Mehran Shakerinava

Department of Computer Engineering
Sharif University of Technology
Azadi Avenue, Tehran, Iran
11365-11155

mshakerinava@ce.sharif.edu
mehranshakerinava@gmail.com
ce.sharif.edu/~mshakerinava
+98(911)860-3909

Education

◇ **B.Sc. in Computer Engineering** 2014 – Present
Department of Computer Engineering
Sharif University of Technology, Tehran, Iran
GPA: 17.47/20 (Last Two Years: 18.30/20)

Research Interests

◇ **Machine Learning**: *Deep Reinforcement Learning, Unsupervised Learning*
◇ **Robotics**: *Intelligent Control, Autonomy*

Research Experience

◇ **High Performance Computing Architectures and Networks Laboratory (HPCAN)**
Undergraduate Research Assistant
Advisors: Prof. Hamid Sarbazi-Azad and Prof. Pejman Lotfi-Kamran

- **Data Prefetching**: DRAM access latency is the most important performance bottleneck in modern computer systems. Therefore, reducing the number of cache misses is of paramount importance. Data prefetching hides DRAM latency by predicting future memory accesses and (pre-)fetching those blocks from DRAM. In this work, I implemented and helped develop a novel algorithm for spatial data prefetching (called Bingo). The work resulted in a *B.Sc. Thesis* and a conference paper in the highly prestigious *HPCA* symposium. We will soon submit Bingo, and another prefetcher that I've designed to the 3rd Data Prefetching Championship (DPC3).

◇ **Machine Learning Laboratory (MLL)**
Undergraduate Research Assistant
Advisor: Prof. Mahdieh Soleymani Baghshah

- **Deep Reinforcement Learning**: I Assisted a senior M.Sc. student in his thesis research. I implemented many Deep Reinforcement Learning agents (DQN, A3C, etc.) and trained them on the Atari Learning Environment (ALE). I also trained environment models using data gathered from trained agents by implementing the "Recurrent Environment Simulators" paper. We performed many experiments on intrinsic motivation and exploration in Deep Reinforcement Learning.
- **Geometric Deep Learning**: We introduced a novel definition of locality in graphs, equivalent to the commute distance of vertices. Such a measure of locality can be computed via spectral embedding of the graph. A notion of locality enables the construction of Convolutional Neural Networks that can process the graph. We also theoretically proved that this method has certain appealing properties (such as being both spectral and local). I implemented and evaluated this method on various datasets.

Publications

◇ M. Bakhshalipour, **M. Shakerinava**, P. Lotfi-Kamran, and H. Sarbazi-Azad, "Bingo Spatial Data Prefetcher," in *International Symposium on High-Performance Computer Architecture (HPCA)*, February 2019.

Honors and Awards

◇ **Silver Medal** (Ranked ~15 among ~10,000) — Summer 2012
21st *Iranian National Olympiad in Informatics*

◇ **1st Place** — Spring 2013
Iranian Qualification Round at 1st *International Bayan Programming Contest*

◇ **1st Place** — Spring 2016
Programming Contest at Iran's 3rd National Python Conference (*PyCon 2016*)

◇ **2nd Place** (Among ~20 teams) — Fall 2016
1st *Gatuino Hardware Competition* at Sharif University of Technology

Teaching Experience

◇ **Instructor**
Informatics Olympiad (2012 – 2015)
NODET High-School

Taught topics on Combinatorics, Graph Theory, Algorithms, and Programming.

◇ **Teaching Assistant**
Fall 2016 - Advanced Programming
Sharif University of Technology, Tehran, Iran

Held a recitation class on Regular Expressions. Designed and graded a Quiz on Object-Oriented Programming and Regular Expressions. Designed a programming assignment.

◇ **Teaching Assistant**
Spring 2018 - Artificial Intelligence
Sharif University of Technology, Tehran, Iran

Designed and graded assignments, covering Markov Decision Processes, Reinforcement Learning, Bayesian Networks, and Hidden Markov Models. Designed programming assignments on Reinforcement Learning and Perceptrons. Held recitation classes for clarifying and solving assignments. Answered newsgroup/email queries.

Selected Courses

◇ **B.Sc., Sharif University of Technology**:

- Multivariate Calculus (20/20)
- Advanced Programming (19.5/20)
- Data Structures and Algorithms (20/20)
- Automata and Compilers (20/20)
- Linear Algebra (19.6/20)
- Deep Learning (TBD)
- Artificial Intelligence (18.6/20)
- Computer Networks (18.7/20)
- Signals and Systems (19/20)
- Real-Time Systems (18.2/20)
- Foundations of Neuroscience (17.8/20)
- B.Sc. Thesis (20/20)

Selected Projects

◇ **2048 AI**
Fall 2014 - Intro to Programming Open-ended Homework Problem

An AI for the game 2048, based on Monte-Carlo tree search and a custom evaluation function. It's able to reach the 4096 tile.

◇ **Flight Control Game**
Fall 2014 - Intro to Programming Project

A clone of Flight Control written in C with GTK.

◇ **Bare Metal Raspberry Pi Programming**
Fall 2015 - Computer Structure and Language Project

Programmed a Raspberry Pi in ARM assembly to draw the Sierpinski triangle with a Rule 90 cellular automaton. *(Best class project)*

◇ **15-Puzzle AI and GUI**
Fall 2015 - Advanced Programming Midterm Project

A GUI for a 15-Puzzle game, and an AI that can solve it. Written in C++ with Qt.

◇ **Pacman Game**
Fall 2015 - Advanced Programming Final Project

A clone of classic Pacman written in C++ with Cocos2d-x.

◇ **Pipelined Processor**
Spring 2016 - Computer Architecture Bonus Project

Verilog implementation of the 5-stage classic RISC pipeline.

◇ **Cython Compiler**
Fall 2016 - Automata and Compilers Project

Wrote a compiler for a made-up programming language called Cython. The compiler used LALR(1) parsing and was written in C++ with Flex, Bison, and LLVM.

◇ **FPGA Odometry**
Fall 2016 - Digital Systems Design Project

Implemented odometry in C on Arduino and afterward, in Verilog on FPGA. Constructed a differential drive robot with optical wheel encoders (consisting of encoder disks and photoelectric sensors), and tested the implementation on it successfully. *(Best Class Project)*

◇ **Video Streaming WiFi Robot**
Spring 2018 - Hardware Lab

Assembled and programmed a WiFi-controlled differential drive robot with a camera, based on the Arduino platform. The video is streamed to a responsive web-based UI from which the robot can be remotely controlled.

◇ **FSM to Ladder Logic**
Spring 2018 - Industrial Automation Lab

Designed a simple algorithm for transforming FSM controllers into Ladder Logic programs.

Voluntary Work

◇ **8th and 9th Sharif AI Challenge**
Sharif University of Technology, Tehran, Iran (2016 and 2017).
Technical Staff (C++ Client)

Skills

◇ Assembly, C/C++, Java, Python, MATLAB, TensorFlow, Git, Verilog, HSpice, ModelSim, Quartus, FPGA, Microcontroller, Arduino, SQL, HTML, CSS, JavaScript, Bash, Linux, LaTeX

Languages

◇ Persian (Mother Tongue)

◇ English (Fluent)

- TOEFL (Reading: 30, Listening: 30, Speaking: 27, Writing: 26)
- GRE (Quantitative: 170, Verbal: 162, Writing: 3.5)

◇ Swedish (Basic)