

An Evolution & Applications of Cyborg Technology

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Abstract— In the years ahead we will witness machines with intelligence more powerful than that of humans. This will mean that robots, not humans, make all the important decisions. It will be a robot-dominated world with dire consequences for humankind. Is there an alternative way ahead? Humans have limited capabilities. Humans sense the world in a restricted way, vision being the best of the senses. Humans understand the world in only 3 dimensions and communicate in a very slow, serial fashion called speech. But can this be improved on? Can we use technology to upgrade humans? The possibility exists to enhance human capabilities. To harness the ever-increasing abilities of machine intelligence, to enable extra sensory input and to communicate in a much richer way, using thought alone. Kevin Warwick has taken the first steps on this path, using himself as a guinea pig test subject receiving, by surgical operation, technological implants connected to his central nervous system. A Cyborg is a Cybernetic Organism, part human part machine. In this we will go through Kevin Warwick's amazing steps towards becoming a Cyborg. The story is one of scientific endeavour and devotion, splitting apart the personal lives of himself and those around him. This astounding and unique story takes in top scientists from around the globe and seriously questions human morals, values and ethics. Now question is, Will the thought of Cyborg is in favor of Human in the future? What will happen when man is merged with a computer? There are many questions, but a proper and good approach towards Cyborg will be beneficial for Humans. Because it is individual choice for any human that whether he wants extra capabilities by implant technology and become Cyborg or whether he just want to be mere a man only. Because electronic tagging can be regarded as a more permanent form of identification than a smart card. An implant could carry huge amounts of data on an individual, such as National Insurance number and blood type, blood pressure etc. allowing information to be communicated to on-line doctors over the internet. Thus Depending on how the technology is used, there are good and bad effects. So much of this smacks of the Big Brother. With an implant, a machine will know where an individual is, in a building,..... at all times. You might not even be able to pay a visit to the toilet without a machine knowing about it. Is this really what we want?

Key words: Evolution, Applications, Cyborg Technology

I. INTRODUCTION

CYBORG, a compound word derived from cybernetics and organism, is a term coined by Manfred Clynes in 1960 to describe the need for mankind to artificially enhance biological functions in order to survive in the hostile environment of Space. Originally, a CYBORG referred to a "Human being with bodily functions aided or controlled by technological devices, such as an oxygen tank, artificial heart valve or insulin pump". Over the years, the term has acquired

a more general meaning, describing the dependence of human beings on technology. In this sense, CYBORG can be used to characterize anyone who relies on a computer to complete his or her daily work..

II. WHAT IS CYBORG?

A CYBORG is a Cybernetic Organism, part human part machine. This concept is bit tricky but let see an example of a CYBORG, You may have seen the movie TERMINATOR. In that ARNOLD was a CYBORG. He was part man part machine. Well defination exactly says this, CYBORG can be made by technology known as CYBERNETICS. What is CYBERNETICS? To understand CYBORG this is the first step next we will see this.

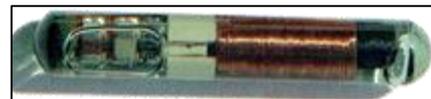


Fig. 1: Human Part Machine

III. WHAT IS CYBERNETICS?

Cybernetics is a word coined by group of scientists led by Norbert Wiener and made popular by Wiener's book of 1948, Cybernetics or Control and Communication in the Animal and the Machine. Based on the Greek "kybernetes," meaning steersman or governor, cybernetics is the science or study of control or regulation mechanisms in human and machine systems, including computers.

CYBERNETICS could be thought of as a recently developed science, although to some extent it cuts across existing sciences. If we think of Physics, Chemistry, Biology, etc. as traditional sciences, then Cybernetics is a classification, which cuts across them all. ...Cybernetics is formally defined as the science of control and communication in animals, men and machines. It extracts, from whatever context, that which is concerned with information processing and control. ... One major characteristic of Cybernetics is its preoccupation with the construction of models and here it overlaps operational research. Cybernetic models are usually distinguished by being hierarchical, adaptive and making permanent use of feedback loops. ... Cybernetics in some ways is like the science of organization, with special emphasis on the dynamic nature of the system being organized."

A. The Evolution of the Cyborg

The replacement and integration of parts of the human body with machines has been simplified and schematized in a model of four stages, as follows:

- 1) Stage I Cyborg: Replacement or augmentation of the human skeleton.
- 2) Stage II Cyborg: Replacement or augmentation of muscle.

- 3) Stage III Cyborg: Replacement or augmentation of parts of the peripheral nervous system, autonomic nervous system.
- 4) Stage IV Cyborg: Replacement or augmentation of parts of the central nervous system.

IV. WHAT HAPPENS WHEN A MAN IS MERGED WITH A COMPUTER?

This is the question that Professor Kevin Warwick and his team at the department of Cybernetics, University of Reading intend to answer with 'Project Cyborg'.

On Monday 24th August 1998, at 4:00pm, Professor Kevin Warwick underwent an operation to surgically implant a silicon chip transponder in his forearm. Dr. George Boulous carried out the operation at Tilehurst Surgery, using local anesthetic only.

This experiment allowed a computer to monitor Kevin Warwick as he moved through halls and offices of the Department of Cybernetics at the University of Reading, using a unique identifying signal emitted by the implanted chip. He could operate doors, lights, heaters and other computers without lifting a finger.

The chip implant technology has the capability to impact our lives in ways that have been previously thought possible in only sci-fi movies. The implant could carry all sorts of information about a person, from Access and Visa details to your National Insurance number, blood type, medical records etc., with the data being updated where necessary.

V. THE CYBERNETIC PIONEER WHO IS UPGRADING THE HUMAN BODY - STARTING WITH HIMSELF

Professor Kevin Warwick, the world's leading expert in Cybernetics, here he unveils the story of how he became the world's first Cyborg in a ground breaking set of scientific experiments.

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The possibility exists to enhance human capabilities. To harness the ever increasing abilities of machine intelligence, to enable extra sensory input and to communicate in a much richer way, using thought alone. Kevin Warwick has taken the first steps on this path, using himself as a guinea pig test subject receiving, by surgical operation, technological implants connected to his central nervous system.

A Cyborg is a Cybernetic Organism, part human part machine. In this book Kevin gives a very personal account of his amazing steps towards becoming a Cyborg. The story is one of scientific endeavour and devotion, splitting apart the

personal lives of himself and those around him. This astounding and unique story takes in top scientists from around the globe and seriously questions human morals, values and ethics.

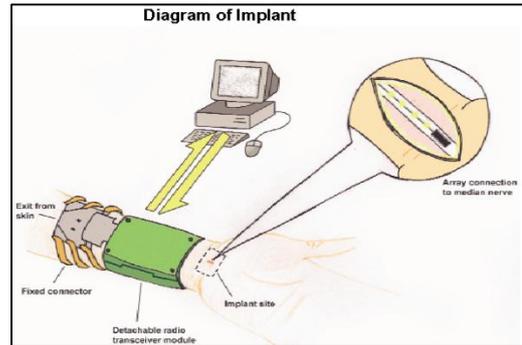


Fig. 2: Chip

VI. THE CHIP USED TO MAKE FIRST CYBORG

The transponder that was implanted in the forearm of Professor Kevin Warwick, on 24th August 1998 consists of a glass capsule containing an electromagnetic coil and a number of silicon chips. It is approximately 23mm long and 3mm in diameter.

When a radio frequency signal is transmitted to the transponder, the coil generates an electric current (an effect discovered by Michael Faraday many years ago). This electric current is used to drive the silicon chip circuitry, which transmits a unique, 64-bit signal. A receiver picking up this signal can be connected in an Intelligent Building network.

By means of a computer, it is able to recognise the unique code and, in the case of an implant, the individual human in question. On picking up the unique, identifying signal, a computer can operate devices, such as doors, lights, heaters or even other computers. Which devices are operated and which are not depends on the requirements for the individual transmitting the signal.



Fig. 3: Coin

The silicon chip transponder had not, prior to this experiment, been surgically inserted into a human. It was not known what effects it would have, how well it would operate and, importantly, how robust it would be. There was the very real possibility that the transponder might leak or shatter while in the body with catastrophic consequences! The implant in Kevin Warwick's forearm was successfully tested for nine days before being removed.

VII. REAL-WORLD APPLICATIONS

Though the experiment sounds like an episode of Dr. Who, its real-world implications are "right around the corner," says Warwick, who foresees enormous medical applications. Through a system of embedded chips interfacing with an artificial motor system, Warwick imagines paraplegics walking. And that's just for starters.

"Simply take measurements off muscles and tendons and feed them into the transponder," Warwick says. "That means, ultimately, that you wouldn't need a computer mouse anymore. You wouldn't need a keyboard."

Charles Ostman, a senior fellow at the Institute for Global Futures and science editor at Mondo 2000, agrees. "Neuroprosthetics are . . . inevitable," he says. "Biochip implants may become part of a rote medical procedure. After that, interface with outside systems is a logical next step."

Warwick's eagerness is palpable, engaging, and contagious. "This is where you can speculate," he says. "This is where we take a technical thing and say, 'Right-o, got the signal, got the implant; all I've got to do is run a wire from the implant to my nervous system.' . . . I'm so excited about it, I want to get on with the next step straight away. Let's see if we can control computers directly from our nervous system."

VIII. PROBLEMS CAME DURING IMPLEMENT OPERATION

- They have transponder in the glass tube so while sterilizing it they had put it into the hot water and because of the thin glass it was blast as it had become very hot.
- They have to think how they can link that chip with the computer as it was implanted in the forearm of Pr. Warwick.
- They have implanted chip in left arm of Pr. Warwick as they were afraid that if operation failed than he can work on with his right arm as he was righty.
- The main thing was to put a chip in the main nerve of arm in such a manner that the nerve should not be broken as by happing so they may lose Pr. Warwick.
- The silicon chip transponder had not, prior to this experiment, been surgically inserted into a human. It was not known what effects it would have, how well it would operate and, importantly, how robust it would be.
- There was the very real possibility that the transponder might leak or shatter while in the body with catastrophic consequences! The implant in Kevin Warwick's forearm was successfully tested for nine days before being removed.

IX. CONCLUSION

Finally I would like to say that if the future is of intelligent robots than to protect mankind we will must need some NEOs, TERMINATORS. They all are CYBORGS. Because by making human CYBORGS we may have following extra ordinary capabilities...

I think by 2100 we're going to see people able to communicate between each other by thought signals alone, so no more need for telephones, old fashioned signaling, we'll be able to think to each other via implants.

Linking myself up via an implant to a computer, my nervous system, electronic signals connected to the electronic

signals in the computer - effectively mentally becoming one with the computer. This will mean movement type signals and emotional type signals can transmit from my body to the computer, but also the other way. The computer will be able to affect me emotionally, perhaps cheer me up when I'm depressed or cause me to move when I didn't think about moving. It opens all sorts of other possibilities; the computer will be able to send down other information ultrasonic or infrared information on my nervous system to my brain. I will effectively have extra sensory perception and will be able to look at the world in new ways than I could do before.

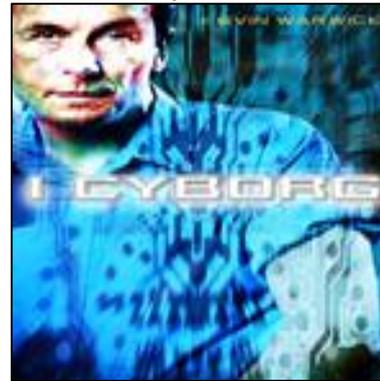


Fig. 3: Example of Cyborg Technology

Instead of communicating by speech as we do presently, we'll be able to think to each other, simply by implants connected to our nervous system linking our brains electronically together, possibly even over the internet.

We won't need the languages that we presently do, we'll need a new language of ideas and concepts in order to communicate thoughts from brain to brain.

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