

Robust Energy Optimization of Robot Systems

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Abstract

Evaluations of the energy consumption in industrial robot stations have recently shown that it is possible to obtain energy reduction up to 30% and peak power reduction up to 60%. This is based on a new efficient optimization procedure for hybrid systems and Petri Nets. Constraint Programming is used to reduce the discrete search space, and no physical models are included in the energy minimization. The procedure only assumes that desired sampled paths for a number of interacting moving devices are given. Furthermore, some interesting conflicts between energy reduction and robust scheduling are highlighted. It is also shown how the optimization procedure can be implemented in a flexible online and event-based information architecture called the Tweeting Factory. Simple messages (tweets) from all kinds of equipment are combined into high-level knowledge, and it is demonstrated how this information architecture can be used to support the energy optimization of robot stations.

About the speaker...



Bengt Lennartson is a Professor of the Chair of Automation since 1999 at Chalmers University of Technology, Gothenburg, Sweden. He is Head of the Division of Systems and Control at the Department of Signals and Systems, and he is IEEE Fellow for his contributions to hybrid and discrete event systems for automation and sustainable production. He has been Associate Editor for *Automatica* and *IEEE Transaction on Automation Science and Engineering*, General Chair of CASE 2015, WODES 2008 and Dean of Education at Chalmers. He is the (co)author of about 300 peer reviewed international papers, and currently, much intention is focused on sustainable production, including energy minimization of robot cells. Recent collaboration with industry involves Volvo, Daimler, Kuka, and TetraPak.