Controlling Prosthetic Devices

Valerie Fortin, *Biomedical Engineering, University of Rhode Island*
BME 281 First Presentation, March 4, 2013 <valerian@my.uri.edu>

Prosthetic devices are artificial creations to replace lost limbs. In the recent past, significant advances have been made in methods of controlling these devices.

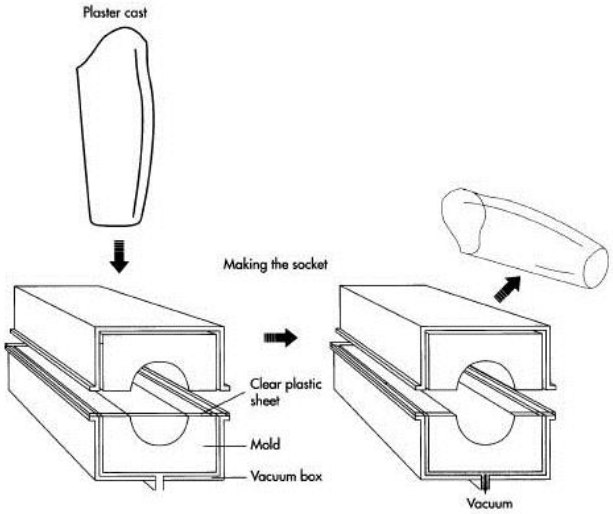
I. Introduction

ALTHOUGH humanity has been replacing lost limbs for over 3000 years, it has been only in the past 500 years that prosthetics have advanced sufficiently to allow the wearer to manipulate the device to perform daily tasks. When amputation became more widespread in the 1500s, it became important to produce better prosthetics to improve the patients' qualities of life.

II. Methods

During the 1900s, new materials and production methods allowed for lighter, more hardy, and more functional prosthetics. The advent of plastics allowed a substitute for heavy and cumbersome devices of iron and wood without sacrificing strength or durability. In recent decades, it has become possible to create realistic synthetic flesh, allowing prosthetic users to blend into society and avoid being singled out.

The introduction of computers and related technologies allows for the streamlining of production, and prosthetics are now often created using Computer Aided Design programs. After a plaster cast is made from the patient's limb, it is put into a vacuum chamber with a plastic sheet. The air is then sucked out of the mold and the plastic forms into the desired shape.



III. Results

Prosthetics can be controlled with a handheld device, through reading the muscle movements of muscles associated with the lost limb, and reading neural signals to the lost limb. Recent advances allow patients to simply watch a row of lights labeled with certain functions that light up one at a time, and the device reads when the patient's brain recognizes that the selected function is correct and will perform the function currently lit. These methods allow patients to regain use of the missing limb and continue to work and live relatively normally.

IV. Discussion

Prosthetic devices allow people who have lost one or more limbs to function normally and avoid the stigma of disability. This allows them to work and become a productive member of society again, alleviating the cost of their disability in favor of the cost of the prosthetic. In addition, replacement limbs improve the overall quality of life for such people, enabling them to regain their confidence and avoid being pitied or looked down upon for their condition.

The future for controlling prosthetics hold great promise as advances in neurology and biomechanics allow for greater control, specificity, and more delicate movements, improving the freedom and functionality of bearers of these devices and reducing their cost on society.

References

[1] How Products Are Made : Artificial Limb <http://www.madehow.com/Volume-1/Artificial-Limb.html>.

[2] Longmore, Paul K. "Artificial Parts, Practical Lives : Modern Histories of Prosthetics (review). *Project Muse.* <http://muse.jhu.edu/journals/tech/summary/v045/45.4longmore.html>.

[3] Peck, Morgan. "Prosthetics of the Future: Driven by Thoughts, Powered by Bodily Fluids." *Institute of Electrical and Electronics Engineers* <http://spectrum.ieee.org/tech-talk/biomedical/devices/prosthetics-of-the-future-driven-by-thoughts-powered-by-bodily-fluids>.