Can wearable technologies be used for out-of-clinic gait training to improve gait symmetry?

Wearable Biofeedback System for Lower-limb Amputee Gait Training

Aliaa Gouda1,2, Jan Andrysek1,2
1 Bloorview Research Institute, Holland Bloorview Kids Rehabilitation Hospital
2 Institute of Biomedical Engineering, University of Toronto

Introduction
Biofeedback (BFB) provides users with real-time feedback that can elicit changes in gait patterns. Two major gaps:
1. Integrating rhythmic stimulation (proven to improve gait symmetry and maintain speed) [1]
2. Validating wearable BFB systems in free-walking environments for gait training

Objectives
1. Develop and validate a wearable BFB system using rhythmic stimulation (evaluate overall gait changes during training targeting stance-time symmetry)
2. Develop and validate an activity recognition algorithm to apply during BFB gait training

Methods
• Validate performance of wearable BFB system (developed mobile-app) targeting stance-time symmetry ratio
• Variable rhythmic stimulation – incremental
• Participants: able-bodied (n=10) and lower-limb prosthesis users (n=10)

Preliminary Results
• Gait parameter calculation based on gait event detection
• TO/HS timing errors significantly small for real-time BFB application

Significance & Impact
• Provides opportunity for gait training systems to move beyond the clinic, for youth and children with disabilities
• Biofeedback can help reinforce good gait habits
• Cost-effective and time-efficient solution
• Increased mobility → increased quality of life

Next Steps

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