Assistive Writing Device for Tremor Patients
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Abstract

Essential Tremor (ET) is the most common adult neuro-motive disorder.
A prototype has been constructed to decrease oscillations at the dominant frequency. The general principal of these prototypes is that an affected user holds an outer case and the oscillations are opposed as the energy is transferred to a stylus.

In pilot testing, on average, the results showed 38%-47% decrease in acceleration at peak frequencies. However, there was significant variation between tests, such that improvements ranged from -3%-69%, indicating the need for further testing.

Results

The pen-tip accelerations were collected throughout testing, the frequency response of the pen can be determined by Fast Fourier Transform. The data was homogenized to account for the varying lengths of trials. However, even within each case, there was significant variation between each reading. The resulting standard deviation of the "tremor power" within each case at the peak: Fixed: 257.7 Parallel: 150.6 Perpendicular: 363.6

Future Designs

Other potential designs are being processed involving active responses to the vibrations. The designs being prototyped include either a DC motor or a voice coil actuator (VCA).

Conclusion

Pilot tests have indicated initial success with the passive design, improvements averaging between 38 and 47%. This indicates that an active device with an active controller would be useful to provide a non-invasive device to help patients suffering from Essential Tremor (ET).

The variabilities between tests of the same type indicate a variable that has yet to be addressed. This is further complicated by the question of posture; as posture changes with pen position. Further testing in a mechanical system, emulating the movement of a tremor patient, could provide more insight into the purely damping quality of the device by reducing the variables considered.

Future devices include potential use of a DC motor or a Voice Coil Actuator.