Amir Hossein Sojoodi

Curriculum Vitae (Extended)

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PERSONAL INFORMATION

Sex Male

August the 6th, 1990 Date of Birth

Place of Birth Tehran, Iran Marital Status Married Nationality Iranian

> Persian (Maternal), English (TOEFL - Jan-2019: Total: 104, R: 28 L: 27 S: 24 W: 25) (fluent) Languages

> > **EDUCATION**

Ph.D. In Electrical and Computer Engineering, Queen's University, Kingston, Canada 2020-Present

2012-2015 M. Sc. In Software Engineering, Shiraz University, Shiraz, Iran

Ranked 3rd among students with GPA 17.66/20.00

Thesis: Design & Evaluation of a Large-Scale Data Processing Framework for Modern

GPUs. (Enabling Apache Tez to use GPU) supervised by Dr. F. Khunjush

2007-2012 **B. Sc. In Software Engineering,** *Shiraz University,* Shiraz, Iran

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

2003-2007 High School, Imam Musa Sadr High school, Tehran, Iran, Major: Mathematics & Physics

RESEARCH INTERESTS

High Performance Computing, Multicore and Parallel Processing, Distributed Computing,

GPU Processing, Big Data Processing

COMPUTER SKILLS

Advanced: C/C++, Java, Assembly Programming

Languages Intermediate: Python, TXL, Matlab, and Shell Scripting

Programming CUDA, OpenMP, MPI, Apache Ignite, Apache Hadoop, Apache Tez, Apache Spark, Apache

Models & Platforms Maven, Pthreads, MapReduce, JCuda, Java FX, and GTK+

> Git, Vim, Make/Cmake, Nexus, Visual Paradigm, Redmine, XenCenter, Squid, Swagger, Latex, Misc. Tools

and Tableau

Advanced: Ubuntu and Windows Basic: CentOS, Debian, and MacOS **Operating Systems**

Video Editing Camtasia, Corel Video Studio, Proshow Producer, Adobe AfterEffects

PUBLICATIONS

Sojoodi, A. H., Beni, M. S., & Khunjush, F. (2020). Ignite-GPU: a GPU-enabled in-memory 2020

computing architecture on clusters. The Journal of Supercomputing, 1-28.

M. S. Beni, A. H. Sojoodi and F. Khunjush, "A GPU-Enabled Extension for Apache Ignite to 2020

Facilitate Running Genetic Algorithms," 2020 20th International Symposium on Computer Architecture and Digital Systems (CADS), Rasht, Iran, 2020, pp. 1-8, doi:

10.1109/CADS50570.2020.9211857.

PROFESSIONAL EXPERIENCES

2020-09 - Course Design and Development Specialist

Present FEAS (Faculty of Engineering and Applied Science), Queen's University

2018-09 - R&D, XenServer and Linux administrator

2019-11 HPC group, CSE Dep., Shiraz University; supervised by Dr. F. Khunjush.

Challenges: To setup and maintain Apache Hadoop, Spark, Tez and Ignite clusters.

2016-04 - Servers administrator, Data Visualization and Java backend developer

2017-02 Aria Hamrah Samaneh, Shiraz Section, Software Group, Shiraz, Iran. Challenges: Data

 $ware house \ research \ and \ develop, \ data \ visualization \ with \ Tableau, \ to \ setup \ and \ maintain$

various development services.

2015-10 - **R&D, BI Developer**

2016-04 ICTC (Information and Communication Technology Center), Shiraz University

2013-10 - R&D, XenServer and Linux administrator

2015-10 HPC group, CSE Dep., Shiraz University; supervised by Dr. F. Khunjush. Challenges: User

management, setup and maintain various services such as, nexus repository manager, apt cacher, squid firewall, version control system, project manager (Redmine) and etc.

2011-2012 Network Administration Specialist

CSE Dep., Shiraz University

2008-2010 Member of ACM group, CSE Dep., Shiraz University

SELECTED PROJECTS – ACADEMIC YEAR

Fall 2021 Multi-GPU Vector Reduction, implemented in CUDA

This project is a part of the course *ELEC 873 – Cluster Computing* at Queen's University. In this project, I have designed, implemented, and evaluated 9 different intra-node *reduction* approaches on 4 data buffers each of which resides on a GPU of a single node. The algorithms are based on 2 common reduction algorithms: Ring and Binomial Tree; and for each of these algorithms, I implemented their pipelined and multi-channel version and compared them against one another. All the algorithms are designed to run in a **single process** environment where one process can efficiently manage and handle multiple GPU data movement, and the major goal was to improve link efficiency.

Winter 2020 Multi-Process-Ensemble-Methods, implemented in Python

- This project is a joint work with Yiltan Temucin as a part of the course *ELEC 872 Artificial Intelligence and Human Interaction* at Queen's University.
- In this project we worked on AMIGOs data set, with the EEG, ECG and GSR signals, and applied filtering, feature extraction, and dimensionality reduction in a parallel manner. We classified the data based on the emotions: neutral, disgust, happiness, surprise, anger, fear, and sadness. We implemented and compared 4 different classifiers: Logistic Regression, SVM, KNN, and AdaBoost. Using this method we received a 3.6x performance improvement in running our pre-processing stage. We also combined these 4 models and used a voting classifier which provided more reliable results. More information can be found at the following address. Link: https://github.com/Yiltan/Multi-Process-Ensemble-Methods

Winter 2020 OpenMP-to-CUDA-Transformation, implemented in TXL

- This project is a joint work with Nicholas Merz as a part of the course ELEC 875 Design Recovery and Automated Evolution at Queen's University.
- In this project we used TXL to transform simplified OpenMP C source codes to its equivalent CUDA version. The transformation takes multiple pre-assumptions into account to make the process easier, like availability of Unified Memory, and the source OpenMP code being race-free and valid. The project's complete documentation can be found at the following address.

Link: https://github.com/amirsojoodi/OpenMP-to-CUDA-Transformation-with-TXL

2019 Ignite-GPU, implemented in Java and CUDA

- This project is a joint work with Majid Salimi, at Shiraz University HPC lab.
- Currently Apache Ignite does not support GPUs formally, therefore, we have designed, implemented, and evaluated a platform in which Apache Ignite integrates with the GPUs smoothly and provides the developers more computing power and performance. We have ported Genetic Algorithm, as a test case, to the Ignite-GPU and achieved around 200x speedup compared to its Ignite-only version.

Summer 2015 Simorgh – GPU-enabled Apache Tez, My M.Sc. thesis, implemented in Java and CUDA

Apache Tez provides a DAG execution programming model to users (Processing Vertices and Reader/Writer Edges). In this project, we have designed and developed a framework in which Apache Tez is integrated with Nvidia GPUs seamlessly. Our evaluations have shown that using GPUs for processing a Vertex gains 4 to 6x speedup.

Spring 2014 **DVONN Game,** implemented in C and GTK+

- This project is the design and implementation of DVONN Game. It can be checked at http://en.wikipedia.org/wiki/DVONN. The project is written with GTK+ in windows with Glade software to produce XML-like version of the graphic designs in Glade Interface Designer.
- The project can be found here: https://github.com/amirsojoodi/DVONN

Spring 2014 Grid Information, implemented in Java

- A joint work with Fatemeh Marzban.
- > The goal of this cross-platform (Windows and Linux) project is to monitor all the nodes in a local Grid and to get all of their resources information (including static and dynamic information of a resource). The libraries and technologies we used: Java RMI, SIGAR, ObjectDB, JPA, JGoodies, Swing, AWT and STAX.
- More information: https://github.com/amirsojoodi/GridInformationService

Spring 2014 Grid Scheduler, implemented in Java

- > A joint work with Fatemeh Marzban.
- This project gets computing nodes and jobs as input and draws a schedule to submit the jobs on more suitable stations. The used algorithms are MaxMin, MinMin, Suffrage and Genetic Algorithm. Its GUI is written with Swing and JGoodies.

Fall 2013 Prime Generator, implemented in C

This project is based on Atkin algorithm and Optimized as well as Parallelized using MPI, OpenMP, Pthreads, and CUDA. It can be run on both GPUs and CPUs of some computers.

Fall 2013 Parallel Algorithms simple library, Implemented in C and MPI

Including Matrix Multiplication, Bucket Sort, Bitonic Merge Sort, PI Computation (Monte Carlo, Integration and Summation Series method), Moor Shortest Path in Graph, Mandelbrot Series, Insertion Sort, Histogram, Factorial, Simulating Heat Transfer, and Prefix Sum.

Spring 2013 Particle Swarm Simulation, implemented in C

- A joint work with Arash Pourhabibi Zarandi.
- > The project is based on Barnes-Hut algorithm and parallelized using Pthreads library and OpenMP directives.

Fall 2012 Linux Shell, implemented in C

A shell (remote and local) that has some of the *bash* features such as: basic execution, background jobs management, change working directory, arbitrary number of arguments processing, clear terminal and process management.

The project can be found here: https://github.com/amirsojoodi/AHS_Bash

Spring 2012 Constructing DFA from an Arbitrary Grammar, implemented in Java

This project is developed to construct a DFA from an input Grammar. First, the input grammar is converted to Regular Expression for each degree. Then, each RegEx is converted to NFA. In each step, the generated NFA is added to the current resulted DFA as far as generated till then. After that, the resulted NFA is converted to DFA. GraphViz and Dot are used to draw states of constructed DFA in each step and save them as PNG files.

Spring 2012 Online Hotel Reservation and Management, implemented in Java

- A joint work with Pedram Veisi.
- This project is a web-based software implementation using JEE framework and integrated with Glassfish and ObjectDB as the application server and data persistency tool (ORM method) respectively. We used Visual Paradigm software for Class, ERD, Use Case and other diagrams and these technologies for development: JSF, JPA and Java Bean

Spring 2011 Troyis Player, implemented in Java

- A joint work with Amir Hossein Shahriari.
- This project captures computer screen and processes the image of the Troyis game board (Situation and state of the horse, empty and full spots) and after processing the board and extracting the required data, the decision-maker module decide which place is the best choice for the next move, using Bellman-ford algorithm. Then the decided option is passed to the mouse buffer. The game is available on www.troyis.com.
- The project can be found here: https://github.com/amirsojoodi/TroyisPlayer

Fall 2011 Front-End of a C Compiler, implemented in Flex Package (Lex and Yacc)

- A joint work with Saeed Kazemi and Pedram Veisi.
- The goal of the project is to grab an input C file and generate a 3-address-code translation and pass to the back-end of the C compiler (Lexical analyzing of the code and generating its parse tree)

Fall 2010 Http Server, implemented in Java

A simple Http Server with general error codes and availability to download and upload regular files.

Summer 2010 Miss PacMan Player, implemented in Java

- A joint work with Mahsa Asadi.
- This project captures computer screen and processes the image of the PacMan game board (Position and state of Miss PacMan, ghosts, walls, dots and fruits) using median filter; and after processing the board and extracting the objects out, the Al part decides which way is the best choice for the next move using A* algorithm. Then, the decided option is passed to the keyboard buffer. As an extra feature, the project draws a simple board simulation next to the main board in order to show what is understood from the board in every cycle of processing. The game is available on www.webpacman.com/mspacman.htm.

Spring 2010 Bank Account Management, implemented in C

- A joint work with Saeed Kazemi.
- > This project is written in two modes: Multiprocess and Multithread, which contains a server and multiple clients which operate over http protocol. The server would open and listen on an arbitrary port, and clients can establish a connection through this port in order to carry out various operations, such as creating a new account, deposit, transfer and withdrawal.

- A joint work with Babak Ahmadi, Mohammad Moein, and Mehrdad Mehrjoo
- > The goal of this project is to find a solution to the CSE department courses' schedule using Island Genetic Algorithm. It can save the output results in a beautiful format in Excel files, using JXL; and its GUI is implemented in C#.

Fall 2009 Launch Format Operation on a Disk Partition, Implemented in Assembly

This project's mostly wanted feature was linking 16-bit and 32-bit object files that was done with 16-bit Tasm and 32-bit Nasm Assemblers. In this project I tried to invoke system processes to perform the *format* task.

Spring 2009 Custom CPU Pipeline Data-Path with Simple Assembler, Implemented in Verilog and Java

- A joint work with Parviz Nekooei.
- It has all stages of the pipeline of a RISC CPU with size of 16 bit for each instruction. It has these features: hazard detection, overflow detection, register forwarding, pipeline stall, assembler for Input Instructions, and write out the register-file contents in each cycle.

Spring 2009 **Decision Tree**, implemented in Java

The goal of this project is to generate a decision tree based on ID3 algorithm. It was designed to decide (predicate) a special parameter of the input data, based on its other parameters.

Spring 2009 Othello Game, Implemented in Java

It's a graphical implementation of the Othello game written in Java Swing which supports two playing modes (Human against computer and human against human). The computer-player module written using Min-Max algorithm.

Fall 2008 File Transfer through Serial COM Ports, implemented in Assembly

This project was written to transfer a file through COM ports between two computers. Its idea was adapted from the book: Art of Assembly. The receiver part of the project have to run on the receiver computer first and wait for the sender. Then the sender computer can initiate the connection and perform a full handshake with the receiver and send any arbitrary file.

TEACHING EXPERIENCE — ACADEMIC YEAR

Winter 2021	Digital Systems Engineering T.A., Undergraduate, Queen's University, by Dr. Sean Whitehall
Fall 2020	Fundamentals of Information Structure T.A., Undergraduate, Queen's University, by Dr. D. Athersych
Winter 2020	Digital Systems Engineering T.A., Undergraduate, Queen's University, by Dr. A. Afsahi
Fall 2013, 2015, 2018	GPU Programming T.A., Undergraduate, Shiraz University, Supervised by Dr. F. Khunjush
Winter 2016	Introduction to OOP with Java Course Instructor, Shiraz University, ICTC
Winter 2014	Multicore Programming T.A., Graduate, Shiraz University, supervised by Dr. F. Khunjush
Sum 2013, Win and Sum 2012	Software Engineering Lab Course Instructor, Undergraduate Course; Shiraz University
Fall 2012	Operating Systems T.A., Undergraduate, Shiraz University, supervised by Dr. M.R. Moosavi
Fall 2012	System Programming (Assembly) T.A., Shiraz University supervised by Dr. Gh. Dastghaibifard
Winter 2012	Microprocessors T.A., Undergraduate, Shiraz University, supervised by Dr. F. Tajeripour
Winter 2011, Fall 2010	Operating Systems T.A., Undergraduate, Shiraz University, supervised by Dr. S. Hashemi
Winter 2010	Principles of Programming (C) T.A., Shiraz University, supervised by Dr. A. Hamzeh
Winter 2010, Fall 2009	System Programming (Assembly) T.A., Shiraz University supervised by Dr. S. Hashemi

	AWARDS AND ACCOMPLISHMENTS
2020-09	Parya Scholarship by <u>Parya Trillium Foundation Scholarship</u> which provides financial support for Iranian students in Canadian post-secondary institutions.
2019-01	Best T.A at CSE, Shiraz University, Shiraz, Iran. According to the students' poll. GPU Programming course supervised by Dr. F. Khunjush.
2016-08	9 th Place at National IoT Hackathon, Iran University of Science and Technology, Tehran, Iran. As Shiraz University 1 st team "SU" Introducing "Intelligent Outlet".
2015-02	Silver Medal at 7 th National JavaChallenge, Sharif University, Tehran, Iran. As Shiraz University 1 st team " <i>Tolu</i> " (with <i>B. Ahmadi & M.R. Katebzadeh</i>)
2012-07	Gold Medal at Chess Games, in Team Section, South of Iran Universities, Shiraz, Iran. As Shiraz University team (Captain: <i>R. Gharakhloo</i>)
2010-07	5 th Place at IEEE CIG 2010, Students Competition, Miss Pacman Intelligent Controller. As Shiraz University team (with <i>M. Asadi</i>)
2010-07	5th Place at Kashan University 2 nd International ACM contest, Kashan, Iran. As Shiraz University 3 rd team " <i>PosixThreads</i> " (with <i>S. Kazemi and M. Saeedi</i>)
2006	Silver Medal at Chess Games, in Individual Section, High School Students. Tehran #1, Iran
2004, 2005, 2006	Gold Medal at Chess Games, in Team Section, High School Students. Tehran zone #1, Iran
	RELATED COURSES
Ranked:	Advanced Programming (BS), Algorithm Design (BS), Microprocessor (BS), Advanced Computer Architecture (MS), Cluster Computing (PhD), Introduction to Computer Science (BS), Artificial Intelligence (BS), Numerical Calculations (BS), Multicore Programming (MS), Design Recovery and Automated Evolution (PhD), Artificial Intelligence and Human Interaction (PhD), Cluster Computing (PhD)
Attended:	Grid Computing (MS), Advanced Operating Systems (MS), Parallel Algorithms (MS), Software Architecture (MS)
	ONLINE EDUCATION
Fall 2019	Udacity: Software Testing, by <i>John Regehr</i> Udacity: Intro to DevOps, by <i>Karl Krueger and Dwayne Lessner</i> Georgia Tech & Udacity: Software Development Process, by <i>Alex Orso</i>
Summer 2019	Addison-Wesley, Livelessons: Design Patterns in Java, by Douglas C. Schmidt
Spring 2019	Udacity: Writing READMEs, by Walter Latimer Udacity: Craft Your Cover Letter, by Trinh Nguyen Udacity: Refresh Your Resume, by Trinh Nguyen Udacity: Strengthen Your LinkedIn Network, by Trinh Nguyen and Chris Saden
Summer 2018	SoloLearn App online courses: <i>Java, Python, C, C++, HTML and SQL</i> Udacity: Introduction to Hadoop and MapReduce, by <i>Ian Wrigley and Sarah Sproehnle</i> Udacity: Configure Linux Webservers, by <i>Michael Wales</i>
Summer 2015	Berkeley, edX: Intro to Big Data with Apache Spark, by Anthony D. Joseph
Fall 2014	NVIDIA and Udacity: Intro to Parallel Programming with GPUs, David Luebke and John Owens
	My Talks
Fall 2019 Summer 2018 Spring 2016	Start a Good Career, CSE Dep. Students, at Shiraz University Illusion of Decision, Break Time in University. For high school students, at Shiraz University Working during college, CSE Dep. Students, at Shiraz University

What is Software Engineering? CSE Dep. Students, at Shiraz University **Time Management** (Keynote Speaker), 8th *Break Time in University*

Future Education (Keynote Speaker), 1st Entekhab-e-Bartar Conference

Climate Crisis (Keynote Speaker at Opening Ceremony), 7th Break Time in University

Fall 2016

Summer 2014 Spring 2014

Summer 2013

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Spring 2011	Art of Googling (with Saeed Kazemi), CSE Dep. Students, at Shiraz University
Spring 2011	Compilers vs. Interpreters (with Saeed Kazemi), CSE Dep. Students, at Shiraz University

OTHER COURSES AND WORKSHOPS

2020-03 Inter-cultural Awareness, by "QUIC" workshops at Queen'sU

In this 4-session workshop we learned about cultures, their roles in society, their differences, and inter-cultural communication techniques. Also, we learned about Indigenous people, and their history in Canada.

Winter 2020 Write Nights, by "SASS" workshops at Queen'sU

- In this 10-session workshop we worked on writing in academic context.
- 2020-03-10 **Presenting with Confidence**, by "<u>Expanding your Horizons</u>" series at Queen'sU
- 2020-03-05 **Leading with Emotional Intelligence**, by "<u>Expanding your Horizons</u>" series at Queen'sU
- 2020-02-27 **LinkedIn Session**, by "Expanding your Horizons" series at Queen'sU
- 2020-02-13 Commercialization Opportunities, by "Expanding your Horizons" series at Queen'sU
- 2020-01-23 Three Minute Thesis, by "Expanding your Horizons" series at Queen'sU
- 2020-01-20 **Procrastination and Mindfulness**, by "Expanding your Horizons" series at Queen'sU
- 2020-01-16 Effective Communication with Supervisor, by "Expanding your Horizons" series at Queen'sU
- 2020-01-16 Notetaking and Writing, by "SASS" workshops at Queen'sU
- 2020-01-09 Reading Faster, Reading Better, by "SASS" workshops at Queen'sU
- 2020-01-07 From B to A: How to be a good Student, by "SASS" workshops at Queen'sU
 - Fall 2019 Self Determination Theory, by Arash Kamali at Arche Academy, Shiraz, Iran
 - In this 10-session workshop, I learned about non-violent communication, growth mindset, motivation causality, and self-determination practices.

EXTRA-CURRICULAR ACTIVITIES

2017-2018 Compulsory Military Service

2009-2019 Break Time in University (BTIU)

- ➢ BTIU is a normally 3-day conference that has been held annually since 2006 every summer for high school students (Last year almost 270 students). High School students of Shiraz city can participate in this program and enjoy the creative classes and workshops about different things. (Every student participates in almost 10 classes). BTIU's objectives include:
 - o Introducing university to high school students.
 - Improving their creativeness and team work skills.
 - o Improving their cultural and social parts of their thoughts.
 - Improve staff committee skills, including communication, management, responsibility and etc. (almost 90 person is in staff committee every year).

BTIU has almost 20 different Committees. What I have done in BTIU:

- **2009:** Member of budget and sponsor committee; and Catering Committee chair.
- **2010:** Budget and sponsor committee chairman; and Opening-Closing Ceremonies Committee chairman, and editor.
- 2011: Opening-Closing Ceremonies Committee member and consultant; Photographer, Cinematographer, and editor.
- 2012: Opening-Closing Ceremonies Committee member and consultant; Cinematographer, and editor
- 2013: Opening-Closing Ceremonies Committee member and consultant; Photographer, Cinematographer, and editor.
- > 2014: Documentary Committee chairman; Member of film and clip Editing
- 2015: Member of Scientific Committee; Ceremonies Speaker

- 2016: Workshop Evaluator
- 2017: Workshop Evaluator
- 2018: Evaluator and Workshop Instructor (Subject: Illusion of Decision)

2012-2016 **Tolu – Group**

Co-founder and member of Tolu group since spring 2012. It's a group with almost 15 members that have meeting every week. We have seminars and talks in different subjects, mostly psychology, psychoanalysis, philosophy, history and sociology.

2014 Entekhab-e-Bartar – Group

Major member of the group since its creation and its conference chair. It's a group with almost 10 staff and 15 consultants that holds workshops and classes for high school students about college majors and fields. We try to help them to choose a better way in their future by informing them about what's going on in each fields. In order to help them to realize what they actually like, we have different tests, psychology tests, sociology tests, IQ tests and face to face talk for each student.

2011-2014 Students' Scientific Group, CSE Dep., Shiraz University

- In this group we work on different Seminars and Work-shops for students. Also each semester, courses and their exams scheduling is done by this group. We have a board for our announcements and posters.
- I was a member of the group in 2009, 2010, 2012 and 2014 and its head in 2011.

Spring 2012 16th CSI International Symposiums on Computer Architecture & Digital Systems and Artificial Intelligence & Signal Processing, Shiraz University, Shiraz, Iran

Opening-Closing Ceremonies Manager; film and clip editor, Cinematographer

Spring 2011 Harekat Fest, Shiraz University

➤ It's a festival for Students Scientific Groups of Shiraz University and their achievements in one year of efforts. I was the head of Opening-Closing Ceremonies Committee, film and clip editor.

INTERESTS

Art Music, Movies, Poem, Writing, Playing Music Instruments, Singing, Photography, Film Editing

Sports Football, Volleyball, Chess, Running, Biking, Mountain Climbing

Misc. Coding, Teaching, Reading (about Philosophy, Sociology, Psychology, and Poetry), Meditating

REFERENCES

Dr. Ahmad Afsahi (ahmad [dot] afsahi [at] queensu [dot] ca)

Dr. Farshad Khunjush (fkhunjush [at] gmail [dot] com)

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Dr. Ali Hamzeh (ali [at] shirazu [dot] ac [dot] ir)

Dr. Mohammad Reza Mousavi (mrmoosavi [at] gmail [dot] com)

Dr. Sattar Hashemi (s hashemi [at] shirazu [dot] ac [dot] ir)