

Gait Lab Validation of Direct Force Measurement in a Transfemoral Prosthesis

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Abstract:

Technological advancements in prosthetic limbs for individuals with lower-limb amputation have resulted in a number of microprocessor-controlled knee and ankle systems in the commercial market. Such systems have the potential to provide enhanced and expanded functionality by being able to actively react to changes in terrain or gait. However, the extent to which this potential is realized in practice remains an open question. There are multiple methods to evaluate the performance of the amputee limb system. The conventional approach to gait analysis involves motion capture cameras and floor-embedded force transducers that are limited to laboratory settings that fail to adequately simulate real-world locomotor function. Alternatively, the approach of direct force measurement provides gait assessments via sensors directly integrated within the prosthetic limb system. This method, when combined with wireless data transmission, enables continuous measurement of prosthetic-limb performance in field settings unsuitable for conventional gait analysis. The objectives of this effort are to compare the prosthetic-limb kinetics as measured by limb-integrated transducers to that obtained via conventional gait analysis and ultimately validate direct force measurement as a tool for field evaluation of prosthetic-limb performance. The work to be presented will discuss the technical details of each system and the progress to date in the collection and analysis of gait data from a single patient with unilateral transfemoral amputation.