Mahbod Afarin

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Professional Summery

Postdoctoral Scholar at UC San Diego with over 5 years of experience in hardware accelerators, compiler design, and graph analytics, working across architecture, runtime, and MLIR-based compiler stacks. Demonstrated ability to deliver high-impact research results, with successful technology deployment at Google and publications in top-tier conferences.

Technical Skills

Languages: C/C++, Python, CUDA, OpenMP, OpenCL, SQL
Compiler Design: LLVM, MLIR, LLVM-BOLT, LLVM Machine Outliner
Hardware Design: VHDL, Verilog HDL, SystemC, Xilinx ISE, Altera Quartus, Synopsys Design Compiler
Simulation & Modeling: Multi2Sim, GPGPU-Sim, Mentor Graphics Modelsim, HSPICE, PSPICE, IC Encounter, HSIM, Cadence SoC Encounter, Structural Simulation Toolkit

Education

University of California Riverside **Jan. 2020 – June 2025**
Doctor of Philosophy (Ph.D.) in Computer Science *Riverside, California*

- *Thesis: "Redundancy Removal for Accelerating Graph Processing Workloads"*
- *Advisors: Professor Rajiv Gupta & Professor Nael Abu-Ghazaleh*
- *GPA:* **3.86***/4*

Sharif University of Technology **Sep. 2015 – Jan. 2018**
Master of Science (M.Sc.) in Computer Engineering *Tehran, Iran*

- *Thesis: "Improving Life Cycle of SIMT Processors for Approximate Computing" (Thesis Grade: Excellent)*
- *Advisors: Professor Shaahin Hessabi*
- *GPA:* **4***/4 (***19.03***/20) (ranked* **7th** *among 83 computer engineering students)*

Research Experience

University of California San Diego **Jun. 2025 – Present**
Postdoctoral Scholar *San Diego, California*

- Member of the *System Energy Efficiency (SEE) Lab* and the *Processing with Intelligence Storage & Memory (PRISM)* Research Center at UC San Diego, under the supervision of Professor *Tajana Rosing*.
- Developing MLIR-based compiler support targeting *Dynamic Programming Processing in Memory Hardware Accelerators.*

Google **Sep. 2024 – Dec. 2024**
Student Researcher *Sunnyvale, California*

- Member of the *Compiler Optimization* team at Google working on *Inter-procedural Identical Basic Block Folding*.
- Developed scalable post-link and inter-procedural identical basic block folding techniques to eliminate redundant basic blocks, reduce binary code size, and maintain performance using profiling-guided analysis.

University of California Riverside **Jan. 2020 – Jun. 2025**
Graduate Research Assistant *Riverside, California*

- Member of the *Graph Analytics with Scalability and Performance (GRASP)* and the *RIverside Programming Language & Software Engineering (RIPLE)* centers, supervised by Professor *Rajiv Gupta* & Professor *Nael Abu-Ghazaleh*.
- Developed HW/SW approaches to accelerate dynamic graph workloads, along with designing hardware accelerators.

Sharif University of Technology **Dec. 2015 – Jan 2018**
Graduate Research Assistant *Tehran, Iran*

- Member of the Very Large Scale Integration Laboratory (VLSI-Lab), supervised by Professor *Shaahin Hessabi*.
- Improved SIMT processor life cycle for approximate computing through techniques that extend hardware longevity.

Publications

C1. [***EuroSys'24***] X. Jiang, **M. Afarin**, Z. Zhao, N. Abu-Ghazaleh, R. Gupta, "Core Graph: Exploiting Edge Centrality to Speedup the Evaluation of Iterative Graph Queries," *2024 Proceedings of the Nineteen European Conference on Computer Systems (Aacceptance Rate:* ***15.99%****)* (Contributed Equally with the First Author).

C2. [***MICRO'23***] C. Gao, **M. Afarin**, S. Rahman, N. Abu-Ghazaleh, R. Gupta, "MEGA Evolving Graph Accelerator," *2023 56th Annual IEEE/ACM International Symposium on Microarchitecture (Aacceptance Rate:* ***22%****)* (Contributed Equally with the First Author).

C3. [***ASPLOS'23***] **M. Afarin**, C. Gao, S. Rahman, N. Abu-Ghazaleh, R. Gupta, "CommonGraph: Graph Analytics on Evolving Data," *International Conference on Architectural Support for Programming Languages and Operating Systems. (Aacceptance Rate:* ***26.66%****)*

C4. [***MICRO'21***] S. Rahman, **M. Afarin**, N. Abu-Ghazaleh, R. Gupta, "JetStream: Graph Analytics on Streaming Data with Event-Driven Hardware Accelerator," *2021 54th Annual IEEE/ACM International Symposium on Microarchitecture. (Aacceptance Rate:* ***21.74%****)*

C5. [***HOPC'23***] **M. Afarin** et al., "CommonGraph: Graph Analytics on Evolving Data (Abstract)," *In Proceedings of the 2023 ACM Workshop on Highlights of Parallel Computing.*

C6. [***BigData'23***] A. Mazloumi, **M. Afarin**, R. Gupta, "Expressway: Prioritizing Edges for Distributed Evaluation of Graph Queries," *2023 IEEE International Conference on Big Data.*

C7. [***Under Review***] C. Mamatha, **M. Afarin**, R. Gupta, S. Tallam, H. Shen, and X. D. Li., "DeduBB: Binary Code Size Reduction via Post-Link Basic Block De-duplication," *ACM 2026 International Conference on Compiler Construction.*

C8. [***Under Review***] **M. Afarin** et al., "UVVs: Identifying Unchanged Vertex Values in Evolving Graphs via Intersection-Union Analysis," *40th IEEE International Parallel & Distributed Processing Symposium (IPDPS 2026).*

C9. [***Under Review***] C. Gao, **M. Afarin**, X. Yin, N. Abu-Ghazaleh, R. Gupta, "Sagas: Temporally Consistent Sampling of Evolving Graphs," *IEEE International Conference on Big Data.*

C10. [***Under Review***] C. Gao, X. Yin, **M. Afarin**, N. Abu-Ghazaleh, R. Gupta, "Indexing Evolving Graphs via Query Evolution Prediction," *ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP 2026).*

Awards & Achievements

- Won ***UCR Dissertation Completion Fellowship Award*** at UC Riverside, 2024.
- Received the ***Excellent Service*** badge in all three cycles of ASPLOS'24 Artifact Evaluation, 2024 (Certificate).
- Won ***UCR GSA Travel Grant Award*** at University of California, Riverside, 2023.
- Won ***Dean's Distinguished Fellowship Award*** at University of California, Riverside, 2019.
- ***Ranked 7th*** among 83 Computer Engineering students at Sharif University of Technology (***Top 8%***), 2018.
- Admitted as an ***Exceptional Talent*** at Sharif University of Technology for M.Sc, 2015.
- ***1st Rank***, highest B.Sc GPA among all Computer Engineering graduates at Shahed University, 2015.

Teaching Experience

- Teaching Assistant, ***Compiler Design*** (Summer'21/22/23 and Spring'21/22), University of California, Riverside, Department of Computer Science & Engineering, Prof. Rajiv Gupta.
- Teaching Assistant, ***System on Chip*** (Spring'18) **Testability** (Fall'17) ***Advanced VLSI*** (Spring'17) ***VLSI*** (Fall'16), Sharif University of Technology, CE Dep., Prof. Shaahin Hessabi.
- Lab Instructor, ***Logic Design Lab***, Sharif University of Technology, Department of Computer Engineering, Summer 2017.
- Lab Instructor, ***Digital System Design Lab***, Sharif University of Technology, Department of Computer Engineering, Summer 2016, Prof. Maziar Goudarzi.

Professional Services

Audio/Video Chair: ASPLOS'24 Conference
Reviewer: CAL'23, TACO'23, IEEE Transaction on Computers'23, Parallel Computing'23 & 25
Talks: HOPC'23, Society of Women Engineers (UCR, Winter'24), Tulane Uni. (Winter'25), & Binghamton Uni. (Spring'25)
Artifact Evaluation Committee: ASPLOS'25, ASPLOS'24, ISCA'24

References

Professor Tajana Rosing, My Postdoc Supervisor – (Email | Homepage)
Professor Rajiv Gupta, My Ph.D. Supervisor – (Email | Homepage)
Professor Nael Abu-Ghazaleh, My Ph.D. Supervisor – (Email | Homepage)