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Advancing Trustworthy Human-robot Collaboration: Challenges and Opportunities in Diverse European Industrial Settings

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Abstract : The decline in employment rates across sectors like industry and construction is exacerbated by an aging workforce. This has far-reaching implications for the economy, including skills gaps, labour shortages, productivity challenges due to physical limitations, and workplace safety concerns. To sustain the workforce and pension systems, technology plays a pivotal role. Robots provide valuable support to human workers, and effective human-robot interaction is essential. FORTIS, a Horizon project, aims to address these challenges by creating a comprehensive Human-Robot Interaction (HRI) solution. This solution focuses on multi-modal communication and multi-aspect interaction, with a primary goal of maintaining a human-centric approach. By meeting the needs of both human workers and robots, FORTIS aims to facilitate efficient and safe collaboration. The project encompasses three key activities: 1) A Human-Centric Approach involving data collection, annotation, understanding human behavioural cognition, and contextual human-robot information exchange. 2) A Robotic-Centric Focus addressing the unique requirements of robots during the perception and evaluation of human behaviour. 3) Ensuring Human-Robot Trustworthiness through measures such as human-robot digital twins, safety protocols, and resource allocation. Factor Social, a project partner, will analyse psycho-physiological signals that influence human factors, particularly in hazardous working conditions. The analysis will be conducted using a combination of case studies, structured interviews, questionnaires, and a comprehensive literature review. However, the adoption of novel technologies, particularly those involving human-robot interaction, often faces hurdles related to acceptance. To address this challenge, FORTIS will draw upon insights from Social Sciences and Humanities (SSH), including risk perception and technology acceptance models. Throughout its lifecycle, FORTIS will uphold a human-centric approach, leveraging SSH methodologies to inform the design and development of solutions. This project received funding from European Union’s Horizon 2020/Horizon Europe research and innovation program under grant agreement No 101135707 (FORTIS).

Keywords : skills gaps, productivity challenges, workplace safety, human-robot interaction, human-centric approach, social sciences and humanities, risk perception
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