Stroke Therapy Coach
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DESCRIPTION:
Improving rehabilitation outcomes with virtual assistance and enhanced user engagement strategies

Active engagement in repetitive motions helps the brain relearn movement by creating new pathways to motor functions. With the Myomo mPower robotic arm, patients can re-learn how to move partially paralyzed (hemi-paretic) arms using their own muscle signals. But to maximize compliance, clinicians also need applications that reward patients' arm movements and keep score as they improve over time.

The Stroke Therapy Coach (STC) is an integrated virtual-reality based therapeutic training system that supports a rich set of exercise motions while providing a controlled environment, individualized training, task oriented movement practice and feedback for reward and motivation. The STC recognizes patient emotions, such as fatigue, to suggest appropriate responses, such as resting. Graphical representations of patient progress and history support ease of review and interpretation by both patient and clinician.

TARGET POPULATIONS:
- Stroke survivors recovering from damage to motor control regions of the brain
- Other patients in need of similar physical therapy exercise for rehabilitation

BENEFITS:
- Permits clinicians to remotely define new exercise sets and configurations
- Motivates patient engagement and compliance with virtual gaming
- Recognizes correct and erroneous exercise movements
- Provides encouragement and corrections by audio and textual feedback
- Enables clinicians to objectively track patient performance and progress

ABOUT THE RESEARCH:
The development platform is a novel rehabilitation technology for upper limb rehabilitation after stroke that combines a virtual reality training paradigm with a robotic power assist arm brace that senses contraction and relaxing of arm muscles to trigger a motor providing assistance. The system consists of a portable elbow limb orthosis made of a lightweight aerospace metal, and includes noninvasive surface sensors for electromyography (EMG) of the biceps and triceps, an actuator, a control unit and battery pack. The Stroke Therapy Coach is composed of a tablet for clinician programming, a Kinect for monitoring motion, a suite of fun virtual games to motivate rehabilitation practice, and a machine learning model to evaluate the quality of the exercise. The system is based on clinical guidelines.