

Curriculum vitae et Studiorum

Fabio Antonacci

September 25, 2013

Personal Data

Name: Fabio Antonacci

Date and place of birth: July 26, 1979, Bari (Italy)

Work address: Dipartimento di Elettronica, Informazione e Bioingegneria, Politecnico di Milano, Piazza L. Da Vinci 32, I-20133 Milano

tel. +390223999653 - +390223997680 mob. +393737741073

Home address: via Dalmazia 18/B, I-22037 Ponte Lambro, Como, Italy, tel. +390314476059

Contacts: mail: antonacc@elet.polimi.it, webpage: <http://home.deib.polimi.it/antonacc>

Affiliations

04/2012 – now PostDoc research assistant at the Politecnico di Milano, Polo Territoriale di Cremona

05/2008 – 03/2012 PostDoc research assistant at the Politecnico di Milano, Dipartimento di Elettronica ed Informazione

03/2005 – 02/2008 PhD Student with the Doctoral School of the Politecnico di Milano, Dipartimento di Elettronica e Informazione

05/2005 – 07/2005 Visiting scholar at the Sensing laboratory of the Technical University of Berlin

05/2004 – 02/2005 Junior Researcher at the Politecnico di Milano, Dipartimento di Elettronica e Informazione

Education

Feb. 2008: PhD in Information Engineering, Politecnico di Milano, Dipartimento di Elettronica e Informazione

Apr. 2004: “Laurea” Degree in Telecommunication Engineering, Politecnico di Milano (summa cum laude)

Academic Collaborations

- January 2013 to present: collaboration with the University of California at Davis, for research activities concerning advanced wave field capturing solutions and the personalization of Head-Related Transfer Functions for binaural rendering.
- January 2009 – December 2011: technical co-coordinator and research activities in the EU-funded SCENIC project (Self-Configuring Environment-aware Intelligent Acoustic Systems). The project was graded as excellent by the panel of reviewers;
- January 2009 – now: collaboration with the Speech and Audio Processing group (SAP) at Imperial College; this collaboration led to the co-authoring of several conference papers and one journal paper;
- January 2009 – now: collaboration with the Multimedia Communications and Signal Processing Group at University of Erlangen-Nuremberg. This collaboration led to numerous publications on international conferences and one journal paper;
- May 2005 – July 2007: collaboration within the EU-funded VISNET project;
- May to July 2005: visiting PhD student at Technical University of Berlin (TUB), he collaborated in themes concerning the tracking of acoustic sources using particle filtering techniques.

Scientific dissemination

He co-authored the following tutorials at international conferences:

- A. Sarti, F. Antonacci, “Geometric Space-Time Audio Processing”, in 20th European Signal Processing Conference, Aug. 27-31, 2012, Bucharest, Romania. Available online at: http://home.dei.polimi.it/antonacc/data/tutorial_final.pdf
- A. Sarti, F. Antonacci, “Wave Field Modeling - part 2: A Primer on Geometrical Acoustics”, in 12th International Conference on Digital Audio Effects (DAFx 2009), Sep. 1-4, 2009, Como, Italy.

Collaborations with the Industry

- Collaboration with Technogym S.p.A. for the development of Biofeedback systems for treadmills, based on the analysis of acoustic (vibrational) signals, to be marketed by March 2014. Within this project Dr. Antonacci developed techniques, implemented on commercial DSP platforms, for the automatic detection of the presence of the user on the treadmill and the localization of footsteps. The developed methodologies are based on the acquisition of vibrational signals by piezoelectric sensors installed on the treadmill. Due to the dispersive nature of the propagation medium, traditional techniques based on the measurements of the Time Difference of Arrival are not suitable. For this purpose, ad-hoc algorithms have been developed, which are based on the measurement of the difference of power between couples of sensors. This activity resulted in a Patent ([Pa1]) and a Technology Transfer Contract with the Dipartimento di Elettronica e Informazione of the Politecnico di Milano.

- Collaboration with B&C Speakers S.p.A. for the development of space-time processing methodologies for acoustic beamshaping in Public Address (PA) systems. Within this project Dr. Antonacci designed an array of loudspeakers that can be reconfigured in different geometries and he is currently developing methodologies for the steering of acoustic beams that are suitable for this scenario.
- Collaboration with Kee Square S.R.L. for the development of innovative technologies for the analysis of audio signals in acoustic monitoring applications, including: sound localization and tracking based on microphone arrays; detection of aggressive behavior in voices; sound recognition/classification: audio analytics. The solutions have all been turned into commercial products. The resulting system has been installed and is currently active at the Montesanto Subway Station of SEPSA, Naples.
- Collaboration with AREA, the leading European company in the area of “telephone tapping”, he worked on problems of voice-based speaker recognition, developing what now is one of the leading commercial products of the sort for this area of application.

Research activities

Dr. Antonacci’s research interests cover a wide range of multimedia signal processing topics, with special emphasis on the modeling of acoustic propagation in enclosures; on space-time processing of signals acquired by microphone arrays; and on the rendering of signals using loudspeaker arrays. Even if different, all these research areas share the same theoretical framework, based on the theory of geometrical acoustics. More specifically, Dr. Antonacci started with devising a modeling engine for an accurate simulation of the propagation of sound field in complex enclosures. This engine is based on a representation of the sound field in terms of superposition of acoustic beams, originated at the location of the source or of its images, obtained by mirroring the source against the walls of the enclosure. A relevant speedup of the computation time is possible using this approach. The generality of this framework enabled, on one side, the modeling of complex propagation phenomena such as diffusion and diffraction, and on the other side its use also in acoustic scene analysis (source and obstacles localization, estimation of the acoustic properties of enclosures) and in acoustic scene synthesis (rendering of acoustic scenes, attenuation of reverberations and virtual surround systems). A detailed description of present and past research activities follows. Referenced publications are listed in the next section.

Modeling of acoustic propagation

One relevant research topic of interest in Fabio Antonacci’s curriculum is the development of a fast and accurate modeling engine of the acoustic propagation in complex enclosures. With reference to this topic, he focused on how to swiftly trace acoustic beams as they propagate in complex enclosures and split and branch out while interacting with reflectors. He devised a solution for tracing acoustic beams as a recursive lookup of a pre-computed data structure that describes the mutual visibility among reflectors. He found that the mutual visibility among reflectors can be conveniently described in a parameter space (ray space) that exhibits dual relationships with respect to the geometric space. Using this novel definition of ray space, the tracing of beams and paths is conveniently described as an application of linear operators acting

on this dual space. He later extended this approach in order to account for more complex propagation phenomena, such as diffraction and diffusion. This work led to numerous conference papers [Co1, Co2, Co3, Co22] and to two journal papers, on IEEE Transactions on Audio Speech and Language Processing and on EURASIP Journal on Advances on Signal Processing [Jr1, Jr2]. He also worked on the extension of the visibility-based beam tracing to three-dimensional environments. This extension is based on a five-dimensional ray space based on Plücker coordinates that nicely generalizes the 2D method leading to efficient modeling solutions working in arbitrarily complex 3D enclosures. This last work recently led to the submission of a manuscript to IEEE Transactions on Visualizations and Computer Graphics, currently under review. All such solutions enable a new class of solutions for interactive (moving sources) wave field modeling with applications to immersive acoustic rendering, gaming, etc.

Space-time sensing of acoustic signals

Plenacoustic imaging (2012-present)

Another relevant contribution of Dr. Antonacci concerns soundfield representation, acquisition, modeling and rendering, based on plenacoustic imaging. This comes from a further generalization of the ray space representation proposed for interactive soundfield modeling. In fact, the ray space (already defined in [Jr1, Jr2, Co1, Co2, Co3, Co22] as the domain of visibility functions between reflectors) now becomes the domain of a “plenacoustic function”, which he redefined (with respect to the state of the art) as the symmetric counterpart of the “plenoptic function” (a popular concept today for image-based rendering applications and, more recently, for lightfield cameras). As part of these developments, he recently published the first journal article on plenacoustic cameras (soundfield cameras) in the literature of computational acoustics [Jr8], to appear on IEEE Transactions on Audio, Speech and Language Processing. The first publication of the sort was an earlier conference paper, presented at IWAENC 2012 [Co36]. This system enables the full imaging and analysis of the acoustic scene for purposes of environment inference (geometry and reflectivity of walls in the environment); source localization and extraction; and geometric wave field extrapolation. Recently, he has also devised a technique for the deconvolution of plenacoustic images with the aim of improving resolution. A conference paper on this topic has been accepted [Co42]. On the practical side, it enables the construction of virtual microphones that, within the limits of visibility of the soundfield camera, can “move around” within the acoustic space (unlike virtual microphones created with beamforming, which can only “point towards” acoustic targets). He also worked on a variety of other applications of plenacoustic imaging, such as source and reflector localization; estimation of the radiance pattern of acoustic sources; environment inference; etc. Other manuscripts have been submitted to international conferences.

Estimation of reflective properties of enclosures (2011 - present)

Since 2011 Dr. Antonacci has worked on the problem of estimating the acoustic reflection coefficient of walls in complex enclosures, which has been an open problem for decades. Several solutions have been presented in the literature. It is possible to categorize them in methods based on laboratory measurements (accurate but expensive) and methods based on in-situ

measurements (less expensive but lacking of accuracy). In collaboration with the Multimedia Communications and Signal Processing Group at University of Erlangen-Nuremberg, he has developed a in-situ methodology based on the matching of modeled and acquired acoustic images. While being an in-situ methodology, it offers the advantage of an accurate estimation. This work has been recently accepted for publication in an article that will appear on IEEE Transactions on Audio, Speech and Language Processing [Jr9]. A conference paper on this topic has been also presented at IWAENC 2012 [Co37].

Acoustic scene analysis based on geometric constraints (2009 - present)

One relevant research topic in Dr. Antonacci's curriculum is that of acoustic scene analysis based on a geometrical acoustics representation of the sound field. In particular, the sound field is modeled as the interaction of acoustic primitives (i.e. sources, receivers and obstacles). This interaction is modeled in the ray space (parameter space of acoustic paths), as for the beam tracing activity described above. Within this framework tasks such as localization of sources and reflectors and calibration of microphone arrays can be accomplished in a unified fashion. More specifically, acoustic measurements such as Time Of Arrival, Time Difference Of Arrival and Direction Of Arrival are converted into constraints (projective conics or quadrics) acting on the primitives of interest. The parameters of the primitives (location, orientation, etc.) can be estimated by combining multiple constraints. This framework has led to numerous conference papers and to four journal articles. The following itemized list identifies the problems that can be addressed through this framework and the corresponding publications:

- mutual calibration of acoustic cameras [Co18, Co20, Co24, Co32];
- localization of acoustic sources [Jr4, Jr6, Jr7];
- inference of the geometry of the environment [Jr5, Co15, Co21, Co28, Co29, Co30, Co33, Co38, Co41].

Two journal articles concerning source localization [Jr4, Jr6] have been published on IEEE Transactions on Audio, Speech and Language Processing. Another journal article [Jr7] has been published on Multidimensional Systems and Signal Processing.

As for room geometry inference, a journal article has been published in IEEE Transactions on Audio, Speech and Language Processing [Jr5].

Localization and tracking of multiple acoustic source using particle filtering (2004-2008)

From 2004 to 2008 Dr. Antonacci focused on the problem of localizing and separating multiple acoustic sources in moderately reverberant environments. Separation and localization of multiple acoustic sources are strictly related tasks. In particular, the estimation of the de-mixing filters enables, through de-convolution, to separate the sources. In addition, the de-mixing filters contain much information that can be used to localize sources as well. However, the estimation of the Time Differences of Arrival from the de-mixing filters is severely affected by the presence of many outliers. In order to mitigate or, possibly, remove the impact of such outliers, he generalized the Particle Filtering algorithm, originally devised for a single source, to the case of multiple sources.

His work led to numerous conference papers [Co4, Co5, Co6, Co7, Co9, Co12, Co13, Co14], mostly on IEEE conferences.

Rendering of acoustic wavefields

Geometric soundfield rendering (2009-present)

Since 2009 Dr. Antonacci has been working on the problem of rendering acoustic wave fields through loudspeaker arrays. More specifically, he has focused on the rendering of spatial cues of sources along with the acoustics of the environment in which they are immersed. In this broad context he has explored different aspects. A common framework behind all these works is that the acoustic wave field to be rendered is modeled as a superposition of beams. The synthesis of such beams within the listening area is then performed by using beamshaping/beamforming engines. He has co-authored several conference papers [Co16, Co17, Co22].

More recently, he also investigated the possibility of using the plenacoustic framework in the context of rendering applications. The idea is to reverse the paradigm behind the sound field imaging and use the loudspeaker array as a plenacoustic display. This approach can be used for both rendering a pre-acquired acoustic scene (data-based rendering) and rendering a synthetic scene (model-based rendering). A conference paper [Co40] was recently accepted for publication. A journal article is in preparation.

Room compensation for virtual acoustics rendering and virtual surround (2010-present)

The geometric approach to wave field rendering described above triggered innovative techniques for the compensation of reverberations in the environment that hosts the loudspeaker array. He developed two different methodologies for room compensation. The first enables the compensation of all the reflections of the hosting environment up to a prescribed reflection order and it is suitable for all the rendering applications where we aim at rendering the acoustics of a virtual environment. The second technique enables the selection of reflections to be suppressed, while preserving the desired reflections, thus paving the way to intelligent acoustic systems that exploit reverberations to trigger novel applications of space-time processing. Within this activity a demonstrator for virtual surround home-theater systems has been developed, which uses a linear array in front of the listener to render the presence of rear and lateral speakers even in highly reverberating environments (through selective reflection suppression/preservation). A conference paper was published [Co34] and a journal article is in preparation.

Quality assessment of soundfield rendering (2011-present)

Since 2010 Dr. Antonacci has been working on the evaluation of the quality of the rendered wave field. This evaluation has included both subjective and objective metrics. Objective tests have been performed measuring the wave field through a rotating rig on which a cardioid microphone is mounted. The wave field in the area enclosed by the rotating rig is extracted by means of interpolation/extrapolation methods based on spherical harmonics. Objective and perceptual cues of the wave field are then extracted to evaluate rendering quality. Several aspects of the quality of the rendering are examined, including: the presence and the relevance of pre- and post-echoes; the coherence between virtual source location and desired one; and the impact of reverberations

coming from the hosting environment. This activity has led to numerous publications on leading IEEE conferences [Co25, Co27, Co35, Co39].

Other activities

Since 2010 Dr. Antonacci has been working on the localization of point of impact of a runner on a treadmill using acoustic signals. This work has led to an Italian patent ([Pa1] *“Metodo basato su analisi di segnali acustici acquisiti con sensori a contatto, per la localizzazione su tapis roulant del punto di impatto del piede e per la stima di altre caratteristiche relative alla corsa”*), which was then acquired by Technogym (the leading Italian Industry for fitness and wellness equipment). He is currently collaborating with Technogym for the engineering of this methodology.

He has also worked on pattern recognition for audio signals for a variety of problems, ranging from audio surveillance systems for recognition of interacting objects on sound tactile interfaces [Co8, Co10, Co11, Co19]. This activity has also led to collaborations with the industry. In 2009 and 2010 he collaborated with Kee Square s.r.l. for the development of audio-surveillance systems and with AREA S.p.A. for the recognition of speaker in phone calls. Both collaborations led to commercial products currently available on the market.

Publications

Accepted publications are available on the personal website (<http://home.dei.polimi.it/antonacc>).

Journal papers

[Jr9] D.MARKOVIC, K.KOWALCZYK, F.ANTONACCI, C.HOFMANN, A.SARTI, W.KELLERMANN, "Estimation of acoustic reflection coefficients from pseudospectrum matching", accepted for publication on IEEE Transactions on Audio Speech and Language Processing

[Jr8] D. MARKOVIC, F. ANTONACCI, A. SARTI, S. TUBARO (2013), "Soundfield imaging in the ray space", to appear on IEEE Transactions on Audio, Speech and Language Processing, 2013, doi: 10.1109/TASL.2013.2274697.

[Jr7] P. BESTAGINI , M. COMPAGNONI, F. ANTONACCI, A. SARTI, S. TUBARO (2013), "TDOA-Based Acoustic Source Localization in the Space-Range Reference Frame", Multidimensional Systems and Signal Processing, Springer, March 2013, doi 10.1007/s11045-013-0233-8

[Jr6] A.CANCLINI, F.ANTONACCI, A.SARTI, S.TUBARO (2013), "Acoustic Source Localization with Distributed Asynchronous Microphone Networks", IEEE Transactions on Audio, Speech and Language Processing, volume 21, issue 2, pgs. 439-443, Feb. 2013

[Jr5] F. ANTONACCI, J. FILOS, M. R. P. THOMAS, E. A. P. HABETS, A. SARTI, P. A. NAYLOR and S. TUBARO (2012), "Inference of Room Geometry from Acoustic Impulse Responses," IEEE Transactions on Audio, Speech and Language Processing, volume 20, issue 10, pgs. 2683-2695, Dec. 2012

[Jr4] M.COMPAGNONI, P.BESTAGINI, F. ANTONACCI, A.SARTI, S.TUBARO (2012), "Localization of Acoustic Sources through the Fitting of Propagation Cones using Multiple Independent Arrays",

IEEE Transactions on Audio, Speech and Language Processing, volume 20, issue 7, pgs. 1964-1975, Sep. 2012

[Jr3] L.AN, P.WANG, A. SARTI, F.ANTONACCI, J.SHI (2011), "Hyperbolic boiler tube leak location based on quaternary acoustic array", Elsevier J. of Applied Thermal Engineering, volume 31, issue 16, pgs. 3428-3436, June 2011

[Jr2] F.ANTONACCI, A.SARTI, S.TUBARO (2010), "Two-dimensional beam-tracing from Visibility Diagrams for Real-Time Acoustic Rendering", EURASIP Journal on Advances in Signal Processing, volume 2010, pgs. 1-18, Feb. 2010

[Jr1] F. ANTONACCI, SARTI A, TUBARO S (2008). "Fast Tracing of Acoustic Beams and Paths through Visibility Lookup", IEEE Transactions on Audio, Speech, and Language Processing, vol. 16, issue 4, pgs. 812-824, May 2008

Conference papers

[Co42] L.BIANCHI, D. MARKOVIC, F.ANTONACCI, A.SARTI, S. TUBARO (2013), "Deconvolution of plenacoustic images", accepted for publication at 2013 IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA'13)

[Co41] D. MARKOVIC, F. ANTONACCI, A. SARTI, S. TUBARO (2013), "Estimation of the Room Geometry From an Impulse Response", accepted for publication at 2013 IEEE International Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA'13)

[Co40] L.BIANCHI, F.ANTONACCI, D.MARKOVIC, A.SARTI, S. TUBARO (2013), "Rendering of Directional Sources through Loudspeaker Arrays based on Plane Wave Decomposition", accepted for publication at 2013 IEEE International Workshop on Multimedia Signal Processing (MMSP 2013)

[Co39] L.BIANCHI, F.ANTONACCI, A.CANCLINI, A.SARTI, S.TUBARO (2013), "Localization of virtual acoustic sources based on the Hough transform for sound field rendering applications", in proc. of 2013 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP'13), pgs. 326-330

[Co38] A.CANCLINI, F.ANTONACCI, J.FILOS, A.SARTI, S.TUBARO, (2012) "Exact localization of acoustic reflectors in three-dimensional geometries", in proc. of International Workshop on Acoustic Signal Enhancement (IWAENC 2012), pgs. 1-4, Aachen, Germany, Sep. 2012

[Co37] D.MARKOVIC, C.HOFMANN, F.ANTONACCI, K.KOWALZCYK, A.SARTI, W.KELLERMANN, (2012) "Reflection coefficient estimation by pseudospectrum matching", in proc. of International Workshop on Acoustic Signal Enhancement (IWAENC 2012), pgs. 1-4, Aachen, Germany, Sep. 2012,

[Co36] D.MARKOVIC, G.SANDRINI, F.ANTONACCI, A.SARTI, S.TUBARO (2012), "Plenacoustic imaging in the ray space", in proc. of International Workshop on Acoustic Signal Enhancement (IWAENC 2012), pgs. 1-4, Aachen, Germany, Sep. 2012,

[Co35] L.BIANCHI, F.ANTONACCI, A.CANCLINI, A.SARTI, S.TUBARO (2012), "A psychoacoustic-based analysis of the impact of pre-echoes and post-echoes in soundfield rendering", in proc. of International Workshop on Acoustic Signal Enhancement (IWAENC 2012), pgs. 1-4, Aachen, Germany, Sep. 2012

[Co34] A. CANCLINI, D. MARKOVIC, F. ANTONACCI, A. SARTI, S. TUBARO (2012), "A Room-compensated virtual surround system exploiting early reflections in a reverberant room", in proc. of 20th European Signal Processing Conference (EUSIPCO 2012), pgs. 1029-1033, Bucharest, Romania, Aug. 2012

[Co33] J.FILOS, A.CANCLINI, F.ANTONACCI, A.SARTI, P.A.NAYLOR (2012), "Localization of planar acoustic reflectors from the combination of linear estimates", in proc. of 20th European Signal Processing Conference (EUSIPCO 2012), pgs.1019-1023, Bucharest, Romania, Aug. 2012

[Co32] A.CONTINI, A. CANCLINI, F.ANTONACCI, M.COMPAGNONI, A.SARTI, S.TUBARO (2012) "Self-calibration of microphone arrays from measurement of Times Of Arrival of acoustic signals", in proc. of 5th International Symposium on Communications, Control and Signal Processing (ISCCSP 2012), pgs. 1-5, Rome, Italy, May 2012

[Co31] A. SARTI, W. KELLERMANN, R. RABENSTEIN, P. A. NAYLOR, M. OMOLOGO, P. SVAIZER, F. ANTONACCI, P. ANNIBALE, P. BESTAGINI, A. CANCLINI, D. MARKOVIC, K. KOWALZCYK, M. R. P. THOMAS and A. BRUTTI (2011), "The SCENIC Project: Space-Time Audio Processing for Environment-Aware Acoustic Sensing and Rendering," in proc. of AES 131st Convention, New York, USA, Oct. 2011.

[Co30] A. CANCLINI, F. ANTONACCI, M. R. P. THOMAS, J. FILOS, A. SARTI, P. A. NAYLOR and S. TUBARO (2011)," Exact Localization of Acoustic Reflectors from Quadratic Constraints," in Proc. IEEE Workshop on App. of Signal Processing to Audio and Acoust. (WASPAA 2011), pgs. 17-20, New Paltz, NY, USA, Oct. 2011.

[Co29] J. FILOS, M.THOMAS, F. ANTONACCI, A.SARTI, P.NAYLOR (2011), "Robust inference of room geometry from acoustic measurements using the Hough transform", in proc. of 19th European Signal Processing Conference (EUSIPCO'11), pp. 161-165, Barcelona, Spain, Aug. 29-Sep. 2, 2011

[Co28] E. NASTASIA, F. ANTONACCI, A. SARTI, S.TUBARO (2011), "Localization of planar acoustic reflectors through emission of controlled stimuli", in proc. of 19th European Signal Processing Conference (EUSIPCO'11), pgs. 156-160, Barcelona, Spain, Aug. 29-Sep. 2, 2011

[Co27] P.ANNIBALE, A.CANCLINI, F. ANTONACCI, R.RABENSTEIN, A. SARTI, S.TUBARO (2011), "An angular frequency domain metric for the evaluation of wave field rendering techniques", in proc. of 19th European Signal Processing Conference (EUSIPCO'11), pgs. 166-170, Barcelona, Spain, Aug. 29-Sep. 2, 2011

[Co26] A. CANCLINI, P. ANNIBALE, F. ANTONACCI, R. RABENSTEIN, A. SARTI, S.TUBARO (2011), "From direction of arrival estimates to localization of planar reflectors in a two dimensional

geometry”, in proc. of 2011 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP 2011), pgs. 2620-2623, Prague, Czech Republic, May 2011

[Co25] A. CANCLINI, P. ANNIBALE, F. ANTONACCI, A. SARTI, R. RABENSTEIN, S. TUBARO (2011), “A Methodology for evaluating the accuracy of wave field rendering techniques, ”, in proc. of 2011 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP 2011), pgs. 69-72, Prague, Czech Republic, May 2011

[Co24] S.D. VALENTE, M. TAGLIASACCHI, F. ANTONACCI, P. BESTAGINI, A. SARTI, S. TUBARO (2010), “Geometric calibration of distributed microphone arrays from acoustic source correspondences”, in proc. of IEEE International Workshop on Multimedia Signal Processing, (MMSP2010), pgs. 13-18, Saint Malo, France, Oct. 2010

[Co23] P. ANNIBALE, F. ANTONACCI, A. CANCLINI, R. RABENSTEIN, A. SARTI (2010), “Wave-Based and Geometric Representations of Sound Fields” in proc. of 9th ITG-Fachtagung Sprachkommunikation. pp. A1- A4, Bochum, Germany, Oct. 2010

[Co22] D.MARKOVIC, A. CANCLINI, F. ANTONACCI, A. SARTI, S. TUBARO (2010), “Visibility-Based Beam Tracing for Soundfield Rendering”, in proc. of IEEE International Workshop on Multimedia Signal Processing (MMSP2010), pgs. 40-45, Saint Malo, France, Oct. 2010

[Co21] F.ANTONACCI, A. SARTI, S. TUBARO (2010), "Geometric reconstruction of the environment from its response to multiple acoustic emissions," 2010 IEEE International Conference on Acoustics Speech and Signal Processing (ICASSP 2010), pp.2822-2825, 14-19 Mar. 2010

[Co20] S.D. VALENTE, F.ANTONACCI, M.TAGLIASACCHI, A.SARTI, S.TUBARO (2010), “Self-calibration of two microphone arrays from volumetric acoustic maps in non-reverberant rooms”, in proc. of International Symposium on Communications Control and Signal Processing (ISCCSP2010), pgs. 1-4, Cyprus, Mar. 2010

[Co19] F.ANTONACCI, G.PRANDI, R.GALLI, G.BERNASCONI, A.SARTI (2009), “Audio-based object recognition system for tangible acoustic interfaces”, in proc. of IEEE Workshop on Haptic Audio-Visual Environments and Games (HAVE 2009), pgs. 123-128, Lecco, Italy, Nov. 2009

[Co18] A. REDONDI, M. TAGLIASACCHI, F. ANTONACCI, A. SARTI (2009), “Geometric calibration of distributed microphone arrays”, in proc. of IEEE International Workshop on Multimedia Signal Processing (MMSP2009), pgs. 1-5, Rio de Janeiro, Brazil, Oct. 2009, *awarded among the Top 10% contributions.*

[Co17] F.ANTONACCI, A.CANCLINI, A.GALBIATI, A.CALATRONI, A.SARTI, S.TUBARO (2009), “Soundfield rendering with loudspeaker arrays through multiple beam shaping”, in proc. of 2009 IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA 2009), pgs. 313-316, New Paltz, NY, USA, Oct. 2009

- [Co16] A. CANCLINI, A. GALBIATI, A. CALATRONI, F. ANTONACCI, A. SARTI AND S. TUBARO (2009), "Rendering of an acoustic beam through an array of loudspeakers", in proc. of 2009 International Conference on Digital Audio Effects (DAFx 2009), pgs. 492-497, Como, Italy, Sep. 2009
- [Co15] F. ANTONACCI, D. APREA, A. SARTI, S. TUBARO, "Acoustic reconstruction of the geometry of an environment through acquisition of a controlled emission", in proc. of 17th European Signal Processing Conference (EUSIPCO 2009), pgs. 710-714, Glasgow, Scotland, Aug. 2009
- [Co14] D. RIVA, P. PAGANI, F. ANTONACCI, G. PRANDI, M. TAGLIASACCHI, A. SARTI, S. TUBARO (2008). "Efficient Interferer Cancellation based on Geometrical Information of the Reverberant Environment", in proc. of 16th European Signal Processing Conference (EUSIPCO 2008), Lausanne, Switzerland, Sep. 2008
- [Co13] G. VALENZISE, M. TAGLIASACCHI, F. ANTONACCI, A. SARTI, S. TUBARO (2008). "Acoustic Source Localization by Fusing Distributed Microphone Arrays Measurements", in proc. of 16th European Signal Processing Conference (EUSIPCO 2008), Lausanne, Switzerland, Sep. 2008
- [Co12] F. ANTONACCI, D. RIVA, M. TAGLIASACCHI, A. SARTI (2007). "Efficient Localization and Tracking Of Two Acoustic Sources Using Particle Filters With Swarm Intelligence", in proc. of 15th European Signal Processing Conference (EUSIPCO 2007), Poznan, Poland, Sep. 2007
- [Co11] F. ANTONACCI, L. GEROSA, A. SARTI, S. TUBARO, G. VALENZISE (2007) "Sound-based Classification Of Objects Using A Robust Fingerprinting Approach", , in proc. of 15th European Signal Processing Conference (EUSIPCO 2007), Poznan, Poland, Sep. 2007
- [Co10] L. GEROSA, G. VALENZISE, ANTONACCI F., M. TAGLIASACCHI, A. SARTI (2007) "Scream And Gunshot Detection In Noisy Environments". , in proc. of 15th European Signal Processing Conference (EUSIPCO 2007), Poznan, Poland, Sep. 2007
- [Co9] F. ANTONACCI, D. RIVA, M. TAGLIASACCHI, A. SARTI, S. TUBARO, (2007). "Tracking Of Acoustic Sources In Reverberant Environment Using A Particle Swarm Optimizer". in proc. of IEEE International Conference on Advanced Video and Signal based Surveillance (AVSS 2007), pgs. 567-572, London, UK, Sep. 2007
- [Co8] L. GEROSA, G. VALENZISE, M. TAGLIASACCHI, ANTONACCI F., A. SARTI (2007). "Scream and Gunshot Detection and Localization for Audio-surveillance Systems", in proc. of IEEE International Conference on Advanced Video and Signal based Surveillance (AVSS 2007), pgs. 567-572, London, UK, Sep. 2007
- [Co7] D. MIGLIORE, F. ANTONACCI, M. MATTEUCCI, D. RIVA, A. SARTI, M. TAGLIASACCHI, S. TUBARO (2007). "Tracking Multiple Acoustic Sources In Reverberant Environments Using Regularized Particle Filter", in proc. of IEEE/EURASIP International Conference on Digital Signal Processing (DSP 2007), pgs. 99-102, Cardiff, UK, July 2007
- [Co6] D. SAIU, D. RIVA, P. RUSSO, F. ANTONACCI, A. SARTI, M. TAGLIASACCHI, S. TUBARO (2006). "Experimental Evaluation Of A Localization Algorithm For Multiple Acoustic Sources In

Reverberating Environments", in proc. of European Signal Processing Conference (EUSIPCO 2006), Florence, Italy, September 2006

[Co5] F.ANTONACCI, D. RIVA, D. SAIU, A. SARTI, M. TAGLIASACCHI, S. TUBARO (2006), "Tracking Multiple Acoustic Sources Using Particle Filtering", in proc. of European Signal Processing Conference (EUSIPCO 2006), Florence, Italy, September 2006

[Co4] D. LONOCE, M. MOTTA, F. ANTONACCI, A. SARTI, S. TUBARO (2005). "Efficient Source Localization And Tracking In Reverberant Environments Using Microphone Arrays". in proc. of IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP 2005), pgs. 1061-1064, Philadelphia, USA

[Co3] F. ANTONACCI, M. FOCO, A. SARTI, S. TUBARO (2004). "Accurate And Fast Audio-realistic Rendering Of Sounds In Virtual Environments". in proc. of IEEE Multimedia Signal Processing Workshop (MMSP-04), pgs. 271-274, Siena, Italy, Sep. 2004,

[Co2] F.ANTONACCI., M.FOCO, A.SARTI, S.TUBARO (2004). "Fast Modeling Of Acoustic Reflections And Diffraction In Complex Environments Using Visibility Diagrams". In Proc. of European Signal processing conference (EUSIPCO-2004), pgs. 1773-1776, Wien, Österreich, Sep. 2004

[Co1] F.ANTONACCI, M. FOCO, A. SARTI, S. TUBARO (2004), "Real Time Modeling Of Acoustic Propagation In Complex Environments", in proc. of 7th International Conference On Digital Audio Effects (DAFX-04), pgs. 274-279, Naples, Italy, Sep. 2004

Patents

[Pa1] S. Tubaro, A. Sarti, M. Tagliasacchi, F. Antonacci, F. Crivellaro, G. Genovese, "Apparato e metodo per la localizzazione del punto di impatto di un corpo su una superficie". Feb. 2011, National Patent No. MO2011A000013;

Service activities

Peer reviewer for the following journals:

- IEEE Transactions on Audio Speech and Language Processing;
- IEEE Transactions on Signal Processing;
- IEEE Transactions on Aerospace and Electronic Systems;
- EURASIP Journal on Advances in Signal Processing.

Services for international societies and conferences:

- Publication Chair at the 12th Intl. Conference on Digital Audio Effects (DAFx'09);
- Technical Program Committee of IEEE International Conference on Acoustics Speech and Signal Processing (ICASSP);
- Technical Program Committee of IEEE International Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA);
- Technical Program Committee of EURASIP European Signal Processing Conference;

- Technical Program Committee of IEEE International Statistical Signal Processing Conference.

Academic activities

Dr. Antonacci has been the **supervisor** of several (20+) MSc theses. He has been also the **technical coordinator** of the activities of four PhD students within their major or minor research theses (Major theses: Antonio Canclini, Dejan Markovic, Lucio Bianchi; minor thesis: Paolo Bestagini).

He has served as Adjunct Professor (*“professore a contratto”*) for the following courses of the “V Facoltà di Ingegneria dell’Informazione” of the Politecnico di Milano:

- “Computer Music”, academic years 2009/2010, 2010/2011, 2011/2012, 2012/2013;
- “Digital Audio Analysis and Processing”, academic year 2006-2007;
- “Digital Sound Processing Project”, academic year 2006/2007.

Dr. Antonacci also served as **Teaching Assistant** for the following courses of the “V Facoltà di Ingegneria dell’Informazione” of the Politecnico di Milano:

- Digital Sound Processing Project, academic years 2007/2008 and 2008/2009;
- Fundamentals of Audio/video Signal Processing , academic years 2006/2007, 2007/2008 and 2008/2009;
- Digital Audio Analysis and Processing academic year 2007/2008 and 2008/2009
- Tecniche avanzate per il trattamento dei segnali audio, academic years 2004/2005 up to 2008/2009;
- Fundamentals of acoustics, academic years 2005/2006, 2006/2007, 2007/2008, 2008/2009;
- Elaborazione dei segnali audio/video, academic year 2004/2005.