

Scenario Design and Research for the Development of Virtual Space Collaboration Services in an Industrial Field

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Abstract— Digital twin technology contributes to quality improvement and service expansion in the smart factory field. In particular, operational status can be monitored without having to visit dangerous industrial sites or distant sites in person.

In this study, we provide specialized service scenarios in terms of user safety and management, such as real-time management, collaboration, and training. Our research presents three key technical elements for service scenario design. First, we study the creation of a precise virtual space that can be shown very similar to the actual site. This enables accurate understanding of the field situation and management from a spatial perspective. Second, we are researching meta-human technology that can simulate the behavior patterns of skilled individuals. In industries that require precision work, the precise patterns and behaviors of skilled individuals are crucial training elements for beginners. Finally, we are researching highly convenient and creative interaction technologies for collaboration. Considering the characteristics of industrial sites, workers can safely and conveniently access the information necessary for their work.

We are researching the necessary scenarios in the manufacturing industry by integrating three core technologies. We plan to prove the effectiveness of digital twin technology by selecting a small or medium-sized manufacturing site and a suitable scenario for that demand. We designed collaborative scenarios such as robot control training and CCTV precision assembly courses, etc. Through these scenarios, workers can quickly receive and work with data, and managers can manage whether there are any problems at the site where the data was delivered.

Future research will upgrade core technologies and verify our R&D technologies and values. We plan to develop AI technologies and algorithms that can automatically generate space and information, reducing manual intervention in the process. In addition, we would like to verify this research and development by directly demonstrating advanced scenarios on the site. It is also an important study to conduct continuous technology advancement feedback through usability evaluation after scenario execution. The technology for collaboration needs to help facilitate business communication between managers and workers, so we want to reflect the requirements of the field in the service.

Keywords—digital twin, virtual space, collaboration technologies, collaboration services, industrial field scenario

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