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Supervisor Expression of Interest MSCA - Marie Sklodowska Curie Action - (PF) Postdoctoral Fellowship 2024

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Link “Pagina docente”:

https://www4.ceda.polimi.it/manifesti/manifesti/controller/ricerche/RicercaPerDocentiPublic.do?evn_prodotti=EVENTO&k_doc=842298&aa=2023&lang=IT

Department Name: Department of Management, Economics and Industrial Engineering (DIG)

Research topic: Human-centric manufacturing and logistics processes

MSCA-PF Research Area Panels:

- ECO_Economic Sciences
- ENG_Information Science and Engineering
- ENV_Environmental and Geosciences
- LIF_Life Sciences
- MAT_Mathematics
- PHY_Physics
- SOC_Social Sciences and Humanities
- CHE_Chemistry

Brief description of the Department and Research Group:

The Department of Management, Economics, and Industrial Engineering (DIG) of Politecnico di Milano was established in 1990. Its mission is to contribute to the common good and individual well-being through a critical understanding of the opportunities and challenges posed by technology to business and society. The Department pursues its mission with an international reach by creating and sharing knowledge through high-quality education, the quest for scientific excellence, and active community engagement.

We aim at:

- Educating responsible individuals who will shape the future of relevant corporations and institutions to serve society.
- Promoting original, rigorous, and relevant research at the intersection of engineering, management, and economics, focusing on a deep understanding of technology and its ecosystem.
- Contributing to a sustainable and inclusive society by inspiring virtuous business practices and transformational policy measures

With approximately 160 professors, DIG is one of the largest departments of Politecnico di Milano. More information can be found at: <https://www.som.polimi.it/en/>



POLITECNICO
MILANO 1863

DIG HumanTech project has been selected and funded by the Ministry of University and Research (MUR) for the period 2023-2027 within “Dipartimenti di Eccellenza” (Law 232/2016), the ministerial initiative aimed at rewarding the departments that stand out for the quality of their research and at financing specific development projects. In particular, the objective of HumanTech is to redefine the relationship between technology and human beings to enable a sustainable digital transition of industrial systems. The project aims to propose new models and processes for the development and adoption of technologies, capable of accelerating the transition towards sustainable, inclusive industrial systems that make individual and collective well-being a priority.

The PostDoc fellowship will be embedded in the **HumanTech** research cluster by the School of Management at Politecnico di Milano (<https://www.som.polimi.it>). All disciplines are needed and welcome, from management and engineering to medical, psychology or social sciences as human behavior in operations systems is analyzed. HumanTech is the project selected and financed by the Italian Ministry of University and Research (MUR) “Departments of Excellence” initiative (<https://www.som.polimi.it/humantech>). HumanTech aims to redesign the relationship between technology and people for a sustainable digital transition of industrial systems, proposing new models and processes for the development and adoption of technologies, capable of accelerating the transition towards industrial systems that are sustainable, inclusive and respectful to individual and collective well-being. New technological development models for sustainable industrial systems (HumanTech [VIDEO](#)). The project provides for the establishment of the Cognitive Ergonomics in Cyber-Physical Systems Laboratory (CORE Lab). The work of the **CORE Lab** is based in the departmental laboratory Industry 4.0 Marco Garetti and in the MADE Competence Center Industry 4.0 of Politecnico di Milano (<https://www.made-cc.eu>) and therefore has the latest technology available, on the manufacturing and logistics as well as on the biosensor sides (EEG, ECG, EDA, Eye Tracking, Motion Mining etc.).

TITLE of the project: The Industry 5.0 Paradigm Enacted – Biosensor Research to Support Human-centric Manufacturing and Logistics Process Design in Practice

Brief project description

The Industry 4.0 concept has aimed to improve business performance through digital transformation – translating into an operations (manufacturing and logistics) environment improved by digital technologies like robots, automation, IoT, drones or artificial intelligence. Yet, pursuing business performance improvement in operations with a solely technological-driven approach led to many challenges such as effective adoption in human decision-making processes, preventing the full exploitation of I4.0-related technologies.

The roles of human workers are changing significantly as technology and digital systems are becoming more and more independent – seeing for example drones, autonomous trucks, or software bots. Therefore, in the future, the human factor relies on supervision, oversight capacity, and system-level decision-making. This paves the way for reflections regarding the role of humans and human workload in such newly conceived technology-centered factories and transportation processes, leading researchers and practitioners to reshape the industrial landscape with a human-centric perspective according to the Industry 5.0 concept by the European Commission, especially on the shop floor for production and assembly operations or in logistics and transportation tasks.



POLITECNICO
MILANO 1863

The rise of neuroscience with mobile and unobtrusive biosensor equipment facilitates the empirical measurement of human worker cognitive ergonomics states during task settings in operations. This includes an array of neuroscientific measurements like electroencephalogram (EEG), electrocardiography (ECG), galvanic skin response or PDA. Yet, large-scale avenues for empirical research in this domain is missing, constituting a significant research gap to be explored by the MSCA grant holder. Together, we aim to measure possible baseline values in typical operations tasks with biosensor equipment. Connected to this, an issue of individual variability and context variability for such values arises. Compared to physical ergonomics, such experience values exist from many years of research – whereas for cognitive ergonomics measurements in operations this is a completely new field of research.

One central core benefit of the PostDoc station with Politecnico di Milano and DIG in the context of the HumanTech research cluster will be the close collaboration with our renowned European partners, including a research stay of several months with one of these leading institutions:

- Prof. Torbjörn Netland, ETH Zurich, Switzerland (Manufacturing)
- Prof. Johan Stahre, Chalmers Gothenburg, Sweden (Manufacturing)
- Prof. Susana Relvas, Tecnico Lisboa, Portugal (Warehousing)
- Prof. Christoph Glock, TU Darmstadt, Germany (Warehousing)

In this setting, the research and career of PostDocs can flourish and produce exceptional results.