PERSONNAL DATA

- French citizenship
- https://phd.julien-cpsn.com
- LinkedIn
- ORCID (0009-0002-0684-7221)
- GitHub (Julien-cpsn)

TECHNICAL SKILLS

Rust	●●●●●
OS / Network	●●●●●
PHP / HTML / CSS / JS	●●●●●
Svelte / Vue.js	●●●●●
Typst / Latex	●●●●●
C / C++ / Python	○●●●●
Git / DevOps	○●●●●
KVM / Docker / Kubernetes	○●●●●
ROS 1 & 2	○○●●●
Java / Kotlin / AI / ML	○○●●●

LANGUAGES

French – Native	●●●●●
English – C1 Cambridge	●●●●●
Italian	○○○○●

HOBBIES

- Guitar and music production
- Computer science
  - Open-source contributions
  - Technology watch
  - Personal projects (ATAC, desktop-tui, RetOS)
- Former president of the La Boutique CPE Lyon association, and former member of three associations (Gaelis, BIGG BDE, Student Club)

JULIEN CAPOSIENA

Second-year PhD student working on router operating systems. Independent, well-organized, with excellent communication skills and extensive development experience. Also a part-time teacher on various subjects, such as web development and systems programming.

STUDIES

oct. 2024 - sept. 2027 — **PhD student**
Ministerial grant – CITI Lab & INSA Lyon, Villeurbanne (69), France

Topic: Design and development of an open-source operating system dedicated to routers: towards a converged system and network architecture

sept. 2021 - july 2024 — **Engineering degree - Computer science and communication networks**
Work-study program – CPE Lyon, Villeurbanne (69), France

Major: Robotics (Tello, Parrot, Bebop, TurtleBot), Development
Minor: Project Management, Communication, Team and Business Management, Economics, Probability & Statistics, Linear Algebra

sept. 2019 - july 2021 — **DUT Informatique**
Institut Universitaire Technologique Lyon 1, Bourg-en-Bresse (01), France

Major: Computer Science, Engineering
Minor: Communication, Economics, Linear Algebra, Analysis, Statistics

sept. 2016 - july 2019 — **Baccalauréat STI2D**
Lycée Léon Blum, Le Creusot (71), France

Awarded highest honors

JOBS & TECHNICAL EXPERIENCE

nov. 2024 - sept. 2027 — **Part-time teacher**
Institut Universitaire Technologique Lyon 1, Villeurbanne (69)

Services: 80h of Web development and software architecture (PHP, JS), 24h of System programming (C, Java), 24h of Human-Computer Interface (Java)

june 2023 - aug. 2023 — **Robotics research internship**
La Sapienza University, Rome, Italy

Publication of a paper [1] on human-robot interaction in wine-harvesting environment for the European project CANOPIES.

sep. 2021 - july 2024 — **Web Development & TV Support Engineer Apprentice at SFR**
Fullstack dev. – Vue.js, Quasar, PHP Laravel, PostgreSQL, Kubernetes

Conceptualization, development, and maintenance of a business application for my team that meets their needs and improves their productivity. The application integrates SFR's TV equipment in real time.

april 2021 - aug. 2021 — **DUT internship at the start-up Tokatab**
Dev. – Vue.js, Quasar, PHP Laravel, PostgreSQL, TornadoFX

Tokatab is a web application for learning to play the piano and sing without knowing music theory. Responsibilities include developing new features and maintaining the application.

JULIEN CAPOSIENA — PUBLICATIONS

INTERNATIONAL WORKSHOPS

October 2025

A Router OS for Ubiquitous Computing: Orchestrating Virtual Network Functions and Control Loops over SD-WAN

Presented at the WUOS workshop of the SOSP 2025 conference – Seoul, South Korea

This work explores the concept of a router operating system designed for ubiquitous computing environments, based on a type 1 hypervisor to host virtualized services (SDN) such as those offered by Internet Service Providers (ISPs). The core idea is to integrate an enhanced version of Software-Defined Wide Area Network (SD-WAN) components, such as orchestrators and controllers, within the router's operating system, enabling it to function as a meta-OS. This configuration aims to efficiently manage network traffic and tasks, particularly in fog computing and edge computing scenarios, while ensuring optimal routing performance through shared policies and rules.

May 2025

Towards a flexible Network Operating System Testbed for the Computing Continuum

Published in the ContinuumRI workshop at the CCGrid 2025 conference – Tromsø, Norway

A conceptual testbed designed to improve the reproducibility, scalability, and robustness of experiments on Computing Continuum and network operating systems. Our testbed offers great flexibility by allowing experimenters to modify the operating systems of network equipment and dynamically reconfigure network topologies. To illustrate its versatility, we define three distinct use cases, ranging from multi-carrier environments to network architectures internal to telecommunications operators, all deployable on the proposed network topology. This article also explores solutions for virtual topology management, operating system deployment, and service orchestration.

December 2023

Empowering Collaboration: A Pipeline for Human-Robot Spoken Interaction in Collaborative Scenarios [1]

Research internship at La Sapienza University – Rome, Italy

Published in the ICSR 2023 conference – Doha, Qatar

In the context of collaborative robotics, robots share the workspace with humans, and communication between the two is essential. In this article, we present a voice pipeline for collaborative robotics, specifically designed to operate within the context of precision agriculture. This system leverages frame semantics as a modality-independent means of representing information, thus facilitating dialogue management between the robot and the human.

NATIONAL CONFERENCES

June 2025

Vers un banc d'essai flexible pour les systèmes d'exploitation réseau dans le Computing Continuum

Published at ComPAS 2025 – Bordeaux, France

Pour remédier au défi de réaliser complètement un Computing Continuum, nous proposons un banc d'essai conceptuel visant à améliorer la reproductibilité, l'évolutivité et la robustesse des expériences réseau. Ce banc d'essai offre une grande flexibilité, permettant aux expérimentateurs de modifier les systèmes d'exploitation des équipements réseau et de reconfigurer dynamiquement les topologies réseau. Nous définissons trois scénarios d'utilisation distincts, allant des environnements multi-opérateurs aux architectures de réseau internes des fournisseurs de télécommunications. L'article explore également des solutions pour la gestion de la topologie virtuelle, le déploiement du système d'exploitation et l'orchestration des services.

November 2024

Comparative analysis of operating systems for network equipment

Thematic day « Virtualization and Networks » of the GDR RSD – Paris, France

This presentation includes a literature review, along with criteria and metrics for comparing router operating systems and other network equipment. Furthermore, an innovative router operating system architecture is proposed and discussed among my peers.

JULIEN CAPOSIENA — PREPRINTS & SERVICE DUTIES

PREPRINT WORK

January 2025 – now

Comparative survey of operating systems for network routing equipments

Submission is planned for IEEE Communications Surveys or ACM Computing Surveys

Despite the central role of operating systems in ISP networks and environments, their comparison remains fragmented in the literature. This study aims to clarify their design, capabilities, performance, and trade-offs. Based on defined criteria, we compare a representative set of operating systems (GPOS, NOS, VSR, MetaOS), as well as the TCP/IP forwarding and routing stacks they use. We present a comparative evaluation methodology using dynamic and reproducible network topologies and workloads to assess metrics such as latency, throughput, and behavior under heavy traffic conditions.

June 2025 – now

High granularity Linux kernel-space and user-space network profiling

Submission is planned for SOSP

High-throughput networking in modern Linux environments demands precise visibility into packet processing costs across both kernel space and user space. Existing profiling tools typically provide coarse-grained metrics or focus on only one side of the kernel–user boundary, leaving fine-grained, end-to-end performance analysis underexplored. We aim to present a high-granularity profiling framework for Linux networking that instruments kernel and application paths using extended Berkeley Packet Filter (eBPF), capturing nanosecond-resolution timestamps and memory usage for every network-related operation. Applied to diverse scenarios, including NIC driver comparisons under load, UDP flooding, and HTTP serving, our approach depicts driver-level design differences, CPU scheduling imbalances, and significant kernel-level I/O overheads that aggregate metrics would miss. The results aim to demonstrate the value of cross-boundary profiling for guiding optimizations in driver design, kernel scheduling, and application I/O handling. We also aim to discuss current limitations, such as symbol volatility, compiler inlining, CPU frequency scaling, and outline future extensions such as cache-miss.

SERVICE DUTIES

November 2024 – now

Laboratory council

CITI Lab

Collegial governing body within the lab where we discuss and advise on organizational matters, resource allocation, and scientific strategy, including representatives of researchers, staff, and PhD students.

November 2025 – now

LiSAC group

CITI Lab

LiSAC (CITI Social Link and Activity) is a working group around well-being at work that host activities throughout the year such as meals, film outings, after-work gatherings, and laser tag.

Nov. 2025 – June 2026

PhD day organisation committee

CITI Lab

The PhD day is a conference-style event organized by and for PhD students, where we present their research, attend talks or workshops, and exchange experiences within a supportive academic setting. We also offer a safe discussion place for other students.

Nov. 2025 – Dec. 2025

HCERES

CITI Lab

HCERES (High Council for the Evaluation of Research and Higher Education) is the French independent authority responsible for evaluating research institutions, higher education programs, and research units to ensure quality and accountability. I had the pleasure of contributing to the right-going evaluation of the lab.