Pedram Aghazadeh

La Jolla, California – U.S. permanent resident

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EDUCATION

University of California San Diego — **San Diego, California**
Ph.D. in Computer Engineering — *Sep 2024 - Sep 2026 (Expected)*
Working on Robustness and Security of Large Language Models under the supervision of **Professor Farinaz Koushanfar** at the ACES lab.

University of California San Diego — **San Diego, California**
M.Sc. in Computer Engineering — *Sep 2024 - March 2026 (Expected)*
As part of the direct Ph.D. program I will earn my M.Sc. degree in Computer Engineering by Spring 2026.

University of Tehran — **Tehran, Iran**
B.Sc. in Computer Science (4.0/4.0) ***1st in class*** — *Sep 2018 - March 2022*
Thesis: Hand Gesture Recognition from Image using Machine Learning and Computer Vision

EXPERIENCES

Jacobs School of Engineering UC San Diego — **La Jolla, California**
Graduate Research Assistant — *Septmeber 2024 - Present*
- Working on the effects of synthetic data and model collapse in LLMs at the ACES lab.
- Designing new benchmarks and evaluation metrics for LLMs in different tasks such as information extraction, question-answering, and code generation.
- Conducting research on using deep learning models for spesis detection at the Nemati lab (UC San Diego Medical School).

Volkswagen Group of America IECC — **Belmont, California**
AI Engineer — *April 2022 - October 2024*
- Training and fine-tuning Multi-Modal Language Models (MMLM) for the purpose of scene understanding and sequential decision making in ADAS by outputting a direct action or using a tool repository.
- Conducting research on RL/IL and implementing approaches such as PPO, TRPO, and GAIL for the tactical/motion planner of Autonomous Vehicles.
- Optimized pre-processing and simulation-to-cloud integration, improving speed by up to 30x and 12x, respectively, leveraging AWS services for continuous training.
- Improved BEV reconstruction accuracy in details (lane mark detection, etc.) by regularization and specific decoding heads by 90%.
- Designed and implemented a rule-based model to control vehicles in a realistic simulation capable of interacting with other agents.
- Developed scalable AI infrastructures, integrating data pipelines and deploying deep learning models across AWS and high-performance local servers.

Russian School of Mathematics (RSM) — **Mountain View, California**
Advanced Mathematics Teacher — *March 2022 - May 2024*
- Instructor for Calculus, pre-calculus, and algebra to high schoolers preparing them for SAT as well as designing, taking, and grading tests and quizzes while closely monitoring the progress of students.

University of Tehran — **Tehran, Iran**
Teaching Assistant — *Sept 2019 - July 2021*
- Teaching Assistant for Calculus I, Advanced Programming(AP), Combinatorics and Computer Systems courses responsible for homework and quiz design and grading of up to 70 students per course.

Various Elite High Schools (Atomic Energy, Energy Plus, Allameh Tabtabaei, and Helli I) — **Tehran, Iran**
Informatics Olympiad Teacher — *Sept 2019 - Sept 2021*
- Giving lessons in algorithms and ACM-style programming with C++, discrete math, set theory, and graph theory.

RESEARCH INTERESTS

Multi-Modal Language Models, AI Robustness, Reinforcement Learning, Deep Learning,

PUBLICATIONS

- A. Shamsoshoara, S. Salih, P. Aghazadeh (equal contribution). **SwapTransformer: highway overtaking tactical planner model via imitation learning on OSHA dataset** *IEEE Access*

- A. Shamsoshoara, S. Salih, P. Aghazadeh (equal contribution). **OSHA dataset: A realistic episodic simulation for highway interaction** *IEEE DataPort*

SKILLS

Python *6+ yrs*

- PyTorch, PyTorch lightning, NumPy, Pandas, Tensorflow, Keras, Polars, and OpenCV alongside.
- Creating web interfaces for models with gradio or ollama and familiar with Django for web development.

C++ *8+yrs*

- Tensorflow, socket programming, protobuf, and SFML graphical library.

R *4+yrs*

- Statistical tests (t-test, paired t-test, chisq test, hypothesis testing, Z-test, ANOVA, Linear & Logistic regressions, clustering algorithms, and decisions trees and BioInformatics packages: limma, grcrma, affy for Gene ontology and differential expression.

Programming Languages and Tools

- Python, C++, R, C, Bash, Julia, R, LaTeX, Assembly MIPS x64, SQL, and MATLAB.
- Experienced with AWS Sagemaker, Docker, Slurm, Atlassian stack (Jira, Confluence, Bitbucket), git, and UNIX/Linux systems. ‘

Honors & Awards

Awarded graduate student fellowship by ECE department of UC San Diego *2024*

Directly accepted in Master’s program at University of Tehran due to graduating first in class of 2022 *2022*

Accepted in CS M.Sc. program at UC Irvine *2022*

Ranked 2nd in ACM-ICPC contests at University of Tehran *2019*

Ranked 270th among 200,000 applicants in National University Entrance Exam (”Konkoor”) *2018*

Candidate Master at CodeForces *2016*

+1300 problems solved

PROJECTS[1]

LLaVA Drive *PyTorch, Deepspeed, NLP*

- Fine-tuning LLaVA-Plus on tools related to autonomous driving while maintaining the capabilities of model in using previously learned tools.

Hand Gesture Recognition *Tensorflow, Keras, NumPy, Pandas, OpenCV*

- Built a Deep Learning model using TensorFlow as my senior project to fulfill requirements for my degree. The model is CSA+CNN using Crow Search Algorithm for optimizing the Convolutional Neural Network’s hyper parameters to achieve best results.

Suffix tree *Python, tkinter*

- A suffix tree app with GUI based on Ukkonen’s algorithm
- Generalized suffix tree in O(nk) and finding pattern in all input strings.
- Finding longest substring repeated at least k times in string in linear time, longest common substring (LCS) between at least k of the input strings in linear time, and longest palindrome substring in a given string.

Multiplayer SNAKE Game *C++, Profobuf, Socket programming, SFML*

- Developed online multiplayer online snake game using SFML library in C++

Online photo editor *Python, Django*

- Built an online photo editor (simple Instagram) with ability to have control over profiles.

Acute Lymphoblastic Leukemia (ALL) genetic abnormalities *R*

- Used R to detect genetic abnormalities from real-world data through gene ontology enrichment analysis using DAVID database.

Compiler Project *C++, COOL, Assembly*

- Designing and implementing a compiler for COOL in C++ as part of the Compiler theory course (CS143 Stanford)

Assmebler & Disassembler *Assembly MIPS x64, Python, C++, intel core i5 architecture*

- Developed assembler & disassembler for x64 assembly language in both x64 assembly language and PyThon.

Basic CPU *Logisim, Assembly x64*

- Using Logisim I designed a simple CPU with RAM capable of executing assembly codes.

[1] Available on github