Background

Translating real-world motions performed by users to virtual avatars, such as walking in reality to walking in virtual reality (VR) worlds, has emerged as a pivotal technique for enhancing immersion in VR environments.

Research question

How can we overcome the challenge of achieving seamless locomotion experiences within virtual reality (VR) environments, with a specific focus on developing affordable solutions suitable for mass consumer adoption?

Methods

In this study, we propose a novel approach utilizing an apparatus that enables users to walk in place while supported by a support rig, coupled with inertial measurement unit (IMU) sensors at the feet to capture locomotion data. Our research focuses on analyzing the gait patterns of users during locomotion and employing Long Short-Term Memory (LSTM) networks, a specialized form of Recurrent Neural Networks (RNNs), to classify different types of locomotion, including walking, running, turning, and reversing.

Findings

We present a comprehensive methodology encompassing data collection, preprocessing, model architecture design, training, and evaluation. Through rigorous experimentation and validation, we assess the accuracy and effectiveness of the LSTM model in classifying locomotion types.

Significance

Our findings contribute to the advancement of locomotion techniques in VR and hold promise for enhancing immersive experiences for a wide range of users in the consumer market.