Peterson Jr. Yuhala

Postdoctoral researcher · Trusted Computing

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Education

University of Neuchâtel — *Neuchâtel, Switzerland*

PhD in Computer Science — *April 2019 - March 2024*

- *Thesis:* Enhancing security and performance in trusted execution environments
- *Advisors:* Pascal Felber, Alain Tchana, Valerio Schiavoni

National Advanced School of Engineering (ENSP) — *Yaounde, Cameroon*

Masters of Engineering in Computer Science — *Sept. 2013 - Sept. 2018*

- *Thesis:* Memory address translation optimization in virtualized systems
- *Advisor:* Alain Tchana

Research and Work Experience

Postdoctoral researcher — *Neuchâtel, Switzerland*

Computer Science Institute - UniNE / Collaboration with ABB Corporate Research — *April 2024 - Present*

- Designing TEE support for processing-in-memory (PIM) architectures
- Accelerating homomorphic encryption algorithms with PIM
- Securing real-time applications with trusted execution environments (TEEs)

Research Assistant/PhD Candidate — *Neuchâtel, Switzerland*

Computer Science Institute - UniNE — *April. 2019 - March 2024*

- Program partitioning for TCB reduction in TEE programs
- Adding TEE support in GraalVM CE for sensitive data protection in the cloud
- IoT security and privacy with TEEs and machine learning

Teaching Assistant — *Neuchâtel, Switzerland*

Faculty of Science - UniNE — *April. 2019 - Present*

- Discrete Mathematics for Computer Science
- Networking and Web Technologies

Research Intern — *Toulouse, France*

Toulouse Institute of Computer Science Research (IRIT) — *March. 2018 - Sept. 2018*

- Memory address translation optimization in virtualization systems

Technical Projects

Securing IoT peripherals with TEEs — *Neuchâtel, Switzerland*

P4 SNSF Project: Practical Privacy-Preserving Processing — *April 2024 - Present*

- Mitigating PIM data transfer overhead with inline deduplication and compression
- Investigating TEE-based security architectures for PIM

Securing IoT peripherals with TEEs — *Neuchâtel, Switzerland*

VEDLIoT project — *Feb. 2023 - Nov. 2023*

- TCB reduction in peripheral device drivers in OP-TEE OS for Arm TrustZone

Multilanguage program partitioning for TEEs — *Neuchâtel, Switzerland*

Collaboration with Oracle Labs Zürich — *Sept. 2021 - Dec 2022*

- Using GraalVM Truffle framework to implement generic AST nodes that encapsulate sensitive information in polyglot programs
- Building taint analysis tool to analyze the AST and partition the program for TEEs
- See: `https://gitlab.com/Yuhala/generic-tools`

Developing a configless approach for Intel SGX switchless call framework — *Neuchâtel, Switzerland*

University of Neuchâtel — *Aug. 2021 - Feb. 2022*

- Design of dynamic worker thread scheduling system for switchless enclave routines
- See: `https://gitlab.com/Yuhala/zc-switchless`

Partitioning Java programs for TEEs *Neuchâtel, Switzerland*

Collaboration with Oracle Labs Zürich *July 2020 - June 2021*

- Java program partitioning with annotations and byte-code transformations for TCB reduction
- Implemented with GraalVM CE
- See: `https://github.com/Yuhala/montsalvat`

Improving fault tolerance guarantees for TEE programs *Neuchâtel, Switzerland*

University of Neuchâtel *April 2019 - June 2020*

- Leveraging persistent memory (PM) to provide efficient fault-tolerance guarantees in TEE programs
- Use case: secure machine learning
- See: `https://github.com/Yuhala/plinius`

Memory address translation optimization in virtualization systems *Toulouse, France*

Institut de Recherche en Informatique de Toulouse (IRIT) *March. 2018 - Sept. 2018*

- Modifying the Xen hypervisor to provide contiguous memory to paravirtual guest VMs
- See: `https://github.com/Yuhala/xen`
- Building a VM placement simulator
- See: `https://github.com/Yuhala/placement-simulator`

SIMbox fraud detection. *Yaounde, Cameroon*

National Advanced School of Engineering *Sept. 2017 - Jan. 2018*

- Developing a tool for SIMbox fraud detection based on the ELK stack
- See: `https://github.com/Yuhala/elk-fraud-detection`

Embedded electronics *Yaounde, Cameroon*

National Advanced School of Engineering *July. 2016 - Sept. 2016*

- Design and implementation of embedded software for domotic systems
- Microcontroller platforms: Arduino, MSP-430, ESP32
- See: `https://github.com/Yuhala/embedded-design`

Scientific Publications

Conference Proceedings

Evaluating the Potential of In-Memory Processing to Accelerate Homomorphic Encryption
Mpoki Mwaisela, Joel Hari, Peterson Yuhala, Jämes Ménétrey, Pascal Felber, Valerio Schiavoni, Tchana
The 43rd International Symposium on Reliable Distributed Systems (SRDS), 2024

Fortress: Securing IoT Peripherals with Trusted Execution Environments
Peterson Yuhala, Jämes Ménétrey, Pascal Felber, Marcelo Pasin, Valerio Schiavoni
. SAC 2024 (2024). Association for Computing Machinery, 2024

A Holistic Approach for Trustworthy Distributed Systems with WebAssembly and TEEs
Jämes Ménétrey, Aeneas Grüter, Peterson Yuhala, Julius Oeftiger, Pascal Felber, Marcelo Pasin, Valerio Schiavoni
. LIPIcs 286 (2023). 2023

SecV: Secure Code Partitioning via Multi-Language Secure Values
Peterson Yuhala, Pascal Felber, Hugo Guiroux, Jean-Pierre Lozi, Alain Tchana, Valerio Schiavoni, Gaël Thomas
Proceedings of the 24th International Middleware Conference, 2023, Bologna, Italy

SGX Switchless Calls Made Configless
Peterson Yuhala, Michael Paper, Timothée Zerbib, Pascal Felber, Valerio Schiavoni, Alain Tchana
2023 53rd Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN), 2023

(No)Compromis: Paging Virtualization is Not a Fatality
Boris Teabe, Peterson Yuhala, Alain Tchana, Fabien Hermenier, Daniel Hagimont, Gilles Muller
International Conference on Virtual Execution Environments (VEE), 2021, Virtual, USA

Plinius: Secure and Persistent Machine Learning Model Training
Peterson Yuhala, Pascal Felber, Valerio Schiavoni, Alain Tchana
2021 51st Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN), 2021

Montsalvat: Intel SGX Shielding for GraalVM Native Images
Peterson Yuhala, Jämes Ménétrey, Pascal Felber, Valerio Schiavoni, Alain Tchana, Gaël Thomas, Hugo Guiroux, Jean-Pierre Lozi
Proceedings of the 22nd International Middleware Conference, 2021, Québec city, Canada

Invited Talks

- Invited talk at FAU Erlangen-Nürnberg hosted by Prof. Dr.-Ing. Rüdiger Kapitza (July 2024)
- Guest speaker at Privacy Reunion 3 hosted by the Crypto Valley Association (June 2024)
- Speaker at the 39th ACM/SIGAPP Symposium on Applied Computing (April 2024)
- Speaker at the 24th ACM/IFIP International Middleware Conference (Dec. 2023)

- Speaker at the 53rd International Conference on Dependable systems and Networks (June 2023)
- Invited talk at Huawei Research Center Zürich (December 2022)
- Guest lecturer at the Institute of computer science, University of Yaounde I (Dec. 2022)
- Guest speaker at the Conférence Universitaire de Suisse Occidentale (Dec. 2021)
- Speaker at the 22nd ACM/IFIP International Middleware Conference (Dec. 2021)
- Speaker at the 51st International conference on Dependable systems and Networks (June 2021)
- Speaker at the Conférence francophone d'informatique en Parallélisme, Architecture et Système (July 2019)

Honors & Awards

Domestic

2018	**Salutatorian,** Computer Engineering class of 2018, ENSP Yaounde	*Yaounde, Cameroon*
2013	**Valedictorian,** Class of 2013, Sacred Heart College	*Bamenda, Cameroon*
2013	**Ralph C. Okwen Award ,** Overall best high school science student, Sacred Heart College	*Bamenda, Cameroon*
2013	**2nd Award,** Academic Excellence Award for a perfect score at the Cameroon GCE A-Level 2013 session (25/25 points)	*Cameroon*
2011	**1st Award,** Academic Excellence Award for a perfect score at the Cameroon GCE O-Level 2011 session (33/33 points)	*Cameroon*

Academic service

Scientific volunteering

University of Neuchâtel

- Organizing a STEM bootcamp: `https://scienceprojectscmr.github.io/`
- Writing scientific articles for LexTech institute blog: `https://www.lextechinstitute.ch/blog`
- University media presence: secure data processing in the cloud

Scientific peer reviewing

University of Neuchâtel

- Program Committee DSN Doctoral Forum 2025
- Artifact Evaluation Committee ASPLOS 2024
- Artifact Evaluation Committee OSDI 2021
- Artifact Evaluation Committee EuroSys 2021
- Sub-reviewer IC2E21

Conference volunteering

University of Neuchâtel

- Student Volunteer OPODIS 2019
- Student Volunteer COMPAS 2018

Skills

Programming Languages	C/C++, Java, Python
Systems Security	Intel SGX, AMD SEV, ARM TrustZone, OP-TEE
Web Development	HTML5/CSS, JavaScript, SQL, Laravel with PHP, Flask
Miscellaneous	Linux, Git, Shell(Bash), Docker, LaTeX

Languages

English	Native proficiency
French	Native proficiency