Michael J. Giardino

Contact Information	Thurgauerstrasse 80 8050 Zürich Switzerland +41 076 237 19 17	www.michaelgiardino.com michael.giardino@gmail.com 0000-0002-9906-720X Google Scholar

Research Interests Hetreogeneous compute and memory systems; microarchitectures for cloud computing; serverless computing models; hardware acceleration; power-aware computing; disaggregated computing; hardware-software co-design; scheduling and resource allocation; low power architectures; hardware protection mechanisms

Education

Georgia Institute of Technology, Atlanta, GA
Ph.D., Electrical and Computer Engineering, January 2019
Dissertation: *A Software Framework for Application-Guided Power-Aware Control Systems* (Advisor: Bonnie Ferri)
M.S., Electrical and Computer Engineering, August 2013

University of New Orleans, New Orleans, LA
B.S., Electrical Engineering (Minor: Computer Science), May 2011

Research Experience

Principal Researcher February 2023 - present
Huawei Technologies – Zürich Research Center – Computing Systems Laboratory

Research areas: Heterogeneous computing, cloud-native architectures, disaggregated systems, RISC-V for serverless

Postdoctoral Researcher August 2019 - January 2023
ETH Zürich – Department of Computer Science – Systems Group
Principal Investigator: Timothy Roscoe

Enzian (custom two-socket CPU-FPGA server platform): Planning of short and long-term goals of the project; developed firmware for board management controller; designed system for testing electrical properties of custom motherboard; modeling of system power and performance; research on mechanisms for resource management; development of FPGA-CPU coherence interconnect
Future Serverless Architectures: Novel microarchitectures for serverless (RISC-V based); (co)developed new software architecture for low-overhead serverless computing; CHERI hardware capability-based isolation mechanisms; allocation and scheduling of heterogeneous resources
System Power Management: advanced ML algorithms (Q(λ), SARSA(λ)) for power management; declarative programming of device drivers; provably correct power distribution management; power-aware scheduling/allocations
Strategy and Advising: Proposed and supervised long-term research goals for the group; defined new areas of research through funding and thesis proposals; (co)supervised 10 MSc and 9 BSc theses, PhD students, and semester projects; presented representative group work in industry, academia, and conferences; discovered and maintained internal and external research collaborations; broad responsibilities for student supervision, scheduling, and planning

Graduate Research Assistant August 2012–December 2018
Georgia Institute of Technology – Advisor: Bonnie Ferri
Projects: Researched power-aware systems, control systems, performance metrics and scheduling. Used machine learning (artificial neural networks and Q-Learning) to model and predict power-performance states.

Opportunity Research Scholar Mentor August 2015–May 2017
Georgia Institute of Technology
Project: Led a team of undergraduates in research into power-aware control systems using machine learning.

Research Intern May 2014–August 2015

Enterprise and Big Data - Software and Services Group
Intel Corporation - Chandler, AZ
Supervisor: Kshitij Doshi

H-Store: Modified H-Store in-memory database to support heterogeneous memory
Soft2LM: Added region-based allocation and migration to Linux memory manager for heterogeneous memory

Published Research

Shashank Anand, Michal Friedman, **Michael Giardino**, and Gustavo Alonso. 2024. Skip it: take control of your cache! In *Proceedings of the 29th ACM International Conference on Architectural Support for Programming Languages and Operating Systems* (ASPLOS 2024). Association for Computing Machinery, La Jolla, United States, 17 pages. ISBN: 9798400703850. DOI: 10.1145/3620665.3640407.

Roberto Starc, Tom Kuchler, **Michael Giardino**, and Ana Klimovic. 2024. Serverless? RISC more! In *Proceedings of the 2nd Workshop on SErverless Systems, Applications and MEthodologies* (SESAME '24). Association for Computing Machinery, Athens, Greece, 15–24. ISBN: 9798400705458. DOI: 10.1145/3642977.3652095.

Tom Kuchler, **Michael Giardino**, Timothy Roscoe, and Ana Klimovic. 2023. Function-as-a-Function. In *Proceedings of the 14th Symposium on Cloud Computing* (SoCC '23). Association for Computing Machinery, Santa Cruz, CA, USA. DOI: 10.1145/3620678.3624648.

David Cock, Abishek Ramdas, Daniel Schwyn, **Michael Giardino**, Adam Turowski, Zhenhao He, Nora Hossle, Dario Korolija, Melissa Licciardello, Kristina Martsenko, Reto Achermann, Gustavo Alonso, and Timothy Roscoe. 2022. Enzian: an open, general, CPU/FPGA platform for systems software research. In *Proceedings of the 27th ACM International Conference on Architectural Support for Programming Languages and Operating Systems* (ASPLOS 2022). Association for Computing Machinery, Lausanne, Switzerland, 434–451. ISBN: 9781450392051. DOI: 10.1145/3503222.3507742.

Michael Giardino, Daniel Schwyn, Bonnie Ferri, and Aldo Ferri. 2022. Low-overhead reinforcement learning-based power management using 2QoSM. *Journal of Low Power Electronics and Applications*, 12, 2. DOI: 10.3390/jlpea12020029.

Michael Giardino, Daniel Schwyn, Aldo Ferri, and Bonnie Ferri. 2021. 2QoSM: a Q-Learner QoS manager for Application-Guided Power-Aware systems. In *14th International Symposium on Embedded Multicore/Manycore SoCs (MCSoC-2021) (IEEE MCSoC-2021)*. Singapore, Singapore, (Dec. 2021), 218–225. DOI: 10.1109/MCSoC51149.2021.00040.

Lukas Humbel, Daniel Schwyn, Nora Hossle, Roni Haecki, Melissa Licciardello, Jan Schaer, David Cock, **Michael Giardino**, and Timothy Roscoe. 2021. A model-checked i^2c specification. In *International Symposium on Model Checking Software*. Springer. (Aug. 2021), 177–193. ISBN: 978-3-030-84629-9. DOI: 10.1007/978-3-030-84629-9_10.

Jasmin Schult, Daniel Schwyn, **Michael Giardino**, David Cock, Reto Achermann, and Timothy Roscoe. 2021. Declarative power sequencing. *ACM Trans. Embed. Comput. Syst.*, 20, 5s, Article 84, (Sept. 2021), 21 pages. DOI: 10.1145/3477039.

Michael J. Giardino, Eric Klawitter, Bonnie Ferri, and Aldo Ferri. 2020. A power- and performance-aware software framework for control system applications. *IEEE Transactions on Computers*, 69, 10, (Oct. 2020), 1544–1555. DOI: 10.1109/TC.2020.2978468.

Michael J. Giardino. 2019. *A Software Framework for Application-Guided Power-Aware Control Systems*. Ph.D. Dissertation. Georgia Institute of Technology, (Jan. 2019). http://hdl.handle.net/1853/61212.

Michael J. Giardino, Wayne Maxwell, Bonnie Ferri, and Aldo Ferri. 2018. Speculative thread framework for transient management and bumpless transfer in reconfigurable digital filters. In *2018 Annual American Control Conference (ACC)*. (June 2018), 3786–3791. DOI: 10.23919/ACC.2018.8431860.

M. Giardino, K. Doshi, and B. Ferri. 2016. Soft2LM: application guided heterogeneous memory management. In *2016 IEEE International Conference on Networking, Architecture and Storage (NAS)*. (Aug. 2016), 1–10. DOI: 10.1109/NAS.2016.7549421.

M. Giardino and B. Ferri. 2016. Correlating hardware performance events to CPU and DRAM power consumption. In *2016 IEEE International Conference on Networking, Architecture and Storage (NAS)*. (Aug. 2016), 1–2. DOI: 10.1109/NAS.2016.7549395.

Lin Ma, Joy Arulraj, Sam Zhao, Andrew Pavlo, Subramanya R. Dulloor, **Michael J. Giardino**, Jeff Parkhurst, Jason L. Gardner, Kshitij Doshi, and Stanley Zdonik. 2016. Larger-than-memory data management on modern storage hardware for in-memory OLTP database systems. In *Proceedings of the 12th International Workshop on Data Management on New Hardware* (DaMoN '16) Article 9. Association for Computing Machinery, San Francisco, California, (June 2016), 7 pages. ISBN: 9781450343190. DOI: 10.1145/2933349.2933358.

A. Lanterman, **M. J. Giardino**, B. Ferri, J. E. Michaels, W. Hunt, and A. Ferri. 2014. Embedding low-cost, portable experiments into a lecture-based signals and systems course. In *2014 American Control Conference*. (June 2014), 2543–2549. DOI: 10.1109/ACC.2014.6859406.

B. Muldrey, S. Deyati, **M. J. Giardino**, and A. Chatterjee. 2013. Ravage: post-silicon validation of mixed signal systems using genetic stimulus evolution and model tuning. In *2013 IEEE 31st VLSI Test Symposium (VTS)*. (Apr. 2013), 1–6. DOI: 10.1109/VTS.2013.6548917.

Michael Giardino, Brandon Samuels, and Dimitrios Charalampidis. 2010. Multiple Vehicle Detection and Tracking Using an Adaptive System. In *Intelligent Engineering Systems through Artificial Neural Networks, Volume 20*. ASME Press, (Jan. 2010). ISBN: 9780791859599. DOI: 10.1115/1.859599.paper49.

Awards

Professional Awards

Huawei Future Star	2023

Student Awards

President's Fellowship	2011-2016
ECE Outstanding Graduate Teaching Assistant Award	Spring 2014
1st place team - IEEE Region 5 Robotics Competition	2011
Dean's List	2008-2011
Outstanding Sophomore in the College of Engineering	2008-2009
ISA Donald Iverson Scholarship	2009

Invited Talks

Future Heterogeneous Cloud Systems *University of New Orleans, USA*	September 2023
Enzian: A Heterogeneous Platform for a Heterogeneous World *VMware Research, Palo Alto, USA*	July 2022
Enzian: An Open Heterogeneous Research Computer *National University of Singapore, Singapore*	December 2021

Service

Shadow PC, Eurosys	2023, 2024
ACM Europe Technology Policy Committee (ETPC)	2023–
Journal Reviewer, IEEE Transactions on Computers	2019, 2021-22, 2024
Artifact Evaluation Committee, HPCA	2024
Artifact Evaluation Committee, OSDI/ATC	2023

	Artifact Evaluation Board, Journal of Systems Research	2021-3
	Journal Reviewer, ACM Trans. on Embedded Comp. Sys. (TECS)	2022
	Artifact Evaluation Committee, SOSP	2021
	Postdoc+ Board, Assn. of Sci. Staff at ETH (AVETH)	2021-22
	Artifact Evaluation Committee, EuroSys	2021
	President, University of New Orleans IEEE-HKN Chapter	2010-2011

Teaching Experience

Instructor of Record (Designed new course) — Spring 2022, 2023, 2024
Heterogeneous Systems Seminar
D-INFK - ETH Zürich

Coinstructor — Spring 2020, 2021, 2022, 2023, 2024
Computing Platforms Seminar
D-INFK - ETH Zürich

Coinstructor — Fall 2023
Hardware Acceleration for Data Processing
D-INFK – ETH Zürich

Substitute Teacher — December 2019–June 2020
Substitute Middle and High School Teacher
American School of Milan
Milan, Italy

Tutor — October 2016–December 2018
SAT, ACT, AP Tutor for High School Students
Within Reach Educational Consultants
Atlanta, GA

Lead Teaching Assistant — Fall 2012–Spring 2014
Teaching Enhancement via Small-Scale Affordable Labs (TESSAL) Center
School of Electrical and Computer Engineering,
Georgia Institute of Technology

Technical Writing Consultant — Fall 2011–Summer 2012
Undergraduate Professional Writing Program
Instructor: Christina Bourgeois
School of Electrical and Computer Engineering,
Georgia Institute of Technology

Languages

English – Native
Italian – Conversational (B1-B2)
German – Elementary