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**Research Article**

# BIONIC LIMBS – BETTER AMPUTATION

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**ABSTRACT**

Prosthetic limbs are advancing in leaps and bounds, They're becoming computerized, brain-controlled, and sensational, Typical amputations slice right through a patient's nerves and muscles, leaving some extra muscle to tuck around the end of the limb for cushioning, Mind-controlled bionic limbs.

The next advance inbionic limb technology is the emergence of mind-controlled bionic limbs. These are prostheses which can be integrated with body tissues, including the nervous system. A mind-controlled prosthetic arm & different types of prosthetic limbs are designed with different goals in mind. Often these goals depend on the site of the amputation and the needs of the patient & For example, a cosmetic prosthetic limb, called a cosmesis, is designed with appearance in mind rather than controllability. Advanced plastics and pigments uniquely matched to the patient's own skin tone allow a modern day cosmesis to take on an amazingly life-like appearance. Even details such as freckles, hair and fingerprints can be included, bringing the cosmesis to the point where it's nearly indistinguishable from the original missing arm or leg.



## INTRODUCTION

Bionics can be highly advanced pieces of technology, able to be integrated with various parts of the human body, Bionic limbs are constantly evolving and becoming more lifelike in their form and function.

There are many different types of bionic limb technology available, each with its own benefits and drawbacks, Bionic limbs still have a long way to go before they achieve the full range of motion, control and sensitivity of 'biological' limbs.

The term 'bionics' was first used in the 1960s. It combines the prefix 'bio'—meaning life—with the 'nics' of electronics. Bionics is the study of mechanical systems that function like living organisms or parts of living organisms.

### *Purpose*

Artificial limbs, or prostheses, are used to replace a missing body part which may have been lost due to trauma, disease or congenital defect. The type of prosthesis a person can use is dependent on the individual, including the cause of amputation or limb loss, and the location of the missing extremity.

### *History*

Basic artificial limbs have been used since 600 BC. Wooden legs, metal arms, hooks for hands—while these primitive replacements gave the wearer back some semblance of movement or function, they were often uncomfortable, difficult to use, had poor functionality and were cosmetically unattractive.

***A Prosthetic leg***

Today, researchers are striving to develop lighter, smaller, better-controlled, more lifelike and affordable options. What's different about the new generation of prosthetic limbs is their union with bionic technology, and the way they combine fields of study as diverse as electronics, biotechnology, hydraulics,

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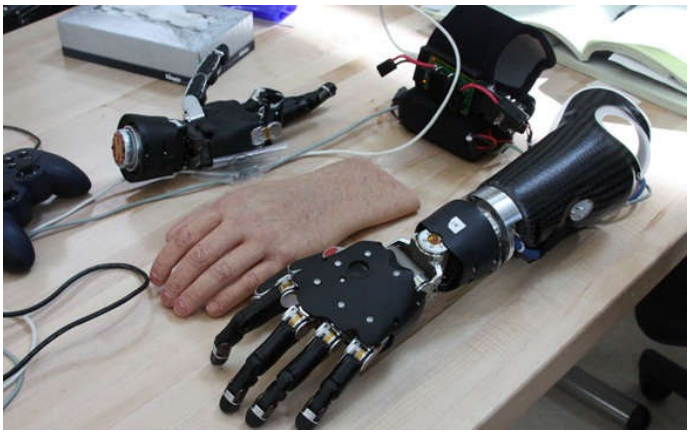
computing, medicine, nanotechnology and prosthetics. Technically, the field is known as biomechatronics, an applied interdisciplinary science that works to integrate mechanical elements and devices with biological organisms such as human muscles, bones, and the nervous systems.

***Types***

1. External prosthetic limbs
2. Myo electric limbs
3. Osseo integration
4. Targeted muscle re – innervation
5. Implanted myoelectric sensor technology
6. Mind-controlled bionic limbs

***Mind Controlled Bionic Limbs***

The next advance in bionic limb technology is the emergence of mind-controlled bionic limbs. These are prostheses which can be integrated with body tissues, including the nervous system. They are highly advanced, able to respond to commands from the central nervous system and therefore to more closely replicate normal movement and functionality, while also instantly triggering the desired movement with less 'lag time'. There are several different procedures and technologies currently in the research and development phase.



A mind-controlled prosthetic arm.

***A Mind-Controlled Bionic Leg***

***Principle of Work***

An array of electrodes were clinically implanted onto the man's sensory cortex—the region of the brain responsible for identifying tactile sensations such as pressure and texture. The team also placed arrays on the volunteer's motor cortex, the part of the brain that directs body movements. Wires from these arrays were connected externally to a mechanical hand, which gave the volunteer the ability to control the hand's movements. Most importantly, however, the hand contained complex torque sensors which were able to detect different levels of pressure, converting those sensations into electrical signals. These signals were then routed back to the arrays on the volunteer's brain, stimulating the sensory neurons in the brain and allowing the sensation and feeling of each finger to be 'felt' by the patient.

***Cosmetic Improvements***

The emergence of 3D printing and computer-aided design is beginning to help create limbs that are a perfect custom-fit for the wearer, and should, as time progresses, become more affordable.

While many of the new bionics look like something out of a science-fiction movie, researchers are also succeeding at creating options that look more realistic than ever before. Prostheses can now be created with anatomically correct shapes that mirror the form of the wearer, and can incorporate details such as accurate skin colour, freckles, birthmarks, hair, veins, tattoos, fingerprints and fingernails.

These life-like creations can be made from PVC or a range of silicones and cover the prosthetic limb using a variety of methods, such as adhesive, stretchable skins, suction, form fitting, or a skin sleeve. For many amputees, having a limb that does not attract unwanted attention is very important.

***A prosthetic hand (the person's right hand), made to be cosmetically similar to their real (left) hand***

***Lower limb prosthetics system overview***

**C-Leg -** No other mechatronic knee joint is worn by as many people worldwide as the C-Leg. It set a new standard in 1997 and studies continue to prove its reliability. Today, its new features make it the best C-Leg of all time.

**Genium X3 -** The Genium X3 builds on the strengths of the Genium and offers all of its functionality – but goes several crucial steps further. This makes the unthinkable possible with the Genium X3: walking, running and swimming with one and the same prosthesis.

**Genium – Bionic Prosthetic System -** The microprocessor-controlled Genium bionic prosthetic system supports the natural movement pattern down to the details – without requiring the user to consciously control the joint.

**Electronic knee joint 3E80 -** The 3E80 knee joint combines the advantages of rotary hydraulics with electronic monitoring and control

**Harmony vacuum prosthesis system -** With its active volume management, the Harmony ensures that the artificial limb is securely connected to the residual limb.

**Triton -** The prosthetic feet from the Triton family of products are suitable for active users. Their outstanding dynamic response and flexibility support mobility at the highest level – in everyday life and for recreational sports.

**3S80 Sport knee joint** - With the 3S80 Sport running prosthesis, the technology from the custom, high-performance artificial limbs for professional athletes has now been successfully transferred to amateur sports enthusiast amputees, or just amputees who want to keep themselves fit!

**3R60 EBS knee joint -** *A prosthesis system for users with a moderate activity level. Suitable for knee disarticulation, above knee as well as hip disarticulation and hemipelvectomy amputations.*

## CONCLUSION

What makes us human? Is it our bodies? Our brains? Our emotions? Or something more intangible? Advances in human bionics may eventually require us to rethink our concepts of what it is to be human, as the lines between human and machine become increasingly blurred.

Yet despite the desire to imagine a future of cybernetic enhancements, at present bionic limbs remain chiefly medical devices, designed to restore function and provide people who have lost limbs with a better quality of life. The bionics may look impressively futuristic, but they are not yet able to fully replicate the complexity, range of movement and functionality of a normal human limb.

## References


1. Katherine R. Schoepp, Journal of Translational Engineering in Health and Medicine Wolters Kluwer Health: Lippincott Williams and Wilkins, ScienceDaily.
2. Zeglin G, Brown B. Control of a bow leg hopping robot. *Proceedings of the* 1998 *IEEE International Conference on Robotics & Automation,* Leuven, Belgium, 1998, 793–798.
3. Christine Connolly, (2008) "Prosthetic hands from Touch Bionics", Industrial Robot: *An International Journal*, Vol. 35 Issue: 4, pp.290-293,
4. Shanghai for Science and Technology,Shanghai 200093,China;3.School of Mechanical Engineering, Shanghai Jiaotong University,Shanghai 200240,China);CMAC Control and Case Simulation for Intelligent Prosthetic Leg Control Engineering of China;2010-02
5. Fiorini P, Hayati S, Heverly M, Gensler J. A hopping robot for planetary exploration.
6. *Proceedings of IEEE Aerospace Conference,* Snowmass, CO, USA, 1999, 153–158.Google Scholar



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