INSTITUT NATIONAL DES SCIENCES APPLIQUÉES STRASBOURG

Job description

Duties: Postdoctoral or Research engineer for SBOVA project

Occupation or type of job*: Postdoctoral or Research engineer.

Job description form

Category: A

Statues (tenure, non-tenure, open): Open.

Field: GEC Department**.**

Quota: Full time**.**

Affectation

Administrative: INSA Strasbourg.
Geographic: INSA Strasbourg / 24 boulevard de la Victoire / 67084 Strasbourg Cedex.

INSA Strasbourg

The INSA (National Institute of Applied Sciences) of Strasbourg is a public establishment that focuses on scientific, cultural, and professional education. Its campus, located near the center of Strasbourg, accommodates approximately 2000 students pursuing degrees in engineering and architecture. The school has access to the nearby University of Strasbourg's amenities, including canteens, libraries, and sports facilities. INSA Strasbourg has a workforce of 270 employees, including both permanent and contractual staff.

In line with its sustainable development policy, INSA participates in the funding of eco-friendly transportation for its employees. This includes reimbursing 50% of public transport fees and providing a sustainable mobility package that includes options such as bicycles, carpooling, and shared mobility services. The primary objectives of INSA Strasbourg are to provide initial training for engineers and architects, conduct scientific and technological research, offer continuing education for engineers and technicians, and promote the dissemination of scientific and technical knowledge. INSA Strasbourg offers seven engineering specialties, including civil engineering, topography, electrical engineering, mechanical engineering, plastics engineering, mechatronics, climate, and energy engineering. In addition, it provides six engineering training programs in collaboration with various companies, as well as one training course in architecture.

INSA has implemented a system to address psycho-social risks, focusing on prevention, detection, and treatment of identified risks. Additionally, INSA Strasbourg has established a program to address instances of sexist, sexual, homophobic, or transphobic violence against staff and students. Finally, the institution has created a professional gender equality plan, which demonstrates its commitment to achieving true equality between men and women. INSA has been awarded the HRS4R label (European Human Resources Strategy for Researchers) since 2022.

The SBOVA project, a collaboration between SATT Conectus and INSA Lyon, aims to develop an innovative technological solution for intelligent fleet management of electric vehicles. This initiative, part of a public research maturation framework, focuses on leveraging advanced battery management systems and predictive algorithms to optimize the use of both new and second-life batteries. Key activities include advanced modeling of battery parameters (SoX: State of Charge, State of Health, etc.), predictive maintenance planning, and energy management optimization using AI-driven solutions. Supported by SATT Conectus, the project emphasizes research and development, market studies, and industrial partnerships to deliver proof-of-concept validations and enable technology transfer. The ultimate goal is to reduce total cost of ownership (TCO), enhance battery performance, and minimize environmental impact, contributing to the strategic shift toward sustainable electric mobility.

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Main tasks:
The recruited candidate will be responsible for drafting detailed project specifications and ensuring effective coordination with academic and industrial partners involved in the project. Their role will include conducting comprehensive reviews of the state-of-the-art in advanced multiphysical models for batteries and their applications. Additionally, they will contribute to the development and optimization of Battery Management Systems (BMS), encompassing both hardware and software components. This includes designing predictive models for battery performance, health monitoring, and lifecycle management while ensuring smooth integration with fleet operations and charging infrastructure. The candidate will play a key role in bridging research advancements with practical industrial applications, ensuring successful collaboration and technology transfer.

Main activities:
The postdoctoral researcher or research engineer will have several primary responsibilities, including:

1. **Project Management and Coordination**
   - Drafting project specifications and technical requirements.
   - Managing relationships with academic and industrial partners to ensure smooth collaboration and alignment with project goals.
2. **Research and Development**
   - Conducting an in-depth state-of-the-art review on advanced multiphysical battery models and innovative solutions.
   - Developing and optimizing Battery Management Systems (BMS), including both hardware and software components.
3. **Modeling and Simulation**
   - Designing predictive models for key battery parameters such as SoC, SoH, SoP, and SoE.
   - Exploring advanced algorithms for battery diagnostics, lifecycle prediction, and performance optimization.
4. **Technology Integration**
   - Implementing hardware-software solutions for BMS to support fleet operations and charging infrastructure.
   - Ensuring compatibility of BMS with real-world applications, including second-life battery management.
5. **Collaboration and Reporting**
   - Working closely with academic labs and industrial teams for technology transfer and validation.
   - Preparing technical documentation, reports, and presentations to summarize progress and findings.
6. **Innovation and Problem-Solving**
   - Exploring innovative approaches to address challenges in battery usage, recycling, and predictive maintenance.
   - Developing solutions to enhance the sustainability and efficiency of battery systems in electric mobility applications.

Other activities:
The postdoctoral researcher or research engineer will also engage in communication and dissemination activities, such as webinars and conferences, to share the project's results and findings with other researchers, INSA open days, industry partners, and the general public. They will collaborate with the other project partners to guarantee the efficient dissemination of project outcomes and participate in meetings with industry partners to discuss the project's progress and outcomes. This will enhance the project's visibility and encourage collaboration between the academic and industrial communities.

Specific conditions of exercise: Travel to partners in France.

Supervision: Scientific coordinators of the project.

Project management: Yes.

Travel: Yes.

Remuneration: Higher education salary scale.

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Skills

Knowledge:
The postdoc or research engineer should possess the following knowledge and skills:

- Fluent in English (and ideally French) with excellent writing skills in English being mandatory.
- Additional language skills in German would be an asset.
- Knowledge of battery systems.
- Understanding of electronic circuits.
- Programming skills in Python/Matlab or other programming languages.
- Advanced battery sizing methodologies and modeling techniques.
- Multiphysics modeling tools and simulation software.
- Data analysis and statistical methods.
- Project management and coordination with partners.
- Technical writing and documentation for reports and publications.
- Presentation skills for webinars, conferences, and workshops.

Having experience or knowledge in the following areas would also be beneficial:

- Electric vehicle systems and components.
- Renewable energy systems and integration.
- Battery testing and characterization techniques.
- Machine learning and artificial intelligence.
- Optimization techniques and algorithms.
- Knowledge of relevant industry standards and regulations.

Knows-how to:

- Implement scientific investigation techniques and documentary techniques.
- Express themselves in public.
- Strong problem-solving skills and ability to work independently and collaboratively in a team environment.
- Use software specific to the activity.
- Experience with project management and ability to coordinate tasks with project partners.
- Work in multicultural environment.

Soft skills:

- Highly organized and self-directed.
- Rigor and responsiveness.
- Spirit of initiative and results.
- Analytical and writing skills.
- Flexibility and ability to work in a team.
- Capacity to guide, negotiate and implement collective decisions.
- Excellent interpersonal skills in an international environment with multiple stakeholders.

Application profile

Level of study (with possible specification of the specialty): Master, engineer, doctoral degree (electrical engineering, chemistry, physics, materials science, computer engineering, industrial engineering).

Level of experience: 1 to 3 years for research engineer or young doctor.

Language (and level required): English and French.

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Follow-up and application procedures
Vacancy date: As soon as possible
Publication dates (1 month for a permanent position): January 21, 2025
Elements of the application: ➢ Resume ➢ Covering letter
Application address: srh.recrutement@insa-strasbourg.fr
Contact person for position information: tedjani.mesbahi@insa-strasbourg.fr