

## MSc 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, and field measurements to understand how the characteristics of power networks affect communication performance in Smart Grid applications.

We are looking for enthusiastic MSc students eager to contribute to cutting-edge research at the intersection of communications, power systems, and digital technologies in the energy sector. This research track offers the opportunity to work on challenging and highly relevant topics spanning electrical engineering, communications, and modern energy systems.

Students will become part of a multidisciplinary team composed of faculty members, PhD candidates, and undergraduate and graduate students at the University of the Basque Country (EHU). They will participate in both laboratory and field-based activities, and gain hands-on experience with advanced measurement systems and communication technologies. We welcome motivated candidates who enjoy problem-solving, teamwork, and tackling real-world engineering challenges while contributing to the development of future Smart Grids.

### Research Topics for MSc Students

Each incoming student will define, together with the supervisors, a specific research topic and work plan covering objectives, methodology, deliverables, and a detailed timeline tailored to their interests and the duration of their stay. The duration of the stay is flexible, typically ranging from 2 to 6 months.

Examples of research topics currently being investigated include:

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

### **Candidate Profile**

Candidates should have a solid background in telecommunications, electrical engineering, electronic engineering, computer engineering, or related disciplines.

Previous experience in PLC or Smart Grid technologies is not required; students are expected to acquire the necessary expertise during their stay.

The working language will be English, so a minimum level of B2 is expected from the candidates.

### **Applications and Contact**

Interested candidates are invited to submit a CV and a motivation letter to:

Prof. Itziar Angulo Pita (Email: [itziar.angulo@ehu.eus](mailto:itziar.angulo@ehu.eus) // Phone +34 946014414)