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Artifacts at the event horizon: A study of Human–Computer Interaction through networking

이벤트 호라이즌 선상에 있는 인공물들: 네트워킹을 통한 휴먼-컴퓨터 인터랙션에 관한연구

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(Yo-ye)


(Abstract)

This paper presents theories regarding Human–Computer Interaction (HCI) through networking from the field of artifacts, checking them against one another, and merging these various perspectives to predict a more balanced approach between the fields of media arts and commercial products, I intend to argue the case for an affective approach to technology, as opposed to a more technical approach, such as RFID using Wi-Fi technology. By exploring and defining a couple of terms—the artifacts, HCI, the networking processes associated with exhibition, and cultural studies, I will particularly look at two examples to explain the similarities and dissimilarities in relation to HCI through networking. They represent diverse attempts to discover the following: what is an artifact in the current digital cultural age; what is RFID technology as an artifact; how does HCI consist in this field; and how are similar or dissimilar relations established between media artifacts and commercial products based on HCI via networking? I examine how the process evolved spontaneously and were determined by cultural factors, such as a wide range of Internet accessibilities, more acceptable human–computer interactive systems, and Wi-Fi technologies through RFID. In addition, by representing with practical examples which is useful approaches to new disciplines that may be more inclusive of multiple interactive surroundings, I will reveal how cultural factors affect human beings in the digital era. To illustrate how high-technology addresses current new environments with computers, I discuss examples of Sensorialoon, relationships are drawn between network theory and artifacts. Finally, I will draw alternative ways to demonstrate my assertions and suggest methods of further inquiry, identifying gaps between current studies. High technologies regarding information and computer networking as artifacts might be more developed for perspective. Therefore, a variety of issues within these fields must be considered to approach an analysis of these results, allowing for a comprehensive milieu of what we might expect.

To close, this paper looks forward, suggesting questions to be addressed in the future as well as practical steps in an interactive media field.

(Keyword)

artifacts, RFID, HCI, interactive, networking
1. Introduction / Background

We are living in a digital era. The scientific developments since the Industrial Revolution in the early 19th century have brought us revolutionary changes. Since then, a century has passed, and we now face the new digital environments. Digital technologies have endowed us with the ability of omnipresence between the online and the offline. The vision of the ubiquitous has been realized by the milieu of matrixed networks.

It is the nature of human beings to be unsatisfied with reality and create artificial surroundings in which they can realize themselves. Creating artificial surroundings means inventing and producing forms. As Pierre Levy mentioned, this human activity might be 'the realization of virtuality'—the humanizing process that materializes that which is latent and virtual. The progress of technology and the digitalizing of culture has to do with humanizations which have been approaching for a long time. The digital culture is considered the latest phase of humanization. What has caused us to connect with machines for over fifty years? Why do human beings desire at this time in our cultural history to communicate with one another by making complicated artifacts out of electrical impulses? We are drawn to this way, because we need it to understand the world and our place in it.

The dictionary defines an artifact as something made with skill. Traditionally, this means by human hands (e.g., sculpture and carpentry). Recently, however, the term artifact has come to mean something different. An artifact today is something also made by a machine. What I will investigate here is how the tradition of craft skills has come to occupy the space of the network and how a programmer can be seen as a modern day carpenter or sculptor. As an example of programming as traditional craft-making, I will discuss my own project in terms of media art by looking into the interdisciplinary processes at work. I will offer an alternative to the design-based immediacy of some technical work by trying to incorporate the human/emotional element at the onset of the creative process, I believe that a simultaneous technological/philosophical approach is necessary to encapsulate the potential of technical mediums as meaningful artifacts. Otherwise, this process becomes linear rather than creative, with a programmer creating nothing of artistic or esoteric innovation and instead creating a uniform, faceless mass of new media objects. As a metaphor for network theory, which will be discussed later, I use scientific terminology to describe how complex notions of space and time can be brought, literally, back down to earth within the networked globe and shed new light on human–machine interfaces at the ambivalent site of human–computer experiential exchange.

2. Definition of Artifact at the event horizon

2-1. What is artifact?

Cognitive artifacts may be defined as "those artificial devices that maintain, display, or operate upon information in order to serve a representational function and that affect human cognitive performance" (Norman, 1991, p. 17).

The term artifact derives form two Latin words: "arte", meaning "by skill", and "factum", which is the past participle of facere, meaning "to do". The common definition is "something created by humans usually for a practical purpose; especially: an object remaining from a particular period (caves containing prehistoric artifacts)"1) (Artifact, 2007, Merriam–Webster). Various artifacts are generally present in human activities, character, and community. I am especially interested in artifacts as doing or making. Moreover, I am also curious about how to process those artifacts and come up with philosophy or not. While the philosopher, Mario Bunge,2)(1999,p,23) defines an artifact as a "man-made object", he uses the word "object" in the broad sense of anything we can create, including "symbols, machines, industrial processes, social

organizations, social movements.

In this sense, artifacts include anything we can make or create in the broad sense of the word, defined as “devising courses of action aimed at changing existing situations into preferred ones,” 3) (Simon, 1982, p.129) With respect to new media art, in my field, I focus on the artifact as two linked relations in the wide range of networks. The first relation is at the center of a field of study focused on HCI. In this regard, studies of artifacts focus on both the computer and the relevance of the artifact, including sensor, code, language programs, etc, I will exemplify two different HCI models as artifacts, and I will follow up the similarity and dissimilarity by comparing what they have in spite of being the same artifact. The second is much more common and ordinary. Another dictionary definition of an artifact is that it is a structure or feature, visible only as a result of external action or experimental error. An artifact is also known as a disturbance in bio potential signals 4)(Artifact, 2007, Wikipedia).

However, the definition of artifact is more significant than any one of these definitions. In relation to human cognition or intelligence, in particular, artifact also comprises many things created by skilled humans, including computer code, software, language programs, etc, because traditional tools have been replaced with current software and computer code. At this time, our artifacts and tools seem more significant and considerable as an artwork than just objects used to perform certain tasks, Thus, the relationship between generating work and the resulting artifact is one of cyclical change, rather than an easy need–response relationship. In the essay, ‘The Task–Artifact Cycle’, Carrol, Kellogg and Rosson (1991) argue that;5)

4) Wikipedia online dictionary.
   http://en.wikipedia.org/wiki/Artifact

A task implicitly sets requirements for the development of artifacts to support it: an artifact suggests possibilities and introduces constraints that often radically redefine the task for which the artifact was originally developed (p, 79)

In this respect, the artifact presents both new possibilities and limitations, and these relations generate other new evolutionary possibilities. If a human being has made artifacts with tools before, now humans create various artifacts with computer code, language, and network systems via online and offline protocols. In this sense, we can build and cover a wide range of products, from artworks to design. Similarly, our artifacts generate as much as we use them to make other things. This distinction leads us to propose that artifacts are objectified things with human awareness and practices. In this way, awareness takes in information and communication through networking in the digital culture age.

Thus, artifacts have now more real sensibilities than objects. They structure a cognitive frame (including definitions of views or the development of concepts, individual minds, groups, and organizations) through which we provide significance and functionality to what we experience or recognize. More importantly, they seem to structure the corporeal draw of a human’s thoughts, manners, cultural constructions, and values. For this reason, although many definitions offer the substantiality of an artifact, the basis of artifact as an idea is of greatest interest to me: “The information processing roles played by artifacts and how they interact with the information processing activities of their users” 6)

Thus, traditional views of cognitive artifacts are concretely difficult to explain creativity, because they focus on the rule and function of most human aspects of
experiences at that time. I pose the following questions. What is the form and definition of digital artifacts in this culture? What is the ultimate result of a computation error, accounting for aspects of creativity? How do we analyze both artwork and design products? Furthermore, with wide ranging definitions of artifact, what can we lead to now and in the future? I will suggest my practical artwork example, sensorialoon, and that it is an artifact based on HCI through networking. Also I will exemplify another aspect, real interactive networking products. Both are exemplified in the area of HCI, and this is also the way most intimately aligned with creativity and networking. What I propose here is that creativity, defined as a variety of thoughts for imagining what might be, seems to be an artifact. In relation to the common cause-result system of computational networking, creative connections can be regarded as flaws. These unexpected connections and possibilities at the core of many creative results are neither logical nor predicted. Thus, we can generate artifacts via the result of information input. This has led me to an attractive insight into my own fields for analysis: contemporary media and interactive-based artwork. In this sense, I view particular structures of interactive installation artworks as an event or display. Sometimes they progress through diverse experiments and group projects so that we or I can often find interesting possibilities and contradictions of artifacts, I will explore and compare two examples, each in the art and design product area, in the following chapter.

Artifacts at the Event Horizon: Human–Computer Interaction through Networking asked the question: what is an artifact? Is it right that events are the shape of an artifact? I conclude from my view that artifacts include a wide range of instructional artwork, events, and products created by human skills and tools. However, this does not mean only their physical shape as objects, and it has changed in meaning and physical structure. However, I think that artifacts have conceptual frameworks, including the cognitive fields as a new tool. More directly, I think they show different structures in different areas, I will define an "event" as a space or field where artifacts are led.

2–2. What is event horizon?

The term event horizon refers to an ambiguous space, the edge of the black hole that is an area in space–time without light and in the center of which is a singularity, a place in which distortion is infinite. Artifacts at the event horizon presents a great number of possibilities of symbols, and these are far from having only one definite meaning. Now, we are faced with concerns about artificial life as a classified and empathetic experience. Participants can influence the piece’s artifacts despite other possibilities. In electronic space, cyberspace, or virtual space composed of computer networks like the Internet, information moves among people. The mass and energy compresses the Earth to a black hole with an event horizon, located at a near–zero distance from the users connected to it.⁷ (Rosen, 2005) They have changed, and we expect what might be described as a new form in life or society, or how the artifact by our technology and tool might be shown, whether it is simple or complicated. I will illustrate two-sided examples within the context of the human–computer, man–machine, or human–artifact system, I will particularly focus on networking possibilities between human, computer, and machine, and communication between participants and audiences. What we experience and what we perceive are about our lives in this digital culture age.

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⁸) Still cut, Artifact as a sensoriloon (2007), Interactive networking installation
3. Interaction through diverse ways

3-1. Interaction through the Sensorialoon?

My project, sensorialoon, is based on networking between participants. Sensorialoon attempts to track its participants’ movements inside the gallery space via 5 IR (Infra-Red) sensors, which are hidden in balloons. A node between participants represents the distance between them, and this node then connects to other nodes. This is projected on the screen and is also represented online. Physical distance in real space is looped into virtual space in the creation of this network. The aim of this project is to develop networking between participants through wearable clothes and to play with the controlling affects that are placed upon the wearer’s acknowledgment of such technology. The perceived distances of such technology also comment on social trends, supporting the idea of a much smaller world. This project, sensorialoon, also starts from a person, a node, linking others in a space called the exhibition place. A person meets another new person, and depending on the node of the person he meets, the shape and the size of social links are decided. The audiences will be exposed to the random network program so that, as the artist has intended, the non-visual concept is readily visualized.

As Barabasi refers via his book, Linked, the Internet is the most effective means to reach the most people at the transition to the third millennium,\(^9\) (Barabasi, 2002). With the support of the Internet it allows people to share a virtually infinite amount of information, I wish that everyone could experience the changes that the new language and behavior, a whole new culture formed through the Internet, brought into our daily lives. The aim of this project is to develop networking between participants using wearable clothing. The sensor inside the acrylic balloon cloth controls and recognizes body movements. In particular, data from the results can show different positions between two participants. This position simulates our proximity to each other. Likewise, those closest to each other can meet new people, regardless of geographical location. In this respect, with this technological functionality with sensor and piezo-sound buzzer in the clothing, I expect to achieve a new generation of movement system that controls beyond the physical body and generates new interaction with the participants. In addition, interactivity with artifacts like sensorialoon can motivate participants to meet with new interactions as an unconsciousness mind. This experience through images and sound recordings simulates how many people are now communicating and networking with someone; even though they don’t know them, they can enjoy these artifacts mutually. This symbolic space can make us become absorbed into the piece emotionally.

In this respect, interaction with artifacts at the event horizon signifies a pleasurable task. I expect to expand the realm of human–computer interactive art through this project and suggest the most effective ways for achieving a two-way exchange between the artwork and its audience. Furthermore, I challenge participants and artists to recognize artificial and interactive technology as the most significant tool as an artifact of this digital age.

3-2. Interaction through the RFID?

This is another example of artifact via the real product, Radio Frequency Identification (RFID). According to the dictionary, the term RFID is defined as a “method” relying on storing and remotely retrieving data using devices called RFID tags or transponders. An RFID tag is also referred to as an object that can be attached to or incorporated into a product, animal, or person for the purpose of


\[^{10}\] Still cut, Artifact as a sensoriloon (2007), Interactive networking installation
identification using radio waves. Some tags can be read from several meters away and beyond the line of sight of the reader\(^\text{11}\) (RFID, 2007). We can find RFID tags embedded in our clothes when we are in the shop or supermarket.

It is also possible to communicate with a computer while controlling physical artifacts. RFID’s simple instruction as an artifact asks to replace the traditional task (checking or networking system applications) with a different one, Wi-Fi-Wireless Fidelity technology systems or information (Wi-Fi). This artifact has the potential values and cognitive capacities to quickly and uniquely compare to my artwork, sensorialoon. In this way, artifacts show new way to change what we think and how we perform. Currently, RFID as an artifact is spread everywhere through Wi-Fi networking:

Radio Frequency Identification (RFID) is evolving as a major technology enabler for tracking goods and assets around the world. It can help hospitals locate expensive equipment more quickly to improve patient care, pharmaceutical companies to reduce counterfeiting and logistics providers to improve the management of moveable assets. It also promises to enable new efficiencies in the supply chain by tracking goods from the point of manufacture through to the retail point of sale (POS). As a result of the potential benefits of RFID, many of the world’s major retailers have adopted RFID tagging for pallets and cases shipped into their distribution centres. The consequence of this RFID activity in the retail sector is likely to impact on around 200,000 manufacturers and suppliers globally, and will fuel the market for hardware and software to support RFID\(^\text{13}\).

Likewise, HCI represents a new generational shift. RFID has an implicit perception that a physical artifact leads as a product or supporting design item via Wi-Fi networking. Therefore, the practical characteristics, such as in this case of the artifact, might decide the turn of phrase of digital interaction.

3-3. Interaction through the Nabaztag?

Nabaztag, meaning rabbit in Armenian, is a Wi-Fi enabled “smart object” that can connect to the Internet\(^\text{14}\) (Nabaztag, 2007). It is a commercial product designed to be a ’hands-off’ approach to network culture. Once programmed to suit the tastes of its user:

Nabaztag can send and receive MP3s and messages that are read out loud as well as perform the following services (by either speaking the information out loud or using indicative lights): weather forecast, stock market report, news headlines, alarm clock, e-mail alerts, and others,\(^\text{15}\) (Nabaztag, 2007)


\(^{12}\)RFID technologies are grouped under the more generic Automatic Identification technologies, RFID is often positioned as next generation barcoding because of its obvious advantages over barcodes.

\(^{13}\)RFID Technology, Introduction to RFID, [online], Available: http://www.rfidc.com/docs/introductiontorfid.htm


\(^{15}\)Nabaz’mob, opera for 100 smart rabbits by Antoine
Such a fully integrated approach to interactivity, effectively synchronizing the body with network processes, anthropomorphizes, through the image of the rabbit object, social networks such as Flickr and YouTube. Through the tangible, empathetic appearance of the Nabaztag product, these applications appear more seamless with their environment, making the task of the Internet more organic and, I say reluctantly, human. By utilizing an affective model for the use of technology, Nabaztag suggests a future whereby media products become an extension of man: an addition that in equal parts generates a symbiotic exchange between human and machine interfaces\(^*\)(Nabaztag, 2007).

A primary security concern surrounding RFID technology is the illicit tracking of RFID tags. Tags which are world-readable pose a risk to both personal location privacy and corporate/military security. … More generally, privacy organizations have expressed concerns in the context of ongoing efforts to embed electronic product code (EPC) RFID tags in consumer products. The Nabaztag/tag can be programmed to respond to the added stimuli, thus allowing voice control, as well as programmed responses to objects (with the RFID stickers on them) being waved in front of the plastic bunny (this feature is being marketed as “sensing smells”, although the Nabaztag/tag obviously cannot actually detect odors)\(^*\) (Nabaztag, 2007)

RFID technology, in opposition to Nabaztag in some ways, enables the tracking of user behavior. For example, Transport for London’s Oyster card scheme uses RFID technology as a cash substitute payment method on the bus and train networks. Pre-pay introduces a more simplistic way to travel but is also a perpetual observation on the movements and patterns of London transport users. What is the price incentive of cheaper fares compared to the status of privacy in the public sphere? Do the benefits outweigh the disadvantages?

Nabaztag is a fully programmable piece of hardware/software with RFID technology embedded in consumer products and is, conversely, controlled from within the structure of the technology, making it impossible for a user to reprogram. This distinction raises important questions about how much technology should dictate to its users and how much a user should be able to dictate to technology. If the former is an example of a relationship of equality, then the latter shows the benevolent potential of consumer products to become a way to further control and monitor public trends. The balance between the user and the technology should be mutually beneficial, with the interactive nature of consumer goods offset only by the creative will of the public it is intended for.

4. Perspective in HCI through Networking

Computer could be like humans in every respect. They could have the intelligence to understand many novels and could have the creativity to paint pictures and compose symphonies, design buildings and invent devices. They could be appreciative of humour and beauty, sensitive to criticism and compassion, motivated by curiosity and ego. And computers could be conscious in the same way as humans. Such computers do not currently exist. But they will, (Jeffery, 1999, Introduction)

Terranova explored in Network Culture, that a meaningful perception from an informational perspective, one that can be made sense of and articulated, is a statistical compound of the familiar and the unfamiliar. From his point of view, he draws the conclusion that information and meaning might be inversely proportional: the more information the less meaning\(^*\)(Terranova, 2004,p.14). Our life is not

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19) In this sense, "the proliferation of information spells
available to stand without associating with this information whether it has much meaning or not, and we network with each other everyday in this information world via the Internet. However, we are often overwhelmed by the amounts of information in the current digital culture age. Sometimes we focus on expediency and overlook much because of this abundance and acceleration, so it is needed to accumulate and reinvent a way in which to get something without being overwhelmed by it. In this respect, my project, sensorialloon shows a period stage from current to next. Through networking and interaction between participants, I expect our digitalizing environment to gain significant influence from this project. We need time to progress to the next stages, such as cybernetics, artificial intelligence, and so on. Otherwise, we might flounder in a morass of overwhelming information. This project has primarily been limited to a consideration of the processing of exhibition in fields of media art; however, this project seems to coincide with an event between real networking, both offline and online. I expect communication and networking, symbiotic HCI between people beyond the man-to-machine HCI via this interactive artwork.

What procedures do computers and information perform in following human beings? This assumption is also drawn from the RFID’s example, Nabaztag. Nabaztag is created by advanced human technology, and its motion and operation are similar to that of humans. Networking between them and connections between terminal points as accessibility create diverse junctions to go to another space via the Internet. It also follows up the central junction, as does a search engine, to find the website, hypertext, or information from the Internet. These various morphological shapes seem to be similar to that of human beings. However, I think this, like artifact, has a shortage of emotional perception. Similarly, sensorialloon also has a shortage of technical approaches to create it. Thus, they need supplementation from each other’s fields. My perspective is to develop them mutually with smart wireless artwork. Using smart artifacts, such as Nabaztag and more studies of cognitive intelligence, I expect to discover new information via new approaches to people.

5. Conclusion

Artifacts of the current digital age are standing on the ambiguous boundary between reality and the structure of human cognition in the HCI fields. I defined artifact and its creation process. In this sense, artifacts are a way to explore structural properties, are made by human thought, and then follow the human mind physically. In particular, it is defined as a bridge between different points of view and perspectives. In this sense, sometimes artifacts are created in terms of sensorialloon as media artwork or in terms of Nabaztag as a commercial product. Sometimes they are created for more practical tools, such as a transportation card or implanted body chip.

They are mediating factors between actions and the resulting changes to the world. In effect and perception, sensorialloon shows that the artifact is brought into the physical world as a work of art or creative expression. Artifacts seem to be like language. Humans create them, and they are mediating connections between humans and the real and cyber worlds. Creatively speaking, artifacts from the perspective of HCI are new ideas that change our perception of the world. We see now artifacts as creative, instead of defined by their traditional definitions. By redefining our perspectives, artifacts enable humans to connect in activities, expand ideas, and build cultural practices previously unknown to them, and they are known as a kind of relational aesthetic.

In short, today the interface and interactivity between human and computer or machine still seems to come from different worlds. In other words, the
interface is familiar to people and is even friendly, such as Nabztag, but it still seems alien despite its magical interface and function via electronics and computers. I would suggest that we need more symbiotic reciprocal artifacts. To show this result of artifact as a mutual work with both an aesthetical approach and a unit of function, I propose to study cognitive science based on human emotions. From this process, we might expect not only smart function but also passive artifacts with an emotional sense, so we can experience real interaction and respond to our artifacts, as would a humanoid.

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