

# CURRICULUM VITAE

## PERSONAL INFORMATION

## ANDREA ABRARDO



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Nationality Italian

Associate Professor

**CURRENT POSITION** Department of Information Engineering and Mathematical Sciences  
University of Siena, Italy

## BIOGRAPHY

He received his "laurea" degree (summa cum laude) in Electronic Engineering at the University of Florence, Italy, in 1993. From January 1994 to November 1994, he worked in the Image Processing and Communications Laboratory of the Department of Electronic Engineering of the University of Florence, in collaboration with the Tuscany Region, on the development of broadband network infrastructures. From November 1994 to October 1997, he was a PhD student at the same Department of Electronic Engineering. In June 1998, he obtained the PhD degree with a thesis on "Web-based Tele-Radiology Systems". In 1998, he joined the Department of Information Technology at the University of Siena, Italy, as a researcher. He is an associate professor in the Department of Information Technology and Mathematical Sciences at the University of Siena. In 2017, he obtained the scientific national qualification for the role of full professor of telecommunications. His interests are in the area of resource allocation strategies for wireless networks, with a focus on 5G mobile systems. He has published more than 130 technical papers and has been involved in several national and European projects. In 2011, he was awarded the Transactions Prize Paper Award from the IEEE Geoscience and Remote Sensing Society. From 2015 to 2019, he was an associate editor (editorial board member) of the international journal IEEE Transactions on Wireless Communications (TWC) and a guest editor for several journals. From 2017 to

2020, he coordinated 5G pre-stage trials in Milan, Italy, on behalf of the National Inter-University Telecommunications Consortium (CNIT) and in collaboration with Vodafone Italia S.p.A.

## TEACHING

1997-1998 Assistant for the course Electrical communications: Three years course program "Diploma Universitario in Ingegneria delle Telecomunicazioni", University of Florence – 20 hours

1997-1998 Lecturer in Elaborazione digitale dei segnali: Three years course program "Diploma Universitario in Ingegneria delle Telecomunicazioni", University of Siena - 50 hours

1998-1999 Lecturer in Elaborazione digitale dei segnali: Three years course program "Diploma Universitario in Ingegneria delle Telecomunicazioni", University of Siena - 50 hours

1998-1999 Assistant for the course Sistemi di Telecomunicazione: Five years course program, University of Siena, "Laurea in Ingegneria delle Telecomunicazioni" – 20 hours

1999-2000 Assistant for the course Sistemi di Telecomunicazione: Five years course program, University of Siena, "Laurea in Ingegneria delle Telecomunicazioni" – 20 hours

1999-2000 Lecturer in Elaborazione digitale dei segnali: Three years course program "Diploma Universitario in Ingegneria delle Telecomunicazioni", University of Siena - 50 hours

2000-2001: Assistant for the course Sistemi di Telecomunicazione: Five years course program, University of Siena, "Laurea in Ingegneria delle Telecomunicazioni" – 20 hours

2000-2001 Lecturer in Elaborazione digitale dei segnali: Three years course program "Diploma Universitario in Ingegneria delle Telecomunicazioni", University of Siena - 50 hours

2001-2002: Lecturer in Comunicazioni Radiomobili: Three years course program L1 "Laurea in Ingegneria delle Telecomunicazioni", University of Siena - 50 hours/6 ECTS

2000-2001: Assistant for the course Trasmissioni numeriche: Five years course program, University of Siena, "Laurea in Ingegneria delle Telecomunicazioni" – 20 hours

2002-2003: Lecturer in Comunicazioni Radiomobili: Three years course program L1 "Laurea in Ingegneria delle Telecomunicazioni", University of Siena - 50 hours/6 ECTS

2002-2003: Assistant for the course Trasmissioni numeriche: Five years course program, University of Siena, "Laurea in Ingegneria delle Telecomunicazioni" – 20 hours

2003-2004: Lecturer in Comunicazioni Radiomobili: Three years course program L1 "Laurea in Ingegneria delle Telecomunicazioni", University of Siena - 50 hours/6 ECTS

2003-2004: Lecturer in Progettazione Sistemi Radiomobili: Two years course program L2 “Laurea Magistrale in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 50 hours/6 ECTS

2003-2004: Assistant for the course Trasmissioni numeriche: Five years course program, University of Siena, "Laurea in Ingegneria delle Telecomunicazioni" – 20 hours

2004-2005: Lecturer in Comunicazioni Radiomobili: Three years course program L1 “Laurea in Ingegneria delle Telecomunicazioni”, University of Siena - 50 hours/6 ECTS

2004-2005: Lecturer in Progettazione Sistemi Radiomobili: Two years course program L2 “Laurea Magistrale in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 50 hours/6 ECTS

2005-2006: Lecturer in Comunicazioni Radiomobili: Three years course program L1 “Laurea in Ingegneria delle Telecomunicazioni”, University of Siena - 50 hours/6 ECTS

2005-2006: Lecturer in Progettazione Sistemi Radiomobili: Two years course program L2 “Laurea Magistrale in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 50 hours/6 ECTS

2007-2008: Lecturer in Comunicazioni Radiomobili: Three years course program L1 “Laurea in Ingegneria delle Telecomunicazioni”, University of Siena - 50 hours/6 ECTS

2007-2008: Lecturer in Progettazione Sistemi Radiomobili: Two years course program L2 “Laurea Magistrale in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 50 hours/6 ECTS

2008-2009: Lecturer in Comunicazioni Radiomobili: Three years course program L1 “Laurea in Ingegneria delle Telecomunicazioni”, University of Siena - 50 hours/6 ECTS

2008-2009: Lecturer in Comunicazioni Digitali: Two years course program L2 “Laurea Magistrale in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 80 hours/9 ECTS

2009-2010: Lecturer in Comunicazioni Radiomobili: Three years course program L1 “Laurea in Ingegneria delle Telecomunicazioni”, University of Siena - 50 hours/6 ECTS

2009-2010: Lecturer in Comunicazioni Digitali: Two years course program L2 “Laurea Magistrale in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 80 hours/9 ECTS

2010-2011: Lecturer in Comunicazioni Radiomobili: Three years course program L1 “Laurea in Ingegneria delle Telecomunicazioni”, University of Siena - 50 hours/6 ECTS

2010-2011: Lecturer in Comunicazioni Digitali: Two years course program L2 “Laurea Magistrale in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 80 hours/9 ECTS

2010-2011: Lecturer in Reti di Sensori: Two years course program L2 “Laurea in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 50 hours/6 ECTS

2011-2012: Lecturer in Comunicazioni Digitali: Two years course program L2 “Laurea Magistrale in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 80 hours/9 ECTS

2011-2012: Lecturer in Reti di Sensori: Two years course program L2 “Laurea in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 50 hours/6 ECTS

2012-2013: Lecturer in Comunicazioni Digitali: Two years course program L2 “Laurea Magistrale in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 80 hours/9 ECTS

2013-2013: Lecturer in Reti di Sensori: Two years course program L2 “Laurea in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 50 hours/6 ECTS

2013-2014: Lecturer in Digital Communications: Two years course program L2 “Laurea Magistrale in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 80 hours/9 ECTS

2013-2014: Lecturer in Reti di Sensori: Two years course program L2 “Laurea in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 50 hours/6 ECTS

2014-2015: Lecturer in Digital Communications: Two years course program L2 “Laurea Magistrale in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 80 hours/9 ECTS

2014-2015: Lecturer in Communications Technology for Energy: Two years course program L2 “Laurea in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 50 hours/6 ECTS

2015-2016: Lecturer in Digital Communications: Two years course program L2 “Laurea Magistrale in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 80 hours/9 ECTS

2015-2016: Lecturer in Communications Technology for Energy: Two years course program L2 “Laurea in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 50 hours/6 ECTS

2016-2017: Lecturer in Digital Communications: Two years course program L2 “Laurea Magistrale in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 80 hours/9 ECTS

2016-2017: Lecturer in Communications Technology for Energy: Two years course program L2 “Laurea in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 50 hours/6 ECTS

2017-2018: Lecturer in Digital Communications: Two years course program L2 “Laurea Magistrale in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 80 hours/9 ECTS

2017-2018: Lecturer in Communications Technology for Energy: Two years course program L2 “Laurea in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 50 hours/6 ECTS

2018-2019: Lecturer in Digital Communications: Two years course program L2 “Laurea Magistrale in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 80 hours/9 ECTS

2018-2019: Lecturer in 5G Technologies: Two years course program L2 “Laurea in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 50 hours

2019-2020: Lecturer in Digital Communications: Two years course program L2 “Laurea Magistrale in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 80 hours/9 ECTS

2019-2020: Lecturer in 5G Technologies: Two years course program L2 “Laurea in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 50 hours/6 ECTS

2020-2021: Lecturer in Digital Communications: Two years course program L2 “Laurea Magistrale in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 80 hours/9 ECTS

2020-2021: Lecturer in Modern Communications for 5G and Beyond: Two years course program L2 “Laurea in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 80 hours/9 ECTS

2021-2022: Lecturer in Digital Communications: Two years course program L2 “Laurea Magistrale in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 80 hours/9 ECTS

2021-2022: Lecturer in Modern Communications for 5G and Beyond: Two years course program L2 “Laurea in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 80 hours/9 ECTS

2022-2023: Lecturer in Digital Communications: Two years course program L2 “Laurea Magistrale in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 80 hours/9 ECTS

2022-2023: Lecturer in Modern Communications for 5G and Beyond: Two years course program L2 “Laurea in Ingegneria Elettronica e delle Telecomunicazioni”, University of Siena - 80 hours/9 ECTS

### **ASSIGNMENTS AND SERVICES TO SUPPORT THE DEPARTMENT ACTIVITIES**

From 2000 to 2008 he was in the Orientation Commission (commissione orientamento) of the Department of Information Engineering of the University of Siena.

From 2014 to 2018 he was a member of the didactic commission (comitato per la didattica) of the two-year master's programme in electronics and communications engineering at the University of Siena.

From 2018 to 2021 he was **president of the didactic commission** (comitato per la didattica) of the two-year master's programme in electronics and communications engineering at the University of Siena.

### **RESULTS OF THE RESEARCH ACTIVITY**

As a result of his research activity he has published 62 journal papers, 2 books, and 71 international conference papers. According to Google scholar (<https://scholar.google.it/citations?user=UJpAic8AAAAJ&hl=it>), the h-index is 26, the i10 index is 57 and the number of citations is 2376.

### **PhD TUTORING AND PARTICIPATION IN PhD ACTIVITIES**

He has been the **tutor** of six PhD students (years 2008-2020) at the Department of Information Engineering of the University of Siena, in the field of: energy efficient protocols in wireless sensor networks, resource allocation for 4-th generation cellular systems, compressive sensing and distributed optimization in wireless sensor networks, design and development of a Fixed Wireless Access (FWA) for 5G systems working at 3.7 GHz in the area of Carugate (Milan), study of possible attacks and protection mechanisms for the new slice-based virtual 5G core network, within the 5G project "5G experimentation Program in Milan, Italy" supported by the Ministry of Economic Development (Ministero dello Sviluppo Economico or MISE) and by Vodafone Italia S.p.A.

He is actually **tutor** of two PhD students on topics: joint communications and localizations in RIS (Reconfigurable Intelligent Surfaces) aided communications systems, IoT technologies for safety in smart industry.

From 2006 to 2010 he has been in the **PhD Board** of the PhD school in Information Engineering of the University of Siena.

He is currently part of the **PhD Board** of the PhD school in Smart Industry of the University of Pisa.

He has been invited to **present a talk** entitled "Location-aided RIS Optimization" within the **Phd School** "2022 European School of Antennas and Propagation (ESoA)" held in Siena in June 2022.

He has been **invited to provide a seminar** in March 2021 within the 42nd European **Doctoral school** on Metamaterials (topic "Future wireless systems enabled by Advanced and Intelligent Metasurfaces", <http://school.metamorphose-vi.org/index.php/schools/8-schools/59-xxxv-school-rome-italy>) with title "Massive MIMO and MTS: a new communications paradigm for beyond 5G systems.

He has been one of the **organizers of the Fourth Doctoral School (PhD school)** on Metawireless held partially online and partially in presence in Siena (9-10 March 2023 and 23-24 March 2023) as responsible of University of Siena within the **META WIRELESS project under the Horizon 2020 Marie Skłodowska-Curie program**.

He presented a seminar entitled "**Joint communication and localization schemes and protocols for RIS-aided networks**" at the **Fourth PhD School on "Metawireless"** in Siena on March 23, 2023.

#### **INTERNATIONAL COLLABORATIONS INVITED SEMINARS/TUTORIALS AND ORGANIZATION OF WORKSHOPS**

From 2003 to 2007 he has **tutored 4 master thesis** collaborating with **Aalborg University**, Denmark and Nokia Denmark, in the field of radio resource management for WCDMA interfaces.

Since 2003 he has been involved as **tutor** in many master thesis programs collaborating with the **Royal Institute of Technology (KTH)** of Stockholm, and with **Ericsson Research**, Stockholm, in the field of wireless networks optimization and resource allocation.

He has been **invited to provide a seminar** on “Power control in 3G wireless systems and capacity evaluation of WCDMA systems with mixed traffic classes”, at **Siemens**, Ulm, Germany in November 2000.

Ha has been **invited to present a seminal work** on “Joint Channel Decoding with Feedback Power Control in Sensor Networks with Correlated Sources,” at IEEE ISWC 2009.

He has **organized** the special session: “Transmission of correlated sources in distributed radio systems: theory and applications,” within the conference ISWCS’09, 2009 IEEE 6th International Symposium on Wireless Communication Systems, held in Siena, Italy.

He has been **invited to provide a seminar** on “Radio resource allocation for D2D communications underlying cellular systems” at **Ericsson**, Stockholm, Sweden in May 2011.

He has been **invited to provide a seminar** on “Optimization of power resources in wireless sensor networks” at **KTH, Stockholm**, Sweden in May 2011.

He has been **invited to provide a seminar** in February 2021 within the **European school on Antennas** programmers, specific session Antenna Systems for 5G Communications (<https://esoa5g.wixsite.com/esoa5gflorence>) with title: "Massive MIMO for 5G Communications Systems: Overview, Challenges, and Open Issues."

He has been **invited to provide a keynote speech** in March 2021 within the ICACIT 2021 2021 International conference on Advanced Computing and Intelligent Technologies (<http://www.icacit.in>) with title " Edge Intelligence in Dynamic Radio Access Network Slicing for Beyond 5G systems".

He has been **invited to present a talk** entitled “From massive MIMO to RIS: overview, challenges and open issues,” within the 2021 Huawei antenna workshop held in October 2021 in Munich, Germany.

He has presented a **tutorial** entitled “Reconfigurable Intelligent Surfaces: A Joint Localization and Communication Perspective,” within the IEEE International Mediterranean Conference on Communications and Networking held in Athens, Greece on 5–8 September 2022.

He has been **invited to present a talk** entitled “Reconfigurable Intelligent Surfaces: a Joint Localization and Communications Perspective,” within the 2022 Huawei antenna workshop held in October 2022 in Munich, Germany.

He has been **invited as an expert in beyond-5G communication technologies to present a talk** entitled “RIS-aided Joint Communication and Localization,” at the Technical University of Munich (TUM) in Munich, Germany as recognized expert of beyond-5G radio technologies.



## EDITORSHIP AND REVISION ACTIVITY

He has served as **Associated Editor** (Member of Editorial Board) of the IEEE Transactions on Wireless Communications (**TWC**) International Journal in the period 2015-2019.

He has served as **Guest Editor** of the special issue "Next Generation Communication Technologies for Sensor and Ad-Hoc Networks" of **MDPI Sensors**.

He is a frequent reviewer for many international conferences and journals. Among them, the most significant are IEEE Transactions on Wireless Communications, IEEE Transactions on Communications, IEEE Transactions on Signal Processing, IEEE Transactions on Information Forensic and Security (TIFS).

He regularly acts as a **technical program committee (TPC)** member for many international conferences, such as the IEEE International Conference on Communications (ICC), the IEEE Globecom Conference.

## AWARDS

In 1993 he has been awarded by OTE S.p.a. (Florence) for the **best Thesis** of the year in the topic: "Telecommunications".

In 2011 he has been awarded by the **IEEE Geoscience and Remote Sensing Society** with the prestigious **2011 Transactions Prize Paper Award** for the paper: A. Abrardo, M. Barni, E. Magli, F. Nencini, "Error-resilient and low-complexity onboard lossless compression of hyperspectral images by means of distributed source coding", T-GARS, v. 48, n. 4, Apr. 2010, pp. 1892-1904.

In 2017 he has been **awarded by the International Academy, Research, and Industry Association** with the **Best Paper Award** for the paper "A Message Passing Approach for Decision Fusion of Hidden-Markov observations in the presence of Synchronized Attacks in Sensor Networks," by Andrea Abrardo, Mauro Barni, Kassem Kallas, Benedetta Tondi, presented during MMEDIA 2017, The Ninth International Conferences on Advances in Multimedia, held in Venice, Italy during April 23 - 27, 2017.

In 2018 he has been elected the grade of **Senior Member of the IEEE**.

## RESPONSIBILITY OF RESEARCH ACTIVITY FUNDED BY PRIVATE AND PUBLIC INSTITUTIONS

He received a research contract for the activity "Power control algorithms for UTRA-FDD systems," with **Marconi Mobile S.p.A**, years 2001-2002.

He received a research contract for the activity "Design and implementation of an audio broadcast TV-Mobile system," with **Tanaza S.r.l. (Milan)**, year 2012.

He received a research contract for the activity "Evolution of an audio broadcast TV-Mobile system," with **Movym S.r.l. (Milan)**, year 2012.

He received a research contract for the activity "Evolution of an audio broadcast TV-Mobile system: streaming and optimized compression," with **Movym S.r.l. (Milan)**, year 2013.

He received a research contract for the activity: "Design and implementation of a wireless sensor system for monitoring high power speakers," with **B&C Speakers S.p.a (Florence)**, year 2018.

He received a research contract for the activity "Robust and secure solutions for cyber physical systems in the field of autonomous driving," with **Thales Italia S.p.A.**, year 2021.

He received a research contract for the activity "Robust and secure solutions for cyber physical systems in the field of autonomous driving," with **Thales Italia S.p.A.**, year 2022-23.

He received a research contract for the activity "5G localization," with **Ground Transportation Systems (GTS) S.p.A.**, year 2023.

## **RESPONSIBILITY AS COORDINATOR IN RESEARCH ACTIVITY WITHIN NATIONAL AND EUROPEAN PROJECTS**

**Coordinator (Principal Investigator, PI)** of the **CNR national project** "Radio resource management and localization of users for multimedia vehicular applications" within the CNR Agenzia2000 program: years 2000-2002. The research activity in this context aimed in particular at the study of algorithms for efficient management of location-based vehicular communications and algorithms for efficient resource allocation in 3G wireless systems.

**Coordinator for the Siena research group** (sub-unit of Marconi Mobile) in the three-year (2002-2005) **national FIRB project** "Reconfigurable Platforms for wide band radio-mobile communications". The research activity in this context was particularly aimed at the definition and practical implementation of power control strategies for CDMA wireless systems. In addition, he was involved in a research activity aimed at investigating the feasibility of cross-layer dynamic radio resource allocation strategies for OFDMA mobile systems.

**Coordinator of the Siena Research Group** of the project **ST @RT** (years 2008 - 2011), funded by the **European Regional Development Fund 2007-2013** - European Territorial Cooperation Objective, for the activity: "Development of a wireless sensor network for

monitoring historical and artistic monuments". In the framework of this research activity, he participated in the development of a prototype monitoring application based on wireless sensor network technology, tested on the Rognosa Tower of the city of San Gimignano.

**Coordinator of the Siena Research Group** (subunit of CNIT) of the two-year **European project SWING** (years 2011-2013), Short Wave Critical Infrastructure Network Based on New Generation of High Survival Radio Communications Systems. The research activity in this context was particularly focused on the study of network and MAC protocols for packet-switched HF networks.

**Coordinator (Principal Investigator, PI) for CNIT** (Consorzio Nazionale Interuniversitario Telecomunicazioni) of the three-year (2017-2020) **national project "5G experimentation Program in Milan, Italy"** supported by the Ministry of Economic Development (Ministero dello Sviluppo Economico or **MISE**) and **Vodafone** Italia S.p.A. with a funding of 350000 euros. In particular, the research activity in this context aims at: (i) designing and developing a fixed wireless access (FWA) for 5G systems at 3.7 GHz in the Carugate region (Milan); (ii) developing a data fusion system for indoor localization of 5G users to be integrated in a virtual and augmented reality platform for tourism 4.0 applications; (iii) investigating possible attacks and protection mechanisms for the new slice-based virtual 5G core network.

**Coordinator (Principal Investigator, PI)** of the two years (2020-2022) National Project CP-SEC, funded by INAIL (National institute for insurance against industrial injuries) with a funding of 400000 euros for the development of IoT technologies in the field of prevention of relevant accident risks in factories according to the industry 4.0 paradigm.

**Coordinator of the Siena Research Group** unit (linked third party of Thales Italia S.p.A.) with a funding of 50000 euros of the European Project H2020 AMPERE (2020-2022) regarding the activity "cyber physical systems in the field of autonomous driving".

He is **Coordinator of the Siena Research Group** (subunit of CNIT) of the three years **SNS Stream B-01-03 European project 6G-Shine** (years 2023-2025), 6G SHort range extreme communication IN Entities. The research activity will be inherent the optimization of Reconfigurable Intelligent Surfaces (RIS) in a multi-user and multi-RIS environment.

**He is responsible for the Siena Research Group** unit with a budget of 50000 euros (linked third party of Thales Italia S.p.A.) of the **European project VERGE** (AI-powered eVolution towards opEn and secuRe edGe architEctures), call HORIZON-JU-SNS -2022- STREAM - A-01-05, whose funding was **approved** by the European Union in September 2022.

**He is responsible for CNIT** (Consorzio Nazionale Interuniversitario Telecomunicazioni) with a budget of 180000 euros of the 3 years **European Project 5G COMPAD** (5G

COMmunications for Peacekeeping And Defense) call EDF-2021-C4ISR-D, whose funding was **approved** by the European Union in September 2022.

## **PARTICIPATION IN NATIONAL AND EUROPEAN PROJECTS**

During his research activity he has been involved in the following projects as collaborator:

Progetto Finalizzato Telecomunicazioni, CNR (National Project) (1994)

European Project RAMA (Remote Access to Museum Archivies) (1995) RACE2 program,

European Project MUSA (Multimedia for protecting Europe's cultural heritage) (1996)

European Project MULTISPACE (1996)

European Project HIPS (Hyper-Interaction within Physical Space) (1997)

European Project PALIO (Personalised Access to Local Information and services for tOurists) (1998)

European Project SMPAYSOC (Secure Mobile Payments ans Services on Chip) 1999-2000

European Project m-ToGuide (A Mobile Tourist Guide) (2000-2001)

European project WIDE - Decentralized and Wireless Control of Large-Scale Systems (2005-2006)

Progetto "Distributed image coding for remote sensing applications" funded by ESA (European Space Agency) (2006-2007)

Project "Parallel Implementation of Lossless Hyperpectral Image Compression (PILL)" funded by ESA (European Space Agency) (2008).

Extension of project "Distributed image coding for remote sensing applications" funded by ESA (European Space Agency) (2008-2009).

Project "Next-generation satellite imaging via compressive sampling: SatSamp" funded by ESA (European Space Agency) (2010).

Project "EXOMARS" funded by ESA (European Space Agency) (2011).

Project "Hyperspectral passive satellite imaging via compressive sensing (HPSI-CS)" funded by ESA (European Space Agency) (2012-2013)

## **TECHNOLOGY TRANSFER**

Development of a **software** for the European Space Agency (ESA) for satellite on-board compression of hyper spectral images based on the theory of Distributed Source Coding

within the activity “Advanced compression of multispectral and hyperspectral images based on distributed source coding,” - P.I. Prof. E. Magli, Politecnico di Torino, ESA-ITI type-A project, ESTEC contract 20035/06/NL/LvH, sub-contract University of Siena.

He is one of the inventors of the **patent** "Method and system of audio signal watermarking," EP 2787503 A1.

He is one of the inventors of the **patent** no. 102018000005591 “Sistema per il monitoraggio di apparecchiature elettromedicali installate a domicilio”

Siena, October 7-th 2022

Prof. Andrea Abrardo

A handwritten signature in black ink, appearing to read 'Andrea Abrardo', written in a cursive style.

**Find Attached the complete list of publications.**