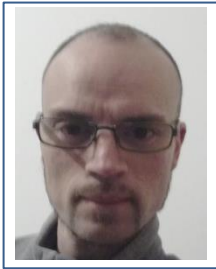


PERSONAL INFORMATION



- First name and Family name: **Andrea TOMA**
- Address: ---
- Mobile number: ---
- E-mail address: andrea.toma@uniud.it
- Personal e-mail address: andreatoma010@gmail.com

RELEVANT RESEARCH INTERESTS AND SKILLS

- Statistical Signal Processing e.g. Least Squares method, Kalman Filter, Probabilistic Data Association Filter, model-driven techniques and estimation of parameters
- Machine Learning and Deep Learning algorithms, e.g. Generative Adversarial Networks, Variational Autoencoders, Dynamic Switching Models
- Learning Deep Generative Models for Abnormality Detection
- Artificial Intelligence and basic concept of Self-Awareness as brain-inspired methodology for AI
- Matlab and its toolboxes, Python on GPU machines
- Acoustic data analysis and RF data analysis
- Control and coordination of drones (MAVLink)
- Real data collection, organization and processing of high-dimensional datasets
- Software: working experience with Python and Matlab
- Operating Systems: Windows and Linux-based OS

CURRENT POSITION

- **FIXED-TERM RESEARCHER (RTDA)** January 2022 - Present
- **Research topics:** Application of Machine Learning and Artificial Intelligence to acoustic data for sound event detection and localization of acoustic sources and speakers. Control and coordination of a cluster of UAVs. Study and development of Machine Learning techniques for optimization of energy and water consumption in a large industrial plant.
- **University of Udine (UNIUD)**, Italy; Department of Mathematics, Computer Science and Physics (DMIF); Website: www.dmif.uniud.it
- **Main activities:** Research in both the university laboratories and on the field, and related activities according to the main topics; participation to international conferences and publication of the findings of the research to journals and magazines; teaching and didactic activities in the classrooms; co-supervision of thesis.

- Participated to **conferences** with **publications** in [cp7, cp8, cp9] and published to **journals** in [jp5, jp6].

RELEVANT RESEARCH AND DIDACTIC QUALIFICATIONS AND ACTIVITIES

- **Doctorate (with thesis [th1]) at University of Genoa and Post-doctorate at University of Udine:**

- application of MACHINE LEARNING and ARTIFICIAL INTELLIGENCE

- **Project:**

- PROACTIVE COUNTER-UAV to counter intrusions from UAVs. My research concerns both HW system development and SW implementation with testing. Writing project presentations and reports is also required

- **Didactic activities at university:**

- assistant at the *Informatics for multimedia* module of the STM course at University of Udine (laboratory classes)
- assistant at the *Laboratory of web programming* module of the STM course at University of Udine (laboratory classes)
- assistant at the *Networks and techniques for multimedia communications* module of the STM course at University of Udine (laboratory classes)
- assistant at the *Drones and robotic systems* module of the CMTI course at University of Udine (laboratory classes)
- assistant at the *Laboratory of Social Robotics* module of the CMTI course at University of Udine (laboratory classes)
- assistant at the *Cybersecurity* module of the CMTI course at University of Udine (laboratory classes)
- assisted a master's student during final thesis development about video data analysis and autonomous drones at University of Udine

- **Conference presentations** (*remotely because of the COVID-19 restrictions):

- ICMCIS 2022, 17 May 2022, Udine, Italy (presented two articles) [cp9]
- IJCNN in WCCI, July 2022, Padua, Italy (presented one article) [cp7]
- ICMCIS 2021*, 6 May 2021 (presented slides in a virtual session) [cp1]
- Interspeech*, 1 September 2021 (presented slides in a virtual poster-like session) [cp2]
- IST-190 Symp. on AI4HMO*, 6 October 2021 (presented slides in a virtual session) [cp3]
- WIDECOM 2019, University of Milan, Italy, February 11-13, 2019 (presentation slides) [cp5]

- **Awards:** ‘*Young Researcher Best Paper*’ at ICMCIS 2022 and ‘*Workshops Best Paper*’ at WIDECOM 2019 conferences

- **Research activities and collaborations:**

- Austrian Institute of Technology - Mobility Department (Vienna): application of Statistical Signal Processing to the ToA-based localization problem with asynchronous

nodes in environments with multipath and fading

- University of Salento - Department of Engineering for Innovation (Lecce): application of Statistical Signal Processing to the ToA-based localization problem using a Recursive Least Squares method

• **Others:**

- I participate in the project above as component of a research group
- I organize the research laboratory for experiments and tests
- assisted for establishment of a research collaboration with external entities

POST-DOCTORATE AND DOCTORATE (PHD)

POST-DOCTORAL FELLOWSHIP

June 2020 - Present

Research topic: Study and development of artificial intelligence techniques for analysing and classifying large amounts of multidimensional data and localization and tracking of a moving target with acoustic and video sensors carried by mobile robotic agents

University of Udine (UNIUD), Italy; Department of Mathematics, Computer Science and Physics (DMIF); Website: www.dmif.uniud.it

Main activities: development and testing of a communication and control system, hardware and software, for micro aerial vehicle (MAV) devices. Application of deep learning techniques to the RF-assisted localization of acoustic sources, speakers, and UAVs.

Participated in **conferences** with **publications** in [cp1, cp2, cp3].

PH.D. IN INTERACTIVE AND COGNITIVE ENVIRONMENTS (JD-ICE)

November 2016 – November 2019

Research topic: Signal processing for AI-based Cognitive Radio

PhD programme: Joint Doctorate in Interactive and Cognitive Environments – JD ICE

Dates: November 2016 - November 2019; final viva: 24 April 2020

University of Genoa (UNIGE), Italy; Department of Electrical, Electronic, Telecommunications Engineering and Naval Architecture (DITEN); Website: www.isip40.it

Queen Mary University of London (QMUL), UK; School of Electronic Engineering and Computer Science (EECS); Website: www.qmul.ac.uk

Supervisors: Prof. Carlo Regazzoni, Prof. Yue Gao, and Prof. Lucio Marcenaro

Title of the PhD thesis [th1]: “*PHY-layer Security in Cognitive Radio Networks through Learning Deep Generative Models: an AI-based approach*”

Participated in **conferences [cp5]**

Publications in [jp1, jp2, cp4, cp5, bc1]

Events and presentations with slides and posters:

- **GTTI - Thematic Meeting** on Multimedia Signal Processing 2017, Courmayeur (AO), Italy, January, 29-31 2017 (with presentation of slide teaser and poster);
- Joint IEEE SPS and EURASIP **Summer School** on Signal Processing for 5G Wireless Access, Chalmers University of Technology, Gothenburg, Sweden, May 29 - June 1, 2017 (with presentation of poster);
- Joint **Annual Meeting** of GTTI-SIEm-CNIT, Udine, Italy, June 21-23, 2017 (with presentation of slide teaser and poster);
- Complex Networks and Telecommunications **Summer School** - Lake Como School of Advanced Studies, Como, Italy, July 16-20, 2018 (with presentation slides);
- **Industry Event** at QMUL (London), 21 November 2018 (with presentation of poster);
- **2019 Annual Meeting** GTTI - Pavia, Italy, June 26-28 (with presentation of slide teaser and poster);
- **S3P-2019 Summer School** on Signal Processing for Autonomous Systems (SP-AS), Sept. 9-13, 2019, Arenzano, GE, Italy. I helped with the organization of the event (for example, editing of the program of the school, registration desk) - with presentation of slide teaser and poster;
- **CSI Intelligent Sensing Summer School**, QMUL, London, 28-29 August 2018;
- **CSI PhD Welcome day**, QMUL, London, 21 February 2019, where I also helped for logistics;
- Seminars and meetings.

Attended courses and modules (UNIGE and QMUL):

- 1) Data Fusion and Bayesian Interaction Modeling for Cognitive Ambient Intelligence (UniGe);
- 2) Industrial Analytics: Theory and Practice of Learning from Data (UniGe);
- 3) Machine Learning for Visual Data Analysis (QMUL);
- 4) Machine Learning (QMUL);
- 5) Deep Learning and Computer Vision (QMUL);
- 6) Deep Learning: a hands-on introduction (UniGe).

TEACHING AND RESEARCH COLLABORATIONS

- TEACHING ACTIVITY - “MATHEMATICS APPLIED TO PROBLEMS IN ENGINEERING”

February 2016 - June 2016

Secondary school, Scientific lyceum “G. Stampacchia”, Tricase (Le), Italy; Website: www.liceostampacchia.it

The course focused on *Vectors, Matrices, Linear Systems and the Least Squares method with application to localization and GPS*. It also included laboratory activities and exercises with the on-line calculator *Wiris*. Class size: 25 students about to conclude their secondary school studies.

- RESEARCH COLLABORATION

January 2016 - March 2016

Statistical Signal Processing - Department of Engineering for Innovation, University of Salento (Lecce, Italy)

Time-of-Arrival based localization algorithm. Development and testing of an innovative *Recursive Least Squares* method which uses the expression for the pseudo-inverse of rank-one modified matrices.

- RESEARCH ACTIVITY

June 2015 - December 2015

I further investigated and developed the ToA-based algorithms, following parametric approaches, from my previous internship and master’s thesis by also collaborating with my supervisors.

- INTERNSHIP, RESEARCH COLLABORATION

April 2014 - June 2014

Austrian Institute of Technology - Mobility Department - Business Unit Dynamic Transportation Systems, 1210 Vienna (Austria), Giefinggasse 2; Website: www.ait.ac.at

Research activity focused on **Time of Arrival (ToA)-based localization algorithms** resulted in a manuscript published on *Computer Networks (COMNET)* journal [jp3].

Supervisor: Prof. Fabio Ricciato

EDUCATION AND TRAINING

- ENGLISH LANGUAGE COURSE AND PERSONAL STUDY

July 2014 - May 2015

- English language course, advanced level (December 2014 - March 2015)

Language Centre - University of Salento, Lecce (Italy); Website: www.cla.unisalento.it ;

- English language practice both autonomously and with some of the attendees of the advanced level course to improve my listening skill and enhance my vocabulary because I like working in international environments and meeting new people from other countries;

- Basics of Embedded Electronics to increase my knowledge.

- **MASTER'S DEGREE IN COMMUNICATION ENGINEERING** April 2009 - January 2014

University of Salento, Lecce (Italy); Website: www.ingegneria.unisalento.it

Final grade: *110/110 cum laude*

Research thesis in Statistical Signal Processing [th2]: “RSS-based localization techniques in heterogeneous environments”, University of Salento, Lecce (Italy), resulted in a conference paper in *International Conference on Acoustics, Speech, and Signal Processing (ICASSP)* [cp6, jp4].

Supervisors: Prof. Giuseppe Ricci, Prof. Francesco Bandiera, Prof. Angelo Coluccia

- **BACHELOR'S DEGREE IN INFORMATION ENGINEERING** September 2001 - January 2009

University of Salento, Lecce (Italy); Website: www.ingegneria.unisalento.it

Final grade: *107/110*

Research thesis in Electronic Devices: “*Passivation of AlGaIn/GaN HEMT transistors*”, National Nanotechnology Laboratory, NNL, Lecce (Italy)

Supervisor: Prof. Massimo De Vittorio

COMPUTER SKILLS

- Programming languages (Python with Pytorch and TensorFlow, Matlab, C, C++, Java)
- Web oriented programming languages: Javascript, PHP, HTML, CSS, MySQL
- XAMPP, Apache
- Engineering software (Cadence, CST MicroWave Studio, Multisim, Origin)
- Windows and Linux Operating Systems, basic knowledge of Mac OS X
- LaTeX and Overleaf
- OwnCloud, Dropbox, GoogleDrive, Onedrive, Box drive
- Microsoft Teams, Zoom, WebEx, Skype
- OBS Studio, Wondershare Filmora X
- OpenVPN, Putty, TeamViewer, GitLab, GitHub, basic knowledge of Version Control with GitKraken
- Fundamentals of hard disk partitioning and operating system installation (in particular operating systems based on Linux kernel such as Ubuntu), VirtualBox
- Working knowledge of Raspberry Pi (zero, 3, and 4) and basic knowledge of Arduino

PUBLICATIONS

- JOURNAL PAPERS (5)

[jp1] *IEEE Transactions on Cognitive Communications and Networking (TCCN)*, March 2020

[jp2] *IET Communications*, June 2019

[jp3] *Computer Networks (COMNET)*, September 2015

[jp5] *Multimedia Tools and Applications (MTA)-Springer*, February 2023

[jp6] *IEEE Communications Magazine*, May 2023

In the following manuscript, I have been mentioned in the Acknowledgments:

[jp4] *IEEE Transactions on Signal Processing*, April 2015

- CONFERENCE PAPERS (9)

[cp1] *IST-190 Symposium on AI, ML and BD for Hybrid Military Operations (AI4HMO)*, October 2021

[cp2] *Proc. Interspeech 2021*, September 2021

[cp3] *21st International Conference on Military Communications and Information Systems (ICMCIS 2021)*, May 2021

[cp4] *IEEE 31st International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC)*, September 2020

[cp5] *2nd International Conference on Wireless Intelligent and Distributed Environment for Communication, WIDECOM2019*. Lecture Notes on Data Engineering and Communications Technologies, March 2019 (*Workshops Best Paper Award*)

[cp6] *International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, May 2014

[cp7] *International Joint Conference on Neural Networks (IJCNN) in IEEE World Congress on Computational Intelligence (WCCI)*, July 2022

[cp8] *Procedia Computer Science, International Conference on Military Communications and Information Systems (ICMCIS 2022)*, May 2022

[cp9] *Procedia Computer Science, International Conference on Military Communications and Information Systems (ICMCIS 2022)*, May 2022

- BOOK CHAPTERS (1)

[bc1] *Cognitive Radio Applications and Practices, Handbook of Cognitive Radio, Springer, Singapore, June 2018*

- THESES

[th1] **A. Toma**, “PHY layer Security in Cognitive Radio Networks through Learning Deep Generative Models: an AI based approach”, PhD thesis, University of Genoa, April 2020

[th2] **A. Toma**, “RSS-based localization techniques in heterogeneous environments”, Master’s thesis, University of Salento, January 2014

Autorizzo il trattamento dei dati personali, ai sensi e per gli effetti del D.Lgs. 30.6.2003, n. 196 “Codice in materia di protezione dei dati personali”.

01/05/2023

Data

AT

Firma

Tutti i fatti e gli stati indicati in questo documento sono da ritenersi dichiarati ai sensi e per gli effetti degli articoli 46 e 47 del DPR 445/2000.

01/05/2023

Data

AT

Firma