Andrea Giovannini

Curriculum vitae et studiorum

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Italy
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Birth date: 18-08-1995

Work Experience

From 01/05/2023 to date
Istituto Italiano di Tecnologia (IIT)
Viale Rinaldo Piaggio 34, Pontedera (PI), Italy

Job position: winner of a public call for **Research Fellow (Collaboratore di ricerca)**
Project name: 5D NanoPrinting, FET Open, Horizon 2020, doi: 10.3030/899349
Project links: https://cordis.europa.eu/project/id/899349, https://5dnanoprinting.eu/
Job description: implementation of the research activities related to the development of an innovative direct laser writing (DLW) system
Details on the research activities can be found below

From 31/03/2023 to date
Alma Mater Studiorum Università di Bologna, Dipartimento di Ingegneria dell'Energia Elettrica e dell'Informazione "Guglielmo Marconi" (DEI)
Viale Risorgimento 2, Bologna, Italy

Job position: winner of a public call for **Teaching Tutor (Tutor accademico)**
Referent: Dr. Jacopo Nanni
Job description: teaching tutor for the course "Optical Fiber Systems M" within the Master's degree in Telecommunications Engineering for a total amount of 30 hours. The main activity performed consisted in the organization and realization of practical laboratory sessions for the students of the course.

From 22/11/2022 to date
Alma Mater Studiorum Università di Bologna, Dipartimento di Ingegneria dell'Energia Elettrica e dell'Informazione "Guglielmo Marconi" (DEI)
Viale Risorgimento 2, Bologna, Italy

Job position: winner of a public call for **Teaching Tutor (Tutor accademico)**
Referent: Prof. Giovanni Tartarini
Job description: teaching tutor for the course "Optical Technologies for Electrical Engineering M" within the Master's degree in Electrical Engineering for a total amount of 30 hours. The main activity performed consisted in the organization and realization of practical laboratory sessions for the students of the course.

From 08/12/2021 to 30/09/2022
Alma Mater Studiorum Università di Bologna, Dipartimento di Ingegneria dell'Energia Elettrica e dell'Informazione "Guglielmo Marconi" (DEI)
Viale Risorgimento 2, Bologna, Italy

Job position: winner of a public call for **Teaching Tutor (Tutor accademico)**
Referent: Prof. Giovanni Tartarini
Job description: teaching tutor for the course "Optical Fiber Systems M" within the Master's degree in Telecommunications Engineering for a total amount of 30 hours. The main activity performed consisted in the organization and realization of practical laboratory sessions for the students of the course.

From 02/12/2021 to 30/09/2022 **Université Gustave Eiffel, ESIEE Paris**
Cité Descartes, Bd Blaise Pascal 2, Noisy-le-Grand, France

Job position: **Chargé d'enseignement (Teaching Tutor, Tutor accademico)**
Referent: Prof. Nadia Madaoui
Job description: teaching tutor for the course "Introduction au traitement du signal (introduction to signal processing)" for a total amount of 30 hours. The main activity performed consisted in the realization of practical laboratory sessions on Matlab for the students of the course and correction of related reports.

Education

From 01/11/2019 to date **Double PhD degree in Electronics, Telecommunications and Information Technologies and in Électronique, Optronique et Systèmes**, *joint degree between Alma Mater Studiorum – Università di Bologna (Italy) and Université Gustave Eiffel (ex Université Paris-Est-Marne-la-Vallée) (France)*
Thesis title: Efficient Wireless Coverage of In-Building Environments with Low Electromagnetic Impact
Currently admitted to defend the thesis on the 15/06/2023 after successful evaluation of the 1st, 2nd and 3rd year
Details on the research activities can be found below

From 01/10/2017 to 03/10/2019 **Master's degree, Telecommunications Engineering**, *Alma Mater Studiorum – Università di Bologna, Bologna, Italy.*
Thesis title: Countermeasures to Rayleigh Backscattering in Optical Fiber Links for Radio Astronomy Applications
Grade: 110/110 with honours
Details on the research activities can be found below
Link: https://amslaurea.unibo.it/18965/

From 01/10/2014 to 06/10/2017 **Bachelor's degree, Electronics and Telecommunications Engineering**, *Alma Mater Studiorum – Università di Bologna, Bologna, Italy.*
Thesis title: Implementation of Visible Light Communication Systems on Raspberry Pi
Grade: 107/110

From 01/09/2009 to 30/06/2014 **Secondary School Diploma**, *Liceo Scientifico Tecnologico G. Galilei, Mirandola (MO), Italy*

Participation in research projects

From 01/05/2023 to date **5D NanoPrinting**
Links: https://cordis.europa.eu/project/id/899349, https://5dnanoprinting.eu/
The 5D NanoPrinting project has the objective of developing innovative smart/functional materials with tailorable properties and novel fabrication methodologies, allowing faster prototyping of micro-electromechanical systems (MEMS).
The activities performed focus on the optimization of an established set-up for direct laser writing (DLW) based on 2-photon lithography. In particular: the integration of devices for the generation of local electrical fields, necessary to the implementation of 3D multiparametric writing; the optimization of the DLW-multiparametric system in terms of spatial resolution and control of the properties of the printed devices.

From 01/11/2019 to date

Université Franco Italienne - Università Italo Francese, Joint Doctorate Project C3-2025 Efficient Wireless of In-Building Environments with Low Electromagnetic Impact, Call Vinci 2019

Link: https://www.universite-franco-italienne.org/menu-principal/bandi/programma-vinci/bandi-e-risultati/

The doctorate project aims to develop a short-range communication system for comprehensive coverage of indoor environments. This system features low levels of cost, power consumption, and electromagnetic impact. The objective is achieved through two key technologies: Radio over Fiber (RoF) for carrying the RF signal to various areas, and beamforming antenna arrays, specifically Time Modulated Arrays (TMA), for transmitting the RF signal only in the necessary directions.

The work, developed during my PhD, dealt with the realization, characterization and modelling of a RoF-TMA system using both commercial and customized optoelectronic, optical, and electronic devices. The activities performed included:

- Proof of concept testing of a RoF-TMA system
- Analysis and simulation of TMA systems
- EM simulations and measurements of TMA radiation patterns
- Characterization and circuit simulation of optoelectronic devices
- Development of a non-linear behavioural model implemented for Vertical Cavity Surface Emitting Lasers (VCSELs)
- Design of SiGe Heterojunction Phototransistors (HPTs) on ADS realized in IHP BiCMOS SG13S technology
- Frequency domain characterization on RF probe station of HPTs on chip
- Design and realization of a PCB for the RoF-TMA system packaging

From 01/04/2019 to 03/10/2019

Square Kilometre Array (SKA)

Study and implementation of Radio over Fiber Systems for Radio Astronomy

Link: https://www.skao.int/

SKA is an intergovernmental international project for the construction of two radio telescopes: one in Australia (low-frequency) and one in South-Africa (mid-frequency). Currently, the project SKA involves 16 countries and is managed by the intergovernmental organisation SKA Observatory (SKAO).

The work, developed during my Master thesis, dealt with noise caused by Rayleigh backscattering at low frequency (50-350 MHz) in SKA optical fiber links and noise reduction techniques, specifically dithering. The activities performed included:

- Analysis of dithering impact on noise in optical links
- Matlab simulations and experimental measurements of Rayleigh backscattered field inside SKA optical links
- Experimental measurements of noise power in optical links with dithered laser

Research experience (Italy and abroad)

From 01/11/2019 to date
More than 3 years

Research Activity (level: PhD), *Department of Electrical, Electronic and Information Engineering (DEI) "Guglielmo Marconi"*, Alma Mater Studiorum – Università di Bologna, Italy

The activity (related to the project Efficient Wireless Coverage of In-Building Environments with Low Electromagnetic Impact), dealt with: the realization of a proof of concept RoF-TMA system, the numerical simulation and characterization of TMA systems, and of RoF links implementing commercial optoelectronic devices and customized SiGe HPTs integrated on chip, developed in France.

From 01/10/2020- to 31/03/2022
18 months

Visiting researcher at ESYCOM Laboratory, *ESIEE Paris, Université Gustave Eiffel*, Cité Descartes – Noisy-le-Grand, Paris, France

The activity (related to the project Efficient Wireless Coverage of In-Building Environments with Low Electromagnetic Impact), dealt with: the design,

commissioning and characterization of SiGe HPTs integrated on chip, the characterization of integrated devices on RF probe station, the characterization, development of behavioural models and numerical simulation of optoelectronic devices

From 01/04/2019 to 03/10/2019 **Research Activity (level: Laurea Magistrale)**, *Department of Electrical, Electronic and Information Engineering (DEI) "Guglielmo Marconi"*, Alma Mater Studiorum – Università di Bologna, Italy
Thesis title: Countermeasures to Rayleigh Backscattering in Optical Fiber Links for Radio Astronomy Applications

From 01/04/2017 to 06/10/2017 **Research Activity (level: Laurea Triennale),** *National Laboratory of Wireless Communications (WiLab), Italian Inter-University Consortium for Telecommunications (CNIT)*, Bologna, Italy
Thesis title: Implementation of Visible Light Communication Systems on Raspberry Pi

List of scholarships

From 01/01/2020 to 31/12/2022 **Bourses en soutien aux thèses en cotutelle**
Scholarship from Université Gustave Eiffel (Paris, France) to fund an 18 months stay in France at ESYCOM Laboratory during my joint PhD.

From 01/11/2019 to 31/10/2022 **Scholarship from Université Franco Italienne - Università Italo Francese**
3-year scholarship won in Call Vinci 2019 from Université Franco Italienne - Università Italo Francese to fund the Joint Doctorate Project C3-2025 Efficient Wireless of In-Building Environments with Low Electromagnetic Impact

Attended summer schools

From 08/05/2023 to 12/05/2023 **Seasonal school PHOTONS-@3 Photonic Technologies for Sensing Applications**, *Scuola Superiore Sant'Anna, Pisa, Italy*

Participation at the seasonal school "PHOTONS-@3 Photonic Technologies for Sensing Applications". The proposed learning activities focused on optical components, photonic integration, optical fiber sensor systems, photonic sensing, imaging sensing and industrial applications of distributed photonic sensors.

Teaching Experiences

Teaching tutor. Department of Electrical, Electronic and Information Engineering "Guglielmo Marconi", University of Bologna, Italy
Courses list:

- Optical Fiber Systems M (within the International Master degree program in Telecommunications Engineering).
  From 31/03/2023 to date: 30 hours total
  From 08/12/2021 to 30/09/2022: 30 hours total
- Optical Technologies for Electrical Engineering M (within the Master degree program in Electrical Engineering).
  From 22/11/2022 to date: 30 hours total

Teaching tutor. ESIEE Paris, Université Gustave Eiffel, France
Courses list:

- Introduction au traitement du signal (Introduction to signal processing).
  From 02/12/2021 to 30/09/2022: 30 hours total

Co-Supervisor of Bachelor's Thesis projects, at Department of Electrical, Electronic and Information Engineering "Guglielmo Marconi", University of Bologna, Italy.
Thesis list:

- Thesis title: Programmazione di una scheda FPGA per la generazione di segnali OFDM per applicazioni Radio-over-Fiber
  Author: Enrico Catozzi
  From 01/09/2022 to 28/02/2023 (6 months)
  Supervisor: Prof. Giovanni Tartarini
  Contact: giovanni.tartarini@unibo.it

Co-Supervisor of intenships, at Department of Electrical, Electronic and Information Engineering "Guglielmo Marconi", University of Bologna, Italy.
Intern students:

- Hugo Matonog
  Internship title: Research internship on FPGA-assisted radio over fiber technology
  From 01/09/2022 to 15/12/2022 (3.5 months)
  Supervisor: Prof. Giovanni Tartarini
  Contact: giovanni.tartarini@unibo.it
- Maxime Le Bigot
  Internship title: RF and Microwave Circuits for the 6G, LiFi and high speed optoelectronics devices
  From 01/05/2022 to 31/07/2022 (3 months)
  Supervisor: Prof. Giovanni Tartarini
  Contact: giovanni.tartarini@unibo.it

Co-Supervisor of intenships, at ESIEE Paris, Université Gustave Eiffel, France.
Intern students:

- Veronika Kienle
  Internship title: Design of a workbench for the characterization of Radio over Fiber links and SiGe/Si devices
  From 01/02/2021 to 31/07/2021 (6 months)
  Supervisor: Prof. Jean-Luc Polleux
  Contact: jean-luc.polleux@icon-photonics.com
- Maxime Le Bigot
  Internship title: RF and Microwave Circuits for the 6G, LiFi and high speed optoelectronics devices
  From 01/11/2021 to 31/03/2022 (5 months)
  Supervisor: Prof. Jean-Luc Polleux
  Contact: jean-luc.polleux@icon-photonics.com
  Links to internship description: https://perso.esiee.fr/~tremplir/
  https://perso.esiee.fr/~tremplir/projets2021/jean-lucpolleux-circuits.pdf

Reviewer Experience

Andrea Giovannini is currently acting as a Reviewer for the following prestigious journals in the field of optical systems:

- IEEE/OSA Journal of Lightwave Technology
  From 29/12/2020 to date

Languages

Italian	**Mothertongue**
English	**Full professional oral and written skills, Certified B2 Cambridge FCE**
French	**Intermediate**

Spanish **Basic**

Technical skills

Software:

- Programming languages: Matlab, Python, C, Java
- System modelling software: Simulink
- EM simulation software: CST Studio Suite by Dassault Systèmes Simulia
- EDA software: ADS by Keysight, EasyEDA
- PCB design software: DesignSpark PCB
- MSOffice packet: Word, Excel, Powerpoint, Outlook
- Packet sniffer software: Wireshark
- Others: Android Studio, Arduino, Unix Shell

Setup bench experience:

- RF probe station
- On-chip characterization and measurement setup
- Active and passive optical devices setup
- Active and passive electronic devices setup
- Vector Network Analyzer
- Electrical Spectrum Analyzer
- Optical Spectrum Analyzer

List of Scientific Publications

Andrea Giovannini is author and co-author of more than 10 papers in: prestigious journals regarding Optics and Optical Systems for Radio Astronomy and Telecommunications and in several IEEE/OSA international conferences. Hereafter the full list of scientific contributions:

Scientific Journals

1. Jacopo Nanni; Andrea Giovannini; Muhammad Usman Hadi; Enrico Lenzi; Simone Rusticelli ;Randall Wayth; Federico Perini; Jader Monari; Giovanni Tartarini, "Controlling Rayleigh-Backscattering-Induced Distortion in Radio Over Fiber Systems for Radioastronomic Applications," in Journal of Lightwave Technology, vol. 38, no. 19, pp. 5393-5405, 1 Oct.1, 2020, doi: 10.1109/JLT.2020.2993203.
2. Andrea Giovannini; Jacopo Nanni; Luis Fernández; Giacomo Paolini; Federico Perini; Enrico Lenzi; Anne-Laure Billabert; Alessandra Costanzo; Jean-Luc Polleux; Diego Masotti; Jean-Marc Laheurte; Giovanni Tartarini, "Phase Shift Impact on the Performance of Time Modulated Antenna Arrays Driven by Radio Over Fiber," in Journal of Lightwave Technology, vol. 39, no. 24, pp. 7761-7770, 15 Dec.15, 2021, doi: 10.1109/JLT.2021.3098232.
3. Jacopo Nanni; Andrea Giovannini; Enrico Lenzi; Simone Rusticelli; Randall Wayth; Federico Perini; Jader Monari; Giovanni Tartarini, "Optimal Configuration Mitigating Rayleigh-Backscattering-Induced Distortion in Radioastronomic Optical Fiber Systems," in Journal of Lightwave Technology, vol. 40, no. 20, pp. 6785-6795, 15 Oct.15, 2022, doi: 10.1109/JLT.2022.3187175.
4. Andrea Giovannini; Muhammad Usman Hadi; Lucas Iogna Prat; Najett Neji; Zerihun Gedeb Tegegne; Carlos Viana; Anne-Laure Billabert; Jean-Marc Laheurte; Jacopo Nanni; Diego Masotti; Giovanni Tartarini; Jean-Luc Polleux, "Improved Nonlinear Model Implementation for VCSEL Behavioral Modeling in Radio-Over-Fiber Links," in Journal of Lightwave Technology, vol. 40, no. 20, pp. 6778-6784, 15 Oct.15, 2022, doi: 10.1109/JLT.2022.3195048.

Conferences
(*presenter)

1. Jacopo Nanni; Andrea Giovannini; Simone Rusticelli; Federico Perini; Jader Monari; Enrico Lenzi; Giovanni Tartarini, "Challenges Due to Rayleigh Backscattering in Radio over Fibre Links for the Square Kilometre Array Radio-Telescope," 2019 21st International Conference on Transparent Optical Networks (ICTON), 2019, pp. 1-4, doi: 10.1109/ICTON.2019.8840161.
2. Jacopo Nanni; Andrea Giovannini; Muhammad Usman Hadi; Simone Rusticelli; Federico Perini; Jader Monari; Enrico Lenzi ;Giovanni Tartarini, "Optimum Mitigation of distortion induced by Rayleigh Backscattering in Radio-over-Fiber links for the Square Kilometer Array Radio-Telescope," 2019 International Topical Meeting on Microwave Photonics (MWP), 2019, pp. 1-4, doi: 10.1109/MWP.2019.8892158.
3. Andrea Giovannini; Jacopo Nanni; Simone Rusticelli; Randall Wayth; Enrico Lenzi; Federico Perini; Jader Monari; Giovanni Tartarini, "Modellization and Control of Spurious Frequency Generation due to Rayleigh Backscattering in Low-Frequency-Radio over Fiber Systems for Radioastronomic Application," 2020 XXXIIIrd General Assembly and Scientific Symposium of the International Union of Radio Science, 2020, pp. 1-4, doi: 10.23919/URSIGASS49373.2020.9232422.
4. Andrea Giovannini*; Jacopo Nanni; Giacomo Paolini; Federico Perini; Enrico Lenzi; Alessandra Costanzo; Jean-Luc Polleux; Diego Masotti; Jean-Marc Laheurte; Giovanni Tartarini, "Beam-Steering Features of Radio-over-Fiber Systems via Antenna Array Time Modulation," 2020 International Topical Meeting on Microwave Photonics (MWP), 2020, pp. 140-143, doi: 10.23919/MWP48676.2020.9314581.
5. Andrea Giovannini*; Jacopo Nanni; Giacomo Paolini; Federico Perini; Enrico Lenzi; Jean-Luc Polleux; Jean-Marc Laheurte; Diego Masotti; Giovanni Tartarini, "Radio over Fiber–driven Time Modulated Array Antennas for Efficient Beamforming within In-Building Environments," 2020 European Conference on Optical Communications (ECOC), 2020, pp. 1-4, doi: 10.1109/ECOC48923.2020.9333311.
6. Jacopo Nanni; Lorenzo Baschieri; Andrea Giovannini; Enrico Lenzi; Jean-Marc Laheurte; Jean-Luc Polleux; Giovanni Tartarini, "Efficient Solution to Bimodal Propagation Effects in Low-Cost 850nm Radio over G.652-Fibre Systems," 2020 Italian Conference on Optics and Photonics (ICOP), 2020, pp. 1-4, doi: 10.1109/ICOP49690.2020.9300342.
7. Jacopo Nanni; Andrea Giovannini; Simone Rusticelli; Federico Perini; Jader Monari; Enrico Lenzi; Randall Wayth; Giovanni Tartarini, "Identification of the Optimal Value of the Dithering Tone Frequency to Mitigate Rayleigh-Backscattering-Induced Distortion in Radioastronomic Scenarios," 2021 XXXIVth General Assembly and Scientific Symposium of the International Union of Radio Science (URSI GASS), 2021, pp. 1-4, doi: 10.23919/URSIGASS51995.2021.9560222.
8. Andrea Giovannini*, Francesco Peressutti, Jacopo Nanni, Jean-Luc Polleux, Anne-Laure Billabert, Diego Masotti, Giovanni Tartarini, Jean-Marc Laheurte, “Phototransistors SiGe en mode commuté pour les réseaux d’antennes à modulation temporelle (TMA)”, oral presentation at 2022 Journées Nationales Microondes (JNM), 7-10 June 2022, Limoges, conference acts link: https://jnm2022.sciencesconf.org/resource/page/id/36
9. Andrea Giovannini, Francesco Peressutti, Jacopo Nanni, Jean-Luc Polleux, Anne-Laure Billabert, Diego Masotti, Giovanni Tartarini, Jean-Marc Laheurte, “Phototransistors SiGe/Si pour les réseaux d’antennes commutés TMA”, poster at 2022 Journée de Club Optique Microondes (JCOM), 13 June 2022, Besançon, conference acts link: https://jcom2022.sciencesconf.org/resource/page/id/13
10. Andrea Giovannini*, Jacopo Nanni, Francesco Peressutti, Anne-Laure Billabert, Diego Masotti, Jean-Luc Polleux, Giovanni Tartarini, Jean-Marc Laheurte, “Commuted Mode SiGe Phototransistors for Time Modulated Array Applications”, oral presentation at 2022 Italian Conference on Optics and Photonics (ICOP), 15-17 June 2022, Trento, conference program link: https://www.icop2022.it/index.php/conference-program/

In compliance with the Italian Legislative Decree no. 196 dated 30/06/2003, I hereby authorize the recipient of this document to use and process my personal details for the purpose of recruiting and selecting staff and I confirm to be informed of my rights in accordance to art. 7 of the above mentioned decree.

Date: 12/06/2023 Signed: