PhD in Information Technology and Electrical Engineering
Università degli Studi di Napoli Federico II
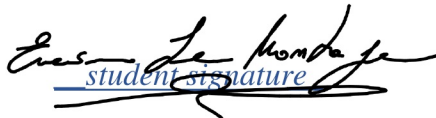
PhD Student: Erasmo La Montagna

Cycle: XXXV

Training and Research Activities Report

Year: First

student signature

Tutor: prof. Nicola Mazzocca

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Co-Tutor:

Date: October 21, 2020

1. Information:

- ➢ **PhD student: Erasmo La Montagna**
- ➢ **DR number: DR993882**
- ➢ **Date of birth: 05/10/1992**
- ➢ **Master Science degree: Computer Engineering   University: Università degli studi di Napoli Federico II**
- ➢ **Doctoral Cycle: XXXV**
- ➢ **Scholarship type:** *no scholarship*
- ➢ **Tutor: Nicola Mazzocca**
- ➢ **Co-tutor:**

2. Study and training activities:

Activity	Type[1]	Hours	Credits	Dates	Organizer	Certificate[2]
Blockchain For Beginners	seminar	3	0.6	12/11/19	Prof. Pierluigi Rippa	Y
Lo spazio cibernetico come dominio bellico	seminar	2	0.4	15/11/19	Prof. Guglielmo Tamburrini	Y
Introduction to CERN and wakefield measurements at CLEAR	seminar	2	0.4	18/11/19	Prof. Pasquale Arpaia	Y
Marked Point Processes for Object Detection and Tracking in High Resolution Images: Application to Remote Sensing Data	seminar	1	0.2	02/12/19	Prof. Giuseppe Scarpa	Y
Safety Critical Systems for Railway Traffic Management	course	20	3.3	10/01/20-27/01/20	Dr. Mario Barbare-schi	Y
Cybersecurity and Fuzzing for Robots, Blockchain and more	seminar	1	0.2	13/01/20	Prof. Roberto Natella	Y
Scientific Programming and Visualization with Python	course	10	2	27/02/20-28/02/20	Prof. Alessio Botta	Y

How to get published with the IEEE?	seminar	2	0.4	20/04/20	Dr.ssa Alessandra Scippa	Y
Virtual Technologies and their Applications	course	20	4	06/04/20-30/04/20	Prof. Domenico Cotroneo	Y
Innovation Management, entrepreneurship and intellectual property	course	25	5	05/05/20-05/06/20	Prof. Pierluigi Rippa	Y
Big Data Analytics and Business Intelligence	course	48	6	08/03/20-12/06/20	Prof. Antonio Picariello	Y
Exploring Autonomy in Robotic Flexible Endoscopy - Prof. Pietro Valdastri	seminar	2	0.4	12/06/20	Prof. Fanny Ficuciello	Y
Virtual Seminars on 'Sensing'	seminar	4	0.8	20/05/20	Prof. Carlo Forestiere	Y
Joint Design of Optics and Post-Processing Algorithms Based on Deep Learning for Generating Advanced Imaging Features	seminar	2	0.4	19/05/20	IEEE	N
Planning 5G under EMF constraints: challenges and opportunities	seminar	2	0.4	18/05/20	Prof. Luca Chiaraviglio	N
Realtà Virtuale e salute reale. Health 4.0 – Dal bit alla mente: spazi virtuali per la salute	seminar	2.5	0.5	15/05/20	Valentino Megale – TecUp	N
Seminario dell'Ing Marcello Savarese di WindTre Italia	seminar	2	0.4	14/05/20	Prof. Antonio Picariello	N
La programmazione europea e la ricerca. Nuovi scenari della programmazione europea dopo il 2020 - La gestione di un progetto di ricerca	seminar	2	0.4	13/05/20	Filippo Ammirati - Università degli Studi di Napoli Federico II	N

Design e Nuove tecnologie. Possibili scenari per fronteggiare l'emergenza	seminar	1	0.2	**11/05/20**	**Amleto Picerno Ceraso - Medaarch**	**Y**
Large Scale Training of Deep Neural Networks	seminar	2.5	0.5	**06/05/20**	**Prof. Carlo Sansone**	**Y**
IEEE Xplore webinar "Access the eLearning Library"	seminar	1	0.2	**04/05/20**	**Dr.ssa Alessandra Scippa**	**Y**
Machine Learning	course	20	4	**06/07/20-17/07/20**	**Prof. Carlo Sansone**	**Y**

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

2.1. Study and training activities - credits earned

	Courses	Seminars	Research	Tutorship	Total
Bimonth 1	0	1.6	8.4	0	10
Bimonth 2	3.3	0.2	6.5	0	10
Bimonth 3	2	0.4	7.6	0	10
Bimonth 4	15	4.1	0.9	0	20
Bimonth 5	4	0	6	0	10
Bimonth 6	0	0	7	0	7
Total	24.3	6.3	36.4	0	
Expected	30 - 70	10 - 30	80 - 140	0 – 4.8	

3.   Research activity:

During this year I have investigated multiple case studies of Physically Unclonable Functions.
In particular, I analyzed the feasibility of use of PUFs as tools to achieve mutual authentication even on devices with poor computational capabilities, such as the most frequently used microcontrollers in Industrial Internet of Things field of application (Arduino, STM32). I collaborated to the writing of a conference paper which analyzed the performance impact of the adoption of the PHEMAP protocol on a centralized Power Delivery Network compared to commonly adopted cryptography-based solutions.
A second case study is the adoption PUFs for the generation of a group-based key in the context of a distributed key management framework to meet end-to-end confidentiality requirements.
Finally, the third case study concerns the problem of obtaining a strong PUF (expensive and difficult to obtain easily on commercial devices) starting from a weak PUF coupled with a symmetric cipher. In a typical challenge/response scheme, the PUF circuit provides the encryption key (tamper evident and generated at power on), while the provided plaintext corresponds to the challenges and the ciphertext to

the responses. Pseudo PUF efficiency is analyzed in terms of metrics such as uniqueness, uniformity and bit-aliasing of the obtained responses.

4. Research products:
- Authors: M. Barbareschi, S. Barone, A. Fezza, E. La Montagna
- Title: Enforcing mutual authentication and confidentiality in Wireless Sensor Networks using Physically Unclonable Functions: a case study
- Conference Name: IFIP International Conference on Testing Software and Systems
- Conference Acronym: ICTSS
- Status: submitted
- Year: 2020

5. Conferences and seminars attended

6. Activity abroad:

7. Tutorship