Marco Martalò - Curriculum Vitae

Internet of Things (IoT) Lab
Department of Engineering and Architecture
University of Parma
Parco Area delle Scienze 181/A
I-43124 Parma, Italy

Email: marco.martalo@unipr.it
Phone: +39 0521 905767
Fax: +39 0521 905758
https://sites.google.com/site/marcomartalo/
http://iotlab.unipr.it/

PERSONAL INFORMATION

Place and date of birth: Galatina (LE), Italy, June 4, 1981

Nationality: Italian

Personal address: Viale Duca Alessandro 67, I-43124, Parma, Italy

Personal phone: +39 320 9206519

Marital status: Married with a daughter

WORKING EXPERIENCES

Post-Doc (*Assegnista di ricerca*) on "Efficient signal processing techniques," Department of Engineering and Architecture, University of Parma, Italy. June 2017 - present.

Assistant Professor (*Ricercatore a tempo determinato tipo A*), School of Engineering, E-Campus University, Novedrate (CO), Italy. May 2012 - April 2017. During the same period Research Associate at the Department of Information Engineering, University of Parma, Italy.

Post-Doc (*Assegnista di ricerca*) on "Efficient techniques for signal processing and transmission in wireless ad hoc and sensor networks," Department of Information Engineering, University of Parma, Italy. February 2010 - April 2012.

SPINNER Research Fellow (*Borsista SPINNER*) on "Low-complexity localization in indoor scenarios," Department of Information Engineering, University of Parma, Italy. January 2009 - January 2010. Tutor: Prof. G. Ferrari.

Research internship on "Network coding complexity," School of Computer and Communication Sciences, Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland. October 2007 - March 2008. Tutor: Prof. C. Fragouli.

EDUCATION

Ph.D. in Information Technologies, Department of Information Engineering, University of Parma, Italy, March 2009. Advisor: Prof. G. Ferrari.

Second Level Master of Science Degree (*Laurea specialistica*) Degree in Telecommunications Engineering, School of Engineering, University of Parma, Italy, December 2005. Grade: 110/110 *Summa Cum Laude*. Advisor: Prof. G. Ferrari.

First Level Bachelor of Science Degree (*Laurea triennale*) in Telecommunications Engineering, School of Engineering, University of Parma, Italy, September 2003. Grade: 103/110. Advisor: Prof. Riccardo Raheli.

"Diploma" Degree, Liceo Classico "P. Colonna", Galatina (LE), Italy, July 2000. Grade: 100/100.

RESEARCH INTERESTS

The activities carried out during my research career are in the in general field of digital communication systems with particular attention to those in wireless envirnomente. Scientific contributions are transversal to different types of systems, both traditional (point-to-point) and more advanced networking scenarios (with multiple users and ad-hoc communications). The results obtained can be classified in the following sub-topics:

1. transmission and distributed detection in sensor networks;
2. signal processing for sensor networks;
3. transmission systems on non-ideal channels;
4. advanced applications for communication networks.

The activities carried out in each of the following areas will be detailed below, with reference to the main publications (in international journals and conferences).

Transmission and distributed detection in sensor networks

The performance analysis of distributed signal processing algorithms in sensor networks was the first topic I carried out in my research activities during the PhD program. The first works, in fact, focused on the derivation of the performance of distributed detection algorithms for an efficient collaborative estimate of a physical phenomenon of common interest to all the sensors (for example, average values of an environmental data). Efficiency is achieved through multi-hop communication topologies and information fusion. The proposed works, based on probability and information theory, have highlighted the evident impact of the network topology and the type (from a statistic point of view) of the observed phenomenon, showing how important it is to plan, achieve, and maintain a topology with a number of fusion levels as low as possible and grouping the sensors in cluster as uniform as possible [J2]-[J3], [J6]-[J7], [J10], and [J13].

The analysis can be extended to take into account the use of devices based on commercial standards, such as IEEE 802.15.4 or ZigBee. In fact, the performance of the previously discussed efficient distributed processing algorithms strongly depends on the amount of nodes that access the shared medium and the information that is carried by the network. It is, therefore, important to define analytical and simulation frameworks for the analysis of these parameters, as performed in [J1] and [J5]. In particular, [J1] was the first work in the literature to present the experimental performance of seminal ZigBee devices available on the market, while [J5] was the first proposing a Markov-based method for prediction of emph throughput and end-to-end delay in multi-hop IEEE 802.15.4 networks. Using this information, it is now possible to predict the performance of distributed detection algorithms in IEEE 802.15.4 networks, as done in [J8], [J12], and [J16], where the presence of a intrinsic tradeoff between the performance of signal processing algorithms and the energy consumption achievable by medium access control protocols.

An interesting application of these techniques is presented in [J22], where distributed signal processing systems are studied in vehicular networks. This scenario is of particular interest from a research point of view because the nodes of the network are characterized, besides the above mentioned issues due to the non-ideal medium access, by a high mobility that makes data collection potentially very difficult. In this work, therefore, the concept of ephemeral clusters was introduced, which is a grouping of nodes that changes very quickly, which any signal collection and processing algorithm must deal with.

Signal processing for sensor networks

The processing provided by distributed detection systems is characterized by a greatly reduced computational complexity. In fact, the nodes of a sensor network are typically battery powered and, consequently, must be able to operate as long as possible without human intervention. For this reason, all signal processing carried out in a sensor network must reduce energy consumption as much as possible. Based on these considerations, [J14]-[J15] proposed efficient algorithms for processing signals acquired from a sensor equipped with a microphone. The goal of this network, produced by an Italian company of the Finmeccanica group active in the defense field, was to monitor an environment of interest and recognize the presence of an unauthorized intruder (person or vehicle) through the audio produced by the intruder itself. In fact, in applications of interest to the company, the target to be identified always generates an audio signal to be detected when present in the monitored area. In particular, the approach achieved high energy saving through an hybrid approach based on the subdivision in the use of time-domain operations (not very complex and often applied) and frequency-domain operations (very complex and applied less often). The results have shown good performance in terms of probability of false alarm and missed detection of the target and the algorithm was successfully inserted into the platform developed by the company.

Another relevant signal processing application for sensors is that of locating users and their associated characteristics. This functionality can be achieved through different techniques that exploit various types of signals (power, time of flight, and angle of arrival) received in the sensor network. In this direction, my activities have focused for example on the technique denoted as fingerprinting, where the localization takes place through a database of pre-determined positions and characterized in a preliminary design phase. The actual localization is obtained, at this point, through a comparison between the received signals and the pre-determined database. An interesting application of this technique is shown in [J20], where fingerprinting is used to determine the position of human body limbs and provide the so-called motion capture, that is the identification of the type of movement. This technique can be successfully applied in different areas, such as gaming or health-care.

Transmission systems on non-ideal channels

A significant portion of my activities in recent years has been devoted to the study of transmission systems, both point-to-point and multi-user, in the presence of non-ideality in communication channels and with application to "modern" networks, such as sensors or the next-generation cellular networks.

Motivated by applications in sensor networks, a first topic of interest was the efficient detection of signals sent by multiple users observing spatially correlated data. The presence of spatially correlated data can be motivated, for example, by observations of a common physical phenomenon carried out at different points of the monitored area with similar characteristics. In these scenarios, different approaches can be followed to exploit the inherent redundancy present in the system. Although it may be possible to compress data in a distributed manner following a distributed source coding scheme, this approach requires a precise knowledge of the level of correlation between the data at the transmitter side. In all cases where this knowledge is not available, it is necessary to use only one channel coding and possibly exploit the knowledge on the correlation level at the receiver side. On the basis of these considerations, an iterative receiver has been developed for a generic number of correlated sources with excellent performance both on channels with only thermal noise and with fading [J4], [J11], and [J17].

A problem of interest for all these schemes is the impact of the correlation model between the data that must realistically capture the environment and do not change the performance achievable by an encoding/decoding scheme, as shown in [J24]. Moreover, the determination of performance limits and the design of coding schemes effective for this type of communication is a problem of considerable interest that has been addressed, among the first in the literature, in [J19] and that has stimulated a lot of research activity among different groups in the world.

Another point-to-point communication system that is assuming considerable importance in recent wireless communication systems is that which operates on channels affected by phase noise, that is the noise caused by the instability of the oscillators used both at the transmitter and at the receiver. In fact, in some recent systems the use of less complex and precise oscillators is becoming more and more established. Moreover, the use of ever-increasing carrier frequencies and communication bandwidths makes these systems more and more sensitive to oscillator imperfections. Finally, modulation schemes with large spectral efficiencies and densities are emerging. In this case, in which oscillator inaccuracies can cause significant degradation in the performance of communication systems. In this context, in collaboration with an important international telecommunication company, receivers have been developed for low-complexity synchronization and decoding for both single-polarization [J26] and dual-polarization systems [J27]. The latter solution, based on the master/slave principle, is of considerable interest because it does not require data on the other polarization to perform synchronization. In other words, the data on the other polarization is treated as an interferer of which nothing is known and on which one tries to make the best possible cancellation. The problem of communication through phase noise channels has also been analyzed in terms of information rate, that is, the capacity constrained to the used modulation format. In this context, we have highlighted the achievable limits (even with a perfect representation of the channel) from any receiver that uses a single sample [J23] and [C31]. To overcome these limits, it has been proposed, among the first in the literature (in particular the first to consider the use of band-limited shaping pulses), the use of multiple samples for symbol time at the receiver to track the most rapid variations in the phase of the received signal. The theoretical results show potential gains in terms of information rate [C34] that have been proved to be achievable even in pragmatic receivers, such as the one in [C36] which is an extension of that presented in [J26].

Finally, I have recently been involved in transmission schemes for future communication systems. A first application of interest is in 5G cellular networks, where the use of multiple antennas and the simultaneous transmission to various users allows to increase the spectral efficiency, which is one of the key performance parameters in such networks. However, the use of so-called massive transmitters, i.e., with a high number of antennas and potential for high-bandwidth, requires the knowledge of a large number of parameters at the base station to adapt the transmission to the effective channel state in order to manage multi-antenna and multi-user interference. To this end, in collaboration with a research group of the company Huawei, a sub-optimal channel estimation algorithm has been developed that drastically reduces the amount of information to be sent to the transmitter for such adaptation purposes [C37]. The results show potentially limited losses compared to the ideal channel estimation case, but with gains of over 90% in terms of the amount of feedback provided to the transmitter. This algorithm was developed for a 4G network but can easily be adapted to a 5G network, since the first standards of the latter have many points in common (at the physical layer) with those of the former. Another interesting approach, recently exploited in [C39], is the use of machine learning techniques to provide a computer the capability to learn from data, without being explicitly programmed for a specific task. In particular, in [C39] machine learning has been proposed as a method to find effective decoding strategies for binary linear codes. The results show that learned decoders can offer a range of performance-complexity tradeoffs for various codes, also achieving near-optimal performance in some cases.

Advanced networking applications

Cognitive networks represent a natural evolution of all the results obtained over the years on distributed computing. A cognitive network means a series of intelligent devices (called secondary nodes) able to detect and automatically use the channels available in the spectrum. In fact, the birth of multiple radio communication technologies have made the use of the spectrum more and more massive and, consequently, it becomes necessary to use it more and more efficiently. A cognitive network, therefore, is based on a detection, by secondary nodes, of the spectrum used by authorized users (called primary nodes). This problem can be reformulated using all the known collaborative and distributed detection techniques, trying to optimize the performance of false alarm and missed detection on the use of a given frequency band. This activity has been explored in [J25] and [J28], where the positive impact of the presence of a priori information on the characteristics of the primary and/or secondary nodes has been highlighted. In particular, it has been shown how the knowledge of the position of the nodes in the environment allows to obtain considerable improvements in network detection performance.

Another network application considered in my activities was that of network coding. This technique aims to make network communications more efficient by combining and superimposing signals at different protocol levels (from the physical to the network) in the intermediate nodes and performing appropriate decoding at the receivers. This activity began during the experience as a visiting student at the EPFL (Lausanne, Switzerland), during which the problem of the complexity of these schemes was analyzed. In fact, depending on the desired network rate to be achieved, a different number of encoding and decoding operations will be necessary. Although theoretical limits are known in the literature, in [C29] it has been demonstrated with a simulation approach that in most topologies these limits are quite loose. From a network design point of view, this means that it will be necessary to perform encoding operations on a smaller number of intermediate nodes, thus reducing the network complexity. This technique has also been successfully applied to networks for distributed information storage [J18] or for a more rapid information dissemination [J21].

Another topic that is recently emerging more and more in the scientific community is that of heterogeneous networks. In fact, over time more and more radio technologies have appeared that must coexist and interoperate in the environment to provide the end user with a seamless connectivity experience. To this end, in collaboration with an Internet connectivity provider, a handover algorithm was developed between cellular networks and WiFi networks. This algorithm was integrated into a mobile application provided by the company to its users [J9] and [P1].

Finally, an aspect that will a hot topic in future networks, e.g., in Internet of Things (IoT) applications, is the user localization with high accuracy even in indoor scenarios, where the presence of obstructions in the communication channels plays a key role. To this end, various classifiers of the channel status have been studied, based both on neural networks and on the evaluation of statistical characteristics of the received power [C38]. Our results show that simple classifiers based on the observation of the statistics of the received power over sufficiently small observation windows allow to reach probabilities of error on the order of 10%. Other recent activities have been devoted to performance analysis and experimental design of localization systems for specific safety applications in industrial environment. This work, whose preliminary results are summarized in [C40], has proposed an innovative method by concentrating the reference anchor nodes in a limited area, instead of spreading them in the environment to be monitored, and the target moves around them. This allows for an efficient implementation of Time Difference of Arrival (TDoA) localization algorithms with Ultra Wide Band (UWB) technology, whose performance show accurate positioning performance also for medium-large target-anchor distances.

DEVELOPED PROJECTS

"Acoustic Field Control in a Vehicle Cabin," collaboration between ASK Industries S.p.A., Fabbrico (RE), Italy, and the Department of Engineering and Architecture, University of Parma, Italy, 2018 - 2021. Principal investigator: Prof. R. Raheli.

"Aggregate Farming in the Cloud" (AFarCloud)", project n. 783221 funded by the European Commission and the Ministero dell'Istruzione, Università e Ricerca (MIUR, Italy) under the call H2020-ECSEL-2017-2-RIA-two-stage, 2018 - 2021. Principal Investigator: Prof. G. Ferrari.

"Outdoor/Indoor Localization in 5G Networks," collaboration between Huawei Ltd., Shanghai, China, and the Department of Engineering and Architecture, University of Parma, Italy, funded by the Huawei Innovation Research Program (HIRP), 2018 - Present. Principal investigator: Prof. G. Ferrari.

"Acoustic Field Control in a Tractor Cabin," collaboration between Argo Tractors S.p.A., Fabbrico (RE), Italy, and the Department of Engineering and Architecture, University of Parma, Italy, 2018 - Present. Principal investigator: Prof. G. Ferrari.

"Analysis and Design of a Localization and Tracking Algorithm," collaboration between Elettric80 S.p.A., Viano (RE), Italy, and the Department of Engineering and Architecture, University of Parma, Italy, 2017 - 2019. Principal investigator: Prof. G. Ferrari.

"Advanced Digital Audio Processing Algorithms," collaboration between Consorzio Nazionale Interuniversitario per le Telecomunicazioni (CNIT), Parma, Italy, and MOVYM S.r.l., Milan, Italy, 2014. Principal investigator: Prof. G. Ferrari.

"Phase Noise Suppression and Frequency Jumps Mitigation Algorithms," collaboration between Huawei GmbH, Munich, Germany, and the Department of Information Engineering, University of Parma, Italy, 2012-2013. Principal investigator: Prof. R. Raheli.

"Cross-Network Effective Traffic Alerts Dissemination (X-NETAD)," joint Isreal-Italy project. Partners: Guglielmo Srl and the Department of Information Engineering, University of Parma (Italian side) and Cellint (Isreali side), 2011. Principal investigator: Prof. G. Ferrari.

"Design and Implementation of Advanced Vertical Handover Algorithms for HSDPA and Wi-Fi Netwoks," collaboration between Guglielmo Srl, Reggio Emilia, Italy, and the Department of Information Engineering, University of Parma, Italy, 2010. Principal investigator: Prof. G. Ferrari.

"Algorithm for Audio Signature Detection," collaboration between Elsag-Datamat, Rome, Italy, and the Department of Information Engineering, University of Parma, Italy, 2008-2009. Principal investigator: Prof. G. Ferrari.

"RFID-based System for Supply Chain Management," collaboration between ID-Solutions, Parma, Italy, and the Department of Information Engineering, University of Parma, Italy, 2007. Principal investigator: Prof. G. Ferrari.

"Cooperative Remote Interconnected Measurement Systems Over Networks" (CRIMSON), Department of Information Engineering, University of Parma, Italy. PRIN (Progetti di Ricerca di Interesse Nazionale) project funded by the Italian Ministry of University and Research (MIUR), 2006. Principal investigator: Prof. R. Raheli.

AWARDS

National Scientific Qualification (*Abilitazione Scientifica Nazionale*) for Associate Professorship in Telecommunications, March 2018.

Elevation to IEEE Senior Member grade, December 2016.

First prize award, together with the WASNLab team, at the first Body Sensor Network (BSN) Contest, organized in conjunction with the 2011 Body Sensor Networks (BSN) conference, Dallas, TX, USA, May 2011.

Fulbright/BEST (Business Exchange Student Training) finalist, December 2006.

Best student paper award, IEEE International Workshop on Wireless Ad hoc and Sensor Networks (IWWAN), June 2006.

Award as best first-year student in Telecommunications Engineering (Second Level Master) for the academic year 2003-2004.

INVITED TALKS AND SEMINARS

"Statistical Models of Spatially Correlated Binary Sources with Application to Communication Networks," International Conference on Advances in Multimedia (MMEDIA), Special Track on Models and Algorithms for Spatially and Temporally Correlated Data (STCD), Venice, Italy, April 27, 2017.

"Phase Noise Channel: Models and Fundamental Limits," Institute for Communications Engineering, Technische Universitat Munchen (TUM), Germany. May 30, 2016.

"Towards Large-scale P2P Distributed Storage with Decentralized Maintenance: a Network Coding-based Approach," Disney Research Zurich, Switzerland. December 9, 2011.

"Clustered Decentralized Binary Detection in Sensor Networks: a Joint Communication/Information-Theoretic Approach," Department of Information Engineering, University of Parma, Italy. July 26, 2006.

SPEAKER AT CONFERENCES

2019 IEEE International Conference on Computing Communication and Security (ICCCS 2019), Rome, Italy, October 2019, to present the paper [C40].

2019 International Symposium on Wireless Communication Systems (ISWCS 2019), Oulu, Finland, August 2019, to present the paper [C38].

2018 IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC), Bologna, Italy, September 2018, to present the paper [C37].

2016 International Symposium on Turbo Codes & Iterative Information Processing (ISTC 2016), Brest, France, September 2016, to present the paper [C36].

2015 International Symposium on Wireless Communication Systems (ISWCS 2015), Bruxelles, Belgium, August 2015, to present the papers [C33]-[C34].

2012 Riunione Annuale dell'Associazione Gruppo nazionale Telecomunicazioni e Tecnologie dell'Informazione (GTTI 2012), Cagliari & Villasimius, Italy, June 2012, to present the paper [CN5].

2010 IEEE International Symposium on Industrial Electronics (ISIE 2010), Bari, Italy, July 2010, to present the paper [C22].

2010 International Symposium on Wireless Pervasive Computing (ISWPC 2010), Modena, Italy, May 2010, to present the papers [C19]-[C20].

2010 Information Theory and Applications Workshop (ITA 2010), San Diego, CA, USA, February 2010, to present the invited paper [C18].

2009 Riunione Annuale dell'Associazione Gruppo nazionale Telecomunicazioni e Tecnologie dell'Informazione (GTTI 2009), Parma, Italy, June 2009, to present the paper [CN3].

2008 Riunione Annuale dell'Associazione Gruppo nazionale Telecomunicazioni e Tecnologie dell'Informazione (GTTI 2008), Firenze, Italy, June 2008, to present the paper [CN2].

2008 IEEE International Symposium on Communications, Control and Signal Processing (ISCCSP 2008), St. Julians, Malta, March 2008, to present the papers [C9]-[C10].

2006 International Workshop on Wireless Ad-hoc Networks (IWWAN 2006), New York, NY, USA, June 2006, to present the paper [C4] awarded with a Best Student Paper Award.

SCOLARSHIPS

6-month scolarship on "Network coding complexity," School of Computer and Communication Sciences, Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland. October 2007.

1-year CNIT scolarship (out of 15 at a nation wide level) on the analysis and design of sensor networks. Assigned to the Department of Information Engineering, University of Parma, Italy. Not accepted for overlap with an Italian Ministry of University and Research (MIUR) scolarship. July 2006.

PRIN (nation-wide italian project) scolarship on "Mutual information and decentralized detection in clustered sensor networks," Department of Information Engineering, University of Parma, Italy. Not accepted for overlap with an Italian Ministry of University and Research (MIUR) scolarship. March 2006.

Merit-based scolarships for completing undergraduate and graduate university studies (average grade above 24/30 in the undergraduate course and 28/30 in the graduate course). Academic years: 2000/2001, 2001/2002, 2002/2003, 2003/2004, 2004/2005, and 2005/2006.

TEACHING ACTIVITIES

Personal Contributions

I believe I have contributed to the advancement of teaching methodologies through the provision of different courses with innovative methods, both in in telematic mode with use of multimedia contents and in traditional courses with frontal teaching. In particular, the former were provided at the E-Campus University, Novedrate (CO), Italy, while the latter were provided at the University of Parma, Italy.

In the telematic courses, the students are provided with slides and videos for learning each lesson. In particular, for each CFU the preparation of 8 lessons and 1 video lesson is scheduled. The lesson is composed of 4 sets of slides (main lesson and 3 in-depth sessions) for an expected duration of 2 hours. The video lesson, instead, is composed of a video recording accompanied by slides for a maximum duration of 30 minutes. To facilitate the preparation of the students for the exams, each CFU is accompanied by a set of multiple choice or open tests, prepared by the teacher, for student self-assessment. Finally, the interaction between teacher and student takes place through messaging and audio-video systems on a dedicated platform and front reception at the university's headquarters.

In traditional courses, a contribution was made to the innovation of teaching methods through different forms. In particular, for the course of " Internet and Multimedia" a bottom-up teaching approach has been proposed. In fact, the course is proposed to students attending the first semester of the first year of the Bachelor, who have not yet acquired the basic skills of mathematics and software programming. To facilitate learning, we start from examples of real-world experience applied to networks, without the necessary knowledge of the theoretical details at the basis which are taught in subsequent courses. For the "Communication Networks" course, the traditional frontal classroom activity, consisting of theoretical lectures and exercise sessions, was supported with an important experimental laboratory activity (about a third of the entire course duration) with the aim of learning different tools (for different operating systems and programming languages) for network design and analysis. For the "Laboratory of Telecommunications" course, instead, the innovativity consisted in the realization of a module strongly based on experimental activity, limited traditional frontal teaching, and intensive laboratory sessions. During the laboratory sessions, the students did not only learn the use of commercial sensor networks, but realize projects based on these devices that could be the basis of future research activities. This working methodology has also been applied in all the support activities carried out over the years for the courses of "Sistemi radiomobili e a larga banda" and "Wireless communications."

Lecturer for *Traditional* Courses

"Internet and Multimedia" (9 CFUs), University of Parma, Italy. First-year course for the Bachelor Degree in Information Systems Engineering. Academic years: from 2017-2018 to 2019-2020.

"Communication Networks" (6 CFUs), University of Parma, Italy. Third-year course for the Bachelor Degree in Computer, Electronic, and Telecommunication Engineering and second-year course for the Bachelor Degree in Information Systems Engineering. Academic year: 2018-2019.

"Laboratory of Telecommunications (Wireless Networks)" (2 CFUs), University of Parma, Italy. Second-year course for the Master Degree in Telecommunications Engineering. Academic year: 2009-2010.

"Network Coding" (10 hours), University of Parma, Italy. Short course for the Ph.D. program in Information Technologies. February 2009.

Lecturer for *e-Learning* Courses

"Signals and Systems" (9 CFUs), E-Campus University, Italy. Second-year course for the Bachelor Degree in Computer and Automation Engineering. Academic years: from 2015-2016 to 2016-2017.

"Telecommunications" (9 CFUs), E-Campus University, Italy. Second-year course for the Bachelor Degree in Computer and Automation Engineering. Academic years: from 2012-2013 to 2016-2017.

"Communication Networks" (6 CFUs), E-Campus University, Italy. Third-year course for the Bachelor Degree in Computer and Automation Engineering. Academic years: from 2012-2013 to 2016-2017.

"Digital Signal Processing" (6 CFUs), E-Campus University, Italy. Third-year course for the Bachelor Degree in Computer and Automation Engineering. Academic years: from 2012-2013 to 2016-2017.

"Telecommunications and Remote Sensing" (6 CFUs), E-Campus University, Italy. Second-year course for the Master Degree in Computer and Automation Engineering. Academic years: from 2013-2014 to 2016-2017.

Teaching Assistant

Integrative teaching activities (lectures, exercise and laboratory sessions, seminars, and tutoring) at the University of Parma, Italy, for a total amount of about 330 hours. Activities done for the following courses: "Network performance" (from 2015-2016 to 2018-2019), "Wireless Communications" (from 2016-2017 to 2018-2019), "Comunicazioni Wireless" (from 2010-2011 to 2012-2013), "Trasmissione numerica A" (from 2009-2010 to 2011-2012), "Teoria dei segnali B" (2008-2009), "Sistemi radiomobili e a larga banda" (from 2006-2007 to 2008-2009), "Precorso di alfabetizzazione informatica" (2006-2007).

Chair of the examination committee for the course of "Wireless Communications" (2018-2019) for the Master Degree in Communication Engineering at the University of Parma, Italy. For this course, I gave lectures, in substitution of the lecturer, for a total amount of 32 hours.

Member of the examination committee for the following courses: "Wireless Communications" (from 2013-2015 to 2017-2019), "Comunicazioni wireless" (from 2010-2011 to 2012-2013), "Trasmissione numerica" (from 2011-2011 to 2013-2014), "Trasmissione numerica A" (from 2009-2010 to 2010-2011), "Sistemi radiomobili e a larga banda" (from 2007-2008 to 2008-2009).

Supervised Ph.D. Students

Alessandro Opinto, Ph.D. in Automotive for Intelligent Mobility, Department of Industrial Engineering, University of Bologna, Italy. Thesis topic: "signal processing for acoustic control in automotive applications," XXXIV cycle, 2018-2021 (in progress). Advisor: Prof. A. Farina.

Muhammad Asim, Ph.D. in Information Technologies, Department of Information Engineering, University of Parma, Italy. Thesis title: "Advanced receivers for next generation wireless communication systems," XXVIII cycle, 2013-2015 (defended in March 2016). Advisor: Prof. G. Ferrari. Partially presented work in the following publications: [J26]-[J27] and [C32]-[C33], [C36].

Supervised Master Students (3+2 or 5-year program)

Gianmarco Carraglia, Department of Engineering and Architecture, University of Parma, Italy. Tentative thesis title: "Signal processing algorithms for active noise cancellation in a tractor cabin." Expected defense in March 2020. Advisor: Dr. M. Martalò.

Anatolij Borroni, Department of Engineering and Architecture, University of Parma, Italy. Tentative thesis title: "Individual listening zones in automotive applications," in progress. Advisor: Prof. R. Raheli.

Fabrizio Carpi, Department of Engineering and Architecture, University of Parma, Italy. Thesis title: "Exploring machine learning algorithms for decoding linear block codes," October 2018. Advisor: Prof. R. Raheli. Partially presented work in the following publication: [C39].

Elia Santi, Department of Engineering and Architecture, University of Parma, Italy. Thesis title: "Decoding Reed-Muller codes using minimum-weight parity checks," October 2018. Advisor: Prof. R. Raheli.

Alessandro Opinto, Department of Engineering and Architecture, University of Parma, Italy. Thesis title: "Design and performance of a precoded OFDM massive MIMO system for new generation cellular network," March 2018. Advisor: Prof. R. Raheli. Partially presented work in the following publication: [C37].

Antonino Gervasi, School of Engineering, University of Parma, Italy. Thesis title: "Information rate analysis of the oversampled phase-noise channel," *in Italian*, March 2015. Advisor: Prof. R. Raheli. Partially presented work in the following publication: [C34].

Carlo Tripodi, School of Engineering, University of Parma, Italy. Thesis title: "Information rate analysis of phase noise-limited communications," December 2012. Advisor: Prof. R. Raheli. Partially presented work in the following publications: [J23] and [C31].

Michele Mohorovicich, School of Engineering, University of Parma, Italy. Thesis title: "Network-coded multihop multicast: topology and complexity," March 2011. Advisor: Prof. G. Ferrari. Partially presented work in the following publication: [C29].

Naldo Poletti, School of Engineering, University of Parma, Italy. Thesis title: "Design and experimental development of a wireless network with mesh topology," *in Italian*, March 2011. Advisor: Prof. G. Ferrari

Erind Meco, School of Engineering, University of Parma, Italy. Thesis title: "Design of a network-coded P2P architecture for managing large information flows," *in Italian*, March 2011. Advisor: Prof. M. Amoretti. Partially presented work in the following publication: [C30].

Davide Ribolini, School of Engineering, University of Parma, Italy. Thesis title: "Highly energy efficient target tracking in clustered sensor networks," *in Italian*, December 2010. Advisor: Prof. G. Ferrari.

Matteo Giuberti, School of Engineering, University of Parma, Italy. Thesis title: "Design of localization algorithms for motion capture in wireless SunSpot sensor networks," *in Italian*, December 2010. Advisor: Prof. G. Ferrari. Partially presented work in the following publications: [J20] and [C26].

Giovanni Spigoni, School of Engineering, University of Parma, Italy. Thesis title: "Design and performance analysis of a software for vertical handover between heterogeneous networks," *in Italian*, July 2010. Advisor: Prof. G. Ferrari. Partially presented work in the following publications: [J9] and [C23].

Riccardo Bussandri, School of Engineering, University of Parma, Italy. Thesis title: "Design and performance evaluation of a P2P distributed storage system based on network and erasure coding," *in Italian*, December 2009. Advisor: Prof. M. Amoretti. Partially presented work in the following publication: [C21].

Stefano Busanelli, School of Engineering, University of Parma, Italy. Thesis title: "Markov chain models for performance analysis of sensor networks with multihop communications," *in Italian*, December 2007. Advisor: Prof. G. Ferrari. Partially presented work in the following publications: [J5] and [C9], [C11], [C17].

Marco Sarti, School of Engineering, University of Parma, Italy. Thesis title: "Algorithms for Distributed Detection of Non-constant Binary Phenomena in Sensor Networks," *in Italian*, December 2006. Advisor: Prof. G. Ferrari. Partially presented work in the following publications: [J7] and [C6].

Paolo Medagliani, School of Engineering, University of Parma, Italy. Thesis title: "Design and Implementation of Wireless Sensor Networks with Zigbee Technology," *in Italian*, April 2006. Advisor: Prof. G. Ferrari. Partially presented work in the following publications: [J1] and [C7].

Supervised Bachelor Students (3-year program)

A total amount of 20 Bachelor students have been supervised, 14 of them as the advisor and the remaining 6 as a co-advisor.

PROFESSIONAL ACTIVITIES

Journal Editor and Conference Organization

Associate Editor for IEEE Access journal, 3-year appointment started on June 2018. Coordination of the review process for an average amount of 3 papers per month.

Organizer for the following Special Sessions.

- "Recent Advances in Indoor Navigation for IoT-based Applications" (RAIN-IoT) in the International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC), Bologna, Italy, 2018.
- "STCD: Models and Algorithms for Spatially and Temporally Correlated Data" in the International Conference on Advances in Multimedia (MMEDIA), Venice, Italy, 2017.

TPC member for the following conferences.

- IEEE International Symposium on Power Line Communications and its Applications (ISPLC), 2020.
- IEEE International Conference on Communications (ICC), Communication Theory Symposium, 2018-2020.
- International Conference on Advances in Multimedia (MMEDIA), 2018-2020.
- IEEE International Conference on Computing Communication and Security (ICCCS), 2019.
- Workshop on Dependable Communication and Localization for the IoT, Graz, Austria, 2017.

- International Conference on Recent Advances in Electronics and Communication Technology (ICRAECT), Bengaluru, Karnataka, India, 2017.
- IEEE Global Communications Conference (GLOBECOM), Communication Theory Symposium, Houston, TX, USA, 2011.
- International Conference on Advances in Satellite and Space Communications (SPACOMM), 2009-2010.
- International Workshop on Performance Methodologies and Tools for Wireless Sensor Networks (WSNPerf), Pisa, Italy, 2009.

Chair for the following conference sessions.

- "RAIN-IoT: Recent Advances in Indoor Navigation for IoT-based Applications," International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC), Bologna, Italy, September 2018.
- "STCD: Models and Algorithms for Spatially and Temporally Correlated Data," International Conference on Advances in Multimedia (MMEDIA), Venice, Italy, April 2017.
- "SPCI - Dialog 1: Electric Machines / Signal Processing," IEEE International Symposium on Industrial Electronics (ISIE), Bari, Italy, July 2010.

Frequent and regular reviewer for the main scientific journals and conferences in the field of telecommunications. The complete list is available on the personal page https://sites.google.com/site/marcomartalo/

Other Academic Duties

Committee member for drafting the review report (*Rapporto del Riesame*), School of Engineering, E-Campus University, Italy. Academic years: from 2012-2013 to 2016-2017.

Committee member for quality assurance, School of Engineering, E-Campus University, Italy. Academic years: from 2013-2014 to 2016-2017.

PERSONAL SKILLS AND INTERESTS

Languages: English (good) and French (basic).

Main personal interest as volleyball player and trainer (second-level Italian degree).

LIST OF PUBLICATIONS

Bibliometric indexes

source	citations	h-index
Google Scholar	709	13
Scopus	350	10

Books

[B1] C. Buratti, M. Martalò, R. Verdone, and G. Ferrari, "Sensor Networks with IEEE 802.15.4 Systems: Distributed Processing, MAC, and Connectivity," Springer, Germany, 2011. ISBN: 978-3-642-17489-6.

Book Chapters

[BC7] A. Abrardo, **M. Martalò**, and G. Ferrari, "Decision Fusion in Cognitive Wireless Sensor Networks," chapter contribution in *Multisensor Data Fusion: From Algorithms and Architectural Design to Applications*, pp. 349-362, edited by H. Fourati. CRC Press, 2015. ISBN: 978-1-4822-6374-9.

[BC6] G. Spigoni, S. Busanelli, **M. Martalò**, G. Ferrari, and N. Iotti, "Vertical Handover in Heterogeneous Networks: a Comparative Experimental and Simulation-based Investigation," chapter contribution in *Heterogeneous Cellular Networks*, pp. 265-286, edited by R. Q. Hu and Y. Qian. Wiley, 2013. ISBN: 978-1-1199-9912-6.

[BC5] **M. Martalò**, G. Ferrari, and C. Malavenda, "Wireless Sensor Networks and Audio Signal Processing for Homeland Security," chapter contribution in *Effective Surveillance for Homeland Security: Balancing Technology and Social Issues*, pp. 457-488, edited by F. Flammini, R. Setola, and G. Franceschetti. Chapman and Hall/CRC Press (Taylor and Francis Group), 2013. ISBN: 978-1-4398-8324-2.

[BC4] S. Busanelli, **M. Martalò**, G. Ferrari, G. Spigoni, and N. Iotti, "Experimental Investigation of Vertical Handover Algorithms between WiFi and UMTS Networks," chapter contribution in *Communication and Networking, Part I*, pp. 137-146, edited by C.-C. Chang, M. Li, C. Rong, C. Z. Patrikakis, and D. Slezak. Springer, 2011. ISBN: 978-3642175862.

[BC3] **M. Martalò**, and G. Ferrari, "Low-complexity Audio Signal Processing for Localization in Indoor Scenarios," chapter contribution in *The Internet of Things: 20th Tyrrhenian Workshop on Digital Communications*, pp. 167-176, edited by D. Giusto, A. Iera, G. Morabito, and L. Atzori. Springer, 2010. ISBN: 978-1-4419-1673-0.

[BC2] G. Ferrari, **M. Martalò**, and M. Sarti, "Reduced-Complexity Decentralized Detection of Spatially Non-constant Phenomena," chapter contribution in *Grid Enabled Instrumentation and Measurement*, pp. 33-54, edited by F. Davoli, N. Meyer, R. Pugliese, and S. Zappatore. Springer, October 2008. ISBN: 978-0-387-09662-9.

[BC1] G. Ferrari, P. Medagliani, and **M. Martalò**, "Performance Analysis of Zigbee Wireless Sensor Networks with Relaying," chapter contribution in *Grid Enabled Instrumentation and Measurement*, pp. 55-79, edited by F. Davoli, N. Meyer, R. Pugliese, and S. Zappatore. Springer, October 2008. ISBN: 978-0-387-09662-9.

Journal Papers

[J28] A. Abrardo, **M. Martalò**, and G. Ferrari "Information fusion for efficient target detection in large-scale surveillance Wireless Sensor Networks," *Elsevier Information Fusion*, Special Issue on "*Event-Based Distributed Information Fusion Over Sensor Networks*," vol. 38, pp. 55-64, November 2017.

[J27] **M. Martalò**, G. Ferrari, M. Asim, J. Gambini, C. Mazzucco, G. Cannalire, S. Bianchi, and R. Raheli, "Iterative synchronization for dually-polarized independent transmission streams," *IEEE Transactions on Communications*, vol. 65, n. 6, pp. 2534-2542, June 2017.

[J26] **M. Martalò**, G. Ferrari, M. Asim, J. Gambini, C. Mazzucco, G. Cannalire, S. Bianchi, and R. Raheli, "Pragmatic phase noise compensation for high-order coded modulations," *IET Communications*, vol. 10, n. 15, pp. 1956-1963, October 2016.

[J25] A. Abrardo, **M. Martalò**, and G. Ferrari, "Impact of the knowledge of nodes' positions on spectrum sensing strategies in cognitive networks," *Elsevier Physical Communications*, Special Issue on "*Self-Optimizing Cognitive Radio Technologies*," vol. 19, pp. 84-92, June 2016.

[J24] **M. Martalò** and R. Raheli, "Models, statistics, and rates of binary correlated sources," *Elsevier Physical Communications*, vol. 19, pp. 70-80, June 2016.

[J23] **M. Martalò**, C. Tripodi, and R. Raheli, "Simple upper bound on the information rate of the phase noise channel," *IET Electronics Letters*, vol. 52, n. 7, pp. 517-519, April 2016.

[J22] A. Gorrieri, **M. Martalò**, S. Busanelli, and G. Ferrari, "Clustering and sensing with decentralized detection in vehicular ad hoc networks," *Elsevier Ad Hoc Networks*," Special Issue on "*Vehicular Networking for Mobile Crowd Sensing*," vol. 36, part 2, pp. 450-464, January 2016.

[J21] M. Picone, M. Amoretti, **M. Martalò**, F. Zanichelli, and G. Ferrari, "Combining georeferencing and network coding for distributed large scale information management," *Wiley Concurrency and Computation: Practice and Experience*, Special Issue on "*Advances in High Performance Computing and Simulation*," vol. 27, n. 13, pp. 3295-3315, September 2015.

[J20] M. Giuberti, **M. Martalò**, and G. Ferrari, "A hybrid radio/accelerometric approach to arm posture recognition," *Journal of Ambient Intelligence and Smart Environments*, vol. 7, n. 4, pp. 563-578, July 2015.

[J19] A. Abrardo, G. Ferrari, **M. Martalò**, M. Franceschini, and R. Raheli, "Orthogonal multiple access with correlated sources: achievable region and pragmatic schemes," *IEEE Transactions on Communications*, vol. 62, n. 7, pp. 2531-2543, July 2014.

[J18] **M. Martalò**, M. Amoretti, M. Picone, and G. Ferrari, "Sporadic decentralized resource maintenance for P2P distributed storage networks," *Elsevier Journal of Parallel and Distributed Computing*, vol. 74, n. 2, pp. 2029-2038, February 2014.

[J17] G. Ferrari, **M. Martalò**, and A. Abrardo, "Information fusion in wireless sensor networks with source correlation," *Elsevier Information Fusion*, vol. 15, pp. 80-89, January 2014.

[J16] **M. Martalò**, C. Buratti, G. Ferrari, and R. Verdone, "Clustered IEEE 802.15.4 sensor networks with data aggregation: energy consumption and probability of error," *IEEE Wireless Communications Letters*, vol. 2, no. 1, pp. 70-73, February 2013.

[J15] **M. Martalò**, G. Ferrari, and C. Malavenda, "Low-complexity hybrid time-frequency audio signal pattern detection," *IEEE Sensors Journal*, vol. 13, no. 2, pp. 501-509, January 2013.

[J14] C. Malavenda, **M. Martalò**, and G. Ferrari, "A hybrid time-frequency audio signal pattern detection algorithm for surveillance applications," *POLARIS Innovation Journal, Selex-ES Technical Review*, vol. 13, pp. 53-64, 2013.

[J13] **M. Martalò** and G. Ferrari, "Decoding and fusion in distributed detection schemes with unreliable communications," *IEEE Trans. on Aerospace and Electronic Systems*, vol. 48, no. 1, pp. 16-26, January 2012.

[J12] P. Medagliani, **M. Martalò**, and G. Ferrari, "Clustered Zigbee networks with data fusion: characterization and performance analysis," *Elsevier Ad Hoc Networks*, vol. 9, no. 7, pp. 1083-1103, September 2011.

[J11] A. Abrardo, G. Ferrari, and **M. Martalò**, "On non-cooperative block-faded orthogonal multiple access schemes with correlated sources," *IEEE Transactions on Communications*, vol. 59, no. 7, pp. 1916-1926, July 2011.

[J10] G. Ferrari, **M. Martalò**, and R. Pagliari, "Decentralized detection in clustered sensor networks," *IEEE Trans. on Aerospace and Electronic Systems*, vol. 47, no. 2, pp. 959-973, April 2011.

[J9] S. Busanelli, **M. Martalò**, G. Ferrari, G. Spigoni, and N. Iotti, "Vertical handover between WiFi and UMTS networks: experimental performance analysis," *International Journal of Energy, Information and Communications*, vol. 2, no. 1, pp. 75-96, February 2011.

[J8] **M. Martalò**, C. Buratti, G. Ferrari, and R. Verdone, "Decentralized detection in IEEE 802.15.4 wireless sensor networks," *EURASIP Journal on Wireless Communication and Networking*, Special Issue on "*Signal Processing-assisted Protocols and Algorithms for Cooperating Objects and Wireless Sensor Networks*," vol. 2010, Article ID 174063, 10 pages, 2010. doi:10.1155/2010/174063.

[J7] **M. Martalò** and G. Ferrari, "Low-complexity one-dimensional edge detection in wireless sensor networks," *EURASIP Journal on Wireless Communication and Networking*, Special Issue on "*Signal Processing-assisted Protocols and Algorithms for Cooperating Objects and Wireless Sensor Networks*," vol. 2010, Article ID 751520, 13 pages, 2010. doi:10.1155/2010/751520.

[J6] **M. Martalò** and G. Ferrari, "A simple information-theoretic analysis of clustered sensor networks with decentralized detection," *IEEE Communications Letters*, vol. 14, no. 6, pp. 560-562, June 2010.

[J5] **M. Martalò**, S. Busanelli, and G. Ferrari, "Markov chain-based performance analysis of multihop IEEE 802.15.4 wireless networks," *Elsevier Performance Evaluation* (PEVA), Special Issue on "*Performance Evaluation of Wireless Ad Hoc, Sensor, and Ubiquitous Networks*," vol. 66, no. 12, pp. 722-741, December 2009.

[J4] A. Abrardo, G. Ferrari, **M. Martalò**, and F. Perna, "Feedback power control strategies in wireless sensor networks with joint channel decoding," *MDPI Sensors*, Special Issue on "*Wireless Sensor Technologies and Applications*," vol. 9, no. 11, pp. 8776-8809, November 2009.

[J3] G. Ferrari, R. Pagliari, and **M. Martalò**, "Decentralized binary detection with non-constant SNR profile at the sensors," *International Journal on Sensor Networks*, Special Issue on "*Energy-Efficient Algorithm and Protocol Design in Sensor Networks*," vol. 4, nos. 1-2, pp. 23-36, 2008.

[J2] G. Ferrari and **M. Martalò**, "Extending the lifetime of sensor networks through adaptive reclustering," *EURASIP Journal on Wireless Communication and Networking*, Special Issue on "*Novel Techniques for Analysis and Design of Cross-Layer Optimized Wireless Sensor Networks*," vol. 2007, Article ID 31809, 20 pages, 2007. doi:10.1155/2007/31809.

[J1] G. Ferrari, P. Medagliani, S. Di Piazza, and **M. Martalò**, "Wireless sensor networks: performance analysis in indoor scenarios," *EURASIP Journal on Wireless Communication and Networking*, Special Issue on "*MobileMAN (Mobile Multi-hop Ad Hoc Networks): From Theory to Reality*," vol. 2007, Article ID 81864, 14 pages, 2007. doi:10.1155/2007/81864.

Conference Papers

[C40] **M. Martalò**, G. Ferrari, S. Perri, G. Verdano, F. De Mola, and F. Monica, "UWB TDoA-based positioning using a single hotspot with multiple anchors," *Proc. IEEE Int. Conference on Computing, Communication and Security* (ICCCS), pp. 1-7, Rome, Italy, October 2019.

[C39] F. Carpi, C. Häger, **M. Martalò** , R. Raheli, and H. D. Pfister, "Reinforcement learning for channel coding: learned bit-flipping decoding," *Proc. Annual Allerton Conference on Communication, Control, and Computing*, Urbana-Champaign, IL, USA, September 2019.

[C38] F. Carpi, L. Davoli, **M. Martalò**, A. Cilfone, Y. Yu, Y. Wang, and G. Ferrari, "RSSI-based methods for LOS/NLOS channel identification in indoor scenarios," *Proc. IEEE Int. Symposium on Wireless Communication Systems* (ISWCS), pp. 171-175, Oulu, Finland, August 2019.

[C37] **M. Martalò**, A. Opinto, M. Maso, M. Debbah, and R. Raheli, "Low-complexity channel estimation in OFDM MU-MIMO next generation cellular networks," *Proc. IEEE Int. Symposium on Personal, Indoor and Mobile Radio Communications* (PIMRC), pp. 1-5, Bologna, Italy, September 2018.

[C36] M. Asim, **M. Martalò**, G. Ferrari, and R. Raheli "Pragmatic code-aided phase synchronization in iterative multi-sample receivers," *Proc. Int. Symposium on Turbo Codes & Iterative Information Processing* (ISTC), pp. 1-5, Brest, France, September 2016.

[C35] **M. Martalò**, A. Abrardo, and G. Ferrari, "Tradeoff between energy consumption and detection capabilities in collaborative cognitive wireless networks," *Proc. IEEE Int. Symposium on Personal, Indoor and Mobile Radio Communications* (PIMRC), pp. 1-6, Valencia, Spain, September 2016.

[C34] **M. Martalò**, A. Gervasi, C. Tripodi, and R. Raheli, "Information rate analysis of the oversampled phase-noise channel," *Proc. IEEE Int. Symposium on Wireless Communication Systems* (ISWCS), pp. 346-350, Brussels, Belgium, August 2015.

[C33] **M. Martalò**, G. Ferrari, M. Asim, J. Gambini, C. Mazzucco, G. Cannalire, S. Bianchi, and R. Raheli, "Phase noise compensation for dually-polarized systems with independent transmission streams," *Proc. IEEE Int. Symposium on Wireless Communication Systems* (ISWCS), pp. 251-255, Brussels, Belgium, August 2015.

[C32] **M. Martalò**, G. Ferrari, M. Asim, J. Gambini, C. Mazzucco, G. Cannalire, S. Bianchi, and R. Raheli, "Reduced-complexity synchronization for high-order coded modulations," *Proc. IEEE Int. Conf. Commun.* (ICC), pp. 4721-4726, London, UK, June 2015.

[C31] **M. Martalò**, C. Tripodi, and R. Raheli, "On the information rate of phase-noise limited communications," *Proc. Information Theory and Applications Workshop* (ITA), pp. 1-7, San Diego, CA, USA, February 2013. **Invited paper**.

[C30] M. Picone, M. Amoretti, **M. Martalò**, E. Meco, F. Zanichelli, and G. Ferrari, "A joint peer-to-peer and network coding approach for large scale information management", *Proc. Int. Conf. High Performance Computing and Simulation* (HPCS), pp. 308-314, Madrid, Spain, July 2012.

[C29] **M. Martalò**, M. Mohorovicich, G. Ferrari, and C. Fragouli, "Network-coded multihop multicast: topology and encoding complexity," *IEEE Int. Conf. Commun.* (ICC), pp. 2529-2533, Ottawa, Canada, June 2012.

[C28] G. Ferrari, **M. Martalò**, A. Abrardo, and R. Raheli, "Orthogonal multiple access and information fusion: how many observations are needed?," *Proc. Information Theory and Applications Workshop* (ITA), pp. 311-320, San Diego, CA, USA, February 2012. **Invited paper**.

[C27] S. Busanelli, **M. Martalò**, and G. Ferrari, "Clustered vehicular networks: decentralized detection "on the move"," *Proc. Int. Workshop on Seamless Connectivity in Vehicular Networks* (SCVN), pp. 744-749, St. Petersburg, Russia, August 2011.

[C26] M. Giuberti, **M. Martalò**, and G. Ferrari, "Fingerprinting-based wireless 3D localization for motion capture applications," *Proc. ACM MobiHoc Workshop on Pervasive Wireless Healthcare* (MobileHealth), Paris, France, May 2011.

[C25] **M. Martalò**, C. Buratti, G. Ferrari, and R. Verdone, "Optimum topology in clustered IEEE 802.15.4 sensor networks with decentralized detection," *Proc. IEEE Vehicular Technology Conference* (VTC Spring), pp. 1-5, Budapest, Hungary, May 2011.

[C24] **M. Martalò**, M. Picone, M. Amoretti, G. Ferrari, and R. Raheli, "Randomized network coding in distributed storage systems with layered overlay," *Proc. Information Theory and Applications Workshop* (ITA), pp. 1-7, San Diego, CA, USA, February 2011. **Invited paper**.

[C23] S. Busanelli, **M. Martalò**, G. Ferrari, G. Spigoni, and N. Iotti, "Experimental investigation of vertical handover algorithms between WiFi and UMTS networks," *Proc. Int. Conference on Future Generation Communication Networks* (FGCN), Jeju Island, Korea, December 2010.

[C22] **M. Martalò**, G. Ferrari, and C. Malavenda, "Low-complexity in-sensor audio detection with experimental validation," *Proc. IEEE Int. Symposium on Industrial Electronics* (ISIE), pp. 1674-1679, Bari, Italy, July 2010.

[C21] **M. Martalò**, M. Picone, R. Bussandri, and M. Amoretti, "A practical network coding approach for peer-to-peer distributed storage," *Proc. IEEE Int. Symposium on Network Coding* (NetCod), pp. 103-108, Toronto, Canada, June 2010.

[C20] **M. Martalò**, G. Ferrari, and C. Malavenda, "In-sensor low-complexity audio pattern recognition for pervasive networking", *Proc. IEEE Int. Symposium on Wireless Pervasive Computing* (ISWPC), pp. 215-220, Modena, Italy, May 2010.

[C19] A. Abrardo, G. Ferrari, and **M. Martalò**, "Non-cooperative block-faded orthogonal multiple access with source correlation: performance limits and practical schemes," *Proc. IEEE Int. Symposium on Wireless Pervasive Computing* (ISWPC), pp. 1-6, Modena, Italy, May 2010.

[C18] **M. Martalò**, G. Ferrari, A. Abrardo, M. Franceschini, and R. Raheli, "Density evolution-based analysis and design of LDPC codes with a-priori information," *Proc. Information Theory and Applications Workshop* (ITA), pp. 308-316, San Diego, CA, USA, February 2010. **Invited paper**.

[C17] S. Busanelli, **M. Martalò**, and G. Ferrari, "Markov chain-based optimization of multihop IEEE 802.15.4 wireless sensor networks," *Proc. Int. Workshop on Performance Methodologies and Tools for Wireless Sensor Networks* (WSNPerf), Pisa, Italy, October 2009.

[C16] **M. Martalò** and G. Ferrari, "Low-complexity audio signal processing for localization in indoor scenarios," *Proc. Tyrrhenian Int. Workshop on Digital Communications* (Tyrrhenian), Pula, Italy, September 2009.

[C15] A. Abrardo, G. Ferrari, **M. Martalò**, and F. Perna, "Joint channel decoding with feedback power control in sensor networks with correlated sources," *Proc. Int. Symposium of Wireless Communication Systems* (ISWCS), pp. 274-278, Siena, Italy, September 2009.

[C14] A. Abrardo, G. Ferrari, **M. Martalò**, M. Franceschini, and R. Raheli, "Optimizing channel coding for orthogonal multiple access schemes with correlated sources," *Proc. Information Theory and Applications Workshop* (ITA), pp. 5-14, San Diego, CA, USA, February 2009. **Invited paper**.

[C13] **M. Martalò** and G. Ferrari, "Decoding and fusion in sensor networks with noisy observations and communications," special session on "Wireless sensor networks," *Proc. Int. Symposium on Spread Spectrum Techniques and Applications* (ISSSTA), pp. 7-11, Bologna, Italy, August 2008. **Invited paper**.

[C12] P. Medagliani, **M. Martalò**, and G. Ferrari, "A multi-dimensional characterization of clustered Zigbee networks: performance trade-offs," special session on "Distributed processing/optimization for wireless networks," *Proc. Int. Symposium on Spread Spectrum Techniques and Applications* (ISSSTA), pp. 12-17, Bologna, Italy, August 2008. **Invited paper**.

[C11] **M. Martalò**, S. Busanelli, and G. Ferrari, "Multihop IEEE 802.15.4 wireless networks with finite node buffers: Markov chain-based analysis," *Proc. Int. Symposium on Spread Spectrum Techniques and Applications* (ISSSTA), pp. 644-648, Bologna, Italy, August 2008.

[C10] A. Abrardo, G. Ferrari, and **M. Martalò**, "Non-cooperative wireless orthogonal multiple access schemes with and without relaying," *Proc. IEEE Int. Symposium on Communications, Control and Signal Processing* (ISCCSP), pp. 455-460, St. Julians, Malta, March 2008.

[C9] **M. Martalò**, G. Ferrari, and S. Busanelli, "Markov chain-based performance evaluation of IEEE 802.15.4 multihop wireless sensor networks," *Proc. IEEE Int. Symposium on Communications, Control and Signal Processing* (ISCCSP), pp. 461-466, St. Julians, Malta, March 2008.

[C8] G. Ferrari, P. Medagliani, **M. Martalò**, and A. Muzzini, "Zigbee sensor networks with data fusion," *Proc. IEEE Int. Symposium on Communications, Control and Signal Processing* (ISCCSP), pp. 472-477, St. Julians, Malta, March 2008.

[C7] G. Ferrari, P. Medagliani, and **M. Martalò**, "Performance analysis of Zigbee wireless sensor networks with relaying," *Int. Workshop on Distributed Cooperative Laboratories* ("Instrumenting the Grid," INGRID), S. Margherita Ligure Portofino, Italy, April 2007.

[C6] G. Ferrari, **M. Martalò**, and M. Sarti, "Reduced-complexity decentralized detection of spatially non-constant phenomena," *Int. Workshop on Distributed Cooperative Laboratories* ("Instrumenting the Grid," INGRID), S. Margherita Ligure Portofino, Italy, April 2007.

[C5] G. Ferrari, **M. Martalò**, and S. Romani, "Maximizing sensor networks lifetime: adaptive reclustering and power management strategies," *DGA Workshop on Components and Technologies for Defence and Security*, Paris, France, November 2006.

[C4] G. Ferrari and **M. Martalò**, "Sensor networks with decentralized binary detection: clustering and lifetime," *Proc. Int. Workshop on Wireless Ad-hoc Networks* (IWWAN), vol. 2, pp. 645-650, New York, NY, USA, July 2006. **Best student paper award**.

[C3] G. Ferrari, **M. Martalò**, and R. Pagliari, "On multi-level decentralized binary detection in sensor networks," *Proc. Int. Conference on Intelligent Systems and Computing* (ISYC), Ayia Napa, Cyprus, July 2006. **Invited paper**.

[C2] G. Ferrari, R. Pagliari, **M. Martalò**, and G. Picchi, "Decentralized binary detection with non-constant SNR profile at the sensors," *Proc. Int. Conference on Intelligent Systems and Computing* (ISYC), Ayia Napa, Cyprus, July 2006.

[C1] G. Ferrari, **M. Martalò** and R. Pagliari, "Clustered decentralized binary detection: an information-theoretic approach," *Proc. Int. Symposium on Communications, Control, and Signal Processing* (ISCCSP), Marrakech, Morocco, March 2006.

National Conference Papers

[CN5] **M. Martalò**, C. Buratti, G. Ferrari, and R. Verdone, "Energy consumption and probability of error in clustered IEEE 802.15.4 sensor networks with data aggregation", *Riunione annuale 2012 del Gruppo nazionale Telecomunicazioni e Teoria dell'Informazione* (GTTI), Cagliari, Italy, June 2012.

[CN4] **M. Martalò**, M. Giuberti, and G. Ferrari, "Experimental investigation of wireless sensor networks for fingerprinting-based posture recognition," *Riunione annuale 2011 del Gruppo nazionale Telecomunicazioni e Teoria dell'Informazione* (GTTI), Messina, Italy, June 2011.

[CN3] **M. Martalò**, A. Abrardo, and G. Ferrari, "Joint channel decoding in non-cooperative block-faded orthogonal access schemes," *Riunione annuale 2009 del Gruppo nazionale Telecomunicazioni e Teoria dell'Informazione* (GTTI), Parma, Italy, June 2009.

[CN2] **M. Martalò**, S. Busanelli, and G. Ferrari, "Markov chain-based analysis of multihop IEEE 802.15.4 wireless networks with finite node buffers," *Riunione annuale 2008 del Gruppo nazionale Telecomunicazioni e Teoria dell'Informazione* (GTTI), Florence, Italy, June 2008.

[CN1] A. Abrardo, G. Ferrari, and **M. Martalò**, "Source correlation, transmit diversity, and channel coding in wireless sensor networks," *Riunione annuale 2007 del Gruppo nazionale Telecomunicazioni e Teoria dell'Informazione* (GTTI), Rome, Italy, June 2007.

Patents

[P2] **M. Martalò**, G. Ferrari, G. Verdano, S. Perri, F. Monica, and F. De Mola, "Metodo per la localizzazione di un obiettivo mobile in un magazzino automatico," Italian patent application n. 102019000004801 presented on March 29, 2019 by Elettric 80 S.p.A.

[P1] N. Iotti, G. Ferrari, G. Spigoni, S. Busanelli, and **M. Martalò**, "Procedimento per il trasferimento verticale di un terminale mobile," Italian patent n. 1408721, July 2014 (application n. RE2011A000099, November 2011). Assigned to Guglielmo Srl.

Parma, November 7, 2019

Dr. Marco Martalò