Parnian Shabani Kamran

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EDUCATION

M.Sc. Computer Science, *University of California, Davis* (GPA: 3.8/4) *Sept 2023 - Present*

M.Sc. Computer Engineering, *Amirkabir University of Technology* (GPA: 18.34/20) *Sept 2014 - Sept 2016*

B.Sc. Computer Engineering, *Isfahan University of Technology* *Sept 2008 - Sept 2013*

Relevant coursework, *Computer Architecture, Machine Learning, Programming Languages, Computer Security, Parallel Programming, Design and Analysis of Algorithms, Large Language Models*

RESEARCH INTERESTS

AI for software engineering and programming analysis and proofs, software supply chain security, LLMs reasoning and faithfulness, Trustworthy systems

RESEARCH PUBLICATIONS

Parnian Kamran, Premkumar Devanbu, and Caleb Stanford, **Vision Paper: Proof-Carrying Code Completions**. In 39th IEEE/ACM International Conference on Automated Software Engineering Workshops (ASEW '24)
Contribution: Proposed and implemented an agentic framework combining retrieval-augmented generation and formal verification tools to study correctness guarantees in LLM-based code generation.

A. A. Zeraatkar, **P. S. Kamran**, I. Kaur, N. Ramu, T. Sheaves and H. Al-Asaad, **On the Performance of Malware Detection Classifiers Using Hardware Performance Counters** International Conference on Smart Applications, Communications and Networking (SmartNets), 2024
Contribution: Designed large-scale experimental evaluations (72 runs across 20 classifiers) to analyze the effectiveness and limitations of hardware-level features for malware detection.

A. A. Zeraatkar, **P. S. Kamran** and H. Al-Asaad, **Advancements in Secure Computing: Exploring Automated Repair Debugging and Verification Techniques for Hardware Design**, IEEE 14th Annual Computing and Communication Workshop and Conference (CCWC), 2024
Contribution: Conducted a structured synthesis of automated repair and verification techniques, identifying methodological gaps and open research challenges in secure computing systems.

RESEARCH AND WORK EXPERIENCE

R&D Summer Intern, Endor Labs, Palo Alto, California *June 2025 - Sept 2025*

- Designed and evaluated **agentic AI systems** for **open-source software vulnerability** prioritization, investigating how build-system (**Bazel**) and **infrastructure-as-code** (Terraform) context influences false-positive rates in static analysis pipelines.

- Achieved up to a 91% reduction in **static analysis** false positives through hypothesis-driven integration of semantic, build, and dependency context, validated on real-world software repositories.

- Implemented Model Context Protocol (**MCP**) interfaces to enable controlled interaction between AI agents and external analysis tools, supporting reproducible experimentation and systematic evaluation.

Researcher, University of California, Davis *Sept 2021 - March 2025*

- Developed a **pipeline for Agentic AI system** including **RAG**, **embeddings**, and tools and function calling to implement proof-carrying code completion (PC^3) to analyze the efficacy of LLMs in generating program proofs to meet user-defined safety guarantees

- Built and compared supervised learning models using hardware performance counters, analyzing tradeoffs between classifier complexity, detection accuracy, and system-level overhead.

- Published a survey on techniques for automating the repair and verification of hardware designs

Software Engineer, Snapptrip (A local platform for accommodation and travel bookings)   *Nov 2017 - Dec 2020*

- Developed data-driven dashboards integrated with backend services, supporting analysis of operational metrics and system behavior.

- Implemented **efficient data handling mechanisms** (filtering, sorting, indexing) to support large-scale data operations, improving system responsiveness and assisting data analysts in **revenue trend detection.**

SELECTED PROJECTS

- Developed a comprehensive framework and a controlled benchmark to analyze **LLM faithfulness** under **perturbed Chain-of-Thought reasoning**, systematically injecting controlled logical and reasoning errors into 101 DeltaBench problems to study reasoning robustness and inductive vs. deductive reasoning across multiple frontier models.

  Formulated build reproducibility as a **predictive systems problem**, **training** and **evaluating supervised learning** models on $3,700+$ open-source artifacts from BugSwarm to analyze failure patterns and reproducibility constraints, achieving 93% accuracy and 94% recall.

- Improved **package confusion detection methods** of Microsoft OSSGadget for npm and PyPI ecosystem, increasing malicious attack detection accuracy by 38.6% through developing refined rules tailored to package typosquatting attacks.

- Optimized a multicore 2D screensaver by **parallelizing a quadtree-based collision detection algorithm** using **OpenCilk**, achieving **1.5 average speedup on 8-core AWS** machines through recursive task parallelism, and performance benchmarking across $1,000 - 5,000$ frames while maintaining correctness in collision results to outperform the $\Theta(N^2)$ pairwise checks

- Optimized in-place bit-matrix rotation in standard C by profiling with **perf** and applying word-level parallelism (**bit hacks**) to outperform the baseline follow-the-cycles algorithm, achieving the **#1 speedup performance among 54 students** in the course

SKILLS

Programming Languages:	Python, C++, Dafny, Rust, JavaScript
Machine Learning:	LangChain, LangGraph, Pandas, PyTorch, Scikit-Learn, OpenCV
Model Deployment & MLOps:	Docker, Kubernetes, gRPC
Software & Infrastructure Tools:	Bazel, Terraform, Helm
AI Agent Protocols & Architecture:	Anthropic MCP

TEACHING EXPERIENCE

MAT 21B Calculus   *Fall 2025*

- Led weekly discussions and individually designed presentations for discussions based on assignments and guide individualized problem-solving, grading exams and assignments

ECS 189C Software Correctness: sophomore-level course in Dafny, Z3 and Hypothesis, and Rust   *Spring 2024*

- In Coordination with the Course Professor, structured a course for 60+ students, including reviewing and designing assignments and exams

EEC 180 Digital Systems II: sophomore-level course in Verilog   *Winter 2023*

- Individually managed weekly lab sessions for 20+ students and aided students in setting up the code development and simulation tools, running test cases, diagnosing errors and resolving them

EEC 193A Senior Design Project: sophomore-level course in Internet of Things   *Fall 2022*

- Individually organized weekly 4-hour lab sessions and designed 2 lab assignments, structured lab sessions for 19 students

ACADEMIC SERVICES

- Session Chair at the International Conference on Automated Software Engineering (ASE) *Oct 2024*
- Reviewer for IEEE Access *July 2024*

VOLUNTEER EXPERIENCE

- Participated in **Endor Labs Hackathon 2025** *Sept 2025*
  - Collaborating on innovative AI solutions for enhancing **open-source software security** and vulnerability detection
- Student volunteer for ASE conference *Oct 2024*