

The Human Integrated Gripping Device

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INTRODUCTION

The Human Integrated Gripping Device is a universal device, which allows users with limited hand strength and dexterity, the ability to perform everyday tasks. This project is specifically aimed at helping those who are living with disabilities as a result of stroke. The device facilitates the user's ability to grasp objects and in turn perform everyday tasks. Products currently on the market do not integrate the users hand into the device, but instead try and replace the hand all together, creating great demand for a product such as this. The Human Integrated Gripping Device overcomes this and other problematic issues such as user friendliness, weight, awkwardness, and functionality; all of which have hindered the success of its predecessors. These objectives are accomplished through a mechanical, ratchet mechanism design, which enables the user to adjust his or her degree of gripping as with a lightweight and user friendly system. With the use of this device, the client's way of life is dramatically improved.

SUMMARY OF IMPACT

The design criteria for the Human Integrated Gripped Device were defined by the capabilities and needs of the client who had a stroke. Because of the stroke, the client lost hand strength and consequently the ability to maintain a grip with sufficient strength for a prolonged period. The device integrates the users hand through a glove system which allows the user to grip objects. Through the use of this device, the user is now able to perform everyday tasks that once seemed impossible. Some of these tasks include swinging a golf club, sweeping the floor, and raking the lawn.

TECHNICAL DESCRIPTIONS

The Human Integrated Gripping Device is comprised of three components: 1) the ratchet mechanism, 2) the release mechanism, and 3) the glove interface. The following paragraphs describe these sections in more detail.

THE RATCHET MECHANISM

The ratchets are the basic core of this device; without them, the device will not perform. They function by allowing motion to proceed in the direction indicated in Fig. 1; the user is able to close his hand, but once closed, the hand is locked into position. This is possible because the teeth on the ratchet, combined with the pawl, restrict any movement in the opposite direction.

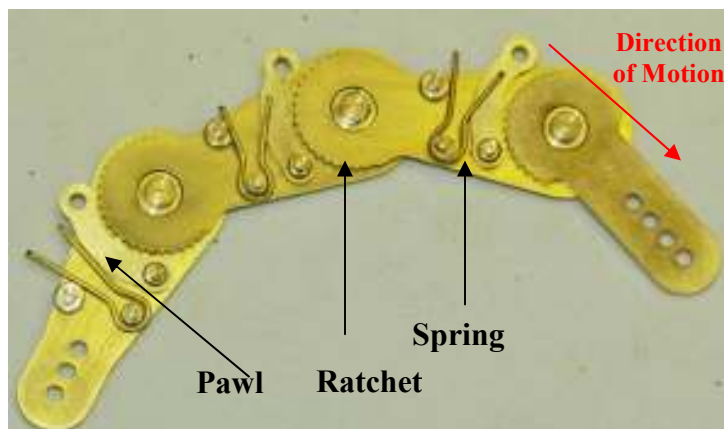


Figure 1. The Ratchet Mechanism

THE RELEASE MECHANISM

Once the user wishes to release his or her grip he or she simply pulls on the strings of the release mechanism. As can be seen in the figure below, the release mechanism is comprised of tubing inside of which Kevlar strings run, connected to each pawl. As the user pulls on a string, the corresponding pawl is pulled backwards, releasing the contact between the pawl and the ratchet surface. This enables the user to freely move the joint in question, allowing the segment to straighten. This process is repeated for each joint until the hand is released.



Figure 2. The Release Mechanism

THE GLOVE INTERFACE

The inner workings of the device are unseen to the user in the final product. Instead, the user simply sees the glove interface as seen below. The strings here are those which the user pulls to release the device.



Figure 3. The Glove Interface

The cost of parts/ material was about \$180.00