



How Bionic Prosthetics Are Poised To Transform Humanity

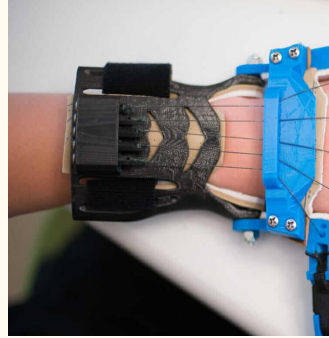
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Introduction

In many years, medical and engineering fields have gathered together to create methods on improving the human body, especially to support the hardship of body removals enforced by the deadly diseases/illnesses.. The amputee would require a prosthetic device(s) and services which become a life-long event.

What are prosthetics? How are Bionic different from Prosthetics?

- Prosthetics are the artificial body parts made to replace missing parts after it has been amputated. This mostly contains various of mechanism capable of moving the body parts
- Bionics(also main examples prosthesis) not only replaces the body parts, but also restore its functions. Capable of using artificial intelligence to synchronize with the human mind to imitate movement as it once was.



Does artificial limbs makes a man more machine than man?

- It is more of an extension of man rather than becoming a machine.
- Some technological parts have a more symbiotic relation to the body, whereas others function more independently.

Reasons to have a prosthetic/bionic:

- If user has lost their body parts from Trauma, diseases, or even defects.



History of Prosthetics and Bionics (part 1)

424 B.C. to 1 B.C.

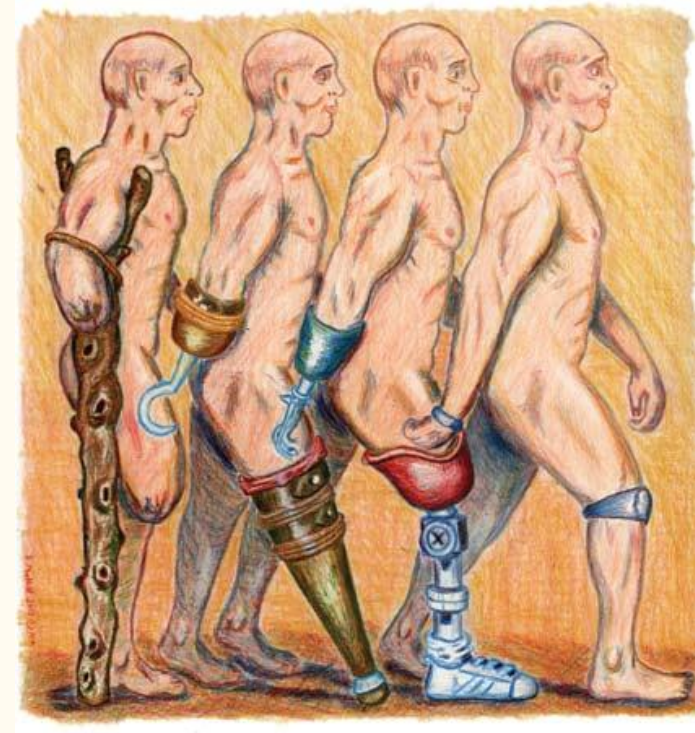
Wooden and Iron Prosthetics were made for simply body replacements to preserve combat or imagery.

The Dark Ages (476 to 1000)

Little improvements were made as the prosthetics were still made to keep imagery up, though designs of peg leg or hand hook were made.

The Renaissance (1400s to 1800s)

This age introduced more towards functional prosthetic: releases and springs, kneeling peg leg, and foot prosthesis that had a fixed position, and etc



History of Prosthetics and Bionics (part 2)

In 1980s-2000s

Microprocessors and prosthetic limbs merged, which developed some Powered limbs. In addition, various of other limbs were made such as teeth, elbow, upper body, and lower body.

In 2007-2016

More fragile replaceable body parts were constructed: eyes, muscular nerves, brain enhancements and internal organs. Most Bionics are achieved by using sensorimotor feedback to gain motion movement by the brain, while other parts were replicated by study of specific functions such as a heart's ability to pump blood.

Forms of Bionic Prosthetics

How can the brain control a “machine?”

Targeted muscle reinnervation (TMR)

- Most advanced form of prosthetics
- Amputated nerves are redirected to control a substitute healthy muscle elsewhere in the body.
- surgeon connects the nerves once controlling a patient's arm to a portion of the patient's chest muscles

How?

Neural interfacing

- More challenging
- implant micro-scale electrodes in the brain to listen in on brain activity
- microelectrodes intercept motor command signals generated in the brain; these signals can then be used to control a prosthetic device



TMR



Neural Interfacing

Different types of bionic prosthetics:

- Power Knee: motor-powered prosthetic knee that benefits the user with symmetry, strength, and endurance
- Proprio Foot: gives heightened stability and mobility to amputees through lifelike powered-ankle motion
- Symbionic Leg: combines the Proprio powered ankle and the Rheo microprocessor knee to create a bionic leg system
- iLimb: appears and functions like a biological hand, featuring natural joints as well as automated grip patterns and gestures

Why should scientists care about philosophy?

Dualism v.s Monism

Belief that the mind and body are separate entities:

- The brain controls the body through nerves
- The brain still can function and tell the nerves to move any arm connected to those nerve
- After amputation the nerves stay active and the brain still functions perfectly

Belief that the mind and body are one:

- Kill the mind and the body dies
- Brain damage and amputated arm
- Neural interfacing and TMR will not be effective if the brain is not fully involved

Future of Prosthetics

- Network of sensors in limbs similar to how sensors in driverless cars work.
- Sense of touch (feeling hot or cold, pain, etc.)
- Artificial organs
- Full replantation of donated limbs

Technology will be the way around human evolution.



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