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GUEST EDITORIAL

Design Computing and Cognition (DCC'12)

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The Fifth International Conference on Design Computing and Cognition was held at Texas A&M University in College Station, Texas, on June 7–9, 2012 (Gero, in press). The main conference was preceded by six workshops: NSF Bio-Inspired Design Workshop: Charting a Course for Computer-Aided Design; Analogies and Metaphors in Design Cognition: Theory and Tools for Design Practice; Evaluation Methods for Creativity Support Environments; Functional Descriptions in Engineering; Studying the Design Process: Quantitative and Qualitative Approaches; and Design Creativity Workshop 2012. The articles in this Special Issue were submitted by authors present at the conference, and they were peer reviewed through two rounds of reviews. The Design Computing and Cognition Conference engages a diverse audience with shared and complementary interests. A selection of topics includes the following:

- artificial intelligence in design
- biologically inspired and analogical design
- collaborative design
- cognitive theories applied to design
- computational theories applied to design
- creative design
- design in practice
- digital media in design
- evolutionary approaches in design
- games and design
- human cognition in design
- machine learning in design
- situated computing in design
- virtual environments in design
- visual and spatial reasoning in design

The first article, by Yan Jin and Chang Chen, "Cellular Self-Organizing Systems: A Field-Based Behavior Regulation Approach," describes a cellular self-organizing approach for developing a multiagent adaptive system. Their article describes the model of a cellular self-organizing system and a field-based regulative control mechanism called field-based behavior regulation. The effectiveness is then demonstrated through simulation-based case studies.

The second article, "Design Fixation: Classifications and Modern Methods of Prevention," by Robert J. Youmans and Thomaz Arciszewski, presents a classification framework for design fixation to improve design research by providing clearer definitions of different phenomena that have been previously explored under the term "fixation." It also distinguishes between concept-based (fixation to a specific class of known design concepts) and knowledge-based design fixation. These classifications will further clarify the experiments exploring design fixation and improve methods to reduce specific types of design fixation.

In the third article, "The Influence of Immersion and Presence in Early Stage Engineering Designing and Building," Daniela Faas, Qifang Bao, Daniel D. Frey, and Maria C. Yang explore presence and immersion's influence on design quality. Presence and immersion measures are standard measures in virtual reality research and adapted within this article for ideation tasks. High presence was found to relate to both high- and low-quality designs. Immersion shows no correlations. The understanding of how to improve and influence engineering idea generation continues to evolve. This paper contributes to this conversation.

The fourth article, "Inferring a Shape Grammar: Translating Designer's Knowledge," by Sara Eloy and José Pinto Duarte, presents a shape grammar approach for adaptation of existing houses to new requirements. Designers' knowledge is incorporated into the design rules that form the shape grammar.

In the fifth article, a new software tutoring tool for the method of joints truss analysis, Mechanix, is presented and evaluated by Olufunmilola Atilola et al. Imagine having homework sets where students cannot find the solution manual online or share answers because each student has a slightly different problem. All of this is automatically graded with prompt feedback by the computer. This is the promise Mechanix holds when fully developed. An overview of the current progress and evaluation of Mechanix is presented.

The six and final article, by Jay JungIk Son and L.H. Shu, "The Mechanical Transformation and Environmentally Con-

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scious Behavior," explores how products that follow mechanical transformation principles help to enable the environmentally conscious behavior. Products that expand/collapse enable better portability and encourage spontaneous environmentally conscious behavior. Other transformation principles are discussed.

REFERENCE

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Tracy Hammond is an Associate Professor in the Department of Computer Science and Engineering and is the Director of the Sketch Recognition Lab at Texas A&M University. She has a PhD in computer science and finance technology option from MIT and four degrees from Columbia University (MS in anthropology, MS in computer science, BA in mathematics, and BS in applied mathematics). Dr. Hammond is an international leader in sketch recognition research.

Julie S. Linsey is an Assistant Professor at the Georgia Institute of Technology in the Woodruff School of Mechanical Engineering and is the Director of the Innovation, Design Reasoning, Engineering Education and Methods Lab. Her research focus is on systematic methods and tools for innovative design with a particular focus on concept generation and design by analogy. Her research seeks to understand designers' cognitive processes with the goal of creating better tools and approaches to enhance innovation. She has coauthored over 50 technical publications, including five book chapters, and she holds two patents. Dr. Linsey's current work is developing a new computational approach for analogy retrieval, measuring the impact of different representations on idea generation and measuring the effectiveness of various bioinspired design approaches.

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