
UNIVERSITÀ DEGLI STUDI DI NAPOLI FEDERICO II

**DOTTORATO DI RICERCA/ PHD PROGRAM IN
INFORMATION TECHNOLOGY AND ELECTRICAL ENGINEERING**

Activities and Publications Report

PhD Student: **Alessandro Pianese**

Student DR number: DR996974

PhD Cycle: XXXV III

PhD Chairman: Prof. Stefano Russo

PhD program student's start date: 01/01/2023

PhD program student's end date: 31/12/2025

Supervisor: Prof. Giovanni Poggi

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PhD scholarship funding entity:

PNRR ICSC National Research Centre for High Performance Computing, Big Data and Quantum Computing (CN00000013), under the NRRP MUR program funded by the NextGenerationEU.

General information

Alessandro Pianese received in the year 2021 the Master of Science in Computing Science with a major in intelligent systems and visual computing from the university of Groningen. After one year of a research grant, he attended the PhD program in Information Technology and Electrical Engineering. His PhD has been funded by the PNNR under the NextGenerationEU initiative.

Study activities

Attended Courses

Year	Course Title	Type	Credits	Lecturer	Organization
1 st	Using Deep Learning Properly	Ad hoc course	4	Dr. Andrea Apicella	ITEE
1 st	How to boost your PhD	Ad hoc course	4	Prof. Antigone Marino	UniNA
1 st	Visione per sistemi robotici	MSc course	9	Prof. Davide Cozzolino	UniNA
2 nd	Strategic Orientation for STEM Research & Writing	Ad hoc course	5	Dr. Chie Shin Fraser	UniNA
3 rd	Innovation and Entrepreneurship	Ad hoc course	4	Prof. Pierluigi Rippa	UniNa

Attended PhD Schools

Year	School title	Location	Credits	Dates	Organization
1 st	Summer School on Metaverse Technologies	Cagliari, Italy	5	18-22/09/23	EURASIP / IEEE SPS Summer School - University of Cagliari
2 nd	Understanding and modeling the world around us	Capri (NA), Italy	4	23-27/09/24	EURASIP / IEEE SPS Summer School - University of Napoli Federico II
3 rd	From Foundational Models to Multimedia Signal Processing: A deep dive in Multimodal AI	San Vincenzo (LI), Italy	5.2	21-26/09/25	EURASIP / IEEE SPS Summer School - University of Firenze

Attended Seminars

Year	Seminar Title	Credits	Lecturer	Lecturer affiliation	Organization
1 st	Statistical Multimedia Security and Forensics	4	Prof. Fernando Pérez-González	University of Vigo	University of Trento - IECS Doctoral School
1 st	Advances on Multimodal Machine Learning Solutions	0.2	Dr. Fei Tao and Dr.	Beihang University,	IEEE Signal Processing Society

Activities and Publications – Final Report

UNINA PhD in Information Technology and Electrical Engineering – XXXVIII Cycle

PhD candidate: Alessandro Pianese

	for Speech Processing Tasks and Emotion Recognition		Carlos Busso	University of Texas at Dallas	
1 st	The Super Neuron Model - A new generation of ANN-based Machine Learning and Applications	0.2	Moncef Gabbouj	Tampere Univeristy	EURASIP
1 st	Human Centric Visual Analysis - Hand, Gesture, Pose, Action, and Beyond	0.2	Dr. Joe (Zhou) Ren	Amazon	IEEE Signal Processing Society
1 st	Algorithm Unrolling: Efficient, Interpretable Deep Learning for Signal and Image Processing	0.2	Prof. Vishal Monga	University of Pennsylvania	ITEE
1 st	What's up with image & video forensics and security?	0.2	Prof. Fernando Pérez-González	University of Vigo	EURASIP
1 st	Unleashing the Power of LLMs: a Historical perspective on Generative AI	0.2	Prof. Tarry Singh	University of Texas at Dallas	ITEE
1 st	Computational Disinformation Symposium	1.4	Micah Musser, Joe Cheravitch, Sougata Saha...	NYU School of Law, National Defense University's College, MBZUAI	Justin Hendrix (NYU Tandon School of Engineering)
1 st	Prompting in Vision	0.2	Prof. Philip Isola	MIT	CVPR Conference
1 st	Scientific Integrity Verification Through Image Forensics	0.2	Dr. Daniel Moreira	Loyola University Chicago	IEE SSPS-IFS
1 st	Progressive JPEGs in the wild: Implications for information hiding and forensics	0.2	Nora Hofer	University of Innsbruck	IEEE SPS-IFS
2 nd	Universal Architectures for Progressive Machine Learning: Model, Performance Evaluation, Applications	0.2	Prof. John S. Baras	University of Maryland	International AI Doctoral Academy (AIDA)
2 nd	Time-based sampling: Theory and an application to video reconstruction from events	0.2	Prof. Pier Luigi Dragotti	Imperial College London	EURASIP
2 nd	Hominis	1.0	Prof. Tarry Singh,	University of Texas at Dallas,	ITEE

Activities and Publications – Final Report

UNINA PhD in Information Technology and Electrical Engineering – XXXVIII Cycle

PhD candidate: Alessandro Pianese

			Dr. Giuseppe Fiameni, Dr. Michela Tuozzo, Prof. Guglielmo Tamburrini	University of Modena and Reggio Emilia, University of Naples Federico II,	
2 nd	The Power of Retrieval for Video Analysis on Human Behavior Understanding	0.2	Dr. Jianquan Liu	Visual Intelligence Research Laboratories of NEC Corporation	EURASIP
2 nd	Video-based identity proofing	0.2	Dr. Cecilia Pasquini	University of Innsbruck	IAPR Computational Forensics Technical Committee
2 nd	Analytic center selection of optimization-based controllers for robot ecology	0.2	Dr. Gennaro Notomista	University of Waterloo	UniNA – PRISMA Lab
2 nd	Sustainable IT: Strategies and best practices for a green engineering future	1.0	Annalisa Di Leva, Dimitri Cuomo, Benedetta Ramazzotti, Tiziano Marcozzi	Capgemini	UniNA - 5G Academy
2 nd	Generative AI for software engineering: Strategies, impacts, and practical applications	1.0	Annalisa Di Leva, Cynthia Cuvi, Giulia Favale, Alessio Zoccoli	<u>Capgemini</u>	UniNA - 5G Academy
2 nd	Introduction to Large Language Models: Evolution and the current state	0.4	Prof. Tanmoy Chakraborty	Indian Institute of Technology	ITEE
2 nd	Learning in nonstationary environments	0.4	Prof. Cesare Alippi	Università della Svizzera italiana	ITEE
2 nd	veraAI audio tools to counter disinformation	0.2	Luca Cuccovillo, Milica gerhardt	Fraunhofer IDMT	Vera.AI
3 rd	On the Security of Semantic Watermarking to Detect AI-Generated Content	0.2	Dr. Erwin Quiring	Ruhr University Bochum	ITEE
3 rd	Pixel-Inconsistency Modeling for Image	0.2	Dr. Chenqi Kong	Nanyang Technological	Recod.ai Lab University of Campinas

Manipulation Localization		University
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Research activities

Alessandro Pianese has conducted research in the field of Multimedia Forensics, focusing on the detection of video deepfakes, fully generated speech tracks and partially altered ones. This research field already presents some solutions to the issue of detecting deepfakes. However, most of the approaches already available struggle to generalize to unseen data and to the noise typical of social media, where generated content is mainly spread. This is a serious concern as new kinds of generators are released every few months. Alessandro's focus was on the development of more generalizable and robust approaches. With this in mind, he contributed to the development of a PoI-based framework, training both a video and an audio network to extract representative speaker embeddings. Moreover, He explored the audio-only side, investigating the impact of adopting large language models and the development of a more explainable network that focuses on the speaker's nuances.

Alessandro Pianese spent three months as a PhD Research Visiting at the Recod.ai laboratory, in the Institute of Computing, University of Campinas, Brazil. During this period, He collaborated on the development of a fusion architecture able to combine the localization maps produced by some state-of-the-art models in order to produce an enhanced final probabilistic map.

He presented one research contribution at the Workshop on Multimedia Forensics hosted at the IEEE/CVP Computer Vision and Pattern Recognition Conference (CVPR) in 2023.

He also presented another contribution at the ACM Workshop on Information Hiding and Multimedia Security (IH&MMSec) in 2024.

Tutoring and supplementary teaching activities

Alessandro Pianese performed the following tutorship activities (Teaching assistance, Laboratory activities and Seminars):

-Elaborazione di Segnali Multimediali (9 hours). Tutor: Prof. Luisa Verdoliva

-Teoria dei Segnali (6 hours). Tutor: Prof. Giovanni Poggi

Credits summary

PhD Year	Courses	Seminars	Research	Tutoring / Supplementary Teaching
1 st	23	7.2	29.8	0
2 nd	13	5	41.46	0.54
3 rd	5.4	0.4	54.2	0

Research periods in institutions abroad and/or in companies

PhD Year	Institution / Company	Hosting tutor	Period	Activities
2 nd	Fraunhofer IDMT	Patrick Aichroth	01/12/24 – 31/12/24	Research topic and experiments: Development of a synthetic audio detector that leverages users vocal clues.
3 rd	Fraunhofer IDMT	Patrick Aichroth	01/01/25 – 28/02/2025	Research topic and experiments: Development of a synthetic audio detector that leverages users vocal clues.
3 rd	Recod.ai lab, Institute of Computing, University of Campinas, Brazil	Prof. Anderson Rocha	01/05/25 - 28/07/25	Research topic and experiments: Design of a fusion model to perform forgery localization in scientific images.

PhD Thesis

Our time witnessed the explosive growth of artificial intelligence. New tools based on this technology have replaced their older counterparts, driving rapid development in existing fields of application and creating entirely new ones. This is certainly true in the field of natural language processing with powerful speech synthesis and vocoding models that have transformed the landscape of the field. These technologies enable very interesting uses, such as automatic translation of educational audio or live translation during online conferences. However, we are also witnessing a growing use of these technologies for fraudulent ends. Increasingly, synthetic audio and deepfakes are being used to spread political and personal disinformation or to commit fraud.

The fight against these phenomena is the field of Multimedia Forensics, a rapidly expanding field that also relies predominantly by now on AI-based tools. The most popular approach to detect synthetic or manipulated speech is to train a model in a supervised manner on a subset of real and fake data. However, behaves poorly with newer technologies and it is too sensitive to signal degradations. To address this issues, we chose to explore innovative solutions that ensure better generalization and greater robustness to compression and background noise.

We introduced POI-Forensics, a deepfake detector that leverages contrastive learning to produce representative embeddings for both audio-visual tracks. We then modified the audio portion by introducing training-free solutions that, thanks to a pre-trained model, prevent bias and improve robustness. Finally, with the aim of supporting better interpretability of the results, we proposed a new encoding-decoding architecture to ensure that the models effectively focus on the individual's unique speech pattern.

Research products

Research results appear in 3 contributions to international conferences.

List of scientific publications

International conference papers

D. Cozzolino, A. Pianese, M. Nießner, and L. Verdoliva,
Audio-visual person-of-interest deepfake detection,
The Multimedia Forensics Workshop (WMF) at IEEE/CVF conference on computer vision and pattern
recognition (CVPR), Vancouver, Canada, June 2023 pp. 943-952. 2023,
DOI: 10.1109/CVPRW59228.2023.00101

International conference papers

A. Pianese, D. Cozzolino, G. Poggi, and L. Verdoliva,
Training-free deepfake voice recognition by leveraging large-scale pre-trained models,
ACM Workshop on Information Hiding and Multimedia Security, Baiona, Spain, June 2024, pp. 289-294,
DOI: 10.1145/3658664.3659662

International conference papers

A. Pianese, L. Cuccovillo, G. Poggi, T. L. Roux and P. Aichroth,
Towards Explainable Person-of-Interest-based Audio Synthesis Detection,
VERIMEDIA workshop, International Joint Conference on Neural Networks (IJCNN), Rome, Italy, 2025, pp. 1-
8, DOI: 10.1109/IJCNN64981.2025.11227306

Awards and Prizes

Date 16/12/2025

PhD student signature



Supervisor signature

