

AmirHossein Sojoodi

PHD CANDIDATE · HPC RESEARCHER · GPU SOFTWARE ENGINEER

Kingston, ON, Canada

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Summary

As a researcher, involved in various areas mainly focused on performance optimizations in MPI and UCX. More specifically, improving GPU-aware communications in CUDA-enabled OpenMPI and UCX libraries, for both point-to-point and collective communications including message matching engine. As a Software Developer, work with parallel-processing platforms and programming models (such as MPI) and have extensive knowledge in various programming languages and frameworks like C/C++, CUDA, OpenMP, WebGPU, etc.

Education

Queen's University

PH.D. IN ELECTRICAL AND COMPUTER ENGINEERING

- **Research Area:** High-performance GPU-aware communication in hybrid clusters, supervised by Dr. A. Afsahi

Kingston, Canada

Jan. 2020 - Jan. 2025

Shiraz University

M.S. IN SOFTWARE ENGINEERING

Shiraz, Iran

Sep. 2012 - Aug. 2015

Shiraz University

B.S. IN SOFTWARE ENGINEERING

Shiraz, Iran

Sep. 2007 - Aug. 2012

Professional Experience

Distributive Co.

GPU SOFTWARE ENGINEER, PART-TIME

- Explore and develop WebGPU and WebAssembly solutions.
- Develop a WebGPU-based math algorithm, called LeGenre Pairs Length 117, achieving +700x speedup compared to the CPU implementation.
- Design and Develop a WebGPU microbenchmark for Distributed Compute Protocol (DCP) systems.

Kingston, Ontario

Sep. 2022 - Present

RE Grant Consulting Company

CUDA DEVELOPER, PART-TIME

- Design and implement a CUDA microbenchmark suite for Rockport Networks (CERIO) systems.
- The suite is a C++ CMake project including Stress and Speed tests for various transfer types, sizes, and scenarios.

Kingston, Ontario

Oct. 2023 - Mar. 2024

Microsoft Research (MSR)

RESEARCH INTERN

- Enable GPU in Distributed Deep Learning (DistDL) framework utilizing CuPy.

Seattle, Washington (Remote)

Jun. 2022 - Aug. 2022

Engineering Teaching and Learning Team (ETLT), Queen's University

COURSE DESIGN AND DEVELOPMENT SPECIALIST, PART-TIME

- Maintain and update the courses' learning objectives (CLOs).
- Edit videos and create animations for the Faculty of Engineering and Applied Science (FEAS) courses.
- Automate the courses evaluation process using Python and Queen's survey platform.

Kingston, Ontario

Sep. 2020 - Apr. 2022

HPC Group, CSE Dept, Shiraz University

XENSERVER AND LINUX ADMINISTRATOR

- Setup and maintain Apache Hadoop, Spark, Tez, and Ignite clusters.

Shiraz, Iran

Sep. 2018 - Nov. 2019

Aria Hamrah Samaneh

SYSTEM ADMINISTRATOR, DATA VISUALIZATION AND JAVA BACKEND DEVELOPER

- Develop data visualization dashboards using Tableau.

Shiraz, Iran

Apr. 2016 - Feb. 2017

Information and Communication Technology Center (ICTC), Shiraz University

BUSINESS INTELLIGENCE (BI) DEVELOPER

- Develop BI solutions based on Microsoft Power BI.

Shiraz, Iran

Oct. 2015 - Apr. 2016

HPC Group, CSE Dept, Shiraz University

XENSERVER AND LINUX ADMINISTRATOR

- Setup and maintain various services such as Nexus repository manager, apt cacher, squid, SVN, project manager, etc.

Shiraz, Iran

Oct. 2013 - Oct. 2015

Skills

Programming	C, C++, Python, JavaScript, Rust, TXL, Matlab, Java, Assembly, and Shell
Platforms/APIs/Libs	CUDA, OpenMP, MPI, UCX, WebGPU, Pthreads, MapReduce, PyTorch, NumPy/CuPy, Apache Ignite
Misc. Tools	Git, Perf, Valgrind, NVIDIA Nsight Tools, Arm DDT, Auto Tools, CMake, Nexus, \LaTeX
Operating Systems	Ubuntu, Debian, CentOS
Video Editing	Camtasia, Corel Video Studio, Proshow Producer, Adobe AfterEffects
Languages	Farsi (maternal), English (fluent), French (basic)

Publications

Enhancing Intra-Node GPU-to-GPU Performance in MPI + UCX through Multi-Path Communication Amirhossein Sojoodi, Yiltan Hassan Temucin, Ahmad Afsahi <i>Proceedings of the International Workshop on Extreme Heterogeneity Solutions (ExHET)</i> , pp. 1–6 doi: 10.1145/3642961.3643800	2024
Efficient Process Arrival Pattern Aware Collective Communication for Deep Learning Pedram Alizadeh, Amirhossein Sojoodi, Yiltan Hassan Temucin, Ahmad Afsahi <i>Proceedings of the European MPI Users' Group Meeting (EuroMPI)</i> , pp. 68–78 doi: 10.1145/3555819.3555857	2022
SciAI4Industry – Solving PDEs for industry-scale problems with deep learning Philipp A. Witte, Russell J. Hewett, Kumar Saurabh, AmirHossein Sojoodi, Ranveer Chandra <i>arXiv</i> (2022), pp. 1–11 doi: 10.48550/arXiv.2211.12709	2022
Efficient Multi-Path NVLink / PCIe-Aware UCX based Collective Communication for Deep Learning Yiltan Hassan Temucin, Amirhossein Sojoodi, Pedram Alizadeh, Ahmad Afsahi <i>Proceedings of the IEEE Symposium on High-Performance Interconnects (HOTI)</i> , pp. 1–10 doi: 10.1109/HOTI52880.2021.00018	2021
Accelerating Deep Learning using Interconnect-Aware UCX Communication for MPI Collectives Yiltan Hassan Temucin, Amirhossein Sojoodi, Pedram Alizadeh, Benjamin W Kitor, Ahmad Afsahi <i>IEEE Micro</i> (2021), pp. 1–9 doi: 10.1109/MM.2022.3148670	2021
A GPU-Enabled Extension for Apache Ignite to Facilitate Running Genetic Algorithms Majid Salimi Beni, Amir Hossein Sojoodi, Farshad Khunjush <i>Proceedings of the International Symposium on Computer Architecture and Digital Systems (CADSD)</i> , pp. 1–8 doi: 10.1109/CADSD50570.2020.9211857	2020
Ignite-GPU: a GPU-enabled in-memory computing architecture on clusters Amir Hossein Sojoodi, Majid Salimi Beni, Farshad Khunjush <i>Journal of Supercomputing</i> (2020), pp. 1–28 doi: 10.1007/s11227-020-03390-z	2020

Honors & Awards

2020-09	Parya Scholarship , Parya Trillium Foundation	Canada
2019-01	Best T.A. , CSE Department students' poll	Shiraz University
2016-08	9th Place , National IoT Hackathon	IUST, Tehran
2015-02	Silver Medal (with B. Ahmadi and M. R. Katebzadeh) , 7th National JavaChallenge	Sharif University
2012-07	Gold Medal in Team Section , Chess Games, South of Iran Universities	Shiraz University
2010-07	5th Place (with M. Asadi) , Students Competitions (Ms Pacman Intelligent Controller)	IEEE CIG (Online)
2010-07	5th Place (with S. Kazemi and M. Saeedi) , Kashan 2nd International Programming contest (ACM)	Kashan University

Selected Certificates

2024-08	Modern C++ Programming , Compute Ontario Summer School
2022-08	Fundamentals of Accelerated Computing with CUDA Python , NVIDIA Deep Learning Institute (DLI)
2022-08	Fundamentals of Deep Learning , NVIDIA Deep Learning Institute (DLI)
2022-08	Accelerating CUDA C++ Applications with Concurrent Streams , NVIDIA Deep Learning Institute (DLI)
2021-08	Debugging and Performance Tuning , SCINET Summer Workshop
2021-07	Summer Workshops , PUMPS+AI at Barcelona Supercomputing Center
2021-06	Modern C++ and Parallel Programming , SHARCNET HPC Summer Workshop
2019-08	Software Testing , Udacity
2019-07	Software Development Process , Georgia Tech & Udacity
2019-07	Design Patterns in Java , Addison-Wesley, Livelessons
2014-11	Intro to Parallel Programming with GPUs , Udacity and NVIDIA

Teaching Experience

2024 Win	ELEC374 - Digital Systems Engineering , T.A. of Dr. Ahmad Afsahi	Queen's University
2023 Fall	ELEC379 - Introduction to Algorithms , T.A. of Dr. Naraig Manjikian	Queen's University
2023 Win	ELEC374 - Digital Systems Engineering , T.A. of Dr. Ahmad Afsahi	Queen's University
2022 Fall	ELEC278 - Fundamentals of Information Structure , T.A. of Dr. Jianbing Ni	Queen's University
2022 Win	ELEC374 - Digital Systems Engineering , T.A. of Dr. Ryan Grant	Queen's University
2021 Fall	ELEC278 - Fundamentals of Information Structure , T.A. of Dr. A. Elwakeel	Queen's University
2021 Win	ELEC374 - Digital Systems Engineering , T.A. of Dr. Sean Whitehall	Queen's University
2020 Fall	ELEC278 - Fundamentals of Information Structure , T.A. of Dr. D. Athersych	Queen's University
2020 Win	ELEC374 - Digital Systems Engineering , T.A. of Dr. Ahmad Afsahi	Queen's University
2018 Fall	GPU Programming , T.A. of Dr. Farshad Khunjush	Shiraz University
2016 Win	Introduction to Object Oriented Programming with Java , Lecturer	Shiraz University
2015 Fall	GPU Programming , T.A. of Dr. Farshad Khunjush	Shiraz University
2014 Win	Multicore Programming , T.A. of Dr. Farshad Khunjush	Shiraz University
2013 Fall	GPU Programming , T.A. of Dr. Farshad Khunjush	Shiraz University
2013 Sum	Software Engineering Lab , Lecturer	Shiraz University
2012 Fall	Operating Systems , T.A. of Dr. Mohammadreza Moosavi	Shiraz University
2012 Fall	System Programming (Assembly) , T.A. of Dr. Gholamhossein Dastghaibifard	Shiraz University
2012 Sum	Software Engineering Lab , Lecturer	Shiraz University
2012 Win	Software Engineering Lab , Lecturer	Shiraz University
2012 Win	Microprocessors , T.A. of Dr. Farshad Tajeripour	Shiraz University
2011 Win	Operating Systems , T.A. of Dr. Sattar Hashemi	Shiraz University
2010 Win	Principles of Programming (C) , T.A. of Dr. Ali Hamzeh	Shiraz University
2010 Fall	Operating Systems , T.A. of Dr. Sattar Hashemi	Shiraz University
2010 Win	System Programming (Assembly) , T.A. of Dr. Sattar Hashemi	Shiraz University
2009 Fall	System Programming (Assembly) , T.A. of Dr. Sattar Hashemi	Shiraz University

Selected Presentations

Distributive Book Club Meetings

Kingston, Ontario

PRESENTER FOR LEGENDRE PAIRS OPTIMIZATIONS

Aug. 2023

- Introduce the LeGenre Pairs algorithm and its implementation on GPUs.
- Discuss the challenges and optimizations for the algorithm.
- Shared memory utilization, coalesced memory access, warp divergence, and other optimizations.
- Slids can be obtained from [here](#) and [there](#).

Distributive Book Club Meetings

Kingston, Ontario

PRESENTER FOR INTRODUCTION TO GPUS

Oct. 2023

- Introduce the GPUs and their architecture.
- Introduce the CUDA programming model, the GPU memory hierarchy, and the memory access patterns.
- Profiling and performance tuning of GPU applications.
- Slids can be obtained from [here](#) and [there](#).

CSE Talks

Shiraz University

PRESENTER FOR COMPILERS VS. INTERPRETERS

Spring 2011

- Introduce the difference between compilers and interpreters and their importance in software development. Co-presented with Saeed Kazemi.

Selected Extracurricular Activities

Graduate ECE Student Council

Queen's University

PHD REPRESENTATIVE

2023-2024

- Graduate Electrical and Computer Engineering (GECE) student council is the governing body representing the graduate students of Electrical and Computer Engineering at Queen's University.
- I was the PhD representative for the 2023-2024 academic year.

Students' Scientific Group, CSE Department

Shiraz University

EXECUTIVE MEMBER

2011-2014

- In this group, we worked on different seminars and workshops for students.
- Also, each semester, courses and their exams scheduling was done by this group.
- I was a member of the group in 2009, 2010, 2012, and 2014, and its chair during 2011.