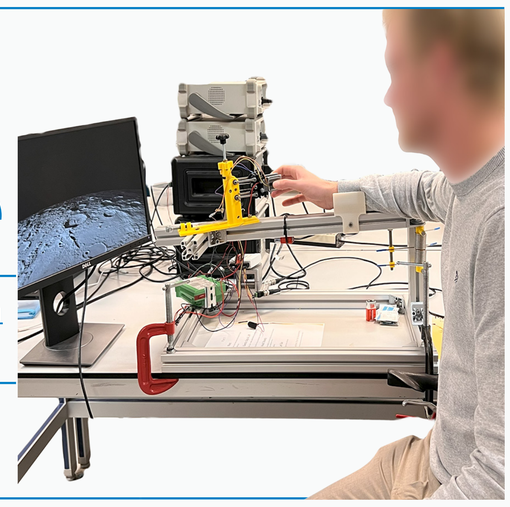
QR to paper

Exploring synergy between Tactile perception and arm usage



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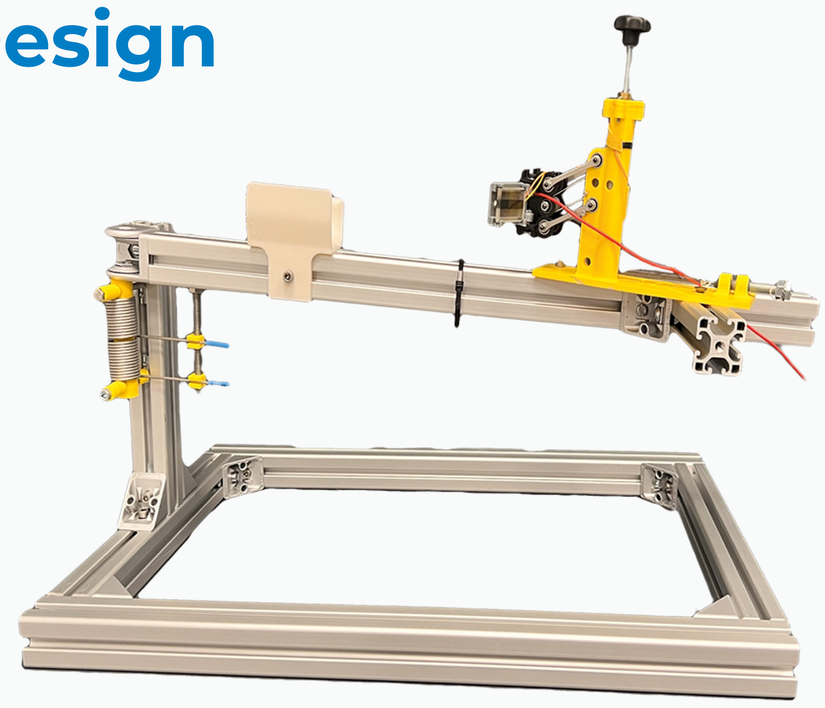
Introduction

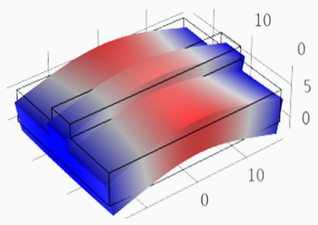
Stroke causes severe tactile deficiencies which affects motor control when grasping and lifting objects [1]. Understanding the fundamental neural disorders associated with tactile deficits is crucial to developing rehabilitation and treatment plans correspondingly [2].

Earlier studies have studied the dynamics between finger grasping behavior and arm muscle activation in stroke patients [3]. However, the exact neuromuscular synergy of tactile perception and arm usage is left unexplored.

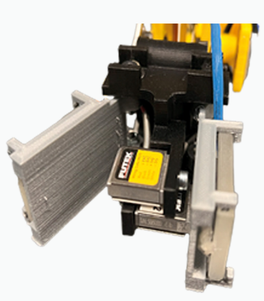
In this paper, we designed a comprehensive experiment platform. We used a grasp and lift task to test the potential synergy on 12 healthy young adults. We asked each participant to perform experiments un-

Design





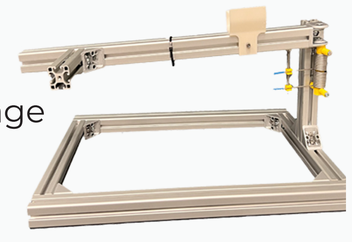
1: Ultrasonic froction modulation plates
- Reduces surface friction by 64%



2: Grasping object
- Holds the friction modulation plates
- Measures the grasping force



3: Constant force system
- Ensures a constant adjustable weight



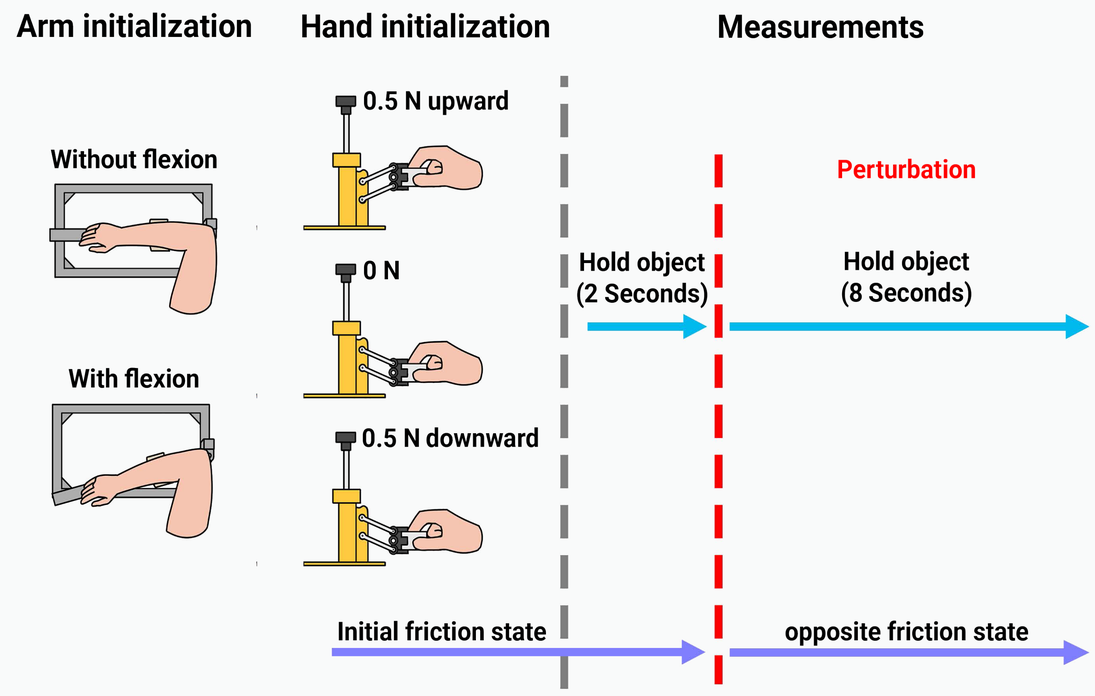
4: Elbow support
- Provides a counter torque with elbow usage

Conclusion

Results firstly revealed a general gripping behavior that is consistent with earlier findings. This confirmed that this experiment is valid to reveal possible tactile perception discrepancies. Then, the results indicate that there is no significant evidence that arm usage is correlated to the subjects' gripping behavior.

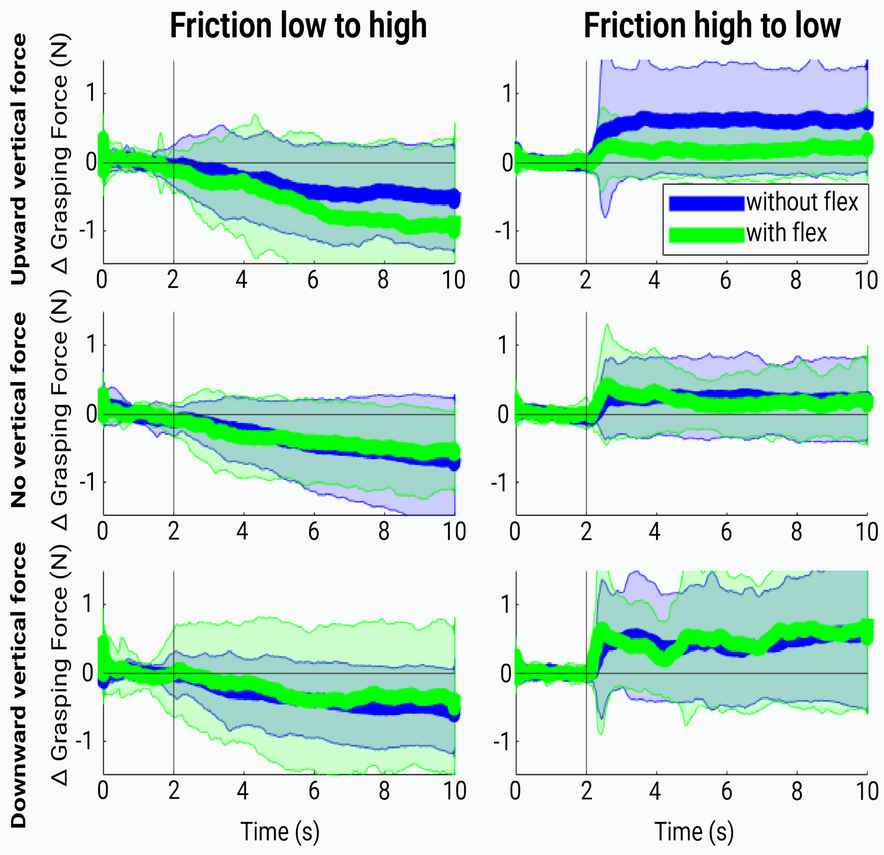
In conclusion, this research established a platform sufficient to test the possible synergy between stroke patients' arm usage and tactile perception and revealed that such synergy may not exist in healthy adults.

Experimental protocol



In this experimental protocol the controlled variables are the elbow position, the vertical force, friction perturbation.

Results



This plot shows the difference in grasping force between initial and opposite friction state for all the different controlled variables

References

[1]: Carey et al. - Physical and Rehabilitation Medicine, (1995)
[2]: Nowak et al. - Movement Disorders, (2005)
[3]: Wiertlewski et al. - Proceedings of the national acadamy of science (aug 2016)