Siwei Cui

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Education

Texas A&M University **Sep 2019 – Present**
Department of Computer Science & Engineering *College Station, TX, USA*
Ph.D. in Computer Science, GPA: 4.0/4.0. Advisor: Prof. Jeff Huang
Research Interests: Program Static Analysis, Software Engineering, Blockchain Security, and LLM for SE.

Shandong University **Sep 2015 – Jun 2019**
School of Computer Science & Technology *Jinan & Qingdao, Shandong, China*
B.Eng. GPA 91.54/100, Top 1 in Elite Class, Advisor: Prof. Xuemeng Song and Prof. Liqiang Nie

Professional Experiences

Applied Scientist Intern, AWS CodeWhisperer **May 2023 – Aug 2023**
Collaborated on fine-tuning large language models (LLM) for software bug detection. *New York, NY*
Manager: Xiaofei Ma Mentor: Murali Krishna Ramanathan
Collaborators: Rob Kwiatkowski, Shiqi Wang, Zijian Wang, and Baishakhi Ray

Applied Scientist Intern, AWS CodeGuru **May 2022 – Aug 2022**
Developed parallelized static compositional taint analysis framework at scale. *Santa Clara, CA*
Manager: Aritra Sengupta Mentor: Michael Emmi, and collaborated with Subarno Banerjee.

Research Assistant, Texas A&M University **Sep 2019 – Present**
Program committee: ISSTA'23 AE *College Station, TX*
Sub-reviewer: ICSE'2022, PLDI'2022, ISSTA'2022, ICSE'2021, FSE'2020, OOPSLA'2020

Publications and Patents

SmallRace: Static Race Detection for Dynamic Languages - A Case on Smalltalk
Siwei Cui, Yifei Gao, Rainer Unterguggenberger, Wilfried Pichler, Sean Livingstone, and Jeff Huang.
45th International Conference on Software Engineering (ICSE 2023).

Compositional Taint Analysis for Enforcing Security and Privacy Policies at Scale
Subarno Banerjee, **Siwei Cui**, Michael Emmi, Antonio Filieri, Liana Hadarean, Peixuan Li, Linghui Luo, Goran Piskachev, Nicolás Rosner, Aritra Sengupta, Omer Tripp, Jingbo Wang.
The ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE 2023).

VRust: Automated Vulnerability Detection for Solana Smart Contracts
Siwei Cui, Gang Zhao, Yifei Gao, Tien Tavu, and Jeff Huang. 2022.
2022 ACM SIGSAC Conference on Computer and Communications Security (CCS 2022).

SemSwap: semantics-aware swapping in memory disaggregated datacenters
Siwei Cui, Liuyi Jin, Khanh Nguyen, and Chenxi Wang.
13th ACM SIGOPS Asia-Pacific Workshop on Systems, pp. 9-17. 2022 (APSys 2022).

User Identity Linkage across Social Media via Attentive Time-aware User Modeling
Xiaolin Chen, Xuemeng Song, **Siwei Cui**, Tian Gan, Zhiyong Cheng, and Liqiang Nie.
IEEE Transactions on Multimedia (2020).

PYInfer: Deep Learning Semantic Type Inference for Python Variables
Siwei Cui, Gang Zhao, Zeyu Dai, Luochao Wang, Ruihong Huang, and Jeff Huang.
arXiv preprint arXiv:2106.14316 (2021).

Cross-social media user identity recognition method and system based on attention mechanism
Siwei Cui, Xuemeng Song, Xiaolin Chen, Jianhua Yin, Meng Liu, and Tian Gan.
Patent No. CN110210540B.

Research Highlights

VRust Blockchain Analysis **Jan 2022 – May 2023**
Implemented data flow state analysis on Rust mid-level intermediate representation
Analyzed eight vulnerability patterns and have found 12 new vulnerabilities
Developed analytical framework to automate testing on Smart contracts written in Move language

Smalltalk Language Analysis **Oct 2020 – Nov 2021**
Detect critical race conditions for the Smalltalk language with LLVM IR
Designed Smalltalk AST and leveraged MLIR to facilitate the LLVM IR generation
Revealed 37 real race conditions confirmed by the developers

Semantics-Aware Swapping **Jan 2021 – Aug 2022**
Constructed finer-granularity swapping on disaggregated memory clusters
Transparently pass program runtime semantics to Linux Kernel
Reduced costs of remote memory access through object consolidation

User Identity Linkage on Social Media **Nov 2018 – Jun 2019**
Linked users on different social media based on user generated contents with temporal relations
Embedded texts and images and utilized attention network to fusion multi-modalities
Designed a parallel computing algorithm with TensorFlow to accelerate pair-wise calculations

Honors & Awards

Scholarship and Grants

Conference Travel Grant awarded by CSE Department, TAMU	Nov. 2022
China National Scholarship	Nov. 2018
Outstanding Student First Class Scholarship at Shandong University	Dec. 2016

ACM

The ACM-ICPC Asia Regional Contest Beijing Site 2017, Bronze Medal	Nov. 2017
The 3rd China Collegiate Programming Contest (Harbin), Bronze Medal	Oct. 2017
The 8th Shandong ACM Collegiate Programming Context, Gold Medal	May. 2017

Software Development

The 15th Shandong Collegiate Software Design Contest, Second Prize	Nov. 2017
Software College Programmer Debug Context, First Prize	Dec. 2016

Modeling

Contemporary Undergraduate Mathematical Contest in Modeling, National Second Prize	Nov. 2017
The 5th "Teddy Cup" Data Mining Competition, National First Prize	Jul. 2017
Interdisciplinary Contest In Modeling (ICM), Honorable Mention	Apr. 2017