Aristide Tanyi-Jong Akem

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EDUCATION

PhD - Telematics Engineering Mar 2021 - Sep 2024

Universidad Carlos III de Madrid (UC3M), Madrid, Spain

Advisor: Marco Fiore

Thesis title: User-plane Algorithms for Stateless and Stateful Inference in Programmable Networks

Thesis committee: Albert Banchs, Gianni Antichi, and Salvatore Pontarelli

Masters - Electrical and Computer Engineering Aug 2019 - May 2020

Carnegie Mellon University Africa (CMU-Africa), Kigali, Rwanda

Advisor: Edwin Mugume

Masters - Telecommunications Engineering Sep 2013 - July 2018

University of Yaounde I (UYI), Yaounde, Cameroon

Advisor: Lele Chrislin

RESEARCH EXPERIENCE

IMDEA Networks Institute (Madrid, Spain) | *Research Assistant* Mar 2021 - Present

I carried out my PhD as an MSCA ITN Fellow within the Networks Data Science Group led by Prof. Marco Fiore. I am currently continuing my research on in-band network intelligence, with a focus on user-plane inference. Our work has been presented at conferences like IEEE INFOCOM, IEEE MetaCom, and IEEE NetSoft.

Ranplan Wireless (Cambridge, UK) | *Visiting Researcher* Sep 2023 - Apr 2024

I visited Ranplan Wireless during the same period I was at the University of Cambridge, as part of the secondments of the BANYAN project. I also had a previous visit to Ranplan between October 2022 and February 2023.

University of Cambridge (Cambridge, UK) | *Visiting PhD Student* Sep 2023 - Feb 2024

I visited the Department of Computer Science and Technology under the supervision of Dr. Ian Wassell, as part of the secondments of my PhD program. During the visit, I researched more in-switch inference use cases. I also served as a lab assistant for the Hardware Lab undergraduate class. I also had a previous visit to the same institution between October 2022 and February 2023.

Orange Innovation Networks (Paris, France) | *Visiting PhD Researcher* Mar 2023 - Aug 2023

I visited the SMART team at Orange Innovation under Dr. Guillaume Fraysse, where we worked on encrypted traffic classification at line rate in programmable switches. The output of this work was presented at the 2024 IEEE/IFIP Network Operations and Management Symposium (NOMS).

TEACHING EXPERIENCE

University of Cambridge (Cambridge, UK) | *Laboratory Assistant* Oct 2023 - Feb 2024

I assisted Dr. Ian Wassell in the Digital Electronics Hardware Practicals Lab. I supervised lab sessions, debugged issues with students' circuit implementations, and guided them on how to go about their labs.

Carnegie Mellon University Africa (Kigali, Rwanda) | *Graduate Teaching Assistant* Aug 2020 - Mar 2021

I assisted Prof. McSharry in 3 courses over 2 semesters. They include Data Inference and Applied Machine Learning, Data Analytics and Big Data Science. My job description included preparing and running recitation sessions, grading homework assignments, and holding office hours to answer the students' questions and help them with exercises.

OMEGA Learning Centre (Yaounde, Cameroon) | *Mathematics Instructor* Sep 2018 - May 2019

As a high school teacher, I prepared and delivered Mathematics lessons to students, producing excellent results. Full-time from September 2018 to January 2019 and then part time from January to May 2019.

INDUSTRY EXPERIENCE

Ministry of ICT and Innovation (Kigali, Rwanda) | *Data Science Intern* May 2020 - Aug 2020

I performed data extraction, cleansing, wrangling, visualization, and analysis, using Python, to generate insights that facilitated the decision-making process.

Huawei Technologies Co. Ltd. (Yaounde, Cameroon) | *Intelligent Video Surveillance Engineer* Jan 2019 - Jul 2019

I was part of the team that installed, configured and commissioned 351 street video surveillance camera sites in the city of Yaounde, under the Safe City Project of the National Police.

Cameroon Telecommunications, (Yaounde, Cameroon) | *Radio Access Network Engineer Intern* Feb 2018 - Jun 2018

I designed a mobile video surveillance value-added service, dubbed CAMTEL4GSURV for CCTV over LTE.

Orange Cameroon S.A., Cameroon | *Transmission Engineer Intern* Jul 2017 - Sep 2017

I updated the microwave link database of the backhaul transport network of the telecom operator, comprising 1731 links, and redesigned the architecture of the backhaul transport network.

REPRESENTATIVE PUBLICATIONS

1. Aristide Tanyi-Jong Akem, Beyza Bütün, Michele Gucciardo and Marco Fiore, "Jewel: Resource-Efficient Joint Packet and Flow Level Inference in Programmable Switches," In: ***IEEE INFOCOM 2024 - IEEE Conference on Computer Communications***, Vancouver, Canada, May 2024. [PDF]

2. Aristide Tanyi-Jong Akem, Michele Gucciardo and Marco Fiore, "Flowrest: Practical Flow-Level Inference in Programmable Switches with Random Forests," In: ***IEEE INFOCOM 2023 - IEEE Conference on Computer Communications***, New York Area, United States, May 2023. [PDF]

3. Aristide Tanyi-Jong Akem, Beyza Bütün, Michele Gucciardo, and Marco Fiore, "Henna: Hierarchical Machine Learning Inference in Programmable Switches," In: ***1st International Workshop on Native Network Intelligence (NativeNi'22)***, Rome, Italy, December 2022. [PDF]

OTHER PUBLICATIONS

1. Aristide Tanyi-Jong Akem, and Marco Fiore, "Towards Real-Time Intrusion Detection in P4-Programmable 5G User Plane Functions," In: ***The 7th European P4 Workshop (EuroP4'24), co-located with The 32nd IEEE International Conference on Network Protocols (ICNP)***, Charleroi, Belgium, October 2024. *(Accepted)* [PDF]

2. Aristide Tanyi-Jong Akem, Beyza Bütün, Michele Gucciardo and Marco Fiore, "Practical and General-Purpose Flow-Level Inference with Random Forests in Programmable Switches," In: ***IEEE/ACM Transactions on Networking***. *(Submitted)*

3. Aristide Tanyi-Jong Akem, Guillaume Fraysse and Marco Fiore, "Real-Time Encrypted Traffic Classification in Programmable Networks with P4 and Machine Learning," In: ***International Journal of Network Management,***. *(Submitted)*

4. Aristide Tanyi-Jong Akem, Michele Gucciardo and Marco Fiore, "Ultra-Low Latency User-Plane Cyberattack Detection in SDN-based Smart Grids," In: ***In The 15th ACM International Conference on Future and Sustainable Energy Systems (E-Energy 24)***, Singapore, Singapore, June 2024. [PDF]

5. Aristide Tanyi-Jong Akem and Marco Fiore, "Towards Data-Driven Management of Mobile Networks through User Plane Inference," In: ***IEEE/IFIP Network Operations and Management Symposium***, Seoul, South Korea, May 2024. [PDF]

6. Aristide Tanyi-Jong Akem, Guillaume Fraysse and Marco Fiore, "Encrypted Traffic Classification at Line Rate in Programmable Switches with Machine Learning," In: ***NOMS 2024 - IEEE/IFIP Network Operations and Management Symposium***, Seoul, South Korea, May 2024. [PDF]

7. Michele Gucciardo, Beyza Bütün, Aristide Tanyi-Jong Akem and Marco Fiore, "Evaluating the Impact of Flow Length on the Performance of In-Switch Inference Solutions," In: ***IEEE INFOCOM 2024 - IEEE Conference on Computer Communications Workshops (INFOCOM WKSHPS)***, Vancouver, Canada, May 2024. [PDF]

8. Aristide Tanyi-Jong Akem, Beyza Bütün, Michele Gucciardo and Marco Fiore, "Showcasing In-Switch Machine Learning Inference," (Demo) In: ***2023 IEEE 9th International Conference on Network Softwarization (NetSoft)***, Madrid, Spain, June 2023. [PDF] **(Best Demo)**

9. Beyza Bütün, Aristide Tanyi-Jong Akem, Michele Gucciardo and Marco Fiore, "Fast Detection of Cyberattacks on the Metaverse through User-plane Inference," In: ***2023 IEEE International Conference on Metaverse Computing, Networking and Applications (MetaCom)***, Kyoto, Japan, June 2023. [PDF]

10. Michele Gucciardo, Aristide Tanyi-Jong Akem, Beyza Bütün and Marco Fiore, “Demonstrating Flow-Level In-Switch Inference,” (Demo) In: ***IEEE INFOCOM 2023 - IEEE Conference on Computer Communications Workshops (INFOCOM WKSHPS)***, Hoboken, New Jersey, United States, May 2023. [PDF]

11. Aristide Tanyi-Jong Akem and Edwin Mugume, “A Machine Learning Approach to Temporal Traffic-Aware Energy-Efficient Cellular Networks," In: ***2020 11th IEEE Annual Ubiquitous Computing, Electronics & Mobile Communication Conference (UEMCON)***, New York, United States, October 2020. [PDF]

TALKS

- Stateless and stateful user-plane algorithms for inference in programmable networks - *Telefonica Research*, 28/08/2024
- Stateless and stateful user-plane algorithms for inference in programmable networks - *Purdue University*, 07/08/2024
- Towards High-Speed Network Intelligence with On-Device Machine Learning - *IBM Research Africa*, 25/07/2024
- Towards Ultra-Low Latency User-Plane Cyberattack Detection in SDN-based Smart Grids - *IMDEA seminar series*, 30/05/2024.
- Machine Learning Inference in Programmable Switches with Random Forests - *BANYAN project summer school*, 26/05/2023.
- Practical Flow-Level Inference in Programmable Switches with Random Forests - *IMDEA Networks seminar series*, 03/05/2023.
- In-Network Machine Learning for Automatic Network Management - *UC3M Thesis Talk 2022*, 04/07/2022.
- An Introduction to In-Band Network Intelligence - *IMDEA Networks seminar series*, 03/11/2021.

COMMUNITY SERVICE

- Journal reviewer: IEEE/ACM Transactions on Networking (ToN)
- Journal reviewer: IEEE Transactions on Network and Service Management (TNSM)
- Journal reviewer: Elsevier Computer Networks (COMNET)
- Program committee member: PAM 2025
- Artifact evaluation committee: SIGCOMM 2024
- Shadow program committee member: EuroSys 2024
- Program committee member: ACM S3 2023 Workshop, co-located with ACM MobiCom 2023
- Publication chair: PAM 2023
- Adhoc conference reviewer: IEEE INFOCOM 2024, IEEE SECON 2024, IEEE GLOBECOM 2024, IFIP Networking 2024, ACM CIKM 2024, IEEE SECON 2023, IFIP Networking 2023, IEEE VNC 2023, and WoWMoM 2022.

AWARDS

- ACM SIGENERGY Student Travel Grant, *ACM e-Energy 2024*, April 2024
- IEEE ComSoC Student Travel Grant, *IEEE/IFIP NOMS 2024*, April 2024
- Best Demo Award, *IEEE NetSoft 2023*, June 2023
- Marie Skłodowska-Curie Grant for PhD Studies, *European Commission*, March 2021
- Dean’s Fellowship for Master’s Studies, *Carnegie Institute of Technology*, July 2019

PROFESSIONAL MEMBERSHIPS

- Association for Computing Machinery (ACM), *Professional member*
- Institute of Electrical and Electronics Engineers (IEEE), *Student member*
- IEEE Communications Society (ComSoc), *Student member*

TECHNICAL SKILLS

Network Programming	Over 3 years experience writing P4 applications for targets, *e.g.*, Intel Tofino ASICs.
Machine learning	Proficient in Python and data science packages like Pandas, Numpy, Sklearn, and Keras.
Deep learning	Intermediate knowledge of Pytorch and TensorFlow
Computer languages/systems	Regular use of Windows and Linux systems, and intermediate C programming skills.
Web application tools	Proficient in HTML5, CSS3, and WordPress
Database management	Experience with designing SQL databases interacting with web applications.
Signal Processing & Simulations	Proficient in running wireless network simulations in MATLAB.

LANGUAGES

English: Fluent French: Fluent Spanish: Beginner

REFERENCES

Marco Fiore
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Guillaume Fraysse
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NEC Laboratories Europe, Spain
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