GIULIA BATTISTINI

👤 Born in Bologna, Italy, on 20th November, 1997 (25 years old)

🏠 Via dello Sterlino 5, 40137 Bologna (BO), Italy

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in Giulia Battistini

🚗 Driver Licence B

EDUCATION AND PROFESSIONAL EXPERIENCE

PhD in Electronics, Telecommunications, and Information Technologies Engineering
November 2022-Present

Alma Mater Studiorum – University of Bologna (DEI – Department of Electrical, Electronic and Information Engineering "Guglielmo Marconi"), Italy. Research Activity: "Wireless Power Transfer System for Neurostimulation Implanted Biomedical Applications".

Licensed Professional Engineer   *November 2022*
Alma Mater Studiorum – University of Bologna, Italy. Qualification to the profession of Information Engineer (Section A).

Research Fellow   *May 2022-October 2022*

Alma Mater Studiorum – University of Bologna (DEI – Department of Electrical, Electronic and Information Engineering "Guglielmo Marconi"), Italy. Research Activity: "Electromagnetic characterization of 3D-printed microwave structures and circuits".

Master's Degree in Telecommunications Engineering   *December 2019-March 2022*

Alma Mater Studiorum – University of Bologna, (School of Engineering and Architecture), Italy.

Final grade: 110/110 e lode (with honors)

Thesis title: "Characterization of a 3D-Printed low-cost flexible dielectric material for the realization of innovative WPT wearable applications".

Thesis abstract: The aim of this thesis is to demonstrate that 3D-printing technologies can be considered significantly attractive in the production of microwave devices and in the antenna design, with the intention of making them lightweight, cheaper, and easily integrable for the production of wireless, battery-free, and wearable devices for vital signals monitoring. In this work, a new 3D-printable, low-cost resin material, the Flexible80A, is proposed as RF substrate in the implementation of a rectifying antenna (rectenna) operating

at 2.45 GHz for wearable wireless power transfer (WPT) applications. A careful and accurate electromagnetic characterization of the abovementioned material, revealing it to be a very lossy substrate, has paved the way for the investigation of innovative transmission line and antenna layouts, as well as etching techniques, possible thanks to the design freedom enabled by 3D-printing technologies, with the aim of improving the wave propagation performance within lossy materials. This analysis is crucial in the design process of a patch antenna, meant to be successively connected to the rectifier. In fact, many different patch antenna layouts are explored varying the antenna dimensions, the substrate etchings shape and position, the feeding line technology, and the operating frequency. Before dealing with the rectification stage of the rectenna design, the hot and long-discussed topic of the equivalent receiving antenna circuit representation is addressed, providing an overview of the interpretation of different authors about the issue, and the position that has been adopted in this thesis. Furthermore, a rectenna design alternative to the conventional one is proposed and simulated with the aim of minimizing the dielectric losses, the cost and the overall rectenna dimension, eliminating the matching network and designing the antenna to be directly conjugate matched to the rectifier. Finally, a prototype of such miniaturized rectenna, operating at 2.45 GHz, has been fabricated with adhesive copper on a substrate sample of Flexible80A and measured, validating the optimum simulated results.

Supervisor: Chiar.ma Prof.ssa Ing. Costanzo Alessandra

Graduation Date: 21st March 2022

Bachelor Degree in Telecommunications Engineering   *September 2016-December 2019*

Alma Mater Studiorum – University of Bologna, (School of Engineering and Architecture), Italy.

Final grade: 98/110

Thesis title: "Deep Learning in the acquisition of ultrasonic signals".

Thesis abstract: This thesis falls within the research area of Structural Health Monitoring (SHM) and non-destructive monitoring systems. In particular, the most utilized method for SHM is the structural inspection by means of guided ultrasound waves, called Lamb waves, generated and received by a network of transducers and sensors within the structure with the aim of detecting the location, the severity and the kind of damages or faults within the latter. Many of the applications based on the exploitation of Lamb's waves for structural monitoring, make use of imaging methodologies for acquiring the wave interaction with possible damages. Unfortunately, these acquisition methods resort to structural scanning systems which are extremely expensive and time consuming. To reduce the amount of wave form samples and acquisition time, the Compressive Sensing (CS) allows to accurately rebuilt the acquired images from subsampled data (the number of signal samples are less than the ones required by Shannon sampling theory) without losing information or degrading the SNR. In this thesis the Pixel Recursive Super Resolution (PRSR), an innovative probabilistic Deep Learning model, has been implemented for the reconstruction of High Resolution (HR) images from the acquired ones, which are compressed and, thus, with Low spatial Resolution (LR). In this regard, this innovative Neural Network model is trained both using a training dataset of HR images acquired with traditional scanning methods, and using a dataset of images rebuilt by means of CS, with different Compressive Rates. The experimental results obtained in both cases reveal the great capacity of the model in predicting and generating super resolution output images, thus, giving the opportunity to adopt this model for accelerating the acquisition time of the wave forms propagating in the structures for damage detection, scanning an inferior number of samples, without degrading the reconstruction quality and improving the identification and quantification performance of structural damages.

Supervisor: Chiar.mo Prof. Ing. De Marchi Luca

Graduation Date: 19th December 2019

Classical Lyceum Degree

Classical High School Marco Minghetti – Bologna (BO), Italy.
Final grade: 89/100
Graduation Date: 9th July 2016

SCIENTIFIC RESEARCH PUBLICATIONS

[1] G. Battistini, G. Paolini, D. Masotti, and A. Costanzo, «3-D Etching Techniques for Low-Cost Wearable Microwave Devices in Grounded Coplanar Waveguide», *IMBioC 2022,* 16th -18th May 2022. Invited for the Best Student Paper Competition held on May 17th during the *IMBioC* 2022 conference.

[2] G. Battistini, G. Paolini, D. Masotti, and A. Costanzo, «Innovative 3-D Printing Processing Techniques for Flexible and Wearable Planar Rectennas», accepted at *WPTC 2022,* 4th - 9th July 2022.

[3] G. Battistini, G. Paolini, D. Masotti, and A. Costanzo, «Wearable Coplanar-Fed 2.45 GHz-Rectenna on a Flexible 3D-Printable Low-Cost Substrate», accepted at *EuMW 2022,* 25th – 30th September 2022.

[4]G. Battistini, G. Paolini, D. Masotti, and A. Costanzo, « 3D-Printable Rectenna for Passive Tag Localization Exploiting Multi-Sine Intermodulation», submitted at *IMS 2023,* 11th -16th June 2023, San Diego, CA.

LANGUAGES

- Italian (native tongue)
- English B2 level – Cambridge English Level 1 Certificate in ESOL International (First) (1st February 2016)
- Spanish (Intermediate)

PROFESSIONAL SKILLS

- C programming language (Good knowledge)
- Matlab Programming (Good knowledge)
- Simulink (Matlab) (Good knowledge)
- CST Studio Suite (CST Microwave Studio for electromagnetic 3-D simulations) (Advanced knowledge)
- Keysight ADS (Advance Design System, circuit simulations) (Advanced knowledge)
- Cadence AWR microwave environmental design (circuit simulations) (Advanced knowledge)
- Basics of QGIS (Geographic Information System) for Fiber Network Mapping
- Proficient with measuring instruments (oscilloscope, spectrum analyzer, vector network analyzer, DC and RF generators)

COMPUTER SKILLS

Highly proficient with the operating systems:
- Microsoft Windows
- Apple macOS
- Microsoft Office packs Programs

Good knowledge of:
- Linux operating system

SOFT SKILLS

- Adaptability and flexibility
- Team work
- Communication
- Proactivity
- Collecting and processing information
- Planning and organizing
- Time management
- Creative thinking
- Managing Conflicts (certificated by UniBOOK Open knowledge on March 23rd, 2021)
- Managing Changes (certificated by UniBOOK Open knowledge on March 8th, 2021)

COURSES AND CONFERENCES

- Winner of the First Prize at the Three Minute Thesis 3MT® competition held in Milan at the EuMW2022 on September 25^{h} -30th, 2022.
- Attendance, on September 25^{h} -30th, 2022, to the European Microwave Week (EuMW2022), held in Milan, Italy. Title of the presented work: "Wearable Coplanar-Fed 2.45 GHz-Rectenna on a Flexible 3D-Printable Low-Cost Substrate".
- Winner of the EuMC Student Grant for the participation at the 2022 European Microwave Week (EuMW) from 25th to 30th September 2022 in Milan, Italy.
- This paper "3-D Etching Techniques for Low-Cost Wearable Microwave Devices in Grounded Coplanar Waveguide" has been selected for the participation at the IMBioC 2022 Best Student Paper Competition held on May 16-18, 2022, in Suzhou, China, in a hybrid mode.
- Attendance, on May 16th -18th , 2022, to the IEEE International Microwave Biomedical Conference (IMBioC 2022), virtual event. Title of the presented work: "3-D Etching Techniques for Low-Cost Wearable Microwave Devices in Grounded Coplanar Waveguide". This paper has been selected for the participation at the IMBioC 2022 Best Student Paper Competition.
- Attendance, on 19th January 2022, to the Online Panel: Additive Manufacturing and 3D Printing Technologies for RF/Microwave Applications, sponsored by Fortify, Rogers Corporation, CAES, Nano Dimension, Boston Micro Fabrication (BMF).
- Participation, on 23rd March 2021, in Bologna, at the MOOC (Massive Open Online Course) entitled "Managing Conflicts", organized by Alma Mater Studiorum – University of Bologna, focused on the development of soft skills, in particular, learning how to deal with conflicts in a constructive way.
- Participation, on 8th March 2021, in Bologna, at the MOOC (Massive Open Online Course) entitled "Managing Changes", organized by Alma Mater Studiorum – University of Bologna, focused on the development of soft skills, in particular, learning how to face changes with awareness and self-confidence.
- Participation, on 17th March 2018, to the Safety formation course for students, organized by Alma Mater Studiorum – University of Bologna, about electrical hazards, the utilization of electrical machines, radioprotection measures, dangerous substances.

- Participation, on 28th January 2017, to the Safety formation course for students, organized by Alma Mater Studiorum – University of Bologna, focused on the organization of working environments, safety procedures, implants and equipment management.
- Participation to the English course organized by Liceo M.Minghetti, Bologna, in preparation of the Cambridge English Level 1 Examination in ESOL International (First) attained on February 2016.
- Participation to the English course organized by Liceo M.Minghetti, Bologna, in preparation of the Cambridge English Entry Level Examination in ESOL International (Entry 3) (Preliminary) attained on May 2014.

La sottoscritta, Giulia Battistini, consapevole che – ai sensi dell'art. 76 del D.P.R. 445/2000 – le dichiarazioni mendaci, la falsità negli atti e l'uso di atti falsi sono puniti ai sensi del codice penale e delle leggi speciali, dichiara che le informazioni rispondono a verità.

La sottoscritta, Giulia Battistini, in merito al trattamento dei dati personali esprime il proprio consenso al trattamento degli stessi nel rispetto delle finalità e modalità di cui al d.lgs. n. 196/2003.

Firma

Giulia Battistini