



## GIAN LUCA MARCIALIS<sup>1</sup>

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### Summary

**Gian Luca Marcialis is an internationally recognized researcher in biometrics and trustworthy artificial intelligence**, currently **Associate Professor of Computer Engineering** at the University of Cagliari, where he leads the [Biometric Unit of the sAlfer Lab](#). He holds a PhD in Electronic and Computer Engineering and has obtained the Italian National Scientific Qualification for Full Professorship. His research is widely recognized at the intersection of biometrics, computer vision, and AI security, with major contributions to fingerprint presentation attack detection (PAD), deepfake detection, biometric forensics, and secure identity verification systems.

He is the founder and chair (since 2009) of the [International Fingerprint Liveness Detection Competition \(LivDet\)](#), the de facto international benchmark initiative in biometric anti-spoofing. Over the years, LivDet has attracted leading academic and industrial participants, including major stakeholders such as Thales and Jenetric, and is currently in its ninth edition.

Prof. Marcialis is also **Director of the “BullyBuster” Interuniversity Research Center**, a multidisciplinary initiative involving multiple Italian universities and addressing digital and social violence through AI-based technologies for behavioral analysis, multimodal data processing, and automated detection of harmful online interactions. The related projects BullyBuster and BullyBuster 2 have received national and international recognition, including their selection among [the TOP100 global initiatives contributing to the United Nations Sustainable Development Goals by IRCAI-UNESCO](#).

His scientific activity includes **participation in numerous European and national research projects** (including FP7 Tabula Rasa and Let's CROWD), as well as long-standing scientific collaborations and joint research activities with leading international researchers such as Anil K. Jain, Sébastien Marcel, Christoph Busch, and Julian Fierrez. He has also played a key role in technology transfer initiatives with major industrial partners, including Crossmatch, DEDEM, and Thales, contributing to the deployment of biometric security technologies in real-world applications.

Prof. Marcialis (H-index: 43, Google Scholar) has co-authored **more than 150 scientific publications** in leading international venues, including top-tier journals such as IEEE Transactions on Pattern Analysis and Machine Intelligence, IEEE Transactions on Information Forensics and Security, IEEE Transactions on Biometrics, Behavior, and Identity Science, Pattern Recognition, and Image and Vision Computing. He serves as **Associate Editor of IEEE Transactions on Biometrics, Behavior, and Identity Science** and has been Guest Associate Editor for journals such as IET Biometrics and Pattern Recognition Letters. He serves regularly as reviewer and program committee member for major conferences and journals in biometrics, computer vision, and artificial intelligence.

He is a **Senior Member of IEEE** and a member of IAPR and ACM, as well as of the **IEEE Biometrics Council**. His research group is active in the **European Association for Biometrics**.

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<sup>1</sup> Last update on April, 16, 2026

## Education

- **March 2004** – PhD in Electronic and Computer Engineering, University of Cagliari, Italy, awarded with *Excellent*. Dissertation: “*Fusion of Multiple Classifiers for Person Recognition by Fingerprints and Faces*” (Supervisor: Prof. Fabio Roli).
- **June 2000** – MSc (Integrated Master’s Degree) in Electronic Engineering, University of Cagliari, Italy, final grade: 108/110. Dissertation: “*A Structural-Connectionist Approach to Fingerprint Classification for Personal Identification*” (Supervisors: Prof. Fabio Roli and Prof. Paolo Frascioni).

## Academic Positions and Employment

- **October 1, 2018 – Present:** Associate Professor (tenured, full-time) in *Information Processing Systems* (SSD IINF-05/A, Competition Sector 09/IINF-05), University of Cagliari, Italy, Department of Electrical and Electronic Engineering. On January 16, 2020, he obtained the Italian National Scientific Qualification (*Abilitazione Scientifica Nazionale*) for Full Professor in the same scientific-disciplinary sector (IINF-05/A, GSD 09/IINF-05).
- **August 1, 2006 – September 30, 2018:** Researcher (tenured) in *Information Processing Systems* (ING-IINF/05), University of Cagliari, Italy, Department of Electrical and Electronic Engineering.
- **March 2006 – July 2006:** Research collaboration contract with the Department of Electrical and Electronic Engineering, University of Cagliari, within national and international research projects.
- **February 2004 – February 2006:** Postdoctoral Research Fellow at the Department of Electrical and Electronic Engineering, University of Cagliari, and the Science and Technology Park “Polaris” (now Sardegna Ricerche), Pula, Italy.
- **September 2000 – October 2001:** Research collaboration contracts with the Department of Electrical and Electronic Engineering, University of Cagliari, within national and international research projects.

## Current Teaching Activities – University of Cagliari

- **Academic Year 2024/2025 – Present:** Lecturer of the course “*Computer Vision Technologies and Biometrics*” (60 hours, 6 ECTS), first year, MSc in Computer Engineering, Cybersecurity and Artificial Intelligence.
- **Academic Year 2024/2025 – Present:** Lecturer of the course “*Fundamentals of Computer Science*” (60 hours, 6 ECTS), first year, BSc in Naval Architecture and Maritime Engineering.
- **Academic Year 2022/2023 – Present:** Co-lecturer of the course “*Programming Languages*” (40 out of 80 hours), first year, Second-Level Master’s Degree in Digitalization of the Electrical System for Energy Transition.
- **Academic Year 2018/2019 – Present:** Lecturer of the module “*Elements of Computer Science*” (60 hours, 6 ECTS), within the integrated course *Information Processing Systems*, first year, BSc in Biomedical Engineering. Seminars and Laboratory Teaching.
- **Academic Year 2022/2023 – Present:** Lecturer of the laboratory “*Image Processing for Computer Vision*” for BSc programs in Biomedical Engineering and Electronic, Computer and Telecommunications Engineering (12 hours, 1–2 ECTS).
- **Academic Year 2020/2021 – Present:** Lecturer of the seminar “*Biometric Technologies for Cybersecurity*” for BSc programs in Biomedical Engineering and Electronic, Computer and Telecommunications Engineering (12 hours, 1–2 ECTS).

## Previous Teaching Activities – University of Cagliari

- **Academic Years 2019/2020 – 2023/2024:** Lecturer of the course “*Biometric Technologies and Behavioral Security*” (50 hours, 5 ECTS), second year, MSc in Computer Engineering, Cybersecurity and Artificial Intelligence.
- **Academic Years 2021/2022 – 2023/2024:** Co-lecturer of the module “*Computer Architecture*” (30 out of 60 hours, 6 ECTS), within the integrated course *Information Processing Systems*, first year, BSc in Biomedical Engineering.
- **Academic Years 2021/2022 – 2022/2023:** Co-lecturer of the course “*Fundamentals of Computer Science I*” (30 out of 60 hours, 6 ECTS), first year, BSc programs in Electrical Energy Engineering, Mechanical Engineering, and Chemical Engineering.

- **Academic Year 2021/2022:** Lecturer of the course “*Biometrics, Deepfakes and Cyberbullying*” (8 hours), within the Second-Level Master’s Degree in Security Awareness.
- **Academic Years 2018/2019 – 2020/2021:** Co-lecturer of the module “*Computer Architecture*” (10 out of 60 hours, 6 ECTS), within the integrated course *Information Processing Systems*, first year, BSc programs in Biomedical Engineering and Electrical, Electronic and Computer Engineering.
- **Academic Years 2014/2015 – 2020/2021:** Lecturer of the course “*Fundamentals of Computer Science 1*” (60 hours, 6 ECTS), first year, BSc programs in Mechanical Engineering and Chemical Engineering.
- **Academic Years 2012/2013 – 2019/2020:** Lecturer of the seminar “*Biometric Technologies for Cybersecurity*” (24 hours, 2–3 ECTS), for BSc programs in Biomedical Engineering and Electrical, Electronic and Computer Engineering.
- **Academic Years 2015/2016 – 2016/2017:** Lecturer of the course “*Computer Science with Practical Sessions*” (56 hours, 6 ECTS), BSc in Industrial Biotechnology.
- **Academic Year 2011/2012:** Lecturer of the course “*Computer Architecture*” (50 hours, 5 ECTS), BSc in Electronic Engineering.
- **Academic Years 2008/2009 – 2010/2011:** Lecturer of the course “*Fundamentals of Computer Science 1*” (50 hours, 5 ECTS), BSc programs in Biomedical Engineering and Electrical Engineering.
- **Academic Years 2003/2004 – 2006/2007:** Lecturer of the course “*Computer Science Laboratory*” (24 hours, 3 ECTS), BSc in Applied Bioecology.

## Other Courses and Seminars

- **Lecture:** “*Fingerprint Presentation Attacks – How Can We Tell a Real Fingerprint from a Fake One?*”, Artificial Intelligence Summer School (AIT–25), June 23 – July 4, 2025. <https://ai.lnu.edu.ua/>
- **Lecture:** “*3D Face Reconstruction: From Computer Security to Forensic Applications*”, International Forensics Summer School (IFOSS 2023), Sampieri, Italy, July 17–21, 2023. <https://www.ifoss.it/>
- **Lecture:** “*Fingerprint Presentation Attacks: Let’s Make the Point*”, International Forensics Summer School (IFOSS 2023), Sampieri, Italy, July 17–21, 2023. <https://www.ifoss.it/>
- **Invited Seminar:** “*Securing Biometrics: From Fake Fingers to Deepfakes*”, University of Salerno (host: Prof. Mario Vento), May 22, 2023.
- **Lecturer:** Training course “*Forensic Analysis of Electronic Documents for Expert Document Examiners*”, lecture on “*Biometrics and Artificial Intelligence*”, February 22, March 8 and March 22, 2022, organized by Manpower Italia for the Anti-Crime Department of the Italian State Police, Rome.
- **Lecturer:** PhD School “*Machine Vision*” (VISMAL 2021), lecture on “*Fingerprint Presentation Attack Detection: Expectations and State of the Art*”. <https://math.unipa.it/vismal2020/>
- **Invited Seminar:** “*Biometric Systems Vulnerabilities: From ‘Gummy’ Fingers to Liveness Detection*”, University of Bari (host: Prof. Donato Impedovo), April 8, 2019.
- **Academic Years 2015/2016 – 2016/2017 – 2017/2018:** Lecturer of the module “*Biometric Technologies for Cybersecurity*” within the course “*Biometrics: Technologies, Regulations and Applications*”, organized by Data Security S.r.l. for employees of Italian government agencies, Interuniversity Center of Pordenone.
- **Academic Years 2013/2014 – 2014/2015:** Lecturer of the module “*Teaching Programming*” within the integrated course “*Teaching Algorithms and Programming*”, Special Qualification Paths (PAS) and Initial Teacher Training (TFA), University of Cagliari, for secondary school teacher qualification (sector A042).

## Institutional and Administrative Roles – University of Cagliari

- Member of the Joint Faculty–Student Committee (CPDS), Faculty of Engineering and Architecture.
- Member of the Internal Quality Assurance Committee (CAV), Department of Electrical and Electronic Engineering.
- Member of the PhD Board in Electronic and Computer Engineering (DRIEI).
- Member of the PhD Board in “*Capacity Building for Global Health*”.
- Member of the Steering Committee for the establishment of the Professional Bachelor’s Degree in Industrial Technologies for Energy and Digital Transition.
- Head of the Cagliari Unit of the CINI National Laboratory “*Informatics and Society*”.

## Research Activity

Gian Luca Marcialis is Head of the *Biometrics Division* of the sAIfEr Lab (formerly the Pattern Recognition and Applications Lab – PRA Lab), which has been directed by Prof. Fabio Roli since 1998.

## Key Scientific Contributions

Among his most relevant and original scientific contributions, developed continuously since the completion of his MSc and further consolidated after obtaining his PhD, Gian Luca Marcialis has built a long-standing expertise—since 2006—in the detection of fake fingerprints and biometric presentation attacks. In particular:

- He has developed an in-depth knowledge of fingerprint spoofing techniques, including the study and continuous identification of materials suitable for accurately replicating dermatoglyphic patterns on fingertips, as well as the analysis of material properties and fabrication processes. This expertise has been leveraged in the organization of the biennial *International Fingerprint Liveness Detection Competition* (LivDet), established in 2009. Each edition has led to invited presentations at major international conferences in biometrics, including ICIAP (2009), ICB (2012, 2018), BTAS (2013, 2015), and IJCB (2019, 2021, 2023, 2025). The first four editions were organized in collaboration with Clarkson University, particularly with the group led by Prof. Stephanie Schuckers. Since 2017, LivDet has been fully managed by Marcialis and his research team, achieving the highest participation levels across editions. LivDet has provided the international community with publicly available benchmark datasets for the independent evaluation of liveness detection algorithms and is widely recognized as a reference point for the state of the art. The competition has been sponsored by leading companies in the field, including Jenetric, Thales, Dermalog, and Greenbit.
- He has contributed to the development of fingerprint spoof detection algorithms based on both “live” features (e.g., pore distribution) and “fake” features (e.g., micro-textures introduced during fabrication and intrinsic material properties), extracted through filtering and texture descriptors. In particular, together with his team, he was among the first to investigate the effectiveness of Local Phase Quantization (LPQ) and Binarized Statistical Image Features (BSIF) for spoof detection, and to propose methods for pore detection and statistical modeling of their spatial distribution. More recently, his research has focused on exploiting individuality-related characteristics derived from texture descriptors to significantly improve performance when these algorithms are integrated into identity verification systems. These contributions have been published in top-tier conferences (ICB, BTAS, ICPR) and high-impact journals such as *Image and Vision Computing* and *IET Biometrics*.
- He has conducted extensive collaborative research with colleagues of the PRA Lab—particularly Battista Biggio, Giorgio Fumera, and Fabio Roli—on the modeling and prediction of spoofing attacks involving fingerprints and faces in multimodal biometric systems. This work has been published in leading venues such as *IET Biometrics* and *IEEE Transactions on Pattern Analysis and Machine Intelligence*, where one paper received the 2014 Best Paper Award. More recently, this research line has been extended to the integration of spoof detection and biometric recognition systems, resulting in a performance impact simulation framework made available to the research community (*IEEE Transactions on Information Forensics and Security*).
- He has led several technology transfer initiatives toward industry, including collaborations with Crossmatch and Italian companies such as Greenbit (now part of Thales), Interferentia, and CSAMed. In particular, Greenbit has integrated fingerprint liveness detection software developed by his team into its commercial fingerprint sensors through licensing agreements with the Department of Electrical and Electronic Engineering. Interferentia developed a biometric-based document sharing platform (fingerprint/face recognition), presented at Maker Faire 2021, while CSAMed implemented a biometric-based encryption system for electronic document protection in collaboration with his research group.
- A similar technology transfer activity has been carried out with MBDA S.p.A., resulting in an innovative iris recognition system currently deployed in the company’s biometric security laboratory.
- He is currently collaborating with DEDEM S.p.A. and BIOMEYE S.r.l. on the development of presentation attack detection systems based on face, fingerprint, and iris biometrics.
- His expertise has enabled active participation in European projects such as FP7 *Tabula Rasa* and *Let’s Crowd*, as well as a role as Vice-PI and local unit coordinator in the PRIN 2017 project *BullyBuster*. The latter was recognized at Maker Faire 2022 (included in the “Maker Faire 10th Anniversary Book”)

and selected among the “Top 100 Global Projects” addressing the United Nations Sustainable Development Goals by the UNESCO-supported International Research Center on Artificial Intelligence. The project was also presented at the International Conference on Research Projects organized by the European Association for Biometrics. More recently, he has been awarded funding as Principal Investigator of *BullyBuster 2* (PRIN 2022), which led to the establishment, in May 2025, of the Interuniversity Research Center “BullyBuster”, of which he serves as Director.

To achieve these results, beyond his scientific creativity in model development and attack analysis, Marcialis has built and coordinated a dedicated research team composed of MSc students, PhD candidates, postdoctoral researchers, and research staff. This has led to the creation of an autonomous and highly specialized unit within the sAIfEr Lab, capable of producing competitive scientific research and effective technology transfer.

This process started progressively and was already well established before his appointment as Associate Professor in October 2018. The group currently includes, in addition to the head, one assistant professor (RTD-A), one postdoctoral researcher, two PhD students (one enrolled in a double-degree program with Northwestern Polytechnical University), four additional PhD candidates, and one research contractor.

The Biometrics Division maintains strong collaborations with leading international research groups, including those led by Anil Jain, Julian Fierrez, Christoph Busch, Stephanie Schuckers, Eric Granger, Nick Evans, Sébastien Marcel, Martin Drahansky, Emanuela Marasco, and Ajita Rattani.

Marcialis also serves as scientific advisor for Wallife, a company specializing in insurance products for biometric identity protection.

### **Additional Contributions**

Throughout his career, Gian Luca Marcialis has also made significant contributions to other key areas of biometrics, often in collaboration with international research groups, including:

- Adaptive biometric systems
- Multimodal biometric fusion
- EEG-based biometric recognition
- Deepfake detection

## Publications

### H-Index

Scopus	Google Scholar
33	43

Pagina google scholar: <https://scholar.google.com/citations?user=7pMEyo4AAAAJ&hl=it&oi=ao>

### PhD Dissertation

[PhD] Fusion of Multiple Classifiers for Person Recognition by Fingerprints and Faces, supervisor Prof. Fabio Roli, PhD in Electronic and Computer Engineering, University of Cagliari, March 2004.

### Master's Degree Thesis

[MSc] A Structural-Connectionist Approach to Fingerprint Classification for Personal Identification, supervisors Prof. Fabio Roli and Prof. Paolo Frasconi, MSc in Electronic Engineering, University of Cagliari, June 2000.

### Feature Articles

- [F6] **G.L. Marcialis**, G. Orrù, M. Micheletto, How I uncover bullies with artificial intelligence: the “BullyBuster” project, AgendaDigitale, May 2021, <https://www.agendadigitale.eu/cultura-digitale/come-ti-scovo-i-bulli-con-lintelligenza-artificiale-il-progetto-bullybuster/>.
- [F5] **G.L. Marcialis**, G. Orrù, R. Casula, ScreenSpooF: beware of fingerprints on smartphones, AgendaDigitale, April 2021, <https://www.agendadigitale.eu/sicurezza/screenspooF-attenti-alle-impronte-digitali-sullo-smartphone-come-vengono-copiate-e-i-rischi/>.
- [F4] **G.L. Marcialis**, International Fingerprint Liveness Detection Competition, Computer Vision News, RSIP Vision, April 2018 (<https://rsipvision.com/ComputerVisionNews-2018April/22/>).
- [F3] **G.L. Marcialis**, Biometrics in public administration: against time-clock fraud and other abuses, AgendaDigitale, August 2016, <https://www.agendadigitale.eu/infrastrutture/biometria-nella-pa-contro-i-furbetti-del-cartellino-e-altre-frodi/>.
- [F2] D. Ariu, **G.L. Marcialis**, M. Mauri, D. Muntoni, M. Ristori, F. Roli, Make yourself recognized, Linux Pro, Sprea Editore, 122 18-23, 2012 (in Italian).
- [F1] **G.L. Marcialis**, F. Roli, S. Schuckers, Liveness Detection Competition 2009, Biometric Technology Today, Elsevier, DOI: 10.1016/S0969-4765(09)70038-4, 17 (3) 7-9, 2009.

### Invited Papers

- [I2] **G.L. Marcialis**, B. Biggio, G. Fumera, Anti-spoofing: Multimodal, in Encyclopedia of Biometrics, S.Z. Li and A.K. Jain (Eds.), Springer, pp. 1-4, DOI: 10.1007/978-3-642-27733-7\_9047-2, 2014.
- [I1] **G.L. Marcialis**, A. Lewicke, B. Tan, P. Coli, D. Grimberg, A. Congiu, A. Tidu, F. Roli, S. Schuckers, First International Fingerprint Liveness Detection Competition, Proc. of 14th International Conference on Image Analysis and Processing ICIAP 2009, September 9-12, 2009, Vietri sul Mare (Italy), P. Foggia, C. Sansone, and M. Vento (Eds.), Springer LNCS 5716, pp. 12-23.

### Book Chapters (peer-reviewed)

- [B14] M. Micheletto, G. Orrù, R. Casula, D. Yambay, **G.L. Marcialis**, S. Schuckers, Review of the Fingerprint Liveness Detection (LivDet) Competition Series: From 2009 to 2021, in fingerprint biometrics, in Handbook of Biometric Anti-spoofing, 3rd edition, S. Marcel et al. (Eds.), Springer, ISBN: 978-981-19-5288-3, DOI: 10.1007/978-981-19-5288-3\_3, pp. 57-76, 2023.
- [B13] J. Galbally, J. Fierrez, R. Cappelli, **G.L. Marcialis**, Introduction to presentation attack detection in fingerprint biometrics, in Handbook of Biometric Anti-spoofing, 3rd edition, S. Marcel et al. (Eds.), Springer, ISBN: 978-981-19-5288-3, DOI: 10.1007/978-981-19-5288-3\_1, pp. 3-15, 2023.

- [B12] D. Yambay, L. Ghiani, **G.L. Marcialis**, S. Schuckers, F. Roli, Review of fingerprint presentation attacks detection competition, in Handbook of Biometric Anti-spoofing, 2nd edition, S. Marcel, M. Nixon, J. Fierrez, N. Evans (Eds.), Springer, ISBN: 978-3-319-92626-1, DOI: 10.1007/978-3-319-92627-8\_5, pp. 109-131, 2019.
- [B11] P. Tuveri, L. Ghiani, M. Zurutuza, V. Mura, **G.L. Marcialis**, Interoperability among capture devices for fingerprint presentation attacks detection, in Handbook of Biometric Anti-spoofing, 2nd edition, S. Marcel, M. Nixon, J. Fierrez, N. Evans (Eds.), Springer, ISBN: 978-3-319-92626-1, DOI: 10.1007/978-3-319-92627-8\_4, pp. 71-108, 2019.
- [B10] M. Abukmeil, **G.L. Marcialis**, S. Marcel, An overview of palmvein biometrics, in Hand-Based Biometrics: Methods and Technology, M. Drahanaky (Ed.), IET, ISBN: 978-1-78561-224-4, DOI: 10.1049/PBSE008E\_ch10, 2018.
- [B09] I. Rida, N. Al Maadeed, **G.L. Marcialis**, A. Bouridane, R. Héroult, G. Gasso, Improved Model-Free Gait Recognition based on Human Body Part, in Biometric Security and Privacy – Opportunities & Challenges in the Big Data Era, D. Crookes, A. Beghadi, R. Jiang, S. Al-Maadeed, A. Bouridane (Eds.), Springer, pp. 141-161, ISBN: 978-3-319-47300-0, DOI: 10.1007/978-3-319-47301-7, 2017.
- [B08] C. Pagano, E. Granger, R. Sabourin, P. Tuveri, **G.L. Marcialis**, F. Roli, Context-sensitive Self-Updating for Adaptive Face Recognition, in Adaptive Biometric Systems, A. Rattani, E. Granger, and F. Roli (Eds.), Springer, pp. 165-184, 2015.
- [B07] G. Fumera, **G.L. Marcialis**, B. Biggio, F. Roli, S. Schuckers, Multimodal Antispoofing in Biometric Recognition Systems, in Handbook of Biometric Antispoofing, S. Marcel, M. Nixon, and S. Li (Eds.), Springer, pp. 145-164, DOI: 10.1007/978-1-4471-6524-8\_9, 2014.
- [B06] A. Rattani, **G.L. Marcialis**, F. Roli, Adaptive Multibiometric Systems: Conceptual Representation and Performance Evaluation Over Time, in Handbook on Multibiometrics Systems: Modern Perspectives to Identity Verification, VDM - Lambert Academic Publishing, ISBN: 978-3-8484-4937-8, pp. 120-143, 2012.
- [B05] L. Didaci, **G.L. Marcialis**, F. Roli, Adaptive Multibiometric Systems, in B. Bhanu and V. Govindaraju (Eds.), Multibiometrics for Human Identification, Cambridge University Press, ISBN: 9780521115964, DOI: 10.1017/CBO9780511921056.009, pp. 143-170, 2011.
- [B04] **G.L. Marcialis**, F. Roli, P. Coli, G. Delogu, A Fingerprint Forensic Tool for Criminal Investigations, in C.-T. Li (Ed.), Handbook of Research on Computational Forensics, Digital Crime and Investigation: Methods and Solutions, IGI, ISBN: 978-1-60566-836-9, DOI: 10.4018/978-1-60566-836-9.ch002, pp. 23-52, 2010.
- [B03] F. Roli, L. Didaci, **G.L. Marcialis**, Adaptive biometric systems that can improve with use, in N. Ratha and V. Govindaraju (Eds.), Advances in Biometrics: Sensors, Systems and Algorithms, Springer, DOI: 10.1007/978-1-84628-921-7, ISBN: 978-1-84628-920-0, pp. 447-471, 2008.
- [B02] **G.L. Marcialis**, F. Roli, A. Serrau, Graph-Based and Structural Methods for Fingerprint Classification, in A. Kandel, H. Bunke, M. Last (Eds.), Applied Graph Theory in Computer Vision and Pattern Recognition, Springer Series “Studies in Computational Intelligence”, vol. 52, pp. 205-226, ISBN: 978-3-540-68019-2, 2007.
- [B01] **G.L. Marcialis**, F. Roli, Fusion of Face Recognition Algorithms for Video-Based Surveillance Systems, in G.L. Foresti, C. Regazzoni, P. Varshney (Eds.), Multisensor Surveillance Systems: The Fusion Perspective, Kluwer Academic Publishers, ISBN: 978-1-4020-7492-9, pp. 235-250, 2003.

### International Journal Articles (peer-reviewed)

- [J53] S.M. La Cava, R. Casula, S. Concas, G. Orrù, R. Tolosana, M. Drahanaky, J. Fierrez, **G.L. Marcialis**, Exploiting multiple representations: 3D face biometrics fusion with application to surveillance, *Array*, Elsevier, 100794, DOI: 10.1016/j.array.2026.100794, 2026.
- [J52] J. Gao, M. Micheletto, G. Orrù, X. Feng, **G.L. Marcialis**, 3D Differential Decomposition for Video Deepfake Detection with Identity Suppression, *Signal Processing: Image Communication*, Elsevier, 144 117525, DOI: 10.1016/j.image.2026.117525, 2026.
- [J51] G. Perelli, M. Micheletto, S. Concas, G. Puglisi, **G.L. Marcialis**, Robust Deepfake Detection in Compressed Video with Scalable Network Strategies, *Expert Systems with Applications*, Elsevier, 317 131761, DOI: 10.1016/j.eswa.2026.131761, 2026.
- [J50] A. Dörsch, M. Grimmer, L.J. Gonzalez-Soler, R. Casula, **G.L. Marcialis**, C. Busch, C. Rathgeb, FaceSpoofLDM: Language-Guided Synthesis of Face Presentation Attacks Based on Latent Diffusion, *IEEE Access*, IEEE, 4 7217-7230, DOI: 10.1109/ACCESS.2026.3651853, 2026.

- [J49] M. Micheletto, G. Orrù, L. Ghiani, **G.L. Marcialis**, Improving fingerprint presentation attack detection by an approach integrated into the personal verification stage, *IEEE Transactions on Biometrics, Behavior, and Identity Science*, IEEE, 7 (4) 654-667, DOI: 10.1109/TBIOM.2025.3560692, <https://arxiv.org/abs/2504.11066>, 2025.
- [J48] I. Amerini, (...), L. Guarnera, (...), **G.L. Marcialis**, M. Micheletto, A. Montibeller, G. Orrù, (...), G. Puglisi, et al., Deepfake Media Forensics: Status and Future Challenges, *Journal of Imaging*, MDPI, 11 (7), DOI: 10.3390/jimaging11030073, <https://www.mdpi.com/2313-433X/11/3/73>, 2025.
- [J47] S. Carta, R. Casula, G. Orrù, M. Micheletto, **G.L. Marcialis**, Interpretability of Fingerprint Presentation Attack Detection Systems: A Look at the “Representativeness” of Samples against Never-seen-before Attacks, *Machine Vision and Applications*, Springer, 36 (44), DOI: 10.1007/s00138-025-01666-z, 2025.
- [J46] M. Gagliardi, M. Bonadeni, S. Billai, **G.L. Marcialis**, A Novel Approach to Personalized Personality Assessment with the Attachment-Caregiving Questionnaire: First Evidence in Favor of Interpretation-Oriented Inventory Designs, *Psychology International*, MDPI, 6 (4) 796-815, DOI: 10.3390/psychoint6040051, 2024.
- [J45] S. Capuozzo, S. Marrone, M. Gravina, G. Cringoli, L. Rinaldi, M.P. Maurelli, A. Bosco, G. Orrù, **G.L. Marcialis**, L. Ghiani, S. Bini, A. Saggese, M. Vento, C. Sansone, Automating Parasite Egg Detection: Insights from the first AI-KFM Challenge, *Frontiers in Artificial Intelligence*, Frontiers, 7, DOI: 10.3389/frai.2024.1325219, 2024.
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- [C27] L. Didaci, **G.L. Marcialis**, F. Roli, *A Theoretical and Experimental Analysis of Template Co-update in Biometric Verification Systems*, Joint IAPR Int. Workshop on Structural and Statistical Pattern Recognition (S+SSPR 2008), Dec. 4–6, 2008, Orlando (Florida, USA), in N. de Vitoria Lobo et al. (eds.), Springer LNCS 5342, pp. 775–784.
- [C26] **G.L. Marcialis**, A. Rattani, F. Roli, *Biometric Template Update: An Experimental Investigation on the Relationship between Update Errors and Performance Degradation in Face Verification*, Joint IAPR Int. Workshop on Structural and Statistical Pattern Recognition (S+SSPR 2008), Dec. 4–6, 2008, Orlando (Florida, USA), in N. de Vitoria Lobo et al. (eds.), Springer LNCS 5342, pp. 694–703.
- [C25] B. Freni, **G.L. Marcialis**, F. Roli, *Template Selection by Editing Algorithms: A Case Study in Face Recognition*, Joint IAPR Int. Workshop on Structural and Statistical Pattern Recognition (S+SSPR 2008), Dec. 4–6, 2008, Orlando (Florida, USA), in N. de Vitoria Lobo et al. (eds.), Springer LNCS 5342, pp. 755–764.
- [C24] A. Rattani, **G.L. Marcialis**, F. Roli, *Biometric Template Update Using the Graph-mincut Algorithm: A Case Study in Face Verification*, IEEE Biometric Symposium (BioSymp 2008), Sept. 23–25, 2008, Tampa (Florida, USA), IEEE, ISBN: 978-1-4244-2567-9, pp. 23–28.
- [C23] A. Rattani, **G.L. Marcialis**, F. Roli, *Capturing Large Intra-class Variations of Biometric Data by Template Co-updating*, IEEE Workshop on Biometrics, IEEE Int. Conf. on Computer Vision and Pattern Recognition (CVPR 2008), June 23–28, 2008, Anchorage (Alaska, USA), DOI: 10.1109/CVPRW.2008.4563116, ISBN: 978-1-4244-2339-2, pp. 1–6.
- [C22] A. Rattani, **G.L. Marcialis**, F. Roli, *Boosting Gallery Representativeness by Co-updating Face and Fingerprint Verification Systems*, winner of the Best Paper Award at the 5th International School for Advanced Studies on Biometrics for Secure Authentication, June 9–13, 2008, Alghero (Italy).
- [C21] B. Freni, **G.L. Marcialis**, F. Roli, *Online and Offline Fingerprint Template Update Using Minutiae: An Experimental Comparison*, 5th Int. Workshop on Articulated Motion and Deformable Objects (AMDO 2008), July 9–11, 2008, Andratx (Mallorca, Spain), in F.J. Perales and R.B. Fisher (eds.), Springer LNCS 5098, pp. 441–448.
- [C20] B. Freni, **G.L. Marcialis**, F. Roli, *Replacement Algorithms for Fingerprint Template Update*, 5th Int. Conf. on Image Analysis and Recognition (ICIAR 2008), June 25–27, 2008, Póvoa de Varzim (Portugal), in A. Campilho and M. Kamel (eds.), Springer LNCS 5112, pp. 884–893.
- [C19] F. Alonso, F. Roli, **G.L. Marcialis**, J. Fierrez, J. Ortega, *Comparison of Fingerprint Quality Measures Using an Optical and a Capacitive Sensor*, IEEE First Int. Conf. on Biometrics: Theory, Applications and Systems (BTAS 2007), Sept. 27–29, 2007, Washington, DC (USA), pp. 1–6, DOI: 10.1109/BTAS.2007.4401956, ISBN: 978-1-4244-1597-7.
- [C18] **G.L. Marcialis**, F. Roli, *Score-level Fusion of Fingerprint and Face Matchers under “Stress” Conditions*, IEEE 14th Int. Conf. on Image Analysis and Processing (ICIAP 2007), Sept. 10–14, 2007, Modena (Italy), in R. Cucchiara (ed.), ISBN: 978-0-7695-2877-9, pp. 259–264.
- [C17] F. Roli, L. Didaci, **G.L. Marcialis**, *Template Co-update in Multimodal Biometric Systems*, IEEE/IAPR 2nd Int. Conf. on Biometrics (ICB 2007), Aug. 27–29, 2007, Seoul (Korea), in S.-W. Lee and S. Li (eds.), Springer LNCS 4642, pp. 1194–1202.
- [C16] P. Coli, **G.L. Marcialis**, F. Roli, *Vitality Detection from Fingerprint Images: A Critical Survey*, IEEE/IAPR 2nd Int. Conf. on Biometrics (ICB 2007), Aug. 27–29, 2007, Seoul (Korea), in S.-W. Lee and S. Li (eds.), Springer LNCS 4642, pp. 722–731.
- [C15] P. Coli, **G.L. Marcialis**, F. Roli, *Power Spectrum-based Fingerprint Vitality Detection*, IEEE Int. Workshop on Automatic Identification Advanced Technologies (AutoID 2007), June 7–8, 2007, Alghero (Italy), in M. Tistarelli and D. Maltoni (eds.), pp. 169–173.

- [C14] **G.L. Marcialis**, F. Roli, *Serial Fusion of Fingerprint and Face Matchers*, IAPR 7th Int. Workshop on Multiple Classifier Systems (MCS 2007), May 23–25, 2007, Prague (Czech Republic), in J. Kittler, F. Roli, and M. Haindl (eds.), Springer LNCS 4472, pp. 151–160.
- [C13] F. Roli, **G.L. Marcialis**, *Semi-supervised PCA-based Face Recognition Using Self-training*, Joint IAPR Int. Workshop on Structural and Statistical Pattern Recognition (S+SSPR 2006), Aug. 17–19, 2006, Hong Kong (China), in D. Yeung et al. (eds.), Springer LNCS 4109, pp. 560–568.
- [C12] P. Coli, **G.L. Marcialis**, F. Roli, *Analysis and Selection of Features for Fingerprint Vitality Detection*, Joint IAPR Int. Workshop on Structural and Statistical Pattern Recognition (S+SSPR 2006), Aug. 17–19, 2006, Hong Kong (China), in D. Yeung et al. (eds.), Springer LNCS 4109, pp. 907–915.
- [C11] A. Serrau, **G.L. Marcialis**, H. Bunke, F. Roli, *An Experimental Comparison of Fingerprint Classification Methods Using Graphs*, Int. Workshop on Graph-based Representations in Pattern Recognition (GbR 2005), Apr. 11–13, 2005, Poitiers (France), in L. Brun and M. Vento (eds.), Springer LNCS 3434, pp. 281–290.
- [C10] **G.L. Marcialis**, F. Roli, *High Security Fingerprint Verification by Perceptron-based Fusion of Multiple Matchers*, 5th Int. Workshop on Multiple Classifier Systems (MCS 2004), June 9–11, 2004, Cagliari (Italy), in F. Roli, J. Kittler, and T. Windeatt (eds.), Springer LNCS 3077, pp. 364–373.
- [C09] **G.L. Marcialis**, F. Roli, *Fingerprint Verification by Decision-level Fusion of Optical and Capacitive Sensors*, Int. Workshop on Biometric Authentication (BioAW 2004), May 15, 2004, Prague (Czech Republic), in D. Maltoni and A.K. Jain (eds.), Springer LNCS 3087, pp. 307–317.
- [C08] **G.L. Marcialis**, F. Roli, *Perceptron-based Fusion of Multiple Fingerprint Matchers*, 1st Int. Workshop on Artificial Neural Networks in Pattern Recognition (ANNPR 2003), Sept. 12–13, 2003, Florence (Italy), in M. Gori and S. Marinai (eds.), pp. 92–99.
- [C07] **G.L. Marcialis**, F. Roli, *Experimental Results on Fusion of Multiple Fingerprint Matchers*, 4th Int. Conf. on Audio- and Video-Based Person Authentication, June 9–11, 2003, Guildford (UK), in J. Kittler and M.S. Nixon (eds.), Springer LNCS 2688, pp. 814–820.
- [C06] **G.L. Marcialis**, F. Roli, A. Serrau, *Fusion of Statistical and Structural Fingerprint Classifiers*, 4th Int. Conf. on Audio- and Video-Based Person Authentication, June 9–11, 2003, Guildford (UK), in J. Kittler and M.S. Nixon (eds.), Springer LNCS 2688, pp. 310–317.
- [C05] F. Roli, S. Raudys, **G.L. Marcialis**, *An Experimental Comparison of Fixed and Trained Fusion Rules for Crisp Classifier Outputs*, 3rd Int. Workshop on Multiple Classifier Systems (MCS 2002), June 2002, Cagliari (Italy), in F. Roli and J. Kittler (eds.), Springer LNCS 2364, pp. 232–241.
- [C04] **G.L. Marcialis**, F. Roli, *Fusion of PCA and LDA for Face Verification*, Post-ECCV Workshop on Biometric Authentication (BIOMET 2002), June 1, 2002, Copenhagen (Denmark), in M. Tistarelli, J. Bigun, and A.K. Jain (eds.), Springer LNCS 2359, pp. 30–37.
- [C03] Y. Yao, **G.L. Marcialis**, M. Pontil, P. Frasconi, F. Roli, *A New Machine Learning Approach to Fingerprint Classification*, 7th Congress of the Italian Association for Artificial Intelligence (AI\*IA 2001), Sept. 2001, Bari (Italy), in F. Esposito (ed.), Springer LNAI 2175, pp. 57–63, DOI: 10.1007/3-540-45411-X\_7.
- [C02] L.I. Kuncheva, F. Roli, **G.L. Marcialis**, C.A. Shipp, *Complexity of Data Subsets Generated by the Random Subspace Method: An Experimental Investigation*, 2nd Int. Workshop on Multiple Classifier Systems (MCS 2001), June 2001, Cambridge (UK), in J. Kittler and F. Roli (eds.), Springer LNCS 2096, pp. 349–358.
- [C01] **G.L. Marcialis**, F. Roli, P. Frasconi, *Fingerprint Classification by Combination of Flat and Structural Approaches*, 3rd Int. Conf. on Audio- and Video-Based Biometric Person Authentication (AVBPA 2001), June 3–5, 2001, Halmstad (Sweden), in J. Bigun and F. Smeraldi (eds.), Springer LNCS 2091, pp. 241–246.

#### Other Publications (Non-peer-reviewed)

- [CN14] G. Orrù, G. Colaiacovo, S. Concas, A. Galli, V. Gattulli, M. Gravina, S. Marrone, M. Micheletto, W. Nocerino, A. Procaccino, G. Puglisi, L. Sarcinella, E. Santoro, G. Terrone, A. Valenti, D. Curtotti, D. Impedovo, **G.L. Marcialis**, C. Sansone, *The BullyBuster Research Center: A Multidisciplinary Approach to Digital and Social Violence*, Ital-IA 2025: Joint Proc. of the Thematic Workshops at Ital-IA 2025 colocated with the 5th National Conference on Artificial Intelligence (CINI), June 23–24, 2025, Trieste (Italy).

- [CN12] G. Orrù, V. Gattulli, G. Colaiacovo, S. Marrone, G. Puglisi, L. Sarcinella, G. Terrone, D. Curtotti, D. Impedovo, **G.L. Marcialis**, C. Sansone, *Artificial Intelligence Tools in the Ongoing Fight Against Bullying and Cyberbullying: A Multidisciplinary Approach*, Ital-IA 2024: 4th National Conference on Artificial Intelligence (CINI), May 29–30, 2024, Naples (Italy), <https://ceur-ws.org/Vol-3762/549.pdf>.
- [CN11] **G.L. Marcialis**, *La sicurezza informatica di frontiera: il modello “secure by design” nei sistemi biometrici* [*Frontier Cybersecurity: The “Secure by Design” Model in Biometric Systems*], in *Sicurezza, informazioni e giustizia penale*, a cura di G. Colaiacovo, Pacini Editore, pp. 378–412, ISBN: 978-88-3379-605-5, 2023.
- [CN10] M. Pintor, G. Orrù, D. Maiorca, A. Demontis, L. Demetrio, **G.L. Marcialis**, B. Biggio, F. Roli, *Cybersecurity and AI: The PRALab Research Experience*, 3rd National Conference of the CINI AIIS Laboratory (Ital-IA 2023), May 29–31, 2023, Pisa (Italy), available online at: <https://ceur-ws.org/Vol-3486/>.
- [CN9] R. Casula, A. Galli, M. Gravina, S. Marrone, D. Mattiello, M. Micheletto, G. Orrù, **G.L. Marcialis**, C. Sansone, *Fingerprint Presentation Attacks: Tackling the Ongoing Arms Race in Biometric Authentication*, 3rd National Conference of the CINI AIIS Laboratory (Ital-IA 2023), May 29–31, 2023, Pisa (Italy), available online at: <https://ceur-ws.org/Vol-3486/>.
- [CN8] G. Orrù, A. Galli, ..., **G.L. Marcialis**, C. Sansone, *Leveraging Artificial Intelligence to Fight (Cyber)Bullying for Human Well-being: The BullyBuster Project*, 3rd National Conference of the CINI AIIS Laboratory (Ital-IA 2023), May 29–31, 2023, Pisa (Italy), available online at: <https://www.ital-ia2023.it/submission/83/paper>.
- [CN7] W. Nocerino, ..., **G.L. Marcialis**, C. Sansone, *L'Acchiappabulli - Un framework per il rilevamento di azioni di bullismo e cyberbullismo mediante computer vision, metodi e algoritmi di intelligenza artificiale* [*L'Acchiappabulli - A Framework for Detecting Bullying and Cyberbullying Actions through Computer Vision, Methods, and Artificial Intelligence Algorithms*], Conferenza GARR 2023, June 14–16, 2023, Florence (Italy).
- [CN6] P. Tuveri, M. Micheletto, G. Orrù, L. Ghiani, **G.L. Marcialis**, *Interoperabilità e accesso a dati e servizi: Sistema di protezione di documenti elettronici mediante accesso biometrico* [*Interoperability and Access to Data and Services: A System for the Protection of Electronic Documents through Biometric Access*], Conferenza GARR 2018, Oct. 3–5, 2018, Cagliari (Italy), available online at: <https://www.garr.it/it/chi-siamo/documenti/selected-papers/selected-papers-conferenza-2018/4719-selected-papers-conferenza-2018-23-tuveri/file>, ISBN: 978-88-905077-8-6, 2019.
- [CN5] F. Roli, **G.L. Marcialis**, P. Coli, *An Advanced Image Processing Tool for Latent Fingerprint Analysis and Liveness Assessment*, Biennial Congress of the Italian Society of Applied and Industrial Mathematics (SIMAI 2010), Mini-Symposium on Image Analysis and Forensics, June 21, 2010, Cagliari (Italy).
- [CN4] **G.L. Marcialis**, F. Roli, P. Andronico, P. Multineddu, P. Coli, G. Delogu, *Video Biometric Surveillance and Forensic Image Analysis*, First Workshop on Video-Surveillance Projects in Italy (VISIT 2008), Mar. 3, 2008, Modena (Italy), in R. Cucchiara (ed.).
- [CN3] L. Didaci, **G.L. Marcialis**, F. Roli, *Semi-supervised Techniques for Improving the Performance of Multiple Classifier Systems and Personal Recognition Systems Using Biometric Traits*, Italian Conference on Intelligent Systems (CISI 2006), Sept. 26–29, 2006, Ancona (Italy), in G. Tascini (ed.).
- [CN2] **G.L. Marcialis**, F. Roli, *Fusion of LDA and PCA for Face Recognition*, Workshop on Machine Perception and Vision, 8th Conference of the Italian Association for Artificial Intelligence (AI\*IA 2002), Sept. 10–13, 2002, Siena (Italy).
- [CN1] **G.L. Marcialis**, F. Roli, P. Loddò, *Fusion of Multiple Matchers for Fingerprint Verification*, Workshop on Machine Perception and Vision, 8th Conference of the Italian Association for Artificial Intelligence (AI\*IA 2002), Sept. 10–13, 2002, Siena (Italy).

## PhD, MSc and BSc Students

A fundamental role in Dr. Marcialis's scientific productivity has been played by the PhD students and graduate students for whom he has served as supervisor or co-supervisor. For the sake of brevity, only the list of PhD students and Master's (or single-cycle degree) students is reported below. Dr. Marcialis has also supervised more than twenty Bachelor's theses.

<b>M.Sc. Students</b>	<b>Ph.D. Students</b>
42	13
<b>Current M.Sc. Students</b>	<b>Current Ph.D. Students</b>
2	4

### PhD Students List

<b>Author</b>	<b>Title</b>	<b>Year</b>
Alessandra Serrau	Structural and graph-based methods for automatic fingerprint classification	2006
Pietro Coli	Vitality detection in personal verification systems using fingerprints	2008
Biagio Freni	Template editing and replacement: novel methods for biometric template selection and update	2010
Ajita Rattani	Adaptive biometric systems based on template update paradigm	2010
Zahid Akthar	Security of Multimodal Biometric Systems against Spoof Attacks	2012
Massimiliano Dibitonto	New Challenges in HCI: Ambient Intelligence for Human Performance Improvement	2012
Luca Ghiani	Textural Features for Fingerprint Liveness Detection	2014
Giulia Orrù	Template update algorithms and their application to face recognition systems in the deep learning era	2021
Marco Micheletto	Fusion of fingerprint presentation attacks detection and matching: a real approach from the LivDet perspective	2023
Roberto Casula	The Art of Fingerprint Spoofing	2023
Sara Concas	Beyond Reality: Advanced Strategies for Deepfake Detection, 3D Facial Reconstruction, and Iris Recognition in Modern Security	2025
Simone Maurizio La Cava	3D Facial Reconstruction and Deepfake Detection: Advances in Security and Forensic Investigation Through Complementary Deep Learning Techniques	2025
Gianpaolo Perelli	Unmasking Deepfakes, Adversarial Attacks, and Mobile Users in The Deep Learning Era	2026

## Awards, Invited Speaker, Editorial and Conference roles

### Awards:

- “BullyBuster” project in the *TOP 100 Global List of projects solving problems related to the 17 United Nations Sustainable Development Goals dall’International Research Center on Artificial Intelligence under the auspices of UNESCO*<sup>2</sup>.
- [C81]: *Best Paper Award*, IEEE/IAPR 25th Int. Conf. on Pattern Recognition (ICPR 2020), Milano (Italy), 10-15th, Jan., 2021, DOI: 10.1109/ICPR48806.2021.9413301.
- [C80]: *Best Session Paper Award*, 4th IEEE International Conference on Image Processing, Applications and Systems (IPAS 2020), IEEE, Dec., 9-11, 2020, Genova (Italy), DOI: 10.1109/IPAS50080.2020.9334946.
- [C75]: *Appreciation Award*, IEEE/IAPR Int. Conf on Biometrics (ICB 2019), 2019, June, 6-10<sup>th</sup>, Knossos (Greece), DOI: 10.1109/ICB45273.2019.8987281.
- [J16]: Included in the “Virtual Issue” Elsevier (K. Bowyer Ed.) [Celebrating the Breadth of the Biometric Research](#)
- [J12]: Included as book chapter in: [Emerging Digital Forensics Applications for Crime Detection, Prevention, and Security](#), C.-T. Li (Ed.), IGI Global, DOI: 10.4018/978-1-4666-4006-1.ch001, pp. 1-17, 2013.
- [J11]: [2014 Premium Award for Best Paper in IET Biometrics](#)
- 2011: Grant received for Scientific Merits acknowledged by UNICA.

### Invited Speaker:

- “Fingerprint Presentation Attacks Detection: Insights from sAifer Lab Research and LivDet”, EAB/CITER Workshop on Biometrics, May 19-20, 2025, Martigny (Switzerland)
- “Bridging Technology and Humanity: The Role of AI and Biometrics in Migrant Rescue and Identification”, ECGFF – FRONTEX Workshop on Coast Guard Evolution: AI and Unmanned Systems Enhancing SAR Operations, 23-25 February 2025, Cagliari (Italy).
- “The FF4ALL research project”, EAB Int. Research Project Conference, Sept. 23-25<sup>th</sup>, 2024, Fraunhofer Institute SIT, Darmstadt (Germany)
- “The BullyBuster project”, EAB Int. Research Project Conference, Sept. 18-20<sup>th</sup>, 2023, Fraunhofer Institute SIT, Darmstadt (Germany)
- “Deepfake detection – generalization is the key”, lecture at EAB & CITER Biometrics Workshop, April, 18-19<sup>th</sup>, 2023, IDIAP Research Institute, Martigny (Switzerland)
- “Electronic Health Record and frontier research: the future in biometric technologies?”, Webinar on Operational and Technological Scenarios of the Electronic Health Record of the Autonomous Region of Sardinia, Italian Committee of Information Engineering, June, 24<sup>th</sup>, 2021
- “Fingerprint Presentation Attack Detection: threats and solutions in the deep learning era”, Webinar on, International Information Systems Security Certification Consortium (ISC)<sup>2</sup> Italian Chapter, June, 2021.
- “Fingerprint Presentation Attacks Detection in the Deep Learning Era: a LivDet Story”, EAB FREE lunch time Web Conference, October, 21<sup>th</sup>, 2020
- “Fingerprint Presentation Attacks Detection: The PRA Lab’s experience and the “International Fingerprint Liveness Detection” competition”, Invited talk at EAB Winter Workshop on Presentation Attack Detection (PAD) evaluation and certification, IDIAP Research Center, Martigny (Switzerland), 20-21<sup>th</sup> feb., 2020
- “Fingerprint Presentation Attacks Detection: from the “loss of innocence” to the “International Fingerprint Liveness Detection” competition”, Key-note talk at 11<sup>th</sup> International conference on Image Processing and Communications (IP&C 2019), Bygdoszcz (Poland), Sept., 11<sup>th</sup> -13<sup>th</sup>, 2019
- “Fingerprint Presentation Attacks Detection: from the “loss of innocence” to the “International Fingerprint Liveness Detection” competition”, Key-note talk at 18<sup>th</sup> International conference on Computer Analysis of Images and Patterns (CAIP 2019), Salerno (Italy), Sept., 3<sup>th</sup> -5<sup>th</sup>, 2019
- “Fingerprint Presentation Attack Detection: lessons learned and a ROADMAP to the Future”, Tutorial presso IEEE Int. Conf. on Biometrics, Goldcoast (Queensland, Australia), Feb. 20<sup>th</sup>-23<sup>rd</sup>, 2018.

<sup>2</sup> <https://ircai.org/global-top-100-outstanding-projects/results/>

- “The fingerprint vulnerabilities problem”, Biometric Training Workshop on Assessing the Vulnerability of Fingerprints Biometrics, CyberSecurity Malaysia (MOSTI agency), Kuala Lumpur (Malaysia), Nov., 23-25, 2016.
- “Presentation Attack Detection for Fingerprint Biometrics: A ‘Tailoring’ Job”, European Biometric Symposium, Martigny (Switzerland), January 19, 2016.
- “Advances in Cybersecurity through Biometric Recognition”, delivered during the event “Biometrics: Technologies, Regulations and Applications”, organized by DataSecurity Srl and the University Consortium of Pordenone, under the patronage of the Presidency of the Council of Ministers (Italy), Pordenone, December 1–2, 2015.
- “Biometric Spoofing: From the Age of Innocence to Liveness Detection”, International Workshop on Biometric Spoofing: Threats and Countermeasures, Joint Research Centre (JRC), Ispra (Italy), October 24–25, 2013.
- “Biometric Technologies”, lecture within the course “Multimedia” taught by Prof. Chang-Tsun Li, Department of Computer Science, University of Warwick (UK), November 24–30, 2013.
- “A Gentle Introduction to Biometrics”, Department of Computer Science, University of Warwick (UK), April 24–30, 2012.

### Editorial Review Board Member

- (2009-2017) *International Journal of Digital Crime and Forensics* (IGI, <http://www.igi-global.com/journals/details.asp?id=7828>)

### Associate Editor

- (2025-current) *IEEE Transactions on Biometrics, Behavior, and Identity Science*
- *IET Biometrics*, IET, Special Issue on “Recent Advances in Representation Learning for Robust Biometric Recognition Systems” (ongoing, <https://ietresearch.onlinelibrary.wiley.com/hub/journal/20474946/homepage/cfp>)
- *Pattern Recognition Letters*, Elsevier, Special Issue on “Biometric Presentation Attacks: handcrafted features versus deep learning approaches (BioPath)” (ongoing, <https://www.journals.elsevier.com/pattern-recognition-letters/call-for-papers/biometric-presentation-attacks>)
- *Pattern Recognition Letters (Elsevier)*, Special issue on Robustness, Security, and Regulations Aspects in Current Biometric Systems, <https://www.journals.elsevier.com/pattern-recognition-letters/call-for-papers/special-issue-on-robustness-security-and-regulation-aspects>
- (2012-2016) *The Scientific World Journal* (Indawi, <http://www.hindawi.com/journals/tswj/>)

### Competition Chair and co-chair

- “Every Frame You Take: The Video-based Morphing Attack Detection (V-MAD) Challenge”, with presentation of results at the International Joint Conference on Biometrics (IJCB 2026), Rome (Italy), September 1–4, 2026.
- 9th International Fingerprint Liveness Detection Competition (LivDet 2023), with presentation of results at the International Joint Conference on Biometrics (IJCB 2025), Osaka (Japan), September 8–11, 2025.
- 8th International Fingerprint Liveness Detection Competition (LivDet 2023), with presentation of results at the International Joint Conference on Biometrics (IJCB 2023), Ljubljana (Slovenia), September 25–28, 2023.
- Special Session on “EMOCROWD: Group-Level Emotions and Crowd Analysis for Recognition of Anomalous Actions, Events, and Sentiments”, International Conference on Automatic Face and Gesture Recognition (FG 2021), Jodhpur (India), December 15–18, 2021.
- 7th International Fingerprint Liveness Detection Competition (LivDet 2021), with presentation of results at the IEEE International Joint Conference on Biometrics (IJCB 2021), Shenzhen (China), August 4–7, 2021.
- 6th International Fingerprint Liveness Detection Competition (LivDet 2019), with presentation of results at the 12th IEEE International Conference on Biometrics, Crete (Greece), June 7–10, 2019.

- 5th International Fingerprint Liveness Detection Competition (LivDet 2017), with presentation of results at the 11th IEEE International Conference on Biometrics, Gold Coast (Queensland, Australia), February 20–23, 2018.
- 4th International Fingerprint Liveness Detection Competition (LivDet 2015), with presentation of results at the 7th IEEE International Conference on Biometrics: Theory, Applications and Systems (BTAS 2015), Washington, DC (USA), September 8–11, 2015.
- 3rd International Fingerprint Liveness Detection Competition (LivDet 2013), with presentation of results at the 6th IEEE/IAPR International Conference on Biometrics, Madrid (Spain), June 4–7, 2013.
- 2nd International Fingerprint Liveness Detection Competition (LivDet 2011), with presentation of results at the 5th IEEE/IAPR International Conference on Biometrics, New Delhi (India), March 29 – April 1, 2012.
- 1st International Fingerprint Liveness Detection Competition (LivDet 2009), with presentation of results at the 15th International Conference on Image Analysis and Processing (ICIAP 2009), Vietri sul Mare (Italy), September 8–11, 2009.

### **Program Chair**

- 2026 IEEE Int. Joint Conf. on Biometrics (IJCB 2026)
- 2026 IEEE Int. Work. on Biometrics and Forensics (IWBF 2026)

### **Area Chair**

- 2024 IEEE Int. Joint Conf. on Biometrics (IJCB 2024)
- 2022 IEEE Int. Conf. on Image Analysis and Processing (ICIAP 2022)
- 2020 IEEE Int. Conf. on Pattern Recognition (ICPR 2020)

### **Doctoral Consortium Chair**

- 2019 IEEE Int. Conf. on Biometrics: Technologies, Applications and Systems (BTAS 2019).

### **Tutorial Chair**

- 2017 IEEE/IAPR International Conference on Image Analysis and Processing (ICIAP 2017), Sept., 11-15, 2017, Catania (Italy)

### **Publication Chair**

- 2014 IEEE Workshop on Biometric Measurements and Systems for Security and Medical Applications, Oct., 17<sup>th</sup>, 2014, Rome (Italy)

### **Programme Committee**

- IEEE Int. Joint Conf. on Biometrics (IJCB 2026), Rome, Sept. 1-4, 2026
- 2026 IEEE Int. Work. on Biometrics and Forensics (IWBF 2026), Cote d'Azur (France), April 22-23, 2026.
- Int. Joint Conf. on Biometrics (IJCB 2025), Osaka (Japan), Sept. 8-11<sup>th</sup>, 2025.
- 24<sup>nd</sup> Int. Conf. of the Biometric Special Interest Group (BIOSIG 2025), Darmstadt (Germany), Sept., 20<sup>th</sup>-22<sup>th</sup>, 2023.
- 23<sup>rd</sup> Int. Conf. of the Biometric Special Interest Group (BIOSIG 2024), Darmstadt (Germany), Sept., 25<sup>th</sup>-27<sup>th</sup>, 2024.
- Int. Joint Conf. on Biometrics (IJCB 2024), Buffalo, USA, 15th-18th Sept., 2024.
- 18th IEEE International Conference on Automatic Face and Gesture Recognition (FG 2024), Istanbul, Turkey, on May 27-31, 2024.
- 1st International Workshop on Responsible Face Image Processing (ReFIP 2024), as part of the 18th IEEE International Conference on Automatic Face and Gesture Recognition (FG 2024) in Istanbul, Turkey, on May 27-31, 2024.
- 30<sup>th</sup> Int. Conference on Image Processing (ICIP 2023), Kuala Lumpur (Malaysia), Oct., 8<sup>th</sup>-11<sup>th</sup>, 2023.
- Int. Joint Conf. on Biometrics (IJCB 2023), Ljubljana, Slovenia, 25th-28th Sept., 2023.
- 22<sup>nd</sup> Int. Conf. of the Biometric Special Interest Group (BIOSIG 2023), Darmstadt (Germany), Sept., 20<sup>th</sup>-22<sup>th</sup>, 2023.

- 22<sup>nd</sup> Int. Conf. on Image Analysis and Processing (ICIAP 2023), Udine (Italy), 11<sup>th</sup>-15<sup>th</sup>, Sept., 2023.
- European Signal Processing Conference (EUSIPCO 2023), Helsinki (Finland), Sept., 4<sup>th</sup>-8<sup>th</sup>, 2023.
- Int. Conf. on Image Processing (ICIP 2022), Bordeaux (France), Oct., 16<sup>th</sup>-19<sup>th</sup>, 2022
- 21<sup>th</sup> Int. Conf. of the Biometrics Special Interest Group (BIOSIG 2022), Darmstadt (Germany), Sept., 14<sup>th</sup>-16<sup>th</sup>, 2022.
- European Signal Processing Conf. (EUSIPCO 2022), Belgrade (Serbia), Aug., 29<sup>th</sup> – Sept. 2<sup>nd</sup>, 2022
- Int. Conf. on Pattern Recognition (ICPR 2022), Montreal Québec (Canada), Aug., 21<sup>th</sup>-25<sup>th</sup>, 2022
- Int. Conf. on Pattern Recognition (ICPR 2020), Milano (Italia), Jan., 10<sup>th</sup>-15<sup>th</sup>, 2021.
- Int. Joint Conf. on Biometrics (IJCB 2021), Shenzhen (China), Aug., 4<sup>th</sup>-7<sup>th</sup>, 2021.
- Int. Joint Conf. on Biometrics (IJCB 2020), Houston (USA), Sept. 28<sup>th</sup> – Oct., 1<sup>st</sup>, 2020.
- 9<sup>th</sup> Int. Conf. on Pattern Recognition Applications and Methods (ICPRAM 2020), Valletta (Malta), Feb. 22-24<sup>th</sup>, 2020.
- 8<sup>th</sup> Int. Conf. on Pattern Recognition Applications and Methods (ICPRAM 2019), Feb. 19<sup>th</sup>-21<sup>th</sup>, Prague (Czech Republic)
- IEEE 12<sup>th</sup> Int. Conf. on Biometrics (ICB 2019), June, 7<sup>th</sup>-10<sup>th</sup>, Crete (Greece)
- IEEE 8<sup>th</sup> Int. Conf. Image Processing, Theory, Tools and Applications (IPTA 2018), Nov. 7-11<sup>th</sup>, Xian (China)
- IEEE Int. Conf. on Image Processing (ICIP 2018), Oct. 7<sup>th</sup>-10<sup>th</sup>, 2018 Athens (Greece)
- IEEE Int. Conf. on Pattern Recognition (ICPR 2018), Aug. 20<sup>th</sup>-24<sup>th</sup>, 2018, Beijing (China)
- 25<sup>th</sup> IEEE Int. Conf. on Telecommunications (ICT 2018), June, 26<sup>th</sup>-28<sup>th</sup>, 2018, Saint-Malo (France)
- 11<sup>th</sup> Int. Conf. on Biometrics (ICB 2018), Feb. 20<sup>th</sup>-23<sup>rd</sup>, 2018, Goldcoast (Australia)
- 5<sup>th</sup> Int. Work. on Biometrics and Forensics (IWBF 2017), April, 4-5, 2018 Coventry (UK)
- 6<sup>th</sup> Int. Conf. on Pattern Recognition Applications and Methods (ICPRAM 2017), Feb. 24-26, 2017, Porto (Portugal)
- IEEE International Conf. on Identity, Security and Behaviour Analysis (ISBA 2017), Feb. 22-24, New Delhi (India)
- 6<sup>th</sup> IEEE Int. Conf. on Image Processing, Tools and Applications (IPTA 2016), Dec., 12-15, Oulu (Finland)
- 13<sup>th</sup> IEEE Asian Conf. on Computer Vision (ACCV 2016), Nov., 20-24, 2016, Taipei (Taiwan)
- 9<sup>th</sup> IEEE/IAPR Int. Conf. on Biometrics (ICB 2016), June, 13-16, 2016, Halmstad (Sweden)
- 9<sup>th</sup> IAPR Int. Conf. on Articulated Motion and Deformable Objects (AMDO 2016), July, 13-15, 2016, Palma (Mallorca, Spain)
- 5<sup>th</sup> Int. Conf. on Pattern Recognition Applications and Methods (ICPRAM 2016), Feb. 24-26, 2016, Rome (Italy)
- 7<sup>th</sup> Int. Conf. on Biometrics: Technologies, Applications and Systems (BTAS 2015), Sept., 8-11, 2015, Washington DC (USA).
- IEEE International Conference on Identity, Security and Behavior Analysis (ISBA 2015), March 23-25, Hong Kong (China)
- 4<sup>th</sup> Int. Conference on Pattern Recognition Applications and Methods (ICPRAM 2015), Jan. 10-12, 2015, Lisbon (Portugal)
- 2014 IEEE Workshop on Biometric Measurements and Systems for Security and Medical Applications, Rome, Italy, Oct. 17<sup>th</sup>, 2014.
- 8<sup>th</sup> IAPR Int. Conf. on Articulated Motion and Deformable Objects (AMDO 2014), July, 16-18, 2014, Palma (Mallorca, Spain)
- 2<sup>nd</sup> IEEE International Joint Conference on Biometrics, Clearwater, Florida (USA), September 29<sup>th</sup>-October, 2<sup>nd</sup>, 2014.
- IEEE Symposium on Computational Intelligence in Biometrics and Identity Management (2014 CIBIM) within the IEEE Symposium Series on Computational Intelligence 2014 (IEEE SSCI 2014). The event will be held in Orlando, Florida, USA from December 9-12, 2014.
- 3<sup>rd</sup> International Conference on Pattern Recognition Applications and Methods (ICPRAM 2014), March 6-8, 2014, ESEO, Angers, Loire Valley, France.
- 2<sup>nd</sup> IEEE/SAE International Conference on Connected Vehicles and Expo, Las Vegas, NV, USA, 2-6 December 2013.

- 2<sup>nd</sup> International Conference on Pattern Recognition Applications and Methods (ICPRAM 2013), Feb. 15-18, 2013, Barcellona, Spagna (<http://www.icpram.org/>)
- 11<sup>th</sup> Int. Asian Conference on Computer Vision (ACCV 2012), Nov 5-9, 2012, Daejeon (South Korea).
- 7<sup>th</sup> IAPR Int. Conf. on Articulated Motion and Deformable Objects (AMDO 2012), July, 11-13, 2012, Andratx (Mallorca, Spain)
- Special Session on “Computational Intelligence and Biometrics”, IEEE World Congress on Computational Intelligence, June, 10-15, 2012, Brisbane (Australia)
- 13<sup>th</sup> International Conference on Computer Vision (ICCV 2011), November, 6-11, 2011, Barcelona (Spain), (<http://www.iccv2011.org>)
- 10<sup>th</sup> Int. Asian Conference on Computer Vision (ACCV 2010), November, 8-12, 2010, Queenstown (New Zealand)
- 6<sup>th</sup> IAPR Int. Conf. on Articulated Motion and Deformable Objects (AMDO 2010), July, 7-9, 2010, Andratx (Mallorca, Spain)
- 11<sup>th</sup> IEEE International Conference on Computer Vision (ICCV 2007), October, 14-21, 2007, Rio de Janeiro (Brasil)

### Organization committee

- 3<sup>rd</sup> IEEE/IAPR International Conference on Biometrics, June, 2-5, 2009, Alghero (Italy)
- 5<sup>th</sup> International Workshop on Multiple Classifiers Systems, June, 9-11, 2004, Cagliari (Italy)
- 3<sup>rd</sup> International Workshop on Multiple Classifiers Systems, June, 24-25, 2002, Cagliari (Italy)

### Referee for international associations

- German National Research Center for Applied Cybersecurity ATHENE
- COST Association
- Brno University of Technology, Brno (Czech Republic)
- Ecole de technologie superieure, Université du Quebec, Montreal (Canada)
- Foundation for Science and Technology (Agency of Portuguese Ministry of Education and Research)
- Institute of Telecommunications of “Instituto Superior Tecnico”, Lisboa (Portogallo)
- Member of EU List of Experts for Horizon2020 Projects
- Ministero dell’Istruzione, dell’Università e della Ricerca (Italy)
- University of Technology, Sidney (Australia)

### Referee for international journals

- International Journal of Digital Crime and Forensics (Editorial Review Board Member)
- IEEE Transactions on Pattern Analysis and Machine Intelligence
- IEEE Transactions on Neural Networks
- IEEE Transactions on Systems, Man and Cybernetics
- IEEE Transactions on Information Security and Forensics
- IEEE Signal Processing Letters
- Pattern Recognition (Elsevier)
- Pattern Recognition Letters (Elsevier)
- Neurocomputing (Elsevier)
- Information Fusion (Elsevier)
- International Journal of Pattern Recognition and Artificial Intelligence (World Scientific)
- International Journal of Image and Graphics (World Scientific)
- Pattern Analysis and Applications (Springer)
- International Journal of Computers and Applications (Acta Press)
- Journal of Intelligent and Fuzzy Systems (IOS Press)
- International Journal of Biometrics (Inderscience)
- EURASIP Journal on Advances in Signal Processing
- Electronic Letters on Computer Vision and Image Analysis (ISSN: 1577-5097)

## Projects

### “Principal Investigator” in commissioned technology transfer projects (third-party funded):

- **AI-based systems for advanced information retrieval**, funded by Ichnobyte Srl, 2025–ongoing.
- **Testing of fingerprint presentation attack detection and matching systems**, funded by PANINI Srl, 2025.
- **Integration of technologies for extracting “biometric traces” from mobile devices**, funded by Interferentia Srl, 2023–2024.
- **Research agreement for the enhancement of software and hardware for deepfake analysis**, funded by the Presidency of the Council of Ministers – Scientific Pole, 2022–2023.
- **Development of an iris recognition system**, funded by MBDA, 2020–2021.
- **Evaluation of Orway’s fingerprint recognition technology**, funded by Orway Srl, 2020–ongoing.
- **Extraction of biometric “fingerprints” from mobile devices**, funded by Interferentia Srl, 2020–2021.
- **Fingerprint Forensic Tool: processing of fingerprint images for minutiae extraction and comparison**, funded by the Presidency of the Council of Ministers – Scientific Pole, 2019–2021.
- **Preliminary analysis of deepfake detection: detection of video artifacts generated by convolutional neural networks**, funded by the Presidency of the Council of Ministers – Scientific Pole, 2019–2021.
- **Development of a fake fingerprint image recognition technology (“liveness detection”) on Linux platforms**, funded by Green Bit, 2018.
- **Feasibility study and prototypical development of a system for the protection of electronic documents through biometric access**, funded by CSAMed–Net4Market, 2017–2018.
- **Testing of software for verifying the compliance of photographs for electronic travel documents with national and international standards**, funded by ID Suisse, 2012.

### “Principal Investigator” (PI) or Head of Operational Unit in competitive calls for research and inter-university cooperation:

- **EDUFLEX - Transforming Higher Education through Adaptive Individual Academic Pathways and Competence-Based Interdisciplinary Learning** – GAP 101237008, European Education and Culture Executive Agency (EACEA), Head UNICA, 2025-2029.
- **AI4Cybersec - Artificial Intelligence for Cyber Security**, ERASMUS Master's programme — GAP 101128245 (Lot 2: Erasmus Mundus Design Measures (EMDM)), Head UNICA, 2023-2025.
- **BullyBuster 2 - the ongoing fight against bullying and cyberbullying with the help of artificial intelligence for the human wellbeing**, Project of Relevant National Interest PRIN 2022 - EU NextGenerationEU, Principal Investigator, 2023-2026.
- **BullyBuster - A framework for bullying and cyberbullying action detection by computer vision and artificial intelligence methods and algorithms**, Project of Relevant National Interest PRIN 2017, vice-Principal Investigator, 2019-2023.
- **Adaptive biometrics systems based on template update**, “Joung Researcher” Project, , Principal Investigator, University of Cagliari, 2009-2010.

### Participation in commissioned technology transfer projects (third-party funded) as coordinator of staff activities:

- **Design of a Fingerprint Liveness Detection system**, Green Bit, 2015–2016.
- **Fingerprint Liveness Detection Algorithms Design and Development**, Crossmatch Inc., 2010–2011.
- **PRiO – Object Recognition Procedure**, Vitrociset S.p.A., 2007–2008.
- **Distributed architectures for multi-sensor surveillance**, Eltag SpA, 2007.
- **Biometric recognition in ski resort environments**, Cap Research Srl, 2003–2004.

## Participation in projects funded through competitive calls as a member or coordinator of staff activities:

- **PNRR Security and Rights in Cyberspace (SERICS), Spoke 2 – Fighting Fakes: Detection of Deep Fake Media and Life-Long Media Authentication (FF4ALL)**, WP2 Leader, 2023–2026.
- **PNRR e.INS – Ecosystem of Innovation for Next Generation Sardinia (e.INS)**, 2022–2024.
- **IQSS – Information Quality-aware and Secure Sensor Networks for Smart Cities**, Fondazione Banco di Sardegna, 2021–2022.
- **LET’s CROWD – Law Enforcement Agencies Human Factor Methods and Toolkit for the Security and Protection of Crowds in Mass Gatherings**, European Union, 2017–2019.
- **Erasmus+ Programme – Capacity Building in Higher Education (E+CBHE) – FORC: Pathway in Forensic Computing**, Project Ref. No. 574063-EPP-1-2016-1-IT-EPPKA2-CBHE-JP, 2017–2018.
- **PISDAS – Integrated Platform for Secure Advanced Digital Services**, Autonomous Region of Sardinia, 2016–2019.
- **MAS – Mobile Face Anti-Spoofing**, Autonomous Region of Sardinia, 2014–2015.
- **MAVEN – Management and Authenticity Verification of Multimedia Contents**, FP7 European Union, 2013–2016.
- **SIVS – Integrated Video Surveillance System**, Integrated Incentive Packages, Autonomous Region of Sardinia, 2012–2015.
- **GIEDION – Intelligent and Secure Management of Distributed Sensor Systems and Human–Machine Interaction: Future Scenarios**, Integrated Incentive Packages, Autonomous Region of Sardinia, 2012–2016.
- **Secure RVID – Radio-Frequency Identification and Computer Vision Technologies for Ambient Intelligence and Workplace Safety**, Regione Lombardia and Autonomous Region of Sardinia, 2012–2014.
- **Adaptive Biometric Systems: Methods, Models and Algorithms**, Autonomous Region of Sardinia, 2010–2012.
- **TABULA RASA – Trusted Biometrics under Spoofing Attacks**, FP7 European Union, 2010–2013.
- **Biometric Guards – Electronic Guardians for the Protection and Security of Biometric Systems**, PRIN Project 2008, 2010–2012.
- **State of the Art on Methods and Algorithms for Automatic Analysis of Latent Fingerprints and Fingerprint Vitality Detection**, research agreement between the Department of Electrical and Electronic Engineering and the Scientific Investigations Department (RIS) of the Carabinieri, 2007–2010.
- **Access Control Based on Infrared Facial Recognition**, Autonomous Region of Sardinia, 2008.
- **Multimodal Biometric Recognition and Video Surveillance for Security**, Ministry of Education, University and Research (PRIN), 2005–2006.
- **Virtual Immersive Communications**, Ministry of Education, University and Research, 2002–2005.
- **Distributed Systems for Multi-sensor Recognition**, Ministry of Education, University and Research (PRIN), 2002–2003.
- **PLAINS – Prototype Landscape Assessment Information Systems**, European Union, Environment and Climate Programme, 1999–2001.