Technische Berichte

Autor(en): Peter M. Kielar, Daniel H. Biedermann, and André Borrmann

Titel des Berichts: MomenTUMv2

Titelzusatz: A Modular, Extensible, and Generic Agent-Based Pedestrian Behavior Simulation Framework

Abstract: Agent-based pedestrian behavior simulators are computational systems that implement models and theories describing the behavior of individual pedestrians. Pedestrian simulations are performed to evaluate and compare behavior models. Ultimately, pedestrian simulations will provide a method to forecast pedestrian behavior. To develop a pedestrian simulator, multiple infrastructure and non-behavior concepts have to be implemented. Such components can be reused for the development of new simulation models, if the simulator is designed as a modular simulation framework. The existing agent-based pedestrian simulation frameworks are often limited in their capabilities regarding infrastructure flexibility, non-behavior models, pedestrian model requirements, or hybrid modeling. To fill this gap, we developed the agent-based pedestrian behavior simulation framework MomenTUMv2, which was carefully designed based on software engineering paradigms and in-depth background in pedestrian dynamics research. MomenTUMv2 has a number of high-level key features. First, MomenTUMv2 handles models generically, because models are conceptualized as operation providers. Second, MomenTUMv2 is extensible by design, which enables model developers to add models by following interface definitions. Finally, MomenTUMv2 can couple models in almost any modular manner, based on a configurable execution pipeline. The unique qualities of MomenTUMv2 allows to design simulations without writing code and to add new theory implementations without changing the given infrastructure. To provide evidence for the capabilities of MomenTUMv2, we discuss an example application that shows a multi-hybrid agent-based simulation conducted by means of our framework.

Jahr: 2016

Sprache: en

Occurences: Einrichtungen > Fakultäten > Fakultät für Informatik > Technische Berichte > 2016

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