



## Ivan Vaccari

Ph.D. in Computer Science,  
Computer Engineer

- ▶ Via Ettore Bisagno 21, Genoa, Italy
- ▶ Italian
- ▶ Born: 13/07/1991

## Skills

### Software development

### Cyber security

### Internet of things

### Machine learning

### Big data/ Data science

### Distributed ledger technology

### Cloud computing

Italian L1

English Good

## Biography

Ivan Vaccari (IV) obtained his PhD in Computer Science and Degree in Computer Engineering, with 110/110 cum laude, from the University of Genoa (UNIGE) in 2017 and 2021 respectively. IV received the award for best thesis from the ABB company on theme "Digitization through the Internet of Things in the power generation industry and Smart grids and smart cities" carried out in collaboration with the Institute of Electronics and Information and Telecommunications Engineering (IEIIT) of the National Research Council (CNR). During the PhD, carried out in collaboration with the CNR-IEIIT, IV focused his research on the issue of cyber-security applied to the development and identification of particularly advanced cyber threats relating to the Internet of Things (IoT) context. In particular, IV has actively worked on identifying vulnerabilities of IoT networks and devices, widely used in many infrastructures such as industry 4.0, hospitals, banks, power plants, to protect and make communication between devices secure. The activities focus on the development of cyber-attacks on different protocols, such as MQTT, ZigBee or Wi-Fi, to exploit the identified vulnerabilities and the related protection systems based on innovative algorithms or machine learning techniques. IV is the author of over 15 international scientific papers, he has played the role of reviewer for over 30 research papers in international sector conferences and journals. Over the years, IV has acquired experience in the management of national and international research projects, as regards scientific, technical and organizational activities. During the research period, IV was directly involved in project activities of an international and national nature, actively participating in the practical development of the projects and in the organizational part of the activities. IV participated in numerous project meetings representing the CNR group, contributing to the success of all projects. Projects have resulted in scientific publications in international journals and conferences. Furthermore IV, in recent years, has actively collaborated with other research groups of the CNR, such as the machine learning and bioengineering group.

## Work experience

### Software Engineer

RINA

07/2021 - present

Software Engineer in charge to develop DevOps solution for clients.

### Ph.D. student

University of Genoa

10/2017 - 05/2021

PhD student in Computer Science at the University of Genoa (cycle XXXIII).  
Supervisor: Alessandro Armando, Maurizio Aiello, Enrico Cambiaso

### Research fellow

CNR, Institute for Electronics and Information Engineering and Telecommunications

06/2019 - 06/2021

Research fellow at the Genoa Network Security group of the CNR Institute for Electronics and Information Engineering and Telecommunications, for the activities related to "Development of innovative solutions in the cyber-security landscape". Scientific responsible: Dr. Enrico Cambiaso. Selection announcement n. IEIIT-001-2020-GE. Supervisor: Maurizio Aiello, Enrico Cambiaso

## Education

10/2017 - 05/2021

### Ph.D. in Computer Science

University of Genoa

*Internet of Things, cyber-security*  
Master's thesis: „Security aspects about Internet of Things networks, devices and protocols“.

09/2014 - 03/2017

### Master's degree in Computer Engineering

University of Genoa

*Computer Engineering*  
Bachelor's thesis: „Study of security aspects on ZigBee networks in Internet of Things“.

09/2010 - 09/2014

### Bachelor's degree in computer engineering

University of Genoa

*Computer Engineering.*

## Interests

- ▶ Technologies
- ▶ DIY
- ▶ Sport - Football
- ▶ Programming
- ▶ Travel
- ▶ Friends

## Contact

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### Research fellow

CNR, Institute for Electronics and Information Engineering and Telecommunications

06/2019 - 05/2020

Research fellow at the Genoa Network Security group of the CNR Institute for Electronics and Information Engineering and Telecommunications, for the european project "Integrated Framework for Predictive and Collaborative Security of Financial Infrastructures – FINSEC". Scientific responsible: Dr. Enrico Cambiaso. Selection announcement n. IEIIT-003-2019-GE. Supervisor: Maurizio Aiello, Enrico Cambiaso

### Research fellow

CNR, Institute for Electronics and Information Engineering and Telecommunications

06/2017 - 05/2019

Research fellow at the Genoa Network Security group of the CNR Institute for Electronics and Information Engineering and Telecommunications, for the european project "My Health - My Data (MH-MD)". Scientific responsible: Dr. Maurizio Aiello. Selection announcement n. IEIIT-006-2017-GE. Supervisor: Maurizio Aiello, Enrico Cambiaso

## Competence acquired

- Good knowledge of the functioning of network devices, both in theoretical and practical terms
- Knowledge of network protocols: IEEE 802.11, IEEE 802.15.4, IEEE 802.3, Wi-Fi, ZigBee, HTTP/HTTPS, MQTT
- Network Engineering: TCP/IP Architecture, IP Routing, ISO/OSI, Bridging/Switching, Firewall, IDS and IPS
- Good knowledge of cloud and storage systems and backups on physical devices such as NAS or tape
- Excellent knowledge of Internet of Things (IoT), both in hardware, software and cyber security
- Development of IoT applications using different communication protocols, depending on the implemented applications
- In-depth knowledge of Docker container systems and classic virtualization
- Knowledge of the Vulnerability Assessment and Penetration test processes
- Programming languages: Python, Matlab, C++, C#, Java, Databases (SQL and NoSQL), Blockchain, Cloud Platform (Google Cloud, AWS, Azure)
- Machine learning, advanced knowledge and algorithm (developed in Python)

## Project involved

- European project "Advanced Networked Agents for Security and Trust Assessment in CPS/IOT Architectures (ANASTACIA)".
- European project "Maturing and Extending the FREETOOL Tool development Initiative".
- European project "MyHealthMyData (MHMD)".
- European project "Integrated Framework for Predictive and Collaborative Security of Financial Infrastructures (FINSEC)".
- National project "Monitoring And Rescue Automation (MAREA)".
- National project "Cyber security delle infrastrutture critiche (CYBIC)".

- National project "Advances in Pneumology via ICT and Data Analytics (PNEULYT-ICS)".
- National project "CASTORE".
- National project "5G" in collaboration with Vodafone.

## Teaching activities

- Teaching with lessons entitled "IoT security" in the STRATEGOS Master's Degree course at the University of Genoa, year 2020.
- Teaching support activities for the course of Algorithms and Data Structures, year 2020, in the course of Computer Science at the University of Genoa
- Teaching support activities for the Advanced Data Management course, year 2018, in the course of Computer Science at the University of Genoa
- Teaching support activities for the course of Algorithms and Data Structures, year 2018, in the course of Computer Science at the University of Genoa
- Teaching support activities for the Mobile development course, year 2019, in the course of Computer Science at the University of Genoa

## Publications

- Vaccari, I., Cambiaso, E., and Aiello, M. (2017). Remotely Exploiting AT Command Attacks on ZigBee Networks. *Security and Communication Networks*, 2017.
- Vaccari, I., Cambiaso, E., and Aiello, M. (2019). Evaluating Security of Low-Power Internet of Things Networks. *International Journal of Computing and Digital Systems*, 8(02), 101-114.
- Cambiaso, E., Vaccari, I., Patti, L., and Aiello, M. (2019). Darknet Security: A Categorization of Attacks to the Tor Network. In *ITASEC*.
- Aiello, M., Cambiaso, E., Canonico, R., Maccari, L., Mellia, M., Pescapè, A., and Vaccari, I. (2020). IPPO: A Privacy-Aware Architecture for Decentralized Data-sharing. *arXiv preprint arXiv:2001.06420*.
- Vaccari, I., Aiello, M., and Cambiaso, E. (2020). SlowITe, a Novel Denial of Service Attack Affecting MQTT. *Sensors*, 20(10), 2932.
- Vaccari, I., Aiello, M., Pastorino, F., and Cambiaso, E. (2020, November). Protecting the ESP8266 Module from Replay Attacks. In *2020 International Conference on Communications, Computing, Cybersecurity, and Informatics (CCCI)* (pp. 1-6). IEEE.
- Vaccari, I., Aiello, M., Cambiaso, E. (2020). "Innovative Protection System Against Remote AT Command Attacks on ZigBee Networks" *Acta scientific computer science*
- Marrella, A., Varani, G., Aiello, M., Vaccari, I., Vitale, C., Mojzisek, M., Degrassi, C. and Scaglione, S. (2020) 3D fluid-dynamic ovarian cancer model resembling systemic drug administration for efficacy assay. *ALTEX-Alternatives to animal experimentation*.
- Mongelli, M., Orani, V., Cambiaso, E., Vaccari, I., Paglialonga, A., Braidò, F., and Catalano, C. E. (2020, August). Challenges and Opportunities of IoT and AI in Pneumology. In *2020 23rd Euromicro Conference on Digital System Design (DSD)* (pp. 285-292). IEEE.
- Cambiaso, E., Aiello, M., Mongelli, M., and Vaccari, I. (2020, August). Detection and classification of slow DoS attacks targeting network servers. In *Proceedings of the 15th International Conference on Availability, Reliability and Security* (pp. 1-7).

- G. Gazzarata, E. Troiano, L. Verderame, M. Aiello, I. Vaccari, E. Cambiaso and A. Merlo (2020) FINSTIX: a Cyber-Physical Data Model for Financial Critical Infrastructures. In Cyber-Physical Security for Critical Infrastructures Protection: First International Workshop, CPS4CIP 2020, Guildford, UK, September 18, 2020, Revised Selected Papers. Springer Nature. p. 48.
- Alessandra Marrella, Arianna Fedi, Gabriele Varani, Ivan Vaccari, Marco Massimo Fato, Giuseppe Firpo, Patrizia Guida, Nicola Aceto and Silvia Scaglione (2021). High blood flow shear stress values are associated with circulating tumor cells cluster disaggregation in a multi-channel microfluidic device. PloS one, 16(1), e0245536.
- Vaccari, I., Aiello, M., and Cambiaso, E. (2020). Slowtt: A slow denial of service against iot networks. Information, 11(9), 452.
- Vaccari, I., Chiola, G., Aiello, M., Mongelli, M., and Cambiaso, E. (2020). MQTTset, a New Dataset for Machine Learning Techniques on MQTT. Sensors, 20(22), 6578.
- Vaccari, I.; Orani, V.; Paglialonga, A.; Cambiaso, E.; Mongelli, M. A Generative Adversarial Network (GAN) Technique for Internet of Medical Things Data. Sensors 2021, 21, 3726.
- Abbas, Syed G., Ivan Vaccari, Faisal Hussain, Shahzaib Zahid, Ubaid U. Fayyaz, Ghalib A. Shah, Taimur Bakhshi, and Enrico Cambiaso. 2021. "Identifying and Mitigating Phishing Attack Threats in IoT Use Cases Using a Threat Modelling Approach" Sensors 21, no. 14: 4816.
- I. Vaccari, S. Narteni, M. Aiello, M. Mongelli and E. Cambiaso, "Exploiting Internet of Things Protocols for Malicious Data Exfiltration Activities," in IEEE Access, vol. 9, pp. 104261-104280, 2021.
- Narteni, S., Ferretti, M., Orani, V., Vaccari, I., Cambiaso, E., and Mongelli, M. (2021, August). From Explainable to Reliable Artificial Intelligence. In International Cross-Domain Conference for Machine Learning and Knowledge Extraction (pp. 255-273). Springer, Cham.
- Umberto Morelli, Ivan Vaccari, Silvio Ranise, and Enrico Cambiaso. 2021. DoS Attacks in Available MQTT Implementations: Investigating the Impact on Brokers and Devices, and supported Anti-DoS Protections. In The 16th International Conference on Availability, Reliability and Security (ARES 2021). Association for Computing Machinery, New York, NY, USA, Article 82, 1–9.

## Book chapters

- Bernal, J., Molina, A., Skarmeta, A., Bianchi, S., Cambiaso, E., Vaccari, I., Scaglione, S., Aiello, M., Trapero, R., Bouet, M., Belabed, M., Bagaa, M., Addad, R., Taleb, T., Rivera, D., El-Din Mady, A., Quesada Rodriguez, A., Crettaz, C., Ziegler, S., Kim, E., Filipponi, M., Bajic, B., Garcia-Carrillo D., Marin-Perez, R. (2019). Challenges in Cybersecurity and Privacy - the European Research Landscape  
River Publishers  
ISBN: 978-87-7022-088-0
- Giorgia Gazzarata, Ernesto Troiano, Enrico Cambiaso, Ivan Vaccari, Ariana Polyviou, Alessio Merlo and Luca Verderame, (2020) FINSTIX: A Security Data Model for the Financial Sector  
Now Publishers
- Habtamu Abie, Svetlana Boudko, Omri Soceanu, Lev Greenberg, Aidan Shribman, Beatriz Gallego-Nicasio, Enrico Cambiaso, Ivan Vaccari and Maurizio Aiello (2020) Adaptive and Intelligent Data Collection and Analytics for Securing Critical Financial Infrastructure  
Now Publishers
- Enrico Cambiaso, Ivan Vaccari and Maurizio Aiello (2020) Detection of Innovative Low-rate Denial of Service Attacks Against Critical Infrastructures  
Now Publishers
- Ivan Vaccari, Maurizio Aiello, Enrico Cambiaso (2021) An Innovative 0-Day Attack against ZigBee: Exploitation and Protection System Analysis  
Book Publisher International

## Conferences

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- Vaccari, I., Cambiaso, E., Aiello, M. (2019). Security aspects about Internet of Things networks and devices  
Computer Science Workshop 2019  
Ph.D. program in Computer Science and Systems Engineering, Università degli studi di Genova
- Vaccari, I., Cambiaso, E., Aiello, M. (2020). Security aspects about Internet of Things networks and devices  
Ph.D. forum poster session and presentation  
ITASEC20
- Vaccari, I., Aiello, M., Cambiaso, E. (2020) Exploiting low-powerful IoT devices to perpetrate network attacks  
Poster session  
IWSEC2020
- Vaccari, I. (2020) Security aspects about Internet of Things networks, devices and protocols  
Ph.D. forum poster session and presentation  
ICISSP2020

## Reviewer activities

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- Reviewer for more than 20 papers in international journals and conferences
- PC Member of the FINSEC'19 event organized during the "Twenty-fourth European Symposium on Research in Computer Security (ESORICS 2019)"
- Member of the Editorial Board of the AS Computer Science (ACTA Scientific) international journal.
- Member of the PhD Program Committee for ITASEC20 event.
- Member of the Editorial Board about the journal Computer Engineering Studies

## Certification

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In possession of more than 40 certifications relating to software development and the cyber-security aspect. The most relevant are:

- eLearnSecurity Web Application Penetration Tester (eWAPT) number 6857335, relating to the study of vulnerability assessment and penetration testing activities for web applications.
- eLearnSecurity Junior Penetration Tester (eJPT) number EJPT-200663, related to the study of vulnerability assessment and penetration testing activities.
- Cyber Security and Cyber Security essentials obtained on 29/01/2018 provided by Cisco Networking Academy concerning the exploration of the topic of cyber-security as a specialization in the IT field.
- Autopsy Basics and Hands On released by Basis Technology Training Center on 30/07/2020.
- Microsoft AI Classroom Series released by Microsoft on 01/28/2021.
- MATLAB Deep Learning Onramp released by MathWorks Training Center on 05/19/2020.