

Gerasimos Gerogiannis

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RESEARCH INTERESTS

- Computer architecture
- Architectures for machine learning, graph analytics and scientific workloads
- Modern aspects of domain-specific systems such as flexibility, scalability, scheduling and decision-making
- Integration of specialization in general-purpose systems

EDUCATION

University of Illinois at Urbana-Champaign (UIUC)

Urbana, IL, USA

PhD - Electrical and Computer Engineering; expected graduation date 06/2026

Aug. 2021 - present

- Advisor: Prof. Josep Torrellas
- Current GPA: 4.0/4.0

University of Patras

Patras, Greece

Diploma in Electrical and Computer Engineering (B.Eng. + M.Eng.)

Sep. 2016 - June 2021

- GPA: 9.83/10.00 (first of my class)
- Thesis: '*Reinforcement Learning for Task Offloading in Next Generation Networks: Algorithms and Hardware Acceleration*'
Thesis Supervisor: Prof. Alexios Birbas

AWARDS AND HONORS

Rambus Computer Engineering Fellowship

UIUC, ECE Department, USA, 2024

- For demonstrating outstanding research performance in the area of Computer Engineering.

IEEE Micro Top Picks from Computer Architecture Conferences Top Pick

IEEE, USA, 2024

- Awarded to the 12 most significant papers in computer architecture published in the previous year based on novelty and potential for long-term impact. Top Pick awarded for my paper: '*Micro-Armed Bandit: Lightweight & Reusable Reinforcement Learning for Microarchitecture Decision-Making*'.

IEEE Micro Top Picks from Computer Architecture Conferences Honorable Mention

IEEE, USA, 2024

- Awarded to the 12 most significant papers in computer architecture published in the previous year based on novelty and potential for long-term impact. Honorable Mention awarded for my paper: '*SPADE: A Flexible and Scalable Accelerator for SpMM and SDDMM*'.

ASPLOS Conference Travel Grant

ACM, USA, 2024

HPCA Conference Travel Grant

IEEE, USA, 2024

MICRO Conference Travel Grant

IEEE/ACM, USA, 2023

ISCA Conference Travel Grant

IEEE/ACM, USA, 2023

Student Excellence Award

University of Patras, Greece, 2021

- For the highest GPA among all 2020-2021 graduates of the Electrical and Computer Engineering Department of the University of Patras.

Excellence Award

State Scholarships Foundation (IKY), Greece, 2021

- For the highest GPA among all 2020-2021 graduates of the Electrical and Computer Engineering Department of the University of Patras.

Skouras Foundation Award

Skouras Foundation, Greece, 2020

- For the highest GPA among all undergraduate students in the Electrical and Computer Engineering Department of the University of Patras.

Freshman Excellence Award

University of Patras, Greece, 2016

- For the highest grade in the National University Entrance Exams (Panhellenic Exams) among the freshmen students in the Electrical and Computer Engineering Department of the University of Patras.

Distinctions in national high-school student competitions

2013-2016

- Replacement member of the student team that represented Greece in the 47th International Physics Olympiad (Switzerland-Liechtenstein, 2016).
- 7th place in phase A and phase B of the National Student Physics Competition organized by the University of Athens (2016).
- 10th place in the National Student Physics Competition organized by the University of Athens in cooperation with Greek Physicists Union (2015).
- 12th place in the National Student Chemistry Competition organized by the Greek Chemists Union (2015).
- Thales Prize in the National Student Mathematics Competition organized by the Greek Mathematical Society (2014-2015).
- Thales Prize in the National Student Mathematics Competition organized by the Greek Mathematical Society (2013-2014).
- Member of the team that finished 9th in the Greek Qualifiers for the European Union Science Olympiad (EUSO) (2015).

CONFERENCE PUBLICATIONS

- [C6] *'Distributed-Memory Parallel Algorithms for Sparse Matrix and Sparse Tall-and-Skinny Matrix Multiplication'*
Isuru Ranawaka, Md Taufique Hussain, Charles Block, **Gerasimos Gerogiannis**, Josep Torrellas, and Ariful Azad
To appear in Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis (SC), November 2024
- [C5] *'Two-Face: Combining Collective and One-Sided Communication for Efficient Distributed SpMM'*
Charles Block*, **Gerasimos Gerogiannis***, Charith Mendis, Ariful Azad, and Josep Torrellas
*Co-first authors, order is alphabetical
In Proceedings of the International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), April 2024
- [C4] *'HotTiles: Accelerating SpMM with Heterogeneous Accelerator Architectures'*
Gerasimos Gerogiannis, Sriram Aananthakrishnan, Josep Torrellas, and Ibrahim Hur
In Proceedings of the International Symposium on High Performance Computer Architecture (HPCA), March 2024
- [C3] *'Micro-Armed Bandit: Lightweight & Reusable Reinforcement Learning for Microarchitecture Decision-Making'*
Gerasimos Gerogiannis and Josep Torrellas
In Proceedings of the International Symposium on Microarchitecture (MICRO), October 2023
Selected as a Top Pick in IEEE Micro Top Picks from Computer Architecture Conferences
- [C2] *'SPADE: A Flexible and Scalable Accelerator for SpMM and SDDMM'*
Gerasimos Gerogiannis, Serif Yesil, Damitha Lenadora, Dingyuan Cao, Charith Mendis, and Josep Torrellas
In Proceedings of the International Symposium on Computer Architecture (ISCA), June 2023
Selected as a Honorable Mention in IEEE Micro Top Picks from Computer Architecture Conferences
- [C1] *'Characterizing the Scalability of Graph Convolutional Networks on Intel® PIUMA'*
Matthew Adiletta, Jesmin Jahan Tithi, Emmanouil-Ioannis Farsarakis, **Gerasimos Gerogiannis**, Robert Adolf, Robert Benke, Sidharth Kashyap, Samuel Hsia, Kartik Lakhota, Fabrizio Petrini, Gu-Yeon Wei, and David Brooks
In Proceedings of the International Symposium on Performance Analysis of Systems and Software (ISPASS), April 2023

JOURNAL PUBLICATIONS

- [J2] *'Practical Online Reinforcement Learning for Microprocessors with Micro-Armed Bandit'*
Gerasimos Gerogiannis and Josep Torrellas
IEEE Micro Magazine, Top Picks in Computer Architecture Special Issue, July-August 2024
- [J1] *'Deep Reinforcement Learning Acceleration for Real-Time Edge Computing Mixed Integer Programming Problems'*
Gerasimos Gerogiannis, Michael Birbas, Aimilios Leftheriotis, Eleftherios Mylonas, Nikolaos Tzanis, and Alexios Birbas
IEEE Access, January 2022

PREPRINTS

- [R1] *'Input-sensitive dense-sparse primitive compositions for GNN acceleration'*
Damitha Lenadora, Vimarsh Sathia, **Gerasimos Gerogiannis**, Serif Yesil, Josep Torrellas and Charith Mendis
arXiv preprint arXiv:2306.15155, June 2023

POSTERS

- [O3] *'HotTiles: Accelerating SpMM with Heterogeneous Accelerator Architectures'*
International Symposium on High Performance Computer Architecture (HPCA) Poster Session, March 2024
- [O2] *'SPADE: A Flexible and Scalable Accelerator for SpMM and SDDMM'*
 - ACE Center for Evolvable Computing Spring Meeting, June 2023
 - ACE Center for Evolvable Computing Annual Meeting, October 2023
- [O1] *'Micro-Armed Bandit: Lightweight & Reusable Reinforcement Learning for Microarchitecture Decision-Making'*
International Symposium on Microarchitecture (MICRO) Poster Session, October 2023

CONFERENCE TALKS

- [N5] *'Sparsity at Scale: Towards Efficient Distributed Sparse Accelerators'*
SRC TECHCON 2024,
Session 24: Digital Processing: Artificial Intelligence, September 10 2024
- [N4] *'Two-Face: Combining Collective and One-Sided Communication for Efficient Distributed SpMM'*
International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS),
Session 1B: Optimizing ML Communication, April 29 2024
- [N3] *'HotTiles: Accelerating SpMM with Heterogeneous Accelerator Architectures'*
International Symposium on High Performance Computer Architecture (HPCA), Session 10A: Accelerator, March 6 2024
- [N2] *'Micro-Armed Bandit: Lightweight & Reusable Reinforcement Learning for Microarchitecture Decision-Making'*
International Symposium on Microarchitecture (MICRO), Session 5B: Prefetching, October 31 2023
- [N1] *'SPADE: A Flexible and Scalable Accelerator for SpMM and SDDMM'*
International Symposium on Computer Architecture (ISCA), Session 1B: CPU Microarchitecture, June 19 2023

OTHER TALKS

- [T5] *'Micro-Armed Bandit: Lightweight & Reusable Reinforcement Learning for Microarchitecture Decision-Making'*
Intel uArch Monthly Meeting, July 16 2024
- [T4] *'Micro-Armed Bandit: Lightweight & Reusable Reinforcement Learning for Microarchitecture Decision-Making'*
Intel Archfest, May 17 2024
- [T3] *'Micro-Armed Bandit: Lightweight & Reusable Reinforcement Learning for Microarchitecture Decision-Making'*
ACE Center for Evolvable Computing Theme Meeting, December 1 2023
- [T2] *'Domain-Specific Hardware and Software for Mixed Sparse-Dense Algebra at Scale'*
ACE Center for Evolvable Computing Theme Meeting, August 4 2023
- [T1] *'Accelerators for Irregular Applications'*
IBM-Illinois Discovery Accelerator Institute Annual Meeting, March 1 2023

SELECTED PROJECTS

miniSPADE

2022-2023

- Designed the microarchitecture and taped-out a simplified ASIC prototype of the accelerator described in our ISCA'23 paper using TSMC 65nm technology.

WORK EXPERIENCE

- Graduate Intern** January 2024 - December 2024 (ongoing)
Intel Corporation (remote) Champaign, IL, USA
- CPU architecture redesign for emerging Machine Learning applications such as Large Language Models.
- Graduate Intern** May 2023 - August 2023
Intel Corporation (remote) Champaign, IL, USA
- Heterogeneous accelerator architectures to accelerate sparse matrix - dense matrix multiplication.
 - Research conducted in internship led to publication in HPCA'24.
- Graduate Intern** May 2022 - August 2022
Intel Corporation (remote) Champaign, IL, USA
- Synergies between hardware and software to maximize performance on the Intel Programmable Integrated Unified Memory Architecture (PIUMA).
 - Research conducted in internship led to publication in ISPASS'23.
- Research Assistant** August 2021 - present
i-coma group, University of Illinois at Urbana-Champaign Champaign, IL, USA

TEACHING EXPERIENCE

- Private Tutor** 2016 – 2020
Patras, Greece
- Tutor** 2020 – 2021
Prosimo Education Center Patras, Greece
- Gave lectures and tutored undergraduate students in preparation for their exams in a variety of electrical and computer engineering subjects.

GRANT WRITING EXPERIENCE

- NSF** 2023 – 2028
PPoSS: LARGE: General-Purpose Scalable Technologies for Fundamental Graph Problems Amount: \$5,000,000
- Lead PI: Josep Torrellas, number of PIs: 10

PROFESSIONAL MEMBERSHIPS

- Student Member** May 2023 – present
ACM

COMMUNITY AND LEADERSHIP

- President** September 2021 – December 2022
Hellenic Students Association (HSA) at UIUC (graduate section) Urbana, IL, USA
- Member** 2017 – 2020
ECE Undergraduate Student Council at the University of Patras Patras, Greece

TECHNICAL SKILLS

Programming Languages: C/C++, Python, Matlab, Shell/Bash scripting, Perl, VHDL, Verilog
Parallel Programming: OpenMP, MPI, Posix Threads
Frameworks/Libraries: Simulink, Vivado, Vivado HLS, Cadence EDA tools, TensorFlow, PyTorch, Deep Graph Library
Microarchitectural Simulators and Tools: SST, gem5, ChampSim, Sniper, Accel-Sim, DRAMSim, CACTI, McPAT
Development Tools: git, CMake

HOBBIES

- FIDE rated chess player - member of the team that won the bronze medal in the National Student Chess Competition (2013).
- Guitar and Greek traditional instruments player.

REFERENCES AVAILABLE UPON REQUEST

Josep Torrellas, Professor, University of Illinois at Urbana-Champaign, USA

Charith Mendis, Assistant Professor, University of Illinois at Urbana-Champaign, USA

Ibrahim Hur, Senior Principal Architecture Lead, Microsoft, USA

Stijn Eyerman, Research Scientist, Intel, Belgium

Alexios Birbas, Professor, University of Patras, Greece

Stavros Koubias, Professor Emeritus and Former Rector, University of Patras, Greece