POLITECNICO DI MILANO

PhD in INGEGNERIA GESTIONALE / MANAGEMENT ENGINEERING - 40th cycle

THEMATIC Research Field: HUMAN-CENTRIC NOISE ANALYSIS IN INDUSTRIAL MANUFACTURING AND LOGISTICS AS ANALYTICAL BASIS FOR INDUSTRY 5.0 AND THE SUPPORT OF DIFFERENTLY-ABLED PERSONS

Monthly net income of PhDscholarship (max 36 months)
€ 1500.0 In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity	
Motivation and objectives of the research in this field	In manufacturing management, fears of widespread job replacement by machines have always accompanied phases of technological breakthrough. This concern recently focused the twin transition (green and digital) as applied to the manufacturing industry to strengthen value chain resilience and explore reshoring options by deploying advanced digital technologies. The modern manufacturing world is focusing on automation leading to rising economic inequality and changes in job quality. Moreover, the emergence of AI as a new competitor for human labour might weaken the employability of workers, especially those that perform tasks that are at high risk of automation. Recent studies report generative AI (ChatGPT, Bard, Llama) to be expected to impact 19% of the workforce having over 50% of their tasks automated and job losses making headlines, while others expect the technology to enhance jobs jobs. While the majority of manufacturers have started their journey towards embedding AI in their production environments, only 16% have so far successfully reached their AI related targets, as reported in a recent study by the World Economic Forum (2023). The Industry 5.0 paradigm addresses these concerns by reshaping twin transition beyond efficiency and productivity as the sole goals and reinforces the role and the contribution of industry to society. It places workers' wellbeing at the centre of the production process, using new technologies to provide

	prosperity beyond jobs. Understanding human technology complementarity combining industry productivity and flexibility with the need for human-centered and human-driven manufacturing processes, is at the core of digital manufacturing innovation focusing multiple domains: technical aspects of human-machine interaction, upskilling, reskilling, work and business organization, regulatory, standards. However ,several challenges persists to understand the social, economic transformations impact of twin transition on inclusiveness, skills development and social sustainability of Europe.
Methods and techniques that will be developed and used to carry out the research	The PhD student will explore the sensor and analysis capabilities in line with the HumanTech CORE Lab at the MADE center for cognitive ergonomics research in manufacturing, using this to implement basic research on human-technology interaction in human-centric manufacturing. This includes for example EEG, ECG or EDA sensors and data, interlinked and analysed together with physical movement and workload for example in assembly.
Educational objectives	PhD students are trained in this context in four relvant streams: First, dedicated research methods for Industry 5.0 and human-centric processes in manufacturing are explored and trained. Second, innovation management and co-design techniques are implemented and trained as well. Third, industry, association and research institution collaboration is implemented and trained fort he PhD student. And fourth, collaboration experience on an European level is trained and explored (in English as the PhD program too).
Job opportunities	PhD students and graduates have excellent job opportunities in industry as well as resaerch or association positions on a European level as the connected project time in the EU HORIZON research project SkillAIbility provides them with extant experience and knowledge in relevant fields of the future of manufacturing and European collaboration.
Composition of the research group	4 Full Professors

	2 Associated Professors 0 Assistant Professors 2 PhD Students
Name of the research directors	Sergio Terzi, Monica Rossi, Matthias Klumpp

Contacts
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Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	750.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information

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Besides contributing tot he EU Horizon Research Project "SkillAIbility", the PhD student will have access to research facilities like MADE center and HumanTech CORE Lab at Polimi DIG. In addition, there is a budget for conference travel options for presenting the conducted research at international conferences like EurOMA or POM.

•Involvement in projects: "For the overall development of their capabilities, PhD candidates will work on sinergical projects to favour empiral data collection and network development for their career. Projects will give candidates the opportunity to work in group (peers and other senior professors)".

Funding for educational activities: 6.100,00 Euros for three years.