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SEARCHING FOR PROSPECTS FOR FORMING A SMART CITY NOOSPACE BASED ON AUGMENTED REALITY TECHNOLOGIES

Abstract: The article presents the results of research into the influence of augmented reality technologies on the development of noospaces in smart cities. Their deep integration with other digital technologies of a smart city is revealed and various directions of influence on the intelligent systems of smart city spaces are revealed. The influence of augmented reality technologies on changing methods of communication, cultural values and habits of residents of a smart city is shown.

Keywords: noospaces, smart city, noovalues, participatory design, augmented reality technologies.

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对在增强现实技术基础上建立智能城市的智慧空间的前景的探索

摘要: 文章介绍了增强现实技术对智能城市的智慧空间发展的影响方面的研究成果。文章揭示了增强现实技术与智能城市其他数字技术的深度融合, 并说明了增强现实技术对智能城市空间智能系统的多方面影响。指出了增强现实技术对智能城市居民的交流方式、文化价值观和生活习惯的影响。

关键词: 智慧空间、智能城市、智慧价值观、参与式设计、增强现实技术。

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The growing informatization of society, life in the VUCA world in the conditions of combusive development of technology cannot but cause concern and uncertainty about the future for the average person. It is beyond argument that new technologies, at the stage of searching for the optimal development option, must find ways aimed at ensuring safety and favorable conditions for human life, resource conservation, and the discovery of new inexhaustible renewable sources of resources demanded by smart technologies. They should have a high penetration rate in the spaces of smart cities, promoting their new organization and social interaction of residents in physical and virtual environments [Bodrunov, 2018, p. 153]. This is how smart spaces of the city – noospaces – are developed. Their rapid development is ensured primarily through the integration

of smart technologies, such as artificial intelligence, big data, Internet of Things, cloud computing, blockchain, robotics, virtual and augmented reality. The sustainable development, well-being and comfort of people in smart cities are also facilitated by the resilience of smart cities [Akberdina, 2021, p. 1412], promoting flexibility, adaptability and rapid response in urban planning to external changes. Intelligent systems of urban noospaces are formed not only on the basis of a technocratic approach, but also as a result of development of new values - noovalues, transformation of the cultural code of urban life with different content, habits, methods of communication and self-expression [Bodrunov, 2022, p. 23]. After all, part of a person's life is already spent in the digital world of the Internet, in virtual reality.

One of the most exciting technology innovations that demonstrates such changes most clearly and revolutionizes smart city spaces is Augmented Reality (AR). It allows adding virtual elements, images and sounds to the real-world environment of public spaces in the urban environment, art spaces, creative and tourist clusters [Bitkin, 2021]. Transformation of urban spaces based on smart technologies, which include virtual and augmented reality, undoubtedly contributes to the development of noospaces of smart cities.

The purpose of the study is to analyze the influence of augmented reality on the perception and interaction with the noospaces of a smart city, and to search for prospects for the development of this area, including the discovery of new unique opportunities for self-expression and self-actualization of city residents.

The diffusion of augmented reality into the noospaces of smart cities leads to the fact that city residents cease to be passive observers and enter into an interactive game, where they become an active participant or protagonist. Such interaction introduces new emotional and cognitive levels of perception and opens up completely new opportunities when designing, for example, creative clusters and public spaces of a smart city. Noospaces are a human-centric urban environment, as they place a person at the center of the entire smart city system. They understand that noospace is an open, safe and comfortable place where they can have a very interesting and meaningful time, relax emotionally and chat with friends. This is how a new content of human needs, needs of a resident of a smart city, is gradually being formed, where values, the quality of consumed goods, reducing inequality, a healthy lifestyle and the environmental sustainability of the urban environment are of paramount importance.

The relevance of using augmented reality lies in the fact that it helps to create “virtual bridges” between cultures, times and places, ensuring the conservation, protection and preservation of cultural and natural heritage. This technology makes it possible, for example, to exhibit works of art from different eras, uniting them in one space and enriching the viewer's perception. The new digital humanism does not imply an insensitive, egalitarian, equal approach to people and urban communities. Human-centricity is based on respect and preservation of the cultural code, memory and traditions of each resident.

Augmented reality technologies ensure a person's right to “their own” city or region. Each city user will be able to customize the appearance of the city as they wish or delegate this customization to algorithms based on their search queries. Using augmented reality glasses, they can, for example, recreate old buildings in their historical locations. Noospaces are urban environments of involvement, diversity and inclusion.

In the noospaces of a smart city, the fusion of art and technology becomes a reality. Augmented reality is a modern tool that significantly changes approaches to arranging art spaces, elimi-

nating barriers in time and space. Despite all the limitations and challenges, augmented reality remains a potentially powerful tool for attracting and interacting with visitors at exhibitions. The use of AR can create a unique and original experience, interaction between visitors and works of art. To visit an exhibition in a famous museum, you don't have to travel to another city or country; you just need to use a smart gadget powered by virtual and augmented reality.

The use of its digital tools transforms art spaces into educational tourist clusters of a smart city, into noospaces where interaction takes place between the virtual and real world based on new forms of art, while enriching the cultural experience of urban communities. For example, special tourist tariffs may appear that will allow one to study the history of buildings, streets and public spaces [Abdullaev, 2023, p. 7].

At the same time, the use of augmented reality technologies in smart cities is not limited to convenience. Their content is much broader and is also aimed at creating new ways of communication and self-actualization of city residents in the processes of managing a smart city. Effective management of smart public spaces cannot be achieved without increasing the degree of involvement of civil society in decision-making processes and urban development. Based on the use of virtual and augmented reality technologies in a smart city, it is possible to provide new opportunities for collaboration with citizens on improvement projects. For example, any city resident, if desired, can download an application with augmented reality on a smartphone, go outside and through the gadget's screen see virtual models of buildings and structures superimposed on real objects where they should appear - the locations of pipes, power cables, gas lines, roads, lawns and playgrounds.

Following the development of smart mechanisms for ensuring civil society involvement in urban planning processes and managing the design of noospaces, engaged residents will no longer have to gather at the local government office to take part in public hearings on the city's master plan. They will only have to visit the event in the metaverse at the specified time, where, together with the architects, they can go through different options for the functions and visual design of public space, real 3D models of the future space. In virtual reality, they can walk among them, feel the distances and dimensions. Cities will have endless digital twins with different themes.

Participation in the design of noospaces will contribute to further development of participatory budgeting. Since citizens will not only be interested in putting forward and discussing new projects, but also in co-financing the works to implement their initiatives and controlling their implementation.

The efficiency of city development management will undoubtedly improve not only due to the transparency and accessibility of citizen participation processes, but also by increasing the value of noospaces among residents, since they not only took the initiative and put forward an improvement project, but also financed it to a certain extent and managed the works under the proposed project. As a result, they will have the opportunity not only to gain self-satisfaction from the completed project for the development of a comfortable urban environment, but will also appreciate more what was built on their initiative and with their direct participation.

Moreover, the processes of citizen participation in the design of new spaces will be aimed at ensuring safety and favorable living conditions for them. Residents will be interested in choosing urban development projects that will be aimed at resource conservation, health protection, and environmental safety. After all, they and their future generations will live in these noospaces. The emerging cultural values of smart cities thus imply not just participatory design and co-financing

by citizens based on smart technologies, including virtual and augmented reality, but also responsible co-financing, responsible investing, when they invest personal savings in projects that comply with international ESG principles. Trust management of such assets allows the investor to generate long-term capital and invest it in intelligent systems for sustainable urban noospaces, including energy-efficient buildings and low-carbon transport, smart waste management systems to ensure proper collection, recycling and disposal of solid waste in cities and etc.

Planning solutions obtained using augmented reality technologies ensure the sustainability of the urban environment to natural and man-made threats, create conditions for a healthy lifestyle in green areas and public places that are accessible and open to all, especially women, children, and the elderly. This is because architects and engaged city residents can design noospaces not in the office, but in the city itself. This way they can achieve high accuracy of perception and compliance with the characteristics of the territory of noospaces, and quickly make the right decisions.

Thus, augmented reality technologies are integrated with other digital technologies and influence many intelligent systems of smart cities. The meaning of their development is not limited only to technical systems. They change the habits and lifestyle of urban residents, their methods of communication, cultural values, and self-esteem criteria. Knowledge of the development patterns of the digital technologies in question will contribute not only to accelerating the formation of comfortable city noospaces, but also to their efficient management.

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