A Multi-Mode and Auto-Adjustable Visual-Cue-Assisted Gait Rehabilitation System

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Functional ambulation is essential to good life quality and active social participation. Research studies have indicated that the use of visual cues is effective in gait training and that practical application requires flexible visual cueing and online outcome assessment. In this study, a method is devised to meet the above needs. A system is implemented with affordable components on a posterior rollator. The system generates intended visual cues with servo-driven laser modules and a designed program. It also “indirectly” measures the user’s key gait parameters, including stride length, speed, cadence, and symmetry index. The functionality of this device not only meets clinical requirements but also provides therapists with a variety of optional cue modes. Since visual cueing and online measurement of gait parameters are integrated, training procedures can be automated and the therapist’s burden is relieved. Additionally, this visual cue device can be used at home if prescribed by a therapist. The home-based training results can be recorded and later assessed by the therapist. Our gait rehabilitation system is faster and more flexible than the traditional cueing method. It enhances a natural reciprocal ambulation, compared with cane-based systems, and unlike body-worn or virtual-reality-based systems, it causes no discomfort. In conclusion, we implemented a mobile cueing and assessing system that not only meets the requirements for clinical or home-based gait rehabilitation but also creates automation possibilities. With our affordable system, we hope that both patients and therapists can benefit from this visual cueing approach to gait rehabilitation.

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