# Dr. Salvatore Signorello

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**Country of Residence**: Portugal

**Researcher ID**: GLV-1127-2022  **Scopus ID**: 49864366900

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**Citizenship**: Italian

**Google Scholar ID**: XhcoaPoAAAAJ

### Current Position

Invited Assistant Professor at the Computer Science Department of the Faculty of Sciences of the University of Lisbon (PT).

### Research interests

I have a background in Computer Science and Engineering and I am broadly interested in protocols and architectures for networked systems. My current research mainly revolves around network monitoring through programmable data planes, with a particular focus on security as an application domain.

### Education

**University of Luxembourg and University of Lorraine** — LU and FR
Ph.D. in Computer Science, joint PhD program. — 2014-2018

**University of Catania** — Italy
M.S. in Computer Science Engineering. — 2005 − 2010
Score: 110/110 with distinction.

**University of Palermo** — Italy
B.S. in Information Engineering. — 2001 − 2005
Score: 100/110.

### Research experience

**Post-doc Researcher at FCUL and at INESC-ID/IST**
*Hosting Institutions*:

- INESC-ID/IST research center for combined Computer Science and Engineering (CSE) and Electrical and Computer Engineering (ECE), Lisbon, Portugal. — Oct 2020 − Sep 2021

- Faculty of Sciences of the University of Lisbon (FCUL), Lisbon, Portugal. — Oct 2018 − Sep 2020

*Project*: "User-centric Programmable Virtual Networks (uPVN)"
uPVN aims to improve the state of the art on network virtualization, to address the limitations in terms of scalability, security, and dependability with existing provider-centric solutions and enhance their services. Towards that goal, uPVN aims to build a virtualization platform that creates user-centric virtual networks, over a substrate that entails both public clouds and private data centers. Following the recent trend on data plane programmability, uPVN envisions virtual networks where users can customize the packet processing of all network elements through the use of domain specific language for networking like P4. To achieve these objectives uPVN innovates in various areas, from network compilers to algorithms for embedding and orchestration.

*Research activities*: within the framework of the uPVN project, I researched on programmable networks and their applications. More specifically, I did research on the virtualization of programmable data planes to enable multi-tenancy in cloud providers networks. And I also did research on the use of programmable networks to improve network monitoring and security, and on their use as an enabler for the design and deployment of novel network architectures and protocols (e.g., ICN and Network Coding). Alongside research, I advised MSc. students on their thesis projects, occasionally taught specific topics in courses on advanced computer networks, prepared proposals for research grants, set and managed experimental networking test-beds for research. I was also involved with the dissemination of the project activities and results at scientific events and I regularly offered my service to the community as a reviewer of scientific publications.

*Advisor*: Prof. Fernando M. V. Ramos (IST)

**PhD Student at the SnT Research Centre and at INRIA Nancy-Lab.**
*Hosting Institutions*: the SnT research centre of the University of Luxembourg (LU) and the INRIA Nancy-Lab at the University of Lorraine (FR).

2014 − 2018

*Project*: IDSECOM
The FNR-CORE IDSECOM project aimed to build a secure platform for self-management of the things and services in Internet of Things (IoT) environments. The developed platform integrated functionalities like self-management, mobility and security/privacy into an enriched network layer, enabling a more intuitive and efficient access to the IoT objects and services in a network. To build this platform, IDESCOM leveraged techniques and concepts from emerging networking paradigms, namely Software-Defined Networking and Information-Centric Networking.

*Research activities*: I researched on the security of forwarding mechanisms in a certain class of Information-Centric Networks as the main topic of my PhD thesis. My work also involved research on data plane programming through P4, a domain specific language for networking. I regularly attended international scientific events in my area of research both as a normal attendee and as a presenter of my own work. I occasionally taught classes on data plane programming to graduate students and gave tutorials on the same subject at international scientific events.

*PhD Thesis*: "A multifold approach to address the security issues of stateful forwarding mechanisms in Information-Centric Networks".

*Advisors*: Prof. Radu State, SnT of the University of Luxembourg (LU),
Prof. Olivier Festor, TELECOM Nancy, France (FR).

**Early Researcher at CNIT.**
*Hosting Institution*: National Inter-University Consortium for Telecommunications (CNIT), R&D unit of the University of Tor Vergata, Rome (IT).

2011 − 2013

*Project*: CONVERGENCE
The EU-FP7 CONVERGENCE project proposed to enhance the Internet with a novel, content-centric, publish–subscribe network model based on the versatile digital item (VDI): a common container for all kinds of digital content, including digital representations of real-world resources. With CONVERGENCE, access to content is more efficient, as search engines exploit VDI metadata for indexing, and the network uses content names to ensure users always access the content copy closest to them since every node in the network can work as a cache. Application developers can exploit CONVERGENCE's middleware and network without having to resort to proprietary ad-hoc solutions for common functionality.

*Research activities*: I was responsible for the design and development of end-user applications and network modules implementing a publish/subscribe communication model on top of an Information-Centric Network (CCNx).

*Advisor*: Prof. Andrea Detti of the University of Tor Vergata, Rome (IT).

**MSc. internship and thesis.**
*Hosting Institution*: Department of Computer Engineering Telecommunications (DIIT) of the University of Catania (Italy).

2009 − 2010

*Thesis*: "Design and deployment of a remotely-accessible 6LoWPAN-based wireless sensor network".

*Research activities*: I designed applications for a remotely accessible wireless sensor network (WSN) test-bed, performing research on Ipv6-based solutions to integrate WSNs in the Internet.

*Advisor*: Prof. Sergio Palazzo of the University of Catania, Catania (IT).

<div style="color:green">Teaching experience</div>

**Invited Assistant Professor**                                    Sep 2021 - Present
Bachelor programme in Information Engineering and Bachelor programme in Information Technology - Role: Co-instructor - Subjects: Computer Networks, Computer Architectures and Programming Lab in Java.

**Teaching assistant**                                                          2019
Master's program in Computer Science Engineering at the Faculty of Sciences of the University of Lisbon (FCUL) - lectures, lab sessions and project assignments about the P4 language.

**Teaching assistant**                                                          2017
Master's program in Computer Science at the School of Engineering in Information Technology TELECOM Nancy - a crash course on the P4 language including lectures and hands-on lab assignments.

**Tutorial Instructor**                                                      2016-2017
I prepared and held hands-on tutorials on the P4 language at the following international conferences:

- 2nd IEEE Conference on Network Softwarization (NetSoft 2016), 6-10 June 2016, Seoul, Korea.

- 15th IFIP/IEEE International Symposium on Integrated Network Management (IM 2017), 8-12 May 2017, Lisbon, Portugal.

- 11th International Conference on Autonomous Infrastructure, Management and Security (AIMS 2017), 10-13 July 2017, Zurich, Switzerland.

I was involved with the organization of the tutorial *"P4PI: P4 on Raspberry PI for Research and Education"* given at the 8th IEEE Conference on Network Softwarization (NetSoft 2022), June 2022, Milan, Italy.
I lectured on the P4 language at the ACROSS International Summer School on Latency Control for Internet of Services in June 2017, Karlstad, Sweden.

I am currently involved with the organization of the hackathon *"P4 on Raspberry PI for Networking Education"*, to be held at the 36th annual conference of the ACM Special Interest Group on Data Communication (SIGCOMM'22).

**Students Supervision**

**MSc. thesis**

Pedro Dos Reis at IST, co-advised with Prof. Fernando M.V. Ramos (IST), *"Virtualizing a Programmable Network Switch"*.                    Ongoing

Gonçalo Matos at IST, co-advised with Prof. Fernando M.V. Ramos (IST), *"Change Detection Sketches in Programmable Data Planes"*.    Grad. Nov 2021

Duarte Sequeira at FCUL, co-advised with Prof. Fernando M.V. Ramos (IST), *"Code Merging for Data Plane Virtualization"*.           Grad. Feb 2021

Diogo Gonçalves at FCUL, as external co-advisor, main advisors were by Prof. M.V. Ramos (FCUL) and Prof. M Médard (MIT), *"Network Coding Switch"*.
                                                                  Grad. Oct 2019

**Professional Experience**

**IT SMEs and research centres**                                    Italy
System Administrator/R&D engineer                               2011-2013
Development of network applications on several different programming environments, administration of GNU/Linux systems.

**Scientific Publications**

Gonçalo Matos, Salvatore Signorello, and Fernando M. V. Ramos. 2021. "Generic change detection (almost entirely) in the dataplane", *in the 4th P4 European Workshop co-located with the 16th ACM/IEEE In Proceedings of the Symposium on Architectures for Networking and Communications Systems (ANCS '21).*

Gonçalo Matos, Salvatore Signorello, and Fernando M. V. Ramos. 2021. "Towards generic traffic change detection in the data plane", *Proceedings of the CoNEXT 2021 Student Workshop.*

Diogo Barradas, Nuno Santos, Luís Rodrigues, Salvatore Signorello, Fernando Ramos, André Madeira, "The Nuts and Bolts of Building FlowLens", *Proceedings of The Learning from Authoritative Security Experiment Results workshop (LASER), Online, Feb. 2021.*

Diogo Barradas, Nuno Santos, Luís Rodrigues, Salvatore Signorello, Fernando Ramos, André Madeira, "FlowLens: Enabling Efficient Flow Classification for ML-based Network Security Applications", *In the 27th Network and Distributed System Security Symposium (NDSS), Feb. 2021.* **[CORE A\*]**

Amado, J. R., Signorello, S., Correia, M., Ramos, F. M. V., "Poster: Speeding Up Network Intrusion Detection", *In 2020 IEEE 28th International Conference on Network Protocols (ICNP) (pp. 1-2). IEEE.*

Diogo Gonçalves, Salvatore Signorello, Fernando M. V. Ramos, Muriel Médard, "Random Linear Network Coding on Programmable Switches", *in the 2nd P4 European Workshop co-located with the 15th ACM/IEEE Symposium on Architectures for Networking and Communications Systems (ANCS). IEEE, 2019. p. 1-6.*

Rui Muigel, Salvatore Signorello and Fernando M. V. Ramos. "Named Data Networks using programmable switches", *in the 1st P4 European Workshop co-located with the 26th IEEE International Conference on Network Protocols (ICNP), Sept 2018.*

Signorello S, Marchal S, François J, Festor O, State R., "Advanced interest flooding attacks in named-data networking", *in the 16th International Symposium on Network Computing and Applications (NCA) IEEE, 2017.* **[CORE A]**

Piro G, Signorello S, Palattella MR, Grieco LA, Boggia G, Engel T. "Understanding the social impact of ICN: between myth and reality.", *AI and SOCIETY. 2017 Aug 1;32(3):401-19.*

Signorello S, State R, François J, Festor O. "NDN.p4: Programming information-centric data-planes.", *In 2016 IEEE NetSoft Conference and Workshops (NetSoft) 2016 Jun 6 (pp. 384-389).*

Signorello S., Festor O., State R. "Exploring IoT protocols through the Information-Centric Networking's lens.", *In IFIP International Conference on Autonomous Infrastructure, Management and Security 2015 Jun 22 (pp. 56-60), Springer.*

Almeida F, Castro H, Andrade MT, Tropea G, Melazzi NB, Signorello S, Mousas A, Anadiotis A, Kaklamani D, Venieris I, Minelli S. "Digital forgetting in information-centric networks—the CONVERGENCE perspective.", *New review of hypermedia and multimedia. 2014 Apr 3;20(2):169-87.*

Leonardi A, Palazzo S, Scoto F, Signorello S. "Enabling remote access to a wireless sensor network by exploiting IPv6 capabilities.", *In 2011 7th International Wireless Communications and Mobile Computing Conference 2011 Jul 4 (pp. 285-290), IEEE.*

## Community Service

- Student Workshop at CoNEXT'22 (TPC)

- FFSPIN SIGCOMM'22 Workshop (TPC)

- EuroSys'22, Artifact Evaluation Committee co-chair

- Elsevier Computer Networks Journal, external reviewer.

- SIGCOMM'21, Artifact Evaluation Committee.

- SIGCOMM Computer Communication Review (CCR), external reviewer.

- Elsevier DSP Journal, external reviewer.

- EuroSys'21, Artifact Evaluation Committee (**Honourable Mention for the AEC Reviewer Award**).

- EuroP4'20, Web and Publications Chair.

- SIGCOMM'20, Artifact Evaluation Committee.

- EuroSys'20, Shadow Program Committee.

- EuroP4'19, Web Chair.

- CHIST-ERA Call 2018, External Project Reviewer.

- Dagstuhl Seminar 19141 on Programmable Network Data Planes - Participation.

- Netsoft'19, External Reviewer.

- Journal of Telecommunications and Information Technology (JTIT) of NIT, Member of the Editorial Advisory Board.

## Technical Trainings

- Barefoot Academy Level 1 Course, "BA-9111: Introduction to Data Plane Development with P416/TNA, Tofino ASIC and P4STUDIO SDE.", provided on-line by Barefoot Networks, an Intel Company.       Oct 2020

- NetFPGA Developers Summer School, hosted by the NetFPGA project at the Cambridge Computer Laboratory in the UK.       Jul 2017

- The 1st P4 BootCamp, hosted by Barefoot Networks in Palo Alto, CA, USA.       Nov 2015

## Awards & Grants

- SIGCOMM'22 Travel Grant.

- Applied Network Research Prize at the annual Advanced Network Research Workshop organized by ISOC.PT for some work on detecting generic traffic changes in the network data plane. [Dec. 2021]

- Honourable Mention for the Artifact Evaluation Committee (AEC) Reviewer Award at EuroSys'21.

- ICNP'18 P4EU Travel Grant.

## Languages

Italian (native) - English and French (full working proficiency) - Portuguese (working proficiency).

## Professional Memberships

Association for Computing Machinery (ACM).

## References

Prof. Nuno F. M. F. Neves, Professor and Head of the Computer Science Department at FCUL (PT),
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Prof. Fernando M. V. Ramos, Associate Professor at IST (PT),
+351 217500521, fvramos@tecnico.ulisboa.pt

Prof. Olivier Festor, Professor at the University of Lorraine and Director of TELECOM Nancy (FR),
+33 372745900, olivier.festor@inria.fr