

Mohammad Jalili Torkamani

Computer Science Ph.D. Candidate | AI4SE Researcher | AI Software Engineer

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SUMMARY

AI software engineer and Computer Science Ph.D. candidate specializing in AI for Software Engineering (AI4SE), large language models, program analysis, and software reliability. Builds end-to-end AI systems in Python and Java spanning LLM fine-tuning and evaluation, static analysis, automated testing, backend APIs, containerized deployment, and multi-agent workflows. Research includes large-scale analysis of 500+ open-source Java repositories and LLM-assisted vulnerability understanding, assertion generation, and developer tooling.

SKILLS

Programming: Python, Java, C/C++, Bash, SQL

AI/ML & LLMs: PyTorch, Hugging Face Transformers, Fine-Tuning, LoRA/QLoRA, Prompt Engineering (Few-shot, CoT/ToT), RAG, LangChain, LlamaIndex, Model Evaluation, Inference Pipelines

Software Engineering: Git, Docker, CI/CD, System Design, OOP, Data Structures, Program Analysis, Static Code Analysis, Program Comprehension, Unit Testing, Fuzzing, TDD, Test Automation, Debugging, Profiling

Backend & Distributed Systems: FastAPI, REST APIs, Microservices, JWT, Pydantic, PostgreSQL, MySQL, MongoDB, Redis, Kafka, Celery, Asynchronous Programming, Nginx

Cloud & Platforms: AWS, Linux/Ubuntu, macOS, Windows, VPS Deployment

Software Security: Vulnerability Analysis, CWE/CVSS, API Security

EDUCATION

Ph.D., Computer Science

University of Nebraska–Lincoln (UNL)

Research focus: AI for Software Engineering, LLMs, program analysis, software security, and reliability.

Jan 2024 – Exp. Dec 2028

GPA: 3.9/4.0

M.S., Computer Science

University of Nebraska–Lincoln (UNL)

Jan 2024 – Dec 2025

GPA: 4.0/4.0

B.S., Computer Engineering

K. N. Toosi University of Technology (KNTU)

Sep 2016 – Sep 2020

EXPERIENCE

Research Assistant

University of Nebraska–Lincoln

Jun 2026 – Jul 2026

Lincoln, NE

- Engineered scalable Python/Java program-analysis and repository-mining infrastructure to extract and analyze production assertions across **500+ open-source Java repositories**.
- Developed LLM-based pipelines for production-assertion generation and program comprehension, integrating prompt engineering, fine-tuning, and automated evaluation.
- Built end-to-end validation workflows combining JavaParser static analysis, source-code transformation, compilation, unit-test execution, and statistical evaluation of generated assertions.

Research Assistant

University of Nebraska–Lincoln

Jan 2024 – Dec 2025

Lincoln, NE

- Developed Python- and Java-based frameworks for automated software vulnerability understanding, including CWE classification, CVSS severity assessment, and vulnerability-description generation using LLMs.
- Built scalable CVE/CWE/CVSS data-processing and evaluation pipelines supporting empirical studies across thousands of vulnerability records and multiple source-code granularities.
- Fine-tuned and benchmarked open-source and API-based LLMs under multiple prompting, input, and model configurations; automated statistical evaluation and reproducible model comparison.

Software Engineer

Arzyaban Salamat Pars Company

Apr 2022 – Jul 2022

- Led design and development of a production internal web application supporting organizational workflows, backend business logic, relational data models, and RESTful services.
- Collaborated across deployment, testing, and release activities to improve application reliability and operational readiness.

- Developed a personalized Android study-planning application for high-school students using Java and Android SDK, including recommendation logic and user-facing mobile features.
- Improved application usability and implemented software features supporting individualized study-planning workflows.

Co-founder & Technical Instructor

Oct 2016 – Oct 2019

SeedS/Lexen Software Startup

Led neural-network and Java/Android workshops for undergraduate students and mentored project-based software development, debugging, and mobile application design.

Software Engineering Intern

Jul 2019 – Sep 2019

Sarmad Insurance

Developed a Java/Android application for insurance-premium calculation and collaborated with company engineers to validate business rules and application behavior.

SELECTED PROJECTS

AUTONOMOUS SOFTWARE FACTORY – Multi-Agent Application Creation and Evolution

- Built a platform that turns natural-language product ideas into Docker-deployed applications using Python/FastAPI, Pydantic, SQLAlchemy, Alembic, PostgreSQL/SQLite, and a JavaScript/HTML/CSS dashboard.
- Engineered a hierarchical Codex-based workflow in which parallel specialist agents assess UX, product value, reliability, design, and security; a judge selects improvements; and a coding agent implements them in a constrained Docker workspace.
- Automated GitHub synchronization, DNS/Nginx routing, SSH orchestration, testing, security/licensing checks, isolated canary validation, rollback, scheduling, and evolution-history monitoring.

CAT GAN – WGAN-GP Cat Image Generation

catgan.MJalili.com

- Designed, trained, and evaluated a WGAN-GP in Python/PyTorch to generate 128×128 RGB cat-face images from a 200-dimensional latent space using custom convolutional Generator and Critic architectures.
- Implemented GPU-accelerated Wasserstein training with gradient penalty and built a responsive Streamlit/VPS deployment for interactive latent-space exploration with persistent state.

CASEY – LLM-Assisted Software Vulnerability Understanding

- Engineered an end-to-end Python framework for LLM-assisted CWE identification, CVSS severity assessment, and vulnerability-description generation from source-code changes.
- Fine-tuned and benchmarked API-based and open-source LLMs across prompting strategies, model configurations, and file/method/change-hunk source-code granularities with reproducible evaluation pipelines.

ASSERTIFY – LLM-Based Production Assertion Generation and Validation

- Built a multi-stage Java assertion-generation system integrating structured LLM outputs, JavaParser-based program analysis, source-code transformation, compilation, and automated test execution.
- Designed reproducible Python/Java experimentation infrastructure for evaluating assertion validity, placement, correctness, and runtime behavior across models and prompting strategies.

ASSERTION STUDY – Large-Scale Empirical Analysis of Production Assertions

- Built Python/Java repository-mining and program-analysis pipelines to extract, classify, and analyze production assertions across hundreds of open-source Java repositories and hundreds of thousands of assertion instances.
- Combined repository-scale quantitative analysis with a developer survey investigating assertion purposes, perceived usefulness, and adoption challenges in production code.

SELECTED RESEARCH & ENTREPRENEURSHIP

- **M.J. Torkamani**, A. Sharma, N. Mehrotra, R. Purandare, “Automatic Generation of Java Production Assertions Using Large Language Models,” *ACM TOSEM*, under review.
- **M.J. Torkamani**, M. Rashedul Hasan, H. Bagheri, B. Sharif, R. Purandare, “The Impact of Code Granularity on LLM-Based Vulnerability Understanding: CWE Identification, Severity Assessment, and Description Generation,” *ACM TOSEM*, under review.
- **NSF I-Corps Entrepreneurship Program (2026)**: Conducting customer discovery and market validation for AI4SE product opportunities and translation of research prototypes toward practical software tools.