Wearable Worlds; Reality in a Pocket

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> "High on his tower, as far as possible from the earth, sits a human being. He has so transformed his eyes, with the aid of gigantic optical instruments, that they have become fit to penetrate the universe up to its most distant stars. In his *Umwelt,* suns and planets circle in festive procession. Fleet-footed light takes millions of years to travel through his *Umwelt* space.
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> And yet this whole *Umwelt* is only a tiny sector of nature, tailored to the faculties of a human subject." (Uexküll, 1934)

Intro -

A device in a pocket, which when taken out, integrates the user into its reality—a complex network of humans, things, organizations and diverse materials. This paper investigates networked wearable technology projects as devices that influence our perception of reality. Instead of considering these devices as prosthetic tools that aim to enhance the human body, this paper takes a broader viewpoint. This viewpoint forms an understanding that reality is part wise a construct of the devices, and this construction is discovered and experience not only through them but also by and around them. The focus of the author's research is on the artistic approaches to wearable technology. This paper investigates projects with network characteristics.

1 -

The biologist Jakob von Uexküll's (1864-1944) term *Umwelt* refers to a concept about the subjective world of an organism. The world can be imagined like a soap bubble, which surrounds each individual. This soap bubble, or *Umwelt,* is actively created by the individual organism in a process of forming a perception reality, which is guided by the organism's design, its physiology, and its needs. Uexküll gives an example of how the physiology and design of an organism impacts it's *Umwelt* ; it has been proven that fighting fish do not recognize their own reflection if it is shown to them eighteen times per second, but they do recogniize their reflection if it is shown at a minimum speed of

thirty times times per second. This experiment shows that in the world of fighting fish, "who feed on fast-moving prey, all motor processes—as in the case of slow-motion photography—appear at reduced speed."(Uexküll, 1934) The *Umwelt* of the fighting fish is based on its need to be able to capture the food for its survival. According to Uexküll's theory, biology should study organisms not as objects, but as active subjects and focus on their abilities to integrate into complex environments. Biology should "deal with holistic units and to maintain a broader scope than physiology in order to grasp the interactive unity of the organism and the world sensed by it." (Rüting, 2004)

<div align="right">Related artwork[1]</div>

2 -

A wearable device is often considered as an extension of the human or as an instrument, which enables the user to perform purposeful tasks. But "a wearable" can also be looked at as a device, which is shaping the user's behavior and intentions. In other words, it can be said that it is integrating the user into its own realm. Vilem Flusser writes the following: "If I hold a revolver against my temple and pull the trigger, I have decided to take my own life. This would appear to be the height of freedom: I am able to free myself from any predicament by pulling the trigger. But in reality, with this pulling of trigger I set in motion a process that is pre-programmed in the revolver. I have not, as it were, made a 'free' decision, but I have made a decision within the limits of the revolver program." (Flusser, 1999) Flusser's example of a gun is not typically thought of as "a wearable", yet it has several similar characteristics with what is typically considered as "a wearable": it is technical, wearable, designed to be used by an individual, and can be considered in a certain way as an extension of a human. However a revolver does not exactly fulfill the goal of mobile information access or transfer, which is listed as one of the goals of wearable computing. (Barfield and Caudell, 2001) What is interesting in Flusser's anecdote is how a device, or an instrument, which is made for specified use, directs the user's behavior and intentions and, further, how the device apparently influences the user's perception and experience of reality.

<div align="right">Related artwork[2]</div>

In earlier texts, I have differentiated various types of wearables based primarily on their motivations and aims. (Beloff, 2010, Beloff, 2009) My research focuses specifically on artistic approaches to wearable technology, which seems to differ in their criteria and aims from the recognized majority of approaches within the field. This paper continues to investigate the artistic approaches to wearable technology and specifically focuses on the ones that deal with concepts about networks and with perception of reality.

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[1]   http://selectparks.net/~julian/theartvertiser/ The Artvertiser, 2009, by Julian Oliver in collaboration with Clara Boj, Diego Diaz and Damian Stewart. The Artvertiser is an urban, hand-held ~~Augmented Reality~~ Improved Reality project that re-purposes street advertisements as a surface for exhibiting art.

[2]   http://www.bernhardleitner.at/works Der Ton-Anzug, 1975, by Bernhard Leitner

Der Ton-Anzug hat ein feinmaschiges Netz als neutralen Raster, in dem an jeden beliebigen Punkt des Körpers ein Lautsprecher eingehängt und eine akustische Stimulation/Erfahrung geortet werden kann.

The development in augmented reality and wearable computing has primarily focused on using various instruments and devices for the purpose of altering human abilities. Microscopes and telescopes extend and improve our sensory abilities and the development of glasses, wristwatches, and telecommunication devices enable us to access and manage information while being mobile. (Barfield and Caudell, 2001)

When looking at the currently available mobile devices, it is obvious that the primary focus of commercial mobile devices has been to access to the Internet. As well, the wearable technology field has presented various projects and prototypes throughout the last decade in which networked features have been investigated and developed. The developments have focused on personal communications networks with short-range data transmissions such as Bluetooth, RFID and Wifi applications, and which have been combined with wide area networks commonly using GPRS and 3G mobile networks and further connected to monitoring systems and applications. In the commercial sector, the presumed areas of growing application and use are in sports and leisure[3], as well as in various health monitoring systems. (Lam, 2009, D. Bryson, 2009)

Experiments with more emotionally and conceptually focused content are emerging in the field of art and design. For example, the Hug Shirt (2004-06) by the fashion company CuteCircuit[4], and the Seven Mile Boots[5] project (2003-04) by Beloff & Berger & Pichlmair. In general, the art & design initiatives and projects have been mainly focusing on a user and his immediate, local environment *rather* than on network features developed in the wearable technology projects. There are currently just a small number of wearable experiments (in art & design), which use the "network" as a component in projects, or otherwise focus on researching fundamental or exploratory aspects of networks.[6]

The interesting question concerning wearable and body-embedded technologies is how they alter our understanding of reality, especially because these technologies are becoming an integral part of an individual and his physiology. "The idea of 'bionic' parts in the human body is not new but more and more this is becoming a reality, where the use of textiles, coupled closely with fashion and the embedding of communications into the whole human body, is an exciting area that will move much of science fiction to science fact."(Lam, 2009) These ideas not only concern the modification of a human body

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[3]   A commercially successful example of this is the Nike running shoe, combined with an Ipod. http://www.apple.com/ipod/nike/

[4]   http://www.cutecircuit.com/products/thehugshirt/ "The Hug Shirt™ , 2004-06, is embedded with sensors that feel the strength of the touch, the skin warmth and the heartbeat rate of the sender and actuators that recreate the sensation of touch, warmth and emotion of the hug to the shirt of the distant loved one."

[5]   http://randomseed.org/sevenmileboots/ Seven Mile Boots, 2003-04, by Beloff & Berger & Pichlmair "is a pair of interactive shoes with audio. One can wear the boots, walk around as a flaneur simultaneously in the physical world and in the literal world of the internet. By walking in the physical world one may suddenly encounter a group of people chatting in real time in the virtual world. The chats are heard as a spoken text coming from the boots. Wherever you are with the boots, the physical and the virtual worlds will merge together."

[6]   One should note that the field of locative media is primarily concerned of networks in relation to geography, often using GPS-system and geo-tagging possibilities. However the locative media is not (traditionally) concerned of wearable aspects of technology. http://en.wikipedia.org/wiki/Locative_media [accessed 9.7.2010] http://www.purselipsquarejaw.org/papers/galloway_ward_draft.pdf [accessed 9.7.2010]

through wearable or body-embedded technology, but also the establishment of its connections to heterogeneous networks of humans and non-humans. The author's view is that a wearable device does not solely give access or add data onto the physically experienced world, but it alters the user in a profound way and how he perceives the world and constructs his individual *Umwelt*.

4 -

According to the research studies developed on the field, wearable and mobile technologies have impacted the material and code-based notions of space and place. Following the notions of de Souza e Silva, we can no longer address the disconnection between physical and digital spaces due to the dynamic relationship between the network and mobile devices. De Souza e Silva calls this merger a hybrid space, which is "a conceptual space created by the merging of borders between physical and digital spaces, because of the use of mobile technologies as social devices." (de Souza e Silva, 2006) The dividing line between mobile devices and wearable technology is very vague and although wearable technology is not as commonly considered to be used for social communication as mobile devices, because of its intimate, nearby vicinity to the user (being attached or close to the body), the networked wearable technology even more rigorously locates the users into a hybrid space—the merger of physical and digital space. "[…] the ability to navigate two spaces simultaneously is actually the ability to consolidate and locate the spaces and information that they associate with our "digital selves" into something of a hybrid space." (de Souza e Silva and Gordon) This space appears different to every individual depending on the local physical aspects, on individual's digital actions, and on his individual needs.

Related artwork[7]

5 -

De Souza e Silva is defining hybrid space based on social activities that are taking place simultaneously in physical and digital realms. The way de Souza e Silva writes about social activity seems to refer primarily to human social communication. The author's viewpoint differs from Silva's supposition in an understanding that the network is the underlying *base* of hybrid space. However, the network that involved in the creation of the hybrid space is not completely or solely material, or an electronic infrastructure with hubs, or servers and personal mobile devices. As such, the hybrid space additionally includes human connections (both in physical and digital space), the information flows between different nodes and end-terminals, as well as any other aspects, things or organizations involved in the process of experience and interaction. The actor-network theorist John Law suggests almost all of our interactions with other people are mediated through some kind of objects, e.g. communication between people may be mediated by a network of objects—the computer, the paper, the printing press, or by network of objects-and-people, such as the postal system. Law argues that these various kinds of networks participate in the shaping of the social. Law continues his argument by

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[7]   http://www.asquare.org/networkresearch/2009/wearable-forest Wearable Forest, 2009, by Ryoko Ueoka, Hiroki Kobayashi and Michitaka Hirose. A dress that interacts bio-acoustically with a remote forest.

saying that "what counts as a person is an effect generated by a network of heterogeneous, interacting, materials." (Law, 2003 (1992))

Actor-network theory claims that social agents are never located only in bodies, but an actor is a patterned network of heterogeneous relations or an effect produced by such a network. This network can be almost anything a person, a machine, a text, an organization, etc.

What is interesting for the author, along this kind of thinking about actors, relations and formed networks, is their clear correlation to networked wearable projects. The projects with artistic approaches to wearable technology often seem to manifest this kind of construction and understanding of the reality. These projects are constructed as a set of relations, actions, and diverse materials in a heterogeneous structure.

Related artwork[8]

6 -

In a comparison to the common notion of considering wearable technology as some type of product or object, which adds on to a human, and which extends or improves human abilities; it could be also considered in light of the actor-network theory. What if the wearable device is the actor (a patterned network of heterogeneous relations), and the role of the user, or carrier of the wearable device, is to be just one component in the complex network that establishes this actor?

Many of the author's projects can be considered in this way; they are commonly focused on complex structures of relations and networks, rather than on extending the abilities of an individual user.[9] In previous papers the author has developed a figure of the Hybronaut, which contains a user and wearable equipment as a single entity[10]. (Beloff, 2007, Beloff, 2009, Beloff, 2043) The Hybronaut is exploring hybrid space through a complex network of relations, interactions, materials, humans and technological components. These projects offer us (public) the possibility to become the Hybronaut by putting on the designed equipment, which allows us to experience the Hybronaut's subjective *Umwelt*.

The paper has presented several projects with artistic approaches emerging in the field of wearable technology. Differing from the common expectations of wearable technology being focused on the user and his abilities and functionality, these projects present us with complex, holistic viewpoints into questions about reality, which are shaped in the co-operation of two equal components—humans and technology. The paper points out how wearable technology devices impact our perception of reality, and how the reality is always a very subjective experience determined by each individual's

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[8] http://pain.yugo.at/index.php?s=life, Constraint city, 2008, by Gordan Savicic. The Constraint city-project is a chest strap (corset) with high torque servo motors and a WIFI-enabled game-console are worn as fetish object.

[9] The author's website: http://www.realitydisfunction.org/ The list of relevant works with links is found at the end of the paper.

[10] The more complete description is found in:

BELOFF, L. (2007) Wunderkammer: Wearables As An Artistic Strategy. *Mutamorphosis - conference*. Prague. Online resource: http://mutamorphosis.wordpress.com/papers-per-sessions/

BELOFF, L. (2009) The Hybronaut and Other Unexpected Approaches to Wearable Technology. IN THOMAS, P. & CUBITT, S. (Eds.) *Re:Live, Media Art History*. Melbourne, AU.

interests and needs. It also points to a possibility to consider the wearable projects as heterogeneous networks consisting of diverse relations, interactions, humans and non-humans.

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The Ton-Anzug, 1975, by Bernhard Leitner.
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The Hug Shirt, 2004-06, by CuteCircuit.
http://www.cutecircuit.com/products/thehugshirt/
Wearable Forest, 2009, by Ryoko Ueoka, Hiroki Kobayashi and Michitaka Hirose.
http://www.asquare.org/networkresearch/2009/wearable-forest
Constraint city, 2008, by Gordan Savicic.
http://pain.yugo.at/index.php?s=life

List of relevant projects by the author:

The author's (Laura Beloff) website: http://www.realitydisfunction.org/
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