Post-Doctoral position: Federated Learning for novel manufacturing paradigm inside Horizon European Project

Main scientific field: Blockchain and AI in the context of manufacturing application

About Arts et Métiers

ENSAM is a traditional engineering/research graduate school (Grande École), recognized for leading French higher education in the fields of mechanics and industrialization. Founded in 1780, it is among the oldest French institutions and is one of the most prestigious engineering schools in France. The school is a "Public Scientific, Cultural and Professional Institution" which has trained more than 85.000 engineers since its foundation.

The Mechanical, Surface, Materials, and Processes (MSMP) Laboratory is at the ENSAM campus located in Aix-en-Provence, France. The city is located in the region of Provence-Alpes-Côte d'Azur, close to the Mediterranean Sea in the south of France, a fact that gives it a warm climate with an average of 300 days of sunshine per year.

Workstation environnent:

Under the scope of the Horizon European project MARS: Manufacturing Architecture for Resilience and Sustainability, the MSMP Laboratory hosted by the École Nationale Supérieure d'Arts et Métiers (ENSAM) offers a post-doctoral position. The post-doctoral candidate will be part of a very ambitious project that offers the opportunity to work with 7 European high-tech companies (STIL/France, Ubitech/Greece, ARXUM/Germany, Konica Minolta/Czechia, Noosware/Netherlands, Simula/Norway, AIN/Spain) and 4 worldwide renowned Universities: Texas A&M, ETH Zurich, RWTH and NTUA.
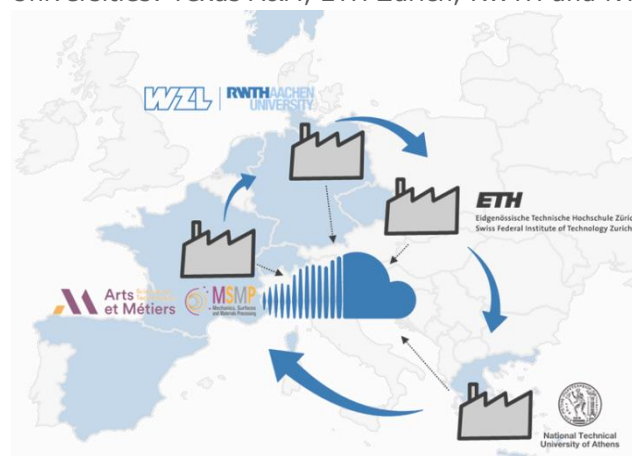
Project background:

The European manufacturing industry is majorly composed of SMEs, and they could take advantage of digitalization to join the world's competitive market. As economic,

sanitary, and societal crises take place more often than usual, supply chain disruptions are experienced creating a shortage of products in many sectors of the economy. The MARS project aims to enable SMEs to access advanced innovations in the field of AI-driven digital manufacturing processes and enter into process chains that are geographically distributed, making the manufacturing industry more resilient to crises. For that, the MARS project will create a Distributed Fractal Manufacturing System (DFMS), which is composed of manufacturing platforms that are interconnected. The DFMS will work as a coordinator hub connecting different manufacturing platforms (nodes). Each node of the DFMS will work as a local convergent manufacturing platform with the following databased decision-making/support tools: i) CAPP (Computer Aided Process Planning), ii) multi-agent distribution and scheduling of manufacturing tasks, iii) digital and data-hashed (blockchain) certification of measurements, iv) Proactive Quality Control (PQC). Each manufacturing platform will have its own local data management and will share only AI models and quality data with the system through the use of Federated Learning.

As a result, the project aims to introduce radical flexibility into manufacturing by redefining the process route, raw material, resources, technology, throughput, manufacturing site, delivery date, proven product quality, and sustainability.

Activities

Your task concerns mainly item iii), in which you will work together with project partners (Ubitech, Arxum, Noosware) to develop the architecture and framework of the DFMS platform.

The platform must be able to:
- Provide different levels of production-related information (procurement & planning, execution & supply chain, quality tracking)
- Perform machine/process data acquisition in relative real time;
- HMI for operator inputs and process monitoring;
- Exchange of AI models via Federated Learning with the DFMS cloud system.

The DFMS platform must also be capable of accommodating the other tools (i, ii, and iv) that will be developed by other R&D teams.
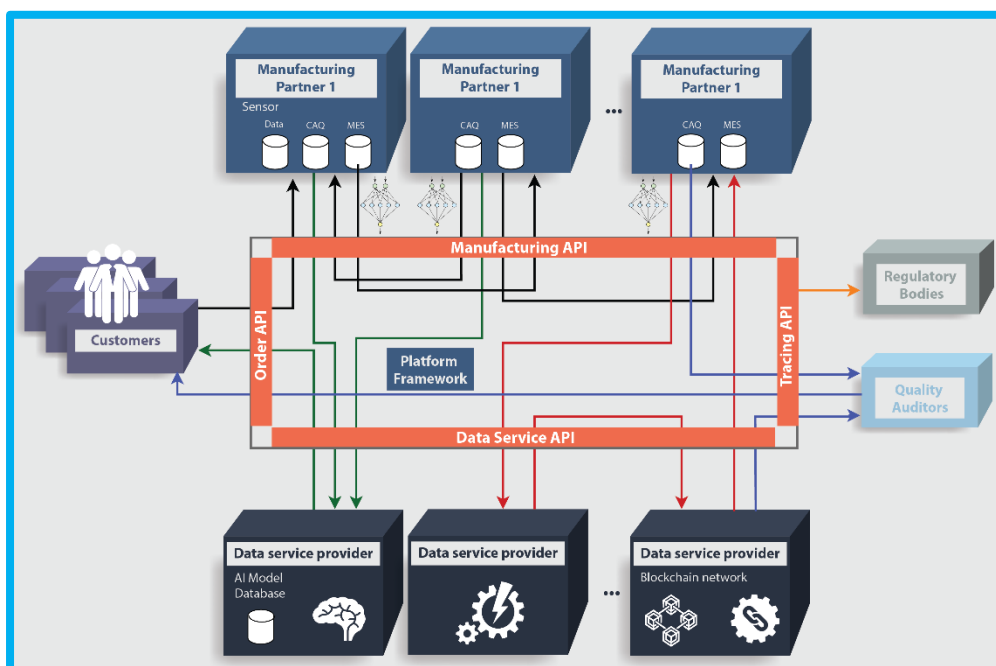
Distributed Fractal Manufacturing System (DFMS) framework in MARS project.

Keywords:

Federated learning, back-end developer, ML , cloud computing, blockchain

Your Profile:

We are looking for a proactive and highly motivated candidate, with a PhD degree in computer science or data science from a recognized University. You have a strong background in AI and a good knowledge about cloud architecture. Experience with Federated Learning is an advantage, as well as any experience with data acquisition or feedback to CNC machine tools. Professional command of English (both written and spoken) is mandatory.

Equal opportunities

ENSAM employs a large number of people with very different backgrounds and qualities, who inspire and motivate each other. We want every talent to feel at home in our organization and to be offered the same career opportunities. We therefore especially welcome applications from people who are underrepresented at ENSAM.

Curious? So are we.

We look forward to receiving your online application with the following documents:

*   Curriculum Vitae, max. 2 pages

*   Motivational Letter, max. 1 page

*   Academic Portfolio

*   Contact details of 2 referees

The contract will be for 2 years, starting at your earliest convenience. Further information about the MSMP can be found on the website : https://www.msmp.eu/. Questions regarding the position should be directed to Dr. El Mansori (mohamed.elmansori@ensam.eu) or Dr. Knoblauch (ricardo.knoblauch@ensam.eu).

Your personal data

ENSAM processes your personal data in accordance with the GDPR and the Data Protection Act. This processing is carried out for the purpose of managing your application and assessing your skills in relation to the position/internship for which you are applying.
For any exercise of rights on your personal data, you can contact ENSAM's Data Protection Officer at **the address dpo@ensam.eu**
To find out exhaustively about the data collected by ENSAM and how your data is processed, you can consult ENSAM's related personal data protection policy **HERE.**