

# University Academic Curriculum Vitae

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- Personal information** Name ANDREA ROSANI  
Year of birth: 1978  
Nationality: Italian  
E-Mail: andrea.rosani@gmail.com
- Education since leaving school**
- 2002 – Bachelor in Telecommunication Engineering; University of Trento
  - 2005 – Master in Telecommunication Engineering; University of Trento
  - 2015 – PhD in Computer Science and Telecommunications; ICT Doctoral School - University of Trento
- Present appointment**
- Engineer
  - 2002
  - Technician – level D2 (Italian University CCNL)
  - University of Trento
  - brief description of responsibilities:  
From 2019 Building manager  
Untill 2019 IT Technical support: system management of workstations and small servers; web-site management and programming; data analysis in the framework of the activities carried on by students and researchers.  
Untill 2019: Technological transfer and applied research activities: collaboration in the proposal phase regarding the technical and budgeting aspects; coordination of the activities during the development of the financed projects; reporting and final review.  
Since the academic year 2003-2005, teaching activity as support to professor for the Degree Courses and Master Degree Courses in Telecommunication Engineering and the Degree Courses in Information and Organization Engineering at the University of Trento. Main duties: frontal lessons for laboratory and theory, material preparation, course exam preparation and correction, student projects.
- Professional experience**
- Experience in academic teaching** In the following the list of the last 5 years of teaching experience.
- A.Y. 2018-2019**
- Comunicazioni Multimediali (Multimedia Communications)
  - University of Trento
  - ING-INF/03
  - Undergraduate
  - Italian
  - 20 hours (teaching activity in support of the teacher with the responsibility for material preparation and exams)
  
  - Elaborazione e Trasmissione Immagini (Image Processing and Transmission)
  - University of Trento
  - ING-INF/03
  - Undergraduate
  - Italian
  - 38 hours (teaching activity in support of the teacher with the

responsibility – 8 hours for frontal lessons, 30 hours for material preparation and projects tutor)

- Comunicazioni Elettriche (Communication Systems)
- University of Trento
- ING-INF/03
- Undergraduate
- Italian
- 20 hours (teaching activity in support of the teacher with the responsibility for material preparation and exams)

#### **A.Y. 2017-2018**

- Comunicazioni Multimediali (Multimedia Communications)
  - University of Trento
  - ING-INF/03
  - Undergraduate
  - Italian
  - 40 hours (teaching activity in support of the teacher with the responsibility – 30 hours for frontal lessons, 10 hours for material preparation and exams)
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- Elaborazione e Trasmissione Immagini (Image Processing and Transmission)
  - University of Trento
  - ING-INF/03
  - Undergraduate
  - Italian
  - 38 hours (teaching activity in support of the teacher with the responsibility – 8 hours for frontal lessons, 30 hours for material preparation and projects tutor)
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- Comunicazioni Elettriche (Communication Systems)
  - University of Trento
  - ING-INF/03
  - Undergraduate
  - Italian
  - 32 hours (teaching activity in support of the teacher with the responsibility – 12 hours for frontal lessons, 20 hours for material preparation and exams)

#### **A.Y. 2016-2017**

- Comunicazioni Multimediali (Multimedia Communications)
  - University of Trento
  - ING-INF/03
  - Undergraduate
  - Italian
  - 32 hours (teaching activity as teacher without the responsibility – “docente senza titolarità”)
  - 23 hours (teaching activity in support of the teacher with the responsibility for material preparation and projects tutor)
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- Elaborazione e Trasmissione Immagini (Image Processing and Transmission)
  - University of Trento
  - ING-INF/03
  - Undergraduate
  - Italian
  - 51 hours (teaching activity in support of the teacher with the responsibility – 8 hours for frontal lessons, 43 hours for material preparation and projects tutor)

- Comunicazioni Elettriche (Communication Systems)
- University of Trento
- ING-INF/03
- Undergraduate
- Italian
- 28 hours (teaching activity in support of the teacher with the responsibility – 12 hours for frontal lessons, 16 hours for material preparation and exams)

#### **A.Y. 2015-2016**

- Comunicazioni Multimediali (Multimedia Communications)
- University of Trento
- ING-INF/03
- Undergraduate
- Italian
- 47 hours (teaching activity in support of the teacher with the responsibility – 24 hours for frontal lessons, 23 hours for material preparation and exams)
- Elaborazione e Trasmissione Immagini (Image Processing and Transmission)
- University of Trento
- ING-INF/03
- Undergraduate
- Italian
- 51 hours (teaching activity in support of the teacher with the responsibility – 8 hours for frontal lessons, 43 hours for material preparation and projects tutor)
- Comunicazioni Elettriche (Communication Systems)
- University of Trento
- ING-INF/03
- Undergraduate
- Italian
- 28 hours (teaching activity in support of the teacher with the responsibility – 12 hours for frontal lessons, 26 hours for material preparation and exams)

#### **A.Y. 2014-2015**

- Comunicazioni Multimediali (Multimedia Communications)
- University of Trento
- ING-INF/03
- Undergraduate
- Italian
- 47 hours (teaching activity in support of the teacher with the responsibility – 24 hours for frontal lessons, 23 hours for material preparation and exams)
- Elaborazione e Trasmissione Immagini (Image Processing and Transmission)
- University of Trento
- ING-INF/03
- Undergraduate
- Italian
- 29 hours (teaching activity in support of the teacher with the responsibility – 8 hours for frontal lessons, 21 hours for material preparation and projects tutor)
- Comunicazioni Elettriche (Communication Systems)

- University of Trento
- ING-INF/03
- Undergraduate
- Italian
- 32 hours (teaching activity in support of the teacher with the responsibility – 12 hours for frontal lessons, 20 hours for material preparation and exams)

#### **Other academic responsibilities**

- Member of the organizing committee of “ICT Days 2018”.
- Member of the organizing committee of “Google HashCode 2018”.
- Member of the organizing committee of “Primo Hackathon del Calcio” Maratona di Innovazione della FIGC 2017.
- Member of the organizing committee of “IEEE Eurasip Summer School on Signal Processing” S3P-2016.
- Webchair of ACM International Conference on Multimedia Retrieval (ICMR 2011)
- Member of the organizing committee of Riunione Annuale di Società Italiana di Elettromagnetismo (SIEm) e Gruppo di Telecomunicazioni (GTTI) 2003.

#### **Memberships**

- Member of Sez. A Ordine Ingegneri - Provincia Autonoma di Trento
- Member of Collegio degli Ingegneri - Provincia Autonoma di Trento.
- Reviewer for different international journals: IEEE Transactions on Instrumentation and Measurement, Signal Processing (Elsevier), Progress in Electromagnetic Research.
- Member of the Technical Program Committee of IEEE MTT-S Wireless Power Transfer Conference (WPTC-2013)

#### **Research and scholarships**

The starting point of the scientific activity of Andrea Rosani could be seen as the university study courses done at the Engineering Faculty of the University of Trento, following an electromagnetic-oriented approach, carried on during the Master Degree Course, especially addressed to study the “Advanced Electromagnetic Technologies” in depth.

During his PhD carried out at the ICT Doctoral School of the University of Trento, Andrea Rosani improved the study of “Signal Processing”, in particular related to multimedia signals (images, videos and sensors).

His research activity concerned the development of the methodological aspects and the specific applications.

#### **A) Inverse electromagnetic scattering and electromagnetic diagnostic**

The study of the inverse electromagnetic scattering is devoted to the determination of the presence of the unknown objects and the definition of the geometric form, the dielectric characteristic and the induced electromagnetic absorption in the exposed structures, on the basis of the measures of the scattered electromagnetic field carried out outside the pre-fixed interest domains containing the unknown structures.

In this field, firstly he dealt with the study of methodologies and algorithms of inversion for microwave imaging with application in the field of: test/non-destructive evaluation (NDT/DE).

Peculiar characteristic of the NDT/NDE problems is the great amount of a-priori information available on the scenario under test. In the vast majority of the considered applications, the unknown structure results to be just a “defect” in an object with known structure and form.

In order to consent to an optimal use of the a-priori information and, at the same time, reduce the research space of the solution, in [R01] he

proposed an innovative formulation based on a genetic algorithm with a “hybrid” codification in which, through a transformation of the space of the unknowns (the object function of the domain under test is the field distribution of the same domain under consideration) in a “intermediate-transformed” space, characterized by a reduced set of parameters, the complexity of the considered problem has been considerably reduced. Then, this formulation has been validated and confronted with the techniques at the state of the art. Its application to specific fields of the biomedical and industrial sector [R02][R03][R04][R06] has been tested. Instead, in [R05] it has been proposed an innovative solution for non-destructive evaluations based on a numerical estimation of the electromagnetic field.

## **B) Multimedia Signal Processing**

The wide diffusion of multimedia contents of different type and format led to the need of effective methods to efficiently handle such huge amount of information, opening interesting research challenges in the media community. In particular, the definition of suitable content understanding methodologies is attracting the effort of a large number of researchers worldwide, who proposed various tools for automatic content organization, retrieval, search, annotation and summarization. In his research, Andrea Rosani focused on the definition of the inherent link between “media” and the “events” that such media are depicting.

In particular, he developed two different methodologies related to such problem, and to the automatic discovery of event-semantics from media contents. The two methodologies address this general problem at two different levels of abstraction. In the first one he proposed a solution about the detection of activities and behaviors of people from a video sequence (i.e., what a person is doing and how), while in the second he faced the more general problem of understanding a class of events from a set visual media (i.e., the situation and context). Both problems have been addressed trying to avoid making strong a-priori assumptions, i.e., considering the largely unstructured and variable nature of events.

### B.1) Activity modeling and matching for human behavior understanding from video

As to the first methodology, Andrea Rosani defined a methodology to understand events related to the behavior of a person living in a home environment. The automatic understanding of human activity is still an open problem in the scientific community, although several solutions have been proposed so far, and may provide important breakthroughs in many application domains such as context-aware computing, area monitoring and surveillance, assistive technologies for the elderly or disabled, and more. An innovative approach has presented in [TD][R07][C14][C15], providing (i) a compact representation of human activities, and (ii) an effective tool to reliably measure the similarity between activity instances. In particular, the activity pattern is modeled with a signature obtained through a symbolic abstraction of its spatiotemporal trace, allowing the application of high-level reasoning through context-free grammars for activity classification.

### B.2) Content mining for social event detection

As far as the second methodology is concerned, he addressed the problem of identifying an event from single image. If event discovery from media is already a complex problem, detection from a single still picture is still considered out-of-reach for current methodologies, as demonstrated by recent results of international benchmarks in the field. In his work he focused on a solution that may open new perspectives in this area, by providing better knowledge on the link

between visual perception and event semantics [TD][R08][C16][C21]. In fact, what he proposed a framework that identifies image details that allow human beings identifying an event from single image that depicts it. These details are called "event saliency", and are detected by exploiting the power of human computation through a gamification procedure. The resulting event saliency is a map of event-related image areas containing sufficient evidence of the underlying event, which could be used to learn the visual essence of the event itself, to enable improved automatic discovery techniques.

## Publications

- [R01] S. Caorsi, A. Massa, M. Pastorino, A. Randazzo, and A. Rosani, "A reconstruction procedure for microwave nondestructive evaluation based on a numerically computed Green's function," *IEEE Transactions on Instrumentation and Measurement*, vol. 53, no. 4, pp. 987-992, August 2004.
- [R02] S. Caorsi, E. Bermani, A. Massa, M. Pastorino, A. Rosani, and A. Randazzo, "A numerical technique for determining the internal field in biological bodies exposed to electromagnetic fields," in *Recent Research Developments in Microwave Theory and Techniques*, edited by S. G. Pandalai, Transworld Research Network Press, Trivandrum, India, vol. 2, pp. 183-193, 2004 (ISBN: 81-7895-150-9) also published as DISI Technical Report DISI-11-086.
- [R03] S. Caorsi, A. Massa, M. Pastorino, and A. Rosani, "Microwave medical imaging: potentialities and limitations of a stochastic optimization technique," *IEEE Transactions on Microwave Theory and Techniques - Special Issue on "Medical Applications and Biological Effects of RF/Microwaves"*, vol. 52, no. 8, pp. 1909-1916, August 2004.
- [R04] S. Caorsi, M. Donelli, A. Massa, M. Pastorino, A. Randazzo, and A. Rosani, "Microwave imaging for nondestructive evaluation of civil structures," 'Insight' – Non-Destructive Testing and Condition Monitoring, *The Journal of the British Institute of Non-Destructive Testing*, vol. 47, no. 1, pp. 11-14, Jan. 2005.
- [R05] A. Massa, M. Pastorino, A. Rosani, and M. Benedetti, "A microwave imaging method for NDE/NDT based on the SMW technique for the electromagnetic field prediction," *IEEE Transactions on Instrumentation and Measurement*, vol. 55, no. 1, pp. 240-147, February 2006.
- [R06] M. Benedetti, M. Donelli, A. Martini, A. Massa, and A. Rosani, "An innovative microwave imaging technique for non-destructive evaluation: applications to civil structures monitoring and biological bodies inspection," *IEEE Transactions on Instrumentation and Measurement*, vol. 55, no. 6, pp. 1878-1884, December 2006.
- [R07] A. Rosani, N. Conci, F.G.B. De Natale, "Human Behavior Recognition Using a Context-Free Grammar," *Journal of Electronic Imaging*, Vol. 3, N. 3, May 2014
- [R08] A. Rosani, G. Boato, F.G.B. De Natale, "EventMask: a game-based event saliency detector," *IEEE Transactions on Multimedia*, vol.17, no.8, pp.1359-1371, August 2015.

## 2. International Conferences

- [C01] S. Caorsi, A. Massa, M. Pastorino, A. Randazzo, and A. Rosani, "A reconstruction procedure for microwave nondestructive evaluation based on a numerically computed Green's function," IMTC/2003, Vail, Colorado, USA, pp. 669-674, May 20-22, 2003.
- [C02] S. Caorsi, M. Benedetti, A. Massa, M. Pastorino, and A. Rosani, "Optimization approaches for the detection of subsurface defects," PIERS2004 in Pisa, Pisa, Italy, p. S6.01, 28-31 March, 2004. Presenting Author.
- [C03] M. Benedetti, M. Donelli, A. Massa, and A. Rosani, "An innovative microwave imaging technique for non-destructive evaluation: applications to civil structures monitoring and biological bodies," Proc. IEEE International Workshop on Imaging Systems and Techniques (no. 0-7803-8591-8/04/\$20.00 (c)2004 IEEE) (IST

- 2004), Como, Italy, pp. 91-94, 14 May 2004 (Invited paper).  
Presenting Author.
- [C04] S. Caorsi, M. Donelli, A. Massa, M. Pastorino, A. Randazzo, and A. Rosani, "A microwave imaging method for NDE/NDT based on the SMW technique for the electromagnetic field prediction," 2004 IEEE Instrumentation and Measurement Technology Conference (IMTC 2004), Como, Italy, pp. 184-189, 18-20 May 2004 (Invited paper; Special Session title: "Microwave Measurements and Instrumentation")
- [C07] M. Benedetti, D. Franceschini, G. Franceschini, A. Massa, M. Pastorino, and A. Rosani, "Improving the numerical effectiveness of a class of microwave imaging techniques for NDE/NDT with the SMW updating formula," 11th International Symposium on Antenna Technology and Applied Electromagnetics (Antem 2005), Saint-Malo, France, pp. 104-105, 15-17 June, 2005, submitted also as UNITN Department technical report DISI-11-277
- [C08] M. Benedetti, M. Donelli, D. Franceschini, A. Rosani, A. Boni, and A. Massa, "Recent advances on the use of kernel-based learning-by-examples techniques for electromagnetic subsurface sensing," PIERS2006, Cambridge, USA, pp. 541, 26-29 March 2006.
- [C10] D. Franceschini, A. Rosani, M. Donelli, A. Massa, and M. Pastorino, "Morphological processing of electromagnetic scattering data for enhancing the reconstruction accuracy of the iterative multi-scaling approach," Proc. IEEE International Workshop on Imaging Systems and Techniques (IST 2006), Minor, Italy, 157-162, 29 April 2006.  
Presenting Author.
- [C11] M. Benedetti, M. Donelli, M. Pastorino, A. Rosani, and A. Massa, "Detection of multiple defects in industrial products by means of a non-destructive microwave approach," Proc. European Conference on Antennas & Propagation (EuCAP), Nice, France, 6-10 November 2006, submitted also as UNITN Department technical report DISI-11-246
- [C12] M. Benedetti, M. Pastorino, A. Rosani and A. Massa "Detection, Location and Reconstruction of Multicracks by Means of a GA-Based Electromagnetic Technique" Proc. 3rd International Conference on electromagnetic Near-Field Characterization and Imaging - ICONIC 2007, St. Louis, USA, pp., 27-29 June 2007.  
Presenting Author. submitted also as UNITN Department technical report DISI-11-231
- [C13] D. Franceschini, M. Donelli, A. Rosani and A. Massa "A Reconstruction Strategy Based on the DORT Method for Imaging Finite Dimension Scatterers" Proc. 3rd International Conference on electromagnetic Near-Field Characterization and Imaging - ICONIC 2007, St. Louis, USA, pp., 27-29 June 2007. Presenting Author. submitted also as UNITN Department technical report DISI-11-232.
- [C14] A. Rosani, G. Boato and F.G.B. De Natale "Weighted symbolic analysis of human behavior for event detection" Proc. S&T/SPIE Electronic Imaging 2013, San Francisco Airport, Burlingame, California, United States, 3-7 February 2013.
- [C15] A. Rosani, N. Conci and F.G.B. De Natale "Human behavior understanding for assisted living by means of hierarchical context free grammars" Proc. S&T/SPIE Electronic Imaging 2014, Hilton San Francisco, Union Square, San Francisco, California, USA, 2-6 February 2014.
- [C16] A. Rosani, D.T. Dang Nguyen, G. Boato, and F.G.B. De Natale "EventMask: a gamification for image processing", Proc. of GTTI Thematic Meeting on Multimedia Signal Processing 2014, Forni di Sopra (UD), Italy, 16-18 February 2014 (winner of the 2nd place during the demo session competition).
- [C19] K. Reddy Konda, A. Rosani, N. Conci, F.G.B. De Natale, "Smart Camera Reconfiguration in Assisted Home Environments for Elderly Care," ECCV 2014 Workshops, Part IV, LNCS 8928, pp. 43-56, 2015.
- [C20] M. Benedetti, L. Ioriatti, M. Martinelli, A. Rosani, M. Sava, G. Angeli,

P. Fontana, "Smart hives for sustainable beekeeping, "eSAME 2015 Conference, Nice, November 5 - 2015.

[C21] K. Ahmad, A. Rosani, F.G.B. De Natale, G. Boato, "A hierarchical approach to event discovery from single images using MIL framework, "2016 IEEE GLOBALSIP.

### 3. Thesis

[TD] A. Rosani, *Multimedia Content Analysis for Event Detection*. Tesi di Dottorato. Relatore Prof. F.G.B. De Natale, ICT Doctoral School, Università di Trento, March 2015.

## Entrepreneurship

Andrea Rosani co-founded Melixa Srl, a private Start-Up, in 2014. The company provides smart solutions for precision agriculture. Its main product, patented, is for the monitoring of apiaries and beekeeping processes by means of advanced and sustainable technology. In the framework of beekeeping, they are addressing the problem of bees' disease and monitoring, in order to improve the quality of the products (honey and other) and increase the efficiency and the effectiveness of the beekeeping processes. Many studies have demonstrated that bees' disease is strictly related to factors (environment, parasitic, chemicals, etc) that could be determined also by means of an observation of the behavior of the colonies and their ecosystem. Therefore, data collection represents an essential step in order to understand the status of a colony and provide the beekeepers with useful information and indications.

The project is deeply visionary because we are introducing advanced technology in a centuries-old practice, where the experience of beekeepers and their capabilities of interpreting the signals from bees and environment have played a capital role. Nowadays, diseases and contaminating factors have deeply conditioned the beekeeping activities and experience of the beekeepers isn't enough anymore. Our solution could represent the response to novel needs arisen in such a framework. The big idea behind the project consists in the possibility of providing useful information to the beekeepers (both professional and hobbyists) starting from the analysis of data collected by sensors [C20].

The idea and the project itself are extremely inspiring because they will deliver a deep innovation in the process of beekeeping. Moreover, the project will offer future developments in many frameworks, such as the interpretation of the behavior and the actuation of functions in the beehive as a response to early warnings.

## Language competence

Mother tongue: Italian

English: B2 written and spoken

German: B1 written and spoken

Date 16th Jan. 2020

Signature  
