
PhD in Information Technology and Electrical Engineering
Università degli Studi di Napoli Federico II

PhD Student: Roberto D'Isanto

Cycle: XXXIX

Training and Research Activities Report

Year: First

Tutor: Prof. Simon Pietro Roma

Co-Tutor:

Date: November 04, 2024

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Author: Roberto D'Isanto

1. Information:

- **PhD student:** Roberto D'Isanto
- **DR number:** DR997218
- **Date of birth:** 06/03/1991
- **Master Science degree:** Computer Engineering **University:** Università degli Studi di Napoli Federico II
- **Doctoral Cycle:** XXXIX
- **Scholarship type:** PNRR
- **Tutor:** Prof. Simon Pietro Romano
- **Co-tutor:**

2. Study and training activities:

Activity	Type ¹	Hours	Credits	Dates	Organizer	Certificate ²
How to boost your PhD	Courses	18	5	10/01/2024 - 07/02/2024	Prof Antigone Marino	Y
Strategic Orientation for STEM Research & Writing	Courses	24	5	07/12/2023 - 23/02/2024	Chie Shin Fraser	Y
Big data architecture	Courses	21	5	06/05/2024 - 31/05/2024	Prof Giancarlo Sperli	Y
Software security	Courses	48	6	01/03/2024 - 18/06/2024	Prof Roberto Natella	Y
Computer Forensic	Courses	48	6	01/03/2024 - 18/06/2024	Prof Lorenzo Laurato	Y
Scienza moderna e disciplina giuridica dell'Intelligenza Artificiale	Courses	20	6	03/06/2024 - 03/07/2024	Prof Lucio Franzese	Y
Industrial Embedded Systems Design with the ARM Architecture	Courses	18	4	03/06/2024 - 26/06/2024	Prof Mario Barbareschi	Y
IEEE/DEI Summer Ph.D. School of Information Engineering "Silvano Pupolin" – SSIE 2024	Doctoral School	27	5	08/07/2024 - 12/07/2024	Prof. Marco Giordani DEI, University of Padova	Y
NATO Cyber Coalition	Research	40	3	27/11/2023 - 01/12/2023	COR Comando Operazioni in Rete	Y
Research on V2X	Research	-	2	2023/2024	-	N
Laboratory activity	Research	~300	10	01/11/2023 - 08/02/2024	Cyber HackAdemy - Federico II	N
Laboratory activity	Research	-	2	2023/2024	ARCLAB	N
Analytic center selection of optimization-based controllers for robot ecology	Seminars	1	0.2	09/04/2024	Prof Brusco Siciliano	Y
Complexity of Quantum Computing vs. Complexity of Classical Computing	Seminars	2	0.4	20/03/2024	Prof Beniamino Di Martino	Y

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Exploring the Frontiers of Modern Cryptography	Seminars	1.5	0.3	12/04/2024	Prof Simon Pietro Romano	Y
GENERATIVE AI FOR SOFTWARE ENGINEERING: STRATEGIES, IMPACTS, AND PRACTICAL APPLICATIONS	Seminars	1.5	0.3	29/05/2024	Prof. Maria Antonia Tulino	Y
HackInBo Summer Edition	Research	6	1.2	08/06/2024	HackInBo	Y
HackInBo Winter Edition	Seminars	5	1	18/11/2023	HackInBo	Y
INTELLIGENZA ARTIFICIALE E REGOLE DEL MERCATO	Seminars	2	0.4	14/05/2024	Prof. Maria Antonia Tulino	Y
Introduction to Large Language Models: Evolution and the current state	Seminars	2	0.4	10/06/2024	Prof. Giancarlo Sperli	Y
Modellazione di sistemi con linguaggio UML	Seminars	2	0.4	16/04/2024	Prof Beniamino Di Martino	Y
Motivation and Basic Ideas of Quantum Computing	Seminars	2	0.4	13/03/2024	Prof Beniamino Di Martino	Y
On the Single Allocation hub location problems: New formulations and Solving Methods	Seminars	1	0.2	26/06/2024	Prof. Claudio Sterle	Y
Resource management and orchestration for mixed-criticality cloud/distributed systems	Seminars	1	0.2	27/07/2024	Prof. Marcello Cinque	Y
Social Network Analysis: Methods and Applications	Seminars	2	0.4	07/06/2024	Prof. Giancarlo Sperli	Y
SUSTAINABLE IT: STRATEGIES AND BEST PRACTICES FOR A GREEN ENGINEERING FUTURE	Seminars	2	0.4	27/05/2024	Prof. Maria Antonia Tulino	Y
Sviluppo di applicazioni a containers su public cloud	Seminars	2	0.4	23/04/2024	Prof Beniamino Di Martino	Y
The maximal covering location problem with edge downgrades	Seminars	1	0.2	28/06/2024	Proff. Claudio Sterle, Maurizio Boccia, Adriano Masone	N
From ACE Technologies to Sustainable, Accessible and Equitable Urban Mobility: An Optimization Journey Seminar	Seminars	2	0.4	15/09/2024	Prof. Stefania Santini	Y
Using support vector machines for feature selection and outlier detection	Seminars	1	0.2	26/06/2024	Prof. Claudio Sterle	Y
Verso una gestione intelligente delle risorse idriche con il supporto dell'innovazione digitale	Seminars	1	0.2	14/05/2024	Prof. Maria Antonia Tulino	Y
Workshop GARR 2023 NET MAKERS Biblioteca Nazionale Centrale di Roma	Seminars	1.2	2.4	8,9,10/11/2023	GARR	Y

- 1) Courses, Seminar, Doctoral School, Research, Tutorship
- 2) Choose: Y or N

2.1. Study and training activities - credits earned

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	Courses	Seminars	Research	Tutorship	Total
Bimonth 1	0	3,4	8	0	11,4
Bimonth 2	10	0	5	0	15
Bimonth 3	0	2,1	3	0	5,1
Bimonth 4	21	2,9	2,2	0	26,1
Bimonth 5	11	0	0	0	11
Bimonth 6	0	0,4	0	0	0,4
Total	42	8,8	18,2	0	69
Expected	30 - 70	10 - 30	80 - 140	0 - 4,8	

3. Research activity:

My PhD thesis is "Analisi e sviluppo degli aspetti di cybersecurity legati alle tecnologie V2X (Vehicle To Everything) e relative ripercussioni sui sistemi a guida autonoma" it is about security in the automotive domain, specifically within the context of V2X (vehicle-to-anything) communication. The primary goal was to explore vulnerabilities and potential security measures in connected vehicle environments.

Since modern automotive cybersecurity is transversal to multiple domains, from software security to wireless communication, from network security to SDR, in this first year of PhD I spend my time improving my general knowledge, via courses and laboratory activity.

One field of research is about analysis of the CAN bus protocol, so I performed experiments by analyzing signals from real vehicles and within controlled laboratory environments using simulators. In the simulated setting, I worked on enhancing the CAN bus by integrating an additional security layer aimed at ensuring the CIA (Confidentiality, Integrity, and Availability) of the data transmitted across the network. This involved implementing encryption techniques to secure communications within the CAN bus, effectively improving protection against unauthorized access and eavesdropping.

There are still challenges to be resolved, particularly in developing solutions to counter replay attacks and in devising effective mitigation strategies against certain types of attacks. These challenges highlight the complexity of securing legacy communication systems within vehicles and underscore the necessity for ongoing research in this area.

4. Research products:

One article currently in progress, focused on adding a layer of encryption and signing to the CAN bus to ensure confidentiality, integrity, and availability.

5. Conferences and seminars attended

- **HackInBo** - Computer Security Conference - <https://www.hackinbo.it/> - Bologna, 08 June 2024
- **RomeHack** - Computer Security Conference - <https://romhack.io/> - Roma, 28 September 2024

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- **MOCA** - Computer Security Camping - <https://moca.camp/> - Teramo, 13-15 September 2024
- **NoHat** - Computer Security Conference - <https://www.nohat.it> - Bergamo, 19 October 2024

6. Activity abroad:

No activity abroad.

7. Activity in partner companies:

The industrial partner associated with my PhD program was FEV Italia s.r.l.
This year, I visited their laboratory to explore potential research opportunities.

8. Tutorship

No tutorship during this year.