

Pietro Simeoni

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING, NORTHEASTERN UNIVERSITY, BOSTON, MA, USA

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• Experience

ECE Department, Northeastern University

Boston, MA, USA

POSTDOCTORAL RESEARCHER

July 2021 - Present

- Piezoelectric ultrasonic/RF systems development and students mentoring. Within Matteo Rinaldi's lab and the SMART Center, I design and build zero-power receivers and high-frequency resonators for next generation RF communication. We focus on ScAlN (built and characterized in-house on an Evatec Clusterline) and Lithium Niobate platforms.

ECE Department, Carnegie Mellon University

Pittsburgh, PA, USA

POSTDOCTORAL RESEARCHER

April 2021 - June 2021

- Miniaturized ultrasound wake-up receiver assembly and testing. I sized components to interface a voltage amplifier and a rectifier with ultrasound sensors I previously built and tested. I assembled the system and characterized it in terms of communication range, bandwidth, BER, and power consumption.

ECE Department, Carnegie Mellon University

Pittsburgh, PA, USA

PHD - MEMS ENGINEERING

July 2017 - February 2021

- PhD Thesis - Piezoelectric Nanoscale Ultrasound Transducers (pNUTs) - I modeled, designed, fabricated, and tested a novel type of ultrasound transducers that takes advantage of aggressively scaled piezoelectric films to reduce devices area by orders of magnitude. I investigated different techniques to mitigate the important role played by residual stress in the films
- Opto-mechanical modulator for high-density channels neural probes. I developed a system-level analytical model for an NSF proposal (accepted) as well as fabricated initial prototypes for a proof-of-concept

ECE Department, Carnegie Mellon University

Pittsburgh, PA, USA

RESEARCH ASSISTANT

February 2016 - August 2016

- Analytical and FEA modeling of a nano-electromechanical switch

• Education

Politecnico di Torino - PHELMA INP - EPFL

Italy - France - Switzerland

MASTER DEGREE IN NANOTECHNOLOGIES FOR THE ICTS

September 2014 - September 2016

- Degree 110/110 cum laude, GPA 4.0
- Courses focus: MEMS, micro-fabrication, analog/digital electronics design

Politecnico di Torino

Torino, Italy

BACHELOR DEGREE IN PHYSICS ENGINEERING

September 2011 - September 2014

• Skills

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|----------------------------|---|
| Matlab | 5 years experience of scripting for automation of data analysis, visualization, and analytical model implementation |
| Python | 4 years experience with data analysis and visualization (NumPy, SciPy, SymPy, Pandas, scikit-learn) |
| COMSOL | 5 years experience with FEA (Solid Mechanics, Electrostatics, Piezoelectricity, Pressure Acoustics) |
| Micro-Fabrication | 5 years experience with process design and cleanroom fab (lithography, sputtering, etching, electroplating, SEM) |
| PCB design | 3 years experience in PCB design on KiCad and soldering (voltage/current amplifiers, rectifiers, devices test boards) |
| Circuit Simulations | 5 years experience in circuit sims on ADS (AC, Transient, Harmonic-Balance, Envelope Circuit Simulation) |
| Electrical Testing | 5 years experience (AWG, Oscilloscope, VNA, Impedance Analyzer, Lock-In Amplifier) |
| Languages | English (fluent), Italian (native), Spanish (fluent), French (good) |
| Others | Ansys Mechanical, LT Spice, MS Office, LaTeX, SOLIDWORKS, Cadence, ZI LabOne, LynceeTec Koala |

• Honors & Awards

2019 **Dowd Fellow**, Philip and Marsha Dowd Graduate Fellowship

Pittsburgh, U.S.A

• Publications

- P. Simeoni and G. Piazza, "Enhanced Airborne Ultrasound WuRx Using Aluminum Nitride 4-Beam pNUTs Arrays", *Journal of Microelectromechanical Systems* (Early Access)
- P. Simeoni and G. Piazza, "Aluminum Nitride 4-Beam Piezoelectric Nanoscale Ultrasound Transducer (pNUT)", *Journal of Microelectromechanical Systems* (Volume: 30, Issue: 5, Oct. 2021)
- P. Simeoni and G. Piazza, "A 100 nm Thick, 32 kHz X-Cut Lithium Niobate Piezoelectric Nanoscale Ultrasound Transducer for Airborne Ultrasound Communication" *Journal of Microelectromechanical Systems* (Volume: 30, Issue: 3, Jun. 2021)
- P. Simeoni, Matteo Castellani and G. Piazza, "Long-Range Ultrasound Wake-Up Receiver with a Piezoelectric Nanoscale Ultrasound Transducer (pNUT)" 2020 IEEE MEMS Conference, Vancouver, Canada
- P. Simeoni and G. Piazza, "A Miniaturized (100 μm x 100 μm) 45kHz Aluminum Nitride Ultrasonic Transducer for Airborne Communication and Powering" 2019 IEEE International Ultrasonics Symposium (IUS), Glasgow, Scotland
- L. Colombo, A. Kochhar, G. Vidal-Álvarez, Z. Schaffer, P. Simeoni and G. Piazza, "Comparison between different MEMS Laterally Vibrating Resonator Technologies for Passive Voltage Amplification in an RF Front-End System," 2018 IEEE MTT-S International Microwave Workshop Series on Advanced Materials and Processes for RF and THz Applications (IMWS-AMP), Ann Arbor, MI, 2018, pp. 1-3. doi: 10.1109/IMWS-AMP.2018.8457149