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