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Computer Aided Architectural Design

DIGITAL CRAFTING

Virtualizing Architecture and Delivering Real Built Environment

Editors: Dr. Bhzad Sidawi and Dr. Zaki Mallasi



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Computer Aided Architectural Design
(ASCAAD)

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DIGITAL CRAFTING
Virtualizing Architecture and Delivering Real Built Environment
31st March-3rd April 2014

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يشرفني الترحيب بجميع القراء المتابعين لكتاب فعاليات المؤتمر العالمي السابع (الجمعية العربية للتصميم المعماري بمساعدة الحاسب الآلي) (ASCAAD))
أبدأ بلمحة موجزة عن الملكة عفت آل ثنيان رحمها الله -مؤسسة جامعة عفت- التي صنعت تاريخاً تفتخر كل امرأة سعودية بماحاكاته، فنظرتها للإيجابيات في مجتمعها ووطنها وثقتها وإيمانها بقدرات المرأة السعودية على وجه التحديد صنع تغييراً إيجابياً هائلاً. فكان التعليم أعظم إرث تركته الملكة عفت للأمة وللشباب السعودي وللقاتة والمرأة السعودية على وجه الخصوص .
وقد نبع ذلك من منطلق شعور سموها العميق بأن تقدم أي أمة أو مجتمع يعتمد في المقام الأول على جودة تعليم المرأة في أي مكان حول العالم. وان أساس أي تقدم حقيقي يبدأ بتطوير الموارد البشرية بشكل عام وبتطوير المرأة في المجتمعات بشكل خاص. لقد فهمت -رحمها الله - أن تعليم المرأة هو الرابطة الوثيق بالفرص التي تفوز بها في حياتها وبمواردها المالية و برفاهيتها، لذلك من المهم فهم العوامل التي تشجع أو تعيق تحقيق فرص المرأة التعليمية و فرص تقدمها في الحياة.
يتناول المؤتمر عدداً من القضايا الحساسة في عصر التكنولوجيا الرقمية، كما يناقش مسائل معقدة متعلقة بعملية حساب التصميم الرقمي و تحليل التصميم المبني على الأداء و طريقة صنع المادة و نمذجة معلومات البناء و تصميم الحدود والصنع بالآلات وغيرها. وأرجو أن يكون جميع الزملاء والمقدمين للمؤتمر والحضور مصدر إلهام للجميع. وأن يعم المؤتمر بالفائدة والخبرة المرجوة على الجميع.
إنه لشرف لنا أن نستضيف المؤتمر العالمي السابع (للجمعية العربية للتصميم المعماري بمساعدة الحاسب الآلي (ASCAAD) في جامعة عفت كما أود تقديم الشكر للجميع على دعمهم و جهودهم، مع شكر خاص لفريق جامعة عفت الذي لعب دوراً هاماً في كل من اللجنة العلمية و اللجنة التنظيمية للمؤتمر.

الدكتورة هيفاء رضا جمل الليل

رئيسة جامعة عفت

It is my privilege to welcome all readers of the proceedings book of the 7th ASCAAD International Conference.

I'd like to share a brief history of Queen Effat Al-Thunayan, Effat University's founder, a history for all Saudi women to emulate. Her vision for the good of society and for her country, her drive, confidence and belief in Saudi women in particular made an incalculable difference. Education was the greatest legacy which Queen Effat left to the nation and to all Saudi youth, but especially to girls and women.

This was because she felt strongly that the development of any nation or community depends largely on the quality of education of females in every society worldwide. Queen Effat believed that the basis for any true development must commence with the development of human resources in general, and especially of women in society everywhere. She understood that a woman's education is closely linked to her opportunities in life, income and well-being; and that it was important, therefore, to understand the factors which foster or hinder a female's educational attainment and life achievement.

The conference addresses a number of critical issues in the age of digitalization, and discusses complex matters related to digital design computation process, performance-based design analysis, the way of object-making, BIM and parametric design, machining and more. I hope that you will find your colleagues, presenters and attendees inspirational; and I hope you gain the expertise and thorough knowledge that you're looking for.

It is an honour to host the ASCAAD Conference at Effat University and I'd like thank everyone for their support and dedication, and a special thank you to the Effat team who played a major role in the scientific and organizing committee.

Dr. Haifa Jamal AlLail

President of Effat University

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خصوصية منهج تدريس التصميم المعماري بمساعدة الحاسب الآلي في قسم الهندسة المعمارية في جامعة
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INTRODUCTION

In decades past, the architect was the master-builder with hands-on craftsman experience to design and direct the various trades in the construction of the building. The role of digital design, computation methodologies and processes are poised to transform how we think and craft architecture to deliver today's built environment. Digital crafting methods in today's thinking process for a designer/builder/manufacturer are affecting the delivery of buildings as a final product with aspiration to create rich sensory and habitable environments. ASCAAD 7th Conference theme explores the linkages among digital design process thinking, constructability, the digital manufacturing process and their impact on the practice of architecture, engineering and construction. ASCAAD society has invited academics, researchers and professionals to join and contribute to the debate on the use of Computer-Aided Architectural Design and Information Technology and how the use/ implementation would support and lead to innovative concepts, tools, systems and products on architectural, Urban/City/ regional planning, and building science levels. Submitted research papers have attempted to find links between digital crafting and built environment aspects regarding the following CAAD themes:

- Design intelligence and cognition
- CAAD Curriculum, design education and computational research
- Generative and parametric design
- Interdisciplinary computational design research
- Creative Design Concepts, taxonomies and Strategies
- Computer-supported design collaboration
- Ubiquitous computing
- Virtual and interactive environments
- Sensory Environments
- Urban/ City/ regional planning and urban performance's visualization.
- Digital tools in design and construction
- Mass customization.
- Building Information Modeling (BIM)
- Building performance virtualization

It is worth mentioning that some papers are very inspiring, innovative thus exploring the possible dimensions beyond the proposed themes. We would like to thank the authors of these papers for their outstanding effort.

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