Yahui Sun

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Research Interests

Programming languages and applied formal methods, with a focus on runtime verification, program analysis, and systems security.

Education

2018-2021 **M.S. Computer Science**, *Texas A&M University (TAMU)*, *GPA - 4.0/4.0*.

Thesis *Efficient Predictive Analysis for Concurrency Bugs* (Advisor: Professor Jeff Huang)

2014-2018 **B.S. Computer Science**, *Wuhan University*, China, *GPA - 3.73/4.0*.

Experience

2020 **Research Intern**, *Microsoft, Seattle, WA*.
Advisor: Dr. David Tarditi
Project: Checked C – making C safe by extension

- Improved static analysis and diagnostic messages of the Checked C compiler.
- Evaluated Checked C on MUSL, a widely-used C runtime.

2018-present **Graduate Research Assistant**, *Parasol Lab*, Texas A&M University.
Advisor: Prof. Jeff Huang
Focuses: runtime verification, program analysis, model checking for concurrent programs.

- **On-the-fly predictive detection of concurrent use-after-free bugs in C/C++.** Proposed the first online predictive analysis to detect concurrent use-after-free bugs in C/C++ programs. Evaluated against ThreadSanitizer on Chromium benchmarks. **First-authored** paper [ASPLOS21] currently in submission.
- **Model checking with commutativity-aware partial order reduction.** Developed an efficient partial-order reduction algorithm that exploits commutativity specification of code regions, achieving exponential speedup on some SV-COMP benchmarks. Completed a first-authored technical report [Manuscript].
- **Predictive order violation detection in Go.** Designed and implemented a dynamic tool to find high-level race conditions in Go programs, which detected 5 new bugs in open-source projects including Kubernetes.
- **Static analysis for concurrency bugs in Go.** Led a team of undergraduate and master's students to develop a static analysis tool for Go concurrency bugs.

2018 **Software Engineer Intern**, *RussellCloud, Shanghai, China*.

2018 **Software Engineer Intern**, *Eyepetizer, Beijing, China*.

2017 **Software Engineer Intern**, *Baidu, Beijing, China*.

Publications/Manuscripts

[ASPLOS21] *Efficient On-the-fly Predictive Analysis for Go and C/C++ Order Violations.* Yahui Sun, Andreas Tsouloupas, Jeff Huang. In submission to *International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)* 2021.

[Manuscript] *Exploiting Semantic Commutativity in Stateless Model Checking.* Yahui Sun, Jeff Huang. In preparation.

[Survey] Surveyed and created a Wikipedia page on *Runtime Predictive Analysis* with Prof. Grigore Rosu and Prof. Jeff Huang.

Awards

PLMW 2020 Selected for *Programming Languages Mentoring Workshop (PLMW)* at OOPSLA'20

PLMW 2020 Travel grants for *Programming Languages Mentoring Workshop (PLMW)* at POPL'20

2016-2017 Outstanding student fellowship at Wuhan University (top 6/60, two consequtive years)

Research Mentoring

Mentored 3 undergraduate students from TAMU and University of Cyprus.

- Andreas Tsouloupas (summer REU, co-authored [ASPLOS21] in submission)
- Andrew Chin (BS honours, TAMU)
- Matthew Davis (BS honours, TAMU)

Teaching Experience

2019 Head TA, CSCE 221: Data structures and algorithms, TAMU

2017 TA, Compiler Design, Wuhan University

Service to Professional Community

AEC Artifact Evaluation Committee, *SIGPLAN on Programming Language Design and Implementation (PLDI)* 2019.

Co-reviewer Confrence and journal co-reviewer

- PLDI 2019
- ICSE 2018,2019,2020
- PPoPP 2019
- OOPSLA 2019,2020
- FSE 2019,2020
- TOSEM

Open-source Software Contributions

Profile My github profile: https://github.com/dopelsunce

New bugs found My research helped find 10+ concurrency bugs in industry-sized well-tested applications including Kubernetes, Docker, CockroachDB, and Etcd.

Checked C I contributed to the Checked C project at Microsoft: checkedc-clang, checkedc, checkedc-musl, checkedc, checkedc-libc-test.

NCMC Implementation of communicativity-aware partial order reduction for Java programs, based on JMCR.

Skills

Lannguages	C/C++, Go, Python, Javascript, Java, Bash, Rust, AWK, Ruby, PHP, Lisp
Tools	Git, Z3, Docker, libFuzzer, CBMC
Compilers	LLVM, Clang, Compiler-rt
Web Dev	D3, VueJS, AngularJS, Webpy, Postgres, Redis, HTML, CSS