MyoTherapy: Utilizing Electromyography and Gyroscope Precession with Gamification to Improve the Physical Therapy Experience

DISRUPT HC

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Background

Physical therapy is an arduous process. We sought to streamline recovery and make it more enjoyable for the patient, using the Myo Band. The Myo Band is a Gesture Recognition Device that utilizes electromyography (EMG) to detect electrical activity in the forearm muscles, and a gyroscope and accelerometer to recognize gestures. We are currently working on creating a platform employing the Myo Band in order to improve the recovery process for physical therapy patients.

The Myo band has shown great potential for use in myopathy. Research in characterizing EMG data using machine-learning tools have shown few models are highly accurate and have classification accuracies of 99%[1]. Additionally, when patients were asked to use the Myo band, many found it to be a practical tool for data collection and have rated it highly in social acceptability, ease of learning, comfortableness, and stress/effort[2].

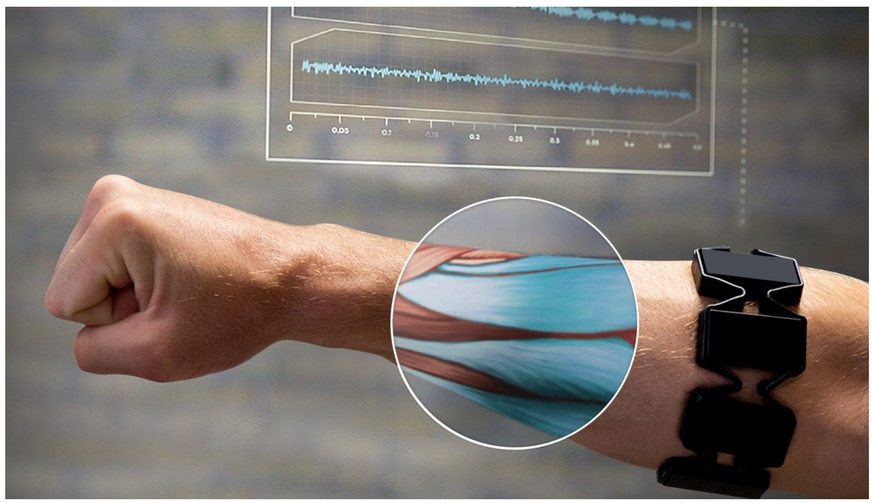
Disrupt HC

Disrupt HC is a socially innovative student organization within the New Brunswick community that is collaboratively developing applications to positively impact society.

Methods

Through collaboration with outpatient physical therapy clinics, initial efficacy of the Myo Band, accuracy of EMG readings, and patient adherence and satisfaction will be reviewed. In order to better determine the efficacy of our platform and to access areas of improvement, a survey-based assessment (i.e. Likert Scale) will be provided to each patient and physical therapist.

Simultaneously, a prospective case-control trial comparing outcomes of patients undergoing physical therapy + MyoTherapy vs. traditional physical therapy alone will be performed. Primary outcomes will be differences in recovery time, improvement in mobility, compliance to physical therapy regimen, and overall patient satisfaction.



Benefits

Myo Band technology demonstrates promise as an adjunct to traditional physical therapy while providing patient autonomy and involvement in the recovery process.

Using gamification psychology incorporated into the Myo Band platform, we hope to not only motivate users, but to make the recovery process more interactive and enjoyable.

Future Direction

- Development - add gesture recognition to other muscle groups
- Partnerships - collaborate with physical therapists to better track and tailor exercises to benefit patients
- Business Plan - Incorporate and sell product to hospitals and increase distribution to more patients

Acknowledgements

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[1]Yousefi J, Hamilton-Wright A. Characterizing EMG data using machine-learning tools. *Computers In Biology And Medicine* [serial online]. August 1, 2014;51:1-13. Available from: ScienceDirect, Ipswich, MA. Accessed May 13, 2018.
[2]M. Sathiyanarayanan and S. Rajan, "MYO Armband for physiotherapy healthcare: A case study using gesture recognition application," *2016 8th International Conference on Communication Systems and Networks (COMSNETS)*, Bangalore, 2016, pp. 1-6.

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