Bachelor-Thesis / Master-Thesis:

Developing a Flexible Interface for Agent-Behaviors in Multi-Agent-System Simulations of Electrical Power Systems

Context:

Computer simulations are a proper tool for fast and cost-effective prototyping, while introducing a high level of convenience for the evaluation and optimization of complex systems. In the area of cyber-physical power systems like future smart grids, multi-agent approaches that are modeling each component of the grid as an autonomous agent are a well suited basis for the development and evaluation of decentralized control mechanisms for innovative advancements of future power systems. To promote the interoperability and maintainability of the electrical models as well as the developed agent behaviors, the separation of agent and behavior code bases promises multiple advantages. This approach not only simplifies the independent development of models and behaviors, but also allows to use different programming languages or paradigms in both parts. However, such a separation requires a flexible interface between electrical models and agent behaviors ensuring a proper connection and interaction between them. In this work, a flexible interface between the electrical component models of the simulator for cyber-physical distribution systems DistAIX and suitable agent behaviors should be developed and compared with existing approaches found in literature.

Figure 1: DistAIX Behavior Concepts. (I) Behavioral algorithms are directly integrated into agent code base. (II) Agent behaviors are interfaced via a flexible behavior API.
Tasks:

- A literature review of existing approaches and/or standards of behavior interfaces for multi-agent-systems
- Developing a flexible interface between electrical models and agent behaviors
- Implementation of the developed interface into the DistAIX simulator
- Evaluation of the implemented interface

Your Profile:

- Programming experience with C++
- Basic knowledge about the simulation and modelling of electrical systems is beneficial

This thesis can be supervised and written either in German or English.

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