Motion Capture-Based Robotic Interfaces to Enhance Engagement and Adherence In Pediatric Rehabilitation
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Opportunity
- Physical therapists struggle to engage children with hemiplegic cerebral palsy (CP) in the repetitive practice required to learn new motor skills.
- Low-cost robotics and other technologies may enhance children’s engagement to participate in home-based and remotely-monitored exercise programs.
- We created an inexpensive motion-controlled robotic interface that encourages repetitive functional movement of the affected arm and hand through gameplay.

Approach
- The game includes: robotic arm, moving platform base, game board
- The robotic arm is controlled with a hand motion controlled Leap Motion device. The arm mimics the user’s motions, and a joystick controls the base.
- Game success and range of motion metrics are recorded for therapists to monitor. Different objects must be dropped in varying locations to replicate effective exercises.
- As we continue to design the REACH interface, we are looking to reduce the number of physical connections through wireless communication to the computer, allowing more user degrees of freedom.

Impact
- Next steps include a usability evaluation with a small sample of children with hemiplegic CP.
- We will then evaluate the effect of a home exercise program of game play on children’s functional outcomes related to upper extremity use in activities of daily living.
- Cerebral palsy is the most common cause of childhood disability and hemiplegia is the most common subtype. Children with hemiplegia participate in long-term rehabilitation, much of which would be less costly if it could take place in home settings.