You are invited to the 48th edition of the PRAGUE COMPUTER SCIENCE SEMINAR

LUKÁŠ SEKANINA
Evolutionary Design of Approximate Digital Circuits
The lecture will be followed by a discussion

June 9, 2022
4:15pm

Auditorium KN:E-107,
FEL CTU, Karlovo nám. 13,
Praha 2

ABSTRACT

Approximate computing exploits the fact that there are many error-resilient applications (such as image processing, deep learning, and data mining) in which the quality of the result can be traded for energy. An open problem is how to effectively approximate hardware and software, i.e., simplifying or modifying digital circuits and programs so that the resulting application error is acceptable for the end-user and the energy requirements are satisfied for challenging deployments on resource-constrained devices. We will present a design automation method capable of creating high-quality implementations of approximate digital circuits. The method is based on multi-objective genetic programming. It employs various techniques such as relaxed equivalence checking, optimized search strategies, and genetic operators to eliminate scalability problems typical for design automation approaches.

The method was used to design an open-source library of approximate adders and multipliers (EvoApproxLib) and other resource-aware computational primitives such as image filters, hash functions, and convolutional neural networks.

ABOUT THE PRAGUE COMPUTER SCIENCE SEMINAR

The seminar takes place once a month on Thursdays at 4:15pm (except June to September, and December) alternately in the buildings of Faculty of Electrical Engineering, Czech Technical University in Prague, Karlovo nám. 13, Praha 2 and Faculty of Mathematics and Physics, Charles University, Malostranské nám. 25, Praha 1. Its program typically consists of a one-hour lecture followed by a discussion. The lecture is based on an (internationally) exceptional or remarkable achievement of the lecturer, presented in a way which is comprehensible and interesting to a broad computer science community. The lectures are in English.

Lukáš Sekanina is a Full Professor and Head of the Department of Computer Systems at the Faculty of Information Technology, Brno University of Technology. He was a visiting professor with Pennsylvania State University (2001), Universidad Politécnia de Madrid (2012), and a visiting researcher with the Department of Informatics, University of Oslo (2001). Prof. Sekanina was a Fulbright Scholar working with the NASA Jet Propulsion Laboratory, Caltech, in 2004. He has served as an Associate Editor of the IEEE Transactions on Evolutionary Computation and the Genetic Programming and Evolvable Machines Journal and chaired TPCs of several conferences focused on evolutionary computing and circuit design. He (co)authored over 200 papers, mainly on evolutionary circuit design, evolvable hardware, approximate computing, and one patent. His research was awarded multiple times at international conferences and competitions (e.g., the Humies at GECCO). He is the recipient of the Czech Science Foundation President Award 2017.

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