A Novel Prosthetic Design Utilizing a Unique, Integrated Sensory Control Platform, Brushless Motor Drive System, and Worm Gear Mechanism through Rapid Prototyping

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Prostheses are currently inhibited by the utilizing of costly apparatuses and inefficient technology. The design of this prosthetic hand looks to integrate cost-efficient devices to create a novel apparatus that utilizes a force-sensitive resistor (FSR) to control the system, a capacitor integrated into a 555 timer and 311 circuit with a potentiometer to monitor the pressure the hand exerts, a brushless motor system coupled with a worm gear mechanism to increase torque output and make the hand non-backdrivable, and formation through rapid prototyping techniques to allow for easy customizability. The replacement of commonly used, unreliable sensors with the FSR, which works through a way of passive electrical transport, minimizes the detection of background noise, enabling the movement of the system to be controlled with a high degree of accuracy. The substitution of commonly utilized, costly pressure sensors for the use of a durable capacitor coupled with a 555 timer, 311 circuit, and potentiometer enables for the hand to monitor the amount of force it exerts on objects in a novel, inexpensive manner. This is done by having the capacitor line the hand and a 555 timer continuously charge and discharge the capacitor. The monitoring of the amount of time it takes to do this allows for the creation of a new type of pressure sensor that is marked by a substantially higher degree of cost-efficiency and durability, therefore minimizing need for repair. The integration of these devices into a single apparatus allows for the creation of a low cost, reliable, prosthesis that is geared to meet the utilitarian needs of the common worker.

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