PSO-STPA model: case study of an industry 4.0 plant using smart glasses

Systemic methods in complex and digitalized manufacturing series

Date: February 15th, 2025
Time: 15:00 UTC
Duration: 60 mins

Brief summary of content:

This webinar is the fourth and last part of the Webinar Series: Systemic Methods in Complex and Digitalized Manufacturing, showcasing applied and analytical modeling research using FRAM and STAMP-STPA. The webinar is presented by members of the IEA Resilience Engineering Committee. The series focuses on applications in complex and digitalized manufacturing environments, including scenarios with complex manual work, digital gloves, smart glasses, and cobots.

In particular, the intervention explores the introduction of smart glasses into complex systems, illustrated by a case study in a refrigerator assembly plant. While wearables like smart glasses offer great potential, they also bring new risks, particularly related to human error. By introducing a novel approach that combines Systems-Theoretic Process Analysis (STPA) with Particle Swarm Optimization (PSO), we provide a promising framework for identifying, quantifying, and managing these risks. The results demonstrate the efficacy of the STPA-PSO approach in managing risks during the design stage, enabling more effective human-machine collaboration.

Early results:

Ali Karevan, Sylvie Nadeau. 2024 A comprehensive STPA-PSO Framework for quantifying smart glasses risks in manufacturing. Heliyon vol. 10, nº 9

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Ali Karevan is a Ph.D. candidate in Engineering at École de technologie supérieure (ÉTS) in Montreal, specializing in risk management for hybrid and complex manufacturing systems within Industry 5.0 frameworks. With a solid background in industry, he previously worked as an Industrial Engineering Manager and Planning Consultant in different manufacturing plants, bringing his practical expertise to academic research. His current research focuses on assessing the integration of smart wearables into manufacturing processes to enhance safety and efficiency. He employs methodologies like STPA (Systems-Theoretic Process Analysis) and PSO (Particle Swarm Optimization) in his research, which aims to identify, assess, and mitigate risk factors in manufacturing systems. His publications have been published in journals such as Heliyon and the International Journal of Quality & Reliability Management, contributing to a deeper understanding of human-AI collaboration in industrial environments

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Registration

https://us02web.zoom.us/webinar/register/WN_XfSnuA4kRla1as0VVCPLPg

Registration is free to all interested people. The webinar will be recorded and published on YouTube. Registration permits live interaction with the presenters via Q&A.