POSition Information with Digital twin Offloading in trustworthy Next-generation Internet Applications

Funded by the European Union

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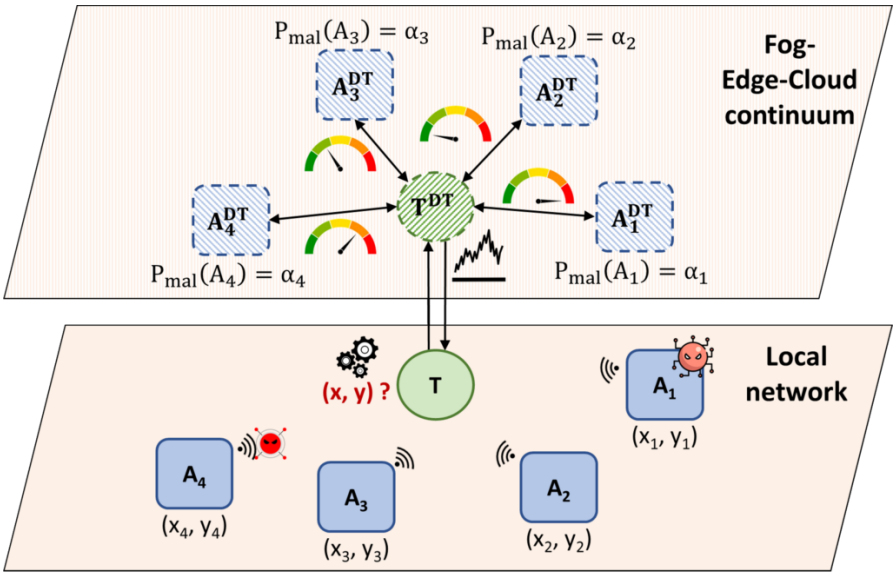
The Project

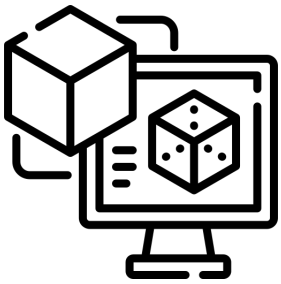


The Idea

Within the Next-Generation Internet (NGI) vision, the project POSition Information with Digital twin Offloading in trustworthy Next-generation Internet Applications (POSIDONIA) tackles a green and human-centric network design for heterogeneous scenarios supported by the Fog-Edge-Cloud continuum. In particular, POSIDONIA envisions a distributed network architecture to provide trustworthy and sustainable Location-Based Services (LBS) in Internet of Things (IoT) scenarios where threat mitigation is opportunistically offloaded between the local network and its core infrastructure. Therefore, POSIDONIA integrates Digital Twins (DTs) to ensure interoperability and computationally-heavy operations.

How?

INTERNET OF THINGS (IoT) - IoT enables real-time connectivity between devices to collect, process, and analyze data, optimize operations, improve efficiency, and support data-driven decision-making across various domains



DIGITAL TWIN & CLOUD COMPUTING - Leverage data from connected devices and location tracking to enable predictive analytics and enhance decision-making across various domains

LOCATION-BASED SERVICES (LBS) - Utilize precise positioning to enable targeted interventions, optimize resource allocation, and enhance operational efficiency across various applications

What Makes Us Different?

POSIDONIA leverages alternative positioning technologies to deliver precise, cost-effective, and sustainable solutions that go beyond GPS limitations. With security and privacy embedded by design, it enables reliable and trustworthy applications by ensuring strong data protection and reducing vulnerabilities.

First Pilot: Smart Agriculture

Our first pilot project, named AGROS, applies POSIDONIA to transform agriculture, tackling challenges such as rising food demand, limited resources like water and fertile soil, and the environmental impact of traditional farming practices.

The Team

University of Cagliari

Francesca Marcello (Non-Tenure Track Assistant Professor)

Marco Martalò (Associate Professor)

Giovanni Pettorru (PhD Student)

Virginia Pilloni (Associate Professor)

Saint Louis University, MO, USA

Flavio Esposito (Associate Professor)

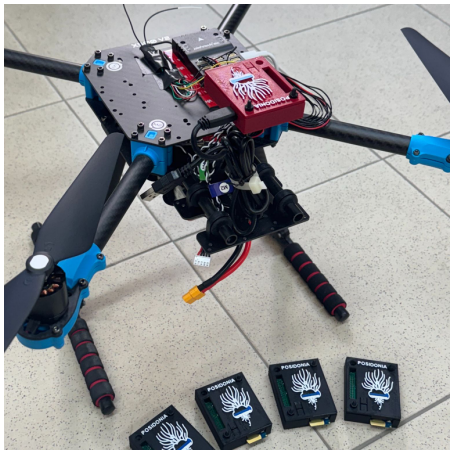
Activities and Main Results

Proof-of-Concept and Experimental Validation

Intensive measurement campaigns with various wireless interfaces and different application scenarios (indoor/outdoor, small/large areas)

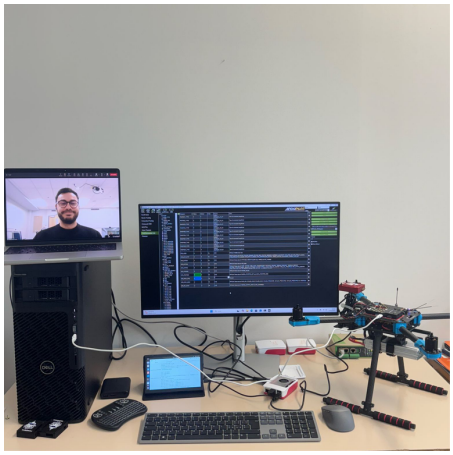
GPS-Free Localization

Autonomous Unmanned Aerial Vehicle (UAV) relying on GPS-free positioning technologies, autonomous navigation, and a mission-based approach with optimized scheduling



Transatlantic Collaboration

Strengthening our American partnership with Saint Louis University with the visit of a team Master's student working on GPS-free autonomous UAV and Edge/Cloud data offloading



Check our recap video

https://www.linkedin.com/posts/posidonia-project_ngisargasso-nextgenerationinternet-posidonia-activity-7320733208780705792-z6_l/

Communication, Dissemination, and Exploitation Strategy

	Linkedin Page: https://www.linkedin.com/company/posidonia-project 283 followers, 27 posts, 15066 total impressions, 523 reactions, 27 comments, 22 shares, 221 visitors and 436 page visualizations
Net4U	Project Website: https://sites.unica.it/net4u/posidonia/ Deliverable repository
4YFN	Booth at 2025 4YFN (Mobile World Congress), Barcelona, 3-6 March 2025
	Github Repository: https://github.com/GiovanniPettorru/LoRaRSSI-PosData Repository with position dataset and source codes
IEEE ICC®	Giovanni Pettorru, Giovanni Nurcis, Virginia Pilloni and Marco Martalò, "How Do Jamming Attacks Impact the Performance of RSS-Based Localization Techniques", IEEE ICC 2025, Montreal, Canada, 7-10 July 2025
IEEE MeditCom	Giovanni Pettorru, Andrea Coni, Virginia Pilloni and Marco Martalò, "A Reliability Index for Position Estimation in Trustworthy Location-Based Services", IEEE MeditCom 2025, Nice, France, 7-10 July 2025