Docket #: S20-087

Isometric force pillow (IFP) to measure finger flexion tone

Stanford researchers at the Okamura Lab have prototyped a computerized "pillow" that fits in the hand and uses air pressure to measure involuntary grip force (spastic hypertonia). An attached sensor provides an accurate and quantitative measurement which can replace the current subjective measurements used clinically and in research to measure the effectiveness of assistive devices, treatments, and patient progress. Spastic hypertonia commonly affects patients post-stroke as well those with other neuromuscular disorders such as Cerebral Palsy and Multiple Sclerosis. This lightweight, ergonomic tool can be useful for stroke recovery and physical therapy, as well as laboratory and pharmaceuticals research.

Figure 1

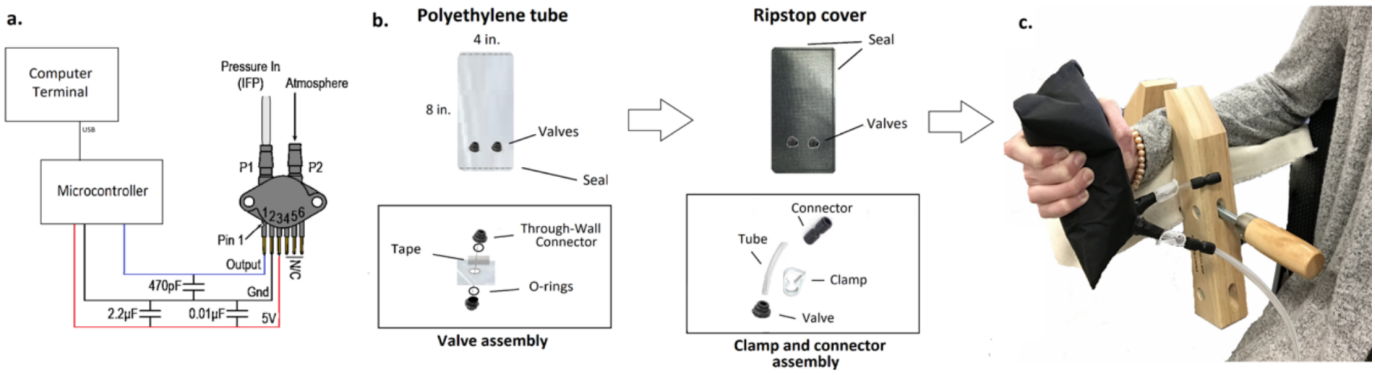


Figure 1 description - a. Schematic of the IFP electronics. b. Assembly of the IFP. c. The isometric force pillow used in a gravity-neutral position. The tube leads to the pressure sensor of 1a. The other valve is clamped after initial inflation using a hand vacuum pump.

Figure 2



Figure 2 description - The mechanical version of the device: increased mobility and simpler to use.

Stage of Development

- Prototype built and tested

Applications

- **Quantitative measuring** of finger flexion tone to help develop treatment plan and monitor progress
- **Stroke recovery and physical therapy**
- **Laboratory and pharmaceuticals research**

Advantages

- **Objective and quantitative and holistic measurement** in contrast to current subjective manual tests such as the Modified Ashworth Scale
- **Can measure finger flexion tone at all joints**
- **Lightweight and Ergonomic design** fits in a variety of hand sizes

Publications

- Seim, C., Han, C., Lowber, A., Brooks, C., Payne, M., Lansberg, M., Flavin, K., Dewald, J., Okamura, A. (2020). Isometric force pillow: using air pressure to quantify involuntary finger flexion in the presence of hypertonia. Springer series on Biosystems & Biorobotics. In *Converging Clinical and Engineering Research on Neurorehabilitation IV: Proceedings of the 5th International Conference on Neurorehabilitation.*

Patents

- Issued: 11,877,849 (USA)

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