Negar Fathi

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Profile

Ph.D. student in Computer Science at the University of Nebraska-Lincoln specializing in program analysis, formal verification, and automated reasoning. My research focuses on static and dynamic analysis, SAT/SMT-based reasoning, and compiler-driven techniques to improve software reliability and verification.

Interests

Formal verification, static and dynamic program analysis, SAT/SMT-based reasoning, and software testing.

Education

University of Nebraska-Lincoln (UNL), Lincoln, NE, USA *2023-Present*
Ph.D. in Computer Science
Research Focus: *Formal verification and program analysis methods for verifying safety and liveness properties, with an emphasis on termination and non-termination reasoning.*
Advisor: Dr. Rahul Purandare

Iran University of Science and Technology (IUST), Tehran, Tehran, Iran *2018-2021*
M.Sc. in Computer Engineering (Software)
Thesis: *Development of a Constraint Solver to Determine the Domain for Complex Data Types*
Supervisor: Dr. Saeed Parsa

Babol Noshirvani University of Technology (NIT), Babol, Mazandaran, Iran *2013-2017*
B.Sc. in Computer Engineering (Software)
Final Project: *Study and Investigation of Routing Protocols in Wireless Sensor Networks*
Supervisor: Dr. Mojtaba Mansouri

Skills

Program Analysis & Verification: LLVM/Clang, Roslyn, DG (Static Slicer), KLEE, Z3
Testing & Fuzzing: AFL (Fuzzer), NUnit, IntelliTest
Programming Languages: C, C++, C#, Python
Frontend Development: HTML, CSS, JavaScript
Backend Development: Entity Framework Core, ASP.NET Core (Web API, MVC)
Databases: Microsoft SQL Server, PostgreSQL
DevOps & Tools: Docker, Git

Publications and Manuscripts

- Manuscript on reasoning about program termination and non-termination, *under peer review*, 2025.
- A. Kalaee, S. Parsa, and N. Fathi, "COSMOS: A Comprehensive Framework for Automatically Generating Domain-Oriented Test Suite," *Information and Software Technology*, vol. 154, p. 107091, Feb. 2023, doi: 10.1016/j.infsof.2022.107091.

Experience

- Graduate Research Assistant to Dr. Rahul Purandare, University of Nebraska-Lincoln, *Fall 2023-Summer 2025*

- Teaching Assistant, CSCE 322 - Programming Language Concepts, University of Nebraska-Lincoln, *Fall 2025*

Selected Projects

- **Hospital Admission System** is modeled and optimized using BPMN, UML, DFD, and dashboard analysis to enhance workflow efficiency and performance evaluation.
- **Software Modularization** analyzes and visualizes software structure using class dependency extraction, clustering with Bunch, and automated package diagram generation in C#, Graphviz, and Rational Rose.
- **UML-Based Code Generation and Unit Testing** implements class diagrams, automated C# code generation, and verification through unit tests using Visual Paradigm, Visual Studio, and NUnit.
- **Clean Code Analyzer** analyzes C# source code using Roslyn to detect violations of clean code principles, including naming, structure, and complexity metrics, with detailed visualization in a Windows Forms interface.
- **COSMOS** implements a comprehensive framework for automatically generating domain-oriented test suites.
- **Client-Server Communication** implements synchronous and asynchronous client interaction with a C# web service to demonstrate performance and concurrency differences.
- **Warehouse Management System** is implemented using PostgreSQL as the backend database, featuring table inheritance, data queries, stored procedures, and C# integration through Npgsql in Visual Studio.
- **Taxi Density Clustering** performs spatial clustering of taxi trajectory data using DBSCAN in ELKI after randomized data sampling with C#, identifying regions of high taxi density based on geographic coordinates.

Certifications

- C# Programming - Beginner Certification, LAITEC (affiliated with Sharif University of Technology), *Jan. 2019*
- ASP.NET, LAITEC, *Oct. 2019*
- ASP.NET MVC - .NET Framework, LAITEC, *Nov. 2020*
- OPLSS - Types, Semantics, and Applications, Boston University, *Jun. 2024*
- OPLSS - Types, Logic, and Formal Methods, University of Oregon, *Jun. 2025*

Honors & Awards

- Ranked 1st among B.Sc. students in Computer Engineering, Babol Noshirvani University of Technology, *2017*
- Ranked 1st among M.Sc. students in Computer Engineering, Iran University of Science and Technology, *2021*
- Othmer Fellowship, University of Nebraska-Lincoln, *2023-2025*

Languages

English (Fluent), Persian (Native)

Last updated: October 26, 2025