



DIGITAL TRANSFORMATION OF INCLUSIVE TOURISM: ROBOTICS AS SUPPORT FOR PEOPLE WITH DISABILITIES

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Abstract:

The technological development that characterizes the 21st century affects numerous spheres of society and economy, bringing innovative solutions and new approaches to everyday life. This development has not bypassed tourism either, where the development of inclusive solutions that enable accessibility and a better experience for tourists can be highlighted. Inclusive tourism through technologies becomes more accessible and adapted to people with disabilities, opening new opportunities for their active participation in travel. Digital transformation of tourism opens up new opportunities to improve inclusivity, especially through the application of robotics and artificial intelligence. Modern robotic technologies, including humanoid robots, assistive robots and artificial intelligence-based systems, enable better accessibility, independence and quality of service during travel. This paper investigates the role of robots and modern robotic technologies as a way of improving the accessibility for people with disabilities in the tourism and hotel industry. Robotics can provide assistance in movement, information, communication and service delivery. Special emphasis is placed on the possibility of robotics to contribute to independence, reducing barriers and increasing the quality of the tourist experience.

Keywords:

inclusive innovations, integration of new technologies, technological assistance, social inclusion, travel.

INTRODUCTION

People with disabilities represent a significant part of the world's population, and according to a report by the World Health Organization – WHO (2011), more than a billion people, or about 15% of the global population, live with some form of disability. Despite progress in human rights and legislation promoting equality, people with disabilities still face numerous barriers in their daily lives – from physical barriers to limited access to education, employment and services. Disability does not depend exclusively on the physical, sensory or mental state of the person, but to a large extent on the environment in which that person lives (Vila, D. *et al.*, 2024). It is about social barriers and inaccessible infrastructure that prevent equal inclusion in different spheres of life, including tourism.

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According to the definition by the United Nations, inclusive tourism or accessible tourism tends to ensure that destinations, services, facilities and activities are accessible to everyone — regardless of age, capabilities and so on (UN, n.d.). It includes physical access, transportation, trained staff, adapted activities, but also digital accessibility of tourist platforms, with the aim of making the tourist experience independent, safe and pleasant for people with different types of disabilities (Vila, D. *et al.*, 2024). The benefits of including people with disabilities in tourism are multiple: it contributes to improving the quality of life, self-confidence, a sense of autonomy, as well as social inclusion (Gillovic and McIntosh, 2020).

In modern society, digital transformation and the application of advanced technologies, including robotics, increasingly influence the shaping of tourist services. Innovations in the field of assistive technology (AT) and services that rely on artificial intelligence (AI) and robotics have the potential to improve the accessibility and independence of people with disabilities during travel.

Digital transformation, driven by the technologies of the Fourth (Industry 4.0) and Fifth (Industry 5.0) Industrial Revolution, such as the Internet of Things (IoT), artificial intelligence (AI), big data, virtual and augmented reality, opens a new horizon in the field of inclusive tourism (Ndhlovu *et al.*, 2024). These technologies enable the creation of personalized, interactive and accessible tourist experiences, both before visiting a destination and during the trip (Ndhlovu *et al.*, 2024). A particularly fast-developing field in this context is robotics, which includes telepresence robots, socially assistive robotics and rehabilitation robots. Telepresence robots allow people with limited mobility to “attend” cultural events or tours remotely, thus removing geographical and physical barriers (Balossino *et al.*, 2025). Socially assistive robots (SAR) support people with disabilities through social interaction, motivation, and often through inclusive activities (Feil-Seifer and Mataric, 2005), while rehabilitation robots help in recovery and increase functional abilities, which can indirectly facilitate tourist activities for people with motor impairments (Brewer *et al.*, 2007). The integration of robotics in tourism is not only a technological advance, but also a social step towards creating a fairer and more accessible tourism for all people (Gonzalez *et al.*, 2020; Buhalis and Amaranggana, 2015).

The present study examines how advances in robotics may facilitate the inclusion of people with disabilities in tourist activities. The aim of the work is to analyze the existing digital and robotic approaches in inclusive tourism, evaluate their potential and challenges, and propose frameworks for the future integration of such solutions into tourism practice.

LITERATURE REVIEW

Inclusive tourism or accessible tourism implies the design and implementation of tourist services that enable the participation of all people, regardless of their physical, sensory, intellectual or other abilities. At the core of this field is an understanding of different models of disability. The medical model, which sees disability as an individual problem that needs to be treated, and the social model, which emphasizes that disability arises from the barriers that society places on people with disabilities, are most often considered (Vila, D. *et al.*, 2024). The key challenges that characterize this type of tourism include physical barriers (inaccessible facilities), informational barriers (for example, incorrectly marked directions), as well as technological and social barriers (Vila, D. *et al.*, 2024).

Digital transformation is becoming an increasingly important factor in improving the accessibility of tourism. The use of information and communication technologies (ICT), such as the Internet, applications, artificial intelligence (AI), big data and the Internet of Things (IoT), enables personalization of services and better information of users (Theofanous *et al.*, 2024). The accessibility of digital platforms is of particular importance. Many tourist destinations and services do not provide accurate, up-to-date and detailed information about the accessibility of their services, which can be a significant obstacle for people with disabilities (Vila, D. *et al.*, 2024). In addition, access to websites must comply with accessibility standards (Web Content Accessibility Guidelines – WCAG) so that they can be used by the people with sensory impairments.



The use of robotics in tourism represents an innovative approach to inclusiveness, which is still unexplored. Robots are increasingly used in catering, hotel management and at airports as support staff – waiters, guides, concierges, baggage carriers (Ivanov *et al.*, 2019). However, the potential of robotics to directly support people with disabilities in tourism remains to be explored.

Robots can help people with disabilities move through complex surroundings, provide assistance in performing daily activities and enable easier inclusion in tourist attractions. For example, telepresence robots allow people who cannot physically travel to virtually attend museum tours, cultural events, and so on (Iodice *et al.*, 2025). This technology is particularly useful for people with severe physical impairments, as it provides them with a sense of presence and interaction with the environment. Also, the use of humanoid and social robots in tourism raises questions related to the acceptance of technology by this group of users. Studies show that users respond positively to robots if their functionality is clearly defined and if they do not violate the user's privacy or security (Skubis *et al.*, 2024).

Although robotics has great potential, its application in inclusive tourism is still at an early stage of development. Most research focuses on robots in rehabilitation and educational institutions, while their use in tourism is rarely analyzed (Seino *et al.*, 2024). There are a number of challenges that slow down the wider application of robotics in inclusive tourism (Ivanov *et al.*, 2019; Skubis *et al.*, 2024):

- insufficient research that directly connects robotics with tourism experiences of people with disabilities;
- limited involvement of disabled users themselves in the design and testing of robotic systems;
- technical limitations, such as robot autonomy, safety and ability to navigate in complex environments;
- ethics and trust – users must have trust in robots, especially in sensitive contexts.

Nevertheless, in addition to the above-mentioned challenges, the potential of robotics in inclusive tourism is significant. Robots can contribute to greater independence for people with disabilities, enable personalized experiences, and facilitate access to remote destinations, for example, through telepresence robots. The combination of robotics with other technologies, such as augmented reality (AR), virtual reality (VR) and artificial intelligence (AI), can create completely new experiences in tourism.

METHODOLOGY

This paper is based on a quantitative analysis of the available scientific literature in order to systematically review and quantify the existing studies and research related to modern technologies, namely robotics and its importance in supporting people with disabilities. Data collection was performed by searching relevant scientific databases, including Research Gate, Web of Science, Scopus, Google Scholar, IEEE Xplore, PubMed and Science Direct, using keywords such as “digital transformation“, “inclusive tourism“, “accessible tourism“, “robotics“, and their combinations in English and Serbian. The criteria for searching papers were the following: papers published from 2007 to 2025 were taken into consideration, particularly those dealing with the topic of digital technologies in inclusive tourism, i.e. the application of robotics in support of people with disabilities.

RESULTS

Based on research, inclusive tourism means the availability of tourist services to all people, regardless of their abilities. Key challenges include physical, informational and technological barriers that make travel difficult for people with disabilities. Digital transformation, through the application of the Internet, applications, artificial intelligence (AI) and other technologies can significantly improve accessibility, especially through better information and personalization of services.

Although robots are increasingly used in tourism, their role in inclusiveness is still underdeveloped. Innovations such as telepresence robots enable people with severe physical impairments to virtually participate in tourist attractions. However, obstacles such as technical limitations, lack of research and ethical issues still slow down the wider application of these solutions. Despite this, technology has great potential to enable a more equal and accessible tourism experience for all.



DISCUSSION AND CONCLUSION

Technological innovation is one of the main factors driving changes in the tourism industry, and its importance in the field of inclusive tourism can be particularly expressed through the application of robotics. The development and implementation of robotic technologies enables significant improvement of accessibility and independence for people with different types of disabilities, providing them with new opportunities for active participation in tourist activities. Robotics, through its various applications – from assistive robots that help with physical movement, through virtual guides, to smart systems for communication and personalized support – contributes to the reduction of barriers that have long affected the accessibility of tourism for people with disabilities.

Digital transformation, in addition to technological innovations, also implies a change in social attitudes and approaches to inclusion, which is necessary for the creation of a sustainable and fair tourist environment. Robotics can be a powerful tool for improving not only technical accessibility, but also emotional and social inclusion, allowing users greater autonomy and safety, but also facilitating communication with tourism workers and the environment. However, although there is great potential, the implementation of these technologies faces challenges such as high development and procurement costs, the need to adapt to different user needs, as well as ethical issues related to privacy and human-robot interaction.

In order for robotics to provide a tangible contribution to inclusive tourism, it is necessary to invest in multidisciplinary research, as well as to create policies that will support the integration of these technologies into tourism services. Educating tourism workers about new digital tools and raising awareness among the general public about the importance of inclusion will further strengthen these efforts. In this way, digital transformation and robotics will not only represent technical progress, but also a social shift towards equal opportunities for all.

In the future, further development of robotic systems adapted to the specific needs of people with disabilities, as well as their wide application in various segments of tourism, can contribute to a significant improvement in the quality of life and increase in social participation. This is how one of the basic goals of inclusive tourism is achieved – by enabling all people to fully enjoy the richness and variety of tourist experiences.

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