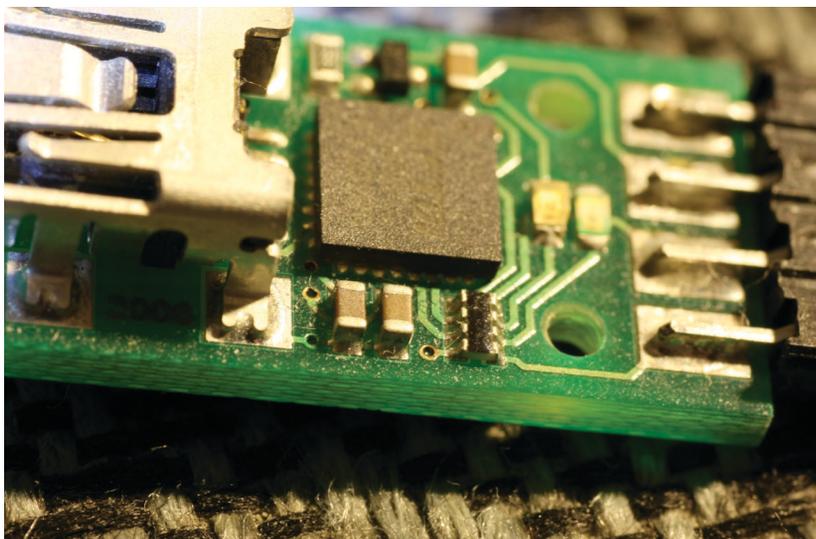


# Electrical & Electronic Engineering

Sorbonne University electrical engineering laboratories at UPMC and UTC cover a broad range of applications, and an established history of industrial partnerships.



## Electronics & Electromagnetism Laboratory (L2E)

Located on UPMC's Jussieu campus, the L2E provides a range of analysis methods and models to explain phenomena of electromagnetics wave propagation in complex environments, and innovative or disruptive electronic solutions to meet specific needs expressed in the domains of telecommunication, health, defense, aerospace and the automotive industry.

The L2E research is on three scales (micro/nanometric; millimeter/submillimeter; and centimetric/metric) and covers, electronic, opto-electronic and mechatronic systems, connected systems in human environments, and electromagnetic (EM) models for surveillance. An additional transverse theme is dedicated to biomedical applications and constitutes a structuring element between the different research activities made at L2E.

For all these themes, the L2E has developed complementary skills in microwaves and RF systems, radio-over-fiber technology (RoF),

electromagnetism and instrumentation. Its originality is based mainly on this multidisciplinary research which enhances the emergence of cross-functional projects and the genesis of new research fields.

Research activities led within the L2E are in close interaction with many industrial sectors, including biomedicine, aerospace, defense, and telecommunication.

### MAIN SKILLS

L2E has many skills in:

- Micro and nano electronics
- Connected systems and localization
- Bio-electromagnetism and EMC
- Antennas and radar

## Electrical Engineering Laboratory of Paris (LGEP)

The LGEP, co-supervised by UPMC and the CNRS, centers on information and power applications. The lab is divided into two departments: MADELEC and MOCOSEM.

The MADELEC department (MATERIALS and DEVICES for ELECTRONICS) has three laboratory teams working on materials for different types of electronic devices (photovoltaics, sensors, detectors and connecting devices and switching). The materials studied range from semiconductors and semi-insulators to superconductors and composites. The department also studies metallic and/or organic thin films used for low-level electric and power contacts. The department also includes the cross-cutting theme "Near-Field Microscopy".

The MOCOSEM department (MODELING and CONTROL of ELECTROMAGNETIC SYSTEMS) studies the analysis, design and control of electrical energy conversion systems. The main topic

\* UPMC: Pierre and Marie Curie University  
UTC: Compiègne University of Technology  
CNRS: French National Centre for Scientific Research

is the development of methods and models to determine the electromagnetic fields found in materials and complex structures whose behaviors adhere to strongly coupled multi-physical phenomena. The department also designs and implements systems that respond to the social and environmental concerns of energy management and dependability.

LGEP was chosen to participate in two advanced research networks in the Paris region, The Physics Triangle and Digiteo, because of LGEP's triple approach to research (theory/experiment/numerical modeling). The MADELEC and MOCOSEM departments are partners in the Excellence Initiative: the Nano-Saclay and the LaSISP LABEXs, respectively. LGEP is also an active member of the Institut Carnot "C3S" and a stakeholder in the SPEE Labs.

### The Compiègne Electromechanical Laboratory (LEC)

LEC focuses on a single domain of research: Electric actuators and motor systems with embedded power. The laboratory's goal is to be recognized as a reference in the field of the overall design of electronically controlled actuators. This domain requires the mastery of aspects as varied as the modeling of electromagnetic phenomena, power electronics, control, but also thermal and acoustic constraints.

LEC's activities are carried out in two complementary themes:

#### COMEC: The Design, Optimization, and Modeling of Electrical Machines and their Control

The objective of this theme is to study the electric actuators with innovative structures (machine, power electronics and control), as well as more conventional structures. This axis requires a scientific and technological multi-field approach, as well as mathematical tools for the numerical analysis and optimization.

The theme is studied from four perspectives:

- Optimal machine design
- Development of models adapted to control
- Realtime identification of electric machines and their power supply
- Analysis of acoustic noise generated during the association of electric machines and electric power converters

#### AS2E: The Supply of Embedded Power Systems

The constant search for increased autonomy in embedded power systems requires optimal sizing and control of the actuators, and their power supply system. Particular emphasis is given to strategies for optimal modulation, modeling and monitoring of electrochemical (battery) power sources.

The LEC has an established history of working closely with industry, including Valeo and EDF, and a developed technology transfer activity.

### Computer Laboratory of Paris 6 (LIP6)

LIP6, under the supervision of UPMC and CNRS, has 174 permanent researchers and 213 doctoral students. It is one of the leading computer science research laboratories in France, and the largest computer lab in the Paris region.

LIP6 is involved in electronics through its Embedded Systems department.

This department studies algorithms, methods and tools to design, model and simulate many core architectures, reconfigurable architectures, and heterogeneous systems on a chip including sensors. LIP6 is particularly focused on power efficiency, security, robustness and e-health.

A complete description of LIP6 activities can be found on the computer science presentation sheet.

L2E: [www.l2e.upmc.fr](http://www.l2e.upmc.fr) | LGEP: [www.lgep.supelec.fr](http://www.lgep.supelec.fr)  
| LEC: [www.utc.fr/lec](http://www.utc.fr/lec) | LIP6: [www.lip6.fr](http://www.lip6.fr)

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