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Using of DEVS and MAS tools for modeling and simulation of an industrial steam generator (Article)

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Abstract

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Complex systems are made of many elementary components in interaction. To model such systems, it is generally more convenient to decompose them into subsystems that are simpler to handle. This new division is to be made in a methodical way, by identification and complete definition of the various structures, actions and interactions of those sub-systems. In this work, the decomposition of the overall system into sub-systems is based primarily on the use of the Discrete Event System Specification (DEVS) formalism. The obtained atomic and coupled models are formally verified and validated. Then, we use the Multi-agent Development KIT (MAD-KIT) Multi Agent Systems (MAS) operational tools to implement an industrial simulator. This simulator is used by beginner operators in the petroleum field to ameliorate the process of training and learning without stopping the real processes. The advantage of this approach is its adaptability as well as its possibilities of extension (addition of new functionalities). Moreover, the decomposition into sub-systems reduces significantly the complexity of the elements being implemented and therefore, allows a great modularity and a better legibility to the system. Our work is realised in collaboration with the production department of natural gas liquefaction (GL1/K Skikda), one of the principal hydrocarbons poles from SONATRACH complex in Algeria.

Author keywords

AALAADIN; Atomic and coupled models; Complex systems; Discrete event system specification (DEVS); Industrial systems; MAD-KIT; Modeling and simulation; Multi-agent systems (MAS)

Indexed keywords

Engineering controlled terms: Computer simulation; Discrete event simulation; Large scale systems; Personnel training; Specifications

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