Dependable Control of Discrete Systems

Proposal of Open invited track for the 20th IFAC World Congress

Organizers:

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Abstract:

The aim of this track is to provide the communities of Dependability Analysis and of DES (Discrete Event Systems) with an opportunity to exchange information and new ideas, and to discuss new developments in the field of Dependable Control of Discrete Event Systems. Researches in this field are driven by the needs of many different application domains, such as production systems, automotive and other transportation systems, embedded and cyber-physical systems, power production and distribution, healthcare and assisted living.

IFAC technical committee for evaluation: TC 1.3

Detailed description:

Several research results recently issued by the communities of Dependability Analysis and Discrete Event Systems (DES) are able to bring partial solutions to dependability requirements of many application domains. Fault-forecasting of dynamic repairable and reconfigurable systems, dependability modelling and analysis with Bayesian networks, fault-tolerant systems design, formal verification of control software, timed and probabilistic model-checking, fault detection and isolation, diagnosis and prognosis for DES, metaheuristics for dependability-driven optimization of design, for instance, provide promising solutions to increasing the dependability of systems. Nevertheless, none of these approaches in isolation is able to provide a global solution. Hence, there is a need to bridge the gaps between the different models, methods, and tools that are proposed to improve the design and the operation of Dependable Control of Discrete Systems.

Gathering researchers of the two communities, this track will favor exchanges and will contribute to a better interdisciplinary approach for dependability improvement. Works focusing on dependability improvement when designing and implementing the system ("off-line" approaches) as well as during system operation ("on-line" approaches) will be considered.

The track will cover all topics related to specification, design, implementation and operation of dependable controllers for critical DES, including (but not limited to) the following:

- Recent advances in fault-forecasting methods for dynamic systems
- Formal methods for timed and probabilistic systems
- Modelling and analysis of stochastic systems
- Monitoring, FDI and diagnosis of discrete event systems
- Fault-tolerant control of DES
- Reconfiguration of DES
- Opacity and security
- Dependable control of loosely connected and large systems of systems
- Interdisciplinary approaches for dependability improvement
- Applications including (but not limited to) the following: manufacturing and production systems, automotive and transportation systems and infrastructures, power plants, mechatronics, embedded and cyber-physical systems, healthcare and assisted living

Internet links to some additional material:

- Web sites of the previous editions of the DCDS workshops series

http://webserv.lurpa.ens-cachan.fr/dcds_archives/dcds07/general_information.html (sponsored by IFAC)

http://dcds09.poliba.it/Home.html (sponsored by IFAC)

http://www.dcds11.uni-saarland.de/ (sponsored by IEEE IES)

http://dcds13.net.dcs.hull.ac.uk/ (sponsored by IFAC)

http://www.gdl.cinvestav.mx/dcds2015/ (sponsored by IFAC)

- DCDS proceedings on IFAC PapersOnline

http://www.ifac-papersonline.net/Dependable_Control_of_Discrete_Systems/1st_IFAC_Workshop_on_Dependable_Control_of_Discrete_Systems__2007_/index.html

http://www.ifac-papersonline.net/Dependable_Control_of_Discrete_Systems/2nd_IFAC_Workshop_on_Dependable_Control_of_Discrete_Systems__2009_/index.html

http://www.ifac-papersonline.net/Dependable_Control_of_Discrete_Systems/4th_IFAC_Workshop_on_Dependable_Control_of_Discrete_Systems/index.html

http://www.sciencedirect.com/science/journal/24058963/48/7