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Model-based Engineering for Energy-efficient Operation of Factory Automation Systems within Non-productive Phases

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Shaker Verlag Apr 2014, 2014. Buch. Condition: Neu. Neuware - In the face of a future rise in energy prices, energy-efficient operation of industrial automation systems has strategic impact for manufacturing companies. The reduction of energy demand during non-productive phases helps to contribute to the overall energy efficiency of automated production systems. Up to now, there is no general scientific concept which addresses energy-efficient operation of factory automation systems within non-productive phases technically and economically on a multi-subsystem level. However, proposing detailed instructions and strategies for multiple interacting subsystems is crucial in order to realize energy savings technically. On this account, the proposed automaton-based system model enables the analytical description of structural and behavioral aspects of industrial automation systems. This kind of mathematical modeling serves as basis for identifying optimal strategies analytically relying on a structure-exploiting procedure which enables efficient strategy computation. Those strategies quantify the energy savings potentials and give support for technical realization. Since the computation of optimal strategies for industrial automation systems is complex, a novel approach is developed to calculate those strategies efficiently incorporating the problem structure provided by the model. Using models of real-world automation systems, the approach of this thesis is evaluated regarding further...



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