

Peterson Jr. Yuhala

PHD CANDIDATE · COMPUTER SCIENCE
IIUN, Neuchâtel, Switzerland



☎ (+41) 79 683 95 57 | ✉ peterson.yuhala@unine.ch | 🏠 yuhala.github.io | 📄 github.com/Yuhala | 🏠 gitlab.com/Yuhala | 🔗 peterson-yuhala-14009411a

“Be the change you wish to see in the world.”

About

Currently a PhD candidate at the University of Neuchâtel, Switzerland, where I conduct research in the field of systems security. My work is more specifically on efficient confidential computing with trusted execution environments (TEEs). I hold a Master’s degree in Computer Engineering from the National Advanced School of Engineering, Yaounde, Cameroon.

I’m a DIY enthusiast who loves tinkering with a Raspberry Pi, Arduino, ESP8266 or ESP32 and other electronics to build interesting automation projects.

Education

University of Neuchâtel PhD Candidate <ul style="list-style-type: none">• <i>Thesis:</i> Enhancing security and performance in trusted execution environments.• <i>Advisors:</i> Pascal Felber, Alain Tchana, Valerio Schiavoni	Neuchâtel, Switzerland April 2019 - March 2024
National Advanced School of Engineering (ENSP) Masters of Engineering in Computer Science <ul style="list-style-type: none">• <i>Thesis:</i> Memory address translation optimization in virtualized systems.• <i>Advisor:</i> Alain Tchana	Yaounde, Cameroon Sept. 2013 - Sept. 2018
Sacred Heart College GCE Advanced Level <ul style="list-style-type: none">• 25/25 points (perfect score)	Bamenda, Cameroon Sept. 2011 - June 2013
Sacred Heart College GCE Ordinary Level <ul style="list-style-type: none">• 33/33 points (perfect score)	Bamenda, Cameroon Sept. 2006 - June 2011

Research and Work Experience

Research Assistant/PhD Candidate Computer Science Institute - UniNE <ul style="list-style-type: none">• Efficient confidential computing with TEEs.• Adding TEE support in GraalVM CE for sensitive data protection in the cloud (collaboration with Oracle labs Zürich).• Enhancing IoT security and privacy with TEEs and machine learning (VEDLIoT project).	Neuchâtel, Switzerland April. 2019 - Present
Teaching Assistant Faculty of Science - UniNE <ul style="list-style-type: none">• Networking and Web Technologies.• Discrete Mathematics for Computer Science.• Computer programming for biologists (Python, R, Linux).• E-Government Frameworks.	Neuchâtel, Switzerland April. 2019 - Present
Research Intern Toulouse Institute of Computer Science Research (IRIT) <ul style="list-style-type: none">• Memory address translation optimization in virtualization systems.	Toulouse, France March. 2018 - Sept. 2018
Engineering Intern Les Brasseries du Cameroun <ul style="list-style-type: none">• Set up a sales management module based on Odoo ERP for wholesalers in the brewery industry.	Douala, Cameroon July. 2017 - Sept. 2017

Intern

Yaounde, Cameroon

National Advanced School of Engineering

July. 2016 - Sept. 2016

- Leveraging microcontrollers to build domotic systems.
- Implemented prototypes for home automation based on several microcontroller platforms: Arduino, MSP-430.
- See: <https://github.com/Yuhala/arduino-projects>
- Building programmable digital circuits with Altera FPGA.

Projects

Securing IoT data with Arm TrustZone and ML.

Neuchâtel, Switzerland

University of Neuchâtel (VEDLIoT project)

Feb. 2023 - Present

- Porting hardware peripheral device drivers to OP-TEE OS.
- Leveraging machine learning classification techniques to filter out sensitive data from data streams.

Multilanguage program partitioning for TEEs.

Neuchâtel, Switzerland

University of Neuchâtel (collaboration with Oracle labs Zürich)

Sept. 2021 - Dec 2022

- Developing a programming language implementation with Oracle's Truffle framework which provides generic AST nodes to encapsulate sensitive data (i.e secure values) in polyglot applications.
- Developing a generic taint analysis tool to analyse the resulting ASTs to deduce sensitive program portions which are partitioned into Intel SGX enclaves.
- See: <https://gitlab.com/Yuhala/generic-tools>

Making Intel SGX switchless calls configless.

Neuchâtel, Switzerland

University of Neuchâtel

Aug. 2021 - Feb. 2022

- Identifying limitations of the static configuration policy in Intel SGX's switchless call library.
- Building a dynamic SGX switchless call system which obviates the performance penalty due to static configurations.
- See: <https://gitlab.com/Yuhala/zc-switchless>

Partitioning Java programs for TEEs.

Neuchâtel, Switzerland

University of Neuchâtel (collaboration with Oracle labs Zürich)

July 2020 - June 2021

- Developing a tool to partition Java-based applications for Intel SGX enclaves.
- The program-partitioning technique leverages Java annotations and byte-code transformations to partition Java classes into trusted and untrusted components.
- The partitioned components are ahead-of-time compiled with GraalVM into native executables that run in and out of secure enclaves in a distributed fashion.
- See: <https://github.com/Yuhala/montsalvat>

Secure and persistent machine learning model training.

Neuchâtel, Switzerland

University of Neuchâtel

April 2019 - June 2020

- Leveraging persistent memory (PM) to provide efficient fault-tolerance guarantees for applications running in TEEs like Intel SGX.
- 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>

Publications

CONFERENCE PROCEEDINGS

Fortress: Securing IoT Peripherals with Trusted Execution Environments

Peterson Yuhala, Jâmes 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

Jâmes Ménétrey, Aeneas Grüter, Peterson Yuhala, Julius Oeftiger, Pascal Felber, Marcelo Pasin, Valerio Schiavoni

CoRR abs/2312.00702 (2023). 2023

SecV: Secure Code Partitioning via Multi-Language Secure Values

Peterson Yuhala, Pascal Felber, Hugo Guiroux, Jean-Pierre Lozi, Alain Tchan, 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 Tchan
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 Tchan, 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 Tchan
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 Tchan, Gaël Thomas, Hugo Guiroux, Jean-Pierre Lozi
Proceedings of the 22nd International Middleware Conference, 2021, Québec city, Canada

Talks

SecV: secure code partitioning using multi-language secure values

24th ACM/IFIP International Middleware Conference

Bologna, Italy

Dec. 2023

SGX Switchless Calls Made Configless

53rd International conference on Dependable systems and Networks

Porto, Portugal

June 2023

Enhancing IoT Security and Privacy with TEEs and Machine Learning

53rd International conference on Dependable systems and Networks (Doctoral Forum)

Porto, Portugal

June 2023

Partitioning Java Programs for Intel SGX

Huawei Research Center Zürich

Zürich, Switzerland

Dec. 2022

SecureL: Secure code partitioning via multi-language secure types

EuroSys Doctoral Workshop 2022

Rennes, France

April. 2022

Montsalvat: Intel SGX shielding for GraalVM Native Images

22nd ACM/IFIP International Middleware Conference

Virtual Event, Québec, Canada

Dec. 2021

Secure and Efficient Learning: approaches, techniques and threats

Conférence Universitaire de Suisse Occidentale (CUSO)

Neuchâtel, Switzerland

Dec. 2021

Secure and persistent ML model training with persistent memory and Intel SGX.

51st International conference on Dependable systems and Networks

Virtual Event, Taipei, Taiwan

June. 2021

Paging virtualization is not a fatality.

Conférence francophone d'informatique en Parallélisme, Architecture et Système (COMPAS)

Biarritz, France

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 , Brasseries du Cameroun Academic Excellence Award for a perfect score at the GCE A-Level 2013 session (25/25 points)	Cameroon
2011	1st Award , Brasseries du Cameroun Academic Excellence Award for a perfect score at the GCE O-Level 2011 session (33/33 points)	Cameroon

Social activities and community 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>

Scientific peer reviewing

University of Neuchâtel

- 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, 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

Interests

Reading	I love books on politics, economics, and personal development.
Sports	Football, Biking
Music	Piano, Singing
Board games	Chess

References

Pascal Felber

- Professor
pascal.felber@unine.ch
University of Neuchâtel, Switzerland

Alain Tchana

- Professor
alain.tchana@ens-lyon.fr
ENS Lyon, France

Valerio Schiavoni

- Assistant Lecturer
valerio.schiavoni@unine.ch
University of Neuchâtel, Switzerland