Dependability Problems in Interconnected World

Hana Kubátová

Faculty of Information Technology
CTU in Prague
Prague 6, Czech Republic
hana.kubatova@fit.cvut.cz

Abstract—**Development of new technologies and especially the basic principles of Industry 4.0 (interconnection, IoT, information transparency, technical assistance, cyber physical systems and decentralization) means not only standard improvements, e.g. increasing of performance, but also some negative issues. Everybody must be on-line 24 hours, there are more and more small things with their own intelligence. The proper trade-off between the price and reliability must be solved always with respect to application. The application-specific systems are used due to possible programmability both hardware and software blocks. It can lead to totally different principles in digital design. Here global overview of problems that must be taken into account in today interconnected world, especially with emphasizing the dependability issues will be presented. There are several basic questions: what does it mean dependability, how to predict proper parameters and how to guarantee them before the final (mostly expensive) production, what model to use and how to validate it and how to verify the final realization, what are and how to overcome the most probable faults, how to combine and express safety and security limits, and finally how to ensure these requirements concurrently both in development and production processes.**

Keywords – embedded and cyber-physical systems, dependability, attack resistance, fault-tolerance, programmable hardware

References related to the talk:

[1] T. Jánský, T. Čejka, Žádník Martin, and V. Bartoš, "Augmented DDoS Mitigation with Reputation Scores," in Proceedings of the 13th International Conference on Availability, Reliability and Security, NewYork, NY, USA, 2018, pp. 54:1–54:7.

[2] Daňhel, M., Štěpánek, F., and Kubátová, H. The effect of the transient faults in dependability prediction. Microprocessors and Microsystems. 2017, 52(C), pp. 498-504.

[3] Borecký, J., Kohlík, M., and Kubátová, H. Parity driven reconfigurable duplex system. Microprocessors and Microsystems, 2017, vol. 52, pp. 251-260.

[4] F. Křížek, J. Ferencei, T. Matlocha, J. Pospíšil, P. Príbeli, V. Raskina, A. Isakov, J. Štursa, T. Vaňát, K. Vysoká, "Irradiation setup at the U-120M cyclotron facility", Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment, Volume 894, 21 June 2018, Pages 87-95.

[5] J. Říha, V. Miškovský, H. Kubátová, M. Novotný, "Influence of Fault-Tolerance Techniques on Power-Analysis Resistance of Cryptographic Design", in Proc. of 20th Euromicro Conference on Digital Systems Design (DSD), Vienna, Austria, August 31-September 1, 2017, pp.

[6] P. Novák, M. Daňhel, R. Blažek, M. Kohlík, H. Kubátová, "Predicting the Life Expectancy of Railway Fail-safe Signaling Systems Using Dynamic Models with Censoring", 2017 IEEE International Conference on Software Quality, Reliability and Security (QRS). Los Alamitos, CA: IEEE Computer Soc., 2017. pp. 329-339.

Hana Kubátová *received her Ph.D. title in 1987 and defended her habilitation in 2005 at Czech Technical University in Prague. From 2009 she is a head of department of Digital Design at Faculty of Information Technology. She is an author of more then 100 papers in peer reviewed conferences and journals with more then 60 citations. She supervised 12 successfully defended Ph.D. students. She is a principal investigator of several projects all correlated with her teaching and research interests: fault-tolerant, safe and secure digital design and architectures, dependability modeling and computations, Petri Nets, FPGA implementation, real-time systems, logic synthesis and reconfigurable computing. She is a member of a board of* directors of EUROMICRO, a senior member of IEEE, a member of an editorial board of MICPRO

journal, member of Council of Higher Education Institutions of the Czech Republic, a member of University Research Board and faculty research boards (in Prague and in Brno). She is a member of steering committee and two times a program chair of Euromicro DSD conference. She is a program committee member of many international conferences (e.g.

DDECS, DSD, ISQED, ARCS, FPL, MECO). She has organizes many international actions, e.g. EUROMICRO DSD-SEAA 2018, annual student forums (Prague Embedded System Workshop).