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EDITORIAL
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Editorial: Digital Twin for Industry 4.0

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Editorial on the Research Topic

Editorial

The emergence of new technologies, including Industry 4.0, has spawned a new generation of connected, robotic and smart factories. With the digital revolution, the boundaries between the physical and digital world are shrinking, giving life to an interconnected 4.0 factory where employees, machines and products closely interact.

Industrial applications of Virtual Reality are transforming the way new products are designed, bringing new possibilities. Overall, the application of VR to the domain of industry is relevant since it greatly improves communication in product design and product development. The direct benefits are optimization of handling and operation times, proper use of materials and the execution of the right tasks at the right time. It helps to identify and avoid design errors in the early stages of the development process; it reduces the number of physical prototypes and saves time and cost for enterprises. Digital Twin using VR is considered a valuable tool for improving and accelerating product and process development in many industries, such as the automotive, aeronautic, construction and energy industries.

As is becoming increasingly recognized, virtual reality has great potential in providing safe and profitable learning experiences. In this context, the paper Podder et al. describes the first step for the realization of a VR learning environment for workers involved in the production of energy-efficient construction elements. To this aim, it employs a sort of digital twin of a purpose-built automated cut-saw machine serving as a novel Industry 4.0 component for the construction industry. It exploits both digital and physical prototypes, proxy and data to build and analyze the environment.

Another paper in the construction sector, Podkosova et al., provides an efficient and intuitive platform for early exploration of industrial building designs, enabling collaborative decision making, and facilitates the creation of more efficient and sustainable industrial constructions.

On the other hand, the paper Weistroffer et al. presents a framework for simulating a physics-based digital twin of a cobotic workstation and computing criterion used for safety and ergonomics.

In terms of AR, more and more applications for home and other indoor environments are becoming available; such applications allow, for instance, for interactively finding good arrangements of furniture, online ordering, or support for maintenance tasks. However, in many cases, the virtual 3D environment must first be reconstructed from the existing building, since these 3D models are usually not available to the users of those AR systems. This is the motivation for the paper Arnaud et al., which presents practical methods to reconstruct such 3D models using just a simple tablet.

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