Immersive Applications of Industrial Digital Twins

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1. Abstract

Digital twins have received a large amount of exposure stating the value they can offer industry, generating lots of noise, however demonstrations that present industrial use cases are uncommon. Prototypes of the current state of the art are needed however for industry to be able to develop business cases to generate investment into the technology and understand the technical challenges with a production system. The AMRC have created several prototypes with industrial companies at different levels of industrial readiness using different methodologies. These vary from state information overlaid onto model information for monitoring through to a real-time closed-loop process digital twin utilising discrete event simulation.

Within three examples, the variety of development areas for different manufacturing sectors and applications for digital twins are presented. The first integrated existing data connectivity that is enabled through Siemens MindSphere on top of a 3D visualisation. Another project focused on an immersive visualisation for greater realism within the Unreal Engine for the dual purpose of training scenarios as well as an emulated digital twin investigating if the higher-quality visualisation is an important aspect required for digital twins. The final example was developed for immersive virtual reality and split into the formation of a real-time monitoring digital twin driven by state information from a robotic control system and an extension to develop the software into a closed-loop process digital twin by using a discrete event simulation that is run in parallel. Overall, each prototype highlights a different approach to producing a digital twin with the commonality of producing immersive environments suiting the each application type highlighting the varied nature of what is required for digital twins within different sectors.