Tianhan Lu

Boulder, Colorado, United States 80302

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Academic Publications

1. Tianhan Lu, Bor-Yuh Evan Chang, and Ashutosh Trivedi. Selectively-amortized resource bounding (Radhia Cousot Award). In *International Static Analysis Symposium*, pages 286–307. Springer, 2021
2. Tianhan Lu, Bor-Yuh Evan Chang, and Mark Marron. Bonsai: Verified bounding of offloaded computation (technical report). 2021
3. Tianhan Lu, Yu-Ju Lee, and Wen-Wei Liao. Towards denial-of-service memory vulnerabilities. *Journal of Software*, 2019
4. Tianhan Lu, Pavol Černỳ, Bor-Yuh Evan Chang, and Ashutosh Trivedi. Type-directed bounding of collections in reactive programs. In *International Conference on Verification, Model Checking, and Abstract Interpretation*, pages 275–296. Springer, 2019

Work Experience

Facebook

Menlo Park, CA, United States

Software Engineer (Internship) — *May. 2020 - Aug. 2020*

- Designed and implemented a parser in C++ for a Domain Specific Language (DSL), such that security engineers at Facebook can easily use the DSL to configure a program analysis tool, MT, that automatically detects security and privacy issues in all (20+) Facebook Android applications.
- Designed and implemented a tool to rewrite Java 11 bytecode into Java 8 bytecode, such that MT can analyze arbitrary Java programs (in addition to Android applications), thus increasing the impact of MT by enabling it to detect security and privacy issues for *any* Java code written by *any* Facebook developers.
- Designed and implemented a feature for MT to detect array allocations whose sizes are controlled by (potentially malicious) users, thus enabling MT to detect potential Denial-of-Service vulnerabilities that may severely degrade system performance.

Microsoft Research

Redmond, WA, United States

Research Intern — *Aug. 2019 - Nov. 2019*

- Designed and implemented an automated tool in TypeScript to guarantee the boundedness of time and memory usage of Bosque programs, predicting software worst-case performance and ensuring the responsiveness and safety when offloading Bosque programs to IoT devices.
- Evaluated my tool with good results on eBPF programs, which can be executed under Linux kernel mode and thus whose responsiveness and memory boundedness are crucial. These results validated the practicality in the design of the (experimental) Bosque programming language.
- Wrote a technical report that formalizes my design of the tool as a Symbolic Execution engine and reports the experimental results, receiving positive feedback from anonymously peer-reviewed top conferences in Computer Science.

CSCI 3155 Principles of Programming Languages

Boulder, CO, United States

Teaching Assistant — *Aug. 2020 - May. 2021*

- Taught recitation classes 1-2 hours per week, 10+ times per semester, to help students learn and review course materials.
- Helped the instructor to review or design course materials once per week, 10+ times per semester.
- Held office hours 2 hours per week, to help students with assignments and course materials.

Space/Time Analysis for Cybersecurity (from Defense Advanced Research Projects Agency)

Boulder, CO, United States

Research Assistant — *Aug. 2015 - May. 2020*

- Discovered and constructed malicious inputs to exploit memory Denial-of-Service vulnerabilities in 12+ Java web applications.
- Designed and implemented an automated tool in Scala to ensure the non-existence of memory Denial-of-Service vulnerabilities in Java applications.

Professional Services

2019 **Reviewer**, IEEE Transactions on Mobile Computing

2019 **Artifact Evaluation Committee**, 31st International Conference on Computer-Aided Verification

2016 **Sub-reviewer**, 22nd International Conference on Tools and Algorithms for the Construction and Analysis of Systems

2016 **Sub-reviewer**, 14th Asian Symposium on Programming Languages and Systems

Education

University of Colorado Boulder

Boulder, CO, United States

Ph.D. in Computer Science (GPA: 3.92/4.00) — *Aug. 2015 – Present*

University of Colorado Boulder

Boulder, CO, United States

M.Sc. in Computer Science (GPA: 3.92/4.00) — *Aug. 2015 – Dec. 2017*

Nanjing University

Nanjing, China

B.Sc. in Computer Science and Engineering (GPA: 4.22/5.00) — *Sep. 2011 – Jun. 2015*

Presentation

28th Static Analysis Symposium *Chicago, IL, United States*

Presenter for "Selectively-Amortized Resource Bounding" *Oct. 2021*

20th International Conference on Verification, Model Checking, and Abstract Interpretation *Cascais, Portugal*

Presenter for "Type-directed bounding of collections in reactive programs" *Jan. 2019*

Honors & Awards

2021	**Radhia Cousot Award**, SAS 2021 - 28th Static Analysis Symposium	*Chicago, IL, United States*
2021	**Selected Winner**, Fall 2021 Departmental Publication Recognition Award	*Boulder, CO, United States*
2013	**Honorable Mention**, National Mathematical Contest in Modeling	*China*
2012	**Second Prize**, People's Scholarship (Nanjing University)	*China*
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