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LUISA ERZINGHER

ABOUT ME

Master's graduate in Biomedical Engineering with a specialization in Biorobotics and Bionics. Involved in the development of AI-based computer vision systems for biomedical imaging and robotics applications. Knowledge of nonlinear dynamical models and control systems, with experience in integrating image processing techniques and vision pipelines for perception and interaction with the environment in biomedical contexts.

EDUCATION AND TRAINING

[09/2022 – 03/2025]

Master's Degree in Biomedical Engineering

Università degli studi di Napoli Federico II https://www.unina.it

City: Napoli | **Country:** Italy | **Field(s) of study:** Biomedical Engineering | **Final grade:** 110 cum laude | **Level in EQF:** EQF level 7 | **Thesis:** Effect of respiration and relaxation on Heart Rate Variability: a mathematical model

[09/2018 – 09/2022]

Bachelor's Degree in Biomedical Engineering

Università degli studi di Napoli Federico II https://www.unina.it

City: Napoli | **Country:** Italy | **Field(s) of study:** Biomedical Engineering | **Final grade:** 108 | **Level in EQF:** EQF level 6 | **Thesis:** Electrothermal models for skin exposed to millimeter waves

[09/2013 – 07/2018]

High school diploma

Liceo Classico Statale A. Pansini

City: Napoli | **Country:** Italy | | **Final grade:** 100 cum laude | **Level in EQF:** EQF level 4

LANGUAGE SKILLS

Mother tongue(s): Italian

Other language(s):

English

LISTENING C1 **READING** C1 **WRITING** C1

SPOKEN PRODUCTION C1 **SPOKEN INTERACTION** C1

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

SKILLS

Technical skills

C++ | Python (computer programming) | Microsoft Office | LaTeX (very good) | SOFA | MATLAB/simulink | Labview (basic level) | simul8 | Cisco - Packet Tracer

PROJECTS

Biomedical Signal and Image Processing

Application of machine learning techniques for the analysis of MRI images aimed at diagnosing biliary atresia in pediatric patients post-Kasai surgery, with the goal of

accurately classifying patients as "ideal" or "non-ideal" based on radiomic features extracted from liver regions, thereby enhancing diagnostic accuracy.

Robotic Vision Systems

Application of deep learning techniques for face detection problem, utilizing transfer learning and fine-tuning of pretrained neural networks. Involved exploration of various architectures, optimization strategies, and data augmentation methods to enhance model performance.

Nonlinear Dynamics and Control

Analysis of a tumor–T-cell interaction model, with a focus on studying bifurcations in tumor onset and progression. Designed control systems for the release of antitumor immunotherapeutic nanoparticles (SMC, I/O FBL) to optimize therapeutic efficacy.

Physiological Control Systems

Analysis of mathematical models for intestinal stem cells dynamics and tumorigenesis, with a focus on the study of bifurcations and the initiation of cancer.

Foundations of Robotics

Trajectory planning and development of adaptive and robust controllers for SCARA robots, focusing on optimizing motion efficiency and accuracy. The work involved designing control algorithms to ensure precise path execution despite environmental uncertainties and disturbances.

Medical Robotics

Development of modeling and design techniques for soft systems, focusing on creating flexible and adaptive structures to improve performance in dynamical environments.

WORK EXPERIENCE

[10/2024 – 02/2025]

Research intern

Università degli studi di Napoli Federico II - DIETI

City: Naples | **Country:** Italy

Research internship focused on the modeling of a dynamical system describing the physiological mechanisms underlying heart rate variability, based on biosignals acquired from real subjects. The activities involved the development of the model, its implementation within simulation frameworks, along with the experimental acquisition and analysis of biosignals for model validation. The work integrated computational and mathematical tools to simulate complex physiological processes within the scope of ongoing research.

PUBLICATIONS

A System Theoretic Oriented Model to Investigate the Dynamics Correlating Respiration and Hearth Rate Variability

Reference: R. Granata, L. Erzingher, S.Mosca, V. Santoriello, M. Russo, L. Donisi, M. Romano, F. Amato and A. M. Ponsiglione, A System Theoretic Oriented Model to Investigate the Dynamics Correlating Respiration and Hearth Rate Variability, 2025

A control theory-based mathematical framework describing the interaction between respiration and heart rate variability. The model was implemented in Matlab Simulink and validated through simulations to support the analysis of autonomic nervous system function.

Authors: Rita Granata, Luisa Erzingher, Sabrina Mosca, Vittorio Santoriello, Michela Russo, Leandro Donisi, Maria Romano, Francesco Amato and Alfonso Maria Ponsiglione

Naples, 08/04/2025

Firma autografa omessa ai sensi dell'art. 3 d.lgs. 39/1993.

LUISA ERZINGHER