

REVIEW OF MODERN BIONIC PROSTHESES

Vinnitsia National Technical University

Анотація

Проводиться огляд досягнень в біонічному протезуванні за останні 7 років

Ключові слова: біонічний протез, біотехнічна система, медична апаратура.

Abstract

An overview of achievements in bionic prosthetics over the past 7 years is given in the paper.

Keywords: bionic prosthesis, biotechnical system, medical equipment.

Creating technical means to restore the ability to work independently and self-care is a complex and largely unresolved problem. The complexity of the task is that it is necessary to create light and strong devices with a high level of miniaturization of individual parts, and in the principles of building control systems. Despite the difficulties, the best way to restore activity is a bionic prosthesis. Bionic prostheses are becoming more and more impressive, so this paper reviews the achievements in bionic prosthetics over the past 7 years.

The Ukrainian team Esper Bionics has created a prosthesis that will cost about 12 thousand dollars and, at the same time, not give up. At the same time it does not require implantation of electrodes, and uses electromyotic sensors that read electrical impulses from muscle tension in the forearm or shoulder. The prosthesis can be connected to a cloud platform to teach the muscle contraction patterns of a particular person, so that not the carrier adapts to the prosthesis, and the prosthesis to the carrier.

The BionicSoftHand robot arm from the German company Festo is interesting for its plasticity. The hand moves almost like a natural. BionicSoftHand is made of soft and flexible materials, the phalanges of the fingers are made of three-dimensional textile fabric with tactile sensors and flexible conductors that can be bent by pneumatic modules. The movements of BionicSoftHand are controlled by artificial intelligence, capable of learning by trial and error, and after adapting to the task quickly and autonomously perform the necessary actions with objects, by analogy as a person does.

Open Bionics develops open-source bionic prostheses that can be printed on any 3D printer. Their goal is not only to make dentures cheap and affordable, but also convenient. Open Bionics together with game designers Deus Ex initiated the Augmented Future project to develop bionic prostheses.

A Johns Hopkins University Medical Center (USA) made a prosthesis for both arms and found a man with two amputated arms to test it. Interestingly, no helmet that reads brain signals is used to control artificial hands. All control signals are read from the pectoral muscles. To make this possible, this person has previously undergone surgery to innervate the chest muscles, so that with the help of their contractions could be controlled, for example, the fingers of an artificial hand.

The consortium of European research institutes and laboratories NEBIAS presented the result of its work - the bionic arm. The difference of this prosthesis is that it not only allows you to control the bionic brush brain power, but also to feel the touch - so a person can adjust their efforts. In order for the prosthesis to work, the nerve fibers were connected to the wires in the carrier's hand, implementing the interface between the nervous system and the electronics of the prosthesis. NEBIAS is the main project for the creation of a bionic hand prosthesis in Europe, funded directly by the European Commission.

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