

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

Kingston, Canada

Jan. 2020 - Jan. 2025

- **Research Area:** High-performance GPU-aware communication in hybrid clusters, supervised by Dr. A. Afsahi
- GPA: **4.0/4.0**

Shiraz University

M.S. IN SOFTWARE ENGINEERING

Shiraz, Iran

Sep. 2012 - Aug. 2015

- **Ranked 3rd** among students with GPA **17.66/20**
- **Thesis:** Design and Evaluation of a Large-Scale Data Processing Framework for Modern GPUs, supervised by Dr. F. Khunjush

Shiraz University

B.S. IN SOFTWARE ENGINEERING

Shiraz, Iran

Sep. 2007 - Aug. 2012

- **Final Project:** Intelligent controller of Miss PacMan agent; supervised by Dr. Zohreh Azimifar

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, ETC
Operating Systems	Ubuntu, Debian, CentOS
Video Editing	Camtasia, Corel Video Studio, Proshow Producer, Adobe AfterEffects
Languages	Farsi (maternal), English (fluent), French (basic)

Professional Experience

Distributive Co.

GPU SOFTWARE ENGINEER, PART-TIME

Kingston, Ontario

Sep. 2022 - Sep. 2024

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

RE Grant Consulting Company

CUDA DEVELOPER, PART-TIME

Kingston, Ontario

Oct. 2023 - Mar. 2024

- 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.

Microsoft Research (MSR)

RESEARCH INTERN

Seattle, Washington (Remote)

Jun. 2022 - Aug. 2022

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

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

COURSE DESIGN AND DEVELOPMENT SPECIALIST, PART-TIME

Kingston, Ontario

Sep. 2020 - Apr. 2022

- 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.

HPC Group, CSE Dept, Shiraz University

XENSERVER AND LINUX ADMINISTRATOR

Shiraz, Iran

Sep. 2018 - Nov. 2019

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

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

Teaching Experience

2024 Fall	ELEC 278 - Fundamentals of Information Structure , T.A. of Dr. Tom Dean	Queen's University
2024 Win	ELEC 374 - Digital Systems Engineering , T.A. of Dr. Ahmad Afsahi	Queen's University
2023 Fall	ELEC 379 - Introduction to Algorithms , T.A. of Dr. Naraig Manjikian	Queen's University
2023 Win	ELEC 374 - Digital Systems Engineering , T.A. of Dr. Ahmad Afsahi	Queen's University
2022 Fall	ELEC 278 - Fundamentals of Information Structure , T.A. of Dr. Jianbing Ni	Queen's University
2022 Win	ELEC 374 - Digital Systems Engineering , T.A. of Dr. Ryan Grant	Queen's University
2021 Fall	ELEC 278 - Fundamentals of Information Structure , T.A. of Dr. A. Elwakeel	Queen's University
2021 Win	ELEC 374 - Digital Systems Engineering , T.A. of Dr. Sean Whitehall	Queen's University
2020 Fall	ELEC 278 - Fundamentals of Information Structure , T.A. of Dr. D. Athersych	Queen's University
2020 Win	ELEC 374 - 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

Publications

- [1] Amirhossein Sojoodi, Yiltan Hassan Temucin, Ahmad Afsahi, "Enhancing Intra-Node GPU-to-GPU Performance in MPI + UCX through Multi-Path Communication" *Proceedings of the International Workshop on Extreme Heterogeneity Solutions (ExHET)*, pp. 1–6, DOI: 10.1145/3642961.3643800 2024
- [2] Pedram Alizadeh, Amirhossein Sojoodi, Yiltan Hassan Temucin, Ahmad Afsahi, "Efficient Process Arrival Pattern Aware Collective Communication for Deep Learning" *Proceedings of the European MPI Users' Group Meeting (EuroMPI)*, pp. 68–78, DOI: 10.1145/3555819.3555857 2022
- [3] Philipp A. Witte, Russell J. Hewett, Kumar Saurabh, AmirHossein Sojoodi, Ranveer Chandra, "SciAI4Industry – Solving PDEs for industry-scale problems with deep learning", *arXiv* (2022), pp. 1–11, DOI: 10.48550/arXiv.2211.12709 2022
- [4] Yiltan Hassan Temucin, Amirhossein Sojoodi, Pedram Alizadeh, Ahmad Afsahi, "Efficient Multi-Path NVLink / PCIe-Aware UCX based Collective Communication for Deep Learning" *Proceedings of the IEEE Symposium on High-Performance Interconnects (HOTI)*, pp. 1–10, DOI: 10.1109/HOTI52880.2021.00018 2021
- [5] Yiltan Hassan Temucin, Amirhossein Sojoodi, Pedram Alizadeh, Benjamin W Kitor, Ahmad Afsahi, "Accelerating Deep Learning using Interconnect-Aware UCX Communication for MPI Collectives", *IEEE Micro* (2021), pp. 1–9, DOI: 10.1109/MM.2022.3148670 2021
- [6] Majid Salimi Beni, Amir Hossein Sojoodi, Farshad Khunjush, "A GPU-Enabled Extension for Apache Ignite to Facilitate Running Genetic Algorithms" *Proceedings of the International Symposium on Computer Architecture and Digital Systems (CADS)*, pp. 1–8, DOI: 10.1109/CADS50570.2020.9211857 2020

Honors & Awards

2024-03	Best Paper Award , International Workshop on Extreme Heterogeneity Solutions (ExHET)	Edinburgh, UK
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
2006	Silver Medal in Individual Section , Chess Games, High School Students	Tehran, District 1
2006	Gold Medal in Team Section , Chess Games, High School Students	Tehran, District 1
2005	Gold Medal in Team Section , Chess Games, High School Students	Tehran, District 1
2004	Gold Medal in Team Section , Chess Games, High School Students	Tehran, District 1

Certificates and Related Education

2024-08	Modern C++ Programming , Compute Ontario Summer School
2024-08	Using Containers: Aptainer , 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
2019-08	Intro to DevOps , Udacity
2019-07	Software Development Process , Georgia Tech & Udacity
2019-07	Design Patterns in Java , Addison-Wesley, Livelessons
2018-12	Java, Python, C, C++, HTML and SQL , SoloLearn App online courses
2018-11	Introduction to Hadoop and MapReduce , Udacity
2018-10	Configure Linux Webservers , Udacity
2015-11	Intro to Big Data with Apache Spark , Berkeley and edX
2014-11	Intro to Parallel Programming with GPUs , Udacity and NVIDIA

Presentations

Book Club Meetings

Kingston, Ontario

WORKSHOP PRESENTER

Oct. 2023

- Introduce the importance of documentation in everyday life and sciences. Slides can be obtained from [here](#).
- Introduce the best practices and tools for writing and maintaining documentation.

Distributive Book Club Meetings

Kingston, Ontario

PRESENTER FOR LEGBREND PAIRS OPTIMIZATIONS

Aug. 2023

- Introduce the LeGendre 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.
- Slides 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.
- Slides can be obtained from [here](#) and [there](#).

CSE Talks

PRESENTER FOR START A GOOD CAREER

- Introduce the importance of starting a good career and the best practices for it.
- Introduce the best practices for writing a resume and preparing for an interview.
- Slides can be obtained from [here](#).

[Shiraz University](#)

Fall 2019

CSE Talks

PRESENTER FOR INTRODUCTION TO SOFTWARE ENGINEERING

- Introduce the software engineering and its importance in the software industry.
- Introduce the best practices for software development and the software development life cycle.

[Shiraz University](#)

Fall 2016

CSE Talks

PRESENTER FOR ART OF GOOGLING

- Introduce the best practices for searching the web and finding the right information. Co-presented with Saeed Kazemi.

[Shiraz University](#)

Spring 2011

CSE Talks

PRESENTER FOR COMPILERS VS. INTERPRETERS

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

[Shiraz University](#)

Spring 2011

Extracurricular Activity

Google Dawn

OPEN SOURCE CONTRIBUTOR

- Google Dawn is an open-source and cross-platform implementation of the WebGPU standard.
- My contributions include fixing building issues on Linux using CMake.

[Distributive Co.](#)

2023-2024

Graduate ECE Student Council

PHD REPRESENTATIVE

- 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.

[Queen's University](#)

2023-2024

Global Education Conference

PANELIST

- I was a panelist in a session titled: Invitation not assimilation: Inclusive listening to expand academic spaces and connect to global knowledge.
- The conference was held by Queen's University International Center (QUIC) and Students Academic Success Services (SASS).

[Queen's University](#)

November 2023

International Voices at Queen's University (IV@Q), Season 2

PODCAST EDITOR AND GUEST

- International Voices at Queen's University is a supportive listening space for members of the Queen's University community, developed in partnership between SASS and the QUIC.
- Episodes include topics about culture shock, developing your authorial voice, and navigating housing in Canada.
- I was the podcast editor for season 2, and I was also a guest in one of the episodes.

[Queen's University](#)

Summer 2022

International Voices at Queen's University (IV@Q), Season 1

PODCAST HOST

- International Voices at Queen's University is a supportive listening space for members of the Queen's University community, developed in partnership between SASS and the QUIC.
- Episodes include topics about culture shock, developing your authorial voice, and navigating housing in Canada.
- I was the podcast host for season 1, including 8 episodes.

[Queen's University](#)

Summer 2021

Graduate ECE Student Council

CONTENT CREATOR

- 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.

[Queen's University](#)

2020-2021

Tolu Group

CORE MEMBER AND CO-FOUNDER

- Tolu was a group of almost 15 members that used to meet every week. We had seminars and talks about various subjects, including psychology, philosophy, history and sociology.

[Shiraz University](#)

2012-2016

Break Time in University (BTIU) Symposium

Shiraz University

EXECUTIVE MEMBER

2009-2019

- BTIU is a conference/symposium that has been held annually since 2006 every summer for high school students (on average 400 students) who can participate in this program and enjoy various creative classes and workshops.
- The conference objectives are: introducing university environment to high school students, improving their creativeness, and team work skills, as well as improving staff's skills, including communication, management, responsibility, etc.
- BTIU has almost 20 different committees. In 2009, I was a member of the budget and sponsor committee, and the catering committee chair.
- In 2010, I was the chair of budget and sponsor committee, and opening-closing ceremonies
- From 2011 to 2013, I was a member of the opening-closing ceremonies committee, consultant, photographer, and video editor.
- In 2014, I was the chair of the documentary committee, a member of the film and clip committee, and the keynote speaker.
- In 2015, I was a member of the scientific committee, and one of the ceremonies keynote speakers.
- In 2016 and 2017, I was a workshop evaluator, and consultant.
- In 2018, I was a workshop evaluator, and an instructor for the workshop "Illusion of Decision", inspired by Dan Ariely.

Entekhab-e-Bartar

Shiraz University

EXECUTIVE MEMBER

2014

- Entekhab-e-Bartar was a group with almost 10 staff and 15 consultants that held workshops and classes for high school students about college majors and fields.
- We tried to help them to choose a better way in their future by informing them about what's going on in each field.
- In order to help them to realize what they actually like, we had different tests, including psychology tests, sociology tests, IQ tests, and face-to-face talks for each student.

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.

16th CSI International Symposiums on Computer Architecture & Digital Systems and Artificial Intelligence & Signal Processing

Shiraz University

EXECUTIVE MEMBER

Spring 2012

- I was the Opening-Closing Ceremonies Chair, and film/clip editor

Harekat Fest

Shiraz University

EXECUTIVE MEMBER

Spring 2011

- Harekat Fest was a festival for Students Scientific Groups of Shiraz University and their achievements in one year of efforts.
- I was the chair of the Opening-Closing Ceremonies Committee and film/clip editor.

CSE Network Administration Group

Shiraz University

SPECIALIST

2011-2012

- I was a member of the CSE Network Administration Group, in charge of the CSE network and workstations.

Programming Contests (ACM ICPC) Group

Shiraz University

EXECUTIVE MEMBER

2008-2010

- I was a member of the Programming Contests (ACM ICPC) group, in charge of holding programming contests for students.

References

Dr. Ahmad Afsahi	ahmad [dot] afsahi [at] queensu [dot] ca
Dr. Ryan Grant	ryan [dot] grant [at] queensu [dot] ca
Dr. Dan Desjardins	dan [at] distributive [dot] network
Dr. Farshad Khunjush	fkunjush [at] gmail [dot] com
Dr. Philipp Witte	pwitte [at] microsoft [dot] com
Dr. Ali Etemad	ali [dot] Etemad [at] queensu [dot] ca