

ESTEBAN MUNICIO, PhD

Telecommunication Engineer — Distributed Systems, Software-Defined Networks, AI-Driven Systems, NTN
Madrid, Spain · esteban.municio@i2cat.net · emunicio.github.io · github.com/emunicio · ORCID 0000-0002-9865-2538
Spanish (native) · English (fluent) · Dutch (B1) · French (A2)

SUMMARY

Telecommunication engineer with a PhD and 12+ years working on distributed software-defined systems in research environments— from technological gap identification to requirements definition and multi-partner integration and demonstration. Currently active in the ESA ecosystem via ARTES 4.0 4S SPL SULFUR (NTN) and participated in twelve EU R&D consortia (FP7 → Horizon Europe SNS-JU). Comfortable working in multi-stakeholder projects and converting research rigour into operationally deployable systems. In-depth knowledge of wired and wireless networks, traffic engineering and data processing pipelines on real testbeds and on-field deployments.

PROFESSIONAL EXPERIENCE

Senior Researcher — Research Line Leader, Sustainable 6G vRANs

Jan 2022 – present

i2CAT, AI-Driven Systems · Barcelona, Spain

- Currently lead i2CAT's contribution to ARTES 4.0 4S SPL SULFUR (ESA) on Non-Terrestrial Network O-RAN compliant payload; responsible for requirements, system design and validation for the O-RAN enabled 5G gNB component of the regenerative payload.
- Engineer and research scientist for AI/ML solutions across Horizon Europe SNS-JU ORIGAMI and BeGREEN: requirements specification, architecture design, software delivery and multi-domain integration in real testbeds and demonstrators.
- Lead a research line of 4 engineers; manage deliverables and reporting under ESA and EU R&D contract frameworks.

Postdoctoral Researcher

Nov 2019 – Dec 2021

IDLab — University of Antwerp / imec · Antwerp, Belgium

- Technical lead across H2020 DAEMON, Vital-5G, ProTego and InterConnect: end-to-end programmable networks for Industrial IoT; full lifecycle from system requirements to deployed, validated software on real pilots.
- Deployment and benchmarking of a global multi-domain testbed federation between Fed4FIRE+ (EU) and Chameleon (US); coordinated joint test campaigns across distributed partners.

PhD Researcher — Scalable End-to-End Programmable Industrial IoT

May 2015 – Nov 2019

IDLab — University of Antwerp / imec · Antwerp, Belgium

- Designed, implemented and validated *Whisper*, a distributed SDN-on-IoT control framework: Design → Architecture → Implementation → Validation on real hardware.
- Core contributor to the open-source 6TiSCH Simulator.

Research Assistant — EU-FP7 TUCAN3G · Universidad Rey Juan Carlos, Madrid

Mar 2013 – May 2015

- Field deployment and operations of low-cost 3G/4G femtocell backhaul networks in isolated rural environments (Amazon basin, Peruvian Andes); hardening of carrier-grade systems for low-cost infrastructure.

EDUCATION

PhD in Computer Science — University of Antwerp, Belgium

2015 – 2020

Thesis: *Towards Scalable End-to-End Programmable Industrial Internet of Things*

MSc in Networks and Computer Systems — Universidad Rey Juan Carlos, Madrid

2013 – 2014

MSc in Telecommunications Engineering — Universidad Politécnica de Madrid (A with Honours, 99.9th percentile)

2010 – 2013

BSc in Telecommunications Engineering (Telematics) — Universidad Politécnica de Madrid

2006 – 2010

SELECTED R&D PROJECTS & OPEN-SOURCE

Space / ESA: ARTES 4.0 4S SPL SULFUR (2026 – present).

Horizon Europe / H2020 / Celtic+: SNS-JU ORIGAMI, SNS-JU BeGREEN, H2020 DAEMON, Vital-5G, InterConnect, ProTego, Celtic+ FlexNet, FP7 TUCAN3G.

Open-source: 6TiSCH Simulator (core contributor); *Whisper* (SDN-on-IoT suite, ONOS-integrated) (primary author); long-distance Wi-Fi/WiMAX link simulator for ns-3 (primary author).

SELECTED PUBLICATIONS · H-INDEX 18 · +800 CITATIONS (GOOGLE SCHOLAR, MAY 2026)

- **Municio, E.**, Garcia-Aviles, G., Garcia-Saavedra, A., Costa-Pérez, X. (2023). *O-RAN: Analysis of Latency-Critical Interfaces and Overview of Time Sensitive Networking Solutions*. IEEE Communications Standards Magazine 7(3).
- **Municio, E.**, Cevik, M., Ruth, P., Marquez-Barja, J. (2021). *Achieving End-to-End Connectivity in Global Multi-Domain Networks*. IEEE INFOCOM CNERT.
- **Municio, E.**, Latré, S., Marquez-Barja, J. (2020). *Extending Network Programmability to the Things Overlay using Distributed Industrial IoT Protocols*. IEEE Trans. Industrial Informatics 17(1).

Full list: emunicio.github.io/publications

TECHNICAL SKILLS

Systems engineering & operations: requirements engineering, ICD definition, V&V on multi-domain testbeds (Fed4FIRE+, Chameleon, Citylab, etc.), CI/automation (Ansible, Juju), monitoring (Grafana, MQTT), GitLab, Kubernetes, Helm, Docker, OpenStack, OSM.

Programming & data: C, C++, Python, Java, Unix shell, Matlab, LaTeX; Numpy, Pandas, TensorFlow, PyTorch, MySQL, PostgreSQL.

Networking & RAN: O-RAN-SC, OpenAirInterface, srsRAN, 5G-Empower, ONOS, ns-3, GNU Radio, OpenWSN, Contiki.

ACADEMIC ACTIVITIES

Teaching: Adjunct Professor at UC3M (2023–present); previously Lab Teaching Assistant at University of Antwerp.