# Passive Reduction of Involuntary Arm/Hand Tremors, Phase III

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In the U.S., millions suffer from life-impairing involuntary shaking of muscles called tremors. Tremors are caused by a variety of diseases, injuries and conditions, including traumatic brain injuries, Parkinson’s disease, multiple sclerosis, and medications. Tremors cause difficulty with fine motor control. The objective of this research was to use data gained from the Electromyograph (EMG) and three axis accelerometers placed on the arm to reveal a direct relationship among a motion damping brace, tremor magnitude, tremor frequencies and muscle activity. The brace, worn between the wrist and elbow, is lined with viscoelastic foam, and constructed with a lightweight ridged plastic outer shell with a non-slip rubber base that rests on a writing surface. The rubber pad grips the writing surface which stabilizes the outer-shell and allows the foam to absorb the energy of the tremor. To test the brace’s effectiveness, human volunteers performed fine motor control tasks with and without the brace. Testing was conducted at a department of physical therapy motion analysis lab. The tasks revealed how much the tremor was reduced both numerically, by analyzing the data collected from surface EMGs and accelerometers, and visually, through inspection of the test results. Results showed that the brace is effective at reducing tremor magnitude, tremor frequency, and muscular activity. Six out of the eight subjects showed improvement with fine motor control. Based on these results further research is warranted into development of passive hand stabilizing equipment.

**Awards Won:**

Fourth Award of $500

International Council on Systems Engineering - INCOSE: First Award of $1,000

International Council on Systems Engineering - INCOSE: First Award of $3,000