

Techno-Emotional Bodies

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Abstract

In terms of sense terminology, it is possible to make use of Digital Technology to expand and modify the perception of humans' environment. The approach to design Cybernetic Extensions to expand the senses of the Human Body is being analyzed throughout this article. Under the debates on the dialectical interaction between technology-body, species-environment, creation-biocreacion and human-bonding, the concept of Prosthesis presented by Tomás Maldonado is proposed as the starting point for the Cybernetic Organs design. It is predicted that these Smart Prosthesis will be designed by using 3D printers, and the patient's own cells, which will be created in Fab Labs laboratories. It will go from designing objects to designing the Human Body as an object.

Keywords

3D Scanning, Cyborgism, Contemporary Education, Interdisciplinary Industrial Design, Human Body.

Within the World of Objects: The Human Body as Raw Material

The academic world of Industrial Design, a discipline specialized in the design of products and objects, considers the link between people and objects as a broad subject of study. Highly regarded Design authors like Tomás Maldonado or Martín Juez consider that an object can be understood as a sensory extension of the body. For instance: a spoon could be the extension of the hand; a bicycle or car, an extension of the legs; a computer, an extension of the brain. Thus, we could make a comparison with each of the thousands of artificially designed objects we see every day. These sensory extensions are designed from the transformation of the human habitat elements and the needs this habitat evokes.

Prosthesis Concept

Maldonado establishes a classification that could be useful to understand how we link to Digital Technology

and what kind of relationship is developed with current and future objects of daily use. On the basis of this segmentation we can begin to understand that the world of objects is multiform and complex. He proposes 4 types of prosthesis: motor, sensory-receptive, intellectual and syncretic.

Motor Prosthesis

The hammer, the knife, the bicycle or the automobile destined to increase our strength, skills or movement.

Sensory-receptive Prosthesis

These are the devices used to correct hearing or vision impairments, or those devices that allow us to reach the reality levels we cannot access to, for example: the microscope or telescope.

Intellectual Prosthesis

They increase the human intellectual capacity by using devices able to store a large amount of data. This is the case of smartphones and computers.

Syncretic Prosthesis

These are characterized by the convergence of the three types of prosthesis mentioned above. Industrial robots can be considered as an example since they are automatic mechanical systems that do not require the operational participation of men.

Certainly, one of the Prosthesis that defines the beginnings of the 21st century is the "smartphone". We could consider that this element was created to make up for communication needs. However, this device began to evolve by "absorbing" technical functions of other objects, and generated a very intimate bond with humans. According to Maldonado's classification, the Cell Phone is an Intellectual Prosthesis: it stimulates and enhances the intellectual capacities, which are defined as the necessary abilities to perform mental tasks: memory, creative thinking and vocabulary. Activities such as observing, describing, explaining, identifying, analyzing, comparing, establishing relationships, valuing, interacting, etc. are intensified by the daily

bond of the use of this type of Prosthesis.

Two decades after the beginning of the 21st century there are several objects which belong to the Digital Technology we use every day. The Prosthesis classification by Tomás Maldonado describes a set of objects that behave in a peripheral way towards the human body. What happens if these peripheral objects happen to be carried inside the body?

Previous Definitions

This entire new paradigm of intimate relation between humans and Digital Technology has been classified since the middle of 20th century as the emergence of a new human species denominated Cyborg. There are also other types of classifications that are closer to the world of objects such as the “Wearables” (usable technology) and also related to the world of biology such as “BioHacking”.

Cyborgs?

The word Cyborg was first used in 1960, the term was coined by Manfred E. Clynes and Nathan S. Kline. These scientists, in the context of the arrival of the man to the moon, were in need of naming the emergence of an intimate relationship between humans and machines.

In 1985, Donna Haraway published the Cyborg Manifesto in the Socialist Review magazine, in which she defines: “A cyborg is a cybernetic organism, a hybrid of machine and organism, a creature of social reality and fiction. Haraway clarifies: “The culture of high technology challenges dualisms in a curious way. It is not clear who is the maker and who is made between the human and the machine.” (Haraway, 1985)

From a Transhumanist perspective, the Cyborg is one of the new species that would arise as from the application of biotechnological modifications on the contemporary human body, in order to establish new parameters of human abilities.

Other predicted emerging species would be: The Bio-orgs, Silo-orgs and Symbo-orgs. Defining the Cyborgs generically as cybernetic organisms conceived as biological and mechanical hybrids that would live not only in the natural environment, but also in the near stellar space. Bio-orgs would be protein encoded individuals. Silo-orgs would be organisms made of silicon, designed through an artificial DNA. The Simbo-orgs would be self-reflexive symbolic organisms, living programs whose habitat would be supercomputers (Hector Velazquez Fernandez, 2009)

Today we can determine that a type of Cyborg is

an individual hyperconnected to the network and its environment. It does not necessarily look like an android or a robot; it is a human that makes use of technology for different purposes. Today’s Cyborg uses a device called cell phone and exclaims “I’m running out of battery!” when this device has 5% of energy left (Harbinsson, 2016).

Wearables?

Wearables belong to a special group of objects; these could be interpreted as some kind of Soft Cyborg. These are soft accessories for our body which blend into it and generally provide us with information about the environment or the body itself. They are usually linked to the internet or the cell phone. Just like some item of clothing, these devices can be used whenever you want; it is a way of wearing the digital world over your body where and when you wish to.

The term refers to the set of equipment and electronic devices that are incorporated in some part of our body and that continuously interact with the user and other devices with the purpose of performing some specific function; smart watches, sports shoes with incorporated GPS and bracelets that control our state of health are some examples of this technological genre.

Biohacking?

The Biohacker Manifesto was written less than a decade ago by Meredith Patterson and it was called “Biopunk Manifesto”. In this Manifesto, the scientific literacy of society is demanded in order “to be active contributors to their own health, to the quality of their food, water and air, to their interactions with their own bodies and to the complex world around them.” (Patterson, 2011)

The term biohacking is an amalgamation of the words “biology” and “hacking”, which contextually refers to the management of biology itself by using a series of medical, nutritional and electronic techniques with the aim of expanding the physical and mental abilities of the individual. Somehow, they can be considered as the Do it Yourself Cyborgs.

Neil’s Story

Neil is the first Cyborg case recognized by a government. The anecdote came up at the time of renewing his Passport: Neil has an antenna implanted in his head. This device, which translates color frequencies into sound frequencies, was conceived, designed and uploaded for free to the network by Neil himself in collaboration with Adam Montandon in 2003. Britain did not allow him to have a photo using an electronic device in his passport.

He replied that the device was part of his body and that he did not make use of technology. On the contrary, he states: *“I am technology and this antenna is a part of my body”* (Harbinsson, 2014).

Neil’s antenna is called “Eyeborg”. It is technically a cybernetic implant. The creation of this device arises from Neil’s need to perceive color.



Figure 1. Cyborg Neil Harbinsson shows his “eyeborg” at Robotronica. August 2015. (s.f.)

He claims that he comes from a world where everything is black and white, making reference to his biological characteristic of having achromatopsia.

Although this implant is permanent, its creators think that in the future electric power will be no longer needed, and that blood flow will be used to power this device. They also assume that they will be able to add an eyelid to hear colors when the user decides to. At the moment, Neil is permanently connected to the visual environment through the sound he receives in the form of musical notes through the antenna.

After 10 years of testing and development it is now connected to the internet and he receives images from 5 authorized people in different parts of the world. He also perceives the sounds of the colors of space by connecting to the International Space Station. Neil says that he was once hacked and that he enjoyed it. This means that non-authorized people sent information to his antenna.

Smart Prostheses Design

The main and traditional idea of Prosthesis in Industrial Design presented by Tomás Maldonado, was improved by a new field of application and study of technology: The Human Body itself. Being conceived as raw material, the human body can be the main supply and

the material basis of its own transformation.

Classification

To continue with Maldonado’s classification I suggest calling this emergent group as Intelligent Prostheses, described as objects of Digital Technology design that are attached to the Human Body in a physical or emotional way.

Smart Prostheses of Physical Union

They are devices that are physically attached to the body. In this case the skin, organs, bones and cells are the base material where the device is attached and / or inserted, as in the case of Neil’s antenna. The transgression of this type of Prostheses is that their use modifies certain brain abilities, considering the brain-software union as the most severe case. There are two types of physical union Prostheses: full permanence and partial permanence. Full permanence prostheses are those which cannot be disconnected, such as the pacemaker. Those of partial permanence are able to be disconnected, such as the case of Wearables.

Smart Prostheses of Emotional Union

They suggest that there is wireless link between the person’s body and the object, such as the smart cell phone, the laptop, and other objects defined previously as Wearables. In several cases the use of these devices causes addiction behaviors on the users. For example, people who cannot stop checking their cell phone, or feel afraid and insecure if they lose it or run out of battery. This situation would be solved if, as predicted, these devices became permanent in the body after the adaptation period we are currently going through.

Within Maldonado’s classification, Smart Prostheses could be considered as the evolution of Intellectual Prostheses, those which intensify the intellectual abilities. In addition to being Smart, these Prostheses modify the behavior of the individual amplifying the perception of reality. Besides, due to the strong bond they have with humans, they can be interpreted as organs with senses. Therefore, the debate in question is: do we design objects or organs?

Cybernetic Organs Design

The case of Neil Harbinsson is an example of a type of Smart Prosthesis of Full Permanence Physical Union. In several occasions, Neil has mentioned that the sensation of feeling as a Cyborg is not created by the device implanted in his skull, but by the union between the device and the brain generated by the software.

En 2010 Harbinsson funda junto a Moon Rivas la *Cyborg Foundation*. It is an integral proposal whose guideline shows the connection of the human body with the environment. Through the concept “*Design Yourself*” a virtual platform was created, this platform helps those interested in initiating an intimate relationship with technology to increase or improve the interaction of body and mind with the environment as from the transformation of three possible core ideas:

Skills: Expansion of the body’s ability to express itself and interact with the environment. For example: an exoskeleton, and a bionic arm or leg.

Cognition: Expansion of the way in which the surrounding information is absorbed and processed. For example, a bracelet that counts the number of steps you walk per day.

Senses: Expansion of the way in which the environment and the brain’s behavior is perceived. For example, being able to see at night, sensing the magnetic pole of the earth and improving our sense of direction. (Neil Harbinsson in: *Cyborg Foundation*, 2010)

At some point, there is the possibility of designing, under the Open Source - Open Hardware philosophy, new senses of technological and cybernetic matrix to expand the perception of reality. It is possible to consider these devices as adapters, translators and regulators of the physical-sensorial environment that we perceive as a species increasing and modifying the interaction with the environment.

When Neil is asked about the design of these devices, he replies:

“We do not sell cyber extensions, we believe that cyber extensions must be treated as parts of the body, not as devices and therefore they should not be sold. Instead, we encourage people to create their own sensory extension. We do not intend to repair people’s senses; we do not see any difference between “disabled” and “non-disabled” people. We believe that we all need to expand our senses and perception. We are all “disabled” when we compare our senses with those of other animal species.” (*Cybor Foundation*, 2010)

Design Major Considerations: The Object is a Means and a Message

As previously mentioned, when planning the Design of Cybernetic Organs, classified as Smart Prostheses, it must be taken into account that an object is stronger than a political, artistic, and / or technical expression since it carries all these aspects with it though it cannot be noticed with the naked eye. It is also important to become aware of the macro areas that influence and shape the design of objects: the morphological, technological and sociological areas. The resulting object of the design process is an element with technical function, symbolic function and it is known as a communicative as well as a cultural good. In a broad sense, the object is a message.

The Technical Function, Technological Area

It defines how it works, under what type of energy it moves, what biodegradability or material configuration it has, what its practical utility is, etc. For example, in the case of Neil’s antenna, it is used for listening to colors. It is made up of a webcam connected to his skull, where some software translates the visual information of the environment into audible vibrations that slide through the occipital bone to his ear.

The Symbolic Function, Morphological Area

It characterizes the sensations that it generates in the human perceptive environment. What color, shape and texture the device is and what it makes reference to. Regarding design, this object was inspired by insects that communicate by antennas, as for example the ants. However, in the cultural imaginary, it can refer to science fiction characters.

Social Function, Cultural Area

These are the aspects related to the object’s entire historical framework: its socio-historical context, the ideology of its creators and the use value it owns. In Neil’s case, this new organ (which works mainly through a chip, has color and resembles an antenna), was created at the beginning of the new millennium, and he is socially defined by it as a Cyborg.

Technological Reach

Within the current technological reaches, 3D printing is in full development. This is a kind of technology that allows manufacturing pieces of diverse materials and forms through a digital drawing generally designed in a computer program.

While many innovative systems that print such dissimilar materials (ranging from stem cells to

thermoplastic polymers) are being developed, one of the key steps for any printed piece to be a success is its prior design. The modeled piece that is to be printed can be obtained in two different ways: it can be modeled by a Computer-Aided Design (CAD) program or scanned in 3D from a physical object and with a scanning device. This combination is known as a process that goes from “bit to atom and atom to bit”.

3D Scanning

The insertion of the 3D scanning system into the world of inventions is highly significant. This tool allows generating a three-dimensional record of a three-dimensional object or environment. It allows for the recollection and storage of culture in graphic format. In its most primitive conception, it is the technology line that follows photography, since it generates a visual record on the desired object.

The information the 3D scanner obtains consists of a cloud of points, which must then be processed, in order to determine the way these points are linked and to obtain the model. 3D scanners can be very accurate and can even capture information about color.

Scanned Bodies: Digital Raw Material

The term raw material refers to a natural or artificial substance that is industrially transformed to create a product. Potentially, it serves to create something. It is characterized by being susceptible to all kinds of forms and to undergoing changes; it has a set of physical or chemical properties perceptible through the senses. Understanding the human body as raw material also expands the conception we have about the body; that means we can modify it. However, the term characterizes tangible material, therefore, could the Human Body be considered as digital raw material?



Figure 3. 3D body scanning and rendering. November 2016. Ph. Jessica Roude

To go into detail about this concern, I carried out an

experience on body digitalization. I called Mario Astutti, a technologist specialized in 3D scanning and Digital Technology. Mario is an interdisciplinary developer who unifies art, engineering and design. As own resources he uses visual, tactile and macroscopic observation and exploration in high definition through the 3D scanner. The artist says that scanning an object in 3D is a process of collecting points in space data; he claims that there is a reinterpretation of the Human Body from the scanned person, since it can be look over in 360 ° as if someone else was looking at it. He considers it as a virtual reinterpretation of a tiny portion of reality in a span of time.

Regarding the idea of characterizing the 3D Scanner as a Smart Prosthesis the specialist makes a very interesting analogy when he mentions that the use of the Scanner turns his body into a vehicle which transcends a portal from tangible to virtual. Mario describes a connection with the object where, somehow, the use of the scanner transforms his body. When asked “What kind of connection do you feel with the scanner?” He reflects:

“As with most tools, I consider it as an extension of my body; this type of scanner, specifically, as an accessory to the sense of sight. A machine for observing, memorizing and documenting.”¹

One of the last scanning works by Mario is part of a project titled “The Willy Crook Experience.” This was developed at the Mingalab-LEIDI, “Laboratorio de Experimentación e Innovación en Diseño Industrial” with its office in Centro Interactivo de Ciencia y Tecnología de la Universidad Nacional de Lanús “abremate”, Buenos Aires, Argentina.

Eduardo Guillermo Pantano Crook, better known as Willy Crook is a distinguished Argentine musician with a three-decade career. He generates different types of mixed compositions that result from his personal history in an abstraction and a humor field. Currently, Crook explores and experiences with compositional possibilities that provide new digital tools.

Through this project, Willy decided to experience an approach between digital technologies and music, understood as a multiform, massive, visual and mutable whole. The idea of having his body on the internet was attractive to him. Somehow, this represents a perpetuation

¹ Entrevista realiza por Jéssica Roude al Diseñador Mario Astutti en el marco del Proyecto Experimentación Interdisciplinar con Artistas en el Laboratorio MINGALAB - UNLa- Lanús Argentina 2016.

of his image and his digitized body scattered throughout the world on the network and to be forever downloaded, printed, mechanized and/or virtualized. While the postproduction possibilities provided by the scan are endless, Crook was interested in his body being in the network. When he was asked, after being scanned, about the relationship between art and technology he replied:

“Art and technology are closely related, it seems unthinkable that technology is not used to go further, that is what both disciplines are about, to go further.”²

Conclusion

“Techno-emotional Bodies” refers to the link we have as a species with Digital Technology and how it affects our body and emotions.

Cyborgs, Wearables and Biohacking, are some of the definitions that describe the analysis of what in Industrial Design could be called “Cybernetic Organs Design” classified as Smart Prostheses.

When designing these Smart Prostheses it is necessary to consider them as a means and a message, and to previously analyze the macro areas in which an industrial design object of classical methodology is comprised: technical, symbolic and social functions.

The current technological reaches allow us to explore different and new ways of interpreting the environment, which is conceived as composed of information. Digital Technology is a social product that makes us more human, and this already stimulates a reinterpretation of what it means to be human as a species.

This new concept of Smart Prostheses proposes to design in order to obtain a social stabilization with the Digital Technology, which leads us to a collective balance of universal thought.

The relationship between art and technology is an articulated space that allows us to go further.



Figure 4. Mario Astutti y Willy Crook. Detailed process of 3D scanning. Ph. Jessica Roude

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²Entrevista realiza por Jéssica Roude al Músico Willy Crook en el marco del Proyecto Experimentación Interdisciplinar con Artistas en el Laboratorio MINGALAB - UNLa- Lanús, Argentina 2016.

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Author Biography

Jéssica Roude belongs to the international movement of Experimental Industrial Design. This movement is defined as different and complementary to that established by the current education, market, and economy. The Designer transforms the methodologies, processes, and materials of Classic Industrial Design into an Interdisciplinary production and research plan. Roude proposes alternatives of scientific analysis in Industrial Design. She establishes links between current technological innovations and the efficient use of human habitat resources. Jéssica has recently received a Special Mention at the XV International Image Festival 2016. The presentation titled “The importance of interdisciplinary experimentation in the academic field of Industrial Design and Technological Scientific Development” was presented at the academic design forum in Manizales Colombia, May 2016. She is currently a professor, researcher and designer at Lanús National University, Buenos Aires, Argentina.