

PhD RESEARCH OPPORTUNITIES

TSR-LAB - Communications for Smart Grids Research Track

The Communications for Smart Grids research track investigates communication technologies that enable reliable monitoring, control, and automation of future Smart Grids. A major research focus is the evaluation of the impact of electrical network conditions on Power Line Communications (PLC) performance. This includes studying the effects of grid impedance variations, channel distortions, and conducted disturbances introduced by emerging grid-connected technologies such as electric vehicle chargers, distributed energy resources (DERs), and energy storage systems. The work combines theoretical analysis, laboratory experimentation, field measurements, and advanced modeling to understand how the characteristics of power networks affect communication performance in Smart Grid applications.

We are looking for highly motivated PhD students interested in pursuing cutting-edge research at the intersection of communications, power systems, signal processing, and digital technologies in the energy sector. This research track offers the opportunity to address challenging scientific and technological problems with direct impact on the development of future intelligent energy networks. Candidates will contribute to the design of novel methodologies, the development of advanced measurement systems, and the generation of new knowledge through scientific publications and international collaborations.

PhD researchers become part of a multidisciplinary team composed of faculty members, postdoctoral researchers, PhD candidates, and undergraduate and graduate students at the University of the Basque Country (EHU). They are expected to actively participate in research activities, collaborate with other team members, present results at international conferences, and contribute to high-impact scientific publications. The position offers extensive opportunities for laboratory experimentation, field measurements, data analysis, and technology development in real Smart Grid environments.

Research Topics for PhD Students

PhD candidates will develop an individual research plan in collaboration with their supervisors. The research plan will define scientific objectives, methodology, expected contributions, milestones, and dissemination activities. Potential research topics include:

- Measurement systems and methodologies for electrical networks.
- Conducted emissions and electromagnetic compatibility (EMC).
- Metrology for power grids.
- PLC channel characterization, modeling, and simulation.
- Grid impedance measurement, estimation, and analysis.
- Impact of EVs, DERs, and energy storage systems on PLC communications.
- Development of advanced laboratory testbeds for Smart Grid communications.

- Performance analysis of Narrowband PLC (NB-PLC, 30 kHz–500 kHz) and Broadband over Power Lines (BPL, 1.7 MHz–15 MHz) technologies under realistic channel conditions.
- Signal processing and communication techniques for robust PLC systems.
- Data-driven and AI-based approaches for communication network characterization and performance assessment.
- Design and validation of communication solutions for next-generation Smart Grids.

Candidate Profile

Candidates should hold (or be close to completing) a Master's degree in Telecommunications Engineering, Electrical Engineering, Electronic Engineering, Computer Engineering, or a related discipline.

Previous experience in one or more of the following areas is desirable but not mandatory:

- Digital communications.
- Signal processing.
- Electromagnetic compatibility (EMC).
- Power systems and Smart Grids.
- Measurement systems and instrumentation.
- Data analysis and programming.

Candidates should demonstrate strong analytical skills, research motivation, initiative, and the ability to work both independently and as part of a multidisciplinary team.

The working language is English; therefore, a minimum proficiency level equivalent to B2 is expected.

Applications and Contact

Interested candidates are invited to submit a CV, academic transcripts, and a motivation letter describing their research interests to:

Prof. Itziar Angulo Pita
Email: itziar.angulo@ehu.eus
Phone: +34 946014414

Successful candidates may have the opportunity to pursue a full PhD within the research group, subject to funding availability and mutual agreement.