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ARTIFICIAL INTELLIGENCE AS A SUPPORT FOR INDEPENDENT LIVING OF PEOPLE WITH DISABILITIES

Abstract

Improving the quality of life and independence of people with disabilities is a challenge in the fields of social policy, technology, and law. The paper explores the application of artificial intelligence (AI) as a means of supporting independent living for this population, with a special focus on the possibilities of digital work and entrepreneurship. The theoretical framework of the paper is based on the functional and social model of disability and on the concept of inclusion and human rights. The relevant scientific literature, reports of international organizations (WHO, UNICEF, UN), as well as case studies and pilot projects in the field of digital support were analyzed. The results indicate that AI solutions significantly improve mobility, communication, access to information, and user confidence, but that their application is often limited by the lack of financial accessibility, appropriate policies, and active involvement of people with disabilities themselves in the process of creating AI support. Special attention is dedicated to employment challenges, where digital work is recognized

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as a potential solution, but is underutilized in our society. The need for accessible, ethical, and inclusive AI solutions is emphasized, as well as for the development of digital competencies in people with disabilities in order to achieve greater social and economic integration.

Keywords: people with disabilities, artificial intelligence, quality of life, inclusion, employment

INTRODUCTION

In modern society, improving the quality of life and empowering people with disabilities is one of the key challenges of social policy, technology and medicine. Attitudes towards people with disabilities are not innate, but learned, among other things, through the prejudices and ignorance of others. Changing attitudes is a complex and long-term process that is largely based on experience, but also on information (Otašević i Dobrota-Davidović 2018, 162–163). The concept of independent living implies the ability of people with disabilities to make decisions about their lives, live in the community, use available resources, and have equal opportunities with all other citizens (Shakespeare 2006, 185). According to the International Classification of Functioning, Disability and Health adopted by the World Health Organization, disability is defined as the result of the complex interaction between the health status of the individual and various barriers in the environment that limit his or her full participation in society on an equal basis with others (World Health Organization [WHO] 2007). This functional and social model of disability marked a shift from the traditional, medical model to a more inclusive approach based on human rights.

In the Republic of Serbia, the position of persons with disabilities is regulated by numerous legal acts and strategic documents, such as the Law on Prevention of Discrimination against Persons with Disabilities, the Law on Social Protection, as well as the Strategy for Improving the Position of Persons with Disabilities for the Period from 2025 to 2030 (Zakon o socijalnoj zaštiti 2011; Zakon o sprečavanju diskriminacije osoba sa invaliditetom 2016). These documents emphasize the principles of equal opportunities, accessibility, independent living, and participation in decision-making, but practice often shows that these measures are not fully implemented, especially in terms of the application of modern

digital and technological solutions (Ministry of Labor, Employment, Veterans, and Social Affairs 2025). Analysis of the living situation of people with disabilities shows that there are numerous obstacles in their living space that stand in the way of meeting their needs. Data on the incidence of disabilities are very heterogeneous, due to the use of different criteria for their identification, which further complicates the targeted planning and implementation of support measures in the community (Otašević i Dobrota 2018, 162). In the last decade, artificial intelligence (AI) has been increasingly recognized as a potentially powerful tool in supporting the integration and independence of people with disabilities. From voice assistants and image recognition systems to smart devices and robotic aids, AI-based technologies enable greater independence in everyday functioning (Heffernan and Heffernan 2014; Farhah *et al.* 2025). However, AI applications in practice are not equally accessible, and the user aspect of people with disabilities is often not sufficiently included in the process of developing these solutions. At the same time, in a world of accelerated digitalization and increased demand for digital work, digital entrepreneurship is increasingly being discussed as one of the mechanisms for employing marginalized groups. Digital work involves creating value through interaction with information and communication technologies, including work via digital platforms and self-employment in an online environment. Such forms of work enable flexible working hours and remote work, which is of particular importance for people who have physical barriers, limited mobility, or the need for an adapted, somewhat slower pace (Lazić *et al.* 2024). Nonetheless, in Serbia, people with disabilities continue to face high unemployment rates. The reasons for this include discrimination in the labor market, lack of adequate work capacity assessment, unfavorable socioeconomic background, and insufficient level of professional and digital skills. Although policymakers have launched some initiatives to develop digital competencies among this population, they are mostly limited to basic-level training, which is not sufficient for independent and sustainable entry into the digital labor market. When it comes to how people with disabilities perceive digital self-employment and to what extent they recognize it as a real opportunity to solve the problem of unemployment, a more detailed analysis is needed (Lazić i Vukmirović 2022).

Taking into account all of the above, the aim of the paper is to explore the potential and challenges of applying artificial intelligence as a

support for independent living for people with disabilities, with a special focus on aspects of digital work and inclusion. In order to obtain relevant and reliable information on the application of artificial intelligence (AI) in supporting independent living for people with disabilities, a literature review was conducted, which includes the analysis of scientific papers as well as official reports from international organizations, and examples of good practice from the environment.

ARTIFICIAL INTELLIGENCE – POSSIBILITIES TO SUPPORT PERSONS WITH DISABILITIES

The application of artificial intelligence (AI) in the field of support for people with disabilities has shown significant potential for improving independence, mobility, communication, and overall quality of life. Modern AI solutions are developed in accordance with the type of disability.

Assistive technologies are devices or systems that help people with disabilities overcome physical, sensory, or cognitive barriers. With the integration of artificial intelligence (AI), these technologies become more adaptable and efficient. These include smart wheelchairs and walking devices – AI enables navigation in space with obstacle avoidance, speed adjustment, and automatic braking. Wheelchairs can be controlled with head, eye, or voice movements. Modern research shows that robotic wheelchairs significantly improve the mobility and independence of people with disabilities, providing opportunities for autonomous and semi-autonomous navigation, customized controls, and improved interactions with the environment (Sahoo and Choudhury 2023). Then, smart prostheses and orthopedic devices – modern prostheses that use machine learning to identify the user's movements, which enables finer motor control and more natural movement, as well as voice control and gesture or speech recognition – devices that use AI to recognize speech or body movements and allow the control of electronic devices or the activation of alarms without the need for physical contact.

Communication is essential for independent living, and for many people with disabilities, it is one of the biggest barriers. Assistive technologies play a key role in empowering blind and partially sighted people, as well as people with other disabilities or problems such as dyslexia, by enabling them to be more independent and access information more easily. Screen readers such as JAWS and

VoiceOver, artificial vision devices such as OrCam MyEye, as well as smart canes and applications such as Be My Eyes, which connect blind people with volunteers via video calls, are commonly used for blind and partially sighted people (Hamideh Kerdar, Bachler, and Kirchhoff 2024). People with dyslexia are helped by text-to-speech technologies (Speechify, Voice Dream Reader), as well as intelligent writing tools that offer word prediction and grammar correction (Grammarly, Co: Writer), which make reading and expression easier. Virtual assistants and Chatbots (Siri, Alexa, ChatGPT) are also playing an increasingly important role, enabling voice interaction, dictation, planning, and search, which significantly simplifies everyday activities for users with various difficulties. In addition, technologies for automatic sign language translation are being developed, which, with the help of cameras and artificial intelligence, enable two-way communication between deaf people and the wider population, in real time (O'Sullivan 2019). All these technologies together build the foundations for a more inclusive society, in which everyone has access to knowledge, communication, and independence, regardless of physical or cognitive barriers.

The concept of a "smart home" takes on a new dimension with AI, especially for people with disabilities who need a greater degree of control over their environment. Smart home systems are used to control lighting, temperature, doors, windows, and alarm systems via voice or mobile applications. These systems allow people with limited mobility to manage their environment without physical effort. There are safety and independence sensors, sensors that are connected to AI systems and can track movement, recognize falls, signal danger (fire or gas leak), and automatically alert emergency services. AI can also analyze user behavior and indicate changes in health in a timely manner. With the increase in the use of smartphones and the Internet, a large number of AI solutions are implemented through mobile and web applications that are intended to improve independence in everyday life. Orientation and navigation applications: AI tools like Google Lookout or LazarilloApp allow blind and visually impaired people to move independently, giving them audio instructions, recognizing obstacles and objects in the environment. Health monitoring, where applications using AI analyze physiological data (heart rate, blood sugar level) and provide instructions or alarms in case of deviations. This is important for people with chronic conditions or elderly people with disabilities. There is also the organization of daily activities; AI applications can help

with reminders of medication obligations or for communication that has been agreed in advance.

Artificial intelligence (AI) based solutions have the potential to significantly improve the lives of people with disabilities, not only by supporting them in performing daily activities, but also by enabling them to acquire new abilities and skills. The use of AI opens up new paths for people with disabilities to independence, accessibility, and active participation in society, overcoming numerous physical, sensory, and communication barriers that would otherwise pose serious challenges or be completely insurmountable. In this way, technology not only compensates for limitations but also contributes to the empowerment of people with disabilities and their full inclusion in all aspects of social life – from education and employment to social and cultural activities (Kumar *et al.* 2024). Moreover, the development of AI in this area also represents a social value because it supports the transition from a model of medical and social dependence to a model of digital independence and active participation in the social community. AI thus becomes not only a technological tool, but also an ethical and inclusive tool for building a more just society. In order to fully realize this potential, it is necessary to continue developing inclusive technological solutions in cooperation with the users themselves – people with disabilities – who must be active participants in the design and testing process. Only in this way will AI technologies be able to respond to real needs, respect diversity, and contribute to building an environment in which accessibility and independence become a reality for all.

THE IMPACT OF ARTIFICIAL INTELLIGENCE ON INDEPENDENCE AND QUALITY OF LIFE

Artificial Intelligence (AI) is a revolutionary tool in improving the lives of people with disabilities, enabling greater independence, better mobility, easier access to information, and increased self-confidence. Although AI is still in its early stages, numerous examples from practice and research confirm that its application can transform everyday life and open up new opportunities for inclusion.

Around 16% of the world's population, or 1.3 billion people, currently live with some form of disability, including 240 million children. In the European Union, 27% of people aged 16 and over had some form of disability in 2023, with a higher percentage of women

than men with disabilities in all member states. These figures highlight the need to systematically improve access to a better quality of life for a large and diverse population (Council of the European Union 2023). The application of AI in assistive technologies, such as smart wheelchairs, screen readers, voice control devices, or orientation applications, significantly increases mobility and access to information. This, in turn, has a positive impact on users' self-confidence, as it allows them to make decisions independently, manage their environment, and communicate without intermediaries. For example, robotic wheelchairs that use machine learning to avoid obstacles and adapt their speed (Sahho and Choudxury 2023) contribute to greater independence for users, while applications such as Be My Eyes and LazarilloApp facilitate orientation and social interaction for people with visual impairments. At the same time, it should be emphasized that this potential is still unrealized for many. According to WHO and UNICEF in 2022, more than 2.5 billion people worldwide need one or more assistive products – such as wheelchairs, hearing aids, or communication applications. However, 1 billion people do not have access to these devices, especially in low- and middle-income countries, which indicates large global inequalities in the availability of AI technologies (Federal Ministry for Economic Cooperation and Development and International Disability Alliance [IDA], 2025).

User experience research shows that AI solutions have a positive impact on quality of life when designed according to the real needs of the user. Users of devices such as OrCam MyEyes highlight convenience and improved independence, but indicate the need for better localization and native language support (Amore *et al.* 2023). Virtual assistants, Chatbots, and text-to-speech systems (e.g., Voice Dream Reader, ChatGPT, Siri) also receive positive reviews in the domain of communication and cognitive support.

LIMITATIONS AND ETHICAL ISSUES

Artificial intelligence (AI) is increasingly shaping various aspects of society, including the area of support for people with disabilities. Although the potential of AI in this context seems promising, numerous limitations and ethical dilemmas that accompany its application should not be ignored. One of the biggest limitations is the high cost of modern AI systems and technological solutions, which often exceeds the financial

capabilities of people with disabilities. Devices such as smart wheelchairs, vision-based communication systems, or personalized voice assistants require significant investments. Although there are certain support actions in Serbia, such as subsidies for technical aids, systemic shortcomings and limited resources mean that many solutions remain inaccessible to the most vulnerable. It should be emphasized that the collection, processing, and storage of data in AI systems pose a serious ethical and legal challenge. People with disabilities, who often use systems for continuous health monitoring or digital communication, are at risk of privacy violations. Unauthorized access, commercialization of data, or unclear terms of use can threaten the fundamental rights of users. Therefore, the implementation of strategies such as data anonymization and strengthening security protocols is a priority (Cowls *et al.* 2019, 4, 8).

In accordance with the ethical imperative of harm prevention, it is essential that the state maintains regulatory oversight of the market for highly automated, AI-based robotic systems intended to provide assistance to persons with disabilities. Owing to their inherent characteristics, such systems typically involve direct and continuous interaction with end users (operators). Within this context, so-called collaborative robots present a distinct set of ethical and legal challenges, as their application may unintentionally result in harm to life, bodily integrity, health, or the fundamental rights of users, as well as the risk of health deterioration. Therefore, the design, development, and deployment of these systems must be guided by rigorous compliance with international safety standards specifically established for human-robot interaction (Regulation EU 2024/1689).

AI systems are based on algorithms that learn from data. If this data is biased – which is often the case – the system itself can make discriminatory decisions, which particularly affects marginalized (vulnerable) groups. For example, an automated hiring system can reject candidates with disabilities based on previously "learned" patterns of discrimination. Developing methods to improve the transparency of algorithmic decisions, as well as monitoring bias, is essential for building fairer systems (Binns 2018). Reliance on AI systems can lead to problems in cases of technical failure, loss of support, or inadequate updates. This dependence is particularly risky for people with severe disabilities who do not have alternative mechanisms for communication or movement. Therefore, it is necessary to develop parallel, low-tech, or hybrid options as backup strategies in real-life situations.

Despite the good intentions of technology creators, many AI systems are still being developed without the active participation of people with disabilities. This means that solutions often do not respond to real needs and life situations. The principle of "nothing about us without us" must guide all phases of technology development (Wolbring and Nguyen 2023).

AI is significantly transforming the labor market, often reducing the need for human labor and increasing the risk of unemployment among less-advantaged groups. People with disabilities, who already have lower employment rates, may be further disadvantaged by these trends. However, new forms of digital work, such as digital entrepreneurship and flexible platform work, present the potential for greater inclusion, but only if the accompanying training is adequate and targeted to the needs of the users.

Current regulatory systems are largely lagging behind the dynamics of technological development. The lack of clear regulations, accountability mechanisms, and transparency standards means that many AI systems operate in legal gray areas. Improving legal frameworks at the national and international levels is necessary, along with strengthening ethical guidelines and cooperation between different sectors. Addressing all of these challenges requires integrating ethics from the beginning of system design, improving transparency of algorithms, creating global ethical standards, and active collaboration between engineers, ethicists, decision-makers, and end-users. Only such an approach can enable AI to become a tool for a sustainable and inclusive digital future for all.

CONCLUSION

In the modern era, where digital technology is increasingly integrated into everyday life, the application of artificial intelligence (AI) is a key resource in improving the quality of life of people with disabilities. Analysis shows that AI has the potential to significantly alleviate or completely overcome numerous physical, sensory, and communication barriers that this population faces on a daily basis. With the help of assistive devices, smart applications, robotic aids, and voice and visual interaction systems, people with disabilities are given the opportunity for a greater degree of autonomy, independent decision-making, as well as easier access to education, work, and social life.

It is particularly important to highlight the role of AI in the field of digital work and self-employment, as these forms of activity open up new opportunities for economic empowerment and social inclusion. However, data indicate that the level of utilization of these opportunities is still low, both due to limited access to technology, as well as insufficient support for the development of digital skills and structural barriers such as discrimination and the lack of adapted programs. Therefore, it is necessary that technological development is accompanied by systemic empowerment – through comprehensive policies, the inclusion of persons with disabilities in design and decision-making processes, as well as continued investment in education and digital inclusion. Artificial intelligence must not remain just a technological innovation trend available to a privileged few, but must become a tool for building equal opportunities for all. Its development must be directed towards social justice, ethical responsibility, and respect for human rights. Only an inclusive and adapted approach can lead to AI becoming a substrate for the transition from a model of social dependence to a model of digital independence. In this context, the role of policymakers, technological institutions, the academic community, and people with disabilities themselves is crucial. By joining forces, it is possible to create an environment in which technology will be not only a tool, but also an example of equality, inclusion, and a dignified life.

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ВЕШТАЧКА ИНТЕЛИГЕНЦИЈА КАО ПОДРШКА САМОСТАЛНОМ ЖИВОТУ ОСОБА СА ИНВАЛИДИТЕТОМ

Резиме

Овај рад истражује потенцијале и изазове примене вештачке интелигенције (АИ) у подршци самосталном животу особама са инвалидитетом, са посебним освртом на дигитални рад и инклузију. Анализом литературе и доступних извештаја утврђено је да АИ технологије, укључујући асистивне уређаје, паметна колица, читаче екрана, уређаје за орјентацију и комуникационе апликације, значајно унапређују независност, мобилност, приступ информацијама и квалитет живота корисника. Уочено је да су, упркос напретку, многи АИ системи и даље недовољно доступни, посебно у земљама са ниским и средњим приходима, што ствара глобалне неједнакости. Истраживања корисничког искуства показују да правилно дизајниране АИ технологије повећавају самопоуздање и олакшавају свакодневне активности, али захтевају бољу подршку на матерњем језику. Рад такође истиче етичке и регулаторне изазове, укључујући високе трошкове, ризик од дискриминације због пристрасних алгоритама, зависност од технологије и питање заштите личних података. У закључку се наводи да инклузивни приступ у развоју АИ, са активним учешћем особа са инвалидитетом, представља кључ за изградњу праведног и доступног технолошког окружења. Имплементација АИ решења може допринети преласку са модела медицинске или социјалне

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зависности на дигиталну независност и допринети активном учешћу у друштву, али само уз етичку контролу, континуирани развој и сарадњу релевантних актера.

Кључне речи: особе са инвалидитетом, вештачка интелигенција, квалитет живота, инклузија, запошљавање

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