GIUSEPPE COSTANTINO GIACONIA CURRICULUM VITAE

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RESUME:

Lauream *degree*: Electronic Engineering (5y), with curriculum in Optoelectronics
date and place: 14 July 1989, University of Palermo
final evaluation: full marks, cum laude
thesis and tutors: Development and characterization of a laser direct writing microlithographic process
Prof. S. Riva Sanseverino and Prof. C. Arnone

Gov. qualification: Certified Professional Engineer, University of Palermo, 7 June 1990

PhD *degree in:* Electronics, Informatics and Telecommunications Engineering
date and place: 25 July 1994, Rome
PhD thesis: Laser direct writing microlithography: evolution and emerging applications
(Università degli studi di Palermo)

Present status: Associate Professor of Electronics at the "Università degli studi di Palermo".

Relevant held positions:
2018-ongoing: Responsible for I Level of Cybernetics Engineering Lauream Degree
2013-2016: Responsible for I and II Level of Electronics Engineering Degrees

Teaching activity: Digital Electronics Systems and Lab (from 2003 up to date)
Analog and Digital Electronics (2002-2005, 2011)
Electronics Devices (1993-1996 - Labs)
"MOS structures: programming and erasing techniques" for STMicroelectronics. (1992)
Several teaching activities within Masters related to smart buildings and energy efficiency

MAIN ACTIVITIES:

Selected for 5 five main fellowships, two of which granted by the European Community:

- **PhD fellowship** carried out at the University of Palermo **(36 months)**;
  Subject: *Laser direct writing microlithography: evolution and emerging applications.*
- **CNR (italian National Research Council) fellowship** carried out at the University of Palermo **(12 months)**;
  Subject: *Techniques of laser photolithography.*
- **CNR (italian National Research Council) fellowship** carried out at the University of Palermo and the Integrated Optics Research Center of Alenia-Marconi of Rome **(30 months)**;
  Subject: *Technologies for integrated optics devices and their use in optical fiber systems.*
- **EC fellowship (Marie Curie Fellowship cat. 30-24 months)** carried out at the Nanoelectronic Group of the Electronics Engineering Department, Glasgow University
  Subject: *Design and fabrication of high efficiency diffractive optical devices made of artificial dielectrics.*
- **EC fellowship (Marie Curie Fellowship cat. R-12 months)** carried out at the University of Palermo;
  Subject: *Diffractive optical elements for sensing applications.*

Author of: over 100 Scientific Publications, several international patents and more than 20 Scientific &Industrial Reports;
(see list of publications only at - https://tinyurl.com/y99nz3bq)

Tutor of: 8 PhD studentships, 15 Research fellowships
over 100 final year project carried out within the DEIM at the University of Palermo and the Nanoelectronic Group of the Electronics Engineering Department, Glasgow University

RELEVANT SCIENTIFIC TECHNIQUES AND SKILLS ACQUIRED

- Micro- and nano-lithographic processes and related technologies: coating of 2-D and 3-D samples with resist or metalorganic compounds by spinning, spraying and dipping deposition techniques, optical and e-beam exposure, wet etching and lift-off processes, thin film fabrication by physical vapour deposition, sputtering deposition, deep knowledge of design, fabrication and general operations in clean room environments.
  This experience arose from two main periods: the 3 years PhD mainly devoted to optical microlithography and related technologies; and the two years European contract spent at the Glasgow University where the e-beam nanolithographic features have been pushed to their limits.

Examples of publications in this field are among others:

- Minì, **C.Giaconia**, C.Arnone, *Copper patterning on dielectrics by laser writing in liquid solution,* Applied Physics Letters, 64 (1994), 3404.
- **C.Giaconia**, C.Pace, *Microlithographic patterning in dielectric multilayers,* Vuoto-Scienza e Tecnologia, 2 (1994), 84.
- C.Arnone, **C.Giaconia**, C.Pace, M.Greco, *Flexible laser systems for defining thin film hybrid geometries,* Hybrid Circuits, 33 (1994), 18.

- Mask fabrication and generic substrate patterning by laser direct writing, for several applications: diffractive and integrated optics, microwave passive planar devices, silicon micromachining, non-conventional 3-D structures. All these technologies has been deeply investigated during the PhD and beyond that period with special emphasis to the scalar diffraction theory, its limits both from the theoretical and practical implementation point of view. A few scientific works related are here named:
  - **C.Giaconia**, G.Grasso, C.Arnone, *Resist coating of cylindrical samples for 3-D lithography*, Microelectronics International, 36 (1995), 22.
  - G.Lullo, **C.Giaconia**, C.Arnone, *Technologies for the fabrication of cylindrical fine line devices,* Microlectronic Engineering, 35 (1997), 417.
  - C.Arnone, G.Lullo, **C.Giaconia**, *Fabrication of thin film inductors by laser lithography and related processing on 3-D substrates,* Proc. of the 11th European Microelectronics Conference) Venice (1997), 444.
  - C.Arnone, **C.Giaconia**, G.Lullo, *Fabrication of diffractive Optics: surface relief and artificial dielectrics,* ed. by S.Martellucci and A.N.Chester, Plenum Press (1997), 119.

- During the EC grant in Glasgow, besides the nanolithographic skills, a deep study of the Diffraction Theory has been carried out with the main goal to investigate the possibility to implement artificial dielectrics, i.e. devices whose dielectric constant doesn't exist in nature. As a result, a computer program capable to design two level geometries emulating predefined dielectric constants has been carried out. Its optimization phase allowed to take into consideration the technological constraints coming out from fabrication tolerances. This has been used to effectively design and implement real nanodevices that perfomed the world best efficiency in its category (1998). Selected papers follows:
  - **C.Giaconia**, R.Torrini, S.K.Murad, C.D.W.Wilkinson*, Artificial dielectric optical structures: a challenge for nanofabrication*, 42nd International Conference on Electron, Ion & Photon Beam Technology and Nanofabrication, Chicago 26-29 Maggio 1998; published on J. of Vacuum Science & Technology B Nov./Dic. 1998, pp.3903-3905
  - **C.Giaconia**, R.Torrini, S.K.Murad, C.D.W.Wilkinson, *A wedge made in artificial dilectric*, OSA Technical Digest Series vol. 10: Diffractive Optics & Micro Optics (DOMO '98) Hawaii 8-11 June 1998: DtuD7, p.129
  - **C.Giaconia**, *Binary grating made with low and high spatial resolution tools*, invited at Sandia National Laboratories – Albuquerque, New Mexico (USA) June 1998.

- During the 30 months period of the CNR grant, a full collaboration with Alenia-Marconi (hold by Finmeccanica) has been carried out. The main goal was the study and realization of a complete method able to use the anysotropic etching properties of crystalline silicon in order to realize a robust coupling between single mode optical fibers and Lithium Niobate optical integrated devices (built by Alenia-Marconi). The results of these work have been confidentially published within sevral Scientific Technical Report hold by CNR and Alenia-Marconi.

- Deep knowledge of microprocessor based hardware architectures, design and implementation of programmable digital systems such as microcontroller and FPGA (Field Programmable Gate Array). Real-time computer control of laboratory equipment. These experiences essentially were matured from the activity carried out within the Programmable Digital Electronics Systems Laboratory (ESDP Lab - whose principal investigator is Costantino Giaconia since 2002) which is involved in several projects related to different applications. The ESDP Lab participated to scientific works by collaborating with several partners within the University of Palermo and with others coming from national and European countries.

<u>Publications excerpt in these fields</u>:

Telecommunication related:

- A. Di Stefano, G. Terrazzino, L. Scalia, I. Tinnirello, G. Bianchi, **C. Giaconia**, *AN EXPERIMENTAL TESTBED AND METHODOLOGY FOR CHARACTERIZING IEEE 802.11 NETWORK CARD.* IEEE World of Wireless Mobile and Multimedia (WoWMoM06), June 26-29 2006, Niagara-Falls, Buffalo NY – US - On page(s): 513-518 - ISBN 0-7695-2593-8 - ISBN-13 978-0-7695-2593-8
- A. Di Stefano, G. Terrazzino, L. Scalia, I. Tinnirello, G. Bianchi, **C. Giaconia**, O*n the anomalous behavior of ieee 802.11 commercial cards.* 5th Annual Mediterranean Ad Hoc Networking Workshop (MedHoc), June 14-17 2006, Lipari (Sicily) - IT - On page(s): 84-89 - ISBN: 88-902405-1-2
- A. Di Stefano, G.Fiscelli, **C. Giaconia**, *An Fpga-based software defined radio platform for the 2.4Ghz ism band.* IEEE Ph.D Research in MicroElectronics conference (PRIME06), June 12-15, 2006, Otranto (BARI) - (Paper awarded with the "Silver Leaf"). On page(s): 73 - 76 - ISBN: 1-4244-0157-7
- A. Di Stefano, G. Terrazzino, **C.G.Giaconia**, *FPGA Implementation of a Reconfigurable 802.11 Medium Access Control*. International Conferences on Wireless Reconfigurable Terminals and Platforms (WIRTEP) – Rome April 2006 - On page(s): 38 – 42
- G.Fiscelli, A.Di Stefano, G.Terrazzino, **C.G.Giaconia**, *A Software Defined Radio Platform Implementing a WiFi and ZigBee Receiver*. International Conferences on Wireless Reconfigurable Terminals and Platforms (WIRTEP) – Rome April 2006 - On page(s): 78 – 82

Electronic System applications related:

- P.Lombardi, **C.G.Giaconia**, V.Di Dio.(2006), *An embedded diagnostic system for wheelchairs brushless drives monitoring.* International Symposium on Power Electronics, Electrical Drives, Automation and Motion (SPEEDAM 2006) - Taormina May 2006 - On page(s): (S28)28-32 - ISBN: 1-4244-0194-1
- DI STEFANO A., **GIACONIA C.** (2005), *An FPGA-Based Adaptive Fuzzy Coprocessor.* In J.CABESTANY, A. PRIETO, F. SANDOVAL. Computational Intelligence and Bioinspired Systems. (vol. LNCS3512, pp. 590-597). ISBN: 3-540-26208-3. NEW YORK: Springer (UNITED STATES).
- A.DI STEFANO, A. SCAGLIONE, **GIACONIA C.** (2005), *Efficient FPGA Implementation of an adaptive noise canceller.* IEEE Proceedings on Computer Architecture for Machine Perception (CAMP05). On page(s): 87 – 89 - ISBN 0-7695-2255-6
- **GIACONIA C.**, DI STEFANO.C., CAPPONI G. (2003), *FPGA-based concurrent watchdog for real-time control systems.* ELECTRONICS LETTERS. vol. 39, pp. 769-770 ISSN: 0013-5194.
- **GIACONIA C.**, DI STEFANO A., CAPPONI G. (2003), *Reconfigurable digital instrumentation based on FPGA.* IEEE 3rd International Workshop on System-on-Chip for Real-Time Applications (IWSoC03). ISBN/ISSN: 0-7695-1929-6.

Condensed Matter related:

- DISPENZA C., SUNSERI C., MARINO I., **GIACONIA C.**, PETRUCCI G., SPADARO G. (2003), *Adherends surface preparation for structural adhesive bonding.* The 6th International ESAFORM Conference on Material Forming. (pp. 911-914). ISBN/ISSN: 88-7676-211-6.
- C. Santini, M. Cherchi, **C. Giaconia**, S. Riva Sanseverino, A. Parisi, S. Guarino, A. Cino (2006), *MATCHING THIN LAYER FOR SURFACE PLASMON RESONANCE TUNING ON LITHIUM NIOBATE WAVEGUIDES* 7th Symposium of European Vacuum Coaters - Anzio (IT), Oct. 2-4, 2006

Energy Efficiency related :

- G. Fertitta, **C. Giaconia**, D. La Cascia, F. Lo Bue, R. Miceli IEEE Member, C. Rando The FP7 BeyWatch European scientific project: general features and design criteria of the Combined Photovoltaic Solar (CPS) system within the BEYWATCH system architecture
- **G.C. Giaconia**, G. Fiscelli, F. Lo Bue, A. Di Stefano, D. La Cascia, R. Miceli, *"Integration of Distributed on Site Control Actions via Combined PhotoVoltaic and Solar Panels System"*, ICCEP 2009 International Conference on Clean Electrical Power - Capri, Italy, 9-11 June 2009
- R. Miceli, D. La Cascia, A. Di Stefano, G. Fiscelli, **C. Giaconia** *"Impact of Novel Energy Management Actions on Household Appliances for Money Savings and CO2 Emissions Reduction"*, EVER 09 Electrical Vehicle and Renewable Energy international conference, Montecarlo 26th - 28th march 2009;
- P.Calò, G. Fiscelli, F. Lo Bue, A. Di Stefano, **C. Giaconia** *"An Electronic Emulator of Combined Photovoltaic and Solar Thermal Systems"* EVER 10 Electrical Vehicle and Renewable Energy international conference, Montecarlo 25th - 28th march 2010;
- **C. Giaconia**, D. La Cascia, F. Lo Bue, R. Miceli *"Reducing energy consumptions and CO2 emissions in European countries: a review on legal environment and increasing use of photovoltaic energy for Electric Propulsion Systems"* EVER 10 Electrical Vehicle and Renewable Energy international conference, Montecarlo 25th - 28th march 2010;
- **C.G. Giaconia**, A. Di Stefano, G. Fiscelli, D. La Cascia, F. Lo Bue, F. Massaro, R. Miceli *"Benefit at Grid Level by Using DoS Actions via Combined Photovoltaic and Solar Panel System"* EVER 10 Electrical Vehicle and Renewable Energy international conference, Montecarlo 25th - 28th march 2010;
- **C. Giaconia** et al.: *Energy Management via Connected Household Appliances*, book edited by R. Miceli – ISBN 978-88-386-6676-6 McGraw-Hill (2008)
- Giglia, G.; Ala, G.; Di Piazza, M.C.; **Giaconia, G.C.**; Luna, M.; Vitale, G.; Zanchetta, P. "*Automatic EMI Filter Design for Power Electronic Converters Oriented to High Power Density"*. MDPI Electronics 2018, 7, 9.

Health and Bioelectronic related :

- G. Adamo, D. Agrò, S. Stivala, A. Parisi, **G. C. Giaconia**, A. C. Busacca, M. Mazzillo, D. Sanfilippo, G. Fallica, "*Measurements of Silicon Photomultipliers Responsivity in Continuous Wave Regime*", IEEE Transactions on Electron Devices, vol. 60, n. 11, pp. 3718-3725, 2013; print ISSN: 0018-9383, online ISSN: 1557-9646, DOI: 10.1109/TED.2013.2282709
- G. Adamo, D. Agrò, S. Stivala, A. Parisi, **C. Giaconia**, A.C. Busacca, G. Fallica, "*SNR measurements of silicon photomultipliers in the continuous wave regime*", Proc. SPIE 8990, Silicon Photonics IX, pp. 899019-1-899019-10; doi:10.1117/12.2039720, Mar. 2014, San Francisco, USA
- D. Agrò, R. Canicattì, M. Pinto, G. Morsellino, A. Tomasino, G. Adamo, L. Curcio, A. Parisi, S. Stivala, N. Galioto, A. Busacca, **C. Giaconia**, "*Design and implementation of a portable fNIRS embedded system*", ApplePies 2014, May 2014, Rome, Italy
- P. Di Buono, L. Mistretta, **C. Giaconia**, *New technique for the CMRR improvement in a portable ECG system* ApplePies 2015, May 2015, Rome, Italy
- **Giaconia G. C.**, Greco G., Mistretta L., Rizzo R. *"Exploring FPGA-Based Lock-In Techniques for Brain Monitoring Applications"*. MDPI Electronics 2017, 6(1), 18.

RELEVANT COORDINATION AND MANAGEMENT SKILLS ACQUIRED

- Planning and managing expertise on R&D projects acquired both at National and European level. Coordination and managing, among others, of the electronic part of the following Research projects has been carried out:

  - ASTONISH project (http://www.astonish-project.eu/): Advancing Smart Optical Imaging and Sensing for Health (on going European Project financed by ECSEL within the H2020 framework – period: 2016-2019)
  - BEYWATCH project: Bulding EnergY WATCHer (awarded as the best ICT for energy efficiency project by EU Commission);
  - HIGH PROFILE project: HIGH-throughput PROduction of FunctIonaL 3D imagEs of the brain (European Project co-financed by ARTEMIS Joint Undertaking initiative)
  - RETI SMART (Linea di intervento 4.1.1.1 of POR FESR Sicilia 2007-2013)

- PRIMO Project: Piattaforme Riconfigurabili per Interoperabilità in MObilità (FIRB Project)
- QUALI.BIO Project: Controllo di QUALItà dei prodotti Alimentari mediante BIOsensori con l'uso di microtecnologie (FIRB National Project).

RELEVANT INDUSTRIAL EXPERIENCES ACQUIRED

- Founder of three start-up companies directly related to the electronic skills acquired from the applied research and aiming to create job opportunities for young, vibrant and talented electronic engineers coming out from the university degrees:
  - MICROTECH s.r.l. High-tech company, born in 1992, mainly devoted to the design and realization of Direct Laser Writing systems, suitable for pattern generators at micron and sub-micron line-width scale and laser diagnostic systems.
  - RCMS s.r.l., ReConfigurable MicroSystems whose main mission is to design and implement high performances embedded systems, based on microprocessor, FPGA or hybrid solutions, for very fast and/or very high precision data acquisition and signal processing. Generation of patented solutions based on new ideas are also among the pursued goals.
  - PRYSMIAN ELECTRONICS s.r.l. devoted to the generation of innovative electronics devices and systems toward the main goal to enrich electric power distribution networks with novel solutions and a full implementation of real smart energy networks.
  - Consultant of industrial partners, both for teaching and research related missions:
    STMicroelectronics (Palermo's Design Center and Catania site)
    Alelco (Palermo premises)
    CRES Monreale (PA)
    Alenia-Marconi (Rome premises)

MAIN LARGE INDUSTRIAL APPARATUS USED:

- Leica EBPG 5HR 100 e-beam writing system, Hitachi S-800 and S-900 SEM (Scanning Electron Microscope). Various RIE (Reactive Ion Etching) machines for Dry Etching processes.
- Several non-conventional 2-D and 3-D laser direct writing systems.
  Microfabrication related machines (for scribing, lapping, thickness measuring etc…)
- Electronic Instruments related to the Design and Implementation of Mixed Signal embedded systems

ICT SKILLS ACQUIRED:

- Knowledge on hardware architectures of microprocessor systems.
- *Operating Systems*: Windows and Linux;
- *Programming languages*: VHDL, Assembler and C;
- *Scientific scripting languages*: Matlab, Scilab;
- *Known Software Packages*: Microsoft and Open-Office, Atmel Studio, Xilinx ISE, AutoCAD, GIMP and several others.
- *IT Courses attended*: Microsoft Official Course for System Administrator.
  .
- *Internet oriented activities*: (1999-2000) Webmaster of www.provincia.palermo.it (about 300 files)
  (2000-2003) Webmaster of www.ingegneria.unipa.it (~ 1000 files), official website of the Engineering Faculty - University of Palermo.

Palermo February, 1st 2021

signature
f.to GIUSEPPE COSTANTINO GIACONIA

Il sottoscritto dichiara di essere a conoscenza dell'art. 46 del D.P.R. 445/2000 e consapevole della responsabilità penale prevista dall'art. 76 del medesimo D.P.R., per le ipotesi di falsità in atti e dichiarazioni mendaci ivi indicate;
Il sottoscritto esprime inoltre il proprio consenso affinché i dati personali forniti possano essere trattati, nel rispetto del Decreto Legislativo 196/2003.

Palermo February, 1st 2021

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f.to GIUSEPPE COSTANTINO GIACONIA