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2016 Article

Published in:



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ACM SIGBED Review - Special Issue on the First Workshop on Declarative Programming for Real-Time and Cyber-Physical Systems (DPRTCPS 2015) [archive](#)

Volume 13 Issue 2, April 2016

Pages 34-42

[ACM](#) New York, NY, USA[table of contents](#) doi>[10.1145/2930957.2930963](#)[Bibliometrics](#)

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Model-based design and development has been applied successfully to design and development of complex systems, including safety critical systems. It is also a promising approach for designing cyber-physical systems (CPSs). In this paper we propose a methodology for model-based design of CPSs where, *logic programming* extended with *coinduction*, *constraints over reals*, and *coroutining* is used for modeling CPSs. This logic programming realization can be used for verifying interesting properties as well as generating implementations of CPSs. We use the reactor temperature control system as a running example to illustrate the various steps of our methodology. We present a model of the system using our framework and verify the safety property of the system. We also show how parametric analysis can be performed in our framework.

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