

Transitioning from Industry 4.0 to Industry 5.0: A Human-Centric Approach

The advent of digital technologies for advanced manufacturing has resulted in a rapid transformation in the industrial world. In the manufacturing sector, Industry 4.0 largely aims to transform production agents from fully physical systems to cyber-physical systems. This is achieved by integration of various technologies such as Internet-of-Things, Artificial Intelligence (AI), big data, edge computing, cyber-security etc. to bridge the digital and physical worlds. In this respect, a strong necessity to increase productivity through automated means while avoiding redundancy of human workers has led to great challenges on the global economy.

In this lecture, the concept of Industry 5.0 that capitalises on a human-centric approach is elucidated, offering a solution to counter the issues of sidelining human capitals in Industry 4.0 environments. The notion is to leverage the possibility of intertwining robots and autonomous systems with the human brain through intelligent human-machine interfaces, allowing both parties (humans and machines) to work as collaborators instead of competitors. As such, while the main concern in Industry 4.0 is focused on automation, Industry 5.0 will be a synergy between humans and autonomous machines to drive the next generation of production strategies.

The lecture will deliberate approaches to bring back human capital to the factory floors in the era of Industry 5.0. Emerging technologies such as wearables and AI to pair humans and machines and exploit human brainpower and creativity to increase production efficiency will be described. On the one hand, the robotic workforce will be perceptive and can intelligently learn human intention and desire. On the other hand, the human workforce will carry out tasks alongside robots, not only with no fear but also with peace of mind, knowing that their robotic co-workers adequately understand them and have the ability to effectively collaborate with them.

The lecture will also explain the roles and responsibilities of the next generation of collaborative robots, denoted as cobots, in Industry 5.0 environments. Cobots will not be only a programmable machine that can perform repetitive tasks but also will transform into an ideal human companion to realise high value-added production tasks, flourishing trusted autonomy, reduced waste and increased human safety. The impact of Industry 5.0 on the manufacturing industry and overall economy from the productivity point of view will be discussed, leading to the co-existence of humans and cobots within a circular economic ecosystem.