Alireza Farshin | Curriculum Vitae

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in alireza-farshin　•　🐦 alirezafarshin

I am a distributed systems researcher at NVIDIA. My research interests include computer networks and networked systems. During my doctoral studies, I improved the performance of Network Functions Virtualization (NFV) service chains by using **low-level optimization** techniques. ▶ Watch

Work Experience

Networking Software & Systems Research Team at NVIDIA　　　**Stockholm, Sweden**
Distributed Systems Researcher　　　*January 2024–now*

Connected Intelligence Unit at RISE Research Institutes of Sweden　　　**Stockholm, Sweden**
Senior Researcher in AI / Machine Learning and Networking　　　*August 2023–January 2024*
- Improving packet processing at multi-100-Gbps rates (see FAJITA).
- Using large language models (LLMs) to build and configure networked systems (see NetBuddy, FlowMage, and NetConfEval).
- Developing pruning techniques and improving inference of LLMs (see [W1]).

Network Systems Laboratory (NSLab) at KTH　　　**Stockholm, Sweden**
Postdoctoral Researcher　　　*March 2023–August 2023*

Network Systems Laboratory (NSLab) at KTH　　　**Stockholm, Sweden**
Doctoral Researcher　　　*August 2017–March 2023*

ICT Doctoral Programme Council at KTH　　　**Stockholm, Sweden**
Student Representative of the Division of Communication Systems (CoS)　　　*May 2018–December 2020*

Mobile Telecommunication Company of Iran (MCCI)　　　**Tehran, Iran**
Portal Specialist　　　*December 2015–June 2016*
Vendor Manager & Portal/Application Supervisor:

- eCare Application: My MCI Application for iOS and Android
- eSales Website: eVoucher

CafeYab　　　**Tehran, Iran**
Co-founder and CEO　　　*Fall-2013*
An application for iOS and Android for finding nearby Coffee Shops

Informatics Services Corporation (ISC)　　　**Tehran, Iran**
Internship　　　*June 2013–September 2013*
- Ported an RF unit controller from PIC-16F877A to AtMega64A and tested the new module.
- Designed a remote-control system with HM-T and HM-R FSK modules.

Publications

Conference Publications

[C1] Hamid Ghasemirahni, **Alireza Farshin**, Mariano Scazzariello, Gerald Q. Maguire Jr., Dejan Kostić, Marco Chiesa. FAJITA: Stateful Packet Processing at 100 Million pps, *The 20th International Conference on emerging Networking EXperiments and Technologies (CoNEXT)*. 2024. Download

[C2] Changjie Wang, Mariano Scazzariello, **Alireza Farshin**, Simone Ferlin, Dejan Kostić, Marco Chiesa. NetConfEval: Can LLMs Facilitate Network Configuration?, *The 20th International Conference on emerging Networking EXperiments and Technologies (CoNEXT)*. 2024. [**IRTF/IETF ANRP Winner!**] Download

[C3] Hamid Ghasemirahni, Tom Barbette, Georgios Katsikas, **Alireza Farshin**, Massimo Girondi, Amir Roozbeh, Marco Chiesa, Gerald Q. Maguire Jr., Dejan Kostić. Packet Order Matters! Improving Application Performance by Deliberately Delaying Packets In *19th USENIX Symposium on Networked Systems Design and Implementation (**NSDI**)*. 2022. Acceptance rate (Spring): $28/104 \approx 26.9\%$. [**Community Award Winner!**] Download

[C4] **Alireza Farshin**, Tom Barbette, Amir Roozbeh, Gerald Q. Maguire Jr., Dejan Kostić. PacketMill: Toward per-core 100-Gbps Networking In *International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**)*. 2021. Acceptance rate: $75/398 \approx 18.8\%$. Download

[C5] **Alireza Farshin**, Amir Roozbeh, Gerald Q. Maguire Jr., Dejan Kostić. Reexamining Direct Cache Access to Optimize I/O Intensive Applications for Multi-hundred-gigabit Networks In *USENIX Annual Technical Conference (**ATC**)*. 2020. Acceptance rate: $65/348 \approx 18.6\%$. Download

[C6] **Alireza Farshin**, Amir Roozbeh, Gerald Q. Maguire Jr., Dejan Kostić. Make the Most out of Last Level Cache in Intel Processors In *The European Conference on Computer Systems (**EuroSys**)*. 2019. Acceptance rate: $45/207 \approx 21.7\%$. Download

Journal Publications

[J1] **Alireza Farshin**, Luigi Rizzo, Khaled Elmeleegy, Dejan Kostić. Overcoming the IOTLB wall for multi-100-Gbps Linux-based networking In *PeerJ Computer Science (**PeerJ CS**)*. 2023. **Impact factor: 2.41**. Download

[J2] **Alireza Farshin**, Saeed Sharifian. A modified knowledge-based ant colony algorithm for virtual machine placement and simultaneous routing of NFV in distributed cloud architecture In *The Journal of Supercomputing (**SUPE**)*. 2019. **Impact factor: 2.469**. Download

[J3] **Alireza Farshin**, Saeed Sharifian. A chaotic grey wolf controller allocator for Software Defined Mobile Network (SDMN) for 5th generation of cloud-based cellular systems (5G) In *The Journal of Computer Communications (**COMCOM**)*. 2017. **Impact factor: 2.816**. Download

[J4] **Alireza Farshin**, Saeed Sharifian. MAP-SDN: a metaheuristic assignment and provisioning SDN framework for cloud datacenters In *The Journal of Supercomputing (**SUPE**)*. 2017. **Impact factor: 2.469**. Download

Patent Applications

[P1] **Alireza Farshin**, Omri Kahalon, Vishwanath Venkatesan, Timothy Stamler. Orchestration of Distributed Inference Operations. US Patent Application 18/926,233. Filed in October 2024.

[P2] Amir Roozbeh, **Alireza Farshin**, Marco Chiesa, Dejan Kostić. Network Entity and Method Performed Therein for Handling one or more Packets in a Computer Environment (*Other name:* System and Methods for Minimizing Branch Mispredictions and Executing Highly Optimized Code for Networking Applications). PCT Application PCT/SE2023/050880. Download

[P3] Amir Roozbeh, **Alireza Farshin**, Marco Chiesa. Network Entity and Method Performed Therein for Handling one or more Packets in a Computer Environment (*Other name:* System and Methods for Programmatically Storing Packet Payloads in the Per-Port Queue Memory). US Provisional Patent Application 63/511,198. Filed in June 2023.

[P4] Amir Roozbeh, **Alireza Farshin**, Marco Chiesa. System and Method Performed Therein for Handling one or more Packets in a Computer Environment (*Other name:* System and Methods for Disaggregated Packet Construction). PCT Application PCT/SE2023/050538. Download

[P5] Amir Roozbeh, **Alireza Farshin**, Marco Chiesa. Entity and Method Performed Therein for Handling Packets in a Computer Environment (*Other name:* System and Methods for Performing Millions Low-Latency Key-Value Insertion on Switches). PCT Application PCT/SE2023/051174. Download

[P6] Amir Roozbeh, **Alireza Farshin**, Marco Chiesa, Dejan Kostić, Hamid Ghasemirahni. Hint Entity, Receiver Node, System and Methods Performed Therein for Handling Data in a Computer Environment (*Other name:* System and Methods for Network-Accelerated State Prefetching). PCT Application PCT/SE2022/051036. <u>Download</u>

[P7] Amir Roozbeh, Chakri Padala, **Alireza Farshin**, Dejan Kostić, Gerald Q. Maguire Jr. Processing Unit, Packet Handling Unit, Arrangement and Methods for Handling Packets (*Other name:* System and Methods for Probing and Polling Multiple I/O Operations on I/O Devcies for Priority-Based Packet Processing). PCT Application PCT/SE2022/050710. <u>Download</u>

[P8] Amir Roozbeh, **Alireza Farshin**, Marco Chiesa, Tom Barbette, Dejan Kostić. Packet Processing Including an Ingress Packet Part Distributor. PCT Application PCT/EP2023/063619. <u>Download</u>

[P9] Amir Roozbeh, **Alireza Farshin**, Dejan Kostić. System and Method for Organizing Physical Queues into Virtual Queues. PCT Application PCT/EP2022/051103. <u>Download</u>

[P10] Amir Roozbeh, **Alireza Farshin**, Marco Chiesa, Fabio Luciano Verdi. System and Method for Accurate Traffic Monitoring on Multi-Pipeline Switches. PCT Application PCT/EP2021/084572. <u>Download</u>

[P11] Amir Roozbeh, Chakri Padala, **Alireza Farshin**. System and Method for Cache pooling and Efficient Usage and I/O Transfer in disaggregated and Multi-Processor Architectures via Processor Interconnect. PCT Application PCT/SE2021/051016. <u>Download</u>

[P12] Amir Roozbeh, **Alireza Farshin**, Chakri Padala, Dejan Kostić, Gerald Q. Maguire Jr. System, Method, and Apparatus for Fine-grained Control of I/O Data Placement in Memory Subsystem. PCT Application PCT/SE2021/050803. <u>Download</u>

[P13] Amir Roozbeh, **Alireza Farshin**, Tom Barbette, Dejan Kostić, Gerald Q. Maguire Jr. Methods and Systems for Efficient Metadata and Data Delivery between a Network Interface and Applications. PCT Application PCT/IB2021/052976. <u>Download</u>

[P14] Amir Roozbeh, **Alireza Farshin**, Dejan Kostić, Gerald Q. Maguire Jr. Method and System for Efficient Input/Output Transfer in Network Devices. PCT Application PCT/SE2020/051107 (<u>Download</u>) & PCT/SE2020/051108 (<u>Download</u>).

[P15] Amir Roozbeh, **Alireza Farshin**, Dejan Kostić, Gerald Q. Maguire Jr, Hamid Ghasemirahni, Tom Barbette. Reordering and Reframing Packets. PCT Application PCT/IB2020/054991. <u>Download</u>

[P16] Chakri Padala, Amir Roozbeh, **Alireza Farshin**, Dejan Kostić, Gerald Q. Maguire Jr. Efficient Loading of Code Portions to a Cache. PCT Application PCT/SE2020/050527. <u>Download</u>

[P17] Amir Roozbeh, **Alireza Farshin**, Dejan Kostić, Gerald Q. Maguire Jr. Entities, System and Methods Performed Therein for Handling Memory Operations of an Application in a Computer Environment. PCT Application PCT/SE2019/050948. <u>Download</u> (<u>US12111766B2 Granted</u>)

[P18] Amir Roozbeh, **Alireza Farshin**, Dejan Kostić, Gerald Q. Maguire Jr. Methods and Devices for Controlling Memory Handling. PCT Application PCT/SE2020/050161. <u>Download</u> (<u>US12111768B2 Granted</u>)

[P19] Amir Roozbeh, Dejan Kostić, Gerald Q. Maguire Jr., **Alireza Farshin**. Memory Allocation in a Hierarchical Memory System. PCT Application PCT/SE2019/050596. <u>Download</u>

[P20] Amir Roozbeh, **Alireza Farshin**, Dejan Kostić, Gerald Q. Maguire Jr. Methods and Nodes for Handling Memory. PCT Application PCT/SE2018/051311. <u>Download</u> (<u>US11714753B2 Granted</u>)

Workshop Papers, Extended Abstracts, Preprints, Technical Reports, Demo, and Posters....

[W1] Laura Puccioni, **Alireza Farshin**, Mariano Scazzariello, Changjie Wang, Marco Chiesa, Dejan Kostić. Deriving Coding-Specific Sub-Models from LLMs using Resource-Efficient Pruning In *The Second International Workshop on Large Language Models for Code (**LLM4Code**)*. 2025. <u>Download</u>

[W2] Hamid Ghasemirahni, **Alireza Farshin**, Dejan Kostić, Marco Chiesa. Just-in-Time Packet State Prefetching, *ArXiv Preprint*. 2024. <u>Download</u>

[W3] Hamid Ghasemirahni, **Alireza Farshin**, Mariano Scazzariello, Marco Chiesa, Dejan Kostić. Deploying Stateful Network Functions Efficiently using Large Language Models In *The Workshop on Machine Learning and Systems (**EuroMLSys**)*. 2024. <u>Download</u>

[W4] Changjie Wang, Mariano Scazzariello, **Alireza Farshin**, Dejan Kostić, Marco Chiesa. Making Network Configuration Human Friendly, *ArXiv Preprint*. 2023. <u>Download</u>

[W5] **Alireza Farshin**, Amir Roozbeh, Christian Schulte, Gerald Q. Maguire Jr., Dejan Kostić. Scheduling - A Secret Sauce For Resource Disaggregation, *Technical Report*. 2021. <u>Download</u>

[W6] **Alireza Farshin**, Tom Barbette, Amir Roozbeh, Gerald Q. Maguire Jr., Dejan Kostić. <u>PacketMill</u>: Toward per-core 100-Gbps Networking In *International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**)*. 2021. <u>Download</u>

[W7] **Alireza Farshin**, Amir Roozbeh, Gerald Q. Maguire Jr., Dejan Kostić. Optimizing Intel Data Direct I/O Technology for Multi-hundred-gigabit Networks In *The European Conference on Computer Systems (**EuroSys**)*. 2020. <u>Download</u>

[W8] **Alireza Farshin**, Amir Roozbeh, Gerald Q. Maguire Jr., Dejan Kostić. Make the Most out of Last Level Cache in Intel Processors In *The European Conference on Computer Systems (**EuroSys**)*. 2019. <u>Download</u>

Funded Projects

<u>**SEMLA**</u> - **Securing Enterprises via Machine-Learning-based Automation**
~9.5 Million SEK   *November 2023–October 2025*
Funded by Vinnova - Cyber Security for Industrial Advanced Digitalization 2023
Acted as one of the co-PIs from RISE AB
other partners: KTH (led by Marco Chiesa), Saab AB, and RedHat AB

Realizing Low-Latency Internet Services via Low-Level Optimization of NFV Service Chains
$140,000 USD   *August 2021–August 2023*
Funded by Google PhD Fellowship in Systems and Networking

Open-Source Contributions

iommu-bench: Understanding the IOTLB Wall for Multi-100-Gbps Linux-based Networking [<u>Link</u>]

DDC-RA: A Constrained-based Scheduler for Disaggregated Data Centers (DDC) [<u>Link</u>]

PacketMill: Toward per-core 100-Gbps Networking [<u>Link</u>]

ddio-bench: Understanding Intel Data Direct I/O Technology [<u>Link</u>]

Slice-aware Memory Management: Exploiting NUCA Characteristic of LLC in Intel Processors [<u>Link</u>]

CacheDirector: Sending Packets to the Right Slice by Exploiting Intel Last-Level Cache Addressing [<u>Link</u>]

Education

KTH Royal Institute of Technology   **Stockholm, Sweden**
Ph.D. in Information and Communication Technology, School of EECS   *August 2017–March 2023*
Advisors: Prof. <u>Dejan Kostić</u> and Prof. <u>Gerald Q. Maguire Jr.</u>

Dissertation Title: Realizing Low-Latency Packet Processing on Multi-Hundred-Gigabit-Per-Second Commodity Hardware (see my Dissertation)

I also received my licentiate degree (Halfway to Ph.D.) in June 2019, see my Thesis.

○ **Amirkabir University of Technology**   **Tehran, Iran**
M.Sc. Electrical Engineering - Digital Electronic Circuits, Department of EE   *September 2015–July 2017*
Advisor: Associate Prof. Saeed Sharifian

Thesis: Resource Allocation in Software-Defined Networks for 5G Applications

I used bio-inspired metaheuristic algorithms to perform resource allocation.

○ **Sharif University of Technology**   **Tehran, Iran**
B.Sc. Electrical Engineering - Electronics, EE Department   *September 2010–July 2015*
Advisor: Associate Prof. Mehran Jahed

Thesis: Design of Exoskeletal System for Wrist and Forearm

Honors, Awards, and Professional Services

2025: NetConfEval [C2] received IRTF/IETF Applied Networking Research Prize 2025.

2024: Packet Order Matters! [C3] was featured in the WIPO Green Technology Book.

2024: Giving a talk with Luigi Rizzo at Netdev 0x18 about IOTLB Wall.

2024: PC Member for eBPF'24.

2023: Faculty at Digital Futures.

2023: Reviewer for IEEE Computer Architecture Letters.

2022: Packet Order Matters! [C3] was featured in the Ericsson Blog and KTH.

2022: "Framtidens Forskning" has published a Swedish article on my research.

2022: PC Member for SIGCOMM'22 posters and demos program.

2022: Packet Order Matters! [C3] received the "Community Award" at NSDI'22.

2022: Giving a talk, Optimization Techniques for NFV, at Cisco Engineering Switzerland.

2021: Awarded Google PhD Fellowship 2021 in Systems and Networking. [Interview with KTH EECS]

2021: PacketMill [C4] was featured in the Ericsson Blog.

2021: Giving a talk with Tom Barbette at FOSDEM'21. [Watch]

2020: EuroSys'20 Shadow Program Committee.

2019: CacheDirector [C6] was featured in the Ericsson Blog, Tech Xplore, AlphaGalileo, and KTH.

2018: External Reviewer for NSDI'19.

2015: **Ranked 107th** among more than 20,000 participants in Iran's universities entrance exam for M.Sc.

2010: **Ranked 46th** among more than 460,000 participants in Iran's universities entrance exam for B.Sc.

Skills

Languages: English (Fluent), Persian (Native), Swedish (Novice)

Programming Languages: C/C++, Python, MATLAB, Scala, R, Assembly-X86, bash.

Tools & Libraries: DPDK, FastClick, Perf, LLVM, TensorFlow, Pandas, Spark, Gecode, Git, gnuplot, LaTeX.

Hobbies

Playing Piano and Bass Guitar, Jamming with Friends, Reading Books, Watching Movies and TV Series.