Ali Reza Ibrahimzada

alirezai@illinois.edu alibrahimzada https://alirezai.cs.illinois.edu/

Research Interest

My research covers software engineering, machine learning, artificial intelligence, LLM agents, LLMs for code, and formal reasoning with the goal of modernizing and enhancing the reliability of large-scale software systems. To this end, I leverage program analysis and LLMs to automatically translate and validate repository-level code across different programming languages. So far, my work has focused on evaluating LLMs in code translation and investigating translation bugs [C4], source code decomposition for code translation [C3], and building end-to-end neuro-symbolic repository-level code translation [C2] and validation [P1] tools.

Beside code translation, I have also enjoyed working on other problems in software engineering [C1, C5] and machine learning for bioinformatics [J1, J2].

Education

08/22 – 12/26 **Ph.D. Computer Science, University of Illinois Urbana-Champaign, IL, USA**
GPA: 4.00 / 4.00
Advisor: Reyhaneh Jabbarvand
Thesis: *Neuro-Symbolic Code Translation and Validation*

08/22 – 12/24 **M.Sc. Computer Science, University of Illinois Urbana-Champaign, IL, USA**
GPA: 4.00 / 4.00
Advisor: Reyhaneh Jabbarvand
Thesis: *Bridging the Gap between Testing and Debugging through Explainable Deep Oracles*

09/18 – 07/22 **B.Sc. Computer Engineering, Marmara University, Istanbul, Turkey**
GPA: 3.98 / 4.00
Advisor: Mehmet Kadir Baran
Thesis: *Depth Estimation of Stereo Images using Deep Learning*

Professional Experience

08/22 – Present **Research Assistant,** University of Illinois Urbana-Champaign, IL, USA
Advised by: Reyhaneh Jabbarvand
Topic: Code LLMs for Source Code Generation, Understanding and Translation

05/25 – 08/25 **Applied Scientist Intern,** Amazon Web Services, VA, USA
Hosted by: Brandon Paulsen and Joey Dodds
Topic: LLM Agents for Autonomous Translation Validation and Repair

05/24 – 08/24 **Research Intern,** IBM Research, NY, USA
Hosted by: Saurabh Sinha and Raju Pavuluri
Topic: End-to-End Repository-level Code Translation and Validation

05/23 – 08/23 **Research Intern,** IBM Research, NY, USA
Hosted by: Saurabh Sinha and Raju Pavuluri
Topic: Evaluating LLMs in Code Translation and Bug Analysis

05/21 – 08/22 **Research Intern,** University of Illinois Urbana-Champaign, IL, USA
Hosted by: Reyhaneh Jabbarvand
Topic: Neural and Interpretable Test Oracles using Deep Learning

06/19 – 02/22 **Research Intern,** Istanbul Technical University, Istanbul, Turkey
Hosted by: Ali Cakmak
Topic: Machine Learning for Bioinformatics

Research Publications

Preprints

[P1] **A. R. Ibrahimzada**, B. Paulsen, R. Jabbarvand, J. Dodds, and D. Kroening, "Matchfixagent: Language-agnostic autonomous repository-level code translation validation and repair," 2025. URL: https://arxiv.org/abs/2509.16187.

Conference Proceedings

[C1] **A. R. Ibrahimzada**, Y. Chen, R. Rong, and R. Jabbarvand, "Challenging bug prediction and repair models with synthetic bugs," in *2025 IEEE International Conference on Source Code Analysis & Manipulation (SCAM)*, 2025, pp. 133–144. DOI: 10.1109/SCAM67354.2025.00021.

[C2] **A. R. Ibrahimzada**, K. Ke, M. Pawagi, M. S. Abid, R. Pan, S. Sinha, and R. Jabbarvand, "Alphatrans: A neuro-symbolic compositional approach for repository-level code translation and validation," FSE, vol. 2, New York, NY, USA: Association for Computing Machinery, Jun. 2025. DOI: 10.1145/3729379.

[C3] **A. R. Ibrahimzada**, "Program decomposition and translation with static analysis," in *Proceedings of the 2024 IEEE/ACM 46th International Conference on Software Engineering: Companion Proceedings*, ser. ICSE-Companion '24, Lisbon, Portugal: Association for Computing Machinery, 2024, pp. 453–455, ISBN: 9798400705021. DOI: 10.1145/3639478.3641226.

[C4] R. Pan*, **A. R. Ibrahimzada***, R. Krishna, D. Sankar, L. P. Wassi, M. Merler, B. Sobolev, R. Pavuluri, S. Sinha, and R. Jabbarvand, "Lost in translation: A study of bugs introduced by large language models while translating code," in *Proceedings of the IEEE/ACM 46th International Conference on Software Engineering*, ser. ICSE '24, Lisbon, Portugal: Association for Computing Machinery, 2024, ISBN: 9798400702174. DOI: 10.1145/3597503.3639226.

[C5] **A. R. Ibrahimzada**, Y. Varli, D. Tekinoglu, and R. Jabbarvand, "Perfect is the enemy of test oracle," in *Proceedings of the 30th ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering*, ser. ESEC/FSE 2022, Singapore, Singapore: Association for Computing Machinery, 2022, pp. 70–81, ISBN: 9781450394130. DOI: 10.1145/3540250.3549086.

Journal Articles

[J1] A. Cakmak, H. Ayaz, S. Arıkan, **A. R. Ibrahimzada**, Ş. Demirkol, D. Sönmez, M. T. Hakan, S. T. Sürmen, C. Horozoğlu, M. B. Doğan, Ö. Küçükhüseyin, C. Cacına, B. Kıran, Ü. Zeybek, M. Baysan, and İ. Yaylım, "Predicting the predisposition to colorectal cancer based on snp profiles of immune phenotypes using supervised learning models," *Medical & Biological Engineering & Computing*, vol. 61, no. 1, pp. 243–258, Jan. 2023, ISSN: 1741-0444. DOI: 10.1007/s11517-022-02707-9.

[J2] G. N. Sohsah, **A. R. Ibrahimzada**, H. Ayaz, and A. Cakmak, "Scalable classification of organisms into a taxonomy using hierarchical supervised learners," *Journal of Bioinformatics and Computational Biology*, vol. 18, no. 05, p. 2 050 026, 2020, PMID: 33125294. DOI: 10.1142/S0219720020500262. eprint: https://doi.org/10.1142/S0219720020500262.

Thesis

[T1] **A. R. Ibrahimzada**, *Bridging the gap between testing and debugging through explainable deep oracles*, 2024.

Awards

- 2024 **Nomination for the Two Sigma PhD Fellowship**, University of Illinois Urbana-Champaign
- **3rd in Student Research Competition @ ICSE'24**, ACM
- **Travel Grant to attend ICSE'24 in Lisbon, Portugal**, NSF
- 2022 **Travel Grant to attend ESEC/FSE'22 in Singapore, Singapore**, ACM
- **Valedictorian of Class of 2022**, Marmara University
- **Ray Ozzie Computer Science Fellowship**, University of Illinois Urbana-Champaign
- **Best Senior Graduation Project of the Year**, Marmara University
- 2019 **Academic Achievement Scholarship**, Marmara University
- 2017 **Valedictorian of High School**, KEN
- 2015 **Travel Grant to attend QUEST'15 in Lucknow, India**, KEN

Talks

- SCAM'25 Challenging Bug Prediction and Repair Models with Synthetic Bugs, Auckland, New Zealand
- FSE'25 AlphaTrans: A Neuro-Symbolic Compositional Approach for Repository-Level Code Translation and Validation, Trondheim, Norway
- ICSE'24 Lost in Translation: A Study of Bugs Introduced by Large Language Models while Translating Code, Lisbon, Portugal
- FSE'22 Perfect Is the Enemy of Test Oracle, Singapore, Singapore

Skill Stack

- Programming Languages: Python, Java, JavaScript, Rust, C, OCaml
- Common: Docker, Vim, Git, SQL
- Machine Learning: PyTorch, TensorFlow, vLLM, Codex, Claude Code

Service

- Program Committee: ICLR'26, ICLR'25, MSR'25, MSR'24
- Artifact Evaluation: ICSE'25
- Organizing: ReCode@ICSE'26

Teaching Experience

- Fall 2025 CS 421 - Programming Languages and Compilers
- Spring 2025 CS 447 - Natural Language Processing

References

Reyhaneh Jabbarvand
Assistant Professor
University of Illinois Urbana-Champaign
201 N Goodwin Ave, 61801, Urbana, IL
reyhaneh@illinois.edu

Darko Marinov
Professor
University of Illinois Urbana-Champaign
201 N Goodwin Ave, 61801, Urbana, IL
marinov@illinois.edu

Saurabh Sinha
Research Scientist
IBM Research
1101 Kitchawan Rd, 10598, Yorktown Heights, NY
sinhas@us.ibm.com

Brandon Paulsen
Applied Scientist
Amazon Web Services
1400 S Eads St, 22202, Arlington, VA
bpaulse@amazon.com