Yoel Kim

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Research

Vision. My long-term research vision is to make formal verification *practical*, realizing error-free software.

Goal. To this end, I address the *scalability* challenge in formal verification by designing abstraction techniques that *automatically* construct software models that are *efficiently verifiable*.

Interests. Currently, I am interested in *data-assisted abstractions*, which leverage dynamic information such as input/output examples, execution traces, and system logs to guide and optimize the abstraction process.

Education

Ph.D. in Computer Science and Engineering, Kyungpook National University *Mar 2023 – present.*

- Advisor: Yunja Choi

M.S. in Computer Science and Engineering, Kyungpook National University *Mar 2021 – Feb 2023*

- Advisor: Yunja Choi
- Thesis: An automated stub generation approach using program synthesis for software verification

B.S. in Computer Science and Engineering, Kyungpook National University *Mar 2017 – Feb 2021*

- GPA: 3.95/4.3

Publications

1. **Yoel Kim** and Yunja Choi. **PBE-Based Selective Abstraction and Refinement for Efficient Property Falsification of Embedded Software**. *FSE 2024: ACM International Conference on the Foundations of Software Engineering*. Jul 2024. Top Conference in SE Community
2. **Yoel Kim** and Yunja Choi. **An Approach of Incremental Constraint Extraction Based on I/O Examples for Automatic Stub Generation**. *KCSE 2023: Korea Conference on Software Engineering*. Feb 2023. Best Short Paper Award
3. **Yoel Kim** and Yunja Choi. **A Case Study to Improve the Efficiency of Model Checking in Embedded Software Using Program Synthesis**. *KSC 2021: Korea Software Congress*. Dec 2021.
4. **Yoel Kim** and Yunja Choi. **A Case Study on the Performance of Program Synthesis in Embedded Software Domain**. *KCSE 2021: Korea Conference on Software Engineering*. Feb 2021.

Talks

1. PBE-Based Selective Abstraction and Refinement for Efficient Property Falsification of Embedded Software. Invited talk at KCC 2025. *Jeju, Korea. Jul 4, 2025.*
2. PBE-Based Selective Abstraction and Refinement for Efficient Property Falsification of Embedded Software. Invited talk at KCSE 2025. *Pyeongchang, Korea. Jan 22, 2025.*
3. PBE-Based Selective Abstraction and Refinement for Efficient Property Falsification of Embedded Software. Research paper presentation at FSE 2024. *Porto de Galinhas, Ipojuca, Pernambuco, Brazil. Jul 17, 2024.*

Experiences

Teaching Assistant (at Kyungpook National University):

- ITEC0414: Software Testing Theory (Spring 2022, 2023, 2024).
- COMP0224: Software Design (Fall 2021, 2022).
- COMP0216: Data Structure Applications (Spring 2021).

Programming Languages and Tools:

- Java: Developed tools PBEAR and ALearner.

- C: Used as the target language for formal verification experiments.
- C++: Utilized LLVM and Clang libraries for analyzing and transforming C programs.
- Python: Modified tools such as EuSolver (PBE solver) and Trace2Model (model learner).