Ali Shokri

Ph.D. in Computer Science – RIT, NY, USA
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About Me

I am a postdoc associate in the Systems Software Research Group, Bradley Department of Electrical and Computer Engineering at Virginia Tech, VA, USA, working with Prof. Binoy Ravindran on the intersection of security, program analysis, and formal methods. I received my Ph.D. in Computing and Information Sciences from Rochester Institute of Technology (RIT), NY, USA, in 2023, under the supervision of Dr. Mirakhorli with the focus on program synthesis and program analysis. In particular, my dissertation aimed at pushing the boundary of program synthesis and supporting a wide range of software developers with inter-procedural program synthesis.

My paper on program synthesis is the First-place Award Winner of the Research Competition at the 36th IEEE/ACM International Conference on Automated Software Engineering (ASE'21).

During my Ph.D., as a Research Intern, I had the privilege to collaborate with brilliant researchers at Google (Fall 2022) and PARC (Spring 2022).

Education

Ph.D. Computer Science (Jan 2018 – Jun 2023)
Rochester Institute of Technology (RIT), NY, USA

- Topic: Program Synthesis
- Advisor: Dr. Mehdi Mirakhorli

M.Sc. Information Technology Engineering (Feb 2011 – Jan 2014)
Tarbiat Modares University (TMU), Tehran, Iran

- Topic: Path Planning in Modular Robots
- Advisor: Dr. Ellips Masehian

B.Sc. Software Engineering (Sep 2001- Sep 2007)
University of Tehran (UT), Tehran, Iran

- Topic: Software Engineering
- Advisor: Dr. Khansari

Publication

Inventions and Patents

- "A method for deriving mathematical models from embedded code using a modified genetic algorithm to perform a symbol-to-variable mapping", Registration date: June 24, 2022, filed as a US Patent.

- "An SMT-based approach for extracting mathematical models from binaries", On its way to being filed as a US Patent.

Conference Papers (Accepted/Under review)

- Santos, J., Mirakhorli, M., & Shokri, A. (2023). Sound Call Graph Construction for Java Object Deserialization. arXiv preprint arXiv:2311.00943.

- Shokri, A., Perez, A., Chowdhury, S., Zeng, C., Kaloor, G., Matei, I., ... & Rane, S. (2023). CONSTRUCT: A Program Synthesis Approach for Reconstructing Control Algorithms from Embedded System Binaries in Cyber-Physical Systems. arXiv preprint arXiv:2308.00250.

- Okutan, A., Shokri, A., Koscinski, V., Fazelinia, M., & Mirakhorli, M. (2023). A Novel Approach to Identify Security Controls in Source Code. arXiv preprint arXiv:2307.05605.

- Shokri, A., "A Program Synthesis Approach for Adding Architectural Tactics to An Existing Code Base", In 2021 36th IEEE/ACM International Conference on Automated Software Engineering (ASE) (pp. 1388-1390). IEEE.

- Shokri, A. and Mirakhorli, M., 2021. DepRes: A Tool for Resolving Fully Qualified Names and Their Dependencies. arXiv preprint arXiv:2108.01165.

- Shokri, A. and Mirakhorli, M., "ArCode: A Tool for Supporting Architectural Concerns Comprehension and Implementation", In 2021 29th IEEE/ACM International Conference on Program Comprehension (ICPC) (pp. 485-489). IEEE.

- Shokri, A., Santos, J.C. and Mirakhorli, M., 2021, March. ArCode: Facilitating the Use of Application Frameworks to Implement Tactics and Patterns. In 2021 IEEE 18th International Conference on Software Architecture (ICSA) (pp. 138-149). IEEE.

- Santos, J.C., Shokri, A. and Mirakhorli, M., 2020, October. Towards Automated Evidence Generation for Rapid and Continuous Software Certification. In 2020 IEEE International Symposium on Software Reliability Engineering Workshops (ISSREW) (pp. 287-294). IEEE.

- Shokri, A. and Masehian, E., 2015, October. A meta-module approach for cluster flow locomotion of modular robots. In 2015 3rd RSI International Conference on Robotics and Mechatronics (ICROM) (pp. 425-431). IEEE.

- Shokri, A. Hashemi, S., Akbaripour, H., Amin-naseri, M., 2013, Overcrowding Detection and Management in Emergency Department using Expert System. In 11th Iranian Conference on Intelligent Systems (ICIS2013).

- Kazemi Tabar, J., Shokri, A., Jenadeleg, M., Optimized Job Shop scheduling as Constraint Satisfaction Problem using Genetic Algorithms. In 2007 12th Conference of Computer Society of Iran (CSICC 2007).

Journal Papers

- Hashemi, S., Shokri, A., Amin Naseri, M. and Akbaripour, H., 2014. Designing an expert system for management of crowding and overcrowding in emergency departments. Advances in Industrial Engineering, 48(2), pp.281-292.

Under Review

- Shokri, A., Perez, A., Chowdhury, S., Zeng, C., Kaloor, G., Matei, I., Schneider, P.P., Gunasekaran, A., Rane, S. A Program Synthesis Approach for Reconstructing Control Algorithms from Embedded System Binaries in Cyber-Physical Systems.

Contributions to SE Community

Reviewer

- Reviewer for the IEEE Transactions on Software Engineering (TSE)
- Reviewer for the IEEE Software Journal (IEEE Softw.)
- Reviewer for the Journal of Systems and Software (JSS)
- Reviewer for the e-Informatica Software Engineering Journal (EISEJ)
- Sub-reviewer for ACM Transactions on Software Engineering and Methodology (ToSEM)
- Sub-reviewer at 42nd International Conference on Software Engineering (ICSE'20)

PC Member

- 31st IEEE International Conference on Software Analysis, Evolution, and Reengineering (SANER'24) - Research Track
- 20th International Conference on Mining Software Repositories (MSR'23) – Junior PC
- 45th International Conference on Software Engineering (ICSE'23) – Student Research Competition
- 31st ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA'22) – Tool Demo
- 22nd IEEE International Working Conference on Source Code Analysis and Manipulation (SCAM'22) – Research track
- 30th International Conference on Program Comprehension (ICPC'22) – Research track
- 43rd ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI'22) – Research Artifact
- 38th IEEE/ACM International Conference on Software Maintenance and Evolution (ICSME'22) – Tool Demo
- 37th IEEE/ACM International Conference on Automated Software Engineering (ASE'22) – Student Research Competition
- 37th International Conference on Software Maintenance and Evolution (ICSME'21) – Tool Demo
- 35th European Conference on Object-Oriented Programming (ECOOP'21) – Research Artifact

Lecturer

- RIT SWEN-610 - Graduate Level Course (Guest Lecturer): Foundation of Software Engineering (An Introduction to Program Synthesis)
- Design Patterns (Melat Insurance Co.)
- Java Programming (Raydana Co.)

Work Experience

Postdoctoral Associate – Virginia Tech (August 2023 –Present)
- Location: Blacksburg, VA, USA
- Projects Involved in: Binary Program Analysis, Formal Methods, Software Security
- Responsibilities: Research, Writing Paper, Presentation, Software Development, Grant Proposal

Graduate Research Assistant – RIT (Jan 2018 – Jun 2023)
- Location: Rochester, NY, USA
- Projects Involved in: Software Synthesis, Program Analysis, Program Comprehension, Software Certification, Security Tactics
- Responsibilities: Research, Writing Paper, Presentation, Software Development, Grant Proposal

Research Intern – Google (August 2022 – December 2022)
- Location: Mountain View, CA, USA
- Projects Involved in: Program Synthesis | AIDA (AI-based Developer Assistant)
- Responsibilities: Research, Design, Writing Paper, Presentation, Software Development

Research Intern – Palo Alto Research Center (PARC) (Feb 2022 – May 2022)
- Location: Palo Alto, CA, USA
- Projects Involved in: ReMath (Software Synthesis)
- Responsibilities: Research, Writing Paper, Presentation, Software Development

Senior Software Engineer - Samen Ertebat Asr (SEA) (Oct 2016 – Jan 2018)
- Location: Tehran, Iran
- Projects Involved in: Banking System
- Responsibilities: Software Architecture, Software Design, Software Development

Senior Software Engineer - Rose System (IIN Groups) (Aug 2016 – Oct 2016)
- Location: Tehran, Iran
- Projects Involved in: Scientific Content Provider
- Responsibilities: Software Architecture, Software Design, Leading a Team

Senior Software Engineer - Melat Insurance (Dec 2011 – Aug 2016)
- Location: Tehran, Iran
- Projects Involved in: Insurance System, Banking System, Global Distribution System (GDS)
- Responsibilities: Leading a Team, Project Management, Software Architecture, Software Design, Software Development

Co-Founder & Lead Developer - Rayan Narm Fan (Nov 2006 – Nov 2010)
- Location: Tehran, Iran
- Projects Involved in: Qeshm Entrance-Exit Control System
- Responsibilities: CEO, Leading a Team, Software Design, Software Development

Software Engineer - Paliz CT (Dec 2006 – Jun 2007)
- Location: Tehran, Iran

- Projects Involved in: Tehran Municipality System
- Responsibilities: Requirement Analysis, Software Design, Software Development

Software Engineer - Raydana (Sep 2005 – Feb 2012)
- Location: Tehran, Iran
- Projects Involved in: Enterprise Resource Planning (ERP) System
- Responsibilities: Leading a Team, Project Management, Software Design, Software Development

Skills

Academic: Intersection of Program synthesis, security, and software architecture
- Research: Published in high-ranked conferences e.g., ASE, ICSA, and ICPC as the lead author, and won the first-place award at ASE'21.
- PC/Reviewer: Reviewed over 50 papers as a PC of top-ranked conferences (e.g., ICSE, ASE, ICPC, ISSTA, MSR, PLDI, SCAM) and a reviewer for top-ranked journals (e.g., TSE, and ToSEM).
- Lecture/Teaching: Guest lecturer at RIT on Program Synthesis in addition to lectures on design patterns and programming at companies.

Engineering: Designed and developed entire software as well as modules of large-scale software (over hundreds of thousands of LoC).
- Languages/Frameworks: Java, Python, Go, MATLAB, C++, PHP, C#, Modelica
- IDEs: IntelliJ IDEA, Eclipse, Visual Studio
- Databases: MySQL, SQL Server, Oracle
- Servers: WebLogic, Tomcat, JBoss, Glassfish
- Software Design: Design Patterns (GOF), Architectural Tactics/Patterns

Leadership: Led small-size teams (from 3 to 10) of different specialties and managed 2 projects (overall 40-50 people).
- Team Leader: Up to 10 members of Software designers and developers, system analysts, and graphic designers.
- Project/Module Manager: Plan and monitor project progress, communicate with internal and external parties, and deliver the product.

Proud of

Research Competition (2021)

ASE'21, an A* conference in Software Engineering
- First-place Award Winner

Research Scholarship (2018)

Data61, a world leader in Data Science research
- Prestigious Research Scholarship

Admission and Fellowship

University of Melbourne, ranked 30th worldwide (2018)
- Ph.D. Admission and Fellowship

Iran Nation-wide University Exam (2001)
- Among the top 0.1% of participants (B.Sc.)