Fabrizio Lo Regio

Innovative telecommunication systems for smart environment

Tutor: Leopoldo Angrisani

Cycle: XXXVIII

Year: I

My background

- **MSc degree** cum laude in Biomedical Engineering at DIETI, University of Naples Federico II (2022)
  - Thesis: "Development and characterization of an enhanced Brain-Computer Interface based on Augmented Reality and SSVEPs recognition"
- **Research group**: Measurement group with Professor Leopoldo Angrisani and Professor Egidio De Benedetto
- PhD start date: 1/01/2023
- **Scholarship**: PNRR, Partenariato Esteso PE14, RESearch and innovation on future Telecommunications systems and networks (RESTART)
- **Supervisor**: Prof. Leopoldo Angrisani

Research field of interest

Telecommunications systems and networks

1. Power Line Communication

- Exploiting existing electrical transmission and distribution networks as guiding structures for data signal propagation
- Enables green solutions, smart environment, circular economy

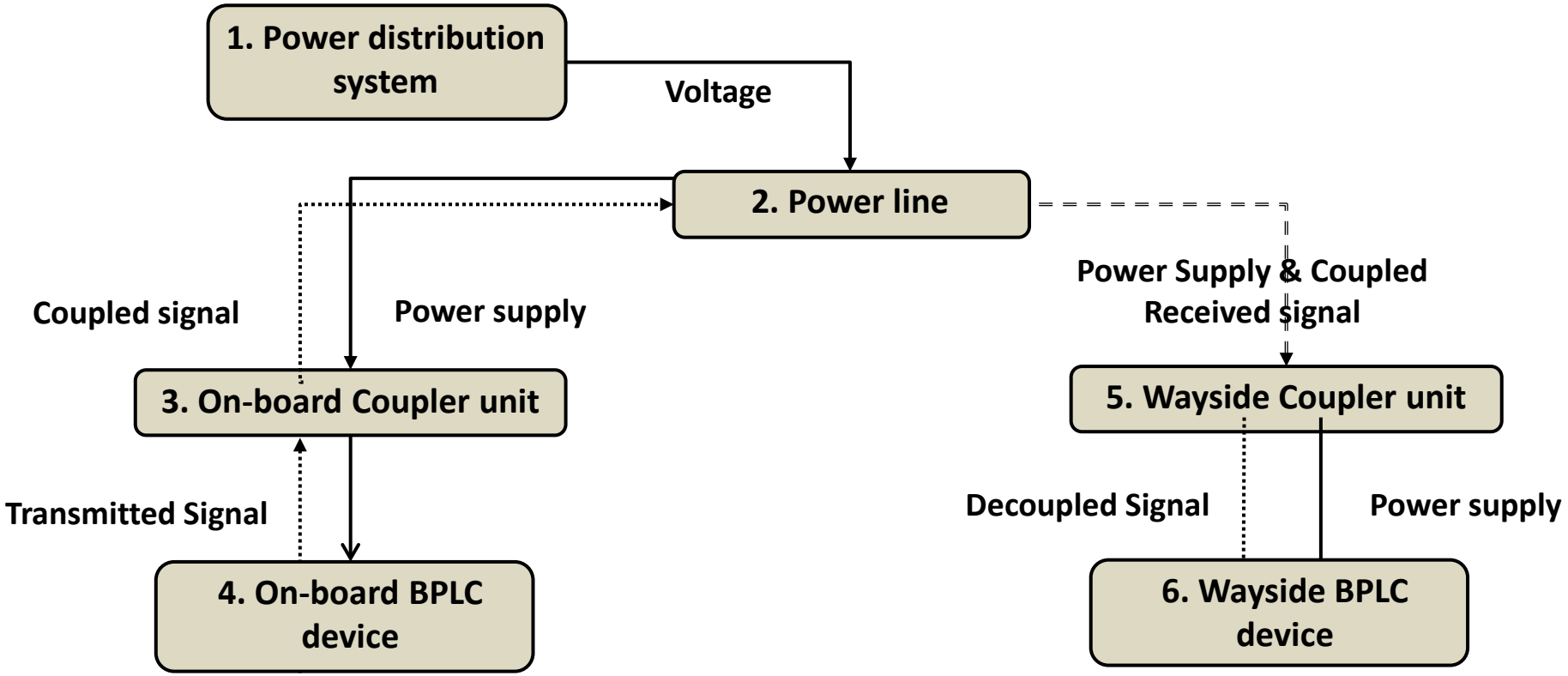
The increase in digital services and smart greed applications, also considering Sustainable Development Goals, require efficient solutions

2. Integrated Sensing and communications

Use of AR in Brain Computer Interface technology, its characterization for Industry 4.0

Power Line Communication: Overview

- Problem: High noise, unpredictable network features, channel characterization
- Objective: Use of statistical and deterministich approaches
- Methodology: Experimental campaigns, adaptive on-line couples, regulations



First Year activities

- **Contribution**
  - Survey about Broadband PLC in out-home scenarios, with regard to railway sector
  - Experimental campaign for data acquisitions about channel characterization and noise measurements
- **Methodology**
  - Systematic literature review based on nine papers strictly related to Broadband PLC in railway scenarios
  - Step response analysis and frequency analysis of acquired data
- **Result**
  - Gap between the in-home and out-home scenarios
  - Lack of knowledge about BPLC applications in railway scenarios
  - Lack of experimental campaigns
  - Highly noise scenario, non-stationary frequency selectivity and channel features

Summary of study activities

- **Ad hoc PhD courses**
  - Statistical data analysis for science and engineering research
  - Progettazione Europea
- **Courses borrowed from MSc curricula**
  - Data uncertainty
  - Lectures cycle about design of experiment
- **Conferences / events attended**
  - Speaker at 2023 IEEE International Conference MetroXRAINE; paper "Expanding the Frontiers of Wearable Brain-Computer Interfaces Combining Augmented Reality and Visually Evoked Potentials", 25-27/10/2023
  - Rapporteur at Conference "Scaling-up digital solutions for active and Healthy living: implementing across scientific disciplines, industrial sectors and scenarios" (AHL - Napoli 2023), 13-15/11/2023
- **PhD School**
  - International Ph.D School "Italo Gorini" 2023

Products

[P1]	Angrisani, L., Arpaia, P., De Benedetto, E., Duraccio, L., Regio, F. L., & Tedesco, A. *IEEE Sensors Journal*. Published. 2023. "Wearable Brain-Computer Interfaces based on Steady-State Visually Evoked Potentials and Augmented Reality: a Review"
[P2]	Angrisani, L., Arpaia, P., De Benedetto, E., Duraccio, L., Regio, F. L., & Tedesco, A. 2023 IEEE International Conference MetroXRAINE. Accepted. 2023. "Expanding the Frontiers of Wearable Brain-Computer Interfaces Combining Augmented Reality and Visually Evoked Potentials"
[P3]	Angrisani, L., D'Arco, M., De Benedetto, E., Duraccio, L., Lo Regio, F., IEEE Energies. Published. 2023. "Broadband Power Line Communication in Railway Traction Lines: A Survey"
[P4]	Angrisani, L, De Benedetto, E., Duraccio, L., Lo Regio, F., Ruggiero, R., Tedesco, A., IEEE Sensors, Published, 2023, "Infrared Thermography for Real-Time Assessment of the Effectiveness of Scoliosis Braces"
[P5]	Lo Regio, F., Angrisani, L., De Benedetto, E., Duraccio, L., & Tedesco, A., International Instrumentation and Measurement Technology Conference – IEEE I2MTC 2024, Submitted, 2023, "Experimental procedure for metrological characterization of AR-based eye-tracking interfaces"