

Curriculum Vitae *LUCA MARCACCIOLI*



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Professional Experience

Luca Marcaccioli was born in Perugia, Italy, on January 8, 1978. He received the Laurea degree (with distinction) in electronic engineering and Ph.D. degree from the University of Perugia, Perugia, Italy, in 2002 and 2006, respectively. He carried out his thesis research with the Laboratory for High Frequency, Technical University of Munich, Munich, Germany. He then joined the Department of Electronic and Information Engineering, University of Perugia. He has been a Visiting Scholar with the Electrical Engineering Department, Georgia Institute of Technology. In September 2007, he co-founded RF-microtech s.r.l., Perugia, Italy (a spin-off company of University of Perugia), where he currently plays the role of research and development engineer.

During his activity, he has been involved in many industrial as well as academic projects, some of them carried on as project leader or technical coordinator. This activity let him grow his professional experience and improve his ability to coordinate projects and cooperate in team.

His research activities include: smart antennas and control algorithms; design of filters, diplexer, multiplexers and phase-shifters in printed or waveguide technology; design of large arrays or reflectarrays, including the radiating elements; design of (multi) beam forming network, investigation and design of innovative semiconductor (PIN and varactor diodes) or MEMS-based reconfigurable devices. Investigation of the mechanical aspects related with waveguide and printed technology (tolerances, manufacturing procedure, RF gaskets, RF transitions); design of low noise amplifiers and studies on signal processing techniques.

Dr. Marcaccioli is a member of the European Microwave Association. He was a corecipient of the Young Engineers Prize presented at the 2007 European Microwave Conference (EuMC), Munich, Germany, and the co-recipient of the 2008 Best Student Paper Award (First Place) presented at the IEEE Microwave Theory and Techniques Society (IEEE MTT-S) International Microwave Symposium (IMS), Atlanta, GA.

Education

Graduated in 2002 in Electronic Engineering, with specialization in Space applications.

Internship at Technical University of Munich, Germany, (8 months, 2001)

Advisors: Prof. P. Russer, Dr. G. Olbrich

Master Thesis: “Analysis and design of the phase-shifter and matching circuit of a multifunctional antenna working at five frequency bands”

Supervisors: Prof. R. Sorrentino, Prof. P. Russer

PhD School:

- *Metamaterials and RF MicroElectroMechanical Systems*, Perugia - 14-19 September, 2003
- *Ultra Wide Band Systems*, Genova, 18-21 September 2006

Internship at Georgia Institute of Technology, Atlanta, USA (7 months, 2004)

Advisors: Prof. M. Tentzeris, Prof. J. Papapolymerou

Phd Thesis: “Reconfigurable microwave devices and pattern control algorithms for Smart Antennas”.

Supervisor: Prof. R. Sorrentino

Phd degree in Jan 2006 in Electronic and Information Engineering, University of Perugia

Dissemination experience

Lectures:

- Microwave engineering (University of Perugia, in Orvieto, 2005 – 12 hours)
- Filters design (University of Perugia, 2006, 12 hours).
- Electromagnetic technologies and their industrial applications (University of Terni, 2007 – 15 hours)
- Smart antennas (University of Perugia, 2007, 6 hours).

Tutor:

- Thesis on “Synthesis algorithms for sparse arrays” (2006, University of Perugia)
- Thesis on “Synthesis of Blass matrix in waveguide technology” (2006, University of Perugia)
- Thesis on “Varactor-based phase-shifter in microstrip technology in Ku band” (2007, University of Perugia)
- Thesis on “Beam forming network and varactor-based phase-shifter in SIW technology in Ku band” (2007, University of Perugia)

Conferences:

Participation to all the conferences where the paper has been submitted as first or second author (*see Publications*)

Skills

Language:

English:	Fluent
Italian:	Native
French:	Basic
German:	Basic

Informatics:

Electromagnetic CADs: Microwave Office, CST Microwave Studio, ADS, HFSS, IE3D, Mician

Program languages: Matlab, C++

Other tools: Autocad, CoralDraw, Microsoft Office

Laboratory:

- Intensive experience on a **clean room facility** available at the University of Perugia (Microwave Engineering Lab, <http://www.diei.unipg.it/MEL/index.html>), classes 10000, 1000 and 100, equipped with photo-etching process and a wire bonder for the manufacturing of microwave hybrid planar circuits, and a test and measurement set-up (probe station for on-wafer microwave measurements up to 40 GHz).
- Experience on **anechoic chamber** available at Technical University of Munich for antenna measurements up to 15 GHz.

Main industrial and academic projects:

- **2001:** (Master thesis) Design and realization of a multi-band antenna for automotive applications (Thesis carried out at Technical University of Munich - TUM Germany - funded by DaimlerChrysler)
- **2003/2005:** (Doctorate thesis) Development of novel algorithms for Smart Antennas, suitable for intelligent systems capable of adaptive interference nulling, beam shaping and signal tracking. (Academic project)
- **2003:** Development of a Matlab code for the analysis and optimization of waveguide structures, based on the Mode Matching technique (Academic project).
- **2003:** Design and realization of folded waveguide diplexers for space and commercial applications (Academic project)
- **2004/2006:** (Technical coordinator) Design and realization of MEMS (Micro Electro Mechanical System)-based beam steerable reflectarray antennas for radio communication and mm-wave imaging (The project is from 2005 funded by the MEMS NoE AMICOM <http://www.amicom.info>)
- **2004:** Survey of innovative microwave technology in Q/V band for satellite communication, and multibeam feeding network for SAR applications, funded by ASI, *Italian Space Agency*.

- **2004/2005:** (Doctorate Thesis) Design and realization of a novel class of MEMS-based devices, a microwave coupler with reconfigurable coupling ratio, in cooperation with the Georgia Institute of Technology of Atlanta, USA (Academic project)
- **2005/2006:** Design of digital and analogue phase-shifters operating at C and Ku band, funded by Selenia Marconi Systems.
- **2006/..:** (Technical coordinator) Design of a smart antenna system for W-LAN application (Academic project)
- **2005/2006:** Design and realization of a slotted waveguide antenna working at Ku band for the SAET project (Satellite Access for European Trains) funded by the European Space Agency (<http://telecom.esa.int/telecom/www/object/index.cfm?fobjectid=22168>)
- **2006/..:** Realization of a commercial flat array antenna for satellite communication (Ku band) in mobile terminals (follow on of SAET project).
- **2008/..:** (Technical coordinator) Design of MEMS (Micro Electro Mechanical System)-based beam steerable reflectarray antennas for radio communication and mm-wave imaging at 77 GHz (ARASCOM project, European Seventh Framework Programme)
- **2008/..:** (Technical coordinator) Realization of an innovative RF indoor positioning system for automated industries (VISPO project, funded by Elettric 80, cooperation with Farthan srl).
- **2008/..:** Design of a electronically steerable reflectarray at Ku band (RESKUE Project, funded by ESA)

Publications:

National conferences [Italian]:

- [1] **L. Marcaccioli**, R. Vincenti Gatti, R. Sorrentino, "Series expansion method for phase-only shaped beam synthesis and adaptive nulling," *XV RiNEm*, Cagliari 11-15 Sept. 2004.
- [2] C. Tomassoni, **L. Marcaccioli**, M. Dionigi, M. Mongiardo, R. Vincenti Gatti, R. Sorrentino, "Un metodo CAD per il progetto di filtri e diplexer ripiegati basato sul calcolo della GSM della singola discontinuità," *XV RiNEm*, Cagliari 11-15 Sept. 2004.
- [3] R. Vincenti Gatti, **L. Marcaccioli**, R. Sorrentino, "Progetto di antenne riconfigurabili a guida fessurata per terminali mobili satellitari," *ElEm'05*, Orvieto 12-16 Apr. 2005.
- [4] R. Vincenti Gatti, **L. Marcaccioli**, R. Sorrentino, "Strumenti CAD per array di guide d'onda fessurate," *Telemil05*, Livorno 15-16 Jun. 2005.
- [5] R. Vincenti Gatti, **L. Marcaccioli**, A. Ocera, E. Sbarra, M. Alunno Corbucci, R. Sorrentino, "Dispositivi riconfigurabili per antenne intelligenti dual-band," *XVI RiNEm*, Genova 18-21 Sept. 2006.
- [6] B. Mencagli, P. Farinelli, **L. Marcaccioli**, R. Vincenti Gatti, B. Margesin, F. Giacomozzi, R. Sorrentino, "Progetto e realizzazione di un reflectarray riconfigurabile a MEMS per Imaging a onde millimetriche," *XVI RiNEm*, Genova 18-21 Sept. 2006.
- [7] R. Vincenti Gatti, **L. Marcaccioli**, R. Sorrentino, "Antenne a guida d'onda fessurata per applicazioni civili e militari," *MECSA 2007*, Fisciano 14-15 May. 2007.

International conferences:

- [8] R. Vincenti Gatti, **L. Marcaccioli**, R. Sorrentino, "A novel phase-only method for shaped beam synthesis and adaptive nulling," *33rd EuMC, European Microwave Conference*, Munich, Germany, 6-10 Oct. 2003.
- [9] **L. Marcaccioli**, R. Vincenti Gatti, R. Sorrentino, "Series expansion method for phase-only shaped beam synthesis and adaptive nulling," *URSI 2004, International Symposium on Electromagnetic Theory*, Pisa, Italy, 23-27 May 2004.
- [10] C. Tomassoni, **L. Marcaccioli**, M. Dionigi, M. Mongiardo, R. Vincenti Gatti and R. Sorrentino, "CAD of folded filters and diplexers by the generalized scattering matrix of the single step discontinuity," *IEEE MTT-S, International Microwave Symposium*, Fort Worth, Texas, USA, 6-11 June 2004.
- [11] R. Vincenti Gatti, **L. Marcaccioli**, R. Sorrentino, "Design of slotted waveguide arrays with arbitrary complex slot voltage distribution," *IEEE AP-S, International Symposium on Antennas and Propagation 2004*, Monterey, California, USA, 20-26 Jun. 2004.
- [12] **L. Marcaccioli**, R. Vincenti Gatti, R. Sorrentino, "Real-time interference nulling method for mobile communication systems," *IEEE RAWCON 2004, Radio and Wireless Conference*, Atlanta, Georgia, USA, 19-22 Sept. 2004.
- [13] D. Trincia, **L. Marcaccioli**, R. Vincenti Gatti, R. Sorrentino, "Modified projection method for array pattern synthesis," *34th EuMC, European Microwave Conference*, Amsterdam, The Netherlands, 11-15 Oct. 2004.
- [14] C. Tomassoni, **L. Marcaccioli**, M. Dionigi, M. Mongiardo, R. Vincenti Gatti, R. Sorrentino, "A Procedure for Computer-Aided Design of Compact Diplexers with Folded Filters," *34th EuMC, European Microwave Conference*, Amsterdam, The Netherlands, 11-15 Oct. 2004.
- [15] B. Mencagli, R. Vincenti Gatti, **L. Marcaccioli**, R. Sorrentino, "Design of large mm-wave beam-scanning reflectarrays," *35th EuMC, European Microwave Conference*, Paris, France, 3-7 Oct. 2005.
- [16] **L. Marcaccioli**, R. Vincenti Gatti, R. Sorrentino, "A novel low cost solution for 2-D smart antenna systems with interference nulling capabilities," *17th APMC, Asia Pacific Microwave Conference*, Suzhou, China, 4-7 Dec. 2005.
- [17] R. Sorrentino, R. Vincenti Gatti, **L. Marcaccioli**, B. Mencagli, "Beam Steering Reflectarrays," 4th ESA Workshop on Millimetre Wave Technology and Applications, The 8th Topical Symposium on Millimetre Waves TSMMW2006, *The 7th MINT Millimeter-Wave International Symposium MINT-MIS2006*, 15-17 February 2006, Espoo, Finland.
- [18] R. Vincenti Gatti, A. Ocera, **L. Marcaccioli**, R. Sorrentino, "A Dual Band Reconfigurable Power Divider for WLAN Applications," *IEEE MTT-S, International Microwave Symposium*, San Francisco, CA, USA, 11-16 June 2006.
- [19] **L. Marcaccioli**, B. Mencagli, R. Vincenti Gatti, T. Feger, T. Purtova, H. Schumacher, R. Sorrentino, "Beam Steering MEMS mm-Wave Reflectarrays," *MEMSWAVE 2006*, Orvieto, Italy, June 27-30, 2006.
- [20] R. Vincenti Gatti, A. Ocera, **L. Marcaccioli**, R. Sorrentino, "Innovative Dual Band Reconfigurable Beam Forming Network for Conformal Arrays," *36th EuMC, European Microwave Conference*, Manchester, UK, 10-15 Sept. 2006.
- [21] M. Alunno Corbucci, R. Vincenti Gatti, **L. Marcaccioli**, R. Sorrentino, "A Compact Dual-Band Antenna for WLAN Applications," *EuCAP 2006*, Nice, France, 6-10 Nov. 2006.
- [22] R. Sorrentino, R. Vincenti Gatti, **L. Marcaccioli**, B. Mencagli "Electronic Reconfigurable MEMS Antennas," *Invited paper at EuCAP 2006*, Nice, France, 6-10 Nov. 2006.
- [23] R. Sorrentino, R. Vincenti Gatti, **L. Marcaccioli**, A. Ocera, E. Sbarra, M. Alunno Corbucci, "Dual Band Reconfigurable Beam Forming Networks for WLAN Applications," *Invited paper at 18th Asia Pacific Microwave Conference*, Yokohama, Japan, 12-15 Dec. 2006.

- [24] R. Vincenti Gatti, A. Ocera, S. Bastioli, **L. Marcaccioli**, R. Sorrentino, “A Novel Compact Dual Band Reconfigurable Power Divider for Smart Antenna Systems,” *IEEE MTT-S, International Microwave Symposium*, Honolulu, Hawaii, 3-8 June 2007.
- [25] B. Mencagli, P. Farinelli, **L. Marcaccioli**, R. Vincenti Gatti, B. Margesin, F. Giacomozzi, R. Sorrentino, “Design and Realization of a MEMS Tuneable Reflectarray for mm-wave Imaging Application,” *MEMSWAVE 2007*, Barcelona, Spain, June 26-29, 2007.
- [26] E. Sbarra, **L. Marcaccioli**, R. Vincenti Gatti, R. Sorrentino, “A Novel Rotman Lens in SIW Technology,” *37th EuMC, European Microwave Conference*, Munich, Germany, 8-12 Oct. 2007 - **Young Engineers Prize award**
- [27] F. Casini, R. Vincenti Gatti, **L. Marcaccioli**, R. Sorrentino, “A Novel Design Method for Blass Matrix Beam-Forming Networks,” *37th EuMC, European Microwave Conference*, Munich, Germany, 8-12 Oct. 2007.
- [28] S.Bastioli, **L.Marcaccioli**, R.Sorrentino, “Novel waveguide pseudo-elliptic filters using slant ridge resonators,” 2008 IEEE MTT-S International Microwave Symposium Digest, pp. 619-622, 15-20 June 2008, Atlanta (GA), USA - **Best Student Paper Award (First Place)**
- [29] S.Bastioli, **L.Marcaccioli**, R.Sorrentino, “A Novel Class of Compact Dual-Mode Rectangular Waveguide Filters Using Square Ridge Resonators,” European Microwave Conference EuMC 2008, 27-31 October 2008, Amsterdam - **Young Engineers Prize award**
- [30] R. Vincenti Gatti, **L. Marcaccioli**, E. Sbarra and R. Sorrentino, “Flat Array Antennas for Ku-Band Mobile Satellite Terminals,” *30th ESA Antenna Workshop on Antennas for Earth Observation, Science, Telecommunications and Navigation Space Missions*, ESA/ESTEC Noordwijk, The Netherlands, 27-30 May 2008.
- [31] S.Bastioli, **L.Marcaccioli**, R.Sorrentino, “An original resonant Y-junction for compact waveguide diplexers,” 2009 IEEE MTT-S International Microwave Symposium Digest, 7-12 June 2009, Boston (MA), USA
- [32] R. Sorrentino, R. Vincenti Gatti, **L. Marcaccioli**, “Recent Advances on Millimetre Wave Reconfigurable Reflectarrays,” *3rd European Conference on Antennas and Propagation, EuCAP 2009*, Berlin, Germany, 23-27 March 2009.

National and International Journals:

- [33] R. Vincenti Gatti, **L. Marcaccioli**, R. Sorrentino, “Progetto di antenne riconfigurabili a guida fessurate per terminali mobili satellitari,” *QUADERNI DELLA SOCIETÀ ITALIANA DI ELETTROMAGNETISMO*, vol. 1, N. 3, Set. 2005. – [Italian]
- [34] J.-H.Lee, **L.Marcaccioli**, G.DeJean, C. Lugo, S.Pinel, J.Papapolymerou, J.Laskar, R.Sorrentino and M.M.Tentzeris, “Advanced System-on-Package (SOP) Front-End Passive Solutions for RF and Millimeter-Wave Wireless Systems”, *EuMA Proceedings*, Number 1, Issue 2.
- [35] R. Vincenti Gatti, **L. Marcaccioli**, E. Sbarra, R. Sorrentino, “Flat Array Antennas for Ku-Band Mobile Satellite Terminals,”*International Journal of Antennas and Propagation*, Special Issue on Active Antennas for Space Applications, Vol. 2009.
- [36] S. Bastioli, **L.Marcaccioli**, R.Sorrentino, “Waveguide pseudoelliptic filters using slant & transverse ridge resonators,” *IEEE Transactions on Microwave Theory & Techniques*, vol. 56, no. 12, pp. 3129–3136, December 2008, ISSN: 0018-9480.

Books:

- [37] M.Mongiardo, L. Accatino, M. Dionigi, P. Kozakowski, A. Lamecki, **L. Marcaccioli**, M. Mrozowski, R. Sorrentino, C. Tomassoni, and R. Vincenti Gatti “Design of Waveguide Filters Using Multiple Irises and Folded Elements”, Published in the book: *Fields*,

Networks, Computational Methods, and Systems in Modern Electrodynamics, I.M., Springer-Verlag, Berlin Heidelberg, 2004.

Patents:

- "Antenna piatta a scansione", Patent RM2008A00282
- "Guida d'onda filtrante", Patent RM2008A000307