A wearable system to assess walking symmetry in individuals with lower limb impairments

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BACKGROUND
• Individuals with lower limb impairments often experience gait asymmetry
• Quantifying asymmetry is important to guide the focus of rehabilitation

OBJECTIVE
Develop a wearable system that can:
1. Accurately identify gait events
2. Quantify asymmetry in walking
3. Provide real-time data output and biofeedback through an android app

METHODS
1. Developed an algorithm to detect Heel Strike and Toe Off Events
2. Two sensors attached to the shank interface with the app to collect data
3. Angular velocity data along z axis compared to data from 3D motion capture system

RESULTS
• Mean timing error for Heel Strike was 0.5% ± 1.1 and 1.5% ± 0.6 for Toe Off detections when tested on offline data from individuals with lower-limb amputations
• Algorithm used these events to calculate stance time, swing time, stance time symmetry and cadence values

NEXT STEPS
• Continue testing with user receiving biofeedback
• Continue testing with individuals with lower limb amputations

CONCLUSION & RELEVANCE TO BLOORVIEW FAMILIES
• Reliable detection of gait events allows this system to perform real time analysis of gait symmetry in individuals with lower limb impairments
• Providing biofeedback guides the rehabilitation focus
• Additional advantages:

REFERENCES