Transdisciplinary Setup Guide for Automated Maintenance Training Generation in Virtual Reality from Virtual Commissioning

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Abstract. In automated production industries, qualified maintenance is important. Planning and executing complex practical maintenance training scenarios on real machines can be expensive. To reduce cost, virtual training simulations in Virtual Reality (VR) are slowly being established in the virtual commissioning sector, but implementation times can be long and costly when each new training scenario needs to be implemented manually. This paper describes the outcome of a three-year research project, which addressed an automated generation of gamified maintenance training in VR based on existing virtual commissioning scenarios instead of manually configuring the machine logic on an example in the automotive industry. With the project partners from the automotive and gaming industry, a demonstrator was created. The result is a transdisciplinary setup guide for three different user types: the commissioner, the trainer, and the trainee. The users are supported with a combination of automated functions and included descriptions to utilize VR without being VR experts. The first user, the commissioner, can generate a VR scene from virtual commissioning and connects them so that the real machine behavior of the virtual Programmable Logic Controller (PLC) and Numerical Control (NC) can be used in VR over the virtual Human Machine Interfaces (HMI) like touchscreens, buttons, and other machine parts. The trainer can configure training in this virtual commissioning scene for the maintenance trainee to use for virtual machine training. The demonstrator received positive feedback from key users of the automotive industry and should be tested for their training in the next steps.

Keywords. Virtual reality, maintenance training, transdisciplinary setup guide, virtual commissioning, OPCUA, digital manufacturing simulation, integrated automation, robot simulation

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