Biomechatronics and the i-LIMB hand

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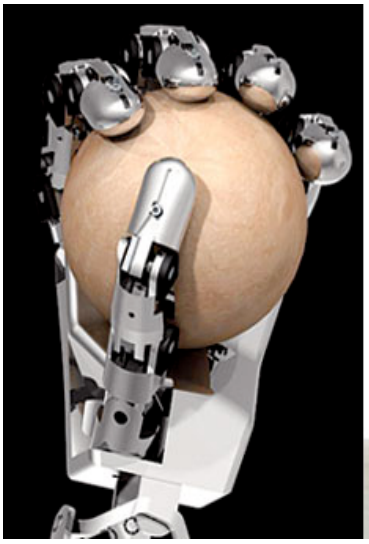
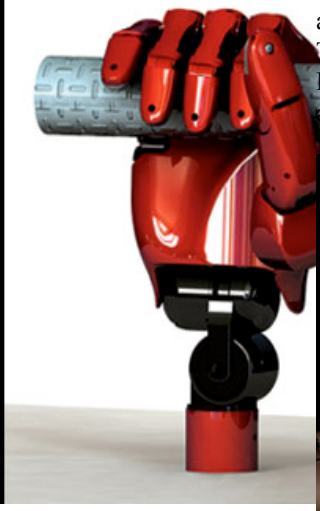
Biomechatronics is the combination of biology, mechanics, and electricity. It is when scientists interface devices with the muscular and neural systems of the body. Biomechatronics work by picking up electrical signals sent to the muscles from the brain. Electrodes that rest on the skin pick up the electrical signals sent to the muscles. The signal is then sent to the controller which interprets the signal and the "intent" of the user. The controller then sends a signal to the actuator which acts as an artificial muscle to move or to help move the limb depending on whether the device is prosthetic or orthotic. The biosensors and mechanical sensors relay information about the limb and its surroundings back to the controller which sends the information to the brain.





Biosensors may be electrodes placed on the skin, needles placed into the muscle, or solid-state electrode arrays with nerves growing through them. Mechanical sensors are sensors within the artificial limb that measure limb position and applied force. The controller acts as the brain and spinal cord of the artificial limb. It receives information, interprets it, and reacts accordingly. The actuator is the muscle groups of the limb and the sensors are the nerve cells and the muscle spindles.

The i-LIMB© hand is a new development in prosthetic devices. It has five fully powered digits that are able to move and act like normal fingers would. The finger of the i-LIMB© have the ability to bend at each joint and open and close around objects. This is a step up from the other myoelectric prosthetics that are no more than a glorified lobster claw, which require super human strength and pressure at the ends of the fingers in order to pick anything up and hold it. This means the i-LIMB can perform many complex daily tasks such as typing, dialing a phone, shaking hands, or throwing a baseball. Since the i-LIMB© acts like a real hand the designers were faced with the challenge of creating a covering or cosmesis for the i-LIMB. The covering needed to be flexible and move like normal skin would as well as being durable to keep dust out. Scientists came up with two solutions to this problem. One is a semi-transparent cosmesis that allows the i-LIMB© hand to be seen, full metal workings. For patients that desire a little more discrepancy, there is a cosmesis that looks and acts like skin and can be color adjusted to match the skin tone of the recipient. The i-LIMB© hand is used in transradial (above the wrist, below the elbow) amputations. As long as there is still enough muscle activity still left for the electrodes to pick up signals. TouchBionics® was the company that created the i-LIMB© hand, though Hanger Inc® has developed and commercially released their own version of the

http://blog.wired.com/gadgets/hand.jpg

http://www.dailymail.co.uk/sciencetech/article-1025452/Worlds-bionic-hand-wins-Britains-technology-prize.html

http://health.howstuffworks.com/biomechatronics.htm

http://img.timeinc.net/popsci/images/2007/08/bioam_embeded1.jpg

http://www.hanger.com/Products/Pages/iLIMBHand.aspx