

# *Curriculum Vitae et Studiorum*

## *Luca Guarnera*

(redatto ai sensi degli art. 46 e 47 del d.p.r. 28.12.2000, n. 445)

### **Academic Office:**

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Cittadella Universitaria - Viale A. Doria 6 – Italy

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**iCTLab:** <https://www.ictlab.srl>

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## **Short Biography**

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Luca Guarnera was born in Catania on October 26, 1992. Since January 1, 2022, he is a research fellow in Computer Science at the University of Catania. He graduated as Ph.D. in Computer Science (XXXIII cycle, PON number E37H18000330006) on October 14, 2021, discussing the thesis entitled “Discovering Fingerprints for Deepfake Detection and Multimedia-Enhanced Forensic Investigations” at the Department of Mathematics and Computer Science, University of Catania. Part of the Ph.D. research was carried out at the University of Hertfordshire, College Lane Campus, Hatfield, UK, under the supervision of Prof. Salvatore Livatino, working on the creation of a software for forensic ballistics analysis and firearms comparison, using the Oculus Rift S headset. He received his MSc (cum laude) in Computer Science from the Department of Mathematics and Computer Science, University of Catania in 2017. He joined IPLab in 2015. In 2017 and 2019, he took part in two Mohamed Bin Zayed International Robotics Challenge (MBZIRC) international robotics competitions. He also participated to four editions (2016-2017-2018-2019) of International Computer Vision Summer School (ICVSS), one edition (2018) of Medical Imaging Summer School (MISS), one edition (2018) of Summer School on Signal Processing (S3P). His main research interests are Computer Vision, Machine Learning, Multimedia Forensics and its related fields with a focus on the Deepfake phenomenon.

## Education

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- **31/03/2018 – 30/06/2021**: Executive PhD Student in Computer Science XXXIII cycle at the Department of Mathematics and Computer Science, University of Catania (PON number E37H18000330006), in collaboration with the spin-off “iCTLab s.r.l.”, a company operating in the field of Digital Forensics, Privacy and Security consulting and software development.
- **2015 - 2017**: Master’s Degree in Computer Science (cum laude) at the Department of Mathematics and Computer Science, University of Catania in 2017 discussing a thesis entitled "Forensics tool per la generazione e ripristino di immagini digitali di targhe di veicoli stradali" (in collaboration with ICTLab and Image Processing Lab (IPLAB)).
- **2011 - 2015**: Bachelor's Degree in Computer Science at the Department of Mathematics and Computer Science, University of Catania with votes 110/110 discussing a thesis entitled "GRAPHJ2.0: Rilievi grafometrici avanzati nell'analisi forense delle manoscritte". (in collaboration with Reparto Investigazioni Scientifiche dell'Arma dei Carabinieri (RIS) of Messina and the Image Processing Lab (IPLAB));
- **2006 – 2011**: Diploma of “Perito Tecnico Industriale” at the Istituto Tecnico Industriale Statale “Guglielmo Marconi”.

## Work Experience

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- From January 1, 2022 - ongoing: Research Fellow (RTDa) at the Department of Mathematics and Computer Science, University of Catania. Action: IV.4 - PhDs and research contracts on topics of Innovation. Title of research activity: ***Study of intelligent monitoring and mapping systems by means of drones and advanced sensing of urban and rural/green areas for prevention and investigation support in environmental matters.*** Department of affiliation: Department of Mathematics and Computer Science, University of Catania. Scientific disciplinary area: INF/01 - Computer Science. Company involved in the project: iCTLAB srl (CT) [www.ictlab.srl](http://www.ictlab.srl). Scientific head of the project: Prof. Sebastiano Battiato.
- From July 1, 2021, to December 31, 2021: Contract Researcher (post-doc) with a project entitled: "***Research and Development of Computer Vision Algorithms in Automotive, SmartCity and Surveillance***", at the Department of Mathematics and Computer Science, University of Catania. Assignment funded by the research project "Development of advanced technologies and systems for car safety using ADAS - ADAS+ platforms," code ARS01\_00459, CUP E66C18000410005; Scientific head: Prof. Sebastiano Battiato;
- In 22/12/2017 – 22/03/2018 he worked at the CUTGANA (Via Santa Sofia, 98, Catania (CT), Italy) with a Fixed Term Research Contract. The main activities were development of computer vision algorithms for object recognition for automatic video production.

## Citation Scores (November 2022)

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- **Google Scholar** (<https://scholar.google.it/citations?user=x1Zhq3gAAAAJ&hl=it>)
  - o H-Index = 7
  - o Total Number of citations = 255
- **SCOPUS** (<https://www.scopus.com/authid/detail.uri?authorId=57196273602>)
  - o H-index = 5
  - o Total Number of citations = 148

## Scientific Research

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### Main Topics

- **Multimedia Forensics;**
- **Computer Vision;**
- **Machine Learning.**
- **Deep Learning**

## Publications

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### Journals

1. Luca Guarnera, Oliver Giudice, Salvatore Livatino, Antonino Barbaro Paratore, Angelo Salici, Sebastiano Battiato (2022). **Assessing Forensic Ballistics Three-Dimensionally through Graphical Reconstruction and Immersive VR Observation.** Multimedia Tools and Applications, 1-27 (DOI: <https://doi.org/10.1007/s11042-022-14037-x>).
2. Andrea Maugeri, Roberta Magnano San Lio, Giuliana Favara, Maria Clara La Rosa, Claudia La Mastra, Paolo Marco Riela, Luca Guarnera, Sebastiano Battiato, Martina Barchitta, Antonella Agodi (2022). **Impact of eating context on dietary choices of young adults: evidence from the HEALTHY-UNICT project.** Nutrients 2022, 14(20), 4418; (DOI: <https://doi.org/10.3390/nu14204418>).
3. Luca Guarnera, Oliver Giudice, Francesco Guarnera, Alessandro Ortis, Giovanni Puglisi, Antonino Paratore, Linh M. Q. Bui, Marco Fontani, Davide Alessandro Coccomini, Roberto Caldelli, Fabrizio Falchi, Claudio Gennaro, Nicola Messina, Giuseppe Amato, Gianpaolo Perelli, Sara Concas, Carlo Cuccu, Giulia Orrù, Gian Luca Marcialis, Sebastiano Battiato (2022). **The Face Deepfake Detection Challenge.** Journal of Imaging 2022, 8(10), 263; (DOI: <https://doi.org/10.3390/jimaging8100263>).

4. Martina Barchitta, Andrea Maugeri, Giuliana Favara, Roberta Magnano San Lio, Paolo Marco RIELA, Luca Guarnera, Sebastiano Battiato and Antonella Agodi (2022). **Development of a Web-App for the Ecological Momentary Assessment of Dietary Habits among College Students: The HEALTHY-UNICT Project**. *Nutrients* 2022, 14(2), 330; (DOI: <https://doi.org/10.3390/nu14020330>).
5. Oliver Giudice, Luca Guarnera, and Sebastiano Battiato. (2021). **Fighting Deepfakes by Detecting GAN DCT Anomalies**. *Journal of Imaging* 2021; 7(8):128, (DOI: <https://doi.org/10.3390/jimaging7080128>). (*Journal of Imaging*, **Q2**, 2020).
6. Luca Guarnera, Oliver Giudice, Sebastiano Battiato (2020). **Fighting Deepfake by Exposing the Convolutional Traces on Images**. *IEEE Access* 8 (2020): 165085-165098, (DOI: 10.1109/ACCESS.2020.3023037). (*IEEE Access*, **Q1**, 2020).
7. Luca Guarnera, Giovanni Maria Farinella, Antonino Furnari, Angelo Salici, Claudio Ciampini, Vito Matranga, Sebastiano Battiato (2018). **Forensic Analysis of Handwritten Documents with GRAPHJ**. *Journal of Electronic Imaging*, 27(5), 051230, (DOI: <https://doi.org/10.1117/1.JEI.27.5.051230>). (*Journal of Electronic Imaging*, **Q3**, 2018).

## Conferences

1. Sebastiano Battiato, Luciano Cantelli, Fabio D'Urso, Giovanni Maria Farinella, Luca Guarnera, Dario Calogero Guastella, Rosario Leonardi, Alessia Li Noce, Giovanni Muscato, Alessio Piazza, Francesco Ragusa, Corrado Santoro, Giuseppe Sutera and Antonio Zappalà (2022). **The UNICT-TEAM vision modules for the Mohamed Bin Zayed International Robotics Challenge 2020**. In *Proceedings of the International Conference on Computer Vision & Image Processing (CVIP)*.
2. Luca Guarnera, Oliver Giudice, Sebastiano Battiato (2022). **Deepfake Style Transfer Mixture: A First Forensic Ballistics Study on Synthetic Images**. In *International Conference on Image Analysis and Processing* (pp. 151-163). Springer, Cham.
3. Luca Guarnera, Oliver Giudice, Matthias Nießner, Sebastiano Battiato (2022). **On the Exploitation of Deepfake Model Recognition**. In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition* (pp. 61-70).
4. Luca Guarnera, Oliver Giudice, Sebastiano Battiato (2020). **Deepfake Detection by Analyzing Convolutional Traces**. In *Proceedings of 2020 IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (CVPRW)*, 2020, pp. 2841-2850, , (DOI: 10.1109/CVPRW50498.2020.00341).
5. Luca Guarnera, Oliver Giudice, Cristina Nastasi, Sebastiano Battiato (2020). **Preliminary Forensics Analysis of DeepFake Image**. In *Proceedings of 2020 AEIT International Annual Conference (AEIT)*, 2020, pp. 1-6, , (DOI: 10.23919/AEIT50178.2020.9241108).
6. Oliver Giudice, Luca Guarnera, Antonino Barbaro Paratore, Giovanni Maria Farinella, Sebastiano Battiato (2019). **Siamese Ballistics Neural Network**. In *Proceedings of 2019 IEEE International Conference on Image Processing (ICIP)*, 2019, pp. 4045-4049, , (DOI: 10.1109/ICIP.2019.8803619).
7. Francesco Ragusa, Luca Guarnera, Antonino Furnari, Sebastiano Battiato, Giovanni Signorello, Giovanni Maria Farinella (2018). **Localization of Visitors for Cultural Sites**

- Management.** In Proceedings of 2018 *International Conference on Signal Processing and Multimedia Applications (SIGMAP)*, pp. 573-579, 2018, , (DOI: 10.5220/0006886404070413).
8. Sebastiano Battiato, Luciano Cantelli, Fabio D’Urso, Giovanni Maria Farinella, Luca Guarnera, Dario Guastella, Carmelo Donato Melita, Giovanni Muscato, Alessandro Ortis, Francesco Ragusa, Corrado Santoro (2017). **A System for Autonomous Landing of a UAV on a Moving Vehicle.** In Proceedings of 2017 *International Conference on Image Analysis and Processing (ICIAP)*. Lecture Notes in Computer Science, vol 10484, pp. 129-139. Springer, Cham, (DOI: [https://doi.org/10.1007/978-3-319-68560-1\\_12](https://doi.org/10.1007/978-3-319-68560-1_12)).
  9. Luca Guarnera, Giovanni Maria Farinella, Antonino Furnari, Angelo Salici, Claudio Ciampini, Vito Matranga, Sebastiano Battiato (2017). **GRAPHJ: A Forensics Tool for Handwriting Analysis.** In Proceedings of 2017 *International Conference on Image Analysis and Processing (ICIAP)*. Lecture Notes in Computer Science, vol 10485, pp. 591-601, Springer, Cham, (DOI: [https://doi.org/10.1007/978-3-319-68548-9\\_54](https://doi.org/10.1007/978-3-319-68548-9_54)).

## Doctoral Thesis

1. Luca Guarnera (2021). **Discovering Fingerprints for Deepfake Detection and Multimedia-Enhanced Forensic Investigations.** Tesi di Dottorato (XXXIII ciclo). Università degli Studi di Catania, Dipartimento di Matematica e Informatica. Tutor: Prof. Sebastiano Battiato.

## Book Chapters (national)

1. Luca Guarnera, Oliver Giudice, Sebastiano Battiato (2022). **Fenomenologia dei DeepFake: aspetti teorici e operativi per la detection di volti umani “artificiali”.** Nuove questioni di informatica forense, a cura di Raffaella Brighi. Collana *Informatica giuridica*, Aracne Editrice.
2. Sebastiano Battiato, Oliver Giudice, Luca Guarnera, Cristina Nastasi (2021). **Analisi Forense di Immagini Deepfake di Volti di Persone.** Capitolo in *International Information System Forensics Association (IISFA) Memberbook 2021 DIGITAL FORENSICS* – Eds. G. Costabile, A. Attanasio, M. Ianulardo – Italy 2021.
3. Sebastiano Battiato, Oliver Giudice, Luca Guarnera, Antonino Barbaro Paratore (2018). **Simulazioni informatiche per le indagini scientifiche forensi. l’utilizzo di SUMO: tool avanzato per la simulazione del traffico urbano.** Capitolo in *International Information System Forensics Association (IISFA) Memberbook 2018 DIGITAL FORENSICS* – Eds. G. Costabile, A. Attanasio, M. Ianulardo – Italy 2019;

## Abstracts

1. Martina Barchitta, Andrea Maugeri, Giuliana Favara, Roberta Magnano San Lio, Paolo Marco Riela, Luca Guarnera, Sebastiano Battiato, Antonella Agodi (2021). **Healthy diet and**

- lifestyles assessment using a mEMA approach: protocol of the HEALTHY-UNICT study.* In Abstract proceedings of 14<sup>th</sup> EPH Conference programme Virtual 2021.
2. Martina Barchitta, Andrea Maugeri, Giuliana Favara, Roberta Magnano San Lio, Paolo Marco Riela, Luca Guarnera, Sebastiano Battiato, Antonella Agodi (2021). **DIETA E STILI DI VITA NEGLI STUDENTI UNIVERSITARI: I RISULTATI DEL PROGETTO HEALTHY-UNICT.** In Abstract proceedings of 54° Congresso Nazionali delle Siti - SOCIETÀ ITALIANA DI IGIENE, MEDICINA PREVENTIVA E SANITA' PUBBLICA, 2021.
  3. Martina Barchitta, Andrea Maugeri, Giuliana Favara, Roberta Magnano San Lio, Paolo Marco Riela, Luca Guarnera, Sebastiano Battiato, Antonella Agodi (2021). **L'impatto dell'epidemia di COVID-19 sugli stili di vita e sullo stato psicologico degli studenti universitari di Catania: i risultati dello studio HEALTHY-UNICT.** In Abstract proceedings of 54° Congresso Nazionali delle Siti - SOCIETÀ ITALIANA DI IGIENE, MEDICINA PREVENTIVA E SANITA' PUBBLICA, 2021.
  4. Sebastiano Battiato, Oliver Giudice, Luca Guarnera (2021). **Houston we have a problem: Deepfake is the word!** In Abstract proceedings of 73st Annual Meeting of American Academy of Forensic Sciences, AAFS 2021 - February 2021.
  5. Sebastiano Battiato, Oliver Giudice, Luca Guarnera, Antonino Barbaro Paratore, Angelo Salici (2020). **2D/3D Imaging for Forensic Ballistics Comparison Assessment.** In Abstract proceedings of 72st Annual Meeting of American Academy of Forensic Sciences, AAFS 2020 - Anaheim, California (US) - February 2020
  6. Oliver Giudice, Antonino Barbaro Paratore, Sebastiano Battiato, Luca Guarnera (2019). **Social Network Image Ballistics through Automatic Reverse-Engineering.** In Abstract proceedings of 71st Annual Meeting of American Academy of Forensic Sciences, AAFS 2019 - Baltimore (US) - February 2019
  7. Oliver Giudice, Antonino Barbaro Paratore, Sebastiano Battiato, Luca Guarnera (2019). **Hands on Digital Image Authentication Techniques.** In Abstract proceedings of 71st Annual Meeting of American Academy of Forensic Sciences, AAFS 2019 - Baltimore (US) - February 2019

## Patents

1. Luca Guarnera, Oliver Giudice, Antonino Barbaro Paratore, Sebastiano Battiato (2022), **COMPARAZIONE BALISTICA FORENSE MEDIANTE TECNOLOGIE IMMERSIVE DI VIRTUAL REALITY.** EP, Patent, 2022.

## Collaboration with Research Groups

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- **2021 - ongoing:** Collaboration with Prof. Dr. Matthias Nießner (<https://niessnerlab.org/>), Professor at the Technical University of Munich, Department of Informatics, Germany. Topic - GAN Model Detection and Recognition Task: Analysis of images created from the same GAN architecture (StyleGAN2-ADA) using different models trained with the same architecture, in order to identify the model used in the synthetic data creation phase.

- **2021 - ongoing:** Participation in research activities as part of a collaboration with researchers from Bocconi University and Georgetown University (Washington) regarding the prediction of the popularity of content posted on social media in relation to studies on behavioral decision theory.
- **2021 - ongoing:** Department of Medical, Surgical and Advanced Technology Sciences "G.F. Ingrassia." Topic - Healthy-Unict pilot project (carried out under the University of Catania " Piaceri" Piano 2020-2022): Studying student's eating habits, but also their relationship with food taking into account emotions and behaviors and also changes related to the COVID-19 pandemic.
- **2021 - ongoing:** collaboration with the R&D department of iCTLab (<https://www.ictlab.srl/> , Spin-off of the University of Catania).
- **2019:** Visiting at the University of Hertfordshire, Hatfield, Hertfordshire, United Kingdom (<https://www.herts.ac.uk/>, 6 Months of which almost one month was done in Smart Working). Supervisor: Prof. Dr. Salvatore Livatino ([https://researchprofiles.herts.ac.uk/portal/en/persons/salvatore-livatino\(d67968f2-00e9-4c13-8635-3cd1363cd2b4\).html](https://researchprofiles.herts.ac.uk/portal/en/persons/salvatore-livatino(d67968f2-00e9-4c13-8635-3cd1363cd2b4).html)). Topic - Forensic Firearms Ballistics Comparison in Immersive Modality: Tool for forensic firearms ballistics comparison of 3D shell casings in immersive mode through the use of Oculus Rift S helmet.
- **2018 - 2021:** iCTLab Doctoral Internship (18 months).
- **2017 - ongoing:** Reparto Investigazioni Scientifiche dell'arma dei Carabinieri (RIS), Messina, Italy. Collaboration organized in: (a) Development of software for scientific investigations - (i) GraphJ: analysis of manuscripts; (ii) GraphF: analysis of statistics of populations of people's faces; (b) Scientific research in the field of forensic analysis and comparison of firearms.
- **2015 - ongoing:** Member of the IPLab Research Group (<https://iplab.dmi.unict.it/people/>).

## Research Projects

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- **2022 – ongoing:** Coordinator and Organizer of the National Course "Certified Information Forensics Investigator (CIFI)"
- **2021 – ongoing:** HEALTHY-UNICT “Healthy diet and lifestyles among University of Catania Students: a mobile Ecological Momentary Assessment (mEMA) approach for health promotion”. Funded by University of Catania, Italy, Department of Medical and Surgical Science and Advanced Technologies ‘GF Ingrassia’ (Programma ricerca di ateneo UNICT 2020-22 linea 4, PIAno di inCentivi per la Ricerca di Ateneo 2020/2022)
- **2021:** ADAS+ - Development of Advanced Technologies and Systems for Car Safety through Advanced Driver Assistance System platforms ;
- **2021:** MAMI-MED - La coorte Mamma&Bambino: un approccio Multisetoriale Alla salute Materno-Infantile Mediante valutazione dell'Esposoma nelle Donne - Piano di incentivi per la ricerca di Ateneo 2020/2022 (Pia.ce.ri.). Periodo: 2020 – 2022.

- **2021:** DL4HEALTH – Deep Learning for Health – PO FESR SICILIA 2014-2020 – Azione 1.1.5. Partners: Quipo (leading), Net Service, Delisa, Aucta Cognitio, Nextra Consulting, UNICT Poli, UNICT DMI, Cerid.

## Participation in International Challenges

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- **2020** International Robotics Challenge MBZIRC (Mohamed Bin Zayed International Robotics Challenge) achieving 8<sup>th</sup> place;
- **2017** International Robotics Challenge MBZIRC (Mohamed Bin Zayed International Robotics Challenge) achieving 4<sup>th</sup> place.

## Coordinator role in organizing International Challenges

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- **23/05/2022 – 27/05/2022:** Deepfake Images Detection and Reconstruction Challenge - International Conference on Image Analysis and Processing, Lecce, Italy. <https://iplab.dmi.unict.it/deepfakechallenge/>

## Speaker at Conferences and Workshops

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- 21/07/2022: *Title presentation:* **DEEPFAKES@WORK - Deepfake Creation and Detection Methods.** International Forensics Summer School (IFOSS) <https://www.ifoss.it/> Punta Sampieri - Scicli (Ragusa), Sicily
- 19/06/2022: *Title presentation:* **On the Exploitation of Deepfake Model Recognition.** IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshop, <https://sites.google.com/view/mediaforensics2022>. Virtual Meeting
- 23/05/2022 – 27/05/2022: *Title presentation:* **Deepfake Style Transfer Mixture: A First Forensic Ballistics Study on Synthetic Images.** International Conference on Image Analysis and Processing, <https://www.iciap2021.org/>. Lecce (Italia).
- 24/05/2022: *Title presentation:* **An introduction on Deepfakes Creation and Detection Approaches.** Tutorial - International Conference on Image Analysis and Processing, <https://www.iciap2021.org/>. Lecce (Italia).
- 2021: EUNICE Workshop, Sessione “Microelectronics, Sensoristics, AI & Big Data”, Virtual Meeting.
- 2021: *Title presentation:* **Houston we have a problem: Deepfake is the word!.** American Academy of Forensic Sciences (AAFS, <https://www.aafs.org/>), Virtual Meeting.



- 2021: Title presentation: **Multimedia Forensics Algorithms for Deepfake Detection**. GTTI on-line workshop "Deep Signal Processing for a safer world" (2021), Virtual Meeting.
- 2020: Title presentation: **2D/3D Imaging for Forensic Ballistics Comparison Assessment**. American Academy of Forensic Sciences (AAFS) conference. Anaheim Convention Center, Anaheim (California), US.
- 2019: Title presentation: **Siamese Ballistics Neural Network**. MULTI-modal Imaging of FOREnsic SciEnce Evidence tools for Forensic Science (MULTIFORESEE) conference, Catania, Italy.
- 2019: Title presentation: **Social Network Image Ballistics through Automatic Reverse-Engineering**. American Academy of Forensic Sciences (AAFS) conference. Baltimore Convention Center, Baltimore (Maryland), US.
- 2018: Title presentation: **Localization of Visitors for Cultural Sites Management**. 15th Signal Processing and Multimedia Applications (SIGMAP) conference. Porto (Portogallo).
- 2017: Title presentation: **GRAPHJ: A Forensics Tool for Handwriting Analysis**. 19th International Conference on Image Analysis and Processing (ICIAP 2017), Catania (CT), Italy.

## Summer Schools

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- **2022**: International Forensics Summer School (IFOSS), Scicli (Ragusa), Italy. (also member of organizing team). <https://www.ifoss.it/>
- **2016-2017-2018-2019**: *International Computer Vision Summer School (ICVSS)*, Scicli (Ragusa), Italy. (also member of organizing team).
- **2018**: *Medical Imaging Summer School (MISS)*, Favignana (Trapani), Italy. (also member of organizing team).
- **2018**: *Summer School on Signal Processing (S3P)*, San Vincenzo (Livorno), Italy.

## Participation in Different Events

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- 2021: Conference "Security, Innovation and Complementarity," Taormina (ME), Italy. Event organized by the Questura di Messina.
- 2019: Maker Fair (Rome), the European Edition.
- 2018: Project "**Hackademicamente: LioTRUE. L'Università di Catania contro le fake news**". Participation in the Fake News Hackathon for the Web Marketing Festival of Rimini, Italy.
- 2018: **Borsa della Ricerca**, Salerno (Italy), Campus di Fisciano.

## Coordinator role in the organization of the following events (National and International):

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- 2018-2019-2020: **Notte dei Ricercatori**, Catania, Italy. Topic: Digital Forensics.

## Program Committee

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- 2022: International Conference On Advanced Engineering, Technology And Applications (ICAETA 22) <http://icaeta.com/>

## Topic Coordinators

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- **Jorunal: Frontiers in Signal Processing (2022)**  
Topic Title: Recent Advances in Deepfake Detection and Image Manipulation

## Reviewer at conferences and journals

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- IEEE Access (dal 2020)
- International Conference on Pattern Recognition (ICPR) (dal 2020)
- Journal of Electronic Imaging (JEI) (dal 2019)
- Pattern Recognition Letter (dal 2020)
- IET Image Processing (dal 2020)
- MULTIMEDIA TOOLS AND APPLICATIONS (dal 2020)
- Journal Forecasting (ISSN 2571-9394) (dal 2021)
- IEEE Transactions on Information Forensics and Security (dal 2021)
- International Conference on Image Analysis and Processing (ICIAP) (dal 2021)
- JOOCH (dal 2021)
- PeerJ Computer Science (dal 2021)
- IEEE Potentials (dal 2022)
- MDPI - Applied Sciences (dal 2022)
- Pattern Recognition (dal 2022)
- International Conference on Machine Vision (ICMV) (dal 2022)
- MDPI – Journal Entropy (dal 2022)

# Teaching Activities

## University Course Teachings held

<http://web.dmi.unict.it/docenti/luca.guarnera>

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### 2022/2023

- **Digital Forensics** 3 CFU – Dipartimento di Matematica e Informatica (<http://web.dmi.unict.it/>), University of Catania, Italy.
- **Computer Networks** 3 CFU (*Channel A-L*) – Dipartimento di Matematica e Informatica (<http://web.dmi.unict.it/>), University of Catania, Italy
- **Computer Networks** 3 CFU (*Channel M-Z*) – Dipartimento di Matematica e Informatica (<http://web.dmi.unict.it/>), University of Catania, Italy
- **Informatica** 2 CFU - Scuole di specializzazione di Igiene e medicina preventiva, Dipartimento di Scienze Mediche, Chirurgiche e tecnologie avanzate "G.F. Ingrassia" (<http://www.gfingrassia.unict.it/>), University of Catania, Italy.

### 2021/2022

- **Computer Networks** 3 CFU (*Channel A-L*) – Dipartimento di Matematica e Informatica (<http://web.dmi.unict.it/>), University of Catania, Italy
- **Computer Networks** 3 CFU (*Channel M-Z*) – Dipartimento di Matematica e Informatica (<http://web.dmi.unict.it/>), University of Catania, Italy
- **Informatica** 2 CFU - Scuole di specializzazione di Igiene e medicina preventiva, Dipartimento di Scienze Mediche, Chirurgiche e tecnologie avanzate "G.F. Ingrassia" (<http://www.gfingrassia.unict.it/>), University of Catania, Italy.

## Teachings to master's courses held

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### 2021/2022

#### - **Master in Cybersecurity & Defense (1 CFU)**

Department of Mathematics and Computer Science, University of Catania, Italy. The master is activated in collaboration with the Free Mind Foundry company.

- Introduction to Deepfake
- A Brief Introduction to Machine Learning and Deep Learning.
- Autoencoders and Generative Adversarial Networks.
- Deepfake: technologies for image creation of human faces.
- Deepfake detection methods

## 2020/2021

### - **Master in Cybersecurity & Defense (2020/2021)**

Department of Mathematics and Computer Science, University of Catania, Italy. The master is activated in collaboration with the Free Mind Foundry company.

- 22 June 2021 (1h 30m): Introduction to Deepfake
- 7 July 2021 (3h):
  - A Brief Introduction to Machine Learning and Deep Learning.
  - Autoencoders and Generative Adversarial Networks.
  - Deepfake: technologies for image creation of human faces.
- 14 July 2021 (3h): Deepfake detection methods

## Academic Seminars

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### Lectures held at the Neural Computing course

Department of Data Science for Management (corso interdipartimentale: Dipartimento di Economia e di Impresa (DEI), Dipartimento di Ingegneria Elettrica Elettronica e Informatica (DIEEI) e il Dipartimento di Matematica e Informatica (DMI)), University of Catania, Italia.

#### A.A 2022/2023

- 16/11/2022: Introduction to Matlab:: Installation and introduction to the programming language; Deep Network Designer tool in Matlab (2h)
- 28/11/2022: Theory and practice session on Transfer Learning (2h)

#### A.A 2021/2022

- 01/12/2021: Convolutional Neural Networks (CNN); Matlab (2h)

### Tutorship of Digital Forensics course (2020/2021)

Tutor of Digital Forensics course at the Department of Mathematics and Computer Science, University of Catania, Italy, Bachelor's Degree Program in Computer Science.

### Seminar held at the Digital Forensics course (2021)

Department of Mathematics and Computer Science, University of Catania, Italy, Bachelor's Degree Program in Computer Science

- 2021 – **Casi di Studio, Amped Five, Amped Authenticate.**

### Seminar held at the Computer Vision course (2017, 2018, 2021)

Department of Mathematics and Computer Science, University of Catania, Italy, Master's Degree Program in Computer Science

- 2021 – **[1] Introduction to Python and OpenCV.**  
**[2] Camera calibration, stereoscopy, fundamental and essential matrix estimation in stereo systems.**
- 2018 – **Face Recognition.**
- 2017 – **MBZIRC 2017 Competition.**

### Seminar held at the Multimedia Forensics course (2018, 2021)

Department of Electrical, Electronic and Computer Engineering (DIEEI), University of Catania, Master's Degree Program in Telecommunications Engineering

- 2018, 2021 – **Video Forensics.**

## Dissertation co-author

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**Master's Degree in Computer Science at the Department of Mathematics and Computer Science, University of Catania, Italy**

- **2020:** Salvatore Giurato: Thesis title: **“Rilevazione di immagini e video deepfake tramite l’algoritmo expectation maximization”**. Advisor: Prof. Sebastiano Battiato. Co-Advisor: Ing. Oliver Giudice, Dott. Luca Guarnera.

**Bachelor's Degree in Computer Science at the Department of Mathematics and Computer Science, University of Catania, Italy**

- **2019:** Valentino Merlino: Thesis title: **“Sviluppo software per l'analisi di reperti e comparazione di marchi di armi da fuoco nel settore della Balistica Forense”**. Advisor: Prof. Sebastiano Battiato. Co-Advisor: Dott. Luca Guarnera , Ing. Angelo Salici.
- **2018:** Nunzio Pedalino: Thesis title: **Sviluppo e sperimentazione di un tool web-based per l’analisi antropometrica di volti”**. Advisor: Prof. Sebastiano Battiato. Co-Advisor: Dott. Luca Guarnera , Ing. Oliver Giudice.
- **2018:** Roberto Leotta: Thesis title: **“Calcolo parallelo su gpu di algoritmi di face recognition”**. Advisor: Prof. Sebastiano Battiato. Co-Advisor: Ing. Oliver Giudice, Dott. Luca Guarnera.

**Bachelor Degree in Computer Engineering, Department of Electrical Engineering Electronics and Computer Science (DIEEI), University of Catania**

- **2022:** *Eleonora Breci*. Titolo della tesi: "**GraphJ-3.0: Misure Grafometriche per l'esame Forense di Documenti Manoscritti**". Advisor: Prof. Sebastiano Battiato. Co-Advisor: Dr. Luca Guarnera.