

# AMIR MOHAMMAD TAVAKKOLI

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## RESEARCH INTEREST

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High-performance computing, domain-specific compiler optimizations, and hardware-software co-design.

## EDUCATION

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**Doctor of Philosophy, Computer Science**, University of Utah Expected Dec 2027

Working on **data-layout optimization and GPU code generation in MLIR**, advised by **Prof. Mary Hall**  
Relevant coursework: Parallel Algorithms, Adv. OS Implementation, High-Performance Machine Learning, Parallel Programming for Many-Core Architectures, Software Verification, Scientific and Data Computing

**Bachelor of Science, Computer Engineering**, Shiraz University 2018 - 2022

CGPA: 19.16/20 (4.0/4.0). Dean's List for eight semesters. (Ranked 1st in the class)

Relevant coursework: GPU Programming, Parallel Algorithms, Linear Algebra, Computer Graphics

## EXPERIENCE

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**Cloud Engineer**, Derak Cloud Co. Sep 2020 - Aug 2022

- Developing and implementing authentication, authorization, and accounting (AAA) with dynamic design decision support for cloud products such as CDN, Streaming, and IaaS with over **30000 active services**. Developing an IP geolocation microservice with **1ms response time** using Routing Information Service (RIS) databases for edge systems.
- Experience in automation and designing and implementing service pipeline orchestration algorithms for cloud services such as CDN, IaaS, and streaming in **Python, Ansible, XenAPI** and **FFMPEG**. Setting up **CI/CD pipelines** and **Dockerizing** projects and developing a single unified command line interface for maintaining and scaling all services.
- Experience in implementing a **Vue.js** user administrative dashboard for cloud computing infrastructures.

**Software Developer**, Break Time In University Event Sep 2019 - Oct 2020

- This is a summer event for high school students. I Implemented a new panel for managing **400 students** and **100 members** on the event day using **Vue.js** and **Django** and deployed as a cross-platform application using **PWA** technology.

**Machine Learning Internship**, Deed Asia Jul 2019 - Sep 2019

- Implementing OCR and YOLO on NPUs using **OpenCV** and **Keras**.

## PUBLICATIONS & TALKS

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### Journal Articles

- M. Hall, G. Gopalakrishnan, E. Eide, J. Cohoon, J. Phillips, M. Zhang, S. Elhabian, A. Bhaskara, H. Dam, A. Yadrov, T. Kataria, **A. M. Tavakkoli**, S. Joshi, M. S. T. Karanam. *An NSF REU Site Based on Trust and Reproducibility of Intelligent Computation: Experience Report*. SC '23 Workshops of The International Conference on High Performance Computing, Network, Storage, and Analysis, Nov 2023
- **A. M. Tavakkoli**, S. Joshi, S. Singh, Y. Xu, P. Sadayappan, and M. Hall. *PEAK: Generating High-Performance Schedules in MLIR*. Languages and Compilers for Parallel Computing (LCPC), Lexington, Kentucky, Oct 2023
- SH Hendi, **A.M. Tavakkoli**, S. Panahiyan, B. Eslam Panah, and E. Hackmann. *Simulation of geodesic trajectory of charged BTZ black holes in massive gravity*. The European Physical Journal C, June 2020

### Invited Talk

- *PEAK: High-performance Transform Dialect*. Invited talk at third Workshop on LLVM in Parallel Processing (LLPP) at International Conference on Parallel Processing (ICPP), Salt Lake City, Utah, Aug 2023

## SKILLS

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<b>Programming Languages</b>	C, C++, Python, Go, Java, JavaScript, Dart
<b>Compiler Infrastructure</b>	MLIR, LLVM, TVM, IREE
<b>HPC Tools</b>	CUDA, OpenMP, MPI
<b>Graphic Libraries</b>	OpenGL, GLSL, NVIDIA OptiX, SDL
<b>Machine Learning Frameworks</b>	Tensorflow, Keras, OpenCV, PyTorch
<b>Container Orchestration</b>	Docker, Swarm, Kubernetes

## AWARDS & HONORS

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<b>Recipient of Graduate Assistantship</b> , University of Utah	2022-2027
<b>Ranked First The First Technical Footsteps Competition</b> , I.D.E.A.	2020
<b>Ranked First Class 2022</b> , Shiraz University	2018-2022
<b>Member of Exceptional Talents Organization</b> , Shiraz University	2018-2022
<b>Dean's List</b> , Shiraz University	2018-2022

## TEACHING

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<b>NSF Research Experiences for Undergraduates (REU) Mentor</b> , University of Utah	Jun 2023 - Aug 2023
Mentoring undergraduate students in performance measurement, modeling, and understanding the effects of programming language choices, memory hierarchy optimization, and architecture on performance for NVIDIA GPUs.	
<b>Teaching Assistant</b> , Shiraz University	Feb 2019 - Aug 2022
Linear Algebra, Data Structures and Algorithms, Computer Architecture, Advanced Programming, Database Design Principles, Numerical Analysis, Operating System Lab, and Discrete Mathematics.	

## ACADEMIC SERVICE

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<b>ACM Chapter Vice-Chairman</b> , Shiraz University	Nov 2020 - Nov 2021
<b>CSE Scientific Association Chair of the Board</b> , Shiraz University	Sep 2019 - Oct 2020
<b>ACM Chapter Board Member</b> , Shiraz University	Sep 2018 - Sep 2019

## COURSE PROJECTS

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<b>GPU Software Verification via Random Walks</b>	Porting the model verification phase of the Murphi model checker Romp to GPUs to accelerate the random walker phase
<b>Estimating cable crossover force using 3D-pose estimation on Nvidia Jetson Nano</b>	Using a Nvidia Jetson Nano and a camera, estimate the pose angle and use this to estimate the force for crossover machine
<b>Containerized Real-time Ray Tracing</b>	Using NVIDIA OptiX 7 With Denoiser and part of the parallel algorithms and GPU programming course project. ( <a href="#">Code</a> )
<b>Linkedin Clone</b>	Technologies used are Go, Vue.js, and gRPC, and containerized using Docker. ( <a href="#">Code</a> )
<b>3D Eight Queen Chess</b>	Interaction with objects and camera by user events in C++ and OpenGL. ( <a href="#">Code</a> )
<b>MIPS CPU</b>	Simulating logical circuits and CPU with forwarding and hazard detection. ( <a href="#">Library Code</a> ) ( <a href="#">CPU Code</a> )
<b>Minimum Steiner tree</b>	Given a set of vertices, find a Steiner tree with minimum weights ( <a href="#">Code</a> )
<b>Workshop Management</b>	Panel for managing workshops. The backend is implemented with Java Spring Framework, and the front-end in Vue.js ( <a href="#">API Code</a> ) ( <a href="#">OOP DESIGN</a> ) ( <a href="#">UI CODE</a> )
<b>Game Engine</b>	Using C + SDL and a textual map and the game console outputs a playable 2D game ( <a href="#">Code</a> )