

# Parnian Shabani Kamran

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## EDUCATION

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**PhD Computer Engineering**, *University of California, Davis* (GPA: 3.8/4) *Sept 2021 - present*

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

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

**BSc 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

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

## RESEARCH PUBLICATIONS

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**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

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**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 - Present*

- 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, Snaptrip (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

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- 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

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

### TEACHING EXPERIENCE

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#### MAT 19C Calculus for Data-Driven Applications *Winter 2026*

- Led weekly discussions and office hours to assist students with completing lab assignments using RStudio and realistic data and guide individualized problem-solving

#### MAT 21B Calculus *Fall 2025*

- Led weekly discussions and individually designed presentations for discussions based on assignments

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

- Structured and designed assignments and exams for 60+ students

#### 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

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

## VOLUNTEER EXPERIENCE

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- 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*