A Novel Prosthetic Design Utilizing a Unique Sensory Control System, Brushless Motor Drives, and Worm Gear Mechanisms through Rapid Prototyping Techniques

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A limitation held within modern prostheses lies in their prohibiting, high cost and inefficient systems of user control, which results in their inability to be optimized for utilitarian purposes by laboring workers of need. This design aims to bring comfort, strength, reliability, and cost efficiency to prosthetics through the coupled optimization of advanced systems, such as a force sensing resistor (FSR), brushless motor, and worm gear mechanism. The replacement of the frequently used, costly electromyography sensor (EMG) with the FSR enables the movement of the apparatus to be controlled through passive electronic transport, eliminating the inaccuracy associated with countering methods of gathering sensory input and enabling the integration of notable improvements in comfort, ease of use, and cost-efficiency to the system. The use of a brushless motor allows for the apparatus to be marked by a high torque output, while the optimization of a worm gear mechanism allows for its enhancement by a non-back drivable holding mechanism. Experimentation upon this device showed that the prosthetic produced promising amounts of torque at a high speed, allowing it to rapidly grasp a wide array of objects. In having the use of laser cutting to form this appendage enable it to be easily customized to the unique shape of its user, the mechanisms utilized within this design in turn hold the ability to greatly advance the field of prosthetics and enable their use by the struggling worker, who, without its aid, may be inhibited from partaking in physically strenuous occupations.

Awards Won:

Third Award of $1,000