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EMG Analysis for Pre-clinical Trials of Hand Rehabilitation Tasks

Objective
To determine the predominant factor(s) affecting EMG–force signals via design of experiments (DOE) – thus develop the Pre-clinical Grading System.

Scope
EMG signals of 5 muscle groups and force exerted are obtained from a total of 25 subjects. 5 factors – Age, Gender, BMI, Hand Size Ratio and Frequency of Exercise/week – are also taken into consideration.

Flowchart of Experiments

- Acquisitions of EMG & Force signals
- Calculations of RMS Potential of all muscles & Percentage change for respective muscle
- Determination of Deviating Data
- Performing Fractional and Factorial Experiments to Determine Predominant Factor(s)
- Single Factor Experiment & Least Significant Difference Level (LSD) Test
- Developing of Pre-clinical Grading System

Concluding Remarks
Pre-clinical Grading System for hand rehabilitation is developed based on the various age groups. A total of five statuses – ‘excellence’, ‘dynamic’, ‘functional’, ‘progressive’ and ‘stiffness’ are created to classify patients or users. Apart from enlarging the sample size, it is best to engage patients with spinal cord injury and post-stroke for testing to reinforce the results achieved.

Sample Results
Lateral pinch test of a male subject below 45 years old

Age is a primary factor of EMG-force signals and there are significant differences among age groups.

Pre-clinical grading system for lateral pinch

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Project Title: Electromyography Analysis for Pre-clinical Trials of Hand Rehabilitation Tasks
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