

**Brooke A. Slavens, PhD**  
**Alyssa J. Schnorenberg, PhD**

**Mission:** To advance quantitative rehabilitation research for improving health and function of people with disabilities.

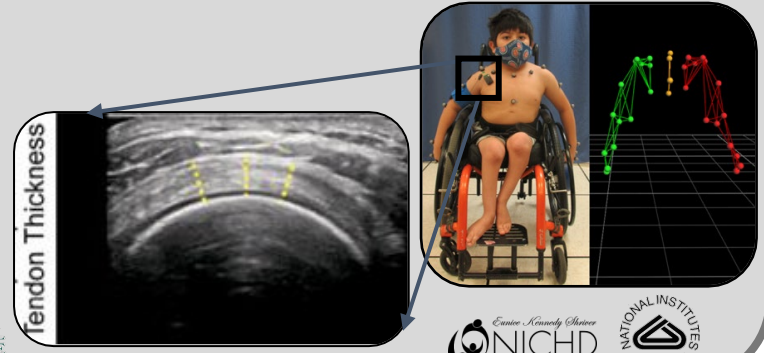
**Goals:** Prevent musculoskeletal injuries, inform rehabilitation best practices, and guide development of devices and treatment for people with impairments.



## Prediction of Shoulder Injury for Disease Prevention in Children and Adults with Spinal Cord Injury Injury Using Advanced Biomechanical Modeling & Diagnostic Imaging

**Aim:** To determine the relationships among age of SCI onset, variability of shoulder joint dynamics, wheelchair propulsion patterns, pain, and pathology in children and adults for enhanced health and quality of life.

These findings are essential for developing targeted strategies to prevent and treat symptoms of overuse transitionally from childhood to adulthood and over the lifespan in persons with SCI.



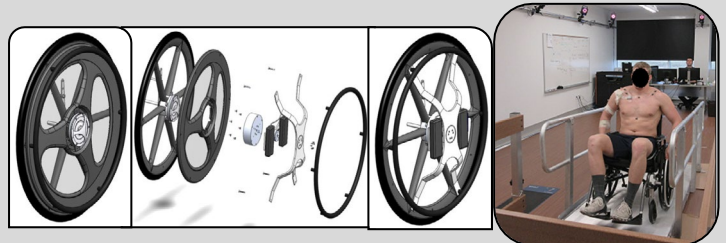
## Development of TransKinect: A Clinically Robust System for Transfer Assessment



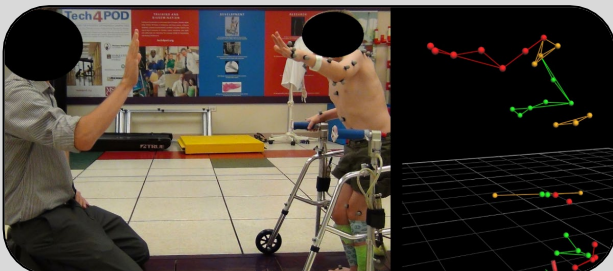
**Aim:** To investigate the usefulness of the TransKinect System, a new tool developed to help clinicians evaluate wheelchair transfers and make recommendations to patients on how to improve their transfers using machine learning.



## IntelliWheels: The Automatic Transmission for Manually Propelled Wheelchairs



**Aim:** To evaluate a multi-speed geared wheel system for manual wheelchair users aimed to enhance function while reducing joint forces and moments through a multi-gearing mechanism.



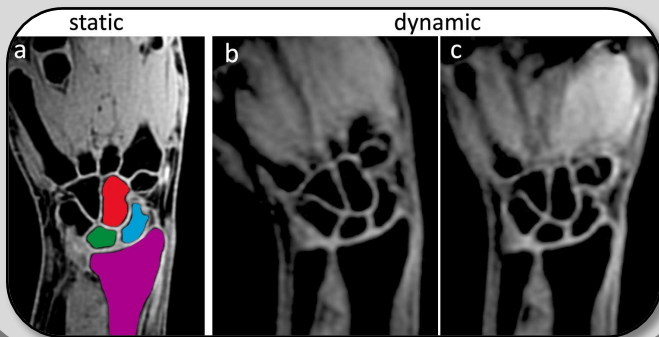
## Rehabilitation Engineering Research Center (RERC) on Technologies for Children with Orthopaedic Disabilities

**Aim:** To utilize advanced mobility modeling to improve function and longer-term transitional care of children with severe orthopaedic disabilities



## Enabling Kinematic Joint Profiling Using MRI

**Aim:** To determine the best methods for capturing wrist joint movements in both pathologic and healthy wrists using magnetic resonance imaging (MRI), to provide guidance to clinicians on how to use MRI techniques to view damaged wrists. This is a critical first step towards designing treatment options and surgical interventions.



## Pre- versus Post-Operative Kinematics and Muscle Activation Assessment of the Upper Extremity Following Rotator Cuff Repair



**Aim:** To identify compensatory upper body joint motions and muscle activation patterns used before repair and during post-operative recovery. Knowledge of movement strategies may help improve rehabilitation strategies, interventions, and patient outcomes; ultimately enabling quicker return to work and activities.

## Biomechanical Analyses of Adaptive Sports

**Aim:** To evaluate the three-dimensional upper body joint movements and loading demands of wheelchair athletes during sports performance such as cross-training exercises and lacrosse. The goal is to assist in the development of evidence-based interventions to mitigate potential injury and preserve upper limb function for wheelchair athletes looking to participate in adaptive sports and to provide recommendations to organizational bodies for use during official rule development.



## Defining the Biomedical Phenotype in Hypermobile Ehlers-Danlos Syndrome

**Aim:** To determine the biomechanical phenotype of hEDS, a rare genetic disease, through advanced quantitative evaluation and genomic sequencing for improved diagnosis, interventions, and rehabilitation and improved quality of life in youths with hEDS.

