

Next-Gen Rehab: VR & AI Revolutionize Physiotherapy

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The integration of Virtual Reality (VR) and Artificial Intelligence (AI) in healthcare can significantly improve patient outcomes, particularly in physiotherapy. Combining VR and AI enhances accuracy and personalization in physiotherapy, ushering in a new era of patient centered rehabilitation. VR and AR use input devices to gather data on body position, movement, and the environment, and output devices to deliver sensory feedback, including visuals, vibrations, and sounds.¹ By offering a non-pharmaceutical alternative for pain management, virtual reality (VR) can help lessen dependency on conventional painkillers and the negative consequences they are linked with. Pain is a complicated feeling that is impacted by many different things, such as psychological, social, cultural, and physical aspects. VR can assist in diverting patients from their pain, changing their perception of suffering, and enhancing their general well-being by submerging them in interesting, interactive settings. Virtual reality (VR) has shown encouraging results in the field of physical therapy, especially in stroke rehabilitation, where patients are able to restore their independence and motor abilities. Virtual reality (VR) offers a comprehensive approach to treatment and pain management by supporting functional recovery and psychological resilience in addition to managing chronic medical concerns. Children with Cerebral Palsy (CP), a neurological disorder that impairs motor skills, frequently need to get regular physiotherapy in order to enhance their muscle strength, coordination, and general functionality. Conventional approaches usually include splints, stretching, strengthening exercises, and activities that encourage movement. But using virtual reality (VR) in rehabilitation has proven to be a very promising new therapeutic strategy.² Children with cerebral palsy benefit from VR-based therapy because it makes their workouts more interesting and dynamic. Research conducted in the last ten years has shown that VR, when paired with conventional physiotherapy, can assist kids in developing new motor skills, preserving the health advantages of physical activity, and enhancing hand functionality. With its potential to enhance both the physical and psychological aspects of rehabilitation,

this hybrid method presents a bright future for children with cerebral palsy.^{3,4} Integrating VR and AI in physical therapy enhances rehabilitation accuracy and customization. VR creates immersive environments that motivate patients and provide detailed data on their movements and progress, which AI analyzes in real-time to tailor treatment strategies. The Precise monitoring and modifications are made possible by this dynamic feedback loop, leading to more individualised and successful physical treatment. Benefits include more effective interventions, quicker recovery times, tailored treatment plans, and increased patient engagement. High upfront expenses, the requirement for infrastructure, patient acceptability, data protection, and the requirement for more training for healthcare professionals are some of the challenges.⁵ In conclusion, the integration of artificial intelligence and virtual reality in physical therapy is a groundbreaking advancement that offers effective and personalised treatment plans. This kind of integration not only makes patients more engaged, but it also makes treatment plans more unique. Despite the challenges, there's a good probability that patient outcomes would get better, which would represent a significant improvement in patient's and the efficacy of rehabilitation as a whole.

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Alishba Eman: Write up and editing

Kanza Mehmood: Idea conception, final approval

Hassan Ali: Proof reading

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