ACS SyntheticBiology

Editorial

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IWBDA 2014

The International Workshop on Bio-Design Automation (IWBDA) brings together researchers with interests in synthetic biology, systems biology, and design automation. The focus areas of IWBDA are concepts, methodologies, and software tools for the computational analysis and synthesis of biological systems. IWBDA offers a forum for cross-disciplinary discussion, with the aim of seeding and fostering collaboration between the biological and the design automation research communities.

The sixth IWBDA, organized by the nonprofit Bio-Design Automation Consortium (BDAC), was held at Boston University in Boston, Massachusetts on June 11th and 12th 2014. This special ACS Synthetic Biology issue includes four papers based on the work presented at IWBDA.

In the first paper Roehner *et al.* present iBioSim that generates a Systems Biology Markup Language (SBML) model from a design of a 4-input AND sensor written in the Synthetic Biology Open Language (SBOL). The paper also discusses the use cases for and benefits of model generation in synthetic biology.

The next paper by Huynh and Tagkopoulos presents a hierarchical computer-aided design architecture that addresses the problems encountered when navigating the large search space of part libraries, models, and design parameters. Their architecture uses a two-step approach that first uses a simple model and branch-and-bound search methods. In a second step, a more complex circuit model is used for a fine-grained search of the solution space identified in the first step.

In the third paper, Angione *et al.* develop a multiomic approach that addresses the rare probabilistic interactions between components that may depend on the environment and on the time course. They develop a multiomic approach of flux-balance analysis combined with Bayesian factor modeling with the aim of detecting pathway cross-correlations and predicting metabolic pathway activation profiles.

The fourth paper proposes designs for localized circuits that enable molecular devices to perform calculations such as the square root of a four bit number. To accomplish this, Dalchau *et al.* use designs involving DNA molecules that are arranged on addressable substrates and interact via hybridization reactions. They develop an efficient method for probabilistic model checking of localized circuits, implemented within the Visual DSD design tool.

Aaron Adler,* Scientist, Raytheon BBN, IWBDA 2014 General Chair Technologies, BDAC Vice-President

AUTHOR INFORMATION

Corresponding Author

*E-mail: aadler@bbn.com.

Notes

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Special Issue: IWBDA 2014

Received: August 11, 2015
Published: August 21, 2015

DOI: 10.1021/acssynbio.5b00150
ACS Synth. Biol. 2015, 4, 867−867