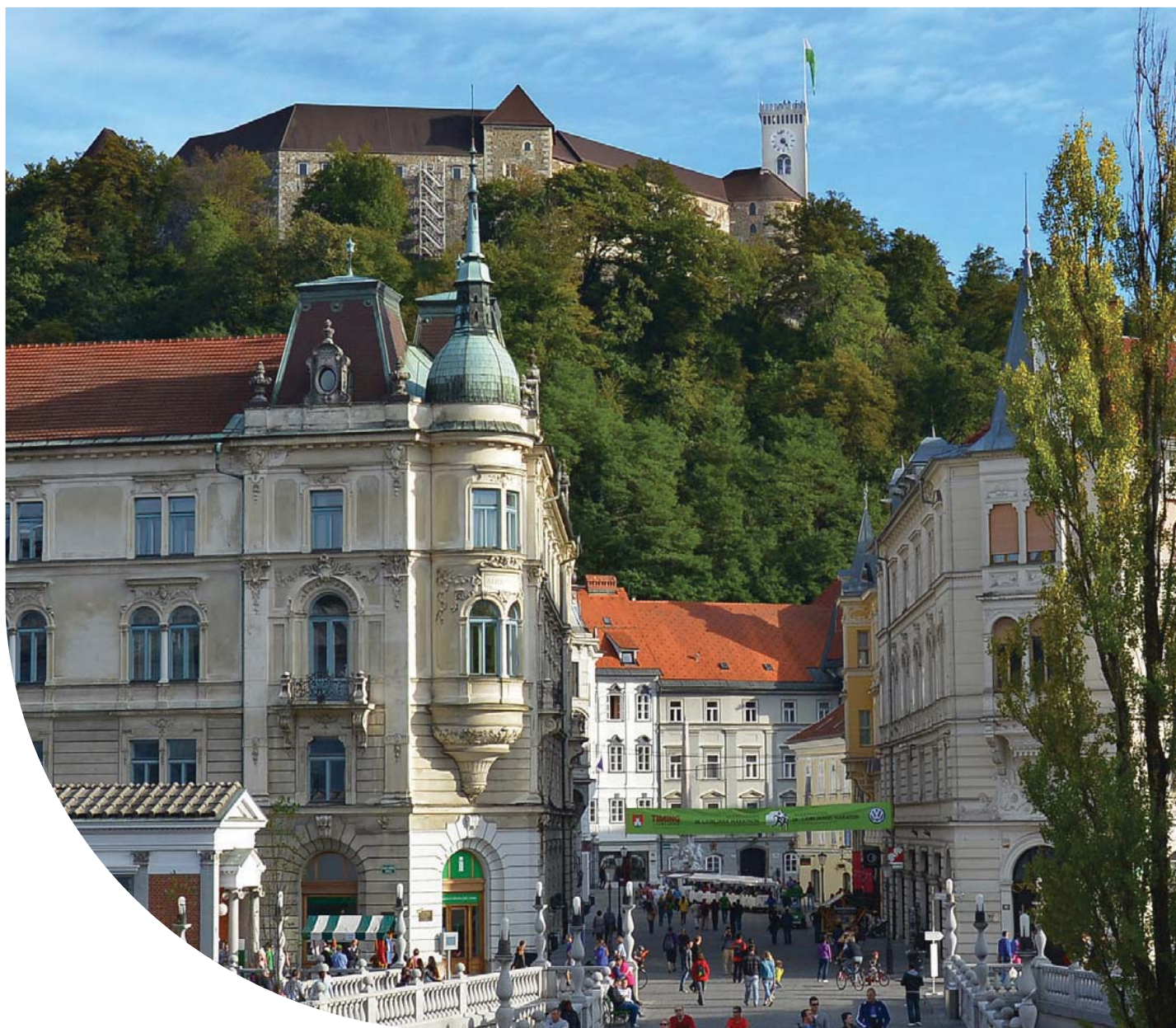




## STREETS FOR 2030: PROPOSING STREETS FOR INTEGRATED, AND UNIVERSAL MOBILITY

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UNIVERSITY OF LJUBLJANA, FACULTY OF ARCHITECTURE and  
URBAN PLANNING INSTITUTE OF THE REPUBLIC OF SLOVENIA in collaboration with  
NOTRE DAME UNIVERSITY-LOUAIZE, RAMEZ G. CHAGOURY FACULTY  
OF ARCHITECTURE, ART AND DESIGN and  
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### EDITORS

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### DESIGN

assist. DR. GAŠPER MRAK, UL FGG

### PUBLISHERS

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## CONTENTS

<b>ORGANISERS</b> .....	III
<b>COLLABORATING UNIVERSITIES &amp; INSTITUTIONS</b> .....	III
<b>ROUNDTABLES COLLABORATORS</b> .....	IV
<b>ADVISORY BOARD, SCIENTIFIC AND ORGANIZING COMMITTEE</b> .....	V
<b>INTRODUCTION</b> .....	IX
<b>CONTENTS</b> .....	XII
<b>KEYNOTE SPEAKERS</b> .....	XVI
<b>CONFERENCE ROUNDTABLES</b> .....	XXIII
Roundtable 1: Public Spaces - Knowledge Transition Between Research, Policy And Practice.....	XXIII
Roundtable 2: Moving Around our Cities in the Times of Epidemics – the Changed Demand for Public Spaces.....	XXIV
<b>TRACK 1: INTEGRATED AND UNIVERSAL MOBILITY: WHOSE STREETS?</b> .....	1
Track Chairs: Matej Nikšič, Paola Somma	
<b>From Everyone's to No-one's Streets – and Back?: Approaches to Public Space Design amid Privatisation Processes</b> .....	2
Matej Nikšič	
<b>Rethinking Public Spaces: Accessibility For All as a Driver to Integrate Mobility, Health and Ecological Issues</b> .....	15
Elena Marchigiani, Ilaria Garofolo, Barbara Chiarelli	
<b>E-Scooters in Urban Areas – A Viable Innovation or Source of New Conflict Potential?</b> .....	25
Raphael David Saalman, Wolfgang Fischer, Sabrina Reinbacher	
<b>City Transport and Social Inclusion, a Case Study of Student Dormitories' Community in Ljubljana</b> .....	33
Zala Bokal	
<b>The "Pop-up Piazza"-project: How temporary changes in public space might help opening streets for everyone</b> .....	46
Sara Bafaro, Sabine Oberrauter	
<b>TRACK 2: DENSE, DIVERSE AND DESIGNED URBAN DEVELOPMENT</b> .....	54
Track Chairs: Branislav Folić, Saja Kosanović	
<b>Sustainable Transformation of Historic Transport Corridor in the City of Belgrade, Serbia</b> .....	55
Branislav Folić, Milena Vukmirović, Saja Kosanović, Milena Ivanović	
<b>From Urban Porosity Decoding to Material Urbanity</b> .....	63
Sérgio Proenca	
<b>Roads In Introverted Megaprojects from Dubai to Lebanon, A walkability Analysis: Urban Design or Engineering Approach</b> .....	78
Oula Aoun	
<b>Role of Accessibility in a Sustainable Town as Applied to Murska Sobota</b> .....	88
Jernej Červek	
<b>Striated and Smooth Identities: Mapping Tripoli's Varying Political Intensities</b> .....	101
Dina Nashar Baroud	
<b>The Evolution of the Shared Space</b> .....	109
Mia Crnić	



<b>TRACK 3: MITIGATING TRAFFIC CONGESTION WITH URBAN DEVELOPMENT .....</b>	<b>124</b>
Track Chairs: Ilka Čerpes, Mia Crnič	
<b>The Impact of Globalization on Ljubljana Streets .....</b>	<b>125</b>
Ilka Čerpes	
<b>Dynamic Streets and City Programs.....</b>	<b>136</b>
Višnja Kukoč, Mirza Džananović, Marko Borota, Jelena Borota, Mariana Bucat	
<b>Decentralization of Workplaces as a Factor of the Reducing Urban Transport System.....</b>	<b>149</b>
Gregor Čok, Samo Drobne, Gašper Mrak, Mojca Foški, Alma Zavodnik Lamovšek	
<b>Promoting accessibility in the urban planning system: FADP in Taranto Smart City Planning .....</b>	<b>157</b>
Alessandro Massaro, Francesco Rotondo	
<b>Urban Morphology and Mobility Patterns: Myths and Real-Life Transformations of a Large Housing Estate in Sofia.....</b>	<b>165</b>
Milena Tasheva-Petrova, Elena Dimitrova, Angel Burov	
<b>TRACK 4: TRAVEL TIME AND EFFICIENCY OF TRANSPORT SYSTEMS.....</b>	<b>173</b>
Track Chairs: Simon Koblar, Manfred Wacker	
<b>Assessing effects of sustainable urban mobility measures: case study in the City Municipality of Novo mesto .....</b>	<b>174</b>
Simon Koblar, Andrej Gulič, Sergeja Praper Gulič	
<b>Future Scenarios on New Mobility and the Digitalisation of Traffic &amp; its Effects on Spatial Issues in Rural Areas .....</b>	<b>181</b>
Lola Meyer, Philipp Oswald, Stefan Rettic	
<b>Future of Urban Mobility in Ljubljana .....</b>	<b>189</b>
Gregor Boltič, Miha Šetina	
<b>TRACK 5: PUBLIC-TRANSPORT-ORIENTED CITIES FOR ALL.....</b>	<b>200</b>
Track Chairs: Luka Mladenovič, Peter Lipar	
<b>Public transport oriented cities .....</b>	<b>201</b>
Luka Mladenovič	
<b>Formulating Multimodal Corridors Towards Sustainable Mobility in a Metropolitan City .....</b>	<b>209</b>
Stefanos Tsigidinos, Thanos Vlastos	
<b>The role of green space and alternative transportation in improving public health .....</b>	<b>217</b>
Jelena Marić, Aleksanda Djukić, Eva Vaništa Lazarević	
<b>Is Transit-Oriented Development in the Aftermath Feasible?.....</b>	<b>225</b>
Dima Jawad, Pamela Mouawad, Peter El Khoury	
<b>Underground rail infrastructure as a multimodal passenger hub – the case of the Ljubljana Passenger Centre .....</b>	<b>237</b>
Jaka Veber	
<b>TRACK 6: BORDERS IN STREET LIFE: DIVIDING OR PROTECTING?.....</b>	<b>249</b>
Track Chairs: Domen Kušar, Luca Staricco	
<b>Fences as a Means of Determination of Mobility.....</b>	<b>250</b>
Domen Kušar, Blaž Komac	
<b>Divided Neighbourhood .....</b>	<b>259</b>
Katarina Konda	
<b>Music on the Streets: Positive Impressions .....</b>	<b>268</b>
Lola Beyrouti	
<b>A-Place: Linking places through networked artistic practices .....</b>	<b>277</b>
Leandro Madrazo, Maria Irene Aparicio, Burak Pak, Tadeja Zupančič	

<b>Digital Borders: Effect of Contemporary and Future Consumerism on Street Life</b> .....	287
Oskar Cafuta	
<b>TRACK 7: GREEN MOBILITY IN A WAY TO CLIMATE RESILIENT STREETS</b> .....	297
Track Chairs: Kristijan Lavtižar, Jean-Pierre El Asmar	
<b>Adapting to the Urban Microclimate – Street Pollution</b> .....	298
Kristijan Lavtižar	
<b>Advancing low carbon mobility in Slovenia: The case of the City Municipality of Novo mesto</b> .....	307
Andrej Gulič, Sergeja Praper Gulič, Simon Koblar	
<b>Configuration of a city street network to support urban seismic resilience</b> .....	317
Katarina Rus, Vojko Kilar, David Koren	
<b>Sustainable Transport University Campus: Starting at the Grassroots</b> .....	329
Dima Jawad, Marie-Belle Boutros, Marc Abi Khalil, Ralph Khadra, Lilia Aboul Hosn	
<b>TRACK 8: PEDESTRIAN FRIENDLY CITIES TO SUPPORT CLIMATE CHANGE</b> .....	341
Track Chairs: Matevž Juvančič, Ognen Marina	
<b>Walkability Themes and Principles Examined on Ljubljana City Centre and Južne Fužine Neighbourhood</b> .....	342
Matevž Juvančič, Kaja Žnidaršič	
<b>Another street is possible: Exploring future streetscapes through temporary redistribution strategies</b> .....	362
Steffan Robel	
<b>New Centralities for Integrated and Universal Mobility in Latin America</b> .....	369
María Eugenia Martínez Mansilla, Marta Adriana Bustos Romero	
<b>Towards a Walkable City: A Case Study of Zouk Mosbeh</b> .....	383
Dima Jawad, Maya El Chakhtoura, Julien Semaan, Nasri Khneisser, Paul Boulos	
<b>Contribution of Public Space to Sustainable Development: Case study Varaždin</b> .....	392
Lea Petrović Krajnik, Damir Krajnik, Tamara Lukić	
<b>TRACK 9: PEDESTRIAN FRIENDLY CITIES TO SUPPORT CLIMATE CHANGE</b> .....	402
Track Chairs: Janez Grom, Christine Mady	
<b>A Road Or a Street? A Case of “Vodnikova” in Ljubljana</b> .....	403
Janez P. Grom, Matevž Frančič, Alenka Fikfak	
<b>Experiencing Mobility under Instability: A Perspective from Beirut’s Informal Bus Riders</b> .....	414
Christine Mady	
<b>Transition Streets: A View from Psychological Sustainability Perspective</b> .....	424
Natalia Olszewska, Nour Tawil	
<b>Space Digitization as a Tool to Enhance the Identity of Historic Public Space</b> .....	432
Milica Lazarević, Aleksandra Djukić, Branislav Antonić	
<b>Potentials and Experience of Streetscape Transformations - Recent Examples from Maribor</b> .....	442
Kaja Pogačar	
<b>Utopia or Dystopia in Mobility Cultures? Beirut’s Informal Bus System and Bus Map Project as Social Innovations</b> .....	452
Carine Assaf, Christine Mady, Pieter Van den Broeck	
<b>T10: STREET LIGHTING – SUPPORTING SUSTAINABLE URBAN DEVELOPMENT</b> .....	462
Track Chairs: Tomaž Novljan	
<b>Urban Lighting Ambiences</b> .....	463
Tomaž Novljan	
<b>Outdoor Lighting Plan – Rethinking of Trg Osvoobodilne Fronte In Ljubljana</b> .....	471
Lanlan Wei	

Lighting in Urban Space – Challenges in Zouk Mosbeh, Lebanon.....	480
Aleš Švigelj, Marko Lazič	
<b>TRACK 11: POSTER SECTION.....</b>	<b>488</b>
Joint Development of Transit Corridors - Re-stitching the City.....	489
A. Savvides, S. Gregoriou	
What Changes are Autonomous Vehicles Bringing to Urban Space .....	491
Urban Bračko, Peter Lipar	
<b>AUTHORS INDEX .....</b>	<b>493</b>

## SPACE DIGITIZATION AS A TOOL TO ENHANCE THE IDENTITY OF HISTORIC PUBLIC SPACE

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### **Milica Lazarević<sup>1</sup>**

PhD Student, University of Belgrade – Faculty of Architecture, Serbia, Bulevar kralja Aleksandra 73/2, 11000 Belgrade, Serbia, milii.lazarevic@gmail.com

### **Aleksandra Djukić**

Associate Professor, PhD, University of Belgrade – Faculty of Architecture, Serbia, Bulevar kralja Aleksandra 73/2, 11000 Belgrade, Serbia, adjukic@afrodita.rcub.bg.ac.rs

### **Branislav Antonić**

Teaching assistant, PhD, University of Belgrade – Faculty of Architecture, Serbia, Bulevar kralja Aleksandra 73/2, 11000 Belgrade, Serbia, antonic83@gmail.com

### **ABSTRACT**

*The 21<sup>st</sup> century is the era of new technologies, Internet, overall digitalization, and the applications that represent a major advance in science and technology. On the other hand, these innovative technologies have had a very challenging impact on various social activities. People are spending more time in a virtual space, instead going out, socialising or enjoying outdoor recreation. Despite this, digitalization has also led to new ideas and directions for creativity, such as the creation of various applications that can encourage human mobility and interaction in the open space of a settlement. Accordingly, these applications can supplement and upgrade the values of existing open spaces, adding them a new, 'digitized' dimension. This opportunity especially comes to light when these open spaces, such as public squares, streets or quays, contain the elements of culture and heritage that make up their identity.*

*The aim of this paper is to examine the level which the digitalization of heritage, history, tradition, and culture is presented in open spaces in Serbia, including public squares and promenades, as well as heritage sites outside settlements. Based on this, a list of the nationally promoted digitized culture and heritage is formed, while few best-practice examples are elaborated. The focus is on their connection to real space and its identity. Therefore, all enlisted items are mapped. In that sense, the final contribution of the research is to understand the role of these innovative applications in the revitalisation and activation of open public spaces based on this new dimension of their identity.*

*Keywords: Open public space, identity, digitalization, culture, heritage*

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<sup>1</sup> Corresponding author

## INTRODUCTION

Open public spaces are key places within cities (Carmona, 2003; Gehl, 2006; Gehl, 2010; Djukic, Skarzauskiene & Mačiulienė, 2019; Vlastos & Joklova, 2019). This is especially pronounced when it comes to the identity of a city or environment, and also social life, as a basic indicator of the image and identity of a city. Open urban spaces are now classified into different types and categories, such as parks, squares, playgrounds, river banks, urban forests, and even streets and sidewalks (Riether, 2016; Skarzauskiene & Mačiulienė, 2019). Each of these categories has its significance in creating the identity of place through the type of content it offers. Today, however, the development of information and communication technologies (ICT) has a profound impact on many aspects of everyday life, including the use of open public spaces. “Information technology has shifted the relation of space and function... Thinking about public space in the same way one might imagine people using the sidewalk as a new work environment or a street as an environment that is not just designed for cars” (Riether, 2016, p. 261). According to this, there have been significant changes in outdoor content creation requirements.

However, people are spending more time in a virtual space, instead of going out, socializing or enjoying outdoor recreation. That is why many authors, including one of the most famous urban designers and theorists of urban design, Jan Gehl, are wondering if technology can replace the function of open spaces (Abdel-Salem & El-Sayed, 2016). He claims that a physical encounter is irreplaceable and that technology cannot in any way replace it, because true quality is a face-to-face encounter (Gehl, 2010), while Keith Hampton (PPS 2014) believes that people should have a freedom of choice and that users can use technology as a secondary form of connection. Technology does not have to replace the first form of connection, and can only be used to improve and add new features. Also, many authors point out the double value of digitizing open public spaces. Smaniotto et al (2017) point out that significance “lays in their ability to enhance communication with (potential) users, transforming the production of public open spaces into an interactive process, and enabling creative community participation and empowerment” (Smaniotto et al, 2017, p. 1). Ruchinskaya, Ioannidis & Kimic (2019) point out that the introduction of mobile devices offers users both new forms of interaction with space, and opportunity to exchange information with potential creators of public spaces. Skarzauskiene and Mačiulienė (2019) also state that the importance of ICT lays in its ability to improve communication between users and stakeholders, turning the creation of open public spaces into an interactive process.

All in all, the fact is that traditional social life is slowly disappearing. Activities and entertainment in the physical environment are diminishing and, therefore, ICT is becoming the factor that must be taken into account for creating successful open public spaces. The relationship between ICT and public open spaces is becoming an increasing challenge for the profession (Skarzauskiene & Mačiulienė, 2019). All this indicates that urban design which includes the digitalization of open public



spaces must be crucial for building the social life and identity of cities. It becomes necessary to think about how to integrate ICT in open public spaces in such a way that they become lively and attractive again. However, the introduction of digital into the physical framework of open spaces is still in its infancy, with many unexplored niches.

The main research of this paper is to analyse the introduction of interactive applications as a form of ICT and the digitalization of open public spaces in order to demonstrate their role and importance in strengthening the identity of open public spaces. The polygons for this research are all open public spaces in Serbia that contain digitized dimension. The paper is focused on the digitized elements of heritage, history, tradition, and culture and how they are presented in open public spaces in Serbia. The main focus is on their connection with real space and its identity. Accordingly, this research spatially examines the interactive applications of the digitized culture and heritage that encourage users in mobility and social interaction. Therefore, all enlisted items are mapped. Considering this approach, the final contribution of the research is to understand the role of these innovative applications in the revitalization and activation of open public spaces based on this new/digitized dimension of their identity.

## **METHODOLOGY**

The proposed research combines the elements of data collecting and case study presentation. The research is mainly focused on the analysis of open public spaces in the territory of Serbia, where ICT technology was applied, in the form of analysis of specially made applications. The first part of the paper presents a brief overview of previous research on the application of digitization at the level of open spaces. Given the reflection that open public spaces, especially those networked with cultural heritage, have on the identity of the city, community or neighbourhood, this part of paper also focuses on to the importance these tools have in terms of identity strengthening. In accordance to this, the aspiration is to show the extent of the implementation of these tools at the level of the territory of Serbia, so the central part of the work is just based on collecting and enlisting of the all open public spaces in Serbia that include and contain digitized elements, which present local heritage, culture and tradition, i.e. their identity in innovative way. Based on this, a list of the nationally promoted digitized culture and heritage is formed, while few best practice examples are elaborated as case studies.

## **PLACE IDENTITY IN THE CONTEMPORARY TIMES**

“Urban identity is defined as a ‘place-identity’, ‘placeness’, ‘character of a place’, ‘image of a place’, ‘sense of place’ and ‘spirituality of place’. These all pertain to the urban identity as the concept of ‘distinctiveness’, denoting that places are distinguishable from one another” (Cheshmehzangi, 2012, p. 309). Costa, Lazos Ruiz & Oliveira (2016, p. 213) state that identity is something that is produced and

created over time, and as such is the characteristic of every age. This is especially important in the age of globalization in which we are living, where all cities become very similar, and “identity becomes a socially necessary condition”. Therefore, cities should have their uniqueness and characteristics and, given the similarities in modern times, “they must be viewed from a historical standpoint” (Lotfabadi, 2013, p. 589), where heritage, culture, and tradition play a very important role. For [Kevin] Lynch, “identity of a place is a response to identification and recognition of objects in space, which is to distinguish one space from another” (Cheshmehzangi, 2012, p. 309). Hence, embedded in the world of an uniformed contemporary architecture, historic sites and monuments make the diversity and uniqueness of a place and thus build its identity. It is also important what these buildings matter to the viewer and what kind of ‘image’ some space creates in the viewer’s eyes. “The interrelationship between space and man is, in fact, what we can characterize as a sense of place or a spirituality of place” (Cheshmehzangi, 2012, pg. 310). Similarly, “person’s total identity involves identification with places. “When a person wants to express who he or she is, a typical response would be something like ‘I am a New Yorker’; This means that human identity presupposes the identity of place” (Polat & Dostoglu, 2016, p. 1). It is clear that people are a part of any urban living environment and that they are the main ones in creating its identity. Moreover, when it comes to open public spaces, the presence of people and the activities these users perform strongly influence the identity of a particular place (Marušić & Niksic, 2012; Polat & Dostoglu, 2016). The identity of open public spaces can also be influenced by many spatial characteristics of the environment such as location, urban patterns, landscape, shape, details or design (Polat & Dostoglu, 2016).

From all the above meanings of urban identity, it could be concluded that there are many components that represent the identity of a place in public open spaces. What has the greatest value, especially in the modern age, the age of globalization and uniformity, are the historic contents as elements of uniqueness, and their experience and meaning for the users of space. This image that users create about a place is also a very important element in promoting the identity of a place (Djukić & Vukmirović, 2012). That is why it is important to focus on highlighting historical contents, such as monuments, protected buildings, and other elements that show the uniqueness of a place. Moreover, since user activities play an important role in creating the identity of the place and technology has a great impact on performing these activities, it is very important to include various digital tools. Therefore, further research will focus on analyzing educational and interactive applications that encourage the user mobility within open public spaces throughout Serbia.

## DIGITIZED OPEN PUBLIC SPACES IN SERBIA

There are dozens of different interactive applications that have been identified in the territory of Serbia, which are basically aimed at promoting the history, culture, and tradition of Serbia, and, therefore, the identity of certain spaces. However, only some of them stand out as applications that simultaneously activate urban public spaces, encouraging users to explore and learn about heritage within a particular network of public spaces. These applications are shown in the following map (Figure 1) and table (Table 1), through their connection to identity and open public spaces.



Figure 1: Spatial representation of applications in Serbia; Author: M. Lazarević

Table 1: List of spaces and applications

No	Name	Relation with Identity	Relation with Open Public Spaces
1	Time machine of Vrnjci [Serb. <i>Врњачки времеплов</i> ] – Open public spaces network in Vrnjci Spa	An interactive and educational application that uses virtual reality, i.e. the AR scan tag. It promotes history and learns about historical buildings in the central area of Vrnjci Spa.	The AR tag recognizes the facades of buildings that are arranged along a network of open public spaces within the central area of the spa.
2	Iron Regiment [Serb. <i>Гвоздени пук</i> ] –Iron Regiment Memorial Park In Prokuplje	An interactive and educational application that uses the AR scan tag to promote history and maintain the memory of the soldiers.	The application supports scanning of monuments at the Iron Regiment Memorial Park. This park is an important element within the network of open public spaces in the central area of Prokuplje.

3	Old Knjaževac [Serb. <i>Стари Књажевац</i> ] – Open public spaces network in Knjaževac	An interactive and educational application that uses the AR scan tag to promote history and learn about heritage within the central area of Knjaževac.	The AR tag recognizes the facades of buildings that are located within the network of open public spaces that includes the shores of Svrlijski Timok, numerous parks and other places in the central area of Knjaževac.
4	Old Bač [Serb. <i>Стари Бач</i> ] – Bač Fortress as a part of open public spaces network in Bač	An interactive and educational application that uses the AR scantag to promote the history of Bač and teaches about significant elements of heritage.	The AR tag recognizes certain elements within the fortress, which is located near the centre of Bač and the promenade along the Danube-Tisa-Danube canal. Considering the location and the green space within the fort, it is the important part of the network of open public spaces.
5	Hidden Places – Savamala, Belgrade	Educational and interactive application that promotes lesser-known Belgrade history.	The application works by locating users using Bluetooth technology in the Savamala area. It is one of the most significant spaces in Belgrade's open public space network.
6	Cultural monuments of Vojvodina [Serb. <i>Споменици културе Војводине</i> ]	Educational and interactive application that contains maps, texts, 3D tours and promotes history and heritage.	It informs about monuments within the parks in the territory of Vojvodina, even in the entire protected areas such as Lake Palic, etc.

Author: M. Lazarević, A Djukić & B. Antonić

There are numerous similar applications for the other sites, such as Timacum minus, Archaeological Site of Lepenski Vir, Museum of the Battle of Batina, Flooded Archaeological Treasure of the Iron Gates, etc. All these and many other applications are also interactive and directly related to space. However, they were not chosen for this paper because these sites are not the part of the urban network of open public spaces.

## CASE STUDIES

Among the list of the nationally promoted interactive applications (Table 1) two types of applications have been identified – first using the AR tag, and the second using Bluetooth technology. Two best practice examples are elaborated as case studies. The choice was influenced by the importance that the application has on a given space.

CASE STUDY 1: Hidden Places is an interactive application that works by locating users with the help of Bluetooth beacons. When the user is located in a certain location, the story of some lesser-known building or hidden element that marked the history of Savamala become unlocked. This is also an educational application that promoting the lesser known history of Belgrade. The app teaches

users about hidden places in the Savamala area. This area is the one of the most significant spaces in Belgrade's open public space network. It is connected to the promenade along the right bank of the Sava River, limited by the Kalemegdan Fortress, Kosančić Wreath and the main bus station. The central street is Karadjordjeva. This app is very important for this zone, because today this area is primarily a place for entertainment and young people, while only few know its historic significance.

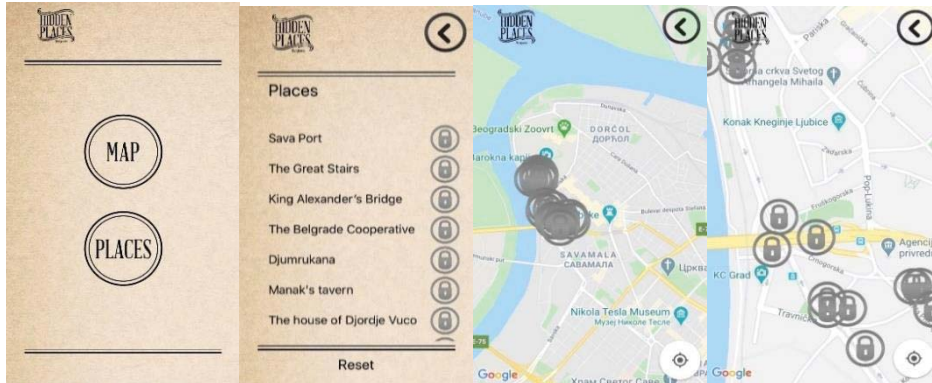


Figure 2, 3, 4 & 5: App options, Places you should visit to unlock stories, Savamala position, Map with places you should visit; Source: Hidden Places

CASE STUDY 2: Time machine of Vrnjci is an interactive application that supports the AR tag that recognizes the facades of protected villas within the central zone of Vrnjci Spa. The application also contains a voice guide through the spa and stories not only about mentioned buildings, but also about the buildings that used to be in this area. It contains songs, paintings, and a virtual catalogue of fashion from the 1900s and 1970s. This is an educational application that promotes the history of this age and learns about buildings that remained in the central area of Vrnjci Spa.

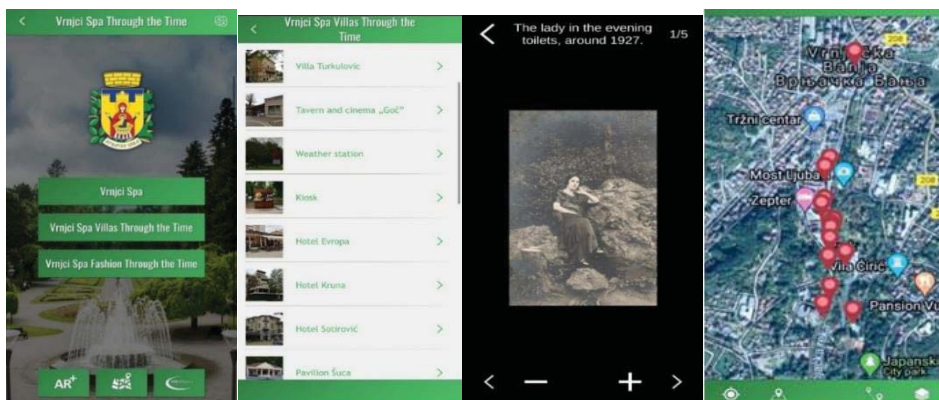


Figure 6, 7, 8 & 9: App options, Vrnjci Spa Villas list, Old picture from 1927, Map of Vrnjci Spa Villas to scan; Source: Vrnjci Spa



The application is a time guide that connects the story of the buildings that are arranged along the Promenade Park, near the pedestrian bridge “Bridge of Love”, and other pedestrian zones within this area, which are interconnected. The AR tag recognizes the facades of these buildings. The scanning unlocks new information in the form of photos, stories and 3D tours. All this should encourage users to go on a tour and interactive, educational walk through this area.

## CONCLUSIONS

All these applications mentioned above have a dual role and value when it comes to promoting identity in open public spaces. On one hand, it opens up a new form of user interaction with space. That means that users, as the main factors of the identity of a space, through applications actively influence the formation of the identity of the public spaces. On the other hand, the applications, with their cultural and historical content, promote the heritage that is also of great importance for the identity of the place.

This is especially important for less-known and under-promoted content and locations. Nevertheless, existing applications are mostly made for places that are attractive, significant, or places that are famous tourist destinations. Such spaces are already alive, active and full of different content, so this kind of interaction, at least for the time being, is just an additional element to an already vibrant locality.

Limitations are also recognized in the passivity of the applications themselves. The digitalization of cultural heritage within public spaces has been seen as a complement to the main content and physical experience of the site. Additionally, the mentioned applications are usually promoted only within the complex, and not enough on the Internet. That is the reason why a small number of people know about them. Some of these applications are not supported by all operating systems, which is a limitation for certain users. All mentioned reasons are due to poor organization in a general sense. Therefore, the final recommendation of this paper is to dedicate to the promotion and advancement of different approaches to the expansion of virtual reality. To conclude at the end, an analysis should be made and a special typology of spaces should be formed where the need for digitalization is recognized and in which way and to whom should be created.

## REFERENCES

- Abdel-Aziz, A. & Abdel-Salam, H. & El-Sayad, Z. (2016). The role of ICTs in creating the new social public place of the digital era. *Alexandria Engineering Journal*. 55. <https://doi.org/10.1016/j.aej.2015.12.019>.
- Carmona, M., Heath, T., Oc, T., & Tiesdel, S. (2003). *Public Places Urban Spaces*. Oxford: Elsevier Ltd.

- Cheshmehzangi, A. (2012). Identity and Public Realm. *Procedia – Social and Behavioral Sciences*. 50. 307–317. <https://doi.org/10.1016/j.sbspro.2012.08.036>
- Costa C. et al. (Eds.). *CyberParks – The Interface Between People, Places and Technology. Lecture Notes in Computer Science*, vol 11380. Springer, Cham. [https://doi.org/10.1007/978-3-030-13417-4\\_15](https://doi.org/10.1007/978-3-030-13417-4_15)
- Costa, M. & Lazos Ruíz, A. & Oliveira, R. (2016). The Role of Public Parks in the Creation of an Urban Identity. 10.5176/2301-394X\_ ACE16.14
- Djukic, A. & Vumirović, M. (2012). Creative cultural tourism as a function of competitiveness of cities. *Technics Technologies Education Management*, 7(1), 404-410.
- Djukic A., Vlastos T. & Joklova V. (2019). *Liveable Open Public Space - From Flaneur to Cyborg*. In: *Smaniotto Costa C. et al. (eds) CyberParks – The Interface Between People, Places and Technology. Lecture Notes in Computer Science*, vol 11380. Springer, Cham
- Gehl, J. (2006). *Life between buildings*. (Sixth ed.) Arkitektens Forlag, The Danish Architectural Press and Jan Gehl.
- Gehl, J. (2010). *Cities for People (first ed.)*, Island Press, Washington, DC.
- Hidden Places Belgrade. Walk round Savamala and as soon as you reach a place included in the app, short story about it would be shown followed by selected historical photos. [https://play.google.com/store/apps/details?id=com.danubecc.hiddenplacesbelgrade&hl=en\\_US](https://play.google.com/store/apps/details?id=com.danubecc.hiddenplacesbelgrade&hl=en_US)
- Iron Regiment [Serb. Гвоздени пук]. AR-part recognises the names of the receivers of the order of Karadorđe's Star, inscribed on a monument in a memory park. <https://play.google.com/store/apps/details?id=org.arhimedia.emg.gvozenipuk>
- Lotfabadi, P. (2013). The Impact of City Spaces and Identity in the Residents' Behavior. *International Journal of Humanities and Social Sciences*, 2.
- Marušić, B. & Niksic, M. (2012). Multilayered identity of places: Linkage between physical form, behaviour patterns and public perception. The Role of Place Identity in the Perception, *Understanding, and Design of Built Environments*. 120-132. <https://doi.org/10.2174/978160805413811201010120>
- Old Bač [Serb. Стари Бац]. Guidance through historic Bač Town and nearby sightseeing sites. <https://play.google.com/store/apps/details?id=org.arhimedia.emg.bac>
- Old Knjaževac [Serb. Стари Књажевац]. AR-part recognises the facades of the existing houses in Knjaževac historic core and projects old photos on them. <https://play.google.com/store/apps/details?id=org.arhimedia.emg.stariknjazevac>
- Polat, S. & Dostoglu, N. (2016). Measuring place identity in public open spaces. *Proceedings of the Institution of Civil Engineers – Urban Design and Planning*. 170. 1-14. <https://doi.org/10.1680/jurdp.15.00031>
- Project for Public Space – PPS (2014). *Technology Brings People Together in Public Spaces After All*. Retrieved from

<https://www.smartcitiesdive.com/ex/sustainablecitiescollective/technology-brings-people-together-public-spaces-after-all/289076/>

Riether, G. (2016). *A Public Space for the Digital Age*. 260-265.  
<https://doi.org/10.5151/despro-sigradi2016-766>

Ruchinskaya T., Ioannidis K. & Kimic K. (2019). *Revealing the Potential of Public Places: Adding a New Digital Layer to the Existing Thematic Gardens in Thessaloniki Waterfront*. In: Smaniotto Costa C. et al. (eds) *CyberParks – The Interface Between People, Places and Technology*. *Lecture Notes in Computer Science*, vol 11380. Springer, Cham

Skarzauskiene, A. & Mačiulienė, M. (2019). Assessment of Digital Co-Creation for Public Open Spaces: Methodological Guidelines. *Informatics*. 6. 39.  
<https://doi.org/10.3390/informatics6030039>

Smaniotto, C., Bahillo, A., Álvarez, F., Erjavec, I., Menezes, M. & Pallares-Barbera, M. (2017). Digital Tools for Capturing User's Needs on Urban OpenSpaces: *Drawing Lessons from Cyberparks Project*. In: Smaniotto Costa C. et al - *CyberParks – The Interface between People, Places and Technology: New Approaches and Perspectives*. Springer, 2019 M03 1

Time machine of Vrnjci [Serb. *Врњачки временлов*], AR-part recognises the facades of 10 villas and gives information about them.  
<https://play.google.com/store/apps/details?id=org.arhimedia.emg.vrnjackabanja>

## AUTHORS INDEX

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### A

Abi Khalil, Marc .....	329
Aboul Hosn, Lilia .....	329
Antonić, Branislav .....	432
Aoun, Oula .....	78
Aparicio, Maria Irene .....	277
Assaf, Carine .....	452

### B

Bafaro, Sara .....	46
Beyrouti, Lola .....	268
Bokal, Zala .....	33
Boltič, Gregor .....	189
Borota, Jelena .....	136
Borota, Marko .....	136
Boulos, Paul .....	383
Boutros, Marie-Belle .....	329
Bračko, Urban .....	491
Bucat, Mariana .....	136
Burov, Angel .....	165
Bustos Romero, Marta Adriana .....	369

### C

Cafuta, Oskar .....	287
Chiarelli, Barbara .....	15
Crnič, Mia .....	109

### Č

Čerpes, Ilka .....	125
Červek, Jernej .....	88
Čok, Gregor .....	149

### D

Dimitrova, Elena .....	165
Djukić, Aleksandra .....	432
Drobne, Samo .....	149
Džananović, Mirza .....	136

### E

El Chakhtoura, Maya .....	383
El Khoury, Peter .....	225

### F

Fikfak, Alenka .....	403
Fischer, Wolfgang .....	25
Folić, Branislav .....	55
Foški, Mojca .....	149
Frančič, Matevž .....	403

### G

Garofolo, Ilaria .....	15
Grom, Janez P. ....	403
Gulič, Andrej .....	174, 307

### I

Ivanović, Milena .....	55
------------------------	----

### J

Jawad, Dima .....	225, 329, 383
Juvančič, Matevž .....	342

### K

Khadra, Ralph .....	329
Khneisser, Nasri .....	383
Kilar, Vojko .....	317
Koblar, Simon .....	174, 307
Komac, Blaž .....	250
Konda, Katarina .....	259
Koren, David .....	317
Kosanović, Saja .....	55
Krajnik, Damir .....	392
Kukoč, Višnja .....	136
Kušar, Domen .....	250

**L**

Lavtižar, Kristijan .....	298
Lazarević, Milica .....	432
Lazić, Marko .....	480
Lipar, Peter .....	491
Lukić, Tamara .....	392

**M**

Madrazo, Leandro .....	277
Mady, Christine .....	414, 452
Marchigiani, Elena .....	15
Martínez Mansilla, María Eugenia .....	369
Massaro, Alessandro .....	157
Meyer, Lola .....	181
Mladenovič, Luka .....	201
Mouawad, Pamela .....	225
Mrak, Gašper .....	149

**N**

Nashar Baroud, Dina .....	101
Nikšič, Matej .....	2
Novljan, Tomaž .....	463

**O**

Oberrauter, Sabine .....	46
Olszewska, Natalia .....	424
Oswalt, Philipp .....	181

**P**

Pak, Burak .....	277
Petrović Krajnik, Lea .....	392
Pogačar, Kaja .....	442
Praper Gulič, Sergeja .....	174, 307
Proenca, Sérgio .....	63

**R**

Reinbacher, Sabrina .....	25
Rettich, Stefan .....	181
Robel, Steffan .....	362

Rotondo, Francesco .....	157
Rus, Katarina .....	317

**S**

S. Gregoriou, S. ....	489
Saalmann, Raphael David .....	25
Savvides, A. ....	489
Semaan, Julien .....	383

**Š**

Šetina, Miha .....	189
Švigelj, Aleš .....	480

**T**

Tasheva-Petrova, Milena .....	165
Tawil, Nour .....	424
Tsigdinos, Stefanos .....	209

**V**

Van den Broeck, Pieter .....	452
Vaništa Lazarević, Eva .....	217
Veber, Jaka .....	237
Vlastos, Thanos .....	209
Vukmirović, Milena .....	55

**W**

Wei, Lanlan .....	471
-------------------	-----

**Z**

Zavodnik Lamovšek, Alma .....	149
Zupančič, Tadeja .....	277

**Ž**

Žnidaršič, Kaja .....	342
-----------------------	-----