

# Peterson Jr. Yuhala

POSTDOCTORAL RESEARCHER · TRUSTED COMPUTING

IIUN, Neuchâtel, Switzerland



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

## About

I am a postdoctoral researcher in the Institute of Computer Science at the University of Neuchâtel, Switzerland. I conduct research in the field of systems security, with particular attention on trusted execution environments (TEEs). I obtained my PhD entitled “Enhancing Security and Performance in Trusted Execution Environments” at the University of Neuchâtel in April 2024.

## Education

### University of Neuchâtel

PhD in Computer Science

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

Neuchâtel, Switzerland

April 2019 - March 2024

### National Advanced School of Engineering (ENSP)

Masters of Engineering in Computer Science

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

Yaounde, Cameroon

Sept. 2013 - Sept. 2018

### Sacred Heart College

GCE Advanced Level

- 25/25 points (perfect score)

Bamenda, Cameroon

Sept. 2011 - June 2013

### Sacred Heart College

GCE Ordinary Level

- 33/33 points (perfect score)

Bamenda, Cameroon

Sept. 2006 - June 2011

## Research and Work Experience

### Postdoctoral researcher

Computer Science Institute - UniNE

- Efficient privacy preserving computation with TEEs and homomorphic encryption

Neuchâtel, Switzerland

April 2024 - Present

### Research Assistant/PhD Candidate

Computer Science Institute - UniNE

- 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 - March 2024

### Teaching Assistant

Faculty of Science - UniNE

- Networking and Web Technologies
- Discrete Mathematics for Computer Science
- Computer programming for biologists (Python, R, Linux)

Neuchâtel, Switzerland

April. 2019 - Present

### Research Intern

Toulouse Institute of Computer Science Research (IRIT)

- Memory address translation optimization in virtualization systems

Toulouse, France

March. 2018 - Sept. 2018

### Engineering Intern

Les Brasseries du Cameroun

- Setting up a sales management module based on Odoo ERP for wholesalers in the brewery industry

Douala, Cameroon

July. 2017 - Sept. 2017

## Intern

National Advanced School of Engineering

- Leveraging microcontrollers to build domotic systems
- Implemented prototypes for home automation based on several microcontroller platforms: Arduino, MSP-430, ESP32
- See: <https://github.com/Yuhala/arduino-projects>
- Building programmable digital circuits with Altera FPGA

Yaounde, Cameroon

July. 2016 - Sept. 2016

## 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

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- SecV: secure code partitioning using multi-language secure values** *Bologna, Italy*  
 24th ACM/IFIP International Middleware Conference *Dec. 2023*
- SGX Switchless Calls Made Configless** *Porto, Portugal*  
 53rd International conference on Dependable systems and Networks *June 2023*
- Enhancing IoT Security and Privacy with TEEs and Machine Learning** *Porto, Portugal*  
 53rd International conference on Dependable systems and Networks (Doctoral Forum) *June 2023*
- Partitioning Java Programs for Intel SGX** *Zürich, Switzerland*  
 Huawei Research Center Zürich *Dec. 2022*
- SecureL: Secure code partitioning via multi-language secure types** *Rennes, France*  
 EuroSys Doctoral Workshop 2022 *April. 2022*
- Montsalvat: Intel SGX shielding for GraalVM Native Images** *Virtual Event, Québec, Canada*  
 22nd ACM/IFIP International Middleware Conference *Dec. 2021*
- Secure and Efficient Learning: approaches, techniques and threats** *Neuchâtel, Switzerland*  
 Conférence Universitaire de Suisse Occidentale (CUSO) *Dec. 2021*
- Secure and persistent ML model training with persistent memory and Intel SGX.** *Virtual Event, Taipei, Taiwan*  
 51st International conference on Dependable systems and Networks *June. 2021*
- Paging virtualization is not a fatality.** *Biarritz, France*  
 Conférence francophone d’informatique en Parallélisme, Architecture et Système (COMPAS) *July. 2019*

## Honors & Awards

### DOMESTIC

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

- 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

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

## Languages

<b>English</b>	Native proficiency
<b>French</b>	Native proficiency

## Interests

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

# References

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## **Pascal Felber**

- Professor  
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University of Neuchâtel, Switzerland

## **Alain Tchana**

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

## **Valerio Schiavoni**

- Assistant Lecturer  
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University of Neuchâtel, Switzerland