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Université Gustave Eiffel

Recruitment of a

Research Fellow Normal Class of Sustainable Development (CRCN)

(Chargé·e de recherche de classe normale du développement durable – CRCN)

within the "Rail traffic management" team

of the Lille campus of the Gustave Eiffel University

Job title:	Research Fellow in « Artificial Intelligence in Decision-Making for Solving Optimization Problems in Railway Services »
Institution:	Université Gustave Eiffel - www.univ-gustave-eiffel.fr/en
Discipline(s):	Computer Science / Automation / Applied Mathematics
Speciality(es):	Artificial intelligence, optimization, rail transport
Host Research Structure:	Département "Composants et Systèmes"
Location:	Université Gustave Eiffel, Campus of Lille
Contacts:	Mohamed GHAZEL, Director of ESTAS laboratory
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1- Research team

The "rail traffic management" team at Université Gustave Eiffel dedicates its research to enhancing the efficiency of the rail service planning process, a critical factor in achieving the sustainable development goals of mobility policies. Its work addresses complex decision-making and optimization challenges that emerge at various stages of this process. To support this effort, the team has developed a cutting-edge experimentation platform based on optimization and simulation models, making it possible to recreate the environment in which the optimization algorithms are deployed (estas.univ-gustave-eiffel.fr/english/research/traffic-management).

With three decades of experience and a strong track record in national and European industrial projects, the team stands at the forefront of scientific and technological innovation in this field. This expertise has fostered robust partnerships with key stakeholders in the rail industry and leading academic institutions. Operating within such a dynamic and collaborative environment, the team tackles emerging challenges driven by the ongoing evolution of the rail system.

Looking ahead, the team aims to further enhance its capabilities to ensure seamless integration of models and algorithms into the decision-making process, paving the way for more efficient and sustainable rail operations.

2- Job Content

The person recruited will play a key role in enhancing the team's expertise in integrating models and algorithms into the decision-making process and will conduct research focused on decision support systems aimed at addressing rail service optimization challenges. This work will leverage advanced methodologies, including artificial intelligence, statistical analysis, decision support frameworks, optimization techniques, as well as interaction languages and models. Without being exhaustive, the research topic can be developed in several directions, such as focusing on the modes of representation of problems and solution techniques, methods for aggregating and simplifying algorithmic inference steps, models and methods of interaction for solving problems, neural networks and learning methods for optimizing the decision-making process, multi-

criteria decision support methods and heuristics or meta-heuristics. In terms of application, various objectives are targeted, such as :

- generating explanations for multiple rail traffic management operators,
- advising the operator on the various possibilities for improving a solution by influencing the choice of models, algorithms and associated parameters,
- interacting with the operator to complete a partial solution or respond to a request for a contrasting explanation,
- evaluate a solution altered by an operator to alert and explain the potential disadvantages and risks associated with the modifications,
- exploiting feedback from the field to suggest reconfigurations and adjustments to model parameters and solution algorithms,
- support the search for a compromise solution among operators with conflicting criteria.

Generally speaking, a person recruited as a Research Fellow is expected to be involved in scientific production, supervision, research promotion and participation in the development of research programs at different levels (regional, national, European, international). In particular, the candidate will be expected to publish her/his work in international peer-reviewed journals that meet the standards of her/his discipline, but also in journals or books in the more applied fields of the laboratory. It is also expected to communicate the work to peers, but also to the general public. She/he may also be required to contribute to or carry out expertise tasks. He/she will also participate in the collective scientific life of the laboratory and the university.

In addition to his or her research production activity, a Research Fellow is also expected to develop, in the long term, a diversified activity in all or part of the following activities

- Teaching and research training (teaching, supervision of trainees, doctoral and post-doctoral students, participation in juries and bodies or committees related to teaching)
- Research administration and facilitation activities (team facilitation, project coordination, staff management, management of test facilities)
- Valorisation and transfer activities (research and industrial contracts, consultancy and advisory activities, transfer of research results to the socio-economic world, contribution to public policy development, dissemination of scientific culture)
- International activities (participation in European projects, ongoing international collaborations, contributions to the international visibility of the university)
- Scientific outreach (membership of learned societies, editorial boards, scientific committees of institutes, conferences, recruiting committees).

3- Expected profile

The candidate must hold a PhD in Computer Science, Automation and Applied Mathematics or be able to prove an equivalent level, in particular for foreign candidates (publications, participation in projects, teaching).

Skills and research experience in designing and testing models of interactions and explanations in the context of combinatorial problem solution would be particularly appreciated. The candidate's application file should highlight his/her ability to develop the activities (listed above) expected of a Research Fellow. Scientific publications at the highest level (international peer-reviewed journals and/or international conferences), participation in research projects (national and/or European), an aptitude for teamwork and scientific leadership, interpersonal skills and oral and written communication skills in French and English will be particularly appreciated. Scientific rigour, as well as autonomy and organisational skills, are obviously expected.

The person recruited will be assigned to the ESTAS laboratory at the research structure “Département Composants et Systèmes” on the university campus in Lille.

4- Recommendation

The candidate is expected to propose in his/her application a scientific project in line with the activities of the targeted research team and it is therefore strongly recommended to contact the persons indicated.The provisional schedule for the competition is as follows (recrutement.ecologie.gouv.fr/canlendrier):

- ***Registration from February 10, 2025, to March 14, 2025***
- ***Orals from June 2, 2025 to June 6, 2025***