The Hybronaut and Other Unexpected Approaches to Wearable Technology

Laura Beloff
Researcher, Planetary Collegium, Plymouth University, UK.
Visiting lecturer, University of Art And Design, Finland.

Abstract:
The perception of wearable technology seems to be primarily driven by a functional approach. This approach assumes an underlying notion that technology's role is to achieve desired ends. However, the author argues that there exists a traceable line of wearable projects, which resist instrumental approach to technology. These projects seem often to appear from the area of the arts.

An example of an alternative approach to wearables can be seen in the author's developed concept of the Hybronaut. Characteristically, the Hybronaut is realized as a figure equipped to observe and exist in hybrid spaces. The primary role of the Hybronaut is focused on a state of being, rather than on purposeful functionality aimed at extending the abilities of a user, and thereby challenges the traditional and utilitarian expectation toward wearable technology. The Hybronaut as an artistic concept and an artifact draws upon prior wearable artworks in which conceptual and critical approaches are in the forefront, and achieving is secondary or even inconsequential. Further, the Hybronaut draws upon the peculiar, the iconoclastic, and the unexpected. This approach to the field of wearable technology challenges how technology is applied and where art practice and theory concerning wearables may be headed.

Keywords: wearable technology, hybronaut, function, conceptual

Intro

Wearable technology has formed at the cross-section of culture, science and technology, and it is strongly related and often guided by the developments in science and technology. In this paper the term wearable technology is referencing experiments, projects and products that are wearable and use (or, at least, reference) technology. These projects may have emerged from any or several of the following fields: technology, arts, augmented reality, design, cybernetics, ergonomics, and/or fashion.

The expectations and predictions of wearable technology, put forward primarily by the wearable research community, often aim at integrated wearable systems based on an idea of smooth and intuitive data exchange between the user and the environment. The researchers in wearable computing see a wearable computer as a kind of an extension of the body that helps it to perform tasks that would not otherwise be possible, such as being in several places at the same time[1]. This is nevertheless just one approach to wearable technology apparent in the field; there are also other detectable approaches. The following categorizes three distinct approaches based on their developed goals and treatment of technology:

1. Traditional Wearables : wearables that aim at purposeful and justified functionality, including areas like wearable computing. The focus is often in enabling performance of various tasks that would not be possible for a mobile human without a wearable device.
2. Design Wearables (this approach is sometimes referenced as Fashionable Technology (Seymore & Beloff, 2008)) : wearables that are related to and often building on fashion and textile traditions. They often focus on finding elegant, playful and/or durable solutions for integration of hardware and various (e.g. soft) materials within design objectives.
3. Alternative Wearables : wearables that seem to oppose the general aims of the field. Instead of aiming at invisibility and transparency of technology, and stylized appearances, these wearables are often theatrical and absurd in their enhancement of the body. Moreover their functionality is not following the typical expectations of rationality of (wearable) technology, nor can they be seen as decorative elements, but they appear to propose critical and conceptual questions.

This categorizing is not meant to be restrictive, many projects may have various different approaches and aims in them, but it attempts to point out that there exist various distinctive approaches and interests in the field, and these three are possibly just few of them.

Furthermore, surprisingly little of the analytical investigations or practical experimentations in wearable technology have focused on the conceptual side, taken a critical viewpoint into it, or investigated deeper layers of the thematic content (or themes) related to the field. This paper focuses on investigating these kinds of projects, their characteristics and historical predecessors. The paper concentrates on the third approach called ‘alternative wearables’.

The first section of the paper introduces aims of wearable technology, which have been put forward by the researchers in wearable computing. It also presents the prevailing direction of technology into ubiquitous computing, and its current tendency and aim to become transparent in use. The second and the third sections define the shared characteristics of alternative wearables as a group and present traceable historical predecessors. Lastly the paper introduces The Hybronaut; a concept and a practical example related to the author’s artistic practice, and an example of contemporary indication of the described approach in alternative wearables.

Purposeful

Until now the field of wearable technology has been primarily understood and discussed as a unified field that has its common, shared aims. However the author’s investigations show that there are various distinct approaches in the field that do not necessarily share common objectives, yet the major influence within the whole field is the research in wearable computing, and its defined aims. For example, Barfield and Caudell claim in ‘Basic Concepts in Wearable Computers and Augmented Reality’ that the development in wearable computing and its related field of augmented reality have been driven by by the need and desire for people to access and manage information while being mobile. (Barfield & Caudell, 2001) To achieve this we have developed various devices from glasses to wristwatches and mobile phones. We have also invented devices, such as microscopes, telescopes, and telecommunication devices to extend and improve our sensory abilities and communication possibilities.

When investigating closer at this array of devices, it becomes evident that all of them are thought out and designed with a functional approach. Technology is used for creating purposeful functionality into devices that have very practical aims. The same applies also to large parts of the current development in wearable technology. It seems that technology, which is made to be worn and used by humans is in the most cases designed for providing purposeful functionality. There is an underlying notion about technology being means for achieving certain ends. (Redström, 2005)

One of the commonly mentioned characteristics of wearable computers is that they are aware of their location and the situation without any need for control. (Rhodes, 1997; Mann, 2001) This is very close to Mark Weiser's definition on ubiquitous computing. (Weiser & Brown, 1996) Furthermore following Weiser's vision, it has been argued that the successful technology is the one, which is able to become so intuitive to our use that it becomes invisible (Clark, 2003). This often happens when technology becomes accepted into everyday use by large numbers of people, and it transforms into a self-evident commodity as the result of this process. Lisa Gitelman compares the acceptance of media technologies to scientific instruments and their employment. When scientists invent a new instrument, they have to demonstrate the use and meaning of the instrument. If they are successful other scientists start using the instrument and its general acceptance will gradually make it a transparent fact of scientific practice. (Gitelman, 2006) According to Gitelman media technologies work in a similar manner, technology and its protocols become transparent with a general acceptance of its use. Gradually we will become unaware of our use of technology, its defined aims and underlying structures, although it will keep influencing us, and the context within which we use it.

A wristwatch, or a pocket watch, would be an early example of wearable technology that is designed with purposeful functionality, and which impacts the context it is used. The invention of a clock synchronized and ordered the life of the people in the cities. The clock became the central medium for structuring daily life. (Kluitenberg, 2006). With a wristwatch this structuring became also a part of an individual's personal and private schedule, and gradually the use of this technology has become a general standard and transparent to us. Today the same tasks are increasingly handled by telecommunications devices, such as mobile phones. Inventions such as mass-production and the assembly line are claimed also to have influenced the standardizing effects of technology on society (Nye, 2006). Furthermore, commercially available technological devices are commonly standardized and restricted to pre-defined functions. Even if it may seem that we have a wide selection of diverse devices and models, they all still appear within the same technological structure deeply embedded into the society. Like David Nye writes: "It is easier to select among many telephones than it is to do without one." (Nye, 2006)

Non-standard

The author's investigation of the field has revealed that there also exist projects that present us with unexpected, or non-standard, characteristics that seem to intentionally contradict the goals for plausible functionality. These characteristics take an approach to technology that purposely or knowingly lack a functional perspective. The author calls this approach 'alternative wearables'.

These projects are often very different from each other, yet one can trace some similar characteristics in them, and enables the consideration of them as a group. The shared identifiable characteristics are: an overall ironic attitude, peculiar functional structures and a sense of exaggeration in their look. In comparison to the typically sleek and unobtrusive design of the commercially aimed wearable technologies, these projects often appear overtly visual and theatrical. Additionally, they are not necessarily designed to be convenient to wear, but their unconventional characteristics often entail physical and even mental adaptiveness from the users.

The rejection of demands for rational functionality and the above-mentioned non-standard aspects set these projects apart from the rest of the field. While these projects with their distinct style and unexpected aspects can also have interesting technical functions or other technical qualities, there are obviously some other criteria and concepts present in them that seem to take precedence over the

objectives for purposeful functionality. Firstly, the majority of this kind of projects seem to challenge the standardized ways technology is primarily understood and used in wearable technology projects. Secondly, they create awareness about the processes that make technology transparent and seemingly resist it. Thirdly, they pose questions about the meaning and purpose of technology in our everyday life. And fourthly, they reveal new viewpoints into the field through their physically constructed propositions.

Examples of projects with above described conceptual focus and non-standard attributes are, among others, Gordan Savicic´s Constrain City[2] and the author's project Heart-Donor[3]. Constrained City (Savicic 2007) is a city-intervention, which detects wireless networks with a wearable chest strap. The Heart-Donor (Beloff & Berger with Mitrunen, 2007) is a wearable vest addressing our life in hybrid space through a connection between skype and a collection of recorded heartbeats.

History

This section introduces few examples from history that have a relation to the development of wearable technology.

The 1960s seems to have been an especially active period, when a lot of the important developments were maturing and made public. For example in the field of science and technology Ivan Sutherland, pioneer on computer graphics, was working on virtual and augmented reality and developing the first see-through head-mounted display in the mid-60s (Sutherland, 1965). A cyborg is a concept often considered in relation to projects emerging from wearable technology. In 1960 Clynes and Kline published the article that coined the term cyborg for the first time. In it they proposed technologically and medically extended functionality for an organism to be able to achieve certain goals (Clynes & Kline, 1960). Edward O. Thorp collaborated with Claude Shannon in constructing the first wearable computer, which was a roulette-predicting device hidden in a shoe. It was complete and operational in 1961 (Thorp, 1998). These few examples of many others can be considered as predecessors of the field of wearable technology that started to be perceived as its own field during the late 1990s, mainly owing to an active and enthusiastic work by Steve Mann[4] who has written extensively about the area. Furthermore there exists projects from the same time period that seem to have more focus on conceptual than on technical side, but which can be considered in relation to the development of wearable technology field. The following few examples all have subsequent features: they are wearable, they differ clearly from "ordinary" instead being experimental and theatrical, and the most of them use or reference technology or aspects linked to its use. These following examples are from the area of the arts.

Atsuko Tanaka's Electric Dress is made of round and tube shaped electric lamps painted in nine colors, which are turning on and off in a slow sequence. The Electric Dress was created as a part of her performance "Stage Clothes" in 1957 for the "Gutai Art on Stage"-event. (Eiblmayr, 2002).

Lygia Clark's works from the late 1960s are good examples of earlier approaches to sensorial experiences. She created a series of goggles with mirrors that manipulated the wearer's perception of the world, and a variety of clothes and masks offered for personal experimentation. (Encyclopedia_Itaú_Cultural) (Brett, 1994)

Alfons Schilling created a series of vision machines that transformed the viewers' perception through firsthand experience. He was investigating the human perception with his crossover practice in art and science from the late 1960s until the 1980s. He believed that new realities could be revealed by an extended perception. (Schilling, 198?)

Other examples from history include Walter Pichler, who drew several sketches and constructed few wearable works in the 1960s. His works were influenced by the theories of Oswald Wiener. Hélio

Oiticica's truly multi-disciplinary artistic practice evolved in many forms. His participatory works questioned the traditional observer–art object relationship, for example with his work *Parangoles,* 1964-79. Krzysztof Wodiczko's long practice from late 1960s until today on wearable technology proposes a functional yet artistic approach to the field. Many of his works investigate problems of marginalized groups in the contemporary cities.

The wearability, the use of technology, and the referencing of developments in science and technology, are features that connect these historical works to current ones. In many of the experiments from the 1960s the prevailing perception of the world was challenged and new perspectives were searched, for example, through fragmenting the visible image of the world via mechanical devices. One of the interests was, among other things, human perception as a physical and conceptual phenomenon. The contemporary works often focus to social phenomenon, and to the relationship between human and environment, which may be (re)constructed through the use digital technology. However in all these wearable works, historical and contemporary, the human is in the center. The works are based on human body, its abilities, and its relation to other people and environments.

An investigation into history has exposed these projects, which can be seen as traceable historical line of conceptual approaches in wearable technologies. It is interesting to notice that the field actively involved in these few examples has been the arts, which seems to have been an area able to provide the necessary liberty for such diverse and multi-disciplinary development.

Hybronaut

This section introduces the Hybronaut, which is a practice-based research vehicle closely linked to the author's research and practice. The Hybronaut enables a first-hand experience within so-called hybrid space (explained in the next paragraph) via the use of wearable devices, and which experiments with approaches that differ from commercial applications. The Hybronaut is simultaneously a concept and a concrete figure exploring hybrid space and existing in the background of the artistic production by the author. In some sense one can compare the Hybronaut to the figure of a flaneur, whose emergence was influenced by the changes in the surrounding environment and society. In a similar way the Hybronaut is tied to its environment (to hybrid space) and influenced by the changes and existing possibilities in this environment.

The author's practice-based investigations are focused on technology and its character in hybrid space. Hybrid space appears in the merger of physical and virtual space. It can be understood as an environment where social and other practices may occur simultaneously in the physical and in the technologically constructed virtual space. (de Souza e Silva, 2006) One of the interests in the wearable technology projects by the author is precisely such technologically enabled hybrid space, and its potentials to use it for constructing alternative perspectives to technology and to everyday life.

The term Hybronaut was developed to include the user and the wearable equipment in one entity instead of investigating them separately. (Beloff, 2007) The Hybronaut constitutes of physically constructed equipment, which is offered for public use. This equipment enables one to become the Hybronaut and explore the potentiality of hybrid space from a non-standardized viewpoint.

An example of the Hybronaut's equipment is the project The Head, 2005-06.

The Head is a wearable object offered for people to adopt. The person adopting this wearable object will be responsible for it. It becomes a kind of a second head for them and it is expected that The Head will follow its "foster-parent" everywhere they may go. The Head is networked and it has an open

public access via mobile phone text messages. The general public can access The Head by sending a mobile phone text message, when The Head receives them it responds by capturing an image and recording a short sound file. The captured image together with the sound is sent back as a reply to the sender. The images are also automatically uploaded to the public site in Flickr.com, which can be thought as the mind of The Head-sculpture with continuous accretion of memories.[5]

In this project the user becomes the Hybronaut, who is aware of his continuous existence within hybrid space via the help of the wearable object: The Head. This networked project does not expect active usage of the device from its host (the Hybronaut), but its use is directed to the general public existing in the same network. The user transformed into the Hybronaut just exists and emphasizes his continuous existence in hybrid space to the public. The Hybronaut offers an alternative perspective and experience within networked wearable technologies and challenges the approaches focused primarily on purposeful functionality. Through the emphasis on 'being' rather than 'doing', the Hybronaut points to a way how technology is commonly understood from a very instrumental perspective, and challenges our perception on technology, its use and meaning now and in the future.

Other examples of wearable technology projects by the author: Seven Mile Boots, The Fruit Fly Farm, The Empty Space, and Heart-Donor[6].

Conclusion

There are several distinct research and practice approaches within the field of wearable technology. The author has detected three different approaches that vary in their treatment and perception of technology and where and how it is used. This paper focuses on the approach, which the author calls 'alternative wearables', and which approaches the field with conceptual, playful and/or critical attitude. Additionally the paper presents predecessors from history as a traceable line of projects in wearable technology. These kinds of wearables with alternative approach go beyond the traditional expectations of (wearable) technology and make visible the ways in which technology determines our behavior and perception. They challenge the instrumental use of technology by creating alternative perspectives and ways to employ technology. But, even more importantly, with their rejection of rational aims these projects open up new ground for fresh interpretations of the meaning and possibilities of technology in wearable field, and in general. These works are commonly not developed with a final product in mind, but rather as objects to think with. The Hybronaut is an indication of the above-described alternative approach in the field of wearable technology. It is a practice-based concept and a developed research vehicle that explores hybrid space with the use of peculiar-looking equipment. Hybronaut ironically reveals our constructed expectations and increasing dependency on technology.

This paper is a part of an on-going investigation into the (wide) field of wearable technology. The investigation has revealed that the field has matured to a point where profound review of the area, its various approaches and diversity of starting-points, is both necessary and possible.

Bibliography

Barfield, W. & Caudell, T. 2001. Basic Concepts in Wearable Computers and Augmented Reality. *Fundamentals of Wearable Computers and Augmented Reality* Lawrence Erlbaum Associates, Inc.

Beloff, L. 2007 Wunderkammer: Wearables As An Artistic Strategy *Mutamorphosis -conference* Prague: CIANT.

Breitwieser, S. 1998. A conversation with Walter Pichler, in: S. Breitwieser, Ed. *Prototypen/Prototypes 1966-69 PICHLER*. Vienna, Generali Foundation.

Brett, G. 1994. Lygia Clark: in search of the body. *Art in America.*

Clark, A. 2003. *Natural-Born Cyborgs: Minds, Technologies, and the Future of Human Intelligence* New York: Oxford University Press.

Clynes, M.E. & Kline, N.S. 1960, 1995 Cyborgs and Space, in: C.H. Gray, Ed. *The Cyborg Handbook.* New York, London: Routledge.

de Souza e Silva, A. 2006. From Cyber to Hybrid: Mobile Technologies as Interfaces of Hybrid Spaces *Space and Culture.* Sage Publications

Eiblmayr, S. Ed. 2002. *Atsuko Tanaka.* Hatje Cantz Publishers.

Encyclopedia_Itaú_Cultural Lygia Clark, Itaú Cultural http://www.itaucultural.org.br/

Gitelman, L. 2006. *Always Already New: Media, History, and the Data of Culture*. Cambridge, London: The MIT Press.

Kluitenberg, E., Ed. 2006. *Book of Imaginary Media; Excavating the Dream of the Ultimate Communication Medium.* Rotterdam: NAi Publishers.

Mann, S. 2001Fundamental Issues in Mediated Reality, WearComp, and Camera-Based Augmented Reality, in: Woodrow Barfield & T. Caudell. Eds. *Fundamentals of Wearable Computers and Augmented Reality.* Lawrence Erlbaum Associates, Inc.

Nye, D., 2006. *Technology Matters; Questions to Live with*. Cambridge, MIT Press.

Plant, S. 2001 On the mobile: The effects of mobile telephones on social and individual life. Motorola, Inc.

Puro, J.P. 2002 Finland: a mobile culture, in: J. Katz, & M. Aakhus, Eds. *Perpetual Contact: Mobile Communication, Private Talk, Public Performance*. Cambridge: Cambridge University Press.

Reder, C. 1987. Über Sehen sprechen; Im Dialog mit Alfons Schilling, in: A. Schilling Ed. *Sehmaschinen.* Wien: Der Hochschule für Angewandte Kunst und Dem Österreichischen Museum für Angewandte Kunst.

Redström, J. 2005. On Technology as Material in Design, in: M. Redström, J. Redström & R. Maze. Eds. *IT + Textiles*. Edita Publishing Oy.

Rhodes, B.J. 1997 The wearable remembrance agent: a system for augmented memory *The First International Symposium on Wearable Computers.* Cambridge, ISWC '97.

Seymore, S. & Beloff, L. 2008 Fashionable Technology - The Next Generation of Wearables, in: C. Sommerer, L.C. Jain & L. Mignonneau (Eds) *The Arts and Science of Interface and Interaction Design*. Berlin, Springer.

Schilling, A. 198? *Binocularis* New York, Vienna, Cologne, Galerie Ariadne.

Sutherland, I.E. 1965. The Ultimate Display. Proceedings of IFIP Congress.

Thorp, E.O. 1998. The Invention of the First Wearable Computer. *Second International Symposium on Wearable Computers.*

Weiser, M. & Brown, J.S. 1996. The Coming Age of Calm Technology. Xerox PARC.

Wodiczko, K. 1999. *Critical Vehicles; Writings, Projects, interviews*. Cambridge, London: The MIT Press.

[1] http://www.wearitatwork.com/What-is-wearable-computing.84.0.html [accessed 11.9.2009]
[2] www.yugo.at/equilibre/ [accessed 2.9.2009]
[3] www.realitydisfunction.org/heartdonor/ [accessed 15.8.2009]
[4] http://wearcam.org/research.htm [accessed 10.9..2009]
[5] www.realitydisfunction.org/head/ [accessed 15.8.2009]
[6] The author's website: www.realitydisfunction.org

BIO / Laura Beloff

With acclaimed international reputation as an artist, Laura Beloff's artistic works can be described as peculiar wearable objects, programmed structures and participatory, networked installations. Many of her works deal with individuals in the global society trying to adapt to highly complex technologically enhanced world, which is becoming increasingly mobile. Beloff has exhibited widely in museums, galleries and media-art events in Europe and worldwide, recently f.e. in the Venice Biennale 2007, and in Brazil 2008. She is frequently lecturing about her research and practice in universities and various conferences. 2002-06 she was Professor for media arts at the Art Academy in Oslo, Norway. 2007-11 she was awarded a five-year grant by the Finnish state. Currently she is a visiting lecturer at The University of Art and Design in Helsinki and working towards PhD within Planetary Collegium, University of Plymouth. More information on her works: http://www.realitydisfunction.org