

Guest Editorial Preface

Special Issue of Revised and Extended Papers From the “ATI 2020, 1st International Symposium on Architecture, Technology, and Innovation”

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Technology has always been pivotal in shaping the society. Advances in information technologies and material sciences in the course of the twenty-first century have irreversibly altered not only the everyday life of individuals, so that the structural tenets of societies, but also the design, construction and management methods in architectural, engineering and urban practices. Beyond these alterations, recent innovations in emergent technologies such as the Internet of Things (IoT) and/or Machine Learning have started to define unprecedented needs and requirements for the built environments. Moreover, environmental problems like pollution, source limitations, overcrowded cities, climate change, extreme weather conditions and the social crises that they cause on the doorstep require each and every profession to rethink its role in the ever-changing conditions of today’s dynamic political and economic agenda, make urgent decisions to adjust itself and take immediate actions. Cutting-edge technological developments and innovations have the potential of being both remedy and poison for these environmental, economic and social upheavals.

Based on these premises, the organisers of the annual symposium on architecture, technology and innovation wanted to scrutinize the role of emerging technologies in the profession of architecture, planning and urban design with an emphasis on innovative practices to address the significant challenges and imperatives of the twenty-first century. Therefore, the symposium theme, “Smart Cities and Smart Buildings,” conveys the vanguard perspectives for smarter, better and liveable urban environments through technology-centric thinking and doing.

This special issue of the *International Journal of Digital Innovation in the Built Environment* (IJDIBE) contains four revised and extended papers (plus two closely related articles) from the International Symposium on Architecture, Technology and Innovation (ATI 2020) held as an online event between 25 and 28 August 2020 by the Yaşar University Faculty of Architecture. This new symposium series brings forth the theory and practice of cutting-edge technology and provides a scholarly platform for stimulating critical debate on research into theories, approaches, principles, applications and the implementation of new and advancing technologies in architectural design, planning and construction.

The six papers in this special issue cover a range of aspects of innovative structural, material and sustainable design principles. Each of these revised and extended papers have undergone full double-blind peer review, prior to being selected for this special issue.

The first paper, “Irregular Light-Scattering Properties of Fenestration for Comfortable and Energy-Efficient Buildings,” is written Lars Oliver Grobe and we think it makes a great opener for this special issue. In his paper, Lars Oliver presents different fenestration techniques with their gonio-photometrically measured scattering properties. In addition, he reports the techniques to model optically complex fenestration to support product development and planning, and effects on daylight availability, glare and solar gains. The results of his study indicate the potential to control and modulate rather than to block irradiation the design of buildings aiming at high comfort and energy efficiency.

In “Relation Between the Iteration of Planar Retractable Plate Structure and Plane Symmetry Group,” Aylin Gazi Gezgin and Koray Korkmaz demonstrate a mathematical tessellation technique for designing retractable plate structures (RPS). In this paper, they both focus on the iteration of planar RPSs that are formed based on 1-uniform tessellation and develop a relation between iteration capacity of RPS and plane symmetry groups.

Earth plasters are interesting natural materials for controlling vapour movement in humid rooms and how to increase their strength is the topic under discussion by Matthieu Pederagnana and Soofia Tahira Elias Ozkan. In their paper “Hygro-Thermal, Hydric, and Mechanical Properties of Fibre and Aggregate Reinforced Earth Plasters,” they aim to understand the consequence of the choice of fibre or sand in the improvement of strength of plasters and the conservation of the plaster hygro-thermal properties.

Mauricio Morales-Beltran, Esra Karatepe, Kaan Çetin and Berk Selamoğlu explore how hybrid materiality in construction and architecture opens up to significant application opportunities in their paper “Hybrid Materiality: Combining Digital and Analogue Fabrication in the Design of a Freeform Gridshell Structure.” In this study, the design and hybrid fabrication of a freeform gridshell structure, placed as a temporary installation in a public park, is presented.

In “Optimization of Concrete-Filled Steel Tubular (CFST) Columns Using Meta-Heuristic Algorithms,” Celal Cakiroglu, Kamrul Islam and Gebrail Bekdaş present the use of meta-heuristic algorithms on concrete-filled steel tubular columns, to obtain the best performance with reduced cost. This study also benefits from a newly developed meta-heuristic algorithm called the social spider algorithm to the cross-section optimization of circular CFST columns.

Stylianos Karatzas, Athanasios P. Chasiakos, Theo Tryfonas, and Anastasios Ioannis Karameros aim to identify and minimize the gap in the energy performance of buildings in their paper, “Development of a Business-Process-Oriented Energy Management System for Buildings.” They develop and propose a smart energy management system, focusing on the human factor and the individual operational procedures that are carried out and affect the energy efficiency of buildings. The proposed system is applied to facilities in the Department of Civil Engineering at the University of Patras and the results are presented.

As the organisation committee of the ATI 2020, 1st International Symposium on Architecture, Technology and Innovation, we hope that reading these high-quality papers will inspire you to make your own submissions to future ATI symposiums.

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