PhD position at Bordeaux University

**Contribution of learning algorithms for optimizing reconfigurable manufacturing systems**

**Host Laboratory**
IMS – Bordeaux University
Graduate School – Sciences Physiques et de l’ingénieur

**Funding**
Région Nouvelle-Aquitaine and Bordeaux University
Starting date: Septembre 1st 2022
Duration: 3 years

**Subject**
The challenges (i.e. volatile demand, technological evolutions, environmental requirements) faced by manufacturing systems require adaptable, resilient and sustainable production systems. The paradigm of reconfigurable manufacturing systems (RMS), in line with the factory of the future (Industry 4.0), aims to address these challenges.
The PhD will focus on the resources layout problem in a context of using autonomous transportation system (AMR: Autonomous Mobile Robot). The main research questions addressed in this thesis are as follows:

- How to optimize the management of transport resources (i.e. routing of AMRs and fleet management) using mathematical or approximate optimization approaches by leveraging artificial intelligence. The use of learning algorithms (reinforcement or by deep reinforcement) will be investigated to extract certain key parameters in a changing environment (management of hazards in a dynamic context).

- How to design a sustainable RMS taking into account product and process variability to achieve production planning reducing energy and resource consumptions

To this end, it will be necessary to develop a software platform to simulate the manufacturing system, to instantiate the decisional models and to test reconfiguration scenarios, evaluated through performance indicators relating to the industrial and environmental efficiency.
Potential use cases will be drawn from the industrial applications developed by the company ez-wheel (https://www.ez-wheel.com/fr), a partner in this project, which develops autonomous wheels used in many fields (industry, logistics, health, etc.).

**References**
Candidate profile

- Master of Science degree (Operational Research, Artificial Intelligence, Computer Science, Applied Mathematics, Industrial Engineering)
- Excellent academic records, with knowledge in learning algorithms and combinatorial optimization (metaheuristics or linear programming / integer linear programming or multi-objective optimization)
- Programming skills:
  - Julia or Java or Python or C++ or optimization solver (Cplex, Gurobi, etc)
- Languages: English [French is a bonus but not mandatory]
- Others [not mandatory]
  - Background in production management or manufacturing
  - Discrete event simulation software (Anylogic, FlexSim, Arena Simio etc.)

Application

Send CV, bachelor’s and a master’s transcripts, cover letter and reference to:

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