AmirHossein **Sojoodi**

PhD Candidate · HPC Researcher · GPU Software Engineer

Kingston, ON, Canada

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Summary

As a researcher, focused on parallel algorithm design, middleware performance optimization, and application acceleration. More specifically, improving GPU-aware communication in OpenMPI and UCX/UCC libraries. As a Software Developer, working with parallel-processing platforms/tools and programming frameworks, including CUDA, OpenMP, MPI, WebGPU, etc. Possess an insatiable enthusiasm to work as a teacher in academia, and look forward to combining my passion for education with my expertise in computer science.

Education

Queen's University   *Kingston, Canada*

PH.D. IN ELECTRICAL AND COMPUTER ENGINEERING   *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   *Shiraz, Iran*

M.S. IN SOFTWARE ENGINEERING   *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   *Shiraz, Iran*

B.S. IN SOFTWARE ENGINEERING   *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, LaTeX
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.   *Kingston, Ontario*

GPU SOFTWARE ENGINEER, PART-TIME   *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   *Kingston, Ontario*

CUDA DEVELOPER, PART-TIME   *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)   *Seattle, Washington (Remote)*

RESEARCH INTERN   *Jun. 2022 - Aug. 2022*

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

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

COURSE DESIGN AND DEVELOPMENT SPECIALIST, PART-TIME   *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   *Shiraz, Iran*

XENSERVER AND LINUX ADMINISTRATOR   *Sep. 2018 - Nov. 2019*

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

Aria Hamrah Samaneh *Shiraz, Iran*

System Administrator, Data Visualization and Java Backend Developer *Apr. 2016 - Feb. 2017*

- Develop data visualization dashboards using Tableau.

Information and Communication Technology Center (ICTC), Shiraz University *Shiraz, Iran*

Business Intelligence (BI) Developer *Oct. 2015 - Apr. 2016*

- Develop BI solutions based on Microsoft Power BI.

HPC Group, CSE Dept, Shiraz University *Shiraz, Iran*

XenServer and Linux administrator *Oct. 2013 - Oct. 2015*

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

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

Enhancing Intra-Node GPU-to-GPU Performance in MPI + UCX through Multi-Path Communication
   Amirhossein Sojoodi, Yiltan Hassan Temucin, Ahmad Afsahi
   Proceedings of the International Workshop on Extreme Heterogeneity Solutions (ExHET), 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
   Proceedings of the European MPI Users' Group Meeting (EuroMPI), 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
   arXiv (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
   Proceedings of the IEEE Symposium on High-Performance Interconnects (HOTI), 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
   IEEE Micro (2021), pp. 1–9

A GPU-Enabled Extension for Apache Ignite to Facilitate Running Genetic Algorithms
Majid Salimi Beni, Amir Hossein Sojoodi, Farshad Khunjush
Proceedings of the International Symposium on Computer Architecture and Digital Systems (CADS), pp. 1–8

Ignite-GPU: a GPU-enabled in-memory computing architecture on clusters
Amir Hossein Sojoodi, Majid Salimi Beni, Farshad Khunjush
Journal of Supercomputing (2020), pp. 1–28

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*
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: Apptainer**, 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 LEGENDRE PAIRS OPTIMIZATIONS *Aug. 2023*

- Introduce the LeGendre Pairs algorithm and its implementation on GPUs.
- Discuss the challenges and optimizations for the algorithm.
- Shared memory utilizaion, coalleced 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 START A GOOD CAREER
Fall 2019

- 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.

CSE Talks
Shiraz University

PRESENTER FOR INTRODUCTION TO SOFTWARE ENGINEERING
Fall 2016

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

CSE Talks
Shiraz University

PRESENTER FOR ART OF GOOGLING
Spring 2011

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

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.

Extracurricular Activity

Google Dawn
Distributive Co.

OPEN SOURCE CONTRIBUTOR
2023-2024

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

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.

Global Education Conference
Queen's University

PANELIST
November 2023

- 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).

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

PODCAST EDITOR AND GUEST
Summer 2022

- 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.

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

PODCAST HOST
Summer 2021

- 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.

Graduate ECE Student Council
Queen's University

CONTENT CREATOR
2020-2021

- 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.

Tolu Group
Shiraz University

CORE MEMBER AND CO-FOUNDER
2012-2016

- 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.

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 environemt 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 cunsultant.
- 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 [doc] ca
Dr. Dan Desjardins	dan [at] distributive [dot] network
Dr. Farshad Khunjush	fkhunjush [at] gmail [dot] com
Dr. Philipp Witte	pwitte [at] microsoft [dot] com
Dr. Ali Etemad	ali [dot] Etemad [at] queensu [dot] ca