

**FACULTY RECRUITMENT PROFILE**  
**Assistant Professor**  
**Group of electrical engineering - Paris – GeePs / Electrical Energy Systems Faculty**

**Title:** Assistant Professor

**Position:** Assistant Professor in Electrical Engineering at the Electrical Energy Systems Faculty at CentraleSupélec, Paris-Saclay Campus / Group of electrical engineering - Paris – GeePs Laboratory (GeePs) UMR CNRS 8507, ZRR (Zone à Régime Restrictif), « CDI de droit public,» level Assistant Professor.

**CNU Section:** 63 – Electrical engineering, electronics, photonics, and systems

**Domain / Job profile:**

Within CentraleSupélec, involvement in teaching activities in electrical energy conversion (electrical machines and electronic power conversion for motors/generators and power transmission and distribution systems) at undergraduate and graduate levels.

Research in electrical engineering/energy conversion, a systemic approach to conversion chain design that integrates the constraints specific to the fields of electromobility, including the reliability, resilience, and sustainability of motorization systems.

**Keywords:** Electromechanical energy conversion systems, power electronics, modeling, design, control, electromobility, reliability, resilience, sustainability of motorization chains.

CentraleSupélec is a public scientific, cultural, and professional institution (EPSCP in French) under the authority of the Ministry of Higher Education and Scientific Research and the Ministry of the Economy, Industry, and Digital Technology. Its main missions are training high-level scientific general engineers, engineering and systems sciences research, and executive education.

The Electrical Energy Systems Faculty is an academic department at CentraleSupélec whose educational scope covers the fields of (*insert subject areas*) for the 3-year CentraleSupélec Engineering Program. The department also manages (*insert Masters only if applicable*) for Université Paris Saclay / and Specialized Masters for CentraleSupélec (*delete unnecessary items*).

The Group of electrical engineering - Paris – GeePs Laboratory is a joint CNRS-CentraleSupélec research unit. The main areas of research include physics of components, materials, waves, electromagnetics, electronics, and energy conversion systems. These activities are organized around three main themes:

- Electronics,
- Energy,
- Materials.

**Academic profile:**

The candidate will be part of the Electrical Energy Systems Faculty. They will engage with courses that are part of the CentraleSupélec engineering program and the electrical energy master program (master PIE). They will be particularly involved in the elective courses in electrical energy (1<sup>st</sup> year of the engineering cycle) and electrical energy conversion (2<sup>nd</sup> year) with participation in practice sessions and

lab sessions. They will also participate in lab sessions in the ST5 engineering challenge (2<sup>nd</sup> year) devoted to the control of systems with application to electrical machines. They will be involved in the 3<sup>rd</sup> year of the engineering program (master level) in the electrical energy topic of the energy major. They will have to supervise students' (academic projects and/or projects with industrial partners) or the preparation and supervision of lab sessions dedicated to controlling a machine with its converter. Additionally, in the frame of the preparation of experimental lab sessions from the year 2026 and beyond, the candidate will contribute to the development of new experimental platforms for teaching purposes, such as machine-converter association for wind generation or electric mobility or the control of power converters connected to the power grid.

If required, the candidate will also participate in the Bachelors's and Masters's of Sciences CentraleSupélec programs.

As some of these courses are taught in English, the ability to teach in English is expected.

### **Research profile:**

The candidate will join the GeePs Laboratory's Energy department, whose research activities include electrical energy conversion systems. The candidate will be expected to develop/undertake research in research activities on power electronic converters and actuators for which we design, model, and study particular topologies dedicated to specific applications.

Within the energy transition framework and from a perspective of sustainability in Electrical Engineering, the candidate's research activities will focus on the electrification of mobility. The design of a traction/propulsion chain for these new vehicles, whether land or airborne, requires combined innovations on the machine, its power supply, and the control of the whole. Research must therefore focus on a systemic approach to the design of the conversion chain that integrates the constraints specific to the field of electromobility. The requirements concern the increase in mass and volume power densities, reliability with increased resilience to failures, and service continuity assurance. This is reflected in an increase in operating frequency and voltage, made possible using "large gap" semiconductors (GaN, SiC). In addition, the objective of integrating converters as close as possible to the machine implies multiphysics problems (thermal, EMC, vibration) that must be considered. Considering the design phase, the physical characteristics of each component, their control, and diagnosis should lead to safer and more efficient mechatronic assemblies. Finally, through life cycle analyses of materials/components and system architecture design, the maintenance (repairability) and sustainability of powertrains should also be addressed.

The levers identified to carry out this research concern converter architectures, machine structures, control and command, integration of power electronics as close as possible to the machine, and the use of new materials and processes.

The person recruited will be able to rely on the various platforms and computing/simulation means of the laboratory to develop experimental devices integrating multiple innovations.

The candidate must demonstrate the ability to collaborate and lead research activities by participating in the supervision of student work and should be able to establish academic and industrial partnerships on this activity at the national and international levels.

### **Candidate profile:**

(Profile expectations)

- The candidate must hold a thesis in the field of Electrical Engineering.
- The candidate must be author or co-author of publications in international journals (the publication requirement will depend on the curriculum vitae and the number of years of experience).
- The candidate is expected to have a taste for teaching, research, and teamwork.
- The candidate is expected to engage in the supervision of research work in line with the themes of the laboratory.

**Recruitment interview:**

For the candidates selected for the audition, the audition will take place in three stages:

- A presentation of the candidate's background and integration project.
- An illustration of a 5-minute lesson, given in English, on a problem whose subject is identical for all candidates, will be specified on the invitation;
- An exchange with the members of the committee.

The duration of the three parts of the audition will be specified in the invitation letter.

**Candidatures:**

File in pdf format, including:

- A cover letter
- A detailed CV (teaching experience, research, mobility, publications, etc.)
- An integration project (5 to 10 pages)
- A copy of the identity card or passport
- A copy of the doctoral degree
- And any documents that attest the previous experience

must be sent by email no later than May 8,2023 at 11h59 p.m. (Paris time) mentioning the reference: GEEPSSEE2304

Human resources: [drh.pole-enseignant@centralesupelec.fr](mailto:drh.pole-enseignant@centralesupelec.fr)

**Scientific contacts:**

Claude Marchand, Director of GeePs Laboratory: [claudemarchand@centralesupelec.fr](mailto:claudemarchand@centralesupelec.fr)

Marc Petit, Director of SEE Faculty: [marcpetit@centralesupelec.fr](mailto:marcpetit@centralesupelec.fr)

Emmanuel Odic, Head of GeePs' Energy department: [emmanuel.odic@centralesupelec.fr](mailto:emmanuel.odic@centralesupelec.fr)