US Patent Nr.: 10649914
- **Recognized on List of Teachers Ranked Excellent**
College of Engineering, University of Illinois Fall 2013
- **Homo Sapiens Sapiens Scholarship**
INPS Italy Spring 2014
Government-issued scholarship to support high-degree education in promising young researchers
- **Patent, Main Inventor** Rome, Italy
CFI Progetti LLC. May 2014
Title: "Providing Interactive Pharmaceutical Services through Internet"
Submitted/accepted: June 2011 / May 2014
Patent Nr.: RM2011A000297
- **Merit Scholarship**
Accenture, PLC Spring 2010
- **High Honor Award and Scholarship** Rome, Italy
University of Rome Tor Vergata 2009, 2010, 2011, 2012
- **Full Merit Scholarship** Rome, Italy
Excellence University College "Lamaro-Pozzani" 2006-2011
Awarded by the Italian Federation "Cavaliere del Lavoro" on a merit-only basis, through a competitive selection procedure involving students from all over Italy. The scholarship was renewed every year, having reached fixed targets, such as: passing all the scheduled university exams with an average grade of at least 27/30, succeeding in the English, Economics and Law internal courses and actively attending all the College activities, meetings and lectures.

Peer Reviewed Conference and Journal Papers

In submission

- [1] P. Sohal, U. Drepper, **R. Mancuso**, O. Krieger, “Surprising Twists when Tackling LLC and Main Memory Bandwidth Contention”, Under submission.
- [2] D. Tarapore, S. Roozkhosh, S. Brzozowski, **R. Mancuso**, “Observing the Invisible: Live Cache Inspection for High-Performance Embedded Systems”, Under consideration at IEEE Transactions on Computers.
- [3] D. Hoornaert, S. Roozkhosh, **R. Mancuso**, “A Memory Scheduling Infrastructure for Multi-core Systems with Re-programmable Logic”, Under submission.
- [4] S. Mysore, B. Mabsout, K. Saenko, **R. Mancuso**, “How to Train your Quadrotor: A Framework for Consistently Smooth and Responsive Flight Control via Reinforcement Learning”, Under consideration at ACM Transactions on Cyber-Physical Systems.
- [5] S. Mysore, B. Mabsout, **R. Mancuso**, K. Saenko, “Regularizing Action Policies for Smooth Control with Reinforcement Learning”, Under submission.

Published

- [1] P. Sohal, R. Tabish, U. Drepper, R. Mancuso, “E-WarP: a System-wide Framework for Memory Bandwidth Profiling and Management”, in Proceedings of the 41st IEEE Real-Time Systems Symposium (RTSS 2020), Houston, TX, USA, Dec. 2020. **(Best Student Paper Award)**
- [2] R. Tabish, J.Y. Wen, R. Pellizzoni, R. Mancuso, H. Yun, M. Caccamo and L. Sha, “SCE-Comm: A Real-Time Inter-Core Communication Framework for Strictly Partitioned Multi-core Processors”, In Proceedings of the 9th Mediterranean Conference on Embedded Computing (MECO 2020), Budva, Montenegro, June 2020.
- [3] A. Bansal and J. Singh and Y. Hao and J.Y. Wen and R. Mancuso and M. Caccamo, “Reconciling Predictability and Coherent Caching”, In Proceedings of the 9th Mediterranean Conference on Embedded Computing (MECO 2020), Budva, Montenegro, June 2020.
- [4] S. Roozkhosh, **R. Mancuso**, “The Potential of Programmable Logic in the Middle: Cache Bleaching”, In Proceedings of the IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), April 2020, Sydney, Australia. **(Best Paper Award)**
- [5] O. Dantsker, M. Theile, M. Caccamo, S. Yu, M. Vahora, R. Mancuso, “Continued Development and Flight Testing of a Long-Endurance Solar-Powered Unmanned Aircraft: UIUC-TUM Solar Flyer”, In Proceedings of the AIAA Scitech 2020 Forum, Jan. 2020, Orlando, FL, USA.
- [6] O. Dantsker, M. Caccamo, M. Vahora, **R. Mancuso**, “Flight & Ground Testing Data Set for an Unmanned Aircraft: Great Planes Avistar Elite”, In Proceedings of the AIAA Scitech 2020 Forum, Jan. 2020, Orlando, FL, USA.
- [7] R. Tabish, **R. Mancuso**, S. Wasly, R. Pellizzoni, M. Caccamo, “A Real-Time Scratchpad-centric OS with Predictable Communication for Multi-core Embedded Systems”, in Real-Time Journal (RTSJ), May 2019.
- [8] G. Gracioli, R. Tabish, **R. Mancuso**, R. Miroslou, R. Pellizzoni, M. Caccamo, “Designing Mixed Criticality Applications on Modern Heterogeneous MPSoC Platforms”, Proceedings of the 31st Euromicro Conference on Real-Time Systems (ECRTS), July 2019, Stuttgart, Germany. **(Outstanding Paper Award)**
- [9] **R. Mancuso**, H. Yun and I. Puaut, “Impact of DM-LRU on WCET: a Static Analysis Approach”, Proceedings of the 31st Euromicro Conference on Real-Time Systems (ECRTS), July 2019, Stuttgart, Germany.
- [10] A. Raza, P. Sohal, J. Cadden, J. Appavoo, U. Drepper, R. Jones, O. Krieger, **R. Mancuso**, L. Woodman, “Unikernels: The Next Stage of Linux’s Dominance”, Proceedings of the 17th Workshop on Hot Topics in Operating Systems (HotOS 2019), Bertinoro, Italy.
- [11] W. Koch, **R. Mancuso**, R. West and A. Bestavros, “Reinforcement Learning for UAV Attitude Control”, In ACM Transactions on Cyber-Physical Systems (TCPS), Vol. 3, Issue 2, Art. 22, February 2019.
- [12] T. Kloda, M. Solieri, **R. Mancuso**, N. Capodici, P. Valente, M. Bertogna, “Deterministic Memory Hierarchy and Virtualization for Modern Multi-Core Embedded Systems”, In Proceedings of the IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), April 2019, Montreal, Canada.
- [13] A. Agrawal, **R. Mancuso**, R. Pellizzoni, G. Fohler, “Analysis of Dynamic Memory Bandwidth Regulation in Multi-core Real-Time Systems”, In Proceedings of the 39th IEEE Real-Time Systems Symposium (RTSS),

December 2018, Nashville TN, USA.

- [14] **R. Mancuso**, Sagar Chaki, "Verification of OS-level Cache Management", In Proceedings of Operating Systems Platforms for Embedded Real-Time applications (OSPERT), May 2018.
- [15] A. Bansal, R. Tabish, G. Gracioli, **R. Mancuso**, R. Pellizzoni and M. Caccamo, "Evaluating Memory Subsystem of Configurable Heterogeneous MPSoC", In Proceedings of Operating Systems Platforms for Embedded Real-Time applications (OSPERT), May 2018.
- [16] F. Farshchi, P. K. Valsan, **R. Mancuso**, H. Yun, "Deterministic Memory Abstraction and Supporting Multicore System Architecture", Proceedings of the 30th Euromicro Conference on Real-Time Systems (ECRTS), July 2018, Barcelona, Spain.
- [17] H. Wang, Y. Gao, S. Hu, S. Wang, **R. Mancuso**, M. Kim, P. Wu, L. Su, L. Sha, T. Abdelzaher, "On Exploiting Structured Human Interactions to Enhance Sensing Accuracy in Cyber-physical Systems", ACM Transactions on Cyber-Physical Systems, vol. 1 no. 3, p. 1-19, July 2017.
- [18] A. Melani, **R. Mancuso**, M. Caccamo, G. Buttazzo, J. Freitag, S. Uhrig, "A Scheduling Framework for Handling Integrated Modular Avionic Systems on Multicore Platforms", In Proceedings of the 23rd IEEE International Conference on Embedded and Real-Time Computing Systems and Applications (RTCSA), August 2017, Hsinchu, Taiwan.
- [19] F. Abdi, **R. Mancuso**, R. Tabish, M. Caccamo, "Restart-Based Fault-Tolerance: System Design and Schedulability Analysis", In Proceedings of the 23rd IEEE International Conference on Embedded and Real-Time Computing Systems and Applications (RTCSA), August 2017, Hsinchu, Taiwan.
- [20] **R. Mancuso**, R. Pellizzoni, N. Tokcan, M. Caccamo, "WCET Derivation under Single Core Equivalence with Explicit Memory Budget Assignment", Proceedings of the 29th Euromicro Conference on Real-Time Systems (ECRTS), June 2017, Dubrovnik, Croatia.
- [21] **R. Mancuso**, R. Dudko, E. Betti, M. Cesati, M. Caccamo, R. Pellizzoni, "Real-Time Cache Management Framework for Multi-core Architectures", Proceedings of the IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), April 2013, Philadelphia, USA. **(Best Student Paper Award)**
- [22] **R. Mancuso**, R. Pellizzoni, M. Caccamo, L. Sha, H. Yun, "WCET(m) Estimation in Multi-Core Systems using Single Core Equivalence", Proceedings of the 27th Euromicro Conference on Real-Time Systems (ECRTS), July 2015, Lund, Sweden.
- [23] **R. Mancuso**, A. V. Louis, M. Caccamo, "Using Traffic Phase Shifting to Improve AFDX Link Utilization", Proceedings of the 15th ACM International Conference on Embedded and Software (EMSOFT). Amsterdam, The Netherlands, October 2015.
- [24] L. Sha, M. Caccamo, **R. Mancuso**, J. E. Kim, M. K. Yoon, R. Pellizzoni, H. Yun, R. B. Kegley, D. R. Perlman, G. Arundale, R. Bradford, "Real-Time Computing on Multicore Processors", IEEE Computer, vol. 49 no. 9, p. 69-77, September 2016.
- [25] A. Melani, **R. Mancuso**, D. Cullina, M. Caccamo, L. Thiele, "Optimizing Resource Speed for Two-Stage Real-Time Tasks", Real-Time Systems, doi:10.1007/s11241-016-9259-y, September 2016.
- [26] F. Abdi, **R. Mancuso**, S. Bak, O. Dantsker, M. Caccamo, "Reset-Based Recovery for Real-Time Cyber-Physical Systems with Temporal Safety Constraints", Proceedings of the 21st IEEE International Conference on Emerging Technologies Factory Automation and Applications Symposium (ETFAs), Berlin, Germany, September 2016.
- [27] R. Tabish, **R. Mancuso**, S. Wasly, A. Alhammad, S. S. Phatak, R. Pellizzoni, M. Caccamo, "A Real-Time Scratchpad-centric OS for Multi-core Embedded Systems", Proceedings of the IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), April 2016, Vienna, Austria. **(Best Presentation Award)**
- [28] R. Tabish, **R. Mancuso**, S. Wasly, S. S. Phatak, R. Pellizzoni, M. Caccamo, "A Reliable and Predictable OS for Real-Time Embedded Systems", Proceedings of the IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), Pittsburgh, USA, 2017.
- [29] M. Cesati, **R. Mancuso**, E. Betti, M. Caccamo, "A Memory Access Detection Methodology for Accurate Workload Characterization", Proceedings of the IEEE International Conference on Embedded and Real-Time Computing Systems and Applications (RTCSA). Hong Kong, China, August 2015.
- [30] A. Melani, **R. Mancuso**, D. Cullina, M. Caccamo, L. Thiele, "Speed Optimization for Tasks with Two Resources", Proceedings of the International Conference on Design, Automation, and Test in Europe

(DATE). Dresden, Germany, March 2016.

- [31] **R. Mancuso**, Or D. Dantsker, M. Caccamo, M. S. Selig, "A Low-Power Architecture for High Frequency Sensor Acquisition in Many-DOF UAVs", Proceedings of the 5th Intl. Conference on Cyber-Physical Systems (ICCPS), April 2014, Berlin, Germany.
- [32] H. Yun, **R. Mancuso**, Z. Wu, R. Pellizzoni, "PALLOC: DRAM Bank-Aware Memory Allocator for Performance Isolation on Multicore Platforms", Proceedings of the IEEE Intl. Real-Time and Embedded Technology and Applications Symposium (RTAS), April 2014, Berlin, Germany.
- [33] G. Gracioli, A. Alhammad, **R. Mancuso**, A. A. Frohlich, R. Pellizzoni, "A Survey on Cache Management Mechanisms for Predictable Real-Time Embedded Systems", Accepted for publication on ACM Computing Survey, September 2015.
- [34] **R. Mancuso**, P. Srivastava, D. Cheng, M. Caccamo, "A Hardware Architecture to Deploy Complex Multiprocessor Scheduling Algorithms", Proceedings of the IEEE International Conference on Embedded and Real-Time Computing Systems and Applications (RTCSA). Chongqing, China, August 2014.
- [35] **R. Mancuso**, R. Dudko, M. Caccamo, "Light-PREM: Automated Software Refactoring for Predictable Execution on COTS Embedded Systems", Proceedings of the IEEE International Conference on Embedded and Real-Time Computing Systems and Applications (RTCSA). Chongqing, China, August 2014.
- [36] Or D. Dantsker, **R. Mancuso**, M. S. Selig, M. Caccamo, "High-Frequency Sensor Data Acquisition System (SDAC) for Flight Control And Aerodynamic Data Collection Research on Small to Mid-Sized UAVs", Proceedings of the AIAA Aviation and Aeronautics Forum and Exposition, Applied Aerodynamic Conference, (APA'14). Atlanta, Georgia, June 2014.
- [37] Y. Gao, S. Hu, **R. Mancuso**, M. Kim, P. L. Wu, L. Su, L. Sha, T. Abdelzaher, "Exploiting Structured Human Interactions to Enhance Estimation Accuracy in Cyber-physical Systems", Proceedings of the IEEE International Conference on Cyber-Physical Systems (ICCPS 2015), Seattle, WA, USA.
- [38] F. Abdi, J. V. D. Woude, Y. Lu, S. Bak, M. Caccamo, L. Sha, **R. Mancuso**, S. Mohan, "On-Chip Control Flow Integrity Check for Real Time Embedded Systems", Proceedings of the 1st IEEE Intl. Conference on Cyber-Physical Systems, Networks and Applications (CPSNA), August 2013, Taipei, Taiwan.

Technical Reports

- [1] E. Asyabi, A. Bestavros, **R. Mancuso**, R. West, E. Sharafzadeh, "Akita: A CPU scheduler for virtualized Clouds", Technical Report at BU, Available at: <https://arxiv.org/pdf/2009.09104.pdf>.
- [2] W. Koch, **R. Mancuso**, and A. Bestavros, "Neuroflight: Next Generation Flight Control Firmware", Technical Report at BU, Available at: <https://arxiv.org/pdf/1901.06553.pdf>.
- [3] A. Melani, **R. Mancuso**, D. Cullina, M. Caccamo, L. Thiele, "Resource Speed Optimization for Two-Stage Flow-Shop Scheduling", Technical Report at UIUC, Available at: <http://hdl.handle.net/2142/88404>
- [4] **R. Mancuso**, R. Pellizzoni, M. Caccamo, L. Sha, H. Yun, "Response-Time Analysis for Single Core Equivalence Framework", Technical Report at UIUC, Available at: <http://hdl.handle.net/2142/55570>
- [5] L. Sha, M. Caccamo, **R. Mancuso**, J.E. Kim, M.K. Yoon, R. Pellizzoni, H. Yun, R. Kegley, D. Perlman, G. Arundale, R. Bradford, "Single Core Equivalent Virtual Machines for Hard Real-Time Computing on Multicore Processors", Technical Report at UIUC, Available at: <http://hdl.handle.net/2142/55672>
- [6] M. Cesati, **R. Mancuso**, E. Betti, M. Caccamo, "MadT: A Memory Access Detection Tool for Symbolic Memory Profiling", Technical Report at UIUC, Available at: <http://hdl.handle.net/2142/78093>
- [7] **R. Mancuso**, A. V. Louis, M. Caccamo, "Improving Bandwidth Utilization With Deterministic Delivery Guarantees in AFDX through Traffic Phase-Shifting", Technical Report at UIUC, Available at: <http://hdl.handle.net/2142/78193>

Teaching and Mentoring

- **Main Instructor, Embedded Systems Development (CS-454/654)** **Boston, MA**
Computer Science, Boston University *Spring 2019, Spring 2020*
- Lab-based hands-on course touching on aspects of embedded and cyber-physical systems development.
- **Main Instructor, Challenges in Cyber-Physical Systems (CS-591 M1)** **Boston, MA**
Computer Science, Boston University *Spring 2018*

- Developed syllabus and reading list of research papers in CPS
- Assigned presentations and projects to a class of 30 students
- Organized peer-reviewed student presentations on research paper
- Formed student teams for custom class projects (6 projects total)
- Official page at: <http://cs-people.bu.edu/rmancuso/courses/cs591-sp18/index.php>

Main Instructor, Fundamentals of Computing Systems (CS-350) Boston, MA

- *Computer Science, Boston University* *Fall 2017, 2018, 2019, 2020*
 - Prepared syllabus, lectures notes, and slides for a class of 120 students
 - Held office hours and coordinated discussion sections (2 TA's)
 - Prepared weekly assignments and exams: 2 midterms and 1 final
 - Coordinated grading of assignments and exams
 - Organized end-of-semester online programming challenge
 - Official page at: <http://cs-people.bu.edu/rmancuso/courses/cs350-fa20>

Co-Instructor, Fundamentals of Computing Systems (CS-350) Boston, MA

- *Computer Science, Boston University* *Spring 2018, 2019, 2020*
 - Delivered 1/3 of the frontal lectures
 - Held office hours and coordinated discussion sections (2 TA's)
 - Support in preparing weekly assignments and exams: 2 midterms and 1 final

Teaching Assistant, System Programming (CS-241) Urbana, IL

- *College of Engineering, University of Illinois* *Spring 2013*
 - Prepared discussion sections with presentations and interactive programming sessions with 60 students
 - Held office hours with live debugging of student code and clarification of class material
 - Prepared machine problems, instructions for assignments and grading strategies
 - Implemented, maintained and executed auto-graders
 - Graded assignments (with auto-graders), midterms and finals
 - Coordinated with other TAs and faculty for the direction of the course

Undergraduate Mentor

- *Department of Computer Science, University of Illinois* *2013 - 2017*
 - Evaluated student fit to research projects based on CV evaluation and interviews
 - Assigned students to ongoing research projects based on their inclinations
 - Drafted project statement to be used as written agreement for independent study projects (CS-397)
 - Prepared embedded platforms, source trees, development environments and repositories for students
 - Evaluated/interviewed 11 students; mentored 5 students

Graduate Mentor

- *Department of Computer Science, University of Illinois* *2014 - 2017*
 - Coordinated with faculty over student selection for Ph.D. program or short-term visiting
 - Assessed student fit to research group based on CV and research interests
 - Suggested short-term and long-term research path
 - Guided new students to understand the exact scope of project, write formal reports and prepare presentations for conferences and industry partners
 - Prepared literature review list for incoming students and introduced basic background concepts
 - Mentored 3 students

Invited Lecturer, Cyber-Physical Systems Munich, Germany

- *Dept. of Electrical and Computer Engineering, Technical University of Munich* *Jan. 2015*
 - Prepared and lectured 4 graduate-level classes on Network Calculus and Real-Time Calculus
 - Integrated lectures with rest of course material
 - Prepared questions about presented material for practice exam and final exam

- **Invited Lecturer, System Programming (CS-241)** **Urbana, IL**
- *College of Engineering, University of Illinois* *Feb. 2014*
 - Prepared tool to demonstrate virtual memory mapping and manipulate memory of running processes
 - Lectured about theory on memory mapping
 - Performed live demonstration of attacks on memory of running processes

Student Advising

Current Ph.D. Advisees.....

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| 1. | Dharmesh Tarapore
<i>Role: Ph.D. Advisor</i>
○ Webpage: https://cs-people.bu.edu/dharmesh/ | Starting Fall 2020
<i>Ph.D. Expected 2025/2026</i> |
| 2. | Shahin Roozkhosh
<i>Role: Ph.D. Advisor</i>
○ Webpage: http://cs-people.bu.edu/shahin/ | Fall 2018—Present
<i>Ph.D. Expected 2023/2024</i> |
| 3. | Bassel El Mabsout
<i>Role: Ph.D. Advisor</i>
○ Webpage: https://sites.google.com/bu.edu/bassel-el-mabsout | Fall 2019—Present
<i>Ph.D. Expected 2024/2025</i> |
| 4. | Golsana Ghaemi
<i>Role: Ph.D. Advisor</i> | Fall 2019—Present
<i>Ph.D. Expected 2023/2024</i> |
| 5. | Parul Sohal
<i>Role: Ph.D. Co-Advisor; Advisor: Prof. Krieger</i>
○ Webpage: http://cs-people.bu.edu/psohal/ | Fall 2018—Present
<i>Ph.D. Expected 2023/2024</i> |
| 6. | Ali Raza
<i>Role: Ph.D. Co-Advisor; Advisor: Prof. Krieger</i>
○ Webpage: https://razaaliraza.github.io/ | Fall 2018—Present
<i>Ph.D. Expected 2023/2024</i> |

Former Ph.D. Advisees.....

- | | | |
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| 1. | William Frederick Koch III
<i>Role: Ph.D. Co-Advisor; Advisor: Prof. Bestavros</i>
○ Thesis: "Flight Controller Synthesis via Deep Reinforcement Learning"
○ Webpage: https://wfk.io/ | Fall 2017—Fall 2019
<i>Ph.D. Fall 2019</i> |
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Students Advised in Directed Study Courses.....

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|---|--|------------------------------------|
| ○ | Weifan Chen
<i>MS Student</i> | Fall 2020
<i>CS995</i> |
| ○ | Andrew James
<i>BA/MS Student</i> | Spring 2020
<i>CS991</i> |
| ○ | Yifei Feng
<i>Graduate Student</i> | Spring 2020
<i>CS991</i> |
| ○ | Bassel El Mabsout
<i>Ph.D. Student</i> | Fall 2019
<i>CS995</i> |
| ○ | Yifei Feng
<i>Graduate Student</i> | Fall 2019
<i>CS995</i> |
| ○ | Erasmio Tani
<i>Ph.D. Student</i> | Spring 2019
<i>CS995</i> |
| ○ | Chet Powers, Tuna Sogut, Ivan Izhbirdeev
<i>Undergraduate Students</i> | Spring 2019
<i>CS492</i> |
| ○ | Steven Brzozowski, Benjamin Sissons
<i>BA/MS Students</i> | Spring 2019
<i>CS911</i> |

Students Advised in Independent Projects.....

- Brandon Chen
- Soon Sung Hong
- Ghazal Randhawa
- Keval Khara
- Chuqiao Liang
- Dharmesh Tarapore
- Yash Jain
- James Kunstle
- Kathryn Quirk
- Max Mesirow

Presentations and Talks

Conference Presentations.....

1. **“Impact of DM-LRU on WCET: a Static Analysis Approach”** Stuttgart, Germany
Euromicro Conference on Real-Time Systems (ECRTS) July 2019
2. **“A Scheduling Framework for Handling Integrated Modular Avionic Systems on Multicore”** Hsinchu, Taiwan
IEEE Int. Conference on Embedded and Real-Time Systems and Applications (RTCSA) Aug. 2017
3. **“Restart-Based Fault-Tolerance: System Design and Schedulability Analysis”** Hsinchu, Taiwan
IEEE Int. Conference on Embedded and Real-Time Systems and Applications (RTCSA) Aug. 2017
4. **“WCET Derivation under SCE with Explicit Memory Budget Assignment”** Dubrovnik, Croatia
Euromicro Conference on Real-Time Systems (ECRTS) Jun. 2017
5. **“A Real-Time Scratchpad-centric OS for Multi-core Embedded Systems”** Vienna, Austria
IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS) Apr. 2016
6. **“Real-Time Cache Management Framework for Multi-core Architectures”** Philadelphia, PA, USA
IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS) Apr. 2013
7. **“WCET(m) Estimation in Multi-Core Systems using Single Core Equivalence”** Lund, Sweden
Euromicro Conference on Real-Time Systems (ECRTS) July 2015
8. **“Using Traffic Phase Shifting to Improve AFDX Link Utilization”** Amsterdam, Netherlands
ACM International Conference on Embedded and Software (EMSOFT) Oct. 2015
9. **“Reset-Based Recovery for Real-Time Cyber-Physical Systems”** Berlin, Germany
IEEE Emerging Technologies Factory Automation and Appl. Symposium (ETFAs) Sept. 2016
10. **“A Memory Access Detection Methodology for Accurate Workload Characterization”** Hong Kong, China
IEEE Int. Conference on Embedded and Real-Time Systems and Applications (RTCSA) Aug. 2015
11. **“A Low-Power Architecture for High Frequency Sensor Acquisition in Many-DOF UAVs”** Berlin, Germany
IEEE Int. Conference on Cyber-Physical Systems (ICCPS) Apr. 2014
12. **“A Hardware Architecture to Deploy Complex Multiprocessor Scheduling Algorithms”** Chongqing, China
IEEE Int. Conference on Embedded and Real-Time Systems and Applications (RTCSA) Aug. 2014
13. **“Light-PREM: Software Refactoring for Predictable Execution on Embedded Systems”** Chongqing, China
IEEE Int. Conference on Embedded and Real-Time Systems and Applications (RTCSA) Aug. 2014
14. **“On-Chip Control Flow Integrity Check for Real Time Embedded Systems”** Taipei, Taiwan
IEEE Intl. Conference on Cyber-Physical Systems, Networks and Applications (CPSNA) Aug. 2013

Keynotes and Other Talks.....

1. **"From Partitioning to Management: Tackling Memory Contention with Fine-grained Profiling and Control"** (Online)
SBESC'20 Keynote (K3) Nov. 2020
2. **"Towards A Unified Virtualized Shared Resource Management Infrastructure"** Boston, MA, USA
Boston University Feb. 2020
3. **"Shared Resource Management with Programmable Logic in-the-Middle"** Cambridge, UK
ARM Ltd. Headquarters Nov. 2019
4. **"Safe, Real-Time Software Architectures for Cyber-Physical Systems"** Worcester, MA, USA
Worcester Polytechnic Institute (WPI) Sept. 2019
5. **"Towards Fine-grained Memory Resource Management in Latest-generation MPSoCs"** Munich, Germany
Dept. of Cyber-Physical Systems in Production Engineering July 2019
6. **"Challenges and Opportunities in High-Performance Cyber-Physical Systems"** Manaus, Brazil
1st Digital Fair of Manaus Nov. 2018
7. **"Are You Ready for the 4th Industrial Revolution? Future-proof Cyber-Physical Systems"** Boston, MA, USA
BUILD-Lab Technology Transition Workshop Nov. 2018
8. **"Restart-Based Fault-Tolerance"** York, UK
Workshop on Modelling, Measuring and Managing Uncertainty in CPS July 2018
9. **"Verification of OS-level Cache Management"** Barcelona, Spain
Operating Systems Platforms for Embedded Real-Time applications (OSPERT) July 2018
10. **"Evaluating Memory Subsystem of Configurable Heterogeneous MPSoC"** Barcelona, Spain
Operating Systems Platforms for Embedded Real-Time applications (OSPERT) July 2018
11. **"Hypervisor-level System Protection with SafeVisor"** San Diego, CA, USA
Qualcomm Inc. - Qualcomm Innovation Fellowship May 2016
12. **"Toward certifiable avionics platforms: Single Core Equivalent (SCE) - Part 1"** Seattle, WA, USA
First TCRTS Workshop on Certifiable Multicore Avionics Systems (CMAS) Apr. 2015
13. **"Scratchpad-centric Resource Management"** Farmington Hills, MI, USA
Hitachi Automotive Ltd. - Technology Transition Workshop May 2015
14. **"Single-Core Equivalence (SCE) Tutorial"** Berlin, Germany
Cyber-Physical Systems Week (CPSWeek) Apr. 2014
15. **"Workshop on Multi-Core Performance Isolation using Freescale P4080"** Denver, CO, USA
Lockheed Martin - Technology Transition Workshop Jan. 2013
16. **"A Hands-on Tutorial on Performance Isolation Techniques"** Urbana, IL, USA
Lockheed Martin - Technology Transition Workshop Apr. 2013
17. **"Automatic Predictability-Oriented Refactoring of Application Code"** Philadelphia, PA, USA
WIP - IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS) Apr. 2013

Services to the Community

Executive Committees.....

- *ACM SIGBED Communication Director* Aug. 2019 - Present

Program Committee Member.....

- *33rd Euromicro Conference on Real-Time Systems (ECRTS'21)* July 2021
- *Design Automation Conference (DAC'21)* July 2021
- *Design, Automation and Test in Europe Conference (DATE'21)* Mar. 2021
- *41th IEEE Real-Time Systems Symposium (RTSS'20)* Dec. 2020

- 19th ACM International Conference on Embedded and Software (EMSOFT'20) Oct 2020
- Design Automation Conference (DAC'20) July 2020
- ACM Student Research Competition (SRC) Grand Finals May 2020
- Design, Automation and Test in Europe Conference (DATE'20) Mar 2020
- 25th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS'20) Apr. 2020
- 7th International workshop on Mixed Criticality Systems (WMC'19) Dec. 2019
- 40th IEEE Real-Time Systems Symposium (RTSS'19) Dec. 2019
- 18th ACM International Conference on Embedded and Software (EMSOFT'19) Oct 2019
- 25th IEEE Intl. Conf. on Embedded and Real-Time Computing Systems and Applications (RTCSA'19) Aug. 2019
- 7th International Conference on Smart Computing & Communications (ICSCC'19) June 2019
- 5th New England Network and Systems Day (NENS'19) Apr. 2019
- 25th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS'19) Apr. 2019
- COINS 2019 – Special Session on Critical Systems Design May 2019
- RTSS 2018 – Brief Presentations Session Dec. 2018
- RTSS@Work 2018 – Demo Session Dec. 2018
- 6th International workshop on Mixed Criticality Systems (WMC'18) Dec. 2018
- 39th IEEE Real-Time Systems Symposium (RTSS'18) Dec. 2018
- 24th IEEE Intl. Conf. on Embedded and Real-Time Computing Systems and Applications (RTCSA'18) Aug. 2018
- 18th ACM International Conference on Embedded and Software (EMSOFT'18) Oct 2018
- 21st Euromicro Conference on Digital System Design (DSD'18) Aug. 2018
- 15th IEEE International Conference on Embedded Software Systems (ICESS'18) Jun. 2018
- 24th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS'18) Dec. 2017
- 14th Workshop on Operating Systems Platforms for Embedded Real-Time Applications (OSPERT'18) Apr. 2018
- WiP Session at CSI Symposium on Real-Time and Embedded Systems and Technologies (RTEST'18) Feb. 2018
- 10th Junior Researcher Workshop on Real-Time Computing (JRWRTC) Sept. 2016

Co-organizer.....

- **Publicity Chair** Houston, TX, USA
- 41st IEEE Real-Time Systems Symposium (RTSS) 2021
- **Co-organizer** Nashville, TN, USA
- 2nd ACM/SIGBED Student Research Competition (SRC) at CPS-IoT Week 2021
- **Publicity Chair** Nashville, TN, USA
- 27th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS) 2021
- **Web Chair** Nashville, TN, USA
- 11th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS) 2021
- **Co-chair** Modena, Italy
- 16th annual workshop on Operating Systems Platforms for Embedded Real-Time (OSPERT) 2020
- **Co-organizer** Sydney, Australia
- 1st ACM Student Scholars Program at CPS-IoT Week 2020
- **Web Chair** Sydney, Australia
- 10th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS) 2020
- **Co-organizer** New York, NY, USA
- 1st ACM/SIGBED Student Research Competition (SRC) at Embedded Systems Week (ESWEEK) 2019
- **Web Chair** Montreal, QC, Canada
- 25th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS) 2019
- **Co-organizer for Conference** Boston, MA, USA
- 4th New England Networking and Systems Day (NENS) 2017
- **Co-organizer for TCRTS CPSWeek Tutorial** Pittsburgh, PA, USA
- 2nd TCRTS Workshop on Certifiable Multicore Avionics and Automotive Systems (CMAAS) 2017

- **Co-organizer for ACM/IEEE CPSWeek Tutorial** **Berlin, Germany**
Single Core Equivalent (SCE) Architecture Framework for Safety-critical Multi-core Systems 2014

Session Chair

- **IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS)** **Online**
Session 1 - Scheduling for Parallelism 2020
- **ACM International Conference on Embedded Software (EMSOFT)** **New York, USA**
Session 3C - Timing, Scheduling and Parallel Execution 2019
- **IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS)** **Montreal, Canada**
Session 7 - Scheduling and Synchronization 2019
- **ACM International Conference on Embedded Software (EMSOFT)** **Amsterdam, The Netherlands**
Session 6 - Energy Efficiency and Security 2015

Journal Reviews

- *IEEE Embedded Systems Letters (ESL)* 2021
- *IEEE Transactions on Aerospace and Electronic Systems (TAES)* 2021
- *Springer Design Automation for Embedded Systems (DAEM)* 2019, 2020
- *ACM Transactions on Architecture and Code Optimization (TACO)* 2020
- *International Journal of Computers and Applications (IJCA)* 2020
- *ACM Computing Surveys (ACM CSUR)* 2018
- *Public Library of Science ONE (PLoS ONE)* 2018
- *IEEE Transactions on Computers (TC)* 2017, 2018, 2019
- *Springer Real-Time Systems Journal (RTSJ)* 2016, 2017, 2018, 2019
- *ACM Transactions on Cyber-Physical Systems (TCPS)* 2016, 2020
- *ACM Transactions on Embedded Computing Systems (TECS)* 2017, 2018
- *ACM Transactions on Modeling and Performance Evaluation of Computing Systems (TOMPECS)* 2018

Secondary Reviewer

- *Springer Real-Time Systems Journal (RTSJ)* 2016
- *ACM Transactions on Embedded Computing Systems (TECS)* 2014
- *IEEE Transactions on Industrial Informatics (TII)* 2013, 2017
- *ACM/IEEE Symposium on Embedded Systems For Real-Time Multimedia (ESTIMedia)* 2012, 2013, 2014
- *IEEE International Conference on Cyber-Physical Systems (ICCP)* 2013, 2015, 2016, 2017
- *ACM Conference on Languages, Compilers, and Tools for Embedded Systems (LCTES)* 2015
- *IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS)* 2013, 2014, 2016
- *IEEE Real-Time Systems Symposium (RTSS)* 2014, 2015
- *IEEE Intl. Conference on Embedded and Real-Time Computing Systems and Applications (RTCSA)* 2016, 2017
- *Euromicro Conference on Real-Time Systems (ECRTS)* 2014
- *Design Automation Conference (DAC)* 2017
- *IEEE Emerging Technologies Factory Automation and Applications Symposium (ETFA)* 2017

Internal Services

Comittee Member at Boston University

- *PhD Student Search & Filtering Engine* Fall 2019
- *Extension for BU Faculty Link to Assess Course Prerequisite of Students in CS Courses* Fall 2019
- *Graduate Initiation Seminar (co-organizer)* Spring 2019
- *Faculty Search Program Committee Member* Fall 2018
- *PhD Admissions Program Committee Member* Fall 2018
- *PhD Admissions Program Committee Member* Fall 2017

Professional Experience

- **Co-founder** **Urbana, IL**
2016-Present
 - *AIVolo LLC.*
 - Development of fully integrated data acquisition and sensor fusion system for UAVs
 - Performed custom PCB, firmware and OS development
 - Developed browser-based configuration interface to simplify in-the-field deployment
 - More info available at: <http://www.alvolo.us>

- **Ph.D. Intern** **Pisa, Italy**
June-Aug. 2014
 - *Evidence Inc.*
 - Porting of RTOS to new-generation multi-core micro-controller (Freescale MPC5777M)
 - Augmented RTOS to support DMA-assisted task loading and scheduling
 - Evaluation of achievable performance and timing properties of augmented RTOS

- **Co-founder and CIO** **Rome, Italy**
2012-2013
 - *ShowOn LLC.*
 - Ground-up development of a vertical social networking platform with LAMP platform
 - System administration, development team recruitment, task assignment and progress assessment
 - Data analysis of the highly segmented user base – about 30000 users
 - Design of interaction with existing services via APIs to centralize content management

Technical skills

- **Programming/Scripting:** C, C++, ASM (IA32, AMD64, PowerPC, ARM), Java, Bash, Python, Makefile
- **Experienced in Linux Kernel development,** ARM-based and PowerPC-based platforms, Xilinx Zynq-7000 & UltraScale+, Microchip PIC18/32, Freescale MPC56xx and MPC57xx, Arduino, ArduPilot, TI MSP
- **Hardware Debugging:** Lauterbach PowerDebug & PowerTrace, GreenHills SuperTrace Probe, Xilinx Integrated Logic Analyzer
- **Hardware Design:** Verilog, VHDL
- **Web Development:** PHP, SQL, JavaScript, Node.js, Handlebars, AngularJS

Language Skills

Italian: Native speaker

English: Fluent

Turkish: Intermediate

References

References available upon request.