



**Gaetano Marrocco, PhD**  
Full Professor of Electromagnetics  
Director of the Medical Engineering School

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**BIBLIOMETRICS** (source: Google Scholar)

Papers on Peer Rev. Journal: 73  
Papers on Conference: more than 350  
Google Scholar: h-Index 32, Citations: >4300  
Scopus: h-Index 26, Citation >3100  
VQR 2004-2010: 3/3  
VQR 2011-2014: 2/2

**Gaetano Marrocco** received the Laurea degree in Electronic Engineering (cum Laude and Academic Honors) and the Ph.D. degree in Applied Electromagnetics at the University of L'Aquila, Italy, in 1994 and 1998, respectively.

1994, studied Computational Electromagnetics at the University of Illinois at Urbana-Champaign.

1997, joined the University of Rome "Tor Vergata," Rome, Italy, as Researcher.

1999, Visiting Researcher at the Imperial College in London, U.K.

2010 Associate Professor of Electromagnetics.

2014 Full Professor qualification in Electromagnetics.

2015 Visiting Professor at the University of Paris-Est Marne La Vallée (FR)

2015 Guest Professor at the University of Kent, Canterbury (UK)

2018 in charge as Full Professor, University of Roma Tor Vergata

2019 in charge and Director of the Medical Engineering School, Univ. Tor Vergata

He currently teaches Electromagnetic Technology for Wireless Systems, Antenna Design and Medical Radio-Systems, he chairs the Pervasive Electromagnetics Labs and is Advisor in the Geo-Information PhD program.

His research is mainly directed to the modelling and design of broadband and ultra wideband (UWB) antennas and arrays as well as of sensor-oriented miniaturized antennas for BioEngineering, Aeronautics and Radiofrequency Identification (RFID). During the last decade, he carried out pioneering research on the wireless-activated sensors, contributing to move from the labeling of objects to the passive sensor networks in the Internet of Things era. His lab designed and experimented the first battery-less RF sensors for deformation, temperature, humidity, gasses, implanted bio prosthesis, and human motion detection and classification, recovering of tactile feeling. Prof. Marrocco has been involved in several Space, Avionic, Naval and Vehicular programs of the European Space Agency, NATO, Italian Space Agency, and the Italian



Navy about the analysis and the design of non-conventional antennas and systems over platforms (satellite, car, ship, nano-satellite, airplanes). He submitted nine patents on broadband naval antennas and structural arrays, and on sensor RFID systems. He was the Principal Investigator of the Research program PRIN-2008 “Multi-Tag”.

He served as Associate Editor of the IEEE Antennas and Wireless Propagation Letters 2008-2014 and now he is Associate Editor of the IEEE Journal of Radiofrequency Identification and member of the board committee of the IEEE Antennas and Propagation Society Awards.

He is moreover Vice-Chair of the Italian delegation URSI Commission D: Electronics and Photonics. In 2008 he was the General Chairman of the first Italian multidisciplinary scientific workshop on RFID: RFIDays-2008: Emerging Technology for Radiofrequency Identification. He was the co-chair of the RFIDays-2010 International Workshop in Finland, Chairman of the Local Committee of the V European Conference on Antennas and Propagation (EUCAP-2011), TPC chair of the 2012 IEEE-RFID TA in Nice, France, TPC co-Chair of the 2013 IEEE-RFID USA, and TPC co-chair of the 2016 IEEE Antennas and Propagation Int. Symposium, TPC-co-chair of IEEE-RFID 2018 USA.

Prof. Marrocco is the co-founder and President of the University spin-off RADIO6ENSE ([www.radio6ense.com](http://www.radio6ense.com)) active in the short-range electromagnetic sensing for Automotive, Cyber and Physical Security and Structural Health Monitoring.

Extended CV at:

<https://tinyurl.com/g-marrocco-CV>

Selected papers at:

<https://tinyurl.com/papers-GM>

## EXTENDED CV

### 1. EDUCATION AND POSITIONS

2019: in charge as Director of the Medical Engineering School  
2018: in charge as Full Professor, University of Roma Tor Vergata  
2015: Guest Professor in the University of Paris-Est Marne La Vallée  
2014: Full Professor qualification in Electromagnetics (Abilit. Scient.Nazion. 2012).  
2013: Founder and president of the University Spin-off RADIO6ENSE  
2010: Associate Professor of Electromagnetics.  
1999: Collaboration with the Imperial College in London, U.K.  
1997: Researcher (Assistant Professor) at the University of Rome Tor Vergata  
1998: PhD In Electromagnetics with Prof. F. Bardati, Univ. L'Aquila  
1994: Internship at the University of Illinois at Urbana- Champaign on “Computational Electromagnetics“ with proff. R. Mittra, A. Boag, E. Michielsen.  
1994 Laurea degree in Electronic Engineering (cum Laude and Academic Honors)  
University of L'Aquila, Italy

### 2. TECHNICAL AND SCIENTIFIC ACTIVITY

#### 2.1 Research

His research was initially mainly oriented to the development of computer electromagnetic solvers based on the Finite Difference Time Domain for the modeling and design of Ultra Wideband Antennas and for Bioengineering, Avionics, Aerospace and Naval systems. Then he moved to the pioneering research of sensor-oriented miniaturized antennas for the emerging Radiofrequency Identification (RFID) technology in the Internet of Thing Paradigm.

He generally operates within not assessed, high-risk research topics as in the case of Time-Domain arrays, RFID Sensors and now Drones.

The hub of the research is the Pervasive Electromagnetic lab (previously Antenna Lab) ([www.pervasive.ing.uniroma2.it](http://www.pervasive.ing.uniroma2.it)), that was settled around twenty years ago and generally hosting around ten Master/PhD Italian and foreign students.

*a) Aeronautics:* design of advanced antenna systems for Software Defined radio for ship communication in collaboration with Finmeccanica group. Modeling of inter antenna coupling in HF aircraft communications. Electromagnetic compatibility of radar transmitters in NATO AWACS aircraft. Modeling of electromagnetic interactions within satellites ITALSAT F2 and SICRAL I. Design of the antenna system for the ALSMASAT I university-satellite.

Design of distributed and multi-purpose antenna systems for micro and nano satellites in C and X bands, in collaboration with European Space Agency.

*b) Broadband Communications:* modelling and design of pulse-radiating antenna and arrays. Investigation of basic phenomena (coupling and distortion), pulse-generating apertures, Ultra-wideband beamforming systems.

*d) Bioengineering:* design of electromagnetic devices and development of electromagnetic tools for the heating of the human body in hyperthermia therapy. Implanted sensors for stenosis monitoring, passive wearable sensors.

*d) Radiofrequency Identification (RFID):* During the last decade he carried out pioneering research on the wireless-activated sensors, contributing to move from the labeling of objects to the passive sensor networks in the Internet of Things Era. His lab designed and experimented the first battery-less RF sensors for deformation, temperature, humidity and various gases suitable to the Structural Health Monitoring and to the environmental analysis in general. His team is also active in the research on bodycentric battery-less wireless sensors concerning the development of **textile RFID** antennas, implantable radio-sensors inside body vessels for integration with stents as well as temperature sensors inside orthopedic **prosthesis**. But he also applied Brain Computer Interface (BCI) algorithms for the real-time classification of RFID-enable human gesture recognition and sleep monitoring and diagnostics by using ad-hoc designed clothes-embedded devices.

More recently he started working on the new emerging topic of **Bio-Integrated radio-sensors** or Epidermal/Skin Electronics for application to the transparent monitoring of the human health. In particular, he investigated the integration of biocompatible membranes with RFID antennas at the purpose to wireless monitoring of wound healing. He moreover developed the first battery-less skin thermometer readable from more than 70cm. The experiment stimulated the interest of several press agencies ([www.dicii.uniroma2.it/?PG=103.0.36.2014](http://www.dicii.uniroma2.it/?PG=103.0.36.2014)) for its potential application to the automatic screening of people within procedures for epidemic control (Ebola, SARS). Among the very latest research topics, it is worth mentioning the synergy between RFID technology and **Drones** for ubiquitous environmental monitoring and the **Radiofrequency Finger Augmented Devices** (R-FAD) to restore/extend the damaged/normal human senses (like touch and temperature feeling) by means of a new class of epidermal sensors over fingers.

Moreover, He is currently giving effort to create a critical mass in the electromagnetic community around Epidermal Electronics throughout the organization of special sessions within main international conferences as well as lecturer and tutorials in foreign university and within summer schools.

## **2.2 Research Impact**

Prof. Marrocco mostly publishes on IEEE journals (Transaction on Antennas and Propagation, Transaction on Microwave Theory and Techniques, Sensor Journal, Antennas and Propagation Magazine, Antennas and Wireless Propagation Letters) that are recognized as the top journals of the Electromagnetic Community. At time being, he has published 68 journal papers and more than 300 conference contributions. Some of his papers on RFID systems gained many citations (five papers more than 100 each, the

most cited paper has more than 500 citations – google scholar) and two papers were at the top of the 2008 monthly more downloaded papers of their Journal:

- G. Marrocco, C. Calabrese, "Meandered-slot antennas for sensor-RFID tags", IEEE Antennas and Wireless Propagation Letters. Vol.7, pp.5-8, 2008 Aug. Sept. 2008, 2nd
- G. Marrocco, "The Art of UHF RFID Antenna Design: Impedance Matching and Size-reduction Techniques", IEEE Antennas and Propagation Magazine, Vol.50, N.1, pp.66-79, Feb. 2008.

Some of Prof. Marrocco's papers are the most cited ones on IEEE Explore with the keywords "RFID Antenna Design" and "Wearable RFID sensor".

### 2.3 National and international research programs

Prof. Marrocco has been involved in several Space, Avionic, Naval and Vehicular programs of the European Space Agency, NATO, Italian Space Agency, and the Italian Navy about the analysis and the design of non-conventional antennas and systems over platforms. He also joined European Projects and past PRIN national projects. It is worth mentioning:

HORIZON 2020: Unit coordinator within the project SCISSORS (Security inTrusted Scada and Smart-Grids)

PRIN

- PRINCIPAL INVESTIGATOR of the Research program PRIN-2008 "Multi-Tag" - Investigator in PRIN-1997, PRIN-1999, PRIN-2013,

### 2.4. Organization of International Conferences and Special Sessions

- General Chairman of the RFIDays-2008: Emerging technology in Radiofrequency Identification, Rome May 12-13, 2008
- Organizer of the special Session: RFID Electromagnetics at the 20th Tyrrhenian Workshop on Digital Communications, Pula, Italy, September 2009
- co-Organizer of the Convened Session: New Frontiers in RFID Technology, at EUCAP-2010, Barcelona, Spain, April 2010
- co-Organizer of the second RFIDay-2010 within the 2010-Aces Conference, Tampere, Finland, 2010
- Local Organizing Chair of EUCAP-2011 (European Conference on Antennas and Propagation) in Rome, Italy
- Organizer of the Special Session: RFID for Healthcare at ISABEL 2010, Rome
- Organizer of the Convened Session: Sensor Networks: Pervasive Electromagnetics for Sensing and Tracking at EUCAP-2011, Roma, Italy, April 2011
- Organizer of the Special Session: RFID for Healthcare and Socials at ISABEL 2011, Barcelona, Spain
- TPC Chair of the 2012 IEEE RFID –TA, Nice, France
- Short course "RFID Design", at the IEEE RFID 2015, Orlando, USA
- TPC co-Chair of the 2013 IEEE RFID, Orlando, USA

- Organizer of the Special Session\_: Trends in RFID: from identification to sensing, (2014-URSI General Assembly, Beijing (China) 2014
- Organizer of the special session “Antennas and Sensors for Epidermal Electronics” at the IEEE Antennas and Propagation International Symposium, Vancouver (Canada) 2015
- Organizer of the special session “Advances in Antennas and Sensors for Epidermal Electronics” at the IEEE Antennas and Propagation International Symposium, San Juan (Portorico) 2016
- TCP Track Chair: IEEE Antennas and Propagation International Symposium 2016
- TCP member of 2016 IEEE International Smart Cities Conference, Trento, IT
- TCP Track Chair: IEEE RFID Conference, Orlando (US) 2018
- TCP Track Chair International Symposium on Networks, Computers and Communications Rome 2018

## 2.5 Memberships of Editorials Boards

- *2007-2013 Associate Editor* of the IEEE Antennas and Wireless Propagation Letters,
- *2014-today Contributors* of the IEEE RFID Virtual Journal
- *2016-today Associate Editor of IEEE RFID Journal*
- *Reviewer*: IEEE Trans. Antennas and Propagation, IEEE Microwave Theory Techniques, IEEE Antennas and Wireless Propagation Letter, IEEE RFID Journal

## 2.6 . Invited Talks (Plenary)

1. “Electromagnetic systems for Ambient Assisted Living (AAL) application”, EUCAP 2018
2. “RFID Sensing”, European School of Antennas: RFID Technology from concepts to applications, September 2014
3. "The Electromagnetics Way to Internet of Things", RINEM/URSI-Italy 2012, Roma, Italy
4. "Sensitive Antennas for a Smarter World: the Electromagnetics Way to Internet of Things", ANTEM 2012, Toulouse, France
5. "Pervasive Sensing by means of Passive UHF RFID Technology", EURASIP on RFID Technology, Turin Italy, 2012
6. "Advanced UHF RFID Design for Tracking and Sensing", IEEE RFID int. Symposium, Orlando USA 2012
7. "RFID Technology for Pervasive Sensing of Things and Humans", ISABEL conference Spain 2011
8. "Sensing the things by pervasive Electromagnetics: open challenges in RFID technology", 2010-Aces Conference, Tampere, Finland, 2010

9. "Challenges, opportunities and Visions in sensing-oriented RFID Technology", WSIM (Wireless Systems International Meeting), Campina Grande, Brasil, May 2010

## **2.7 Memberships of Evaluation Boards**

- 2015-2017 Member of the **Jury of the IEEE Antennas and Propagation Society Awards.**
- 2016-today Evaluator of ERC Projects
- 2015 Evaluator of Academy of France

## **2.8 Scientific Society Membership**

- Vice-Chair of the Italian URSI Commission D: Electronics and Photonics.
- Member IEEE Antennas and Propagation Society

## **2.9. Awards and Honour (with My Students)**

### 2019

Best Paper Award (third classified) at IEEE Body Sensor Networks (IEEE-BSN-19) Chicago,  
F. Amato, S. Amendola, G. Marrocco "Upper-bound Performances of RFID Epidermal Sensor Networks at 5G Frequencies"

### 2018

Best Paper Award (CNIT Prize) at Riunione Nazionale di Elettromagnetismo (RINEM), Cagliari, for best paper under 35  
C. Miozzi, G. Marrocco, "An Epidermal Configurable Antenna System for the Monitoring of Biophysical Parameters"

### 2017

Best Paper Award at IEEE RFID-TA 2017 Warsaw, Poland  
M. C. Caccami, M. Y. S. Mulla, C. Di Natale, and G. Marrocco  
"An Epidermal Graphene Oxide-based RFID Sensor for the wireless analysis of human breath"

First Classified, Best Student Paper Award at EUCAP-2017  
M. C. Caccami, M. Y. S. Mulla, C. Di Natale, and G. Marrocco  
"Wireless Monitoring of Breath by means of a Graphene Oxide-based Radiofrequency Identification Wearable Sensor"

Best Paper Finalist IEEE-RFID 2017  
V. Di Cecco, S. Amendola, P.P. Valentini, and G. Marrocco, "Finger-Augmented RFID System to Restore Peripheral Thermal Feeling"



Best Paper Award at IEEE 14th International Conference on Wearable and Implantable Body Sensor Networks (BSN2017), Eindhoven (The Netherlands),  
C. Miozzi; S. Amendola; A. Bergamini; G. Marrocco, "Reliability of a Re-usable Wireless Epidermal Temperature Sensor in Real Conditions"

2016

COST IC1301 - Women in Wireless Power Transfer (WPT) Award.  
Sara AMENDOLA

2015

AP-S/MTT-S CHAPTER CENTRAL AND SOUTHERN ITALY AWARDS 2015, AP-S Prize

Caccami, S, Manzari, G. Marrocco, "Phase-oriented Sensing by means of Loaded UHF RFID Tags", *IEEE Trans. Antennas Propagat.*,

2014

AP-S/MTT-S CHAPTER CENTRAL AND SOUTHERN ITALY AWARDS 2014, Honorable mention for the paper

S. Amendola, L. Bianchi, G. Marrocco "Movement detection of human body segments: passive radio identification and machine-learning technologies", *IEEE Antennas Propagation Magazine*

First Classified ex-equo at INSIEM "Giovani Presso L'Impresa", XX Riunione Nazionale di Elettromagnetismo, Padova 16 Settembre 2012

C. Occhiuzzi, S. Amendola, S. Caizzone, S. Manzari, G Marrocco, "NIGHTcare: sistema wireless per il monitoraggio e la diagnostica del sonno",

Third Classified Student Competition at IEEE RFID-TA 2014, Tampere,

S. Manzari, T. Musa, M. Randazzo, Z. Rinaldi, A. Meda, G. Marrocco, "A Passive Temperature Radio-Sensor for Concrete Maturation Monitoring"

2013

Best Master's Thesis Award Italian Association for ICT (AICA) in cooperation with the National Inter-University Consortium for Telecommunications and Informatics (CNIT and CINI)

Sara Amendola, "Body Movements Classification by Passive Radiofrequency Identification and Machine Learning Technologies"

2012:

IEEE MTT-S/AP-S 2012 prize of central-south Italy

S.Manzari, C. Occhiuzzi, S. Nawale, A. Catini, C. Di Natale, "G. Marrocco, Humidity Sensing by Polymer-loaded UHF RFID Antennas

AP-S doctoral award,  
 C. Occhiuzzi, "Wearable and Implantable RFID Technology for Pervasive Healthcare"

First Classified Student Competition at IEEE RFID-TA 2012, Nice,  
 S. Manzari, S. Pettinari and G. Marrocco, "Miniaturized and Tunable Wearable RFID Tag for Body-Centric Applications"

Phd Thesis Awards at RFID Journal Live 2012, Orlando  
 C. Occhiuzzi, "Wearable and Implantable RFID Technology for Pervasive Healthcare"

First Classified, Best Student Paper Award at EUCAP-2012 Prague,  
 C. Occhiuzzi and G. Marrocco, "Experimental Characterization of the RFID STENTag for passive Vascular Monitoring"

2010

Second Classified, Best Student Paper Award at EUCAP-2010 Barcelona,  
 C. Occhiuzzi, G. Marrocco, "Sensing the Human Body by Implanted RFID Tags"

2004

Mario Sannino Award al XV Riunione Nazionale di Elettromagnetismo (RINEM), Cagliari, per il miglior lavoro con autori under 35.  
 M. Ciattaglia, G. Marrocco, "Calcolo della risposta impulsiva di antenne ad apertura per applicazioni ultra-wideband"

### 3. TEACHING ACTIVITY

#### 3.1 Classes

YEARS	NAME	CFU
1997 -2000	<b>Support to Antennas</b> (prof. Bardati)	
1999-2003	<b>Bioelettromagnetismo</b> (S. S. Fisica Sanitaria)	
2004-2005	<b>Radiazione non Ionizzanti</b> (S. S. Fisica Sanitaria)	
2001	<b>Laboratorio Applicazioni Informatiche</b> (L1 Telecomm. Eng.)	
2001 - 2003	<b>Progettazione di Antenne</b> (L2 Telecomm. Eng., L2 Electronics Eng.)	5
2000 - 2003	<b>Antenne a Microonde</b> (L2 Telecomm. Eng.)	5
2004 - 2010	<b>Progettazione di Antenne a Microonde</b> (L2 Telecomm. Eng.)	5
2004 - 2011	<b>Progettazione di Antenne Integrate</b> (L2 Electronics Eng.)	5
2005 - 2008	<b>Interazione Elettromagnetica 2</b> (L2 Medical Eng.)	5



2009 - today	<b>Radio Sistemi Medicali</b> (L2 Medical Eng.)	6
2010	<b>Antenne e Propagazione</b> (L2 Telecom. Eng.)	9
2013 - 2014	<b>Tecnologie Elettromagnetiche per Sistemi Wireless</b> (L2 Electronics Eng, Internet Eng)	9
2015- today	<b>Wireless Electromagnetics Technology</b> (L2 Electronics Eng, Internet Eng., Medical Eng.)	9
2015 - today	<b>Electromagnetic Sensing</b> (L3 Internet Engineering)	5
2014- today	<b>Short Range Sensing</b> (Master “Sistemi e Tecnologie Elettroniche per la Sicurezza, la Difesa e l’Intelligence”)	1.5

### 3.2 PhD

Member of the Computer Science, Control and Geoinformation PhD Programme

Advisor of the following PhD Thesis:

1. Ciattaglia Matteo (now in Leonardo)
2. Mattioni Lorenzo (now at Bank of Italy)
3. Occhiuzzi Cecilia (now CEO and co-owner of RADIO6ENSE spinoff)
4. Manzari Sabina (now at Phillips Research , The Netherlands)
5. Caizzone Stefano (now at German Space Agency – DLR, Munich)
6. Lodato Rossella (now freelance engineer)
7. Amendola Sara (now Partner of RADIO6ENSE spinoff)
8. Caccami Cristina (now at Bridgestone Research EMEA)
9. Milici Stefano (now at Scuola Superiore S.Anna. Pisa)
10. Longhi Michela (in progress)
11. Miozzi Carolina (in progress)
12. Nappi Simone (in progress)
13. Bianco Giulio Maria (in progress)

### 3.3 Master Thesis

Supervisor of more than 40 Master Thesis (Electronics Engineering, Communication Engineering, ICTY and Internet Engineering, Medical Engineering)

### 3.4 Management

- Director of the Medical Engineering School
- Chair of the Pervasive Electromagnetic Labs
- Chair of the Teaching Board (*commissione didattica*) of Medical Engineering school
- Member of the Third Mission (Technology Transfer) Quality committee

### 3.5 Member of External PhD Defence Jury

2008 University of Grenoble  
2012 Università della Calabria

2013 Politecnico di Torino  
2013 Università La Sapienza, Roma  
2017 Georgia tech  
2018 University of Roma Sapienza

### **3.6 Teaching in foreign Institution**

2015 - Visiting Professor at the University of Paris Est  
1016 - Visiting Professor at University of Kent, Canterbury

## **4. Technology Innovation (Third Mission)**

Professor Marrocco gives full care to the social and technological impact and valorization of his research through the submission of patents (11 on ship-bore antennas and RFID sensors and security devices) the continuous collaborations with major Italian and European technology players (European Space Agency, Selex, Ingegneria dei Sistemi, Thales Alenia Space) and more recently as founder in 2013 and president of a University spin-off Radio6ense ([www.radio6ense-com](http://www.radio6ense-com)).

### **4.1 Patents (filed and pending)**

1. Antenna multi-funzione a larga banda operante nella gamma HF, particolarmente per installazioni navali, TO2005A000344
2. Antenna strutturale a larga banda operante nella gamma HF, particolarmente per installazioni navali, TO2005A000417
3. Wideband structural antenna operating in the HF range, particularly for naval installations, WO 2006/134543 A1
4. Wideband multifunction antenna operating in the HF range, particularly for naval installations, WO 2006/123311 A2
5. RFID a porta multipla e relativo metodo di realizzazione e utilizzo, RM2007A000466
6. Multiple-port RFID and method of manufacturing and using thereof, 8445PTWO
7. Dispositivo a Radiofrequenza per la sensoristica termica e/o meccanica, RM10331I4611
8. Dispositivo impiantabile in condotti biologici, RM2010A000153
9. Device Implantable in Biological Ducts. WO.2011. 121581.A1
10. SENSORE DI TEMPERATURA PER CALCESTRUZZO E SUO METODO DI PRODUZIONE, B15-103IT, ON2015A00008 / 102015902344730
11. DISPOSITIVO SENSORE WIRELESS A RADIOFREQUENZA CONFIGURABILE E REGOLABILE - BI4927R



12. METODO DI REALIZZAZIONE DI GIUNZIONI DI NASTRI TRASPORTATORI IN GOMMA ED APPLICAZIONE DI PROFILI MEDIANTE VULCANIZZAZIONE A CALDO, file number 102018000004542
13. Dispositivo RFID per il monitoraggio del grado di maturazione della frutta, procedimento e contenitore che utilizzano tale dispositivo . N.102018000010038
14. Sigillo di sicurezza autobloccante. N. 102016000023352
15. Tunable RF wireless sensor. n. 102016000009727
16. “DISPOSITIVO RFID PERFEZIONATO PER PNEUMATICI” - “IMPROVED RFID DEVICE FOR TIRES” nr. 102019000002337
17. "METODO E SISTEMA PER LEGGERE/SCRIVERE DATI DA/SU TAG RFID INTEGRATI/APPLICATI IN/SU PNEUMATICI TRASPORTATI SU NASTRI TRASPORTATORI" 102018000020134

#### 4.2 Spin-off

Co-founder of the University spin-off ((■)) **RADIO6ENSE** ([www.radio6ense.com](http://www.radio6ense.com)) (pronounce like “radiosens”), whose mission is to bring the passive wireless sensing, mainly based on the Radiofrequency Identification technology (RFID), to Industry and to Public Companies, through engineering services and the development and marketing of new electromagnetic/informatic systems.

RADIO6ENSE (R6E) specifically addresses the emerging Industrial Internet of Things and Industry 4.0 as it is active in the digitalization of Tire and Rubber manufacturing processes and in the improvement of physical and cyber security of Smart Grids and the Container Logistics. The most relevant customers are Bridgestone (tires), ENEL (electronics seals) Morinat (conveyor belts), Leghorn (integrity seals), Austrian Microsystem (sensor boards), Mecstar (RFID tags). R6E is also involved in the H2020 project SCISSORS (Cyber Security).

#### 4.3 Grants (Government and Industry)

2019-20	PATCH-STRESS: Wireless Skin PATCH for the early detection of post-traumatic Stress Disorders, Funded by Defense Ministry (Military Research Program), Italy
2018-20	SECOND-SKIN: Bio-integrated Wireless Sensors for the monitoring of the epidermis and for the recovery of tactile senses, funded by Regione Lazio
2017	Prove Electromagnetic characterization and sensing of rubber compounds for conveyor belts, funded by MORINAT, Italy
2016-17	RADIO-SKIN: Epidermal Electronic Technology for battery-less skin sensors with wireless reading, funded by University of Roma Tor Vergata, Italy
2014	Design of RH-enabled secure seals, Leghorn, Italy
2013	Highly-secure RFID seals, funded by Leghorn, Italy
2013	RF monitoring of night-sleep. Funded by SIR (Italy)
2012-	Design and experimentation of thermal and humidity RFID-sensors for application to concrete production, funded by FAMATIM (IT)



- 2011- Electromagnetic and Thermal modeling of microwave heating of salvage solar panel, funded by SASIL (IT)
- 2011- Modular and customizable accommodation friendly antenna system for satellite avionics, funded by ESA-ESTEC
- 2011-12 Design of Miniaturized RFID antennas for body-worn applications, funded by AMEDO (Germany)
- 2010-11 National Coordinator of funded PRIN-2008: Electromagnetic Technology for Multiple-Interrogation Active and Passive RFID Systems with University of Siena, University of Bologna and Polytechnic of Turin.
- 2010 Electromagnetic Analysis of dual-service HF antennas for Seaport communications, funded by Selex Communications
- 2009-10 Miniaturized Multi-Function Antenna System for Micro/Nano-Satellites, funded by European Space Agency
- 2007 Automatic design of broad-band and miniaturized antennas, funded by IDS Ingegneria dei Sistemi
- 2007 Electromagnetic Analysis of antenna co-location over vehicular platforms, funded by Selex Communications
- 2006 New Multi-band antenna systems for hand-held Galileo receivers, Funded by Alcatel Alenia Space.
- 2006 Experimental characterization of a radar for Speed Control, funded by Lindblad & Piana
- 2005 Electromagnetic software for the modeling of periodic structures, funded by ESA (via IDS)
- 2005 Multi-function structural antenna systems for naval Software-Defined Radio, funded by Selex Communications, Finmeccanica Group
- 2003-05 Novel wideband antennas for Naval Communications, funded by Marconi-Selenia Communications, Finmeccanica Group
- 2003-04 Electromagnetic Models of Radiofrequency interstitial Hyperthermia, funded by Tecnobiomedica
- 2003-05 Electromagnetic Modeling of point to multi-point broadband communication, funded by PRIN
- 2001-02 Virtual Bioelectromagnetic Lab: numerical facilities for dosimetric analysis, funded by Italian Ministry of University and Research (via IDS)
- 2001-02 Electromagnetic coupling for HF antennas on aircraft, funded by MARCONI MOBILE, Finmeccanica Group
- 2001 Evaluation of numerical models for the electromagnetic compliance of base station antennas, funded by the Town of Roma, (Italy)
- 1999-01 Planar arrays for Space Applications, funded by Italian Space Agency
- 1999-02 Microwave antennas for multimedia communications, funded by Italian Ministry of University and Research (PRIN)
- 1999-03 Reflectarray antenna systems for space application, funded by Italian Space Agency
- 1998-99 Numerical modeling of electromagnetic emission from spacecrafts, funded by IDS Ingegneria dei Sistemi, Pisa (Italy)
- 1998 EMC modelling of a RF transmitter for the upgrade of Awacs facility, funded by NATO
- 1998-99 Hybrid electromagnetic simulation tool for the design of corrugated horn antennas with integrated feed, funded by European Space Agency
- 1997 Microwaves antennas in planar technology, PRIN

## 5. Selected List of Papers on International Journals and Transactions

The integral version of the papers can be downloaded from the following link

**<http://www.pervasive.ing.uniroma2.it/Papers.htm>**

### Under review

1. S. Nappi and G. Marrocco, "Space-Filling Electromagnetic Skins for the Wireless Monitoring of Surface Defects", *IEEE Transaction on Antennas and Propagation* - under review
2. C. Miozzi, F. Amato and G. Marrocco, "Self-tuning Thin-Wire RFID Epidermal Antennas for Worldwide UHF Band Coverage", under review

### 2019

1. C. Miozzi, G. Saggio, G. Marrocco, "Upper bounds of Through-the-Arms UHF-RFID Transcutaneous Wireless Communication for the Control of Prostheses", *IEEE Transaction on Antennas and Propagation* – early access July 2019
2. V. Di Cecco, S. Amendola, G. Marrocco, "Numerical and Experimental Characterization of Wrist-Fingers Communication Link for RFID-based Finger Augmented Devices", *IEEE Trans. Antennas Propagat.*, Vol.67 N.1, 2019 pp. 532-540, Jan, 2019
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