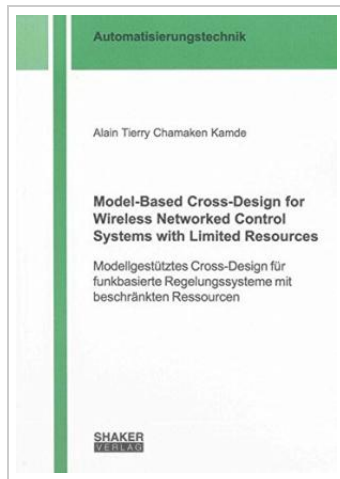



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Model-Based Cross-Design for Wireless Networked Control Systems with Limited Resources

By Alain Thierry Chamaken Kamde

Shaker Verlag Jun 2013, 2013. Buch. Condition: Neu. Neuware - This work shall provide a foundation for the Cross-Design of wireless networked control systems with limited resources. A Cross-Design methodology is devised, which includes principles for the modeling, analysis, design, and realization of low cost but high performance and intelligent wireless networked control systems. To this end, a framework is developed in which control algorithms and communication protocols are jointly designed, implemented, and optimized taking into consideration the limited communication, computing, memory, and energy resources of the low performance, low power, and low cost wireless nodes used. A special focus of the proposed methodology is on the prediction and minimization of the total energy consumption of the wireless network (i.e. maximization of the lifetime of wireless nodes) under control performance constraints (e.g. stability and robustness) in dynamic environments with uncertainty in resource availability, through the joint (offline/online) adaptation of communication protocol parameters and control algorithm parameters according to the traffic and channel conditions. Appropriate optimization approaches that exploit the structure of the optimization problems to be solved (e.g. linearity, affinity, convexity) and which are based on Linear Matrix Inequalities (LMIs), Dynamic Programming (DP), and Genetic Algorithms (GAs) are investigated. The...


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