Project Title: A Novel Balance Assessment Outcome for Individuals with Spinal Cord Injury
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Balance is defined as "the state at which all forces acting on the body are at equilibrium." Individuals with spinal cord injury (SCI) suffer from significant balance impairment. This can affect large activities such as walking, standing and sitting; as well as other activities such as propelling a wheelchair, transferring, grooming and eating. Balance training/re-training is important during all phases after SCI. This is because balance ability impacts one's level of independence and quality of life. The importance of this can be shown by the recent emergence of impactful discoveries, that have occurred for the first time in over 10 years, capable of improving or enhancing mobility and balance in SCI individuals. Examples include treatments such as stem cell transplantation, transcranial magnetic stimulation and epidural stimulation. Yet, despite its importance, the field is stunted by the lack of robust outcomes that are able to test balance. The development of a novel balance outcome tool will help fill a large gap in numerous important upcoming clinical trials in the SCI field. It will also improve assistive device/caregiver prescription, fall risk detection, and personalized rehabilitation training goals.

 In this proposal, we start on the initial phases of development of a new balance outcome tool, using the 3D sensor from the Microsoft Kinect. This type of innovative technology is compact and easy to use (it can fit into any clinic or home with minimal space), yet sophisticated enough for robust motion detection. The aims of this project are to determine the feasibility of the Microsoft Kinect in tracking balance in individuals with SCI. We will accomplish this by determining its accuracy (compared to existing equipment) using a small sample of individuals with SCI, and its' utility based on feedback from SCI clinicians. If successful, this initial data will be the groundwork for larger full-scaled development phases of our balance outcome assessment; which will include the development of a methodology that can be turned into a clinical app for balance assessment in SCI. We believe this will be invaluable for use in upcoming SCI clinical trials and for multiple rehabilitation needs. We project that all of these will lead to substantial improvements in quality of life and independence for individuals with SCI.