

# HW interface to Unreal Engine for train simulator

**Initial Situation:** The increasing desire of railroad operators to supplement the training of their drivers with driving simulators has led Stadler Rail AG, the industrial partner of this bachelor thesis, to start developing its own simulators. While the visualization and simulation of vehicles and environment is done in the Unreal Engine, a video game engine, the train driver's inputs come from an industrial controller that reads the buttons and levers of a replica driver's desk. An interface that allows the Unreal Engine to communicate with an industrial controller did not yet exist and was developed as part of this bachelor thesis.

The hardware was provided by the industrial partner and includes an industrial controller, a touch display used to simulate the driver's desk, and two notebooks. One for programming the controller and the touch display and one for programming the Unreal Engine application.

**Result:** The interface is based on the OPC UA protocol, which is commonly used in the industry. An open source implementation called "open62541", was integrated as a plugin into the Unreal Engine and can thus be reused in various projects. For the industrial controller, a program was written that simulates certain functions of the driver's desk, and for the touch display, a graphical user interface was created that mimics the look of the real driver's desk. In the Unreal Engine, a simple train simulator was created that represents the railroad line between St. Margrethen and Buchs in an abstract form.

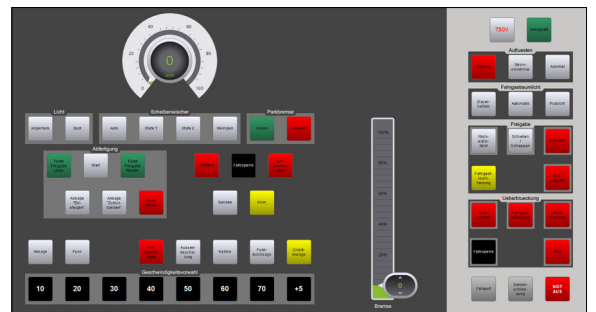
The result is a simple simulator that demonstrates the core of the work, the interface between the industrial controller and the Unreal Engine. The Unreal Engine writes periodically the speed of the simulated train to the industrial controller and is notified by the controller when a button is pressed or the brake lever is operated on the touch display.

**Conclusion:** With this bachelor thesis, Stadler now not only has a functioning interface between industrial controller and Unreal Engine, but also benefits from the basic knowledge that has been worked out and is available for other applications.

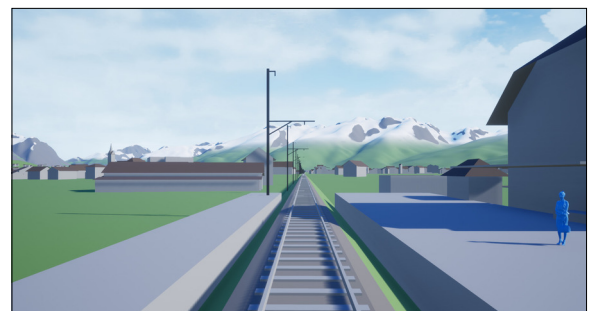
**Hardware provided by the industrial partner**  
Own presentation



**Graphical user interface for the touch display**  
Own presentation



**Simulated railway line through the Rhine Valley**  
Own presentation



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**Subject Area**  
Computer Science