

# 1ST INTERNATIONAL ACADEMIC CONFERENCE PLACES AND TECHNOLOGIES 2014

BELGRADE, 3-4. APRIL 2014 | KEEPING UP WITH TECHNOLOGIES TO IMPROVE PLACES

EDITORS

Eva Vaništa Lazarević,

Aleksandra Krstić - Furundžić,

Aleksandra Đukić,

Milena Vukmirović

conference proceedings



# DYNAMIC APPEARANCE OF URBAN AND ARCHITECTURAL SURFACES

**Tihana Hrastar**

University of Zagreb, Faculty of Architecture, Kačićeva 26, thrastar@arhitekt.hr

**Tamara Marić**

University of Zagreb, Faculty of Architecture, Kačićeva 26, tmarić@arhitekt.hr

**Bojana Bojanić**

University of Zagreb, Faculty of Architecture, Kačićeva 26, bbojanic@arhitekt.hr

## ABSTRACT

*This paper shows how the quality of space can be improved through different kinds of contemporary surfaces that are mobile, transformable or interactive. The development of new media, building materials and technologies are the main cause of these changes. In this context the research is focused on surfaces such as kinetic facades, vertical gardens, media facades and floors by analysing different ways of achieving dynamics with various effects in space. Quality can refer to aspects such as sustainability, human scale places or identity and all this is often achieved through an interdisciplinary approach. The transformation of places through encouragement of interaction is an added value.*

*Keywords: interaction, media surface, interdisciplinary design, space identity*

## INTRODUCTION

Surface, as an element of un-volumetric architecture, has significant influence on space making. Many spaces today are dominated by contemporary surfaces, such as the displays at Times square. Vertical and horizontal surfaces can assume multiple meanings and design possibilities in different scales by creating a specific cityscape image, street character or architectural form. In meanings, surfaces can be floors, ceilings, facades, verticals, installations, enclosures, shelters, figures, decorations, etc. The importance of a dynamic surface appearance is in understanding that it can lead to horizontals becoming landmarks, like the promenade Copacabana. A tendency of dynamic appearances today is derived from movable parts, light effects and images or other forms of motion. [Aymonino, 2008]

The aim of this research is to explore the importance, characteristics of surface dynamics, and ways of achieving them in public spaces. Through a series of examples different kinds of dynamics are analysed depending on surface types. In every example attention is directed to forms of collaboration between authors and accomplished impact in space. Research of these examples shows: (1) a tendency

towards interdisciplinary collaborations, mainly between architects and artist or architects and technical engineers; (2) light and lighting is important in all ways of achieving dynamic; (3) the degree of integration between dynamic surfaces and architecture can vary; (4) the main goals for dynamic surface design are sustainability, interactivity, creating attractive architecture or landmarks, and making pleasant, interesting public places in a more human scale.

## DYNAMIC SPACE EXPERIENCE



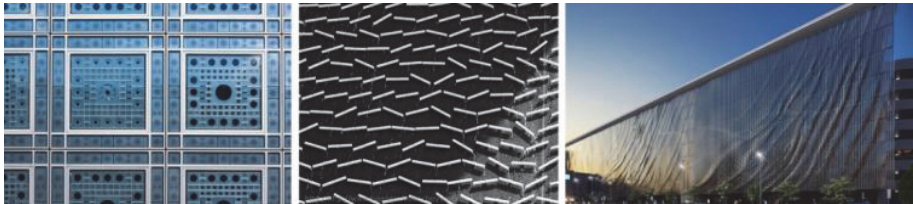
**Figure 1: a. Superkilen; b. Time Tree; c. Domplein; d. hotel Lucerne**

In order to achieve dynamic, elements don't necessarily need to change their characteristics, expression or be movable. This refers to surfaces where light, graphic or architectural design is visually formed in such a way to create attraction, stimulate motion or both. A diagonal or curved line is one possible way. This is well expressed in projects for public spaces where the floor graphic is an invitation to play, move and meet in a public space like: *Superkilen* (Copenhagen; BIG, Superflex and Topotek1 - figure 1a.) or *Nicholson Street Mall Upgrade* (Melbourne; Hassell and Maribrynong Council Design and Place Making Team). The same can be achieved through lighting, which can produce accents as well as provoke memory in space: *Domplein*, (Utrecht, OKRA - figure 1c.). Graphics and lighting can also be a way of giving information in public spaces, resulting in a higher interactivity of space. An example is the *Time Tree* design from project *Iidabashi Plano* (Tokyo, EARTHSCAPE - figure 1b.) where floor information about the historical facts is designed in such a way that it enables motion and evokes interaction related to the reading. At *Millennium Place* in Coventry authors MJP Architects collaborated, among other artists, with Francoise Schein who designed the floor lighting artwork called *Time Zone Clock*. This artwork uses large-scale LED lights that dominate the surface of the square and indicates the actual time in Coventry together with geographical relations to 26 twinned towns. Architectural original design can come from recognizable forms or new technical solutions. Facade elements are fixed but create dynamic effects with colours or different transparency levels. The facade of *Harpa Concert Hall and Conference Centre* (Reykjavik; Henning Larsen Architects and artist Olafur Eliasson) is made of steel framework clad with geometric shaped glass panels of different colours. This is an example of a unique and dynamic facade that creates new identity and a new landmark for the city. Elements do not necessarily need to be transparent or translucent to achieve dynamic. In that case, form and

structure are more important, like in the works of Zaha Hadid or the facade of Beijing National Stadium ("Bird's Nest", Beijing, Herzog & de Meuron, artistic consultant Ai Weiwei). There are numerous examples where a combination of lighting and graphic is used in designing surfaces. The ceiling in the hotel in Lucerne by Jean Nouvel (figure 1d.) has movie scenes painted on it, and in combination with the specific lighting and transparent windows these scenes put out dynamic into the public space of the street. The facade reconstruction of the airport in Zagreb combines graphical dynamics of print and changing lighting effect in different colours. This is collaboration between de Architekten Cie and designer Damir Gamulin.

Dynamic elements in architecture and urbanism can be divided into three main categories depending on solutions for that change mechanism: kinetic, vegetation or image. Kinetic facades and installations have mechanical systems, which make visual and physical oscillations. In media surfaces, light and image display are the basis for constant change. Vertical gardens, also known as green walls, living walls, biowalls or ecowalls, are surfaces covered with vegetation that are dynamic themselves, and change their appearance significantly through time. [Fortmeyer, 2014; Lambertini, 2007; Haeusler, 2009]

## KINETIC SURFACES



**Figure 2: a. Institute du Monde Arabe; b. Tipping Wall; c. Turbulent Line**

Facades with movable elements differ significantly depending on the author's profession. The ones designed by architects or in their collaboration with engineers usually represent a response to environmental conditions. Movement often refers to functional elements such as windows or sunshade system used for optimizing internal climate in the building. Such an example is *Kiefer Technic Showroom* in Bad Gleichenberg (GOD, Giselbrecht + Partners). There are also examples of the complete integration of windows and sun shade system like the facade of *Institute du Mond Arab* in Paris by Jean Nouvel (figure 2a.) whose photoelectric cells controlled via central computer moderate light levels in the building. All these systems are electronically driven, sometimes programmed with different patterns into dynamic sculptures and their movement is usually based on user input or sensor data [Fortmeyer, 2014].

Facades designed by artists and often in collaboration with architects are usually driven by natural forces, such as wind or water. The resulting movements are unpredictable and not controlled, almost constant and often refer to non-functional

elements. These surfaces sometimes have a secondary pragmatic role (sun shade, ventilation, etc.) but primarily they represent permanent art installations. There are more and more artists entering this field of design such as Charles Sowers, Janet Echelman and Ned Kahn. This research explores Kahn's projects because of their great number and diversity. He almost always collaborates with architects, and thanks to dynamic achieves attractiveness and interesting effects in space. His work usually involves capturing an invisible aspect of nature and making it visible, creating new space dimensions through sound, motion, etc. In the Marina Bay Sands project in Singapore he designed a water-driven installation called *Tipping Wall* (figure 2b.) with architect Moshe Safdie. This is an example of an artistic installation as animation of a plain wall. It aids the functioning of the cooling tower on which it is applied, thus contributing to the sustainability of the building. Sometimes facades appear to be floating in front of the building, forming a kind of visual screen of the building, such as the facade of The Swiss Science Centre in Winterthur in Switzerland designed in collaboration with Durig and Rami. This concept is also used for unattractive facilities such as car park buildings to minimise their visual impact while also providing ventilation and shade. An example of this is *Turbulent Line* (figure 2c.), the facade of the Brisbane Domestic Terminal car park (with Hassel Architecture and UAP). There are also projects that show more integration with architectural framework such as the facade of Neiman Marcus Store in California where wind-activated vertical fins are integrated into the design of a glass curtain wall. Some examples show more connection with the architect's concept as in the case of the entry facade of the Dutch Water Departments headquarters in Utrecht (Kahn with Cepezed). This artwork comprised from clear plastic panels is intended to complete the face of the building, which is made of semi-transparent ETFE plastic "cushions" pressurized with air. All these wind-driven installation surfaces of moving elements reflect light and colours from the sky and surrounding urban landscape, so they require daylight for their full appreciation. [<http://nedkahn.com/>]

## SURFACES AND VEGETATION

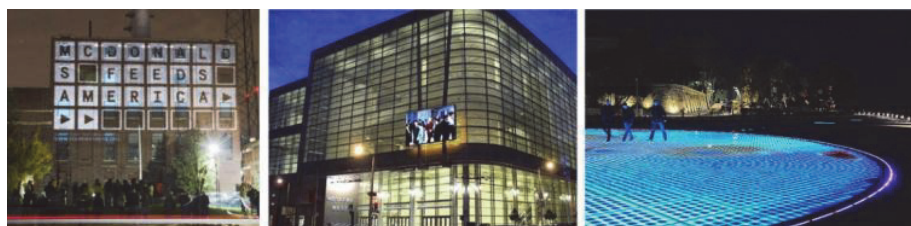


**Figure 3: a. Replay Barcelona Interior; b. CaixaForum; c. Eco-sculptures**

Natural environment in the cities gives us the places for relaxation, contemplation, strolling, recreation, having fun and other similar activities. "Green surfaces" today imply garden roofs or vertical gardens. The 21st century is a high point for vertical gardens since most of them date after 2005. The inventor of the idea was American

Stanley Hart White, but French botanist Patrick Blanc is the one who made contemporary patents. They can be outdoors or indoors in a great variety of sizes. In both interior and open spaces they provide aesthetically pleasant environments. Indoors they are still not used for other purposes, nevertheless they are becoming more and more fashionable. Michael Hellgren of Vertical Garden Design has designed a lot of interior vertical (figure 3a.) walls and he often collaborates with architects, among which are Snøhetta and Studio 10. These walls are suitable for shops and offices because when seen from the outside they attract attention with their effective and unusual looks. On the other hand, outdoor elements have multiple functions: they reduce overall temperatures of the building, protect from sound noise and create a pleasant microclimate. They can function as urban agriculture or urban gardening and, for their beauty, as art. They may also be a means for water reuse. Architects Herzog & de Meuron designed CaixaForum Madrid art centre (figure 3b.) in collaboration with Patrick Blanc and his 24 m high vertical garden as a one of main facade of square [Lambertini, 2009]. Eco-sculptures in Mexico (figure 3c.) designed out of green surfaces are the examples of a possible model for new city sustainability because they serve as both artworks and oxygen replenishers.

## DYNAMIC OF LIGHT IN MEDIA SURFACES



**Figure 4: a. Your Text Here; b. Facsimile; c. Pozdrav Suncu**

Light is a basis of media surfaces. In architecture light is a new form of communication in space, which uses electronically generated changeable visual effects and pictures [Kersalé, 2010]. Since the first ideas in seventies they are becoming an everyday phenomenon in urban places through defining buildings, squares or cities and giving ornament, information and identity. These effects in space can be achieved by: (a) front or back projections, (b) display solutions or (c) light emitting technologies. (a) Projections have no connection other than visual with the architectural surface onto which they are projected, therefore under certain conditions it is possible for any surface to function as a media façade. [Čikić-Tovarović, 2011; Haeusler, 2009]

They are often used for temporary art installations, which can be seen in the example of Kunsthau Bregenz. This museum's glass facade has been repeatedly occupied by artists' interventions, among them Tony Oursier or Jenny Holzer. Installation *Your Text Here* by architect Marcos Zotes/UNSTABLE in October 2012 at the event *Dlectricity* in Detroit connected mobile and large scale projecting

technology with local community and represented a new interpretation of the facade surface of a large heat production plant (figure 4a.). Interactivity is an evolving characteristic of media surfaces, and here we see how it can become the main feature of intervention. (b) Display surfaces have independent, non-transparent large screen displays added in front of the structure itself. They represent the familiar situation that can be found in urban centres such as Times Square in New York City or The Strip in Las Vegas [Schoch, 2006]. In most of the cases there are difficulties with integration of architecture and media element. One of the rare exception is the A.AMP Building in Singapore (Realities:United) whose large high resolution screen was linked to a system of reverse projection onto the glass facade. An interesting intervention with video display is permanent installation Facsimile by Diller Scofidio+Renfro for the Moscone Convention Centre expansion in San Francisco (figure 4b.). The moving video screen suspended in front of the facade transmits events in the building via camera, becoming a sort of a roving window. The screen enhances the transparency of the glass building through virtual transparency and brings out interaction in space. (c) Light-emitting surfaces have lighting elements placed in front, behind the facade or integrated in the facade structure. An example of such a surface is a temporary art installation SPOTS, placed on the Berlin office building on Potsdamer Platz. The surface was designed by Realities:United, a studio for art and architecture, and later on several artists were commissioned to design the lights programs. An example of media floor surface is Pozdrav Suncu (Zadar, 2008, Nikola Bašić - figure 4c.), on the renovated waterfront, which contributed to identity and attraction of the place by using multilayer glass with integrated lighting and photovoltaic cells [Krajina, 2012]. Most of the media surfaces are not visible and active during daylight, such as this installation which collects sun energy for its effective visual displays during the night.

Media surfaces have the power to evoke memory (Eventful Path, Sydney Olympic Park, ASPECT Studios, Feeder Ass.) or to improve pedestrian activity in space (Finsbury Avenue Square, London, SOM). They can contribute to the distinctive urban identity. On the city scale, in Graz this is Kunsthaus Art Museum (Peter Cook and Colin Fournier with Claus Bollinger engineer) with the BIX Media facade designed by Realities:United. On a smaller urban scale Museum of Contemporary Art (MCA) by Igor Franić in Zagreb creates identity of street on a central axial line and identity of the area of Novi Zagreb, across the river Sava. Most buildings with media facades are landmarks, which provide orientation and interesting views. In Vienna there are two buildings on Donaukanal at close proximity to each other with media effects achieved through different types of surfaces. The first one is a hotel by Jean Nouvel who collaborated with video artist Pipilotti Rist and botanist Patric Blanc. This hotel's video panel ceiling stands out of the black volume of the building creating the impression that it hovers over the city. The second example refers to the facade of Uniqua Tower designed in collaboration with lighting design firm LichtKunstLicht and media artists Mader Stublic Wiermann. Their network of LED lights transforms an ordinary office building into a dynamic volume with illusion of movement. Media facades are excellent for drawing attention and in addition they can become part of branding and marketing strategies. This can be seen in the warehouse project for

company ERCO Leuchgten GmbH in Lüdenscheid, designed by schneider+schumacher in collaboration with lighting planner Uwe Belzner. The last important example is the Tower of Winds in Nishi-ku by Toyo Ito, which houses water tanks for an underground mall. This facility at night becomes a constantly transforming surface of colours changing according to the surrounding sounds and winds of the city. What Toyo Ito did for the city and architecture with this technological sculpture in 1986 has an important impact in rethinking the urban surfaces. The public realm of 21st century urban space is no longer limited by physical space and reverse, dynamic digital information is moved from virtual to physical city surroundings [Čikić-Tovaročić, 2011].

## INTERDISCIPLINARY APPROACH AND NEW DIMENSIONS IN SPACE

Dynamic surfaces can be designed by architects or artists alone but they are in most cases designed in some kind of interdisciplinary collaboration. Artists generally consult architects and architects usually team up with an individual graphic designer, lighting designer, artist or even a botanist like Patric Blanc. For achieving dynamic, architects also collaborate with interdisciplinary firms such as artists' group Superflex or Mader Stublic Wiermann. There are many collaborations with studio for art, architecture and technology Realities:United and light engineering planning firm LichtKunstLicht. There are also projects of large firms like SOM or Scofidio+Renfro whose staff include not only architects, but also designers, artist or engineers. Some projects are designed with the possibility for later artistic intervention, which mostly refers to media facades.

Light connects all types of dynamic surface appearances. It brings new dimensions in space, creating nightscapes and accents in architectural design [Kersalé, 2010]. While kinetic surfaces and vertical gardens are primarily daylight installations, media facades are most effective during the night. In their own ways, all these surfaces give new dimensions by stimulating multiple senses and reinforcing the impression of space or by making certain forces of nature visible. All surfaces are interactive in some way, but in some examples interactivity with users or the environment is a way of achieving dynamic (kinetic facades, temporary projection installations, *Facsimile* etc.). An attractive and dynamic appearance at the city scale forms landmarks and city identity: Zadar-Pozdrav Suncu, Graz-Kunsthaus Art Museum, Reykjavik-Conference Centre. Also it defines streets, squares and buildings (*CaixaForum* Madrid, MCA Zagreb, etc.). Sustainability is a possible added dimension found in all types, but in vertical gardens and kinetic surfaces it is more evident and frequently used in design. The installation *Pozdrav Suncu* is the rare exception of sustainability in media surfaces.

## CONCLUSIONS

All analysed dynamic surfaces - media, vegetation, kinetic - have in common the interdisciplinary range of activities: research, theory and concepts within technology,



architecture, art, urban design and marketing. That is why the majority of examples of the research are designed in collaborations (1). Light is in different ways important for all types of surfaces (2): it can influence non-dynamic surfaces making them change their appearance; it enables vegetation to grow; it generates image in media surfaces mostly by night and it reflects daylight in kinetic surfaces. It is also used for interior green walls or paintings to be seen on the outside, creating a dialogue between buildings and the city. Described surfaces are sometimes only a decorative element like in cases of lighting, graphic treatments or some kinetic facades but they can also be functional elements or part of a sustainability system. This is mostly seen in vertical gardens which improve microclimate and reduce noise or some kinetic facades that are also used as sunshades. All this is achieved with independent surfaces or ones fully integrated into architecture systems (3). In most cases dynamic surfaces have a high degree of invitation to interactivity in space. Most of them create landmarks, identity or brand, especially media surfaces. Through vertical gardens and kinetic surfaces urban space is becoming more connected to the environment and nature resulting in more humane places (4). In general, dynamic surfaces' appearance is highly connected to new technology and materials, and with their development the possibilities of implementation with architectural and urban surfaces grow.

## REFERENCES

- Aymonino, Aldo and Mosco, Valerio Paolo. 2008. *Contemporary Public Space: Un-volumetric Architecture*. Milano: SKIRA
- Čikić-Tovarnović, Jasna, Škularac, Nenad and Ivanović-Škularac, Jelena. 2011. "Specific Problems of Media Façade Design." In *Facta Universitatis*, series: *Architecture and Civil Engineering*. Vol 9, no. 1: 193-203.
- Fortmeyer, Russel and Linn, Charles. 2014. *Kinetic Architecture: Design for Active Envelopes*. Mulgrave, Vic.: Images Publishing.
- Haeusler, M. Hank. 2009. *Media Facades: History, Technology, Content*. Ludwigsburg: Avedition.
- Kersalé, Yann. 2010. "When light reveals the phenomenological complexity of a building." From *Colour and Light in Architecture Conference*. Venice: IUAV. Accessed February 11, 2014. [http://rice.iuav.it/2017/1/01\\_auboiran.pdf](http://rice.iuav.it/2017/1/01_auboiran.pdf)
- Krajina, Zlatan. 2012. "Iskustvo medijske arhitekture. Pozdrav Suncu kao heterotopijska 'zgoda prostora'." *Čovjek i prostor*. 01-04
- Lambertini, Anna. 2009. "Artificial Wilderness – Patric Blanc's Vertical Gardens." In *Architecture and Urbanism* 04, no. 463: 48-53.
- Lambertini, Anna. 2007. *Vertical Gardens: Bringing the City to Life*. London: Thames & Hudson.
- Schoch, Odilo. 2006. "My Building is my Display - omnipresent graphical output as hybrid communicators." From 24th eCAADe Conference Proceedings *Communicating Space(s)*. Volos, Greece: 610-616. Accessed February 11, 2014. [http://cumincad.architexturez.net/system/files/pdf/2006\\_610.content.pdf](http://cumincad.architexturez.net/system/files/pdf/2006_610.content.pdf)

# Proceedings of INTERNATIONAL ACADEMIC CONFERENCE ON PLACES AND TECHNOLOGIES

APRIL 3-4, 2014, BELGRADE, SERBIA

# PLACES AND TECHNOLOGIES 2014

## PROCEEDINGS OF FIRST INTERNATIONAL ACADEMIC CONFERENCE ON PLACES AND TECHNOLOGIES

International Academic Conference on Places and Technologies, Places and Technologies 2014, will be the first conference organized by University of Belgrade – Faculty of Architecture, Professional association Urban Laboratory and University of Belgrade – Faculty of Philosophy.

Editors: Dr Eva Vaništa Lazarević, Dr Aleksandra Krstić-Furundžić, Dr Aleksandra Đukić and Dr Milena Vukmirović

For publisher: Dr Vladan Đokić

Publisher: University of Belgrade – Faculty of Architecture

Design: Stanislav Mirković

Place and year: Belgrade 2014

ISBN 978-86-7924-114-6

CIP - Каталогизација у публикацији  
Народна библиотека Србије, Београд

711.4.01(082)(0.034.2)

711.4:005.591.6(082)(0.034.2)

INTERNATIONAL Academic Conference on Places  
and Technologies (1st ; 2014 ; Belgrade)

Places and Technologies 2014 [Elektronski  
izvori] : keeping up with technologies to  
improve places : conference proceedings : 1st  
international academic conference, Belgrade,  
3-4. April 2014 / [organized by University  
of Belgrade - Faculty of Architecture,  
Professional Association Urban Laboratory and  
University of Belgrade - Faculty of  
Philosophy] ; editors Eva Vaništa Lazarević  
... [et al.]. - Belgrade : Faculty of  
Architecture, 2014 (Belgrade : Faculty of  
Architecture). - 1 USB fleš memorija ; 1 x 2  
x 14 cm

Sistemski zahtevi: Nisu navedeni. - Nasl. sa  
naslovnog ekrana. - Tiraž 150. -  
Bibliografija uz svaki rad.

ISBN 978-86-7924-114-6

1. Vaništa Lazarević, Eva, 1961- [уредник]
2. Faculty of Architecture (Belgrade)  
а) Градови - Мултидисциплинарни приступ -  
Зборници б) Урбанистичко планирање -  
Технолошки развој - Зборници

COBISS.SR-ID 206380812

## ORGANIZERS



## GENERAL SPONSOR



## SPONSORS



## DONATORS



## SUPPORTERS



# PREFACE

## CONFERENCE TECHNICAL DIRECTOR'S SPEECH

Ladies and gentlemen, distinguished speakers and guests, dear colleagues,

As a Technical Director of the International Academic Conference on Places and Technologies I must admit that the essence of this idea has been born spontaneously, during discussions on all sorts of architectural issues and chit chats between Dr Milena Vukmirović, assistant of mine, and me, while enjoying hot summer under the trees in my garden. Milena is known as a technically oriented person, ready to try all sorts of new technologies linked with the space / place and she met a soul mate in me, always ready to deny my age and seek for something new. Organization Committee with Prof Krstić, Prof Đukić and Prof Bajić Brković have offered and provided their numerous contacts, colleagues from abroad who participate at the Conference. The Faculty of Architecture and its dean, Prof Đokić, have immediately recognized the importance of the Conference on school and gave their utmost technical support.

Therefore, we tried to establish a structure, or frame, of the Conference which would be appealing for all sorts of new age people, those enthusiastic and ready to enter the new era. Because nothing is the same anymore. Looking back, just a decade ago we realize how much we have changed along with our prospectives and paradigms. From the architect's approach – the impact on the places is enormous.

The conference, therefore, examines the formation and presentation of knowledge of technologies and the environment, as well as the ethical considerations and potential risks. We analyze developing solutions, expertise and discussions with respect to strategic environmental problems. We would like mainly to focus on multidisciplinary approach to this matter also identifying and establishing relationships between issues of technological development, environmental protection and social change.

Consequently, the conference program and research are based on the knowledge regarding several academic disciplines: engineering and technical sciences, but also humanities and social sciences. We would like to examine the future of society and places, design of places, facilities and infrastructure in line with new and future needs of inhabitants; trying to support development of institutions and regulations. The aim remains always the same: creating appropriate and high quality environment with creation of favourable conditions for the advancement of innovation and business.

We wish to understand, from the critical aspect, the importance and role of technology in designing creative ideas to improve places. Secondly, we want to realize the importance of the whole image of rapid technological development that is

disproportionate to the social progress. That is why we split our focus on several domains: Urban design, Urban planning, Industrial and Architectural design, Building technologies, Sociology of the City, Innovations, ICT, Traffic as well as Contemporary cartography.

We have received a variety of very interesting and innovative research papers made by young scientists from all over Europe, and we are proud to share them gathered in one place. We are particularly proud to say that moderators during sessions will be our most prospective experts in the field, from the region and from abroad as well. A practical reference book consistent of common conclusions from these sessions will be the matter of further presentation. The very best papers will be elected and published by Cambridge Scholar Publishing house and/or in *Energy & Building* Special Issues.

During the upcoming two days, University of Belgrade – Faculty of Architecture will be the host of an incredible exchange of knowledge, networking and development of new thoughts, ideas and projects.

Thank you for your attention and Welcome to Belgrade!

Prof. Dr Eva Vaništa Lazarević, arch.

Technical Director of the Conference

University of Belgrade - Faculty of Architecture

# Keynote Speakers

**Dr Ir.-Arch. Jan Belis**

Department of Structural engineering, Ghent University, Ghent, Belgium

**Dr Phil Jones**

University of Cardiff, Welsh School of Architecture, Cardiff, UK

**Dr Ćedo Maksimović**

Imperial College London, London, UK

**Manfred Schrenk**

CEIT - Central European Institute of Technology, Schwechat, Austria

**Dr Stefan van der Spek**

Faculty of Architecture and Built Environment, Delft University of Technology, Delft, Netherlands

**Dr Raffaele Paloscia**

Department of Architecture of the University of Florence. Florence, Italy



# Scientific Committee

## **Dr Eva Vaništa Lazarević – Conference Director**

University of Belgrade Faculty of Architecture, Belgrade, Serbia

In alphabetical order:

## **Dr Ivan Aleksić**

University of Belgrade Faculty of Civil Engineering, Belgrade, Serbia

## **MSc Petar Arsić**

University of Belgrade Faculty of Architecture, Belgrade, Serbia

## **Dr Evangelia Athanassiou**

Aristotle University of Thessaloniki School of Architecture, Thessaloniki, Greece

## **Dr Fernando Brandao Alves**

FEUP - Faculty of Engineering University of Porto, Porto, Portugal

## **Dr Nataša Danilović Hristić**

Urban Planning Institute of Belgrade, Belgrade, Serbia

## **Dr Grygor Doytchinov**

Institute for Urban Design, Technical University of Graz, Austria

## **Dr Vladan Đokić**

University of Belgrade Faculty of Architecture, Belgrade, Serbia

## **Dr Aleksandra Đukić**

University of Belgrade Faculty of Architecture, Belgrade, Serbia

## **Dr Bob Giddings**

Northumbria University Faculty of Engineering and Environment, Newcastle, United Kingdom

## **Dr José Luis Gómez Ordoñez**

University of Granada Department of Urban and Regional Planning, Granada, Spain

## **Dr Phil Jones**

University of Cardiff, Welsh School of Architecture

## **Dr Soteris Kalogirou**

Mechanical Engineering and Materials Department, Cyprus University of Technology, Lemesos, Cyprus

## **Dr Christopher Koroneos**

School of Rural and Surveying Engineering, National Technical University of Athens, Athens, Greece

## **Dr Vlatko Korobar**

St. Cyril and Methodius University, Faculty of Architecture, Skopje, FYR Macedonia

**Dr Aleksandra Krstić – Furundžić**

University of Belgrade Faculty of Architecture, Belgrade, Serbia

**Dr Piotr Lorens**

Faculty of Architecture, Gdansk University of Technology, Gdansk, Poland

**Prof. Branislav Mitrović**

University of Belgrade – Faculty of Architecture, Belgrade, Serbia

**Prof. Ljubomir Mišević**

Faculty of Architecture, University of Zagreb, Zagreb, Croatia

**Dr Güldem Özatağan**

Faculty of Architecture, Izmir Institute of Technology, Izmir, Turkey

**Dr Dorina Pojani**

Faculty of Architecture and Built Environment, Delft University of Technology, Delft, Netherlands

**Dr Goran Radović**

Faculty of Architecture Podgorica, Montenegro University, Podgorica, Montenegro

**Dr Ralf Risser**

Research Institute FACTUM, Vienna, Austria

**Dr Nikola Samardžić**

University of Belgrade Faculty of Philosophy, Belgrade, Serbia

**Dr Karel Schmeidler**

REDECO, Brno, Czech Republic

**Dr Lina Seduikyte**

Kaunas University of Technology, Faculty of Civil Engineering and Architecture, Kaunas, Lithuania

**Dr Jasmina Siljanoska**

St. Cyril and Methodius University, Faculty of Architecture, Skopje, FYR Macedonia

**Dr Sc Metka Sitar**

University of Maribor Faculty of Civil Engineering, Department of Architecture

**Dr Ljupko Šimunovic**

University of Zagreb Faculty of Transport and Traffic Sciences, Zagreb, Croatia

# Regional Deans Workshop Committee

**Dr Vladan Đokić - Regional Deans Workshop Committee Host**

University of Belgrade Faculty of Architecture, Belgrade, Serbia

**MSc. Boris Koružnjak**

University of Zagreb Faculty of Architecture, Zagreb, Croatia

**MSc Peter Gabrijelčič**

University of Ljubljana Faculty of Architecture, Ljubljana, Slovenia

**Dr Dušan Vuksanović**

Faculty of Architecture Podgorica, Montenegro University, Podgorica, Montenegro

**Dr. Sc. Dženana Bijedić**

University of Sarajevo - Faculty for Architecture, Sarajevo, Bosnia and Herzegovina

**Dr Minas Bakalčev**

St. Cyril and Methodius University, Faculty of Architecture, Skopje, FYR Macedonia

**Dr Darko Reba**

University of Novi Sad Faculty of Technical Sciences, Novi Sad, Serbia

**Dr Milenko Stanković**

Faculty of Architecture and Civil Engineering, Banja Luka, Republic of Srpska, Bosnia and Herzegovina

**Dr Florian Nepravishta**

Department of Architecture at Polytechnic University of Tirana, Tirana , Albania

**Dr Bálint Bachmann**

University of Pécs Pollack Mihály Faculty of Engineering and Information Technology, Pécs, Hungary

# Conference Guests

**Jean-louis Frechin**

NoDesign.net and Digital Design Workshop at L'ENSCI – Les Ateliers, Paris, France

**Uroš Petrevski**

Nodesign.net and ENSCI Les Ateliers, Paris, France

**Dr Marija Todorović**

Southeast University, Nanjing, China  
CSHeB, Kyung Hee University, Korea.

**Dr Anđelka Mihajlov**

Faculty of Technical Sciences, University of Novi Sad, Novi Sad, Serbia

**Rade Milić**

Chairman of the Center for Urban Development (CUD), Belgrade, Serbia

# Organizing Committee

**Dr Eva Vaništa Lazarević – Conference Director**

University of Belgrade Faculty of Architecture, Belgrade, Serbia

**Dr Aleksandra Krstić – Furundžić**

University of Belgrade Faculty of Architecture, Belgrade, Serbia

**Dr Aleksandra Đukić**

University of Belgrade Faculty of Architecture, Belgrade, Serbia

**Dr Milena Vukmirović – Conference Executive Coordinator**

Urban Laboratory, Belgrade

**TECHNICAL SECRETARIAT**

**Maja Milošević, MArch**

Urban Laboratory, Belgrade

# CONTENTS

## PART I: URBANISM

### **Urban planning and technologies**

#### **OVERCOMING BARRIERS TO GROWTH**

Stephen Platt 16

#### **URBAN CHALLENGES OF ENERGY EFFICIENCY AND CONTEXT-SENSITIVE PLANNING APPROACHES IN BULGARIA**

Elena Dimitrova 25

#### **NEW URBAN PROTOCOLS FOR FRAGMENTED TERRITORIES \_ THE EXAMPLE OF WESTERN THESSALONIKI**

Styliani Rossikopoulou-Pappa, Valia Fragkia 33

#### **A FEASIBILITY STUDY FOR A TECHNOLOGICAL PARK IN FALCONARA MARITTIMA AN, ITALY**

Giovanni Sergi 41

#### **SAVING URBAN PLANNING FROM ANOTHER UTOPIAN MODEL**

Danijela Milojkić, Marija Maruna 48

#### **THE IMPLICATIONS OF DIGITAL TECHNOLOGY ON THE PERCEPTION OF CENTRALITY**

Mihai Alexandru, Cătălina Ioniță 56

#### **TECHNOLOGY AND LANDSCAPE: REDUCE, REUSE AND RECYCLE THE MINING DROSSCAPES**

Nicola Martinelli, Francesco Marocco, Alessandro Reina, Maristella Loi, Federica Greco 63

#### **THE ILLEGAL SETTLEMENTS IN BELGRADE VS. TAMING CITY GROWTH: CASE STUDY OF BELGRADE**

Biserka Mitrović, Miodrag Ralević, Branislav Antonić 71

#### **IMPACT OF CLIMATE CHANGE IN URBAN PLANNING**

Tamara Tošić 78

#### **CONCEPT OF URBAN VILLAGE: THE APPLICATION OF THE CONCEPT AS A FOUNDATION FOR NEW TYPOLOGY OF URBAN VILLAGES**

Branislav Antonić 85

#### **RESILIENCE AND VULNERABILITY OF URBAN SYSTEMS. A METHODOLOGICAL PROPOSAL FOR SEISMIC RISK MITIGATION**

Rigels Pirgu 94

## **Urban design and technologies**

### **PUBLIC PLACES AND SPLIT DEVELOPMENT MODEL**

Višnja Kukoč 103

### **AGILE LANDSCAPES: REDESIGNING URBAN SPACE**

Anastasios Tellios, Despoina Zavraka 110

### **PLANNING AND DESIGNING SAFE AND SECURE OPEN PUBLIC SPACES IN SERBIA**

Svetlana Stanarević, Aleksandra Djukic 118

### **SPATIAL AND FUNCTIONAL TRANSFORMATION OF BUSINESS AREAS UNDER THE IMPACT OF INFORMATION TECHNOLOGIES – CASE STUDY OF NIŠ ADMINISTRATIVE DISTRICT**

Aleksandar Ristić, Petar Mitković 130

### **THE IMPACT OF NEW TECHNOLOGIES ON CITY ACUPUNCTURE METHODOLOGY AND INTERVENTIONS**

Kristina Careva, Rene Lisac 138

### **COMFORT OF OPEN PUBLIC SPACES: CASE STUDY NEW BELGRADE**

Aleksandra Djukic, Nevena Novakovic 145

### **005 PUBLIC ART IN BERLIN**

Biljana Arandjelovic 151

### **PROTECTION OF PERSON WITH DISABILITIES: IMPLEMENTATION OF ACCESSIBILITY STANDARDS**

Dragana Vasiljevic Tomic, Radojko Obradović 160

### **VERTICAL PUBLIC SPACE**

Sorana Cornelia Radulescu, Roger Riewe 167

### **READY-AVAILABLE HYBRID METHODOLOGIES FOR CONTEMPORARY PUBLIC SPACE RESEARCH**

Milena Ivkovic, Berit Piepgras, Robin van Emden 175

### **RETAIL – NEW TECHNOLOGIES AND URBAN CENTRALITY**

Martin Brabant 181

### **TECHNOLOGY AND NEOLIBERAL URBAN PLACES**

Marija Cvjetković 191

### **NEURAL CITIES OR HOW CITIES TEACH US TO DESIGN THEM BETTER**

Angelica Stan 198

### **MORPHOLOGICAL AND TYPOLOGICAL CLASSIFICATION OF GREEN STREET FORMS: MLADEN STOJANOVIC STREET IN BANJA LUKA**

Tanja Trkulja 206

## **Urban regeneration and tehcnology**

### **PROPERTY ISSUES IN THE TURKISH URBAN REGENERATION PROJECTS**

Mehmet Çete, Yunus Konbul 215

### **URBAN ENERGY AND URBAN REGENERATION STRATEGIES: EVALUATION OF IZMIR-UZUNDERE URBAN REGENERATION PROJECT**

Yakup Egercioğlu, Çilem Türkmen 222

### **THE EMPTY URBAN SPACES AS AN OPPORTUNITY FOR THE CITY TO REINVENT ITSELF: THE CASE OF THE INDUSTRIAL TECHNOLOGICAL OBSOLETENESS**

Cătălina Ioniță, Mihai Alexandru 230

### **ENHANCEMENT OF URBAN LIFE QUALITY IN URBAN REGENERATION PROJECTS: IZMIR-BAYRAKLI URBAN REGENERATION PROJECT**

Yakup Egercioğlu, Tuğçe Ertan 238

### **THE INDUSTRIAL BUILDINGS WHICH USED IN SAUDI ARABIA AND SUSTAINABILITY**

Wael Al-Buzz 246

### **AN OVERVIEW OF URBAN REGENERATION PROJECTS IN TURKEY**

Yunus Konbul, Mehmet Çete 257

### **ART AND CULTURE AS INITIATORS OF ARCHITECTURAL AND URBAN TRANSFORMATION IN SAVAMALA**

Ksenija Pantović, Iva Čukić, Jasna Kavran 265

## **Smart cites/regions and network protocols**

### **SMART CITY GRAZ: FROM THE VISION TO THE ACTION**

Carlos Varela Martín, Ernst Rainer, Hans Schnitzer 276

### **RESIDENTS INTERACTION WITH HOME RESOURCES**

Cerasela Dinu, Constantin-Daniel Oancea 285

### **RENEWABLE AND DISTRIBUTED SOURCES WITHIN SMART ENERGY REGIONS**

Jovan Todorovic 293

### **THE SMART CITY FOR THE FUTURE. HOW A SPATIALLY ENABLED AFFECTED BY THE URBAN POPULATION?**

Shahryar Habibi 300

### **PERFORMANCE EVALUATION OF ROUTING PROTOCOLS FOR AD-HOC NETWORKS**

Ledina Karteri, Valma Prifti 306



<b>SMART CITIES AND CHALLENGES OF SUSTAINABILITY</b>	315
Rigels Pirgu	
<b>A FUZZY BASED CALL CONTROL SYSTEM IN MOBILE NETWORKS, CONSIDERING PRIORITY COMMUNICATIONS</b>	323
Valma Prifti, Ledina Karteri	
<b>Historical centers, Building heritage and Technologies</b>	
<b>ICT AND VGI TO PROMOTE MINOR HISTORIC CENTRES AND THEIR LANDSCAPE</b>	331
Pierangela Loconte, Francesco Rotondo	
<b>THE SUSTAINABILITY AND CULTURAL HERITAGE MANAGEMENT</b>	339
Christian Kersten Hofbauer, Elham Madadi Kandjani, Jean Marie Corneille Meuwissen	
<b>CONCEPTS OF FORMING OF URBAN SOLUTIONS IN HOUSING SETTLEMENTS IN BELGRADE BUILT IN PRECAST INDUSTRIALIZED SYSTEMS IN SECOND HALF OF XX CENTURY</b>	346
Dragana Mekanov	
<b>NEW ARCHITECTURE IN HISTORICAL CENTRES</b>	355
Alessandro Bruccoleri	
<b>INFORMATION AND COMMUNICATION TECHNOLOGIES TO IMPROVE THE KNOWLEDGE OF PLACES. THE ROME HISTORICAL CENTRE AS A CASE STUDY</b>	363
Francesca Geremia	
<b>CONTEMPORARY INTERVENTIONS IN HISTORIC PLACES _ THE EXAMPLE OF THESSALONIKI METRO</b>	372
Stavros Apotsos	
<b>Image and Identity of place</b>	
<b>THE IMAGE OF TRIFKOVIĆ SQUARE (NOVI SAD, SERBIA) THEN AND NOW</b>	380
Ivana Blagojević, Ksenija Hiel	
<b>IDENTITY OF NEW MEDIA SPACES</b>	388
Jelena Brajković, Lidija Đokić	
<b>THESSALONIKI: A MULTICULTURAL ARCHITECTURAL DESTINATION</b>	400
Niki Manou-Andreadis, Maria Milona	
<b>ELEMENTS OF IDENTITY AND UNUSED POTENTIALS OF CENTRAL ZONE IN NOVI SAD</b>	408
Milena Krklješ, Dijana Apostolović, Aleksandra Milinković	

<b>BELGRADE SKYLINE: CONTINUITY, PARADOXES &amp; DESIRES</b> Vladimir Milenković, Snežana Vesnić, Tatjana Stratimirović	416
<b>CITY OF THE MIND - INVISIBLE IN THE MAP</b> Jelena Stankovic, Milenko Stankovic	424
<b>WHAT MAKES A PLACE?</b> Saskia I. de Wit, Denise Piccinini	432
<b>SUSTAINABILITY, IDENTITY AND ROLE OF TRADITIONAL MATERIALS</b> Olivera Ilić Martinović, Mirjana Miletić	441
<b>IDENTITY OF URBAN SPACES; ASSESSMENT AND EVALUATION</b> Elham Madadi-Kandjani, Christian Kersten Hofbauer, Jean Marie Corneille Meuwissen	448
<b>IMAGE OF SUSTAINABLE PLACES</b> Vladimir Parežanin, Miloš Mihajlović	456
<b>PRESERVATION OF IDENTITY OF SPACE WITHIN RAPID ECONOMIC AND TECHNOLOGICAL DEVELOPMENT OF TOURIST DESTINATIONS IN THE EXAMPLE OD JIJOKA DE JERICOACOARA IN BRAZIL</b> Maja Momirov	469
 <b>PART II: ARCHITECTURE AND TECHNOLOGIES</b>	
<b>Sustainability, Sustainable buidings and technologies</b>	
<b>SUSTAINABLE RETROFITTING OF EXISTING AND HISTORIC BUILDINGS</b> Marina Traykova, Tanya Chardakova	477
<b>OSMOTIC LANDSCAPES - RECOVERED IDENTITIES</b> Venetia Tsakalidou, Anastasia Papadopoulou	485
<b>DESIGN SCENARIOS FOR AN OFFICE BUILDING – ENERGY AND ENVIRONMENTAL ASPECTS</b> Aleksandra Krstic-Furundzic, Tatjana Kosic	493
<b>TECHNOLOGICAL AND ENVIRONMENTAL ASPECTS OF RAPID HOUSING CONSTRUCTION</b> Nikola Macut, Bojana Stanković, Nataša Ćuković-Ignjatović	507
<b>ENERGY ANALYSIS AND REFURBISHMENT STRATEGY FOR ZAGREB UNIVERSITY BUILDINGS: FORMER FACULTY OF TECHNOLOGY IN ZAGREB BY ALFRED ALBINI</b> Stanka Ostojić, Zoran Veršić, Iva Muraj	515

<b>SUSTAINABLE REUSE OF OLD STRATEGIC INFRASTRUCTURE CANAL DANUBE-TISA-DANUBE</b>	523
Mirjana Jočić, Nataša Kuburović	
<b>PLACE ATTACHMENT AS POTENTIAL FOR SUSTAINABLE LOCAL DEVELOPMENT IN SERBIA</b>	533
Andelka Mirkov	
<b>LOW ENERGY BUILDINGS: CONCEPT OF ENERGY PERFORMANCE OPTIMIZATION OF SINGLE-FAMILY HOUSES</b>	540
Katarina Slavković	
<b>TECHNOLOGY AND PRODUCTIVE PROCESS: MINING REJECTIONS FROM WASTE TO SUSTAINABLE RESOURCE</b>	549
Vincenzo Paolo Bagnato, Giovanna Mangialardi, Silvana Milella, Michele Mundo	
<b>ADAPTATION OF AN INDUSTRIAL BUILDING INTO HIGHER EDUCATION INSTITUTION IN ACCORDANCE WITH IMPROVED ENERGY PERFORMANCE</b>	557
Branko Slavković, Komnen Žižić, Danilo Dragović	
<b>FUNCTION OF A DESOLATE SPACE</b>	565
Aleksandra Pešterac, Daniela Dimitrovska	
<b>ENVIRONMENT CERTIFICATION OF REHABILITATION DESIGN PROJECTS: PUT AND SHU BUILDINGS AS CASE STUDY</b>	570
Florian Nepravishta, Gerta Velui, Ramadan Alushaj	
<b>Green strategies and technologies</b>	
<b>GREEN URBAN STRATEGIES IN THESSALONIKI IN THE CONTEXT OF CRISIS</b>	580
Evangelia Athanassiou	
<b>GEOSCIENTIFIC EDUCATIVE CENTRE AS SUSTAINABLE COMMUNITIES BUILDING MODEL – POSITIVE COOPERATION EXAMPLE OF LIKA-SENJ COUNTY (CROATIA) AND UNA-SANA COUNTY (BIH)</b>	587
Ivan Brlić, Anita Bušljeta-Tonković, Katarina Milković	
<b>THE OCCUPANTS' PERSPECTIVE AS CATALYST FOR LESS ENERGY INTENSIVE BUILDINGS</b>	597
Lucia Martincigh, Marina Di Guida, Giovanni Perrucci	
<b>THE COLLECTIVE SELF ORGANIZED HOUSING EXPERIENCE IN ITALY</b>	605
Silvia Brunoro, Giacomo Bizzarri	

<b>APPLICATION OF ROOF GARDENS IN THE DEFINING IMAGE OF THE CITY</b>	
Mirjana Sekulić, Bojana Stanković, Ljiljana Dosenović	613
<b>STRATEGY FOR NATIONAL DEFINITION OF NEARLY ZERO ENERGY BUILDINGS</b>	
Milica Jovanović Popović, Bojana Stanković, Jasna Kavran	621
<b>ENERGY OPTIMIZATION OF THE BUILDING ENVELOPE OF THE REPRESENTATIVE SAMPLE OF THE EXISTING RESIDENTIAL BUILDING IN BANJA LUKA</b>	
Darija Gajić, Aleksandra Krstić – Furundžić	629
<b>BLUE GREEN DREAM AND DAYLIGHT</b>	
Srdjan Stankovic, Cedo Maksimovic, Milenko Stankovic	637
<b>POSSIBILITIES FOR ENERGY REHABILITATION OF TYPICAL SINGLE FAMILY HOUSE IN BELGRADE – CASE STUDY</b>	
Bojana Stanković, Dušan Ignjatović, Nataša Ćuković-Ignjatović	646
<b>BLUE-GREEN INTEGRATED MODELING SOLUTIONS IN URBAN PLANNING AND ARCHITECTURAL DESIGN</b>	
Miloš Mirošavić, Ivana Mirošavić, Srđan Stanković, Čedo Maksimović, Ranko Božović	654
<b>POTENTIALS AND LIMITATIONS FOR ENERGY REFURBISHMENT OF MULTI-FAMILY RESIDENTIAL BUILDINGS BUILT IN BELGRADE BEFORE THE WORLD WAR ONE</b>	
Ljiljana Đukanović, Ana Radivojević, Aleksandar Rajčić	661
<b>FROM BUILDING INFORMATION MODELS TO SIMPLIFIED GEOMETRIES FOR ENERGY PERFORMANCE SIMULATION</b>	
Daniel Ladenhauf, René Berndt, Eva Eggeling, Torsten Ullrich, Kurt Battisti, Markus Gratzl-Michlmair	669
<b>ENERGY CITY GRAZ - REININGHAUS: FIRST RESULTS FROM AN ENERGY SELF-SUFFICIENT QUARTER</b>	
Heimo Staller, Ernst Rainer, Carlos Varela Martín	677
<b>ENERGY EFFICIENCY AS ADVANCED TECHNOLOGY FOR A SOLUTION TO THE PROBLEM OF DEPOPULATION OF RURAL AREAS IN SERBIA</b>	
Jovana Stanišić	684
<b>THE ENERGY EFFICIENT CITY</b>	
Ivan Dochev	692

## **Innovative materials, systems and technology**

### **INVESTIGATION OF FLY ASH INFLUENCE ON CEMENT MORTARS PROPERTIES**

Dragica Jevtić, Aleksandar Savić 701

### **INFLUENCE OF GLASS COMPONENT JOINTS ON THE STRUCTURAL GLASS FACADE DESIGN**

Aleksandra Krstic-Furundzic, Tatjana Kosic, Jefto Terzovic 709

### **QUANTIFYING THE THERMAL BRIDGING EFFECT WITH REGARD TO THE FAÇADE'S CONFIGURATION**

Katerina Tsikaloudaki, Theodore Theodosiou, Dimitris Aravantinos, Karolos Nicolaos Kontoleon, Dimitrios Bikas 720

### **THE INFLUENCE OF NEW TECHNOLOGIES ON MODERN CITY FACADES**

Jasna Čikić Tovarović, Jelena Ivanović Šekularac, Nenad Šekularac 728

### **DYNAMIC APPEARANCE OF URBAN AND ARCHITECTURAL SURFACES**

Tihana Hrstar, Tamara Marić, Bojana Bojanić 736

### **TOWARDS GENERATIVE CONVERGENCE IN DESIGN OF ARCHITECTURAL STRUCTURES**

Jelena Milošević, Zoran Šobić, Miodrag Nestorović 744

### **APPLICATION OF WOOD AS AN ELEMENT OF FACADE CLADDING IN CONTEMPORARY ARCHITECTURE OF BELGRADE**

Jelena Ivanović Šekularac, Jasna Čikić Tovarović, Nenad Šekularac 752

### **COMPARISON OF INSULATION APPLIED ON SURFACES OF MODEL PLACED IN THE AREA OF SKOPJE**

Aleksandar Petrovski, Todorka Samardzioska, Ana Trombeva Gavriloska 758

### **APPLICATION AND EFFECTS OF PHASE CHANGE MATERIALS IN A MODERN ARCHITECTURAL AESTHETICS**

Vladana Stanković, Goran Jovanović, Mirko Stanimirović 766

### **INTEGRATED DESIGN OF STRUCTURAL SYSTEMS**

Aleksandra Nenadović 772

### **NEW COMPOSITE SLAB SYSTEM – LIGHTWEIGHT CONCRETE, STEEL SHEETING AND REINFORCEMENT**

Zoran Šobić, Jelena Milošević, Miodrag Nestorović 780

### **MODERN METHODS OF STRENGTHENING MASONRY WALLS**

Nenad Šekularac, Jasna Čikić Tovarović, Jelena Ivanović Šekularac 788

### **NEW PERSPECTIVES FOR FERROCEMENT**

Ornela Lalaj, Yavuz Yardim, Salih Yilmaz 796

<b>Cultural patterns, Architecture and technologies</b>	
<b>SPATIAL AND SOCIAL ASPECTS OF THE ARSENAL TRANSFORMATION, MILITARY PORT IN TIVAT INTO NAUTICAL – TOURISM SETTLEMENT AND PORT „PORTO MONTENEGRO“</b>	
Goran Radović	805
<b>DIGITAL FABRICATION IN THE FIELD OF ARCHITECTURE</b>	
Roberto Vdović, Morana Pap	816
<b>THE IMPACT OF SMART HOME TECHNOLOGIES ON ARCHITECTURAL DESIGN</b>	
Goran Petrović, Marko Aleksendrić	822
<b>BETWEEN THE PLACE AND NON-PLACE: ARCHITECTURE AND TERRITORY ON THE EXAMPLE OF SKOPJE</b>	
Saša Tasić, Mitko Hadzi Pulja, Minas Bakalchev	830
<b>INTEGRATED ARCHITECTURAL COMPLEXITY - FROM ABSTRACTION TO TECHNOLOGY AND MATERIALISATION</b>	
Rada Čahtarević, Dženana Bijedić, Amra Taso	838
<b>EVOLUTION DIGITIZED: ARCHITECTURE OF THE SUBLIME DREAM</b>	
Mihailo Popović, Vladimir Milenković	846
<b>MONOCHROMATIC IN THE ARCHITECTURAL COMPOSITION: WITH SPECIAL REFERENCE TO THE APPLICATION OF WHITE COLOUR</b>	
Dragana Vasiljevic Tomic, Rifat Alihodzic, Dragana Mojsilovic	853
<b>(RE)GENERATION &amp; REFLECTIONS OF THE SCHOOL OF ARCHITECTURE – BANJALUKA IN THE CENTURY OF KNOWLEDGE AND SKILLS</b>	
Milenko Stanković, Una Umićević	864
<b>QUANTUM ARCHITECTURE, NON-PLACE AND ACCULTURATION</b>	
Dubravko Aleksić	873
<b>PLACES AND PRACTICES OF CONSUMPTION IN THE POST-SOCIALIST CONTEXT</b>	
Dejana Nedučin, Dušan Ristić, Vladimir Kubet	880
<b>INTERACTIONS BETWEEN LIGHT AND ARCHITECTURE: AN EXPERIMENT USING MODELS AND PHOTOGRAPHS</b>	
Anita Stoilkov-Koneski	888
<b>THE INTERPLAY OF MUSIC AND ARCHITECTURE: LAYERING OF SOUND AND SPACE</b>	
Anja Kostanjšak, Morana Pap	895
<b>CULTURAL PATTERNS AND SENSITIVITY TODAY: FROM THE PHILOSOPHY TO THE TECHNOLOGY IN ARCHITECTURAL DESIGN PROCESS</b>	

### PART III: PLACES, TECHNOLOGIES AND RELATED FIELDS

#### **Big data, apps, social networks and microblogs in urban planning and design**

#### **PLACE COMPETITIVENESS EXPRESSED THROUGH DIGITAL DATA. MEASURING THE PLACE ATTRACTIVENESS TRACKING THE GEOTAG DATA VISUALS**

Milena Vukmirovic, Eva Vanista Lazarevic 914

#### **ROOM BOOK 2.0 – BRING BACK THE INFORMATION TO ITS PLACE**

Christoph Breser, Stefan Zedlacher 926

#### **THE INTERCONNECTED OBJECT: ARE YOU AT HOME IN A NETWORK?**

Kalina Ntampiza, Polina Zioga 936

#### **THE INTERACTION TIME IN A NETWORKED SOCIETY**

Danijel Baturina 944

#### **GOOGLE EARTH AS A MICROWORLD**

Milena Zindović 962

#### **TRANSPARENCY OF SCALE: GEOGRAPHICAL INFORMATION PROGRAM (GOOGLE EARTH) AND THE VIEW FROM BEYOND**

Pavle Stamenović, Dunja Predić, Davor Ereš 970

#### **Geodesy and modern cartography**

#### **ROBUST ESTIMATION APPLIED TO GEODETIC DATUM TRANSFORMATION USING A METAHEURISTIC ALGORITHM**

Mevlut Yetkin 979

#### **THE STATE OF THE ART SURVEYING BY TECHNOLOGY OF THE TERRESTRIAL LASER SCANNING**

Marko Pejić, Branko Božić, Verica Erić, Jelena Pandžić 987

#### **ROLE OF CARTOGRAPHY IN MAKING A “SMART CITY”: CASE STUDY OF INDJIJA**

Dragutin Protić, Ivan Vučetić, Ivan Nestorov 995

#### **MODERN CARTOGRAPHY IN PROJECT OF CENSUS**

Maja Kalinić, Dragoljub Sekulović 1002

## **Mobility and technologies**

### **PERSONAL RAPID TRANSIT – A SUSTAINABLE URBAN TRANSPORT SYSTEM**

Ljupko Šimunović, Luka Novačko, Mario Ćosić 1011

### **FLIGHTPATH TO AN ENVIRONMENTAL FRIENDLY AIR TRANSPORT**

Ivana Čavka, Olja Čokorilo, Slobodan Gvozdenović 1020

### **PRESERVATION OF PLACE-IDENTITY THROUGH URBAN TRANSFORMATIONS BASED ON SUSTAINABLE FORMS OF TRANSPORT**

Miloš Kopic 1029

### **BELGRADE RIVERSIDE TRAFIC INTERCHANGES**

Ksenija Stevanović, Milena Stevanović 1037

### **SUSTAINABLE URBAN MOBILITY PLANS IN EUROPE**

Davor Brčić, Ljupko Šimunović, Marko Slavulj 1045

### **URBAN DEVELOPMENT IN BELGRADE IN THE CONTEXT OF GLOBAL TRENDS: CHANCES OF ILLEGAL HOUSING INTEGRATION**

Biserka Mitrović, Miodrag Ralević, Branislav Antonić 1051

### **RE-THINKING INFRASTRUCTURE PROJECT FOR THE METROPOLIS: LABORATORY GRANADA**

Juan Luis Rivas Navarro, Belén Bravo Rodríguez 1059

## **Public participation, e-governing and tehcnology**

### **COMMUNITY PARTICIPATION AND GREEN INFRASTRUCTURES: A DELIBERATIVE EVALUATION METHOD**

Saverio Miccoli, Fabrizio Finucci, Rocco Murro 1067

### **RESULTS OF INTRODUCTION OF PARTICIPATORY TOOLS IN URBAN PLANNING IN SERBIA – 7 CASE STUDIES**

Ratka Čolić, Harald Mueller 1075

### **WAYS TOWARDS A CITY OF NEW TECHNOLOGIES**

Miodrag Ralevic, Tatjana Mrdjenovic, Natasa Krstic, Djemila Beganovic 1083

### **PARTICIPATION OF CITIZENS IN TOWN PLANNING PROCEDURES IN NEIGHBOURHOODS WITH FORMER REFUGEE AND DISPLACED POPULATION IN PRIJEDOR, BOSNIA AND HERZEGOVINA**

Rada Latinović 1090

### **THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY IN A VIRTUAL ORGANIZATION**

Jelena Lukić 1098



