Aosen Xiong

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Education

University of Waterloo June 2027(Expected)
Ph.D. in Electrical and Computer Engineering *Current GPA: 4.0/4.0*
Chongqing University June 2021
B.Eng in Nuclear Engineering

Relevant Coursework

Courses: Software and Systems Security, Language design and implementation, Foundation of Multi-agent system, Software Reliability Engineering, Foundations of Software Engineering, Algorithm Design and Analysis, Methods and Tools for Software Engineering

Projects

EISOP Checkerframework | EISOP Github Jan 2023 – Present
- Actively maintain of the Checker Framework, rectified unsoundness issues, and enhanced documentation.
- Formulated comprehensive tests leveraging a variety of Java constructs, increase confidence of the type checker.
- Introduced a new Java polymorphic type qualifier, augmenting the expressiveness of the initialization type system.
- Conceived and executed static analysis algorithms, integrating them with the prevailing type system.

Checkerframework VS code Extension | VS code Extension Apr 2023 – Present
- Actively maintained the CheckerFramework language server, ensuring consistent performance.
- Implemented new features for the language server, enhancing its functionality and user experience.
- Designed a specialized VS Code extension to enable real-time detection of potential Java NullPointerExceptions during the compile phase and other bugs by configuration.

E-commerce website – Full-Stack Web Application | E-commerce Sep.2022 - Dec.2022
- Built the frontend of a single-page e-commerce application with search methods using Angular and Bootstrap.
- Implemented RESTful APIs with SpringBoot and MySQL database to handle HTTP requests and responses and created CRUD operations to fetch data with queries.
- Used JSON Web Token(JWT) and OAuth2 to create user authentication,improve security and verify results.
- Secured Angular frontend and SpringBoot backend communication using HTTPS by a self-signed certificate.
- Utilized Stripe to realize payment with real bank accounts and automatically send receipt emails to users.

Boolean Satisfiability Solver | *C++* Sep.2022 - Dec.2022
- Developed a tokenizer and parser for pre-processing Boolean input string and assignment to tokens, forming abstract syntax tree and checking for possible errors.
- Built an SAT evaluator to check whether the Boolean input string and assignment are true or false.
- Implement the Tseitin transformation algorithm to covert arbitrary input formula into conjunctive normal form.
- Developed a SAT solver using Davis–Putnam–Logemann–Loveland(DPLL) algorithm and Unit resolution.

Software Reliability projects | *Python, Java, Rust* Jan 2023 – Aug 2023
- Developed an abstract syntax tree based analysis for Python code identifiers' length and nesting control structure.
- Implement a control flow graph analysis for parity analysis of variables by devising lattice and abstract operations.
- Used Prusti to verify Rust sorting algorithm (bubble sort et al.) by specifying invariants, pre- and post-condition.
- Developed program with bug and successfully escape American fuzzing loop, KLEE and SymCC checks.
- Built a passkey-based system server system using Springboot and test against man-in-the-middle attack.
- Constructed attack leveraging race-condition vulnerabilities, buffer overflows, and format-string exploits

Skills

Languages: Java, Python, C/C++, JavaScript/TypeScript, HTML/CSS, LaTeX, OCaml, Dafny
Tools: Git, Bash, VS Code, IntelliJ IDEA, Gradle, Maven, Github Actions
Frameworks : React, Angular, JUnit, SpringBoot, WordPress, Material-UI, Node.js
Database : MongoDB, MySQL, Mongoose, S3, DynamoDB, RDS
Software Reliability : Checkerframework, Errorprone, Clang-tidy, American Fuzzing loop, KLEE, Spotless