LETTER TO THE EDITOR

The Future Role of Robotics Combined with Artificial Intelligence in Supporting Handicapped Patients

Dear Editor,

The integration of robotics and artificial intelligence (AI) is expected to transform the management, rehabilitation, and daily functioning of handicapped patients in the future. Robotics already supports patients through mobility aids, prosthetic devices, and rehabilitation tools (Garcia-Gonzalez et al., 2022). However, future systems enhanced with AI will be more adaptive, patient-specific, and capable of clinical decision support. This technological evolution can create a comprehensive care model that reduces disability burden, improves independence, and enhances the quality of life for individuals with physical impairments. In mobility assistance, intelligent robotic systems may provide real-time support for patients with spinal cord injury, stroke-related motor deficits, neuromuscular disorders, or limb amputations. Robotic wheelchairs, for example, could be equipped with AI-based obstacle detection, navigation algorithms, and predictive motion control. These features can improve patient safety and prevent falls or collisions. For patients who have difficulty using their upper limbs, voice-activated, eye-tracking, or brain-computer interface controlled navigation systems may allow more autonomous mobility compared to current devices.

AI-assisted robotic prosthetics are another major advancement. Future prosthetic limbs may use surface electromyography, peripheral nerve interfaces, or cortical implants to interpret motor intentions. Machine-learning algorithms can refine movement patterns (Kok et al., 2024) (Figure 1), adjust joint angles, and maintain gait symmetry. These prosthetics may also include sensory feedback systems to restore touch, pressure, and proprioception, which are important for functional motor control. Such systems would significantly improve the rehabilitation outcomes of amputees and patients with congenital limb defects. Robotic exoskeletons enhanced with AI may benefit patients with lower-limb paralysis, post-stroke hemiplegia, or muscular weakness. In clinical rehabilitation, robotic devices combined with AI can deliver standardized, high-intensity therapy with precise movement tracking. AI can analyze kinematic and electrophysiological data to determine progress, identify motor deficits, and suggest therapy adjustments. This may support early diagnosis of functional decline and guide clinicians in selecting appropriate interventions. Continuous monitoring also helps reduce therapist workload and ensures consistent therapy sessions, which are essential for long-term recovery. Furthermore, AI-integrated home-based robotic monitoring systems can track vital signs, sleep patterns, muscle activity, and mobility status. Early detection of complications such as pressure ulcers, respiratory distress, or sudden immobility can lead to timely medical interventions and reduced hospitalization. Overall, robotics combined with AI represents a major future direction in the care of handicapped patients. The integration of adaptive algorithms, neuro-interfaces, and intelligent sensing systems can create advanced therapeutic and assistive technologies that improve mobility, enhance rehabilitation, and support independent living. These developments hold strong potential to reshape patient management and provide a more effective and inclusive healthcare environment.

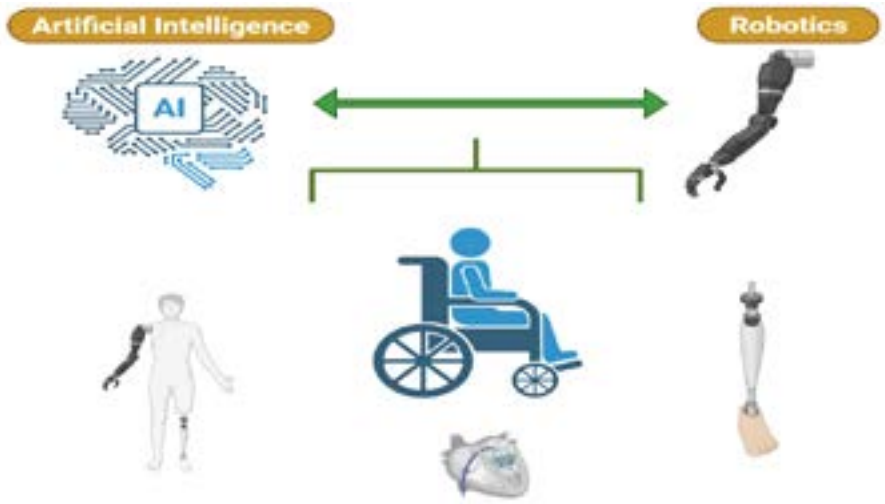

Figure 1: Integration of Artificial Intelligence and Robotics for Advanced Support in Handicapped Patients.

Declarations

Ethics approval statement

No ethical approval was required for the current study as it did not deal with any human or animal samples.

Consent to participate

Not applicable

Consent to publish

Not applicable

Data Availability Statement

The data are available from the corresponding author upon reasonable request

Competing Interests

The authors declare that they have no conflict of interest

Funding

Not Applicable

Acknowledgements

Not Applicable

Author contribution

A.G.R.C: Conceptualization, Writing and Reviewing draft, Project administration, and Supervision

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Articleinfo

Received: 28 September 2025
Accepted: 02 November 2025

How to cite this article: Ajay Guru Ramesh Chandran. (2025). The Future of Telesurgery: Expanding Access and Expertise Through Remote Care and Advanced Technology, 2(6) 1-2 Retrieved from https://archmedrep.com/index.php/amr/article/view/69