Physical Therapy Device for Shoulder Rehabilitation

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Objective

Create a physical therapy device for shoulder rehabilitation in order to help post-surgery or elderly patients with a limited range of motion.

Background

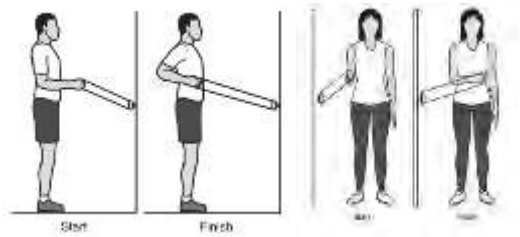

Figure 1. Example of simple exercises used to increase shoulder strength using resistance bands

To increase mobility and force ability of the shoulder in a safe and accessible manner, we designed a physical therapy (PT) device for specific shoulder rehabilitation. Improper PT of affected muscles can cause damage rather than recovery.

Methods and Materials

This PT device uses a linear actuator, motor control, Arduino control board, a liquid crystal display, and a handle attached to a force sensor to monitor patients. The PT procedure will be a linear push/pull by the patient on the device's handle that will move back and forth across the linear track at a set speed.

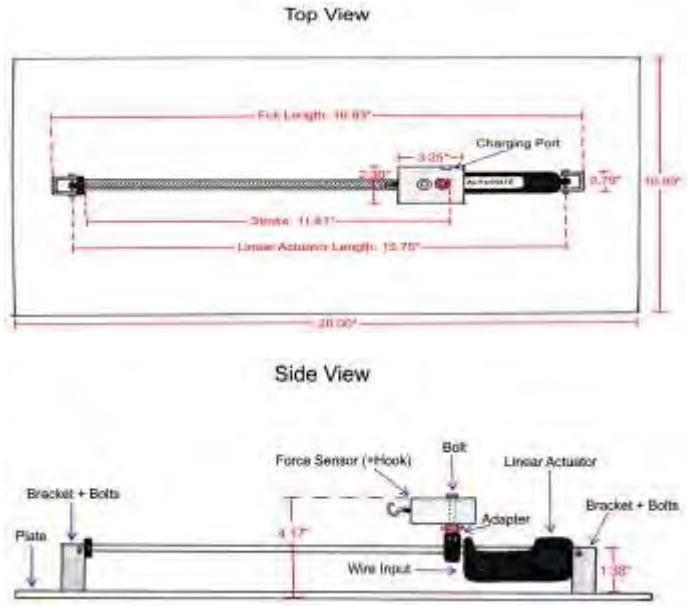

Figure 2. Top (top) view and side (bottom) view of the device

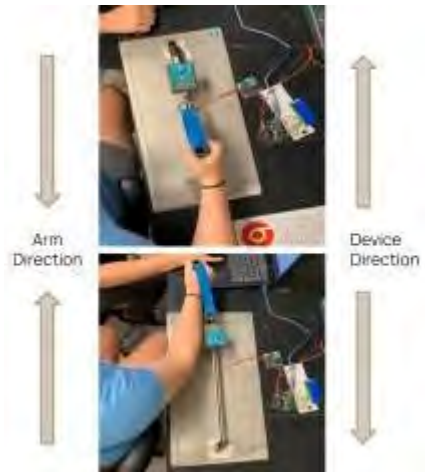

Figure 3. Image of the device relative to the user. The top image indicates pulling the device, while the bottom image indicates pushing the device.

Results

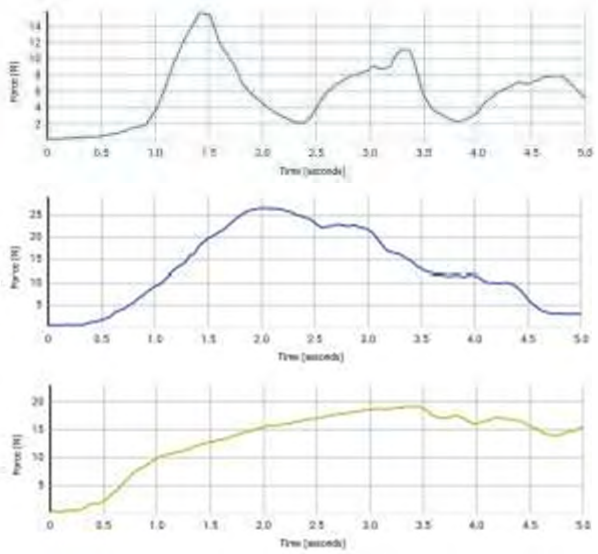

Figure 4. Outputs of the force sensor of the device. This information can be output to either a phone or laptop device for observation. These are demonstrations of the device working up to 25N, over the course of 5 seconds.

Conclusion

Decreases the risk of injury and provides patients the opportunity for at-home physical therapy to graduate from dynamic exercises with no resistance to dynamic motions with resistance.