

# ARSHIA AKHAVAN

Undergraduate Student of Computer Engineering

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in arshia-akhavan    ArshiAAkhavan

## EDUCATION

B.Sc. in Computer Engineering

Sharif University of Technology

📅 Sep 2018 – Apr 2024

## RESEARCH INTERESTS

- Operating System Design and Implementations
- Distributed Systems and Parallel Computing
- Programming Languages and Formal Verification
- Cloud Computing
- High-Performance Computing
- Computer Networks

## RESEARCH EXPERIENCE

Vulnerable Call Chain Pruning Using Machine Learning-based Pruning Technics on Dynamic Call Graphs

BGSU CS Department

📅 May 2024 – currently

📍 Ohio

I am currently working under the supervision of Dr. Heydarnoori on optimizing the generation process of program call graphs. My focus is on applying algorithmic and machine learning-based pruning techniques on the dynamically generated call graphs from test runs. The goal is to minimize the size of static call graph without compromising accuracy, ensuring that no vulnerable call chains –sequences of calls leading to a vulnerable function– are inadvertently pruned.

Explainable Rational Synthesis in Multi-Agent Systems: A Compositional Approach

Sharif University of Technology

📅 Dec 2023 – currently

📍 Tehran

We are currently developing novel algorithms for explainable rational synthesis in multi-agent systems (MAS) with Linear Temporal Logic (LTL) objectives. Our work addresses the challenge of computing Nash equilibrium strategies in concurrent graph games, a problem known for its double-exponential complexity. I have created a compositional approach that enhances the performance and explainability of rational synthesis by converting the game into a suspect game, solving it as a parity game, and optimizing strategies for multi-agent coordination. Additionally, my research includes the practical implementation of a tool that significantly outperforms state-of-the-art LTL synthesis methods in various case studies, with a focus on improving system performance and understandability in applications such as autonomous systems and robotics.

## INTERSHIPS

Semantic memory garbage collection for concurrent lock-free data structures

Kaist University

📅 May 2023 – Aug 2023

📍 Seoul

My internship focuses on **memory model for atomic operations** and Design of **lock-free data structures** for high concurrency workloads. I start by learning and implementing different models of Locks and then went on implementing lock-free data structures such as **Hash Map based on Split-Ordered List** and other data structures. As the next and necessary step, I studied different methods for **Semantic Memory Reclamation** for these data structures and learn many schemes such as **hazard pointers** and **EBR**. I also was given the chance to work with professor Kang's recent published scheme, **HP++** which was a improvement over Hazard pointers. it was also a good opportunity for me to get better in rust programming language

# PROJECTS

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## CS162 Berkeley's Pintos Project

Developed an operating system kernel, addressing challenges like system call implementation, filesystem management, and process scheduling, showcasing expertise in OS design and low-level programming. ([git](#))

## Matrix Vector multiplication using AVX

Develop a library for multiplication of sparse Matrices on top of Intel's AVX vector processors to further increase the performance ([git](#))

## TCP network stack

Implement a TCP FSM with Rust using the Linux kernel's TUN/TAP based on RFC 793

## C minus Compiler

Implement a Compiler for C minus language ([git](#))

## Hash Map based on Split-ordered list

Implement a Concurrent HashMap based on Split-ordered list paper in Rust ([git](#)) ([paper](#))

## Hazard pointers

Hazard pointer implementation using Rust ([git](#))

# INDUSTRIAL EXPERIENCE (SUMMERIZED)

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## Software Engineer

### Sotoon

📅 Jan 2023 - Currently

📍 Tehran, Iran

Sotoon is a B2B cloud provider which focuses on different aspects of Cloud Computing, such as hardware abstraction, Providing storage servers, DNS, CDN, Bigdata solution and managed k8s cluster. I worked in the K8s as a Service team. Experiences:

- Using [SIGS/Cluster-api](#) to provide bootstrapping and operations as a service for k8s.
- Develop and Maintain SotoonCSI, a **CSI implementation** that integrates with Sotoon's storage backend.
- Develop **node-AutoScaler** for k8s cluster which integrates with Sotoon's Computation backend to reduce customers' costs.
- Develop and maintain a **CCM** module to provide loadbalancers for k8s clusters using sotoon's compute infrastructure.
- Provide additional cluster plugins such as **DNS** and **CNI** as an automated solution.
- Plan and Lead **Migration** of **over 100 customers'** k8s-clusters to the new infrastructure with **zero downtime**.

## Data Platform Engineer

### Digikala

📅 Aug 2021 - Jan 2023

📍 Tehran, Iran

Digikala is the largest e-commerce company in Iran with 40+ million users. Experiences:

- Developing **Karavan**, a **Parallel Processing Engine** for data pipelines on top of **Apache Spark**.
- **Reducing Computation time** of our Pipelines by **revising our data retrieval models and Queries**.
- **Reducing latency** of our API by locating **critical paths** in the codebase of the framework and **optimizing** them.

## DevOps Engineer

### Tapsell

📅 Nov 2019 - Aug 2021

📍 Tehran, Iran

Providing the infrastructure needed by other technical teams in the corporation.

Experiences:

- Optimizing Cassandra's **Disk usage** for different workloads
- Developing a fully automated backup, validity check, and restore tool for managing our backups in a cloud-native infrastructure.

# VOLUNTEER EXPERIENCE

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## Founder & President

### Code o She'r Contest

📅 May 2024

📍 Tehran, Iran

Code o She'r is a Spaghetti Code challenge which focuses on UBs and exploits architectural behaviors of Computers and compilers with the aim of hosting an environment for contestants to become more familiar with the field of computer systems.

As the Founder and President of Code o She'r, I took on the role of leadership over a team of 70+ members and oversaw various flows from design, marketing, and executive duties to Scientific and technical tasks.

## Chief Technical Staff

### ICPC Asia Tehran Regional Contest 2023

📅 May 2024

📍 Tehran, Iran

Build contest-customized OS images and distribute them on contestant hosts using **Network boot**.

Manage and configure hosts used by contestants and **monitor their connectivity**.

**Restrict external access and host-to-host access** of each contestant's host device.

## Technical Chapter

### Student's Scientific Chapter (SSC)

📅 Aug 2020 – Aug 2021

📍 Tehran, Iran

Maintain Technical resources owned by SSC and **supervise technical requirements** of events held by SSC

## Chief of Infrastructure and System Team

### Sharif AI Challenge 2021

📅 Dec 2020 – May 2021

📍 Tehran, Iran

Develop and deploy a **scalable infrastructure/software** for AI challenge's **high demanding game engine**. [GitHub](#)

## Chief Technical Staff

### ICPC west championship

📅 Dec 2019

📍 Tehran, Iran

Manage and configure hosts used by contestants and **monitor their connectivity**

# TEACHING ASSISTANT EXPERIENCES

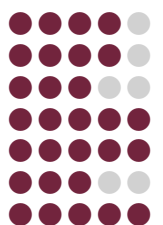
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- Course Desgin - **Zero to Hero Linux** - Quera - [link](#)
- Head TA - **Operating System** - Dr. Mehdi Kharrazi - Spring 2023
- TA - **Operating System** - Dr. Mehdi Kharrazi - Spring 2022
- TA - **Computer Network** - Dr. Mehdi Jafari - Spring 2023
- TA - **Computer Network** - Dr. Mehdi Jafari - Fall 2022
- TA - **Automata Theory** - Dr. Ali Movaghar - Spring 2023
- Head TA - **Multi-Core Computing** - Dr. Hajar Falahati - Fall 2023
- Head TA - **Multi-Core Computing** - Dr. Hajar Falahati - Spring 2023
- TA - **Multi-Core Computing** - Dr. Hajar Falahati/Dr. Hamid Sarbazi - Spring 2022
- TA - **Computer Structure and Language** - Dr. Laleh Arshadi - Spring 2021
- TA - **Numerical Computation** - Dr. Samira Hossein ghorban/ Dr. Hamid Sarbazi - Spring 2023
- TA - **Design Of Database** - Dr. Mojtaba Varmazyar - Fall 2022
- TA - **Big Data** - Dr. Sharare Ali pour - Spring 2023
- Head TA - **Advanced Programming** - CE department - Spring 2021
- TA - **Advanced Programming** - CE department - Spring 2020

# PROGRAMMING LANGUAGES

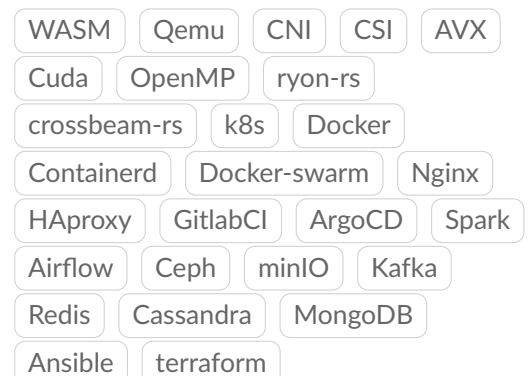
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Rust  
Go  
C  
Bash  
Python  
Java  
SQL



# TECHNOLOGIES

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- Head TA - **Fundamentals of Programming** - Dr. Mohammad Amin Fazli - Fall 2022
- Head TA - **Fundamentals of Programming** - Dr. Mohammad Amin Fazli - Fall 2021
- TA - **Fundamentals of Programming** - Dr. Fakoori - Fall 2020
- TA - **Fundamentals of Programming** - CE department - Fall 2019

## SELECTED COURSES

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- |                     |       |                         |       |                        |       |
|---------------------|-------|-------------------------|-------|------------------------|-------|
| • Operating Systems | 20/20 | • Compiler Design       | 20/20 | • Multi-Core Computing | 20/20 |
| • Computer Network  | 20/20 | • Automata theory       | 20/20 | • Real-time Systems    | 20/20 |
| • Database Design   | 20/20 | • Computer Architecture | 20/20 |                        |       |