Pierluigi Locatelli

Nationality: Italian | Address: Italy (Home)

Education & Training

BSc in Computer Engineering | Sapienza Università di Roma (ROMA) | 10/09/2014 - 21/05/2018 | Italy

Java application that allows users to sign and verify documents according to European standards provided by CEF Digital.

Field of study Computer Engineering | **Final grade:** 104/110 | **Thesis:** PGSign&Verify

MSc in Cybersecurity | Sapienza Università di Roma (ROMA) | 10/10/2018 - 14/07/2021

We discovered and analyzed a new vulnerability in the LoRaWAN protocol which results in blocking downlink communications between the network and the end device. We implemented the attack over a real network and discussed possible ways to detect and mitigate this vulnerability.

Presented at IEEE Globecom 2021, titled "Hijacking Downlink Path Selection in LoRaWAN"

Field of study Cybersecurity | **Final grade:** 110L/110 | **Thesis:** Time-based Wormhole Replay (TWR) Attack

PhD in ICT | Sapienza Università di Roma | 01/11/2021 - 31/10/2024 | Italy

Field of study Information and Communication Technologies | **Final grade:** Excellent | **Thesis:** Investigating secure and distributed control in IoT: improving BLE security and strengthening LoRaWAN with blockchain

Work experience

"Studio di meccanismi per la sincronizzazione dati reti cloud e gateway wireless per IoT" – Bando n. 02/2019 - Scholarship | Sapienza Università di Roma | 15/03/2019 - 15/06/2019 | Rome, Italy

The work focused on optimizing data synchronization between Medical Gateway devices and the Cloud in an IoT-based medical network. Using Octodiff, derived from the rdiff algorithm, the goal was to reduce data transmission by sending only modified file portions. We developed an adaptive chunk-size algorithm that adjusts based on "copy" and "data" instructions, minimizing delta file size iteratively. For specific devices like pulmonary ventilators that append data, a direct transmission method bypassing Octodiff is more efficient. Tests confirmed that our adaptive approach significantly improves synchronization efficiency compared to a fixed chunk-size method.

Backend Developer | Auenduo S.R.L. | 01/07/2019 - 30/11/2019 | Rome, Italy

Co-Author of middleware and backend server for communication and storage of data produced by several medical devices.

The middleware is developed using Node.js/Express, the backend is developed using C# .NET-core.

Web developer | CustomCubix | 01/12/2019 - 31/12/2019 | Rome, Italy

Co-Author of the 3D rendering and photo section for CustomCubix site, developed using the Three.js framework and HTML5/CSS/JS.

Site can be found at http://www.customcubix.com/

Research associate in university | Sapienza Università di Roma | 01/11/2024 - 31/10/2025 | Rome, Italy

Developed and integrated digital twins for water distribution networks combining hydraulic modeling and AI-based control for leak detection, resilience, and optimization.

Conducted cybersecurity analysis of an open-source Eclipse Ditto DT architecture using STRIDE, DREAD and CVSS; identified possible broker misconfigurations and weak isolation as main risks; proposed secure configuration and adaptive monitoring measures.

Designed a hybrid AI framework coupling supervised learning with reinforcement learning for autonomous leak mitigation and network control.

Created and enhanced Dynamic-WNTR, an event-driven, real-time hydraulic simulator integrated with OpenTwins for interactive DT testing and RL training, improving efficiency and reproducibility.

Published multiple peer-reviewed works on secure IoT communication, LoRaWAN, and water network DT control, including a best paper at AlgoCloud 2025.

ICT research consultant | Associazione Cyber4.0 | 02/12/2024 - 30/04/2025 | Rome, Italy

Development of a browser extension to intercept data sent to LLM agents.

Implementation of a system to anonymize sensitive and private information.

Automatic replacement of data with placeholders while preserving semantic context.

University research assistant | Aenduo s.r.l. | 04/04/2022 - 16/09/2022 | Rome, Italy

SAFE-MATE-ECG Project (Silent Atrial Fibrillation ECG Monitor with Artificial Intelligence), POR FESR Lazio 2014/2020 – Regione Lazio.

Development of a wearable ECG sensor for continuous cardiac monitoring and atrial fibrillation detection.

Data transmission via Bluetooth to the patient's smartphone and automatic upload to a central server.

AI-based analysis of ECG signals to identify atrial fibrillation episodes and notify the physician for further evaluation.

University research assistant | CNIT | 01/11/2021 - 15/11/2023 | Rome, Italy

ELEGANT Project (EU H2020, Grant Agreement No. 957286 – Secure and Seamless Edge-to-Cloud Analytics): Integration and evaluation of a prototype for large-scale water monitoring using the ELEGANT platform and Nebula Stream framework.

Conducted research on two ELEGANT use cases: optimization of radio resource allocation in LPWAN networks and detection of water resource consumption patterns.

Contributed to the testing, validation, and enhancement of the overall ELEGANT framework.

Supported the design and development of the ELEGANT Software Development Kit to enable efficient edge–cloud resource orchestration.

Language Skills

Mother tongue(s): **Italian**

	Understanding		Speaking		Writing
	Listening	Reading	Spoken production	Spoken interaction	
English	B2	B2	B2	B2	B2

Skills

Microsoft Office | Operating Systems (Windows, Linux) | C / C++ / C# | Ruby | HTML5/CSS, Javascript | Android Development (Kotlin, Java) | Java | MongoDB, MySQL | Backend: NodeJS, Express, socket.io | React ecosystem: ReactJS, React Router, Redux, Typescript | Web-development front-end (Bootstrap, HTML) | React React-Native | Wordpress | bash-script | GIT & Github | Visual Studio & Visual Studio Code

Publications

BE-Mesh: Bluetooth Low Energy Mesh Networking

2019. Presented at IEEE INFOCOM 2019.

https://doi.org/10.1109/INFCOMW.2019.8845084

Exploiting edge computing for adaptive data update in internet of things networks

2019.

http://ceur-ws.org/Vol-2492/paper4.pdf

Hijacking Downlink Path Selection in LoRaWAN

2021. Presented at IEEE GLOBECOM 2021.

https://doi.org/10.1109/GLOBECOM46510.2021.9685973

Ruling Out IoT Devices in LoRaWAN

2022. Presented at IEEE Infocom 2022.
https://doi.org/10.1109/INFOCOMWKSHPS54753.2022.9798063

BLENDER - Bluetooth Low Energy discovery and fingerprinting in IoT

2022. Presented at MEDCOMNET 2022.
https://doi.org/10.1109/MedComNet55087.2022.9810437

Device discovery and tracing in the Bluetooth Low Energy domain

2023. Computer Communications, Volume 202, 42-56.
https://doi.org/10.1016/j.comcom.2023.02.008

Friendship Security Analysis in Bluetooth Low Energy Networks

2023. Presented at IEEE MedComNet 2023 .
https://doi.org/10.1109/MedComNet58619.2023.10168876

DeLoRaN: Decentralize LoRaWAN Network Server Through Blockchain

2024. Presented at IEEE WCNC 2024.
https://doi.org/10.1109/WCNC57260.2024.10571052

Internet of things security issues in lorawan and bluetooth low energy

2023. Published on CNIT Technical Report-11 .
https://dx.doi.org/10.57620/CNIT-Report_11

Realistic traffic modeling and performance evaluation of a blockchain-enabled lorawan

P Locatelli, P Spadaccino, F Cuomo 2025 IEEE Wireless Communications and Networking Conference (WCNC), 1-6.
https://doi.org/10.1109/WCNC61545.2025.10978662

Detection and mitigation of jamming attacks in lorawan using machine learning

S Di Pinto, P Locatelli, P Spadaccino, F Cuomo 2025 IEEE Wireless Communications and Networking Conference (WCNC), 1-6.
https://doi.org/10.1109/WCNC61545.2025.10978351

Exploiting LoRaWAN Downlinks for Covert Device-to-Device Communication

P Spadaccino, P Locatelli, F Cuomo, 2025 IEEE 23rd Mediterranean Communication and Computer Networking Conference (MedComNet), 1-6.
https://doi.org/10.1109/MedComNet65822.2025.11103548

Secure Management of a Water Distribution Nework in Multi-tenant scenarios

P. Locatelli, T. Cattai, P. Spadaccino, F. Cuomo, ALGOCLOUD 2025 - 09/25 presented but not published yet.

Certifications

Abilitazione professionale Ingegnere dell'Informazione | Sapienza Università di Roma | 18/11/2022

Honours and Awards

Best Paper Award - "Secure Management of Water Distribution Networks in Multi-tenant Scenarios" | Algocloud 2025 | 15/09/2025