

An Enhanced Simulation Model for Complex Human Pedestrian Movement System using Hybrid Discrete Event and Agent Based Simulation

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Abstract

Agent Based Simulation (ABS) and Discrete Event Simulation (DES) are two well-known simulation techniques for modelling human behaviours. ABS is found suitable to model autonomous, responsive and interactive behavior due to its agent structure but it still impossible to model human queueing behavior using purely ABS. Meanwhile, DES is found suitable to model human queue and priority sorting due to its event scheduler structure. Therefore, combining DES inside ABS is significant in modelling the diversity of human behaviors as realistic as possible such as modelling pedestrian traffic flow. Pedestrian traffic flow is important for construction or redesign projects such as shopping centers, airport or railways stations. Simulation analyses can be used by architects in the design stage or by civil authorities to simulate evacuations for a good design of buildings and pathway projects. Addressing the aforementioned issue, the main objective is to enhance the capability of ABS and DES for modelling human behaviors by combining the DES approach inside ABS model. The actors inside the ABS model are presented as agents in a process-oriented DES model. The expected outcome of this research is to produce an enhanced simulation model for complex Human Pedestrian Movement System using Hybrid Discrete Event and Agent Based Simulation called as Agent Oriented Discrete Event Pedestrian Model (AoDEPM). This research is significantly useful to overcome the ABS and DES accuracy problem in modelling various prediction systems that consists of complex human behaviours.

Key Words: Agent Based Simulation, Discrete Event Simulation, Human Centric System, Human Movement, Pedestrian Traffic Flow.

1. Research background

Simulation appears to be the preferred choice as a modelling and simulating tool for investigating human behavior [1]. This is because the diversity of human behaviours is more accurately depicted by the use of simulation. Throughout the literature, the best-known simulation techniques for modelling and simulating human behaviour are DES and ABS. DES models represent a system based on a series of chronological sequences of events where