## PERSONAL INFORMATION  Nicola Pesce

### EDUCATION AND WORK EXPERIENCE

**Nov. 2024 – Present**

**Postdoctoral Fellow**, Sapienza University of Rome, Dept. of Astronautics-Electric-Energy Engineering (DIAEE)

Development of functional piezoresistive coatings for pressure mapping (ERT/AI). Simulation and optimization of sensor-array architectures; COMSOL studies linking geometry/materials to sensitivity; design of DAQ protocols; prototyping and electrical/mechanical characterization.

**Nov. 2021 – Oct. 2024**

**Ph.D. in Nanotechnology Engineering**, Sapienza University of Rome, Dept. of DIAEE

Thesis: *"Piezoresistive graphene-based inks for strain and pressure sensing through electrical resistance tomography-inspired methodologies and AI-assisted pattern recognition techniques."*

**2022 – 2024**

**Research Consultant**, Sapienza University of Rome

FEM modeling of nanostructured devices and design of advanced electrical characterization setups.

**2022**

**Research Start Fellow**, Sapienza University of Rome

Project on graphene-nanoplatelet inks for tomographic sensing integrated with machine learning.

**2021**

**Research Fellow**, Sapienza University of Rome, DIAEE

Design and characterization of nanostructured polymeric foams for sensing.

**2016 – 2019**

**M.Sc. in Theoretical Physics**, Sapienza University of Rome

Thesis: *"Study of the Hopfield model with correlated patterns"* (Statistical physics of disordered systems).

**2012 – 2016**

**B.Sc. in Physics**, Sapienza University of Rome

Thesis: *"Stark Effect"* — Study of spectral line shifting in external electric fields.

### PROFESSIONAL EXPERIENCE

**05.12.2022 – Present**

**Researcher in the national project "Age-IT" (PNRR)**

The project addresses the challenges of aging in Italian society via technological innovation. Activities include the development of a non-invasive sensory system for bedridden patient monitoring using graphene-based coatings, electrical resistance tomography, and machine learning techniques.

**06.2022**

**Winner of the "Research Start" grant, Sapienza University**

Project: "Development and application of piezoresistive Graphene NanoPlatelets (GNPs)-filled inks for the realization of sensing surfaces for human activity monitoring in elderly care using ERT assisted by machine learning and deep learning."

## TEACHING EXPERIENCE

**2021 – 2024** — **Lab Instructor**, "Sensors and Electrical Characterization Lab" (Nanotechnology Engineering), Sapienza University

**2023** — **Co-supervisor of MSc thesis**: "Piezoresistive Coefficients of Graphene-Loaded Waterborne Paint"

## PUBLICATIONS

### Journal and Conference Publications

[1] Pesce, N. et al. (2025). *"Graphene-Printed Sheet Textiles for AI-Driven Infant Sleep Position Recognition."* IEEE Sensors Journal.

[2] Pesce, N. et al. (2024). *"Screen-Printed Graphene-Ink on a Fitted Sheet for Pressure Sensing and Sleeping Posture Recognition by Machine Learning Techniques."* In IEEE SENSORS 2024 Conference Proceedings, pp. 1–4. IEEE.

[3] Pesce, N. et al. (2023). *"3D Printed Graphene-Based Piezoresistive Foam Mat for Pressure Detection Through ERT and Machine Learning."* IEEE Sensors Letters.

[4] Fortunato, M. et al. (2023). *"3D-Printed Graphene Nanoplatelets/Polymer Foams for Pressure Sensors."* Sensors, 23(16), 7054.

[5] Cozzolino, F. et al. (2022). *"New Sensing and EM Absorbing Laminate Combining Structural Detection and Radar Absorption."* Sensors, 22(21), 8470.

[6] Tamburrano, A. et al. (2022). *"Piezoresistive Graphene-Loaded Paint for Spatial Sensing."* Sensors, 22(11), 4241.

### Conference Presentations

[C1] IEEE SENSORS 2024 (Kobe, Japan): *"Screen-Printed Graphene-Ink on a Fitted Sheet for Pressure Sensing and Sleeping Posture Recognition by ML Techniques."*

[C2] IEEE SENSORS 2023 (Vienna, Austria): *"3D Printed Graphene-Based Foam Mat for Pressure Detection via ERT and ML."*

## PERSONAL SKILLS

**Mother tongue** — Italian

**Other languages**

| | UNDERSTANDING | | SPEAKING | | WRITING |
|---|---|---|---|---|---|
| | Listening | Reading | Spoken interaction | Spoken production | |
| English | C1 | C1 | C1 | C1 | C1 |

**Technical skills**
- **Simulation:** Multiphysics FEM (COMSOL), parametric studies, device-level modeling
- **Fabrication & Prototyping:** Functional inks, screen-/spray-/3D printing, microfabrication
- **Characterization:** Electrical (DC/AC, impedance, C–V), electromechanical testing, FE-SEM
- **Computation & Data:** Python, MATLAB, C++, AI/ML for sensing and inverse problems, signal processing
- **Electronics & Lab Tools:** DAQ, nanovoltmeters, current generators, Arduino
- **Software:** Linux, LaTeX, Microsoft Office, VBA

**Additional Skills**
- **Online course:** "Machine Learning with Python" (Coursera, authorized by IBM)
- **Tutoring experience:** Assistant teacher for high school and university students