A Therapeutic Robotic System for the Upper Body Based on the Proficio Robotic Arm

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Goal

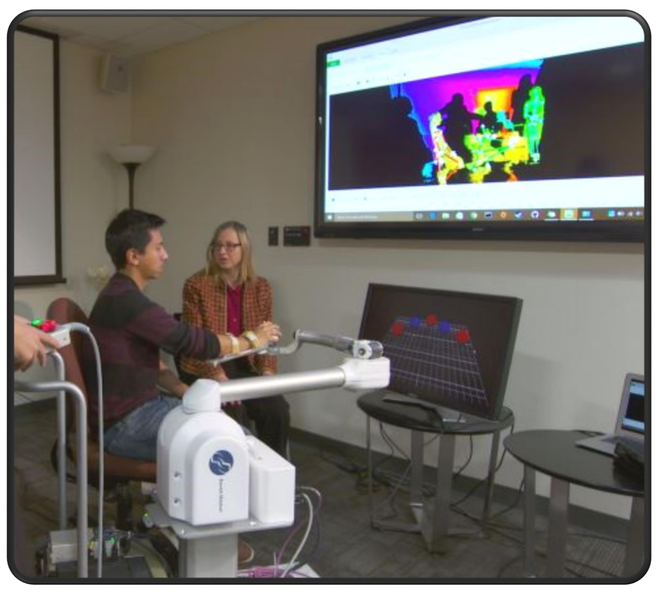
Leverage robotics to improve physical therapy and expedite recovery.

The Proficio Robotic Arm

- Robotic arm with 3 degrees of freedom.
- Trajectory planning that enables therapists to plan and personalize exercises.
- Programmable haptic feedback that can be leveraged to modify exercise difficulty.
- 3D positioning of the arm joints that allows exercise visualization and analysis.

Methodology

Therapist designs exercise trajectories personalized to the needs of the individual patient.



We design an auxillary Kinect system that allows the therapist to remotely monitor the patient in real-time and allow the patient to exercise without the Proficio.

Our Dynamic Adjustment (DyAd) system analyses patients' exercises by measuring trajectory alignment (DTW), smoothness (Spectral Arc Length) and speed.

DyAd provides trajectory visualization on the screen to help both patients and therapists get a visual representation of exercise performance.

The system then provides recommendations to adjust the difficulty level of the exercise.

Future Work

- Replace the screen with a VR headset for exercise visualization to provide a more immersive and intuitive interface for the patients.
- Conduct rehabilitation study with individuals with temporary or permanent motor disability to evaluate system.