

Agent-Based Modelling of Pedestrian Intention and Interaction with Autonomous Cars in Critical Traffic Scenarios



The aim of this Master Thesis is to investigate the nature of bilateral, intention-aware interaction between pedestrians and an autonomous car (with non-verbal communication features) simulated in OpenDS. Focus is on the development and evaluation of behavior tree-based BDI (Belief-Desire-Intention) pedestrian agents with integrated online action planning in (interactive) POMDPs for different types of pedestrians and their behavior in critical traffic scenarios simulated in OpenDS.

Comparative experimental evaluation includes an initial user study and addresses in particular the questions: How will different types of human

pedestrians and their virtual representations as BDI agents behave in critical traffic scenarios? How will human pedestrians interact with autonomous cars if they are unaware or unsure they are even interacting with such a car? How should autonomous cars communicate intent to pedestrians? Agents shall be implemented with DFKI's agent engineering tool AJAN; virtual cars in OpenDS are either human-driven, or autonomous with trained or online planning of navigation in OpenDS-CTS benchmark of critical traffic scenarios.

Requirements:

- Basic proficiency in programming (e.g. Java, Python, deep learning frameworks)
- Basic knowledge on AI including automated planning and reasoning, machine learning, behavior trees, semantic Web (RDF/S, OWL)

OpenDS: <https://opends.dfki.de>

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