Utilizing Artificial Muscles to Enhance the Human Body

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Today’s compression braces try to support and constantly compress joints or injuries which can cause pain after long use. They also restrict blood flow thus slowing or affecting healing time. The goal of this project was to design a self-variable “smart” compression brace which will eliminate these problems associated with traditional compression braces. The “smart” brace only compresses when needed and allows blood flow and comfort when compression is not needed. The harder the muscle contracts the more compression and support the brace will provide. This device is fully automatic and self-contained. It is also comfortable, light-weight, and self-powered, allowing for easy wear-ability and functionality. The “smart” brace consists of sensors to detect muscle contraction, a material which contracts with added heat or electricity, and a control module to sense input and adjust what is needed for the brace. There are several materials to use which contract in this manner. The first material that was used in the first prototype was mono-filament nylon twisted into a spring like structure which contracts with added heat. Currently the newest prototype uses newly designed artificial muscles which utilizes specially designed electromagnets. The new electromagnet muscles are controlled with off-the-shelf muscle sensors and an Arduino control unit to demonstrate feasibility. The muscles are incorporated into a lose brace so that its support can be varied as needed. The muscle sensors are also incorporated into this brace to make the unit self-contained. The smart brace can assist the human body in many ways. It can add strength to make humans stronger, and help certain areas in the human body. The possibilities are endless with the new artificial muscles.

Awards Won:

Third Award of $1,000