Intelligent Agent

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Patrick Lichty, Editor-In Chief, *Intelligent Agent,*
Susan E. Ryan, Guest Editor for *Social Fabrics*

Editorial - Thank You for Your Patience

Patrick Lichty

As I sit to write this in February 2008, I am communicating to you, our readers, with complete understanding that this has been the first *Intelligent Agent* since August 2006. That was the 132-page issue that constituted proceedings for the ISEA/ZeroOne 2006 symposium in San Jose. I think that says volumes. It was an amazing project, but honestly, it has taken over a year for us to recover while, among other things, I completed my initial time in academia at Columbia College Chicago. There have been questions in regards to when the next issue was coming out, and whether we were still in existence at all. In regards to this, I want to iterate the title for this missive - thank you for your patience. I will say that publication may not be on the 15th of the first month of every quarter, I will say that we will be "more frequent".

Secondly, but also foremost, I am really pleased that this issue is largely constituted of thematic content from another great event; the *Social Fabrics* exhibition hosted by the LEONARDO Educational Forum at the College Art Association in Dallas Texas. This exhibition, curated by Susan Ryan of Louisiana State University and myself, continues a conversation on fashion and technology and wearable New Media. For this issue, we have a fine array of critical essays on the topic, as well as a full catalogue of the works displayed in a live modified runway show. This exhibition is an extension of the dialogue created by the *Wearable Futures* (London), *Sartorial Flux* (Chicago), and SIGGRAPH CyberFashion shows. Susan and I are thrilled by the work included in this show, and have enjoyed the opportunity to dialogue with the worlds preeminent artists in the genre, and for this we are truly grateful. There are many people to thank in the creation of the show, and I invite you to note all the people who have given their generous support in our acknowledgements.

In January, Rhizome.org announced its 2008 Commissions competition, which had certain distinctions that made me think about the nature of the overall practice of New Media as an art practice exclusive to itself. In the call, the statement related that Rhizome was shifting its curatorial focus to the support of broader sets of media art, including video, performance, and so on. In response, Tim Whidden, on the MTAA blog, wrote that MTAA as such has not been focused solely on New Media as such, but on conceptual practice. Taken in context with Barbara London's

Lichty at Video Vortex, Amsterdam, Jan 2008

assertion in her statement for the 2007 *Automatic Update* show that New Media (sic) as a specific art form died with the Dot-Com crash, it's hard not to "give up the faith" on New Media. What seems clear is that there has been a systematic integration of New Media practices into the Contemporary scene. This can be evidenced by the Sundance *New Horizons* program and the changing of organizations like ISEA and Rhizome. While there is still something to New Media as a community-based genre with its own festivals and events, it is also obvious that the terrain has changed.

What this means for *Intelligent Agent* is that as its editor, I am considering material that might have been seen more tangential to our mission than before. For example, although Brian Cowlishaw's essay on "High-Pop" addresses literary genres, I also feel that it also draws strong analogies to certain Pop aspects of New

Media, such as the 8-Bit movement. While my intent is to remain firmly centered within the Venn diagram of technology and media art, I also realize that on occasion, broader perspectives may give us a greater context for the larger cultural milieu that Contemporary New Media artists have become a part of. I think this is only reasonable as, there are issues of culture, including historiography, histories, literature, media, art, sociology, and more that comment in the changing nature of the New Media community and its emergent multivalence. I have not given up the faith, btu have merely seen my environment for wat it is. Again, thank you for your patience.

And lastly, it is exciting to have the prospect of having another print issue in my hands, with the emergence of new on-demand printers like Blurb and Lulu. It's my hope that the flexibility of these presses create more options for the production of varied Intelligent Agent documents.

We live in interesting times. And for those of you who are reading this ending sentence, I want to just say thanks. Not for your patience, just thanks.

Fish Hook Dress, by Irena Morris (Eshi Otawara)

Foreword to Social Fabrics

Edwards Shanken/Leonardo Educational Forum

The Leonardo Education Forum (LEF) is proud to sponsor Social Fabrics in collaboration with the University of Texas, Dallas and Louisiana State University. We are grateful to LEF members Susan Ryan and Patrick Lichty, who curated the exhibition at the 2008 Annual Conference of the College Art Association and edited this special issue of *Intelligent Agent*.

LEF promotes the advancement of artistic research and academic scholarship at the intersections of art, science, and technology. Serving practitioners, scholars, and students who are members of the Leonardo community, LEF provides a forum for collaboration and exchange with other scholarly communities.

LEF actively participates in research conferences, including the Society for Literature, Art, and Science, SIGGRAPH, Mutamorphosis, re:place, ISEA, and CAA, of which it is an affiliated society. Comprised of over 120 members from around the world, we organize panel discussions, workshops, exhibitions, and other events that promote scholarship and education at the intersections of art and science. Our website, hosted by the Art|Sci Center at UCLA offers members a forum for discussion, exchange, and networking. See http://artsci.ucla.edu/LEF/ We invite you to join us online and at our events.

Edward A. Shanken, Chair

Andrea Polli, Vice-chair

Victoria Vesna, Vice-chair

Nina Czegledy, Vice-chair

What is Wearable Technology Art?

Susan Elizabeth Ryan

Today we know that art can be a lot of things. We know we can not pin it down by medium or format or even context any more. Yet despite this new formal freedom, art conceived as something *worn on the body* has had a conflicted and often elusive reputation. Moreover, works that are wearable contribute to an unknown history of projects people do not necessarily link together or think of as part of a cohesive practice. And this is despite many similarities between garments and art as normatively considered, including, for both, dependence on commercial infrastructures and resonance in cultural literature. All the same, writers like Sung Bok Kim, in an article entitled "Is Fashion Art?" have pointed out that the aesthetic nature of garments is often overlooked.[1]

Arguably, it is with the advent of wearable technology--mobile media--that artists working with wearables have begun to achieve critical mass and their activities have crystallized into a type of creative practice that merits analysis and an expanded discourse. This is so despite many encumbrances--for one, artists working in "wearable media" navigate a tough path for their work, between commercial fashion, theatrical costume, or craft project, on the one hand, and engineering device or commercial prototype, on the other. But there are some strong unifying ideas: this work is worn on the body, it exists in the complex multidimensional realities of contemporary social discourse (often simultaneously on line and off), and it engages with a world transformed by varieties of "media." Additionally, and perhaps most importantly of all, the work is deployed critically in terms of viewer interaction and experience. Elsewhere in this volume I describe, under the term "Critical Garment Discourse," some of the practices that produce this work. [2] But here at the outset, I want to lay groundwork for assembling a provisional history of such practices (I use provisional, as it remains a history in flux, as opposed to canonical history, the type of history these artists, and this writer, are trying to avoid).

So, how can we begin to think coherently about practices by artists from such divergent fields--even antithetical disciplines--as engineering, computational technology, fashion, garment design, and performance art? Is there a set of practices we might call wearable technology art (WTA)? How can we formulate a flexible framing system that traverses disciplinary boundaries of art, technology, media, and dress? In fact, this is just the kind of challenge being addressed by emerging models for interdisciplinary research into media history and cultural knowledge--new models such as, for example, Siegfried Zielinski's "variantology," a loosely defined retooling of intellectual inquiry that circumvents institutional standardization and modularization:

> Currently, research is only considered excellent if it is committed to some programme or main focus and serves common denominators that are based on contracted political agreements . . . . [*Variantology* tries] to react naively to this culture of bloc formation and programmatic standardization [and] contains a paradox . . . . Phenomena that are diametrically opposed, that rub each other the wrong way, where there is friction between them . . . congregate under a provisional roof.[3]

Variantology is also a strategy for incorporating the concept of media intrinsically into historical research, rather than having to center research on a singular genealogy of media. Instead, Zielinski says, "media are spaces of action for constructed attempts to connect what is separated."[4] Media is a kind of connective tissue or spatial field. And this may be the best way to think about art and design practices, like wearable technology art, that incorporate ideas about dress (garments and/or fashion), technology, art, and social mobility, from both aesthetic, and critical, points of view.

Wearable technology art (WTA), then, supposes an intensely hybrid and dynamic space of investigation. To begin with, perhaps we can construct an overview of some of the divergent historical trajectories in play within it.

Where Did It All Begin?

Fashion and garments are terms we use almost interchangeably in this investigation, because they belong today, in the "era of fashion after fashion" (as some have called it), to the same continuum of processes that includes a widespread heightening of awareness of personal presentation in a world of social appearances and accelerating choices.[5] The very notion of fashion, maintain many writers from Baudelaire to recent authors like Ulrich Lehmann and Gilles Lipovetsky, is bound up with the advent of modernism (a fact present in the French terms *mode* and *moderne*). But modernism itself is also a cultural con-

dition brought about by, among other things, a particular level of technological advancement manifested in terms of industrial production, mass marketing, and urbanized society.[6] So fashion, modernism, and technology are inevitably bound up together.

In the mid-19th century Baudelaire, the archetypal figure of modernism, wrote extensively about fashion and art, and in 1874 the French symbolist poet Stéphane Mallarmé edited a fashion magazine, *La Dèrniere Mode*.[7] It was 1907 when Adolf Loos condemned his own Austrian society for not being modern enough, and did so using fashion imagery: in an age of industrial growth and expanded literacy, why did they maintain the same dependency on ornamented attire that tribal societies did?[8] Walter Benjamin, who decades later wrote the notes we know as *The Arcades Project*, commented that fashion is "the mould in which modernity is cast."[9] And Mark Wigley, in *White Walls, Designer Dresses*, argues that fashion--or rather anti-fashion, but certainly dress--was the model(!) for Le Corbusier's writings about modernism in architecture.[10]

Throughout the 20th century the dialogue between garments and technology is as persistent as the dialogue that particular garment styles also continuously sustain with both their forebears in the past and their imagined counterparts in the future

Accordingly, the title of our exhibition, *Social Fabrics,* restores a modernist garment metaphor to its origins as well: the pioneer of sociology, philosopher George Simmel, in his writings at the turn of the 20th century, regarded society as a whole as *Gewebe* (fabric), and its inner relations, in Lehmann's comparison, are likened to the connections between different embroideries or threads.[11]

Throughout the 20th century the dialogue between garments and technology is as persistent as the dialogue that particular garment styles also continuously sustain with both their forebears in the past and their imagined counterparts in the future--Benjamin in particular comments on the peculiar ability of fashion to defy simple notions of time. But, practically speaking, technological inventions have driven key developments in the recent history of wearables. For example, the development of elastic thread in the 1930s, as a result of research in synthetics, led to rapid changes in women's undergarments and eventually in clothes themselves. After World War II garments from runway to retail reflected ideas culled from science fiction, and its delineation of futurist lifestyles, and the space race, as well as industrialization. We remember that Jacquard's loom is a forerunner of digital devices. Even the rise of mass media in the post-World War II years could be connected to the notion of the demise of fashion as couture and its reemergence as commerce.

Wearable Technology

So, garments reflect their technological culture, or their culture's fascination with technology. It is no surprise that examples of wearable technology (that we could arguably recognize as such) reach back beyond the Enlightenment. Eyeglasses were invented in the 1200s--are they wearable technology? And wrist watches (as opposed to clocks carried in pockets or on chains, which are earlier) were developed by Jacquet-Droz and Leschet in 1790, but for their first hundred years were exclusively women's accessories (an early example of technology's association of femininity with the body that is also characteristic of modernism). Wearable technology fills post-war spy and sci-fi literature, from Batman's military-derived utility belt full of gadgets and Dick Tracy's 2-Way Wrist Radio in the 1940s, through James Bond's Seiko telex watch and *Star Trek: The Next Generation's* wearable communicators in the 1980s.

Originally, wearable computing, an early iteration of wearable technology as we know it today, is thought to have begun with Edward O. Thorp's pocket-sized analog computer developed in 1961 to predict results in roulette games in Las Vegas. But there is an important distinction to be made: functional portable gadgets--wearable computing--are not actually *worn*, they are carried or held, and ultimately have little to do with the conceptual and body-based nature of wearable technology, though the two are often confused in accounts of wearable computing.[12] The next stage, the earliest wearable webcams, a result of increasing experimentation in the field of telepresence in the 1980s, were developed by Steve Mann, an engineer who used the technology to interface with the internet in performance-type projects that received a lot of attention.[13] But a rise in interest in actual wearables that could perform computational tasks coincided with an increase in numbers of women in engineering programs such as the Media Lab at MIT in the late 20th century.[14]

In fact, wearable technology erupted in the 1990s due to a confluence of multiple forces, not the least of which was inspiration from literature and mass media. Devices in Neal Stephenson's widely read novel, *Snow Crash* (1992), helped focus creative energy unleashed by the wearables imagined by William Gibson some years before (*Neuromancer*, 1984). The trend picked up speed with *Star Trek : The Next Generation* series, which ran from 1987 to 1994, and *Deep Space Nine*,

which ran from 1993 to 1999. With their androids and cyborgs, episodes in these series explored, on a popular level, issues raised since the time of Mary Shelley concerning the integration of man and machine. At the same time, critical literature contributed, especially the rise of cyberfeminism: a key text was Donna Harraway's "Cyborg Manifesto," published in a specialist journal in 1985 but in a more widely available version in 1991.[15] Also, in the 1990s, advances in wireless technology, networks, RFID tags, and sensory devices brought forth the spiraling world of "ubiquitous computing" we are still trying to navigate today.

But what possible roots does the practice of WTA have already in the art world? What is the history of wearable art? In fact, while the phrase is common parlance, its use is often casual and its meaning, vague. Fashion and art have always had close connections

In the same decade, DARPA/ARPA started programs to explore the arena of wearable computers and devices for use in battle.[16] But there were impetuses from fashion as well. Designer Thierry Mugler showed jackets printed like circuit boards on the runway in 1991 and Walter Van Beirendock used flashing LEDs on T-shirts in his "Avatar" collection in 1997. That was a banner year that also saw Margaret Orth at the MIT Media Lab develop methods for stitching electronic circuits directly into fabric. The same year, a "Smart Clothes Fashion Show" created by the students and faculty of Creapôle École de Création (Paris), in collaboration with Professor Alex Pentland (MIT), was held at the Pompidou Center in Paris. In 1999 Katrina Barillova used her intelligence training in the Czech government to conceive of technological garments and founded the influential *Charmed Technology*.[17] These few examples must serve to represent the flurry of activity during these years.

As a result of that activity, literature on aspects of wearable technology began to appear--though at a pace that is slow by comparison--notably Bradley Quinn's *Techno-Fashion* (2002), Suzanne Lee's *Fashioning the Future: Tomorrow's Wardrobe* (2004), and Sabine Seymour's (forthcoming) *Fashionable Technology: The Intersection of Design, Fashion, Science and Technology.* But none of these texts pull together the disparate threads of wearable technology, nor do they address the aesthetic potential or social dynamics of the new practices.[18]

Rather, the most promising ideas were put forth by certain practitioners themselves. In 1998, a Master's student at MIT's Media Lab, Elise Co, who designed many garments utilizing luminosity, remote activation, and bodily sensors, was also among the first technicians to articulate and explore the ramifications of wearable technology for human expression in the context of garments and fashion. Co writes:

> With this research work I have tried to explore the ways that technology and computation can expand the vocabulary of fashion and change the way we think about our bodies as they relate to others and the environment. From the experience of designing and implementing each project, it is clear that we must somehow become more facile, able to move dexterously between various aspects of design. Beyond a generalized system for creating computational garments lies the fundamental need to change our notions of hardware and software as separate entities, removed from the physicality of fabric, wind, and shape.[19]

In her work, Co brought together crucial considerations for understanding wearable technology as a multifarious practice: technology and computation vastly expand what we are able to "say" with, or about, garments. And the bodily experience of wearing and moving in them is central.

Wearable Art

But what possible roots does the practice of WTA have already in the art world? What is the history of wearable art? In fact, while the phrase is common parlance, its use is often casual and its meaning, vague. Fashion and art have always had close connections, from the time Paul Poiret, a founder of French couture, told his clients he was making art works and his shop was a studio. But serious art in the form of clothes, presented on the body (as opposed to on a wall, for example), emerged in the 1950s and 1960s alongside art world interest in the body (body art) and in time-based art forms, like performance and video. Artists like Atsuko Tanaka (*Electric Dress*, 1959) created wearable works that could be worn or "hung." By the 1980s and early 1990s, with the development of the feminist art movement and its interest in fabric as art medium and art world critique as a practice, wearable art had become a more common theme, though not always an accepted one. Its marginality is epitomized perhaps by Hunter Reynolds' Patina du Prey's *Aids Memorial Dress* (1994-present), a ball gown embroidered with the names of thousands of AIDS victims. It has been widely exhibited internationally for more than a decade, but remains relatively unknown. On the whole, wearable art has been a critically invisible practice.

If art-as-dress remained on the fringes, high fashion was welcomed by major art museums in the 1990s. True, even earlier Diana Vreeland's fashionable exhibitions, culminating with her Yves Saint-Laurent retrospective in 1984, hung frequently at the Metropolitan Museum in New York, but they were under the auspices of the Met's Costume Institute. The cause of art and fashion was taken on as a strategy by Director Thomas Krens, with feature shows like *Art/Fashion* (1997), curated by Germano Celant, Luigi Settembrini, and Ingrid Sischy, at the Guggenheim Soho, and *Giorgio Armani: A Retrospective* at the uptown Guggenheim in 2000. The latter show especially helped fuel widespread criticism of Krens's marketing-oriented vision for the Guggenheim brand, but negative criticism has a way of advancing the discourse anyway, and art-as-fashion became ensconced in the worlds of museums and exhibitions.

As opposed to actual fashion, which is unabashedly commercial, art (its institutional articulation) has long maintained a fantastical existence behind a mask of disinterested aesthetics, while being madly and schizophrenically market driven. You might say art, for some, has not come out of the proverbial closet. Within such a context, wearable art, as it were, faded into the woodwork. Despite suffering through institutional denial, wearable art possesses the unique ability to comment on culture and the way we live our lives, and so it has survived and thrived and has been the subject of a growing number of exhibitions at university galleries in recent years, including (in the U.S.) the Tufts University Art Gallery's successful touring exhibition, *Pattern Language: Clothing As Communicator* (2005, curated by Judith Hoos Fox) and Columbia College Chicago's *Sartorial Flux* (2006, curated by Valerie LaMontagne). Blogs and websites also demonstrate continued interest in the interface of avant garde fashion and art, particularly *Showstudio* (which went on line in 2000 and is still going strong: see http://www.showstudio.com/) and *Fashion Projects* (online and in print journal begun in 2005: see http://fashionprojects.org/).

Likewise, garments and fashion play a significant physical and conceptual role in the work of many contemporary artists, though this is seldom acknowledged as a critical direction. Cindy Sherman, Vanessa Beecroft, Robert Kushner, Sylvie Fleury, Rosemary Trockel, Andrea Zittel, Matthew Barney, Tracey Emin, Yinka Shonibare, Thomas Hirschhorn, Christine Hill (her *Volksboutique* at the 2007 Venice Biennial), and Richard Prince, among many others, engage with the culture (and sometimes the industries) of dress and fashion in their work.[20]

Interestingly, a guru of new media art, Lev Manovich, in 2000, was among the few significant spokesmen to realize the potential of fashion (broadly defined) for art:

> It is the beginning of the new century . . . . We want to imagine ourselves anew. If visual art, hopelessly stuck in recycling its recent history over and over, can no longer help us, where can we turn? Enter fashion. Fashion is everything contemporary art is not: it is concerned with beauty; it is well aware of its history over many centuries, rather than just recent decades; it is more semiotically layered than the most complex Photoshop composite you ever worked on; and it has one ever present constraint (and only constraints can lead to great art)--the human figure. This constraint gives the art of fashion its vitality, its optimism and its inventiveness.[21]

It turns out that garments and fashion--as facts or ideas--occur constantly in art, and in an act of aesthetic sleepwalking we continuously forget how persistent their presence is, so imbedded is the superficiality of our viewpoint, or just perhaps our collective amnesia, on this subject.

Wearable Technology Art (WTA)--a Cohesive Practice?

Like artists working with wearables, artists working in all forms and technologies of digital and electronic media also face waffling recognition by the art world. History shows us that the art world shies away from association with technology and science (most of us have heard enough about C.P. Snow's 1959 lecture, "The Two Cultures").[22] But, here again, things are changing. Pioneering surveys, like Christiane Paul's *Digital Art* (2003), have begun to appear, as have a few anthologies seeking to define a discipline, like *MediaArtHistories* (ed. Oliver Grau, 2007), but critical literature on specific work is still limited and scattered, and comprehensive indexing is lacking both online and off. A few key works provide examples in a field where much has yet to be written. For example, Edward Shanken has demonstrated correspondences between the appearance of technological art works in the 1960s and the advent of conceptual art--a defining development that still informs art today.[23] But many specific technological art practices go unrecorded or unrecognized by wider potential audiences, and certainly practices involving technology worn on the body are among the casualties.

Moreover, a role for fashion and garments in ivy tower discourses of culture and aesthetics has been slow to emerge. So it is not surprising that practices involving wearable technology have received little attention in the academy, or even that such attention as exists has frequently been directed toward notions about skin and the naked body, not what is conceived around it. Not that works by groups like KnoWear (*Skinthetics*) and the performative experiments of Orlan, Stelarc, and the like are not important and thought provoking, but they

do not engage with quotidian reality and intersect both the "space of places" and the "space of flows" (real and virtual space/time experience) as often as creative experiments with wearable media do.[24]

In fact, much WTA research is scattered widely in academic departments and institutes around the globe. It could hardly be otherwise, since there are so many different challenges: smart textiles, woven circuitry, luminosity, sensor and networking implementation, and critical strategy. Among institutions where efforts in these areas are taking place are Extra-Soft (XS) Labs and the Hexagram Institute at Concordia University in Toronto; Saint Martins College, University of the Arts, London; the Australian Network for Art and Technology (ANAT)'s *ReSkin* Wearable Technology Lab; Am-I-Able Network for Mobile, Responsive Environments (a collaboration between several institutions in Canada); the University of Art and Design at Helsinki; Studio 505, New York; V-2 Labs in Rotterdam; and International Fashion Machines, Seattle.[25] There are increasing numbers of artists involved, and these artists are scattered among international centers. But practitioners tend to communicate with each other regularly. Online forums and consortiums have helped establish networks for the artists and designers and their growing audiences, like CuteCircuit (http://www.cutecircuit.com/) and the Fashionable Technology Research Consortium (http://moondial.typepad.com/fashionabletechnology/2007/04/index.html). Technological and other wearables are regularly featured on major blogs like *We Make Money Not Art* (http://www.we-make-money-not-art.com/). Even such a commercially entrenched institution as ACM Siggraph, which has had wearable technology shows for years, has abandoned the dramatic, rock and goth-inspired productions full of cyber disco wear that characterized the shows during the 1990s, and turned to modified runway shows that feature the creativity of individual designers and artists in a vast array of looks, technologies, topics, and associations.[26]

Conclusion

WTA is gaining momentum. Through the efforts of the artists themselves, this kind of work is achieving visibility and expanding exhibition opportunities and online resources. Moreover, the work is getting noticed. Designers in the fashion industry (with its history of interest in technological innovation) are increasingly experimenting with technologically enhanced garments. Hussein Chalayan, for example, who has straddled commercial design and WTA for years, most recently created a stir with his "111" exhibition of animatronic couture--dresses that expand and contract, and reference the history of fashion --shown at his Spring 2007 runway show in Paris (beneath each model's skirt was a computer- driven system designed by the creative engineering firm 2D3D). The interest of the fashion industry in art and creativity, not to mention the current "Project Runway effect" of the popular television series--all of this has helped energize interest in WTA.

As opposed to actual fashion, which is unabashedly commercial, art (its institutional articulation) has long maintained a fantastical existence behind a mask of disinterested aesthetics, while being madly and schizophrenically market driven.

But the creative synergy of WTA is also fueled by the exponential rate of developments in mobile media technologies and industries and, in the academy, the corresponding rise of social theory concerning mobile networks, virtual societies, and web 2.0 phenomena. As mobile media becomes a more pervasive part of our experience as humans, and the technology itself vanishes into walls, furniture, pockets, and streets--as technology merges reality with the bubble of virtuality (Microsoft's Surface Technology, for example)--WTA can and hopefully will continue to do the opposite: make connections with the palpable, the fantastic, the self-consciously mechanistic, and the intractably corporeal aspects of the body as dynamic interface.

Still, there is a lot to be done. There are scarce financial resources for artists, who depend upon too few established institutions for financial support to do research or travel the distances required to show their work at still scattered international venues. And yet, one cannot help but wonder whether institutional recognition the way it exists in the art world might snuff out the very energy and wild experimentation that characterizes WTA and distinguishes artists in this field, who must "connect things that are separated." Perhaps new standards for aesthetic merit need to be devised. The same crippling effect might be true for critical discourse. WTA pulls together practices--science, technology, fashion/dress, visual/collaborative/performance art--that have grated against each other in the annals of art history. In no other art form that I can think of is the experience of being inside the work so rich, so profoundly associative, and at the same time so rife with real sensual and psychological impact. Not only are the technologies that artists deploy highly diverse, but the historical and cultural trajectories the critic must untangle multiply like shooting stars. There is no single meaning, no

logical explanation. If WTA is to be properly interpreted and understood, traditional linear strategies for academic analysis will have to adapt just as inventively.

References

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[4]Siegfried Zielinski, *Deep Time of the Media* (MIT Press: Cambridge, MA, 20060, p. 7.
[5]"Fashion after fashion" refers to the what has come after the rise and fall of the modernist couture houses, from Worth to Yves Saint Laurent, and involves changes in fashion's marketing, and the nature of its appeal. The term comes from Barbara Vinken, *Mode nach der Mode: Geist und Kleid am Ende des Jahrhunderts* (Fischer: Frankfurt, 1993).
[6]Other characteristics involved and noted by writers, like a newly sensitized notion of time, all hinge on a condition of technologization. See Ulrich Lehmann, *Tigersprung: Fashion in Modernity* (MIT Press: Cambridge, MA, 2000); Gilles Lipovetsky, *The Empire of Fashion: Dressing Modern Democracy*, trans. Catherine Porter (Princeton Univ. Press, Princeton,1994); and Elizabeth Wilson, *Adorned in Dreams: Fashion and Modernity*, rev. ed. (Rutgers University Press: New Brunswick, NJ, 2003).
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[10]Mark Wigley, *White Walls, Designer Dresses: The Fashioning of Modern Architecture* (MIT Press: Cambridge, MA, 1995).
[11]Lehmann, p. 129.
[12]See for example Bradley Rhodes's "Brief History of Wearable Computing," ca. 1999, written as a part of the Wearable Computing activity under Sandy Pentland's Human Dynamics Group at the MIT Media Lab.
http://www.media.mit.edu/wearables/lizzy/timeline.html #1907 accessed December 12, 2007.
[13]Christiane Paul, *Digital Art* (Thames & Hudson: London and New York, 2003), p. 164.
[14]The fact that both women and blacks were scarce at the Media Lab is discussed by Ronald Roach and Laurie Dunivant Sneiderman in "MIT's Media Lab," *Black Issues in Higher Education* (March 2, 2000), n.p. See also *Women, Work and Computerization: Spinning a Web from Past to Future*, A. Frances Grundy, ed. (Springer: Berlin, 1997).
[15]Donna Harraway, "A Cyborg Manifesto: Science,Technology, and Socialist-Feminism in the Late Twentieth Century," in *Simians, Cyborgs and Women: The Reinvention of Nature* (Routledge: New York, 1991; essay originally published in 1985).
[16]DARPA (Defense Advanced Research Projects Agency) is the research and development branch of the United States Department of Defense.
[17]Quinn, pp. 71-75.
[18]Sabine Seymour's *Fashionable Technology: The Intersection of Design, Fashion, Science and Technology*, forthcoming in 2008, will take a more holistic approach.
[19]Elise Co, "Computation and Technology as Expressive Elements of Fashion," M.S. Thesis at MIT, Program of Media Arts and Sciences, 1998. Accessed December 10, 2007 from http://acg.media.mit.edu/people/elise/.
[20]And examples need not restricted to contemporary artists. Andy Warhol pioneered the involvement of artists with fashion in the 20th century, but numerous fashion designers have contextualized their couture within the art world. See Carolyn Evans, *Fashion at the Edge: Spectacle, Modernity, and Deathliness* (Yale University Press: New Haven, 2003).
[21]Lev Manovich, "Fashion Sites" (2001), accessed December 19, 2006 from http:///www.manovich.net/DOCS/art_fashion.html .
[22]British scientist and novelist C.P. Snow's "The Two Cultures" was an influential Rede Lecture at the University of Cambridge in which he said that science and the humanities were two cultures that had suffered a complete breakdown in communication.
[23]Edward A. Shanken, "The House That Jack Built: Jack Burnham's Concept of 'Software' as a Metaphor for Art," L.E.A. Archives, Vol. 6, No. 10 (1998) accessed December 10, 2007 from http://www.artexetra.com/.
[24]Peter Allen and Carla Murry (KnoWear), Skinthetic, 1999; *Stelarc: The Monograph*, ed. Marquard Smith (MIT Press: Cambridge, MA, 2005). The space of places and the space of flows are roughly equivalent to physical/social space and virtual or networked space; see Manuel Castells, *Rise of the Network Society* (Oxford University Press: Oxford, 1996).
[25]Am-I-Able Network consists of the School of Interactive Arts and Technology, Simon Fraser University (SIAT), Extra Soft Labs (XSLabs), Concordia University, and the Banff New Media Institute (BNMI).
[26]The 2007 Siggraph Fashion show, entitled *Unravel* and "curated" by Amanda Parkes, even produced a small catalog.

Building a Culture of Ubiquity

Patrick Lichty

(*Editor's note: As this may seem slightly Dated, this presentation was origiginally part of the Emotional Architectures summit at the Banff New Media Institute in 2000. It is being included as it has never been published, and is a fundamental statement of my fascination with art and the body. It also has some prescient moments. - PL)*

For some time now, my personal interest in artistic practice is that which looks to capitalize on what I call the "cracks" in our culture. In this I relate to those interstitial parts of society which offers possibilities to the practitioner for delivery of cultural content. These include screensavers, Personal Digital Assistants, intelligent agents and microcontrollers to name a few, and I gave a talk called "the next little thing"[1] in 1999 at the *Invencao* symposium in Sao Paulo, Brazil. In that presentation, I looked at these cultural gaps and how art that utilizes them challenge monumental and novel forms of technological art through utilizing 'small systems initiatives'. By this, I mean the use of small, inexpensive, or transparent technologies to communicate a cultural or aesthetic experience through a sense of personal engagement. My practical inquiry since that time has broadened to include information appliances, responsive environments and cybrids [2]. Such a practical turn makes visible that the inquiry into "small systems initiatives" is actually a journey into the exploration of a culture of computational ubiquity. In my body of research vis-à-vis the shift in praxis from the screen to the palm to the body to the space, there are issues of representation that are revealed through the way that aesthetic content is embodied through the interface. This interface may be a screen, dataglove, head-mounted display or responsive space, but each mode of representation illustrated by each display or input device indicates a unique space of interaction and expression, whether on the screen body, or reinscribed in space itself. As we consider the arc of praxis from screen to body to space, perhaps this may create some insight into how a culture of technological ubiquity will be constructed, and what modes of expression may emerge from such cultural forms and technological developments.

the proliferation of personal information devices, personal computers ... is creating the environment for the establishment of a culture of the digital...

From a cultural perspective, the proliferation of personal information devices, personal computers, and explorations into technologies like Augmented Reality is creating the environment for the establishment of a culture of the digital. To add these devices together under the proposition that the presence of any technological agency will create its own cultural milieu is ill-founded, as the widespread attention to technological art forms has not been evident until recently [3]. The catalyst for the rapid expansion of a technological aesthetic has undoubtedly been the Internet, with its predilection for community building. This was evident from the Walker Art Center's former Gallery 9, with its extensive online archives and exhibitions, reflecting the move of art in the digital age to exploit a communicative mode of expression. In fact, Steve Dietz in an introduction voiced his awareness of the emergence of such a culture, and voiced his desires to support it, [4] "If we are at the formation of a next phase of technological society, then let us partner with developers and scientists as practitioners of the arts to create a cultural content which is thoughtful and incisive to conditions of the society."

My reflection on these words is that a portion of the world is moving toward a society in which information technology is saturating us to the point where there is a threshold for the creation of a culture or set of cultures, niche to mass, which are unique to the electronic milieu. This saturation is in the form of personal information devices, PDA's, and the proliferation of embedded controllers like so many nanomites circulating in the air in Stephenson's *The Diamond Age*[5], As I alluded to before. The catalyzing forces behind this cultural shift are connectivity between individuals and decentralized distribution of communication and content. These factors underlie the creation of the electronic culture, and are essential to the work described here. But, as this portion of humanity moves towards a culture of ubiquity, there are a series of localities that may serve as points of analysis for the communications of cultural codes. Each (the screen, palm/pocket, body, and public space) has unique modes of representation that allude to Hayles' linkage of the subject between its signification and the embodiment of experience [6]. All of these localities make visible systems of production, consumption, and representation that illustrate a possible ecology of signs within a culture of ubiquity.

The Screen -->

The most familiar embodiment of engagement with the digital/technological is the screen, and as such, exhaustive studies have been made of our interactions and representations of the aesthetic [7] that any more than a brief discussion falls outside of the scope of this article. Seminal works include titles by Sherry Turkle (*Life on the Screen*), and Brenda Laurel (*Computers as Theatre*) to name just a couple. However, the interesting point to most explorations of the ontology of the computer monitor is that they reflect the two-dimensionality of that visual plane as many critiques refer to textual and cinematic analyses of the virtual screen. This is to be expected, as much of our familiarity with the computer screen is that of a cinematic engagement through games, graphics and animation, or via the textual world of the word processor..

GameBoy Color, Courtesy Nintendo

...much of our familiarity with the computer screen is that of cinematic engagement through games, graphics and animation, or via the textual world of the word processor.

Another aspect of the screen, and we will see modulations in this effect, is some degree in our other manifestations of the human-computer interface, is that of its performative quality. This follows from Barthes' argument of the active role of the reader [8] in which the construction of meaning is now as much in the eye of the computer user than the programmer or media producer. Case [9] takes this further in positing that the electronically augmented writer and reader have to follow certain ritualistic procedures inscribed by the program and operating system, creating a 'performative' aspect to mediated electronic interaction. So, what I am positing here is that through the embodiment of any form of information, the mode of representation, interaction, and feedback creates a specific environment and context for the communication of any cultural content. In the case of the screen, we can see that it operates under certain rules of dimensionality, temporality, and interfacing protocols, such as the mouse/keyboard and size of screen that presents its unique ontology to the human organism.

The Hand

Following from this systematic reading of the screen as interface for the embodiment of digitally mediated experience, let us take the first shift off the screen and onto the hand. From the creation of Mattel *Electronic Grand Prix* to the Nintendo GameBoy [10] and Tamagotchi, electronic games are the precursors to the information appliance, and have been with us for over twenty five years. The introduction of information processing (PDAs), and cellular phones (distributed networks), create the opportunity for the creation of aesthetic experiences in the interstitial 'cracks' in distributed/cellular networks and highly localized devices like the Palm and Pocket PC. These devices, such as the Web-enabled cell phone and PDA/PocketPC have only been recently been recognized in the US as a platform for the delivery of cultural content. Currently, I know of few artists using these devices [11], probably due to their diversity of operating systems and nascent level of development/proliferation. However, the wireless networks bridge the gap between the Internet and cellular networks, and are the next logical step towards a ubiquitous transmission of cultural codes.

The information appliance is an intimate space, unlike the larger, more paper-like or cinematic space of the screen.

The information appliance is an intimate space, unlike the larger, more paper-like or cinematic space of the screen. Even at the level of the device as a chip on a board embedded microcontroller, it hearkens to systems in which the body is biometrically linked to the digital aesthetic space, or that the experience could be distributed across numerous small devices in large collaborative interactions. On another level, the information plays on the precious and fetishistic, as is evident in specialty items like gadget watches and PDAs for teenagers [12]. Because of these aspects of such technologies, it is logical that there is a specious quality about these devices that bears investigation.

In my own work, I have been interested in the information appliance as a place to subvert the intimate (both through violation of the 'trust' of the OS/user interface and creation of distributed collaborative spaces), to

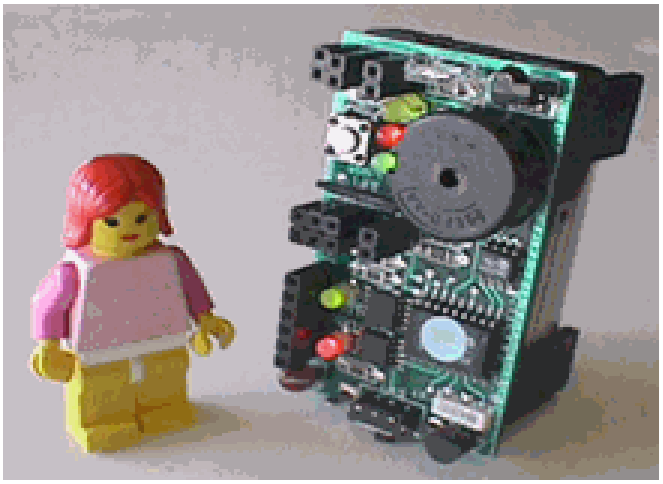
create networked experiences, and to become emotionally involved with the information structures we create. A project developed with the generative music company Sseyo was the *SseyoPhone*. [13]. The important concept for the phone is that is creates a step towards individual expression through the information appliance.

SseyoPhone, Courtesy Sseyo

This was done through allowing the user to use generative music algorithms to create unique 'signature' ring tunes and network-based collaborative jams. In so doing, it questions the role of collaboration and collective interaction in distributed environments by blurring the line between the artist/musician and the sampler artist/interactor. The phone itself illustrates the aesthetic object as McLuhanist prosthetic, and transparent (yet still physical) interface to the digital sphere. Its mode of representation is still rather straightforward in following semi-traditional compositional and game play processes, but what may be even more exciting are culture jamming experiments for this type of platform.

For example, one concept that plays on short-circuiting the intimate level of trust implicit in the functioning of an operating system is my series of *Alpha Revision* [14] interventions called "the Graphic User Interface". In one, based on Perry Hoberman's *Error Message* series, the user is greeted to hostile and ambiguous error messages when the applet is enabled in the Pocket PC. Instead of the usual error message, the user is treated to insults, arguments about Microsoft, and other comments which problematize the role of the palmtop as subservient assistant. In the other *Graphic User Interface*, the desktop is replaced by the visage of a mangled corpse, and the space of interaction is transformed into a forensic dissection table as the parts of the dismembered body replace the program icons.

However, culture jamming and generative music collaborations represent only two ways in which representation, interface and feedback combine in ways that are specific to the hand or pocket. A 1998 work by Simon Penny and Jamieson Schulte entitled *Sympathetic Sentience* [15], creates "complex patterns of rhythmic sound through the phenomenon of 'emergent complexity'" through a spatial matrix of twelve dedicated microcontrollers equipped with infrared transducers. Each device emits its own musical code through an infrared transceiver, which is then represented by audible tones. When the signal reaches the next device, its own algorithms add or subtract from the tonal sequence. The process continues until the tonal stream meets certain informational saturation and the tonal stream continues its mutation. Although this installation has little interaction with the human onlooker, is illustrates an embodied experience in which information is embedded into the gallery space to create a representational space for the mutating stream of musical tones as aesthetic metaphor for the data itself. Such a space alludes to the small tamagotchi-like 'love pendants' [16] which displayed various actions dependent on the attributes of the pendants around it (programmed personality traits, gender, etc). To take the metaphor even further, such a space could be taken to localized venues where pocket PCs or other PDAs could establish their own emergent communities through the transmission of aesthetic data. In this way the intimate duplicates itself into a local, or handheld form, one encompassing the local network, and the next expanding into numerous clusters of communities.



Cricket
(with LEGO figure shown for scale)
Courtesy Mitchel Resnick

Another way we embody experience through informational structures is through our toys. Any number of intelligent toys have come on the market, but of interest to me are the open-ended toys like the *LEGO Mindstorms* [17] home robotics system, which was developed at the MIT Media Lab. Mitchel Resnick's [18] work, utilizing small PIC microcontrollers similar to those used in the Mindstorms kit, used with the LEGO block system deals primarily with the concept of learning through the use of cognitive computational tools. These toy-like tools create a transparent culture of

computational ubiquity in the form of 'smart' beads, differing sensor blocks and mini-bots. In using these tools, Resnick has used the play-space created by the cognitive patterns of construction with the LEGO blocks to impart knowledge about abstract concepts like complexity, and to create a more accessible interface to technology to groups such as disadvantaged children.

Resnick's work in his "Beyond Black Boxes" [19] project also bridges between the space of the body and the handheld information appliance. The devices consist of small microcontroller driven LEGO bricks that exhibit simple functions. These blocks, called the Crickets, are programmable devices that could communicate, sense or perform other functions. The potential for these blocks would be for telemetry, communication, research of social patterns such as viral transmission, and so on. The *Cricket* devices engage in the intimate locus of the toy as an interface with informational spaces, and possibly could even serve as interfaces whose signification slides between desktop computation and technologies such as smart clothing. They reflect the tool as agent of expression, and resonates with the human organism's sense of play and use of symbolic objects.

To the Body -->

From looking at the aforementioned work, there has obviously been much work done in information appliance technology, and Resnick's work leads this investigation to the next step on our epistemic arc from the screen to space onto the body. As the modes of communication, representation, and interaction shift with the move from desktop computation to handheld devices, what is the shift that is created when the site of engagement moves from the hand to the body? What are the issues that arise when the corpii of flesh and information are so closely signified? Technological artists have been wrestling with these concerns in virtual reality for some time, but my concerns are less about the HMD-based sensorium than the embodiment of information on the flesh itself. Jaron Lanier, in a 1998 lecture [20], spoke of his interest in certain cephalopods in the South Pacific that communicate by changing the pigmentation/phosphorescence of their bodies. In this case, the display device is more akin to a transmission device between individuals than an interface between the individual and the informational space itself. Lanier's metaphor drew my interest when it is applied to a device I saw at Philips Design. It consisted of a jacket that incorporated a fiber-optic based display that was woven directly into the garment itself. Although the area covered on the jacket was relatively small and low in resolution, it illustrated that the communicative potential for garments that would serve as an overlay for the body of information relating to the individuals status, expressive nature, or other metaphors for 'body language'. In such a device the interface with the informatic realm would then become manifested outwardly, and could display 'bodies of text' [21], biometric information for those under medical care, or concurrent levels of communication with human and electronic counterparts[22].

An extant work that engages with the concept of concurrent layering of meaning through the use of embedded technology on the body is the author's *Internal Monologues* work[23]. In this piece, a Magritte-style bowler is outfitted with three components: A fluorescent alphanumeric display mounted on the front of the hat, an embedded microcontroller, and a voice recognition unit which sends information to the first microcontroller based on certain predefined patterns of speech. In the initially proposed configuration, the hat would then overlay an typically provocational 'subtext' onto the display, playing with cultural idioms like 'talking out of your hat' and 'it's written all over your face'. Other planned installations include an interface to the Internet so that online participants can transmit their own content into the display, creating a representational disjuncture between the artist's actions and the inscription of others' narrative onto the artist. With such an installation, the hat then becomes an embodiment not only of the informational space of the artist's expression, but also of a distributed community's voice as well.

Internal Monologues
Interactive Communications Hat
Courtesy Patrick Lichty

What is the shift that is created when the site of engagement moves from the hand to the body?

What are the issues that arise when the corpii of flesh and information are so closely signified?

Each of the bodily manifestations so far for aesthetically-based wearable technologies has stressed the device as communications display (outward flow of information from the wearer), but such a discussion of this particular genres must also include certain aspects of wearable computing. This particular genre will not be covered in depth here other than a mention of the MIT Wearable computing group [24]. The experiential shift that the work done by the MIT group is significant as it represents wearable computing as expression of fashion, or as possible platform for distributed performances, like Tina LaPorta's *Call and Response* [25], which utilized several individuals across a CU-SEEME link. Secondly, wearable computing reverts the gaze of the interactor to the primacy of the user, and not of the onlookers, as in our previous examples. When linked to technologies like the Philips fiber optic cloth, wearable computing could provide powerful platforms for personal expression, but in their current state, express more about commodity power and represent only slight paradigmatic shifts from the desktop. I do want to mention that various interventions that question the panoptic quality of computation have taken place with this group, but the bulk of information relates to the production of viable wearable computing products.

Between the Body and Space

One genre where the potential of wearable computing surpass its objectified commodity power is that of Augmented Reality, in which a head mounted display or wearable computer overlays graphic information over the view of the user in real time. It is an inversion of the informatic overlay onto the body speculated by the Philips fiber jacket, as the body of information now is superimposed upon the world and presented to the individual. The infosphere is now a representational spectre, moving in real time, but the physical world is now the interface, creating tightly linked heterotopic spaces instead of multiple bodies. .

At SIGGRAPH 2000, an ATR Japan project, entitled *Augmented Groove* [26] utilized simple machine vision linked to paper cards that, when manipulated, controlled musical and video elements on a monitor as participants manipulated the physical objects in the booth. Multiple participants could partake of mixing the audio and video to create the live dance mix creating a cybrid collaborative dataspace consisting of physical implements, performers, the interface world, and the resulting entertainment media space. A number of spaces are actually created in this piece, each unique for the user, but still representative of the doppelganger informational space that intersects with the performers. An important note to the installation was that the description on the SIGGRAPH 2000 website stated that the installation uses head-mounted visors. The actual installation utilized a large-scale projection screen as well as the audiovisual media output monitor, and thus alluded to the inscription of infosets onto physical architectures through the creation of responsive spaces rather than the AR interactions previously intended..

Augmented Groove AR controller
Courtesy ATR/Japan

SPACE

In seeing the *Augmented Groove* with a projection rather than a visor, it brings to the fore the issues of the aesthetic experience where the space itself is inscribed by the body. In this case, the wearable display garment inverts off the body, becoming architectural. Further still, in a responsive environment, the interface becomes transparent. Unlike Augmented Reality, in which the embodiment of the informatic world is still mediated by the worn display, the physical environment is now the tangible interface. The body needs few interfaces such as keyboards or mice, as the space itself represents the doubling of spaces for interaction. The technology has thus become transparent in that the responsive space is now the interface with the body of information. There are various ways in which the body can reinscribe the cybrid physical/media space through different methodologies of sensing and telemetry. The body and space can be correlated using attached sensors, translating the body directly into the surrounding architecture, to the use of embedded sensors throughout the public area itself. Our arc of experiential embodiment from the desktop to the space through the hand and then the body projects the informatic corpus onto the environment, imbuing a synaesthenic quality upon the intersection of physical, informational, and corporeal spaces, blurring that meeting of worlds. By the time our discussion reaches the milieu of responsive architectures, the space itself has reached a stage where it has transformed to the point where the distinction between spaces has become duplicitous and unclear.

This sense of transmutation of space is evident on the Sponge work, *M3 T-Ggarden* [27], as stated in their description: "*T-Garden* is a responsive environment

where visitors can put on sound, dance with images and play with media together in a tangible way, constructing musical and visual worlds 'on the fly'. The performance dissolves the lines between performer and spectator by creating a social, computational and media architecture that allows the visitor-players to sculpt and shape the overall environment…The media use a dynamic language that can be compared to the movement of verbs instead of the symbolism of nouns."[28]

The *T-Garden* has become a multifaceted performative dataspace in which the body sensors within the participants' costumes allow them to sculpt a media grammar of architectural space through performance. According to Kuzmanovic, [29] this refers to the transmutative qualities of alchemy in which a space and its inhabitants have made the transformation into a fluid environment in which distinctions between performer and audience, language and media, and the traditional grammars of representation are left for reinterpretation moment to moment.

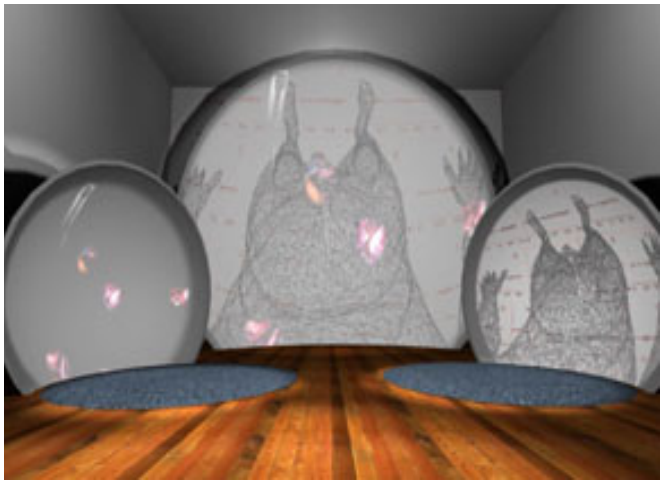
M3 T-Ggarden
Courtesy Sponge/M.Kuzmanovic

In Lichty, et al's *GRID* installations[30], the architectural space is transformed though sound and video into a space for communication, play, and collaboration as the participants work together to shape a transparent sonic environment. The environment can represent a stylized pastiche of actual contextually-based spaces or completely irreal environments, such as swimming as a peer in a school of whales. Technology is now transparent as all tracking is done through embedded sensors throughout the space, and hints at ubiquitous interfaces, which can then be used to represent infosets, whether virtual or cybrid in architectural structures. The end goal to *The Grid* is an interactive architectural space in which the participants can shape the audio, visual and possibly even structural components to respond to the group's collective actions. In the case of *The Grid*, the embodiment of the informational body has become both transparent and collective, as the installation itself is now the display and the interface, and the bodies performing within it are as inscribed by the reactions of the installation as they inscribe upon the piece. .

A further extension of the embodiment of experience through its inscription into technologically ubiquitous spaces is when an autopoetic element is incorporated into the environment

The last two instances highlight spaces where the responsive element has some sort of direct correlation to the actions of the visitor, whether it is representational in nature or not. A further extension of the embodiment of experience through its inscription into technologically ubiquitous spaces is when an autopoetic element is incorporated into the environment. This breaks the direct representational linkage between body, action and space, and creates a milieu in which the informatic corpus as aesthetic dataspace exhibits limited autonomy as it performs with the audience. In a proposed work, *Space Without Organs* (Lichty & Little)[31], the bodies of the participants are remapped back upon the space through projections of dataset representations of 3-dimensional bodies, organs, and internal sounds of the human anatomy across three responsive areas in a room. In the piece, two virtual worlds, one 2D, one 3D, are linked where the participants generate sets of metaphorical bodies and organs that are then mixed in real time as projections in the installation space to infer a reflexive inscription of the space by the very bodies that are within the technological space itself. In addition, a central GRID senses the actions from both worlds, senses the motion of participants within the gallery area, and creates audiovisual responses and builds cumulative datasets from the worlds' interactors. Such installations

The GRID (3d representation)
Courtesy Patrick Lichty



Space Without Organs (3d representation)
Courtesy Patrick Lichty/Gregory Little

..it appears that in a culture of technological ubiquity there will be numerous levels of engagement with the subject

create a metaphorical translation of signs that infers a series of semotic recursions between the body and its environment when responsive spaces become transparent. Furthermore, the inclusion of a cumulative element adds the possibility of a work self-generating its own body of information, which can become a collaborator in a performative aspect of the installation itself.

Conclusion

Throughout this discussion I have looked at the possible interstices in the emerging digital society that could be utilized for transmission of aesthetic content in a possible culture of technological ubiquity. From the ever-present screen throughout the various technological devices and methodologies to the disappearance of the interface in space itself, it appears that in such a culture there will be numerous levels of engagement with the subject. And, as such, an ecology of devices and systems can emerge that the artist can utilize for the transmission of their message. In each case, the mode of expression is linked to the embodiment of the information and its forms of representation (screen, hand, body, space), and this will in part define the scope and context of the artistic intervention that the practitioner will create. The aesthetic/epistemological concerns of the conceptual context of the work will be likewise tied to the representations of the space of interaction and response with the individual or group. These factors define how a culture of technological ubiquity may build its infrastructure, but it does not foresee the interstitial crevices that the artist my exploit for their aesthetic purposes. As with most applications of new devices throughout history, the trend has held true that a given technology is frequently used for radically different uses than first intended. The artist, through critical inquiry and diligence, will likely be the first to find the niches and cubbyholes in the expanding global networks. Dietz' appeal to the creative to fashion the artistic blueprint of the coming age is a call to practitioners of all disciplines to consider the cultural dimensions of the digital society. Our culture is a key reflection of our own society, and through the study of this series of works, it is my hope that I have made visible some of the underlying issues and structures that could be utilized to build a coherent culture of technological ubiquity.

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[3] In my involvement in technological art since 1978, it has taken until 2000 for institutions like the Whitney to include predominantly technological art forms like Internet art in their Biennial. Furthermore, the lack of a material referent for archival and objectification once again problematizes the institutional acceptance of these forms.
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[11] As of 9/2000, I have only seen a mention on the Rhizome list of a PalmPilot-based poetry project and talk of utilization of WAP-based cellular phones. No other references are known to the author.
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style games and sharing of notes between owners. The television ads consistently showed teenage girls using them, which is an interesting shift in demographic focus from the usual male audience. Unfortunately I do not remember the brand of the device.
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[21] Both Katherine Hayles in *How We Became Posthuman* Laurie Anderson in *The Ugly One With the Jewels* and Gregory Little in his *Bodies Without Organs* project muse over the similarities between the similarities of bodies of text (books) and bodies as text.
[22] I posit throughout much of my writing that we communicate on concurrent channels in person and when we create media, this may consist of various gestures, body languages, subtexts, or concurrent media texts.
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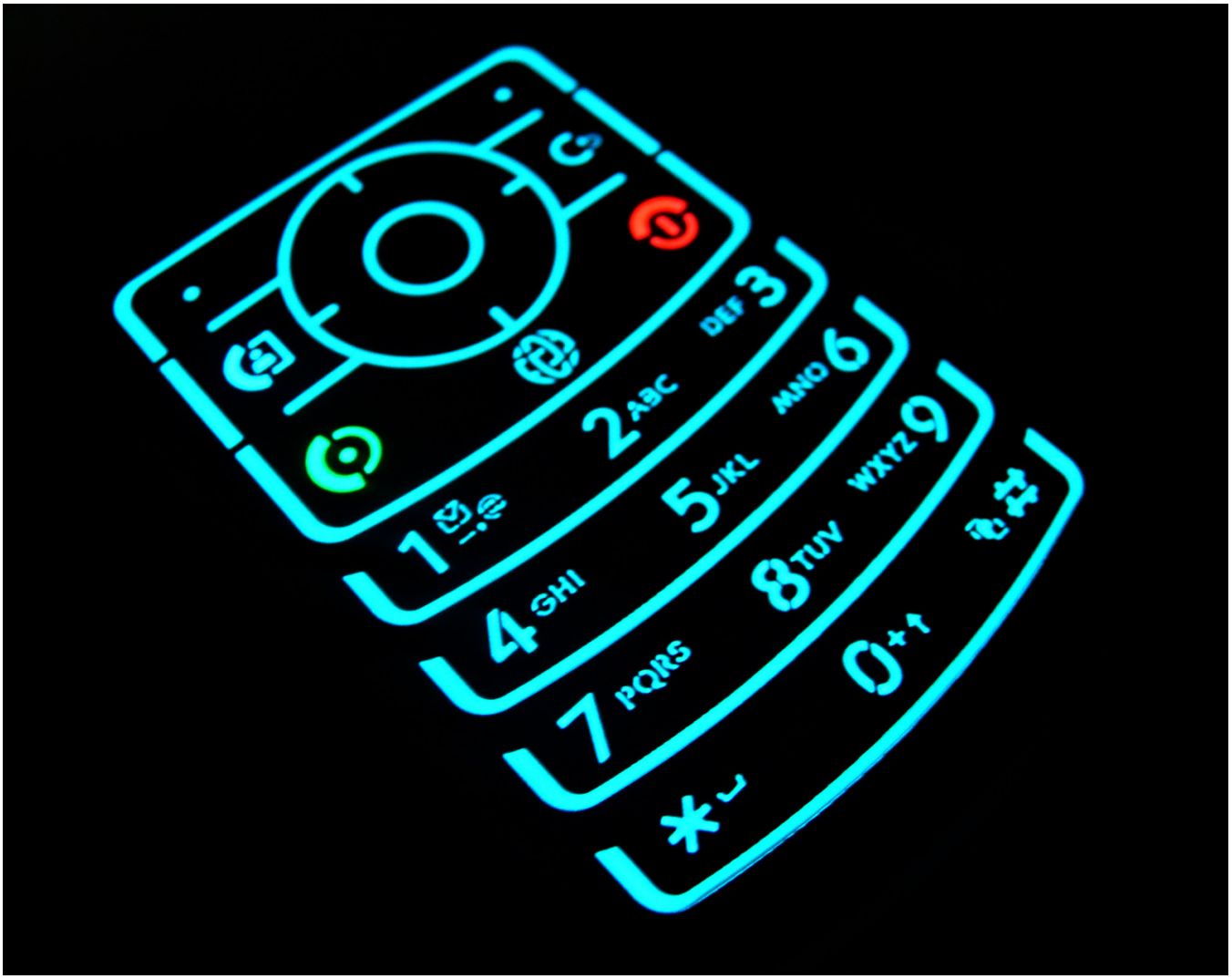
[29] Ibid.
[30] Patrick Lichty *The Grid*, http://www.voyd.com/grid
[31] P Lichty/ G. Little, *Space without Organs* current reference at: http://www.voyd.com/grid .



Dress For Stress: Wearable Technology and the Social Body[1]

Susan Elizabeth Ryan

This essay considers the work of artists, designers, and activists who, since the 1990s, have worked with body covering as survival mechanism and social tool. Individually or within collectives, they call their work art, design, or activism; or all three. The result is a "body of records" of technological, biological, and performable wearables that have not received the attention they deserve, either as art or design, or as vehicles for ideas about threats to species survival and collective experience.

For example, we can consider wearable artworks in the form of survival attire embedded in localized performative events concerned with social connection under adverse circumstances. Lucy Orta is prominent among such practitioners, who formulate clothing the body as critical, social, and ethical practice within an ambient "culture of fear."

Lucy Orta
Nexus Architecture X 50:
Intervention Köln, 2001

I call such work "critical garment discourse" (abbreviated as CGD), a term I propose to mean work in the form of fashion or clothing that concerns not just the body, but notions of dress--and dress, not just as historically viewed or normatively considered, but as experienced, situated and located, and empowered as a medium capable of significant commentary.

Is there a new way to think about aesthetic practice here? Typically, fashion and dress have been trivialized as objects of scholarship. However, increasing numbers of researchers are studying garment history and theory, and some argue, as philosopher Gilles Lipovetsky does, that, far from being materialistic incentives for the growth of market economies, notions about what we put on our bodies are involved in the very infrastructure of democratic societies. He writes:

> We have reached the era of *consummate fashion*, the extension of the fashion process to broader and broader spheres of collective life. Fashion is not so much a particular peripheral sector, now, as a general form at work in society as a whole. Everyone is more or less immersed in fashion, more or less everywhere . . . [2]

For Lipovetsky this is not a bad thing: fashion--or, more broadly, dress--is not a commercial but a quintessential element in the life of individuals functioning in societies. If the discourse of dress is as important as that to our social existence, one might ask, how does it mediate conditions of stress? In the future, what may pass for clothes, or extend beyond them, may be driven not just by fear of death (fashion's primal force, according to Walter Benjamin, writing of the rise of modern fashion in the 19th century), but now of political eradication, or even species annihilation.[3] This essay represents the beginning of my own research; it is exploratory rather than conclusive, so I will touch on a number of different phenomena. I will not consider gender differences in this presentation; rather, I will discuss aspects of dress that apply across genders.

Extreme environmental conditions constitute one form of stress that has long influenced the discourse of dress, and not just in the military-industrial complex where we have been electrically heating up and cooling down clothing for a hundred years. Stylish heated coats appeared on runways in the 1930s, and today new garments proposed for extreme environments, like the moon or Mars, are becoming a lot more fashionable. Further, designers like Mike Webb in the 1960s, or artists like Orta, later, have produced inven-

tively armored or wired up attire that protects against inclement circumstances, and architectural clothing that forms nomadic lodging. Current trends project visions of mobile populations that can move out and hunker down, and fears of unpredictable environmental and political challenges that keep populations on the run. This clothing discourse is a function of fluid subjectivities.

Numerous authors have portrayed the notion of post-modern selfhood under adverse circumstances as an interactive, ongoing process, much along the lines of Deleuze and Guattari's concept of Nomadology, the deterritorializing and reterritorializing cycle of the body-without-organs engaged in multiple social entanglements and lines of flight.[4] Relevant also is Bruno Latour's definition of society, "not as a special domain, a specific realm, or a particular sort of thing, but only as a very peculiar movement of re-association and reassembling."[5] Recently, renewed interest in behavioral, corporeal, and subjective processes has helped generate wearables that multiply and perform embodied powers and protect nomadic, homeless bodies in action.

CGD differs from commercial trends such as eco-fashion. I refer to the conspicuous planet-consciousness of the fashion industry in the past few years. Linda Loudermilk's "eco-luxury" line, for example, uses renewable resources--bamboo and soda bottles--and crafts them into high-end, luxury fabrics. Such work is marketed via slick trademarks, ignoring the inherent contradiction between luxury and global awareness. And it is a common confusion.

British handbag designer Anya Hindmarch attempted to project an environmentally conscious image by producing a cheap "designer" canvas grocery bag to call attention to those petroleum based plastic versions clogging up landfills. However, fashionistas waited in long lines to purchase the designer's bags and celebrities were photographed using them as purses. They quickly sold out in Europe and the US and product launches in Asia were cancelled, as the company says, out of "concerns for customers' safety."[6]

By contrast, Lucy Orta was also trained in fashion, and, in response to the First Gulf War, she began to work outside the studio, to investigate how, in the words of relationalist aesthetician Nicolas Bourriaud, "art was about working well within social reality, not just about finding a means of representing reality."[7] She began piecing outfits together at the Salvation Army which were shown in the streets on the outskirts of Paris during Fashion Week, positioned in direct counterpoint to that dominant institution associated with beauty, wealth, and privilege. Then, Orta created *Refuge Wear*. Though her collectivist garb has hung bodyless, as art works in museums and galleries, more often it has been worn, and to greater effect, on bodies in motion, in social interventions around the globe.

Left: Lucy Orta,
Refuge Wear, early 1990s

Right: Dealing with the Virus,
from *X-Files: Fight the Future* (1998)

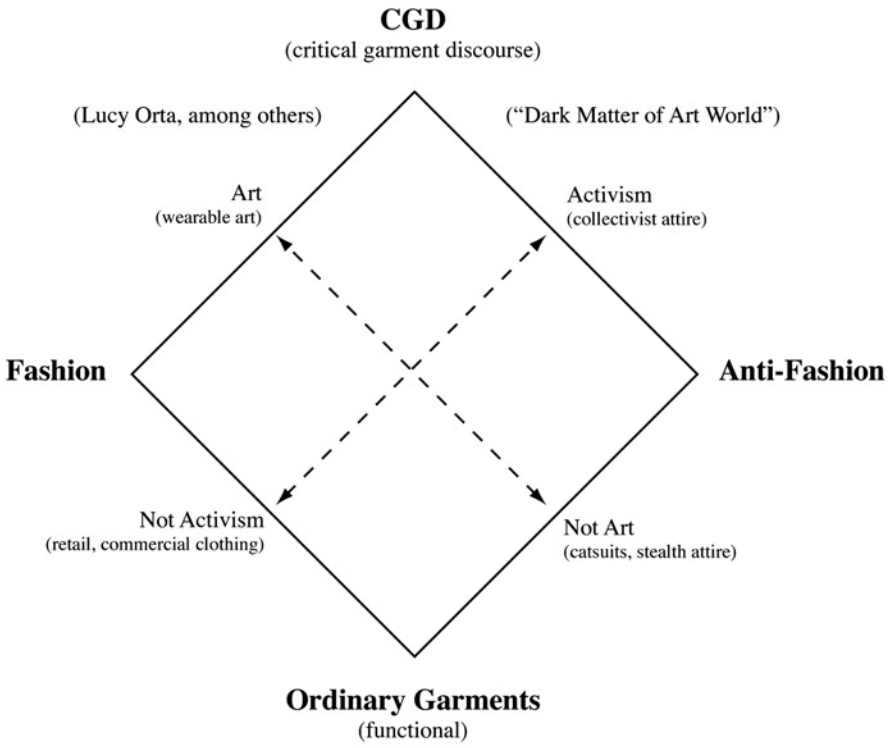
Orta's pieces succeed not because their imagery is so new, but rather because they project multivalent references to known hazardous situations. The garment references for Orta's pieces are everywhere from space and environmental suits to hazmat and "clean room" attire. We are familiar with the type from mass media--cinema and television scifi--from the *Star Trek* EV suits of the 1960s to the quarantine suits crucial to the plots of the *X-Files*.

I wonder if Orta fulfills Foucault's notion of a "founder of discursivity"--someone who has begun a new domain of thought (and, in this case, art practice) enabling new language and further contributions.[8] The discourse here is characterized by its deployment of clothing as worn, as concept, process, and visual aesthetic. It encompasses not just the body, but its performability, and the way dress participates in networked collectivity--in Okwui Enwezor's sense: "[the networked art collective] tends to emphasize a flexible, nonpermanent course of affiliation, privileging collaboration on a project basis more than on a permanent alliance."[9] Progeny of Orta's work include projects like Moreno Ferrari/C.P. Company's *Parka/Air Mattress*, Kosuka Tsumura's *Final Home 44-Pocket Parka*, and Derek Ryden's *Blizzard Survival Bag*, and all in various ways extend the discourse.

But in fact Orta's hooded coverall-as-intervention is not unique; it compares with projects created by many activist art collectives. Thinking about wearables routinely involves criss-crossing genres from couture to clothing as daily performance and more. CGD is perhaps another "expanded field" (to use Rosalind Krauss's term) for the 1990s and 2000s--some of it is art, some activism, some both, some neither.[10] Orta's work would locate the extreme "art" parameter of this system. Much of the rest would be what Gregory Sholette has termed the "Dark Matter of the Art World"--work so embedded in reality that is off the art radar.[11]

Lucy Orta, *Refuge Wear-City Intervention*,2001

Can ... (the) control of emotional, narrative content of sound enhance the understanding of abstract information?



Author's Diagram of Garment Art Garment Activism System

The realm of CDG includes garment-based political activities occasioned by regional threats: terrorism, factional struggles, and military aggression, for example, projects by the Barcelona collective Las Agencias, or Italy's Yabasta and Tute Bianche (White Overalls or White Monkeys). "If, as Foucault wrote, the body is the object of the power's micro-physics, if all social and political control exercises its mastery of the body, if the market economy has converted

the body into merchandise, the 'white monkeys' [Tute Bianche] have called for a 'rebellion of bodies' against world power," reflects Sergio Zulin, one of the organizers of that group.[12] Tute Bianche in action wear hazmat attire--white, as opposed to the police's black riot suits--and pad themselves to keep their bodies safe.

Tute Bianche (Disobedienti), Prague, 2000

Alan Sekula distinguishes this new type of mass mobilization from the street theater of the 1970s in three ways: "1. Unified opposition to the global diffusion of a largely intangible corporate capitalism; 2. the . . . carnivalesque nature of much of this protest; and 3. [which I emphasize] a connection between actual bodies in space and the disembodied realm of cyber space."[13] Gregory Sholette adds a fourth characteristic, the elevated visibility of creative forms of expression. And dress elevates, and further articulates and aestheticizes, such visibility. An example is Las Agencias' *Prêt À Revolter* (a play on *prêt à porter*), a line of colorful coveralls with huge hidden pockets for protesters' gear.

Las Agencias, *Prêt À Revolter*, 2002, for the World Economic Forum Protests

Though simpler and more widely worn, Vexed Generation's famous hooded jackets of the 1990s served as commentary on surveillance in the UK. Then the Center for Practical Magic recast the form as their *Ultimate Jacket*, 2003, in an art context.[14] The theme of the zip-up suit or jacket with hood or transformable neck cowl may be a prime form for art/dress discourse of the past two decades.

Vexed Generation Jacket, 1990s
Ralph Borland, *Suited for Subversion*, 2002, nylon reinforced PVC, padding,speaker, pulse reader, circuitry

Creatively deployed protective garments continue to function as social discourse, as exemplified by a series of projects done at the Bezalel Academy of Art and Design in Jerusalem in 2003--for example, Ralph Borland's *Suited for Subversion*, which foregrounds Sekula's notion of carnival, and the activist as clown within a media circus.[15] The image of the protectively garbed artist-clown is reiterated by The Yes Men in their *Halliburton SurvivaBall* (2006), which is like a satirical corporate version of Orta's *Refuge Wear*.

Biological threats like pandemics inspired tremendous creativity in the area of surgical and other types of protective masks.[16] Studio Samira Boon's "Get Well

The Yes Men, *Halliburton SurivaBall*, 2006, shown at the Catastrophic Loss Conference at the Ritz-Carlton, Amelia Island, Florida

Soon" masks offer protection but also counteract the isolating effects of disease. The masks create their own comic, playful space between caretaker and sick, as stated on the designer's website: "Products we make are not seen as final and fixed, but are adaptable according to circumstance. This flexibility creates an active relationship between user and object."[17] Other practitioners of critical wearables concentrate on responsive design in terms, not of carnival, but of terror and the need for body security within unstable ambiences. Whiton and Nugent's *No Contact Jacket*, which delivers an electric shock to an attacker; Gayla Rosenfeld's chain mail headscarf; or Ark Levy, Tal Lancman, and Maurizio Galante's *Safe Being: Bullet Resistant Shirt*--all reference the incursion of the violent into the everyday.

CGD also encompasses the symbolically wearable. The Tissue Culture + Art Project in the SymbioticA Art and Science Collaborative Research Lab at the University of Western Australia takes issue with fashionable use of animal skins and furs. There, little garments are lab-grown out of immortalized cell lines which are cultured and form a layer of live tissue supported by a biodegradable polymer matrix. While not actually wearable--yet--these "semi-living" mini-garments explore "notions relating to human conduct with other living systems, or to the Other," where the Other encompasses a fluid, mobile notion of ourselves.[18] Lipovetsky links the growth of ethical themes in society (like animal rights or fair labor practices) to the social discourse of democracy that has expanded in part via the ability of dress to articulate complex cultural circumstances and (hopefully) help negotiate differences.[19]

These days, I wonder where CGD is going. In the last few years, new incidents of wardrobed collectivity are decreasing, while--and this may or may not be linked--virtual connectivity within MMORPGs (Massive Multiplayer Online Role-Playing Games) or MUVES

Avatars for the Band Duran Duran, *Second Life* Screenshot from http://mmorpg.qj.net/ retrieved September 24, 2007

(Multi-User Virtual Environments), which involve expressive avatar appearance and attire, is soaring. Major examples like *World of Warcraft* and *Second Life* (where dress is a major concern) experience tens of thousands of players at once, and count members in the millions. Dressing and interacting as avatars in virtual worlds reflect the interplay and negotiation we make as processual subjects involved in social interaction, but, at present, as recently noted by Kathy Cleland, notions of virtual dress are largely stereotypical, and follow the ideals of bodies and clothing circulating in the mass media.[20] And theorists of embodied subjectivity, like Joanne Entwistle, remind us that the dressed body is a situated subjective practice and we must consider not only how dress is represented, but how it is experienced on real moving bodies within high-risk (i.e. real, not virtual) social environments.[21]

So, under ultimate conditions, will we be dressing our own bodies, or imagined ones? Some argue that, in a widespread cataclysmic event, the Internet will be unsustainable. But, setting that possibility aside, if we encase ourselves in virtual cocoons that sacrifice phenomenological, body-based communication, will our "wearables" migrate to virtual "be-ables," self-styled avatars that are bodies-without-organs within what are, in the end, corporately-owned environments (which these games are)? Will body-based concepts of self and social interaction go the way of the dinosaur? I think not, and that Sekula and Cleland are right. Actual notions about bodies and dress in real space are needed to support meaning for avatar phenomena in cyberspace. But only time will tell.

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A Virtual Interview with Geert Lovink

Susan Elizabeth Ryan

Geert Lovink is a media theorist, critic, and activist who teaches at the Institute for Networked Cultures, University of Amsterdam. He holds a Ph.D. from the University of Melbourne and was a founder of the Nettime mailing lists. He is also a member of Adilkno (Foundation for the Advancement of Illegal Knowledge). He is a radio program producer and a co-founder of The Digital City, the Amsterdam-based Freenet. And he is the author of numerous books on network culture, including My First Recession: Critical Internet Culture in Transition (2003), Uncanny Networks: Dialogues with the Virtual Intelligentsia (2003), and Dark Fiber: Tracking Critical Internet Culture (2002).

In an email exchange that took place October 2 and 3, 2007, I asked Geert what he thought about an exhibition of communication-oriented wearable technology, an exhibition we were planning to call "Social Fabrics." He said "Great!" but added some comments that are worth printing here:

SR: What are some of your thoughts on wearable technology?

GL: It is time for radical prototyping and some very explicit stuff. The danger of wearable computing at the moment is increased invisibility. After decades of carrying around heavy loads of gear, the pendulum now shifts to the opposite side, which is a shame. RFID in textiles is not a good thing. Fashion implies visibility, seduction, and play. It's nice if you weave chips and LEDs into fabric, but this should be done in order to increase freedom of form, not for some good intention or practical reason."

SR: You mention designers elaborating wearables ("weaving chips") but say this should be done "not for some good intention etc." Do you mean a good intention that is in fact not good, i.e., commercial? Or, good intention meaning just functional and not expressive?

GL: Aesthetics should put us off, disturb us. Beauty does. It is shocking. The integration of technology into clothing has the danger of becoming invisible and merely expanding corporate functionality, which is not beneficial for the user.

SR: Is there a good example of wearable technology used expressively that you have noticed?

GL: Who is the Oscar Wilde of our age? Momus, perhaps? How can we imagine walking and talking, dancing, peer-to-peer stations that give [things] away?

It is time for radical prototyping and some very explicit stuff. The danger of wearable computing at the moment is increased invisibility. After decades of carrying around heavy loads of gear, the pendulum now shifts to the opposite side...

In the early 1990s Adilkno speculated about data dandyism, written before the spread of the internet in society. The question is, how do we re-introduce the outrageous into the wearable technology discourse?

SR: Lastly, what are the implications for society-now regimented into notions of logo-fashion and icon uniforms-to (instead) technologically enhance the inherent quality of clothing to convey messages of all kinds, including personal or counter-cultural ones? Do we need to learn (or relearn) how to have things to say, as well as how to feel free to say them?

GL: Unlearning is a good start. Undressing street wear is another.

The Curious Apparel: Wearables and The Hybronaut

Laura Beloff

Introduction

Our use of technology is generally limited to standard applications and commercial ready-mades, which commonly exhibit a very functional and task-oriented approach to technology. The other viewpoints and possibilities of usage are often left unnoticed due to the ordinary and pre-defined perspectives offered by mobile devices available for consumers.

In my research I investigate wearable artistic experiments that explore concepts related to ubiquitous computing and to the merger of virtual and physical space-hybrid space. These wearable art works offer a different way to experience hybrid space in comparison to more standardized perceptions offered by commercial mobile devices. They aim at directing the focus away from a functionally oriented approach toward one inspired by the technology--in other words, toward a more conceptual approach.

Within my research I have introduced the figure of the Hybronaut; a person coupled with an artistic wearable device. The Hybronaut observes life and explores her existence in hybrid space. By simply focusing on being rather than doing, the Hybronaut refers to the wider phenomenon of technology within our society and in our future.

Connected Space

Many of our everyday practices are already intertwined with concepts of connectivity, mobility, and wireless networks. The virtual is increasingly being mixed with physical space. Still, the virtual and physical spaces are easily perceived as separated entities. The most common example of the merger of physical and virtual space is the extensive use of mobile phones in everyday life. According to a survey carried out in 2000 with young mobile phone users, the most important motivation for mobile phone usage is the simple fact of being "reachable." This also implies the value of belonging to a group, or "a tribe" in the way that Lobet-Maris writes about it.[1]

Various theorists and researchers have scrutinized the so-called hybrid space that emerges from this technological condition. Among others, Timo Kopomaa has written about the concept of a third space, Anthony Townsend about phonespace, and Adriana de Souza e Silva has defined the concept of hybrid space which is formed as a social space including physical and virtual space.

Timo Kopomaa writes that the mobile phone itself, as a communication device, can be interpreted as a kind of virtual space parallel to work and home. A mobile phone with its connections forms a third space for socializing and meeting friends, as well as functioning as a place to withdraw into privacy and safety within the midst of an urban lifestyle. According to Kopomaa, chatting in the third space is a primary function and a major way of expressing one's personality and individual self. The meeting of two people in third space is considered completely private in relation to the surrounding environment: it is one's own personal zone of freedom. The mobile phone is firmly linked to sustaining connectedness. As Kopomaa writes, the mobile phone is not solely a device to keep in touch, but a device for being together.[2]

Anthony Townsend has observed that time is the most important change occurring with new lifestyle opportunities offered by mobile phones. Time is a commodity, which is bought, sold and traded over the phone. Instead of living within a more traditional schedule based on minutes, hours and weeks, individuals now live within a constant stream of negotiations, reconfigurations, and reschedulings. One can be interrupted and can interrupt others at any time. Townsend has defined this as phonespace. According to him, a person living in the phonespace cannot let go of it; it is a primary link to the temporally and spatially fragmented world of personal networks of friends and colleagues, as well as offering constant reconfiguration of schedules and meetings. "It has become their new umbilical cord, pulling the information society's digital infrastructure into their very bodies."[3]

Adriana de Souza e Silva defines a concept of hybrid space in order to re-conceptualize physical spaces through the connectivity of digital mobile media. She writes about hybrid space: "the mix of social practices that occur simultaneously in digital and in physical spaces, together with mobility, creates the concept of hybrid reality."[4] She has focused her research on the use of mobile media devices as social interfaces which reshape space. Obviously, hybrid space is not solely a technological construction. According to de Souza e Silva hybrid space is emerging explicitly as a social space created by social networks and interactions, which are developing simultaneously in physical and digital space. Based on de Souza e Silva's definition, hybrid space inherits properties from both worlds; it grows larger than the sum of its parts.

As mobile phone users we carry individual spaces, as described by Kopomaa and Townsend, with us everywhere. The amplified importance of individual spaces as pockets of privacy within public space is impacting on our developing relationship with our physical surroundings. When large parts of our lives and important events take place within technologically-enabled private spaces, it raises the question as to whether physical surroundings will eventually be converted into a mere backdrop for the alluring individual spaces. Or possibly, as many seem to believe, the era of ubiquitous computing [5] will eventually remove the rigid separation of physical environment and virtual space.[6]

No Return

It has been argued that, when technologies reach a certain momentum, it becomes difficult --often impossible--to undo decisions. The technological momentum appears when technology is no longer an isolated machine. An example is an invention that has matured and become embedded into so many fields and practices that society can no longer voluntarily return to the previous situation without facing a collapse. The only choice is
to continue further on the path. In other words, society, once having experienced technological progress, can no longer go backwards because we have become dependent
upon it.

Currently computers and networks determine many of the daily practices within the developed world, both work-related and recreational. Most of our public services are also relying on computers--from banking to social services. The more recent elaboration of the use of computers and digital technology has been the development of wireless networks and various mobile devices. Everyday life is becoming increasingly tied to these invisible networks. For example, in the western hemisphere it is becoming harder to manage one's everyday life without a mobile phone. It is expected that we all have our own individual phones, and that we are available via them. The return from this situation would mean replacement of public phone services (phone booths), deconstruction of mobile networks (antennas, servers), and re-evaluation of the work culture that has quickly adapted to the usage of mobile phones that offer both more mobility and more control over the employees. In the western world the technological momentum of wireless communication devices, such as mobile phones, have undeniably approached and even reached its point of no return.

Without being aware of the fact, the majority of us are already inhabitants of the hybrid space defined by de Souza e Silva [4] through the use of mobile phones or other connected mobile devices. Even if our mobile phones are always on and we are constantly connected through them, the concept of hybrid space that we share with other connected bodies, and its wider possibilities, are easily left unnoticed. This could be claimed as the result of our standardized attitudes towards technology. Technological devices are often solely scrutinized as to their functionality and usability. Johan Redström writes, "though phenomenological, sociological and other studies have challenged and expanded our understanding of technology, practice still seems to be dominated by an instrumental perspective. Central to our understanding of technology still lies notions of use, the idea that technology is the means for achieving certain ends, often by amplifying the power of our actions."[7] We carry mobile phones with us to be connected and available to others; we possibly read our mails with them, and pay our bills via them.

Mobile devices are commonly considered mainly as tools for these pre-specified tasks. Also, the various possibilities of use, which are offered for us, are often standardized and restricted to defined specific functions. A popular phenomenon of personalization of private phones with unique phone covers, wallpapers, ringing tones, and amulets, is a simple example, which readily creates a false idea of freedom. Though we all can apparently choose from within a wide range of computers, phones, and other commodities, these are all still enveloped within larger technological systems. David Nye writes: "It is easier to select among many telephones than it is to do without one."[8]

In the current situation, hybrid space is only attainable by way of standardized interfaces (for example, mobile phones) with predefined functional possibilities. To be able to function or experience hybrid space differently is out of reach for the average consumer.

Artistic Strategies

The wearable and mobile technologies bring the virtual layer of the world more rigorously into one's physical, bodily presence. These kinds of "personal technologies"[9] are expected to be attached to the body and used in one's everyday life. There no longer exists a separated virtual world as its own entity, but the virtual layer of the world is blending into our physical reality. Like de Souza e Silva has stated, within hybrid space we are communicating and socializing simultaneously within the both layers, virtual and physical. [4] In wearable and mobile technologies the physical reality is as important as the virtual reality.

The development of wearable, small-footprint technologies, and wireless and mobile networks, has impacted on the manifestation of various artistic projects using mobile and wearable devices. One of the earlier wearable works is, for example, K. Wodiczko's *The Mouthpiece (Porte-Parole)* of 1993. It is an instrument that covers the wearer's mouth by a small moni-

tor and loudspeakers. The instrument replaces the immigrant's actual act of speech with an audiovisual broadcast of prerecorded, edited, and electronically perfected statements, questions, answers. Wodiczko writes: "Strangers in their relation to the self and to the non-stranger (as well as to other strangers) need a thing-in-between, an equipment-artifice that will open up discussion and allow them to reveal and to share (communicate) their experiences, identities, visions, and unique strangenesses."[10] According to him the wearer appears as a prophetic storyteller and poetic interrupter of the continuity of established life in public space and the dominant culture.

Recently artists have also begun to expand the notion of hybrid space and its possibilities by exploring the limits and creating customized situations. These kinds of artistic works [11] experiment with new perspectives that oppose the pre-fabricated standard perceptions, which neither offer possibilities for exploring the shifting notions concerning hybrid space, nor address critical notions concerning the ways we use technology.

Machiko Kusahara introduces the concept of "Device Art" as a new approach in understanding Japanese contemporary media art. It is outlined in a following way: "Works of Device Art involve hardware specifically designed to realize a particular concept. The functional and visual design of such hardware, or a device, is an essential part of the artwork. Material and technology are explored and used in an original and innovative manner, as is familiar from the Japanese tradition of respecting tools. The material chosen is important for users to keep in touch with the real world." According to her, artists visualize what technology means to us, and they also help to reveal what is happening inside the black box of technology when information technologies become more invisible and ubiquitous in our daily lives. The devices created by artists can result to become either ironic or playful, as art has no straightforward practical purpose. [12]

The Hybronaut

Hybronaut is a figure, a person, or a body, coupled with a peculiar-looking wearable device. This figure becomes a kind of space traveler, who is equipped to be able to exist within hybrid space and explore its possibilities by producing a non-standardized perspective on this space, and also by pointing to the restricted manners in which we are currently allowed to use hybrid spaces.

The concept of Hybronaut was created to be able to consider a user and a wearable device as a single unit instead of investigating them separately. Ana Viseu introduces a hybrid actor, which is a body coupled with a wearable device. She writes that in augmentation physical actors (bodies) are augmented with, or host, computational devices that participate in the processing of information. This creates new synergies that would be beyond the abilities of each individual actor. "Rather than building self-contained machines, or leaving the body behind, machines and humans are coupled together into a new hybrid actor." [13]

Hybronaut is created within the realm of art as an attempt to pin down (or categorize) an increasing amount of artistic works that appear in the forms of wearable technologies, but do not otherwise follow the typical characteristics of wearable and mobile development.[14] The focus is on works that are wearable or portable, mobile, and networked, either via digital network or with another distinct connection to the surroundings. While being a Hybronaut, the user is not only appearing in a physical environment, but is simultaneously appearing in a virtual sphere. The possibilities for a variety of concretely linked relations are expanded via means of technology. These relations can include persons, environment, nature and other artifacts. The presence of the relations is emphasized in the Hybronaut's equipment with a constant connectedness (and with a constant awareness about the connectedness).

The--often-curious looking--wearable device, which is an essential part of the Hybronaut, raises curiosity through its visual appearance. This fosters interaction and communication with the public. One could claim that the Hybronaut is a user turned into a performer. The Hybronaut carries her own (connected) world with her, pointing out to the public her private investigations concerning both connectedness and our shifting notions of space, presence, the real, and the virtual.

In some way the Hybronaut can be compared to a flâneur [15]. The appearance of the flâneur was influenced by the material circumstances of the city, for example, at the time, the newly developed concept of department stores. In a similar manner the concept of hybrid space and even the figure of the Hybronaut have appeared within the technological development of (commercially enabled) wireless and mobile networks. The flâneur, like the Hybronaut, is a figure on the street, strolling around the city without any specific goal or destination, simply observing life; the only clear difference here is that the Hybronaut is strolling and observing life within a hybrid space while the flâneur was enthralled by emergent urban life within the physical world.

My own research is focused on the meaning of artistic works which, in contrast to the functional approach to technology as a tool, often appear as awkward looking wearable devices and objects offering a more conceptual direction, rather than a strictly useful functionality. They are not designed for, or solely focused on, the user's perspective, in which case they would be designed as an aid for, or an extension of the user, and would often have a sleek or almost invisible

appearance. These artistic devices in question may have an absurd look, and can even be uncomfortable to wear. Their inherent playfulness in relation to technology, as well as their humor and irony combined with their awkward appearance, opposes the existing views and (restricted) possibilities of commercial mobile devices. These kinds of works question our understanding of technology and its meaning for us.

The Works

In my artistic works, the Hybronaut's equipment is constructed from standard technological components and already existent possibilities. However, the way these standard parts are linked together differs from what is usually expected, or possibly even allowed, for normal consumers. By simply focusing on continuous existence via connectedness rather than purposeful functionality, Hybronaut refers to a wider phenomenon of technology within our society and in our future.

Sherry Turkle has written that various objects carry both ideas and passions; they can be emotional and intellectual companions that can provoke new ideas and reflect larger themes.[16] By making a reference to Turkle, I would like to propose to consider Hybronaut to be an evocative object to think with.

HEART-DONOR by Laura Beloff & Erich Berger with Elina Mitrunen (2007) *is a wearable vest addressing our life in hybrid space. You can "wear" the hearts of your own selected network, and observe the presence of these people in physical and virtual space.*

The work takes its point of departure by rejecting the concept of the differentiation of virtual (digital) and physical (real) layers of the world. This work is specifically constructed for hybrid space. The work *Heart-Donor* is a physical instantiation of a concept concerning personal social networks and life in hybrid space.

Laura Beloff and Erich Berger with Elina Mitrunen, *Heart-Donor,* 2007.

It is imagined as one's personal apparel (a vest) for long-term everyday use.

The wearer can make thirty recordings of heartbeats of friends and family as collected personal mementoes in the HD-vest. Each heartbeat will be stored into one of the thirty small lamps embedded on the front of the vest. The lamp will blink in the rhythm of the recorded heartbeat. Additionally each heartbeat is linked with this person's Skype-name (if she has one). The default color of a recorded heartbeat is green, but it will change to beat in red-color when the person (whose heartbeat is stored into the HD-vest) goes online with Skype. The "owner" of the HD-vest can observe her selected social network of people shifting their presence between the physical and the virtual layers of the world wherever she and the people in the network may geographically be. The HD-vest and its wearer reside continuously within hybrid space.

The form and design of the HD-vest is inspired by the traditional life-vest as a reference to the fragility of life. The heartbeat is used as a sign of physical life and presence, which is combined with another sign for a global presence within a technological sphere of the world. The work is not created as a tool or defined as a function aimed at specific tasks. It is created as wearable apparel enabling everyday existence within a hybrid space. One becomes an observer of the hybrid world, the one who simply exists within it.
http://www.realitydisfunction.org/heartdonor/

SEVEN MILE BOOTS by Laura Beloff, Erich Berger, Martin Pichlmair (2003-04) *"Seven mile boots, the magical footwear known from folk tales, enables its owner to travel seven miles with one step. With little effort one can cross the countries, to be present wherever it seems suitable and to become a cosmopolitan flâneur with the world as the street."*

The project *Seven Mile Boots* is a pair of interactive shoes with audio output. When wearing the boots the

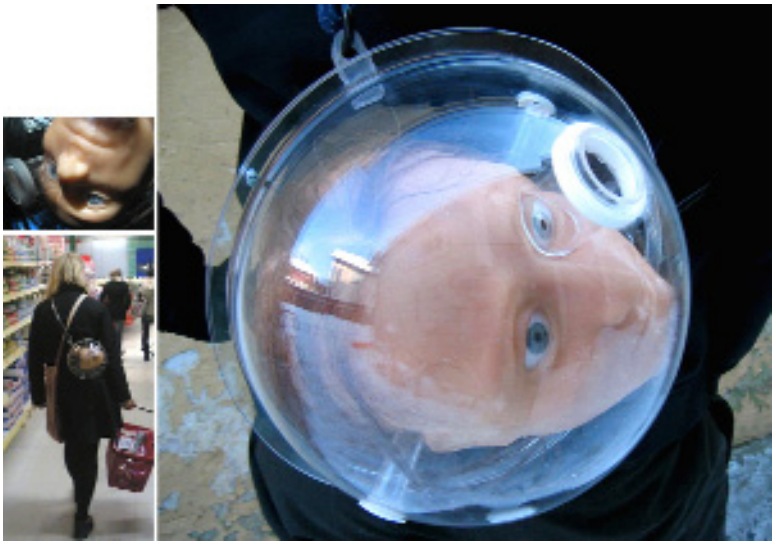
Laura Beloff, Erich Berger, Martin Pichlmair, *Seven-Mile Boots*, 2003-04

user walks around--as a flâneur--simultaneously in the physical world and through the literal world of the Internet. While walking in the physical world one may suddenly encounter a group of people chatting in real time in the virtual world. This encounter is noticed by hearing the chats suddenly coming out as a spoken text from the boots. The user can pass through a group of chatters or she can decide to stop for closer observation.

.The boots join IRC-chat rooms automatically under the name of "sevenmileboots." Every time, while walking, the boots are looking for a new selection of channels from the IRC-servers. The boots are embedded with all the necessary hardware: a computer with wireless network, microprocessor, sensors, amplifiers and loudspeakers. They are ready to function in any location provided with an open wireless network.

Wherever you are with the *Seven Mile Boots*, the physical and the virtual worlds will merge together. The piece is built upon feet and shoes as an interface to move in the text-based "non-space" of the chat rooms. The piece offers a perspective into processes that are an inherent part of our current lifestyle. The artistic focus of the piece, at the time of creation, was in the construction of an open structure which would be filled by real people in real time: real life. This kind of structure creates a possibility-space that pushes the users forward in a search for more substance, with a desire to consume and to experience. http://randomseed.org/sevenmileboots

Laura Beloff, *The Head (Wearable Sculpture)*, 2004-06.



THE HEAD (wearable sculpture) by Laura Beloff (2004-06)
The Head (wearable sculpture) is a piece with process-like, participatory and mobile approach to art practice. It is dealing with a view of contemporary, mobile and technologized society. It is built as a "wearable" object for people to adopt.

One of the main features of *The Head*-sculpture is that it is available for a free public adoption. The person adopting this wearable sculpture becomes responsible for it. It becomes like a second head for them and it should follow its "foster-parent" everywhere s/he may go (or occasionally be placed in a location of their choice).

The Head is connected to the Internet and it has an open public access via mobile phone text messages. *The Head* contains a mobile phone, which is embedded in such a way that the camera of the phone functions as the technological eye of *The Head*-sculpture, and a microphone is embedded into the ear. The general public can access *The Head* by sending a mobile phone text message (SMS). When *The Head* receives the SMS-message it responds by capturing an image and recording a short sound file simultaneously. The captured image together with sound is sent back as a reply to the sender. These images are also automatically uploaded to the public site in Flickr.com. In a similar manner as many of us use Flickr for storing and sharing our photos, *The Head* is doing the same. The dedicated Flickr-site can be thought as the mind of *The Head*-sculpture with continuous accretion of memories. On the site one can see all the observations of *The Head*. It develops to a collective memory. *The Head* will be adopted and carried around by various

Laura Beloff, *Fruit Fly Farm*, 2005-06

individuals and its vision and hearing are triggered by others to collect memories on the way.

Ideally, *The Head*-sculpture should be occasionally adopted by specific public figures; for example, a police officer, a politician, a tourist guide, or a teacher - professional, which generally have "a view" on society. The public access via SMS-messages would naturally remain open for the general public equipped with mobile phones. The piece has no permanent location. It is a nomad living amongst the people, moving from place to place. Simultaneously it is present and accessible at any moment via mobile phone. http://www.realitydisfunction.org/head/

FRUIT FLY FARM by Laura Beloff (2005-06)
The Fruit Fly Farm is a wearable space station designed for fruit flies. The nest for the flies is located in the center of this traveling artificial habitat. The public can observe the nest via captured mobile phone images.

Fruit Fly Farm is a second work (after *The Head*) which uses one of the most common everyday technologies for observations: the mobile phone. While *The Head*-sculpture is observing outwards to the surroundings and the society, the *Fruit Fly Farm* has an entire community under observation. Fruit Fly Farm is embedded with a camera mobile phone, which is observing the nest. The public can access the phone camera by sending a text message, which will trigger the camera to capture an image. The image will be sent back as a reply and also uploaded to a dedicated website where one can see all the uploaded images observing the fly nest. The sent SMS-messages (comments) will be displayed on the website with the image.

Traditionally fruit flies are considered to be a nuisance and a pest. In this piece they are treated as a living community which can be observed by the public. For the "owner" of this wearable *Fruit Fly Farm*, it is a pet that requires responsibility and care taking. The nest is located in the middle of the Ø20cm transparent acrylic ball. The nest capsule contains rotten fruits and needs to be re-filled approximately once a week. The outer ball and the nest capsule are perforated with small holes. The flies are free to fly in and out of the nest.

The audience members are invited to adopt the work

and become responsible for the fly farm. It is designed as a lightweight transparent ball with a custom made easy-to-carry system. http://www.realitydisfunction.org/

TRATTI by Laura Beloff and Martin Pichlmair (2006-08)

Tratti makes funny noises. It is a wearable noise instrument with artistic twist for kids of all ages. The initial inspiration was the idea of using the world as a constantly changing real-time score for the sounds and the notion of children being very loud at certain age-period. *Tratti* records a short sound clip (for example, one's own voice) and continuously transforms it using the surrounding world as a score. *Tratti* also sets up a connection with the universe; the actual satellites passing above *Tratti*'s location will be heard as specified sound-signals.

The current version contains a custom written software for a camera mobile phone, microphone, modified megaphone system with amplifier, and rechargeable batteries, all within a custom-designed wearable device. http://tratti.attacksyour.net/

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[11] For example, Stephan Schulz's *Tin Drum* (2006) is a wearable physical drumming machine which reads GPS data and translates this into drumming patterns. The artist writes that it is important to combine the virtual layer with a real world intervention in order to create a stronger connection between the two, and to use new technology as a catalyst for social interaction. In this work the user of the device becomes a public performer, functioning as a focus for public attention and as a juncture between the virtual and real layers of public space.
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[14] This includes also my own artistic production.
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TRATTI by Laura Beloff and Martin Pichlmair (2006-08)

Negotiations

Daniela Kostova and Olivia Robinson

Introduction

Negotiations, by Daniela Kostova and Olivia Robinson, explores issues of cross-cultural communication using readily available digital effects and surveillance technologies. Over two years, the artists developed an interactive performance system consisting of two connected costumes, one blue (the "Alien") and containing a hidden point-of-view camera, the other black (the "Authority") and carrying a visible camera. From the Authority's perspective the body of the Alien is replaced via blue screening techniques with the Alien's point-of-view, in real-time. The system has been performed in three public environments: Sardinia, Italy; New York City, USA; and Sofia, Bulgaria. In each performance, the Alien's hand-held monitor, which displays the "negotiated" video in real time, becomes a focal point for the formation of relationships between the spectators and the performers. This, combined with the costumes' conspicuousness, fosters the development of a site-specific story with recurring themes, including estrangement and integration; cultural economics of "authority"; flexibility of law, territory and ownership; and mediation of experience.

During performances, locals would stare as the system passed. The distinctive blue suit and authority costume exemplified the tourist, the alien, the exotic, the military, the Other - no matter the city. A familiar scenario emerged: an actual "authority" figure would approach the system and aggressively ask about the use of technology within his/her territory. The Alien would show the hand-held screen displaying the live manipulation of the blue screening process in effort to excuse our presence, while the Authority continued focusing the camera on the Alien, engrossed in her job documenting every interaction of the Alien. The screen thus became a bridge between the system and the unknown environment. The process it displayed, both familiar because of its use in movies and yet unfamiliar in the context of the street, allowed us to be seen as slightly magical oddities (rather than sharply intrusive) and thus less threatening. As the Alien struggles to gain minimal trust and invitation, the system becomes a tool for collecting stories specific to the manner in which each place presents itself to a foreign observer.

History

Negotiations is based on the project Invisible Suits (2005), realized by Daniela Kostova and fashion designer Galina Kumanova. The project was informed by Daniela's experience as an immigrant living between Bulgaria and the United States and by experiments with blue screen techniques, where the blue was used as a metaphor for displacement.

For *Invisible Suits*, Galina designed two costumes out of blue screen fabric that were intended to completely cover the bodies so that they could virtually disappear in the video post-production. The effect was achieved by the use of two cameras: one mounted on the person wearing the blue suit and another one shooting her from behind. In post-production, the blue color is displaced by the footage of the first camera so that the bodies seem to merge with their visual environment.

Through this act of digital erasure, the suits became a tool for exploring issues of silence and absence, and integration and estrangement in different political and cultural environments. While drawing from theoretical concepts such as Spivak's "subaltern (1)" and the Boua's "double consciousness (2)", *Invisible Suits* also examined the tension between supposed objective and actual subjective points of view.

The *Negotiations* system was born from *Blue Suits* when Olivia Robinson introduced automating the blue screen process through developing the hardware and software technology as well as an identity for the observing character. The system became a portable unit made of readily available consumer technology, and it now physically and metaphorically tethered the observer and observed, elements that became important while performing and exploring ideas of integration, authority, and surveillance.

...the suits became a tool for exploring issues of silence and absence, and integration and estrangement in different political and cultural environments.

Prototyping and Italian Police Negotiations - Nuoro, Sardinia, Italy

The prototype of the self-sufficient *Negotiations* system was first performed for the international exhibition *Boundaries* at MAN Museum in Nuoro, Italy (2006). This was the first time the costumes could perform the blue screening process live in public spaces. Although the system functioned and helped us navigate through the space, it exhibited technical and logistical problems that seemed to accentuate the stress of "cross-cultural communication." For example, some of our American power supplies failed when combined with the Italian voltages (even though we brought transformers) and the substituted Italian batteries refused to work with our American devices.

The performance happened on the streets of Nuoro where we walked in the suits with active technology. Through this performance we would explore visible and invisible boundaries within the city and the new system. In our initial concept, the Alien was the "victim" whose personal space was violated by the constant surveillance of the Authority. Through the performance, we found that the Alien was actually in control, dragging the constricted Authority by the umbilical cord-like cable that connected the two. The Authority's mission was to watch the Alien, while the Alien was free to choose her movements and interactions as long as she remained connected via the cable. The cable became a literal symbol of the confinement that an authority figure chooses to move within, and that a subject (the Alien) learns to adapt to.

Our unusual presence in Nuoro provoked emotional reactions from the locals. As they spoke in Italian or Sardinian, the Alien simply smiled back. The Authority did not smile, she remained focused on the Alien. Her behavior, together with the military costume and large video camera, appeared intimidating. We realized because we both were foreigners (Aliens) in Sardinia, neither of us understood the visual statement we might be making via the system. At the same time, we were both aware of our personal and political status in the performance: Olivia (the Authority) is from the US, a powerful and currently domineering country, and Daniela (the Alien) is from Bulgaria, a country associated with the influx of new (illegal) immigrants coming to Western Europe from the post-communist East.

Sardinia is an autonomous republic in the context of Italy, an island with its own language and parliament. At the end of our performance we were stopped by the police. It turned out they were federal Italian police stationed in Sardinia - they were alien as we were. The locals didn't appreciate their presence on the island and refused to speak with them in Italian. This story came out as we explained our performance, but after they demanded we turn off the technology and hand over our papers. We agreed on two things with the police: we both didn't understand Sardinian language, and that they were not wanted while we were only unknown. The story of this interaction was told through a single channel video incorporating images from the system and the story of the police.

Development and Story Telling

I Am Whatever You Want Me to Be -
New York City, USA & Sofia, Bulgaria

I am Whatever You Want me to Be is a project using the Negotiations system created for the show *Between Welcome and Goodbye, Artists Positions* (2007) curated by Vladiya Mihaylova for Vaska Emanuilova (City Gallery of Sofia). It takes the form of a two interactive performances in NYC and Sofia, a culminating single channel video, and a series of prints that unfold the story and establish the context for this piece.

As a public performance, *I am Whatever You Want Me To Be* connected two different urban realms: those of New York City (USA) and Sofia (Bulgaria) through the act of graffiti-making. Using graffiti as a metaphor for art, anti-authority culture and public space reclamation, we focused on the different positioning of graffiti artists in New York and Sofia.

While a criminalized and marginalized practice with a long history since the 70s and 80s in the US, graffiti culture gained popularity in the former communist countries during the last ten years. Soon after the communist regime was overthrown thousands graffiti paintings covered communist monuments and official buildings, representing an act of civil disobedience against the old power. They became symbols of democracy and change. Today, graffiti murals are often commissioned by the Sofia Municipality and through private advertising agencies. Our intervention aimed to explore the criminalized space of NYC graffiti and the state sanctioned graffiti of Sofia, as well as the economy and power mechanisms behind the two situations.

At least this is what we thought we were doing. Again, we were tourists in a foreign culture (graffiti), bringing with us assumptions, mythologies and an openness to the possibilities of what the system may help reveal. We decided to do graffiti in New York but were not sure how to make this happen. Driven by a tourist's curiosity and assumptions, we went to Queens, where we found graffiti covering an entire building. This negotiated space (5 Pointz in Queens) was private property (as are most walls in NYC) but with graffiti artists in charge of its surfaces. They had proposed to the building owner to become graffiti curators for its exterior and he agreed. In that strange economic realm the question arose, who benefits from this? And, whom does this art challenge? This building was the former Fun Factory that later became 5 Pointz.

Making graffiti and comic books (the format of the print documentation supporting the performance) are practices laden with mythologies

Making graffiti and comic books (the format of the print documentation supporting the performance) are practices laden with mythologies. Raised to legendary standards, the heroic anti-authority practices of graffiti artists in NYC and Chicago can now be found regulated on private buildings or institutionalized by galleries and museums. The graffiti culture was appropriated long ago and now bridges multiple worlds - even the historic graffiti celebrity (turned gallery artist) Lady Pink

was present at 5 Pointz with a team of five assistants on the day we were there. 5 Pointz is an ever changing monument of the "free graffiti culture" controlled by one rule enforced by the graffiti artists: you must use spray. It seems that in this legal and almost encouraging environment the graffiti lost its initial birth right by having no political potency nor reclaiming public space beyond the view from the F train in Queens. At 5 Pointz, where you can paint what you want, graffiti became a beautiful decorative piece of art, on the map of must-see NYC attractions.

We suited up with live technology across the street from 5 Pointz. Immediately Meres, the graffiti magistrate of 5 Pointz, approached us to ask about our cameras. (A large painted sign on the primary wall stated that no commercial photography was allowed without permission of Meres.) After showing Meres our small screen displaying the manipulated video, he was won over. We asked to do a graffiti, he said as long as we have spray. We asked if we could hire him to wear the suit and do the graffiti for us. He gave the job to Topaz.

I am Whatever You Want Me To Be created an interesting situation that could be read as socially and economically emblematic of Bulgaria and the US. In both places, we paid the graffiti artist USD 150 to paint our design. In the US, Topaz painted "Welcome" below the word "Goodbye" in the colors of the American flag. "Welcome" resembled a barrier with diagonal strips in red and white. Once finished it was covered by "Goodbye" painted with gold and blue stars. By overlapping the two words they cancel each other sending a mixed message, illustrating the complex and controversial immigration politics of the US. With respect, Topaz painted per our requests, though upon our return the following weekend we found our graffiti had already been painted over.

In Sofia, we met a graffiti artist who claimed to be the "first Bulgarian graffiti artist." (He wanted to remain anonymous and used only his a-k-a, Scum.) His attitude changed the power dynamic between "employer and employee," as he established his own rules for us to follow. After finishing a wall with the word "Between" spelled in Bulgarian (as one would phonetically pronounce the English word), Scum turned to the camera and declared that he sold the Bulgarian Graffiti Culture for 150 American Dollars and showed us the finger. His statement gave the performance a different significance and revealed aspects of the experience of living within a culture that identifies itself as secondary.

Today graffiti is seen as a sign of globalization, visually unifying the world. This specific "new" culture is international and inter-cultural, offering different ways of communication without having to know a specific language or artistic history. It can also be examined in relation to a traveler's recognition of a place.

In *I Am Whatever You Want Me to Be* there are several levels of mediation, another metaphor pointing to the removal from actual experience and first hand knowledge in the technological (post-industrial) society. "Our" act of making graffiti was mediated several times: through the negotiations with Meres at 5 Pointz, through the negotiations with Vladiya Mihaylova in contacting Scum, through graffiti artists who painted the graffiti, through exchanging money, through the technology which made the performer invisible. Our experience reveals little about the action of making graffiti, though highlights a foreigners experience within the edges of both graffiti contexts.

Conclusion

In each of the performances with the *Negotiations* system, there is a play between being seen and not seen. The performers stick out, yet ultimately the technology works to erase identities. Upon first view, the Authority seems to have all the power: she holds the only obvious camera, she is rarely herself in frame, and it is her costume that manipulates the video, which is transferred back to the Alien's monitor, reducing her to a hyper-visual "nobody." Without detail, she becomes an outline, a magnifying glass, a pattern of movements, a body incapable of taking up space.

But, as we discovered while performing the system in Nouro, the Alien wields partial control. Her self-awareness, having been placed on display by the Authority in her hand-held monitor, becomes a key to establishing relationships with curious passers-by. Or, as in the case of Topaz in New York or Scum in Sofia, the inhabitor of the Alien is not completely erased and his or her personality and agendas can still be made visible. The Alien pushes the story along, navigating society, exposing the Authority's role, spreading curiosity or voicing ideas. The Authority, bound to the Alien by an umbilicus of cable, can only observe this process, or at most slow it down. By tethering the Alien to herself, she has effectively tethered herself to the Alien. However, much as in the process of assimilation and integration, the Alien acquires this power over her surveyor at the cost of partial disappearance.

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The Body-as-Interface: A possibility to merge mind spaces with hybrids of physical and virtual worlds

Anne-Marie Skriver Hansen

Abstract

This paper proposes a set of ideas behind physical interfaces that provide us with the ability to express abstract concepts in the hybrid of virtual and physical worlds. It considers the types of communication that may arise as a result from the linking of body and mind, and it debates the use of stimulus in the communication with other people and our surroundings. By referring to the habituation process that happened, when people adapted to technology in the industrialized countries, this paper demands that technology now needs to adapt to us, so that we can expand the idea of how technology is used as a tool of expression and mediation. Here experience from other cultures, where physical expression is part of the everyday dialogue, is seen as a valuable source of inspiration. The main idea presented, is that wearable technology can give people the option to simultaneously express ideas and thoughts through an ensemble type of dialogue. It also suggests that it is possible to communicate with each other simultaneously in the co-creation of an experience. Finally, the ideas presented are linked to a specific attempt to address the topics discussed: The Vacuole Robes interface is described as an example of a wearable interface that offers the opportunity for simultaneous physical speech and co-creation of an experience.

Introduction

Upon having entered the 21st century, it is clear that we have a choice to integrate our body in a close relationship with technology in our everyday communication forms. This reverses the idea that our body is obsolete in the use of technology. Wearable technology fosters new forms of physical and non-verbal communication that challenge the dominating verbal language. New levels of communication with each other and our surroundings are possible, because the content-based digital media can be linked to postures and gestures that express stored-, projected- and meta-layers of meaning and thinking. So far, two parallel scenes inside digital media have developed alongside with each other. They have also benefited from each other while learning from mutual experiences. The first scene, which was prominent in the 90's is the scene of virtual reality, where people are "immersed" in the medium. The realization of a "platonic" world scenario, where story telling, imaginative landscapes and avatars arise from 3D miniature projected worlds gains popularity in *Second Life*, *EVE* and other 3D computer games. Since this scene of fantastic imagery can not be experienced physically, it has been important to simulate real natural forces to reach the feeling of gravity and momentum that we use to orient ourselves to and navigate in the real world. The virtual reality scene represents an inherent paradox: First it claims that it immerses people in phenomena that are not possible in the real world, but at the same time, it is necessary to simulate the real world till such a degree that the virtual world can provide the immersive experience that it promises. The other scene that has developed in parallel with the virtual reality scene was the physical computing scene. A part of the physical computing inventions are used as tools in virtual reality worlds to obtain a sense of visceral connection with the elements of the virtual world. Physical computing technology has provided us with innovative tools of navigation and expression. By integrating all possible body movements and signals, sensor devices merge the body with the medium - mind and thought does no longer have to be separate. We can reach the bodily experience of an imagined and abstract world. Enactive environments consisting of multi-variable real-time graphics, sounds and perhaps even physical materials are mapped to multi-modal interface structures that we can physically inhabit. The body has become a premise for experiencing non-substantial content as if it was substantial. The idea of body-as-interface has finally become an extensive research area.

This changes the our percepion of interacting with each other, because now, we are able to ascribe new meaning to physical movement. The dismissal of the body as-interface would be to regress to single point and click navigation. We are no longer consumers of a medium that offers us a narrow selection of possible routes to follow. We now have the opportunity to use interfaces that allow us to manipulate content as if it was a piece of clay. We can choose to challenge our role as a passive audience and actively participate in a non-verbal conversation - become virtuosos within the ranges of expression that media artists, designers architects and engineers challenge us to explore through interfaces that address our physical engagement. We have the opportunity to let our body become a resonating organ of our surroundings and other peo-

ple's inner worlds. We have the tools to establish a visceral connection to our mind, and if we manage, we can share this amongst each other at the speed of movement and touch.

The "Slush-Condition" - a Risky Moment of Transformation

A "risky" moment of adaptation between technology and body is currently introduced and debated by the media art world. The adaptation is "risky", because limitations of resolution and speed and the size and amount of sensor equipment can "slow down" the way we express ourselves. It may limit us and seem primitive compared to the speed with which we communicate with words. But there are already limitations inside the traditional media based communication forms, where static graphical icons and the written and spoken word cannot be experienced in any visceral sense. Furthermore, the word is single-threaded and temporal, while physical communication is multi-threaded. [1]

By positioning ourselves in a concentrated test area that will provide a cocoon-like shelter for our bodily transformation into an ultra sensory multi-modal interconnected and expressive unit, we can address aspects of how technology becomes symbiont with our needs to physically express and experience the abstract process of thinking. The way we perceive the different types of media, when they are closely connected to physical activity needs to be studied along with the speed and intensity of gestures and postures! A new discourse inside physical computing design and new media art can for example involve several thousand years of erudite human experience with the linking of body and mind. This profound knowledge can provide the theoretical background for physical interface experimentation. This will include physical exercises in the shape of ritual behaviors that are perhaps not symbolic, but used as tools to obtain mental experiences through specific physical performance. It will include processes of habituation with the various types of interfaces, so that mental activity can be transferred into precise and meaningful physical activity. This experimentation extends beyond the creation of physical exercise programs, where the goal is to entertain the user during the time of an exercise, and where the physical movement by itself does not provide any meaning. The goal of the current experimentation with physical interfaces could be to stimulate the physical communication of the user as a speaking person. Currently, experiments inside contemporary dance performance have established an interesting explorative connection between dancer and medium, where modules of artificial intelligence notice, and in some cases respond to the dancer's movements. (Here I will mention research groups like Soniacillari, The Open Ended Group, Proyecto Bipopus, Troika Ranch and Palindrome).

Our bodies cannot and will not adapt to the current array of electronic communication tools that are designed to reach the lowest denominator and often homogenize our ways of expressing ourselves. We need to be aware of the limitations of these interfaces in terms of their conceptual design, resolution and modality. Furthermore, the commercial requirements of mainstream product quality need to be addressed and we need to impress upon the product industry that wearable technology can be integrated with individual and personal needs to a much higher degree. If the interface was able to grow with a person's newly obtained bodily knowledge and skills, it could possibly diverge from the stasis condition that most technology products encounter, when designed to satisfy a limited amount of functions. If body interfaces were physical platforms for software that address complex human conditions, the same physical interface would become multi-functional and open to newly discovered ways of using it. This will support the development of a completely new vocabulary for physical speech.

Physical versus Mental?

There are several connotations related to the dichotomy between "physical" and "mental". The most dominant connotation is that physical action is "primitive", and mental activity is "sophisticated". Humans have developed through the activity of building tools that connect our body to our surroundings in a functional, complex and sophisticated relationship. The tool making process is based on layers upon layers of physical experience, where we have learned through a combination of conscious and unconscious, mental and subliminal organization of physical actions and reactions. Even though we have removed ourselves from the bare physical action of "labor", we are still in contact with the surrounding world, however, through several levels of abstraction. The problem with the current abstraction level is that it appears to be removed from the premises of the body. Instead of controlling things while being physically active in the situation, we "play back" a set of selective actions that have been precomposed and presented in front of us. As an observer, we activate a set of subtasks through switches labeled with icons. In this position, we are so far removed from the action situation, that we have difficulties inventing new tools that address the situation as such. The labeling of actions also extends to the labeling of what we call users into target groups, where interaction strategies are developed according to the user's demographical relationships, education, access to technology, life style etc. These are artificial labels that perpetuate inequities. Instead the user's situation, when encountering the physical interface, could be analyzed according to actor-defined purposes and action strategies. [2] If today's wearable technology is positioned in a synergetic relationship with our body, it will adapt to the way we experience a situa-

tion, as it follows the bodily perception and adjustment of the surrounding world. Here, the two seemingly disparate processes of being physical and mental converge.

Does technology disconnect bodily features?

Throughout the industrial age, machines have been developed to efficiently replace labor. In order to reach the freedom of communication over a distance, and the release of time consuming action, technology has become a surrogate for actions that we find "unnecessary" to perform. The only physical act that we have not labeled "unnecessary" is the sexual performance. This brings us to the point, where any physical activity can possibly be related to the sexual act. The restrained body language in many industrialized (Western) cultures shows that the body is no longer used as a tool of communication. Unless we are trained sportsmen, musicians, actors or dancers, our body's ability to make complex physical movements has become unfamiliar to us. What is left is the decoration of our body, where fashion styles carry references to other cultures, where physical communication is still part of the everyday dialogue. This type of decoration carries static symbols of how physical action used to provide a special level of communication. Static symbols are as 'compressed' layers of meaning difficult to unwrap and explore and sometimes we have even lost contact with the original meaning of the symbols that we refer to.

When information is compressed in static symbols and icons (like the ones we navigate with on the computer screens), we need to be professional in order to "perform", in order to be able to unpack and reconstruct icons of action, so that we can communicate impulsively, intuitively and creatively. Personal trainers, spin-doctors and technology help us with that. In talent shows people obtain their own individual professionalism, and they are finally 'allowed' to act according to their desires. But their performance is still limited by a strict set of theatrical guidelines that do not change their iconic appearance. Their individual performance in front of an audience does not give them the opportunity to share their professionalism with anyone directly. A physical interface that goes beyond point-click navigation of pre-selected professionalized actions presented as icons makes it possible for us to learn and express ourselves simultaneously, as we practice towards becoming virtuosos. If the medium is provided as a material that can be shaped, instead of being a collection of static symbols, we can construct our own dramatic and meaningful language through physical behavior. An entire new diversity of languages can enter the sphere of communication, and these languages can be learned through experiencing processes rather than memorizing icons and functions. Currently, the majority of electronic gadgets help us to select and share pre-composed material that we can collect and "modify" according to our own individual needs. The mass-produced spectacle of pre-composed expressions helps us relate to the part of the mainstream community that we find pleasing. This requires some degree of engagement, but these collect-and-combine-interfaces quickly become dusty libraries of media material, as collections get bigger. It is difficult to navigate in the huge amount of static material that is available. As an action situation passes by, it may be cumbersome to select and activate the right kind of material for the right kind of action. But when technology merges with our body, transformational media types can evolve naturally with the action flow. Because we start to carry mobile pieces of intelligence that can be communicated through physical activity, we include the features of our body and are now able to not just play back an action, but to express it with a flexible and dynamic medium. The D.I.Y. community explores the possibilities of "handmade electronics' that challenge physical skills: First in relation to musical performance tools, where gesture is essential, but also in relation to people's sphere of social connections, where the physical signaling of desires and needs has become an innovative, sometimes provocative form of communication. The genre of design noir takes into account that the body has an infinite amount of expression features that electronic devices can help "legalize" the use if in social situations. [3] A concrete example of this is Maywa Denki's tools and gadgets that are quirky, imperfect pieces of technology that have been developed from the desire of acting physically upon desires and needs. The custom made electronic devices behave with their own personality, when operated by a human. [4]

The Body-As-Interface - a Tool of Sensation and Expression

The body-as-interface consists of three key concepts that are digitally advanced mutations of features that our body already contains: The body as an enhanced multi-sensorial organ, the body as a physical converter of abstracted meaning, and the body as an interconnected unit that immediately transfers sensed and experienced material to other bodies. These enhanced features encourage active contribution to a physically mediated community of people, who make their ideas and thoughts manifest through visceral and physio-aesthetic experiences. When digital information is deployed through physical gestures, there are possibilities of a multi-level transfer of information. This adds another dimension to the understanding of the message sent, because meta-levels of meaning exist between the bands of expression that are made possible with a multimodal interface. New movement- and action-based memes will start to populate the sphere of language, as we currently know it. The concepts of transmission and reception will be focused on a process, where information permeates our body before

it reaches our brain, and the idea of the body as a resonating organ will be further elaborated. Interfacing possibilities will be far more holistic in their nature. Co-culturing with plant and animal life will be prominent, when we can learn physically from their ecological structures and transfer our experiences to robotic systems. The idea of the person as a user and consumer of a product will disappear, when technology merge with body-related features and is adapted by us as organs that interface us with other people. We will become participators of a social and physical situation and (re-)discover the possibilities of being able to co-invent a story, an environment, or space of information as it unfolds through the ensemble of actions.

Interconnected Body Tools - Sensations as Transfer of Knowledge

Tools of communication that are attached to our body and perhaps even embedded in it make us able to communicate through actual actions. Here an action does not need to be re-formulated and interpreted through words and texts, before another person understands and can respond. Body interfaces hold people in the experience of the situation. The physically expressed medium that contains thoughts and ideas is immediately transferred. This means that instead of collaborating about reaching a goal that is first set through a verbal conversation, people can co-construct the goal with a multi-threaded action-based conversation. In addition to this, the body related interfaces could even provide visceral stimulus, so that information can be immediately transferred from one person to the other. It does however require a person to adapt to the interface so that s/he can learn what the sensations mean. But when learned, the stimulus based information transfer can be multi-threaded, versus the language based information transfer that is single-threaded. People can acquire knowledge by harvesting sensations from others in a space. When directly interfaced with other people, animals, plants and materials, bits of information can freely traverse the space of a situation and be manipulated by the actions performed in that space.

Body Interface Speciation

The question is: How many physical information transfers can our body handle? Is there a risk that "mind space" will overwhelm and replace the physical inputs we get from the unmediated world? Imagine an interface that helps you "switch off" basic human sensations such as pain. What if you cannot differ between the pain that comes from the physical environment and the pain that a physical information transfer is programmed to provide you? A group of people can agree on developing an immunity system that operates against the basic sensations that help us navigate in the world. If thoughts are mediated, so that they affect our body radically, wearable technology can be used as tools with limitation and control purposes. Ethical discussions need to follow along with technology that is developed to either invade or enhance the body and discuss the fact that people can tinker with each other's bodies and hack features that their body has been given. We need to discuss how sub-cultures can design their own custom made devices and modify the body, and in the most radical sense form sub-species that differ by life style, social connections and physical languages. This is not unlike what we see in local communities, where cohorts of people develop special skills, language and a common sphere of understanding. Like we customize our clothes and electronic devices, we customize the way we communicate with our body. By mastering customized body tools, various groups will diverge towards the specific kinds of communication that they share in public and private spheres. A person, who wants to communicate with different sub-communities, must then develop a versatile array of modes and skills that can be attached and deployed as needed.

Communities of Performers

As groupings of physical communication methods arise, a person may be forced to acquire skills in order to transgress private, perhaps even esoteric language systems that have arisen within a community. A dominating language like English homogenizes communication and makes it easier to communicate across borders of understanding. However, it does require that you learn how to speak the language. How difficult would it be to learn non-verbal languages that are expressed through physical gestures and corresponding media forms? In a community of performers that act together in an ensemble type of constellation, the person, who is foreign to the media situation generated, would need to understand the physio-aesthetic language that is shared among the people, who participate in a non-verbal conversation. The question is, if these language forms share some universal characteristics? Would there for example be a basic platform, a scene, or an interface that is embedded in the architecture of a "conversational space" that gives people the possibility to tune in to each other? Or what if the body-related interfaces share some common features and differ on others, so that the medium will be transformed along its trajectory through people's actions? In contemporary dance performance, where media is part of the choreography, there has been an interesting integration process between body and media. The performance aspect can make it easier for a person to decode what is being said. Movement is in general an overt activity. As soon as a newcomer starts to participate in the physical dialogue, the elements of improvisation and performance may require practice, but since the newcomer's movements are immediately visible to other people, a mutual adjustment process could be a natural and intuitive result of the newcomer's attempt to engage. Furthermore, physical movement can be done simultaneously and still be compre-

hensible. To lighten the burden of having to practice several physical languages, the sensor devices and the media that is generated as a result of physical movement can for example be designed in a modular fashion, so that there is room for an integration process among different conversation groups. Common key nodes in possible forms of expressions could be embedded in the physical interfaces that people use as conversation tools. The idea of a utility fog envisioned by John Storrs Hall could in this case be realized as media units that contain introductory modes of expression that automatically connect to other people's media units, so that a common language is possible. [5] In general, I think there may be a peculiar concurrence between sensation and expression when the expressed medium resonates in a newcomer's body.

The Vacuole Robes - a Body Interface that allows Simultaneous Contribution to a Non-verbal Conversation

The *Vacuole Robe* interface is an attempt to reach a stage, where two people can transfer ideas and thoughts with simultaneous physical movements. The situation that this type of interface aspires to reach is the moment, where ideas and thoughts are transferred from one person to another through the establishment of a common condition - a type of condition that requires simultaneous contribution of all the participators. This form of conversation differs from the verbal conversation, where an idea can only be transferred in small portions over time and cannot be felt simultaneously in a commonly experienced condition. The cocoon-like design of the *Vacuole Robes* puts the people, who use them into the "slush-condition" of being physically engaged with technology till a degree, where their movements can form meaning in the shape of a medium. However simple the technology in the robe interface may be, it proposes a form of physical interface design that involves the entire body seen as a speaking unit. The condition that the interface immerses people into, establishes a common ground for a specific type of mutually generated speech. Each Vacuole Robe surrounds a person till such a degree that a person is forced to experience the surrounding world through medium generation. The robe blinds the person, who is inside it in order to draw attention to the co-invention of the sound medium that the two people generate. Through the delimiting character that the interface has, it is the idea that the feeling of being enclosed in a concentrated space can evolve a sense of connectedness.

The sculptural aspect of the *Vacuole Robes* proposes an interface that connects with other species and it suggests speciation through special interface features. When veiled by the robe, a person's anonymous appearance puts his/her movements in a different light, where person changes identity and becomes a plant or an animal. Several people that wear this interface would form a sub-culture, a forest of sculptures that both communicate and perform in an ensemble type of unit. The *Vacuole Robes* is one interface among many others to come, where people start to interface themselves physically with each other and their surroundings. It is an attempt to demonstrate a set of ideas regarding the linking of body and mind. These ideas can be explored even further, so that new interfaces help people to act in the situation they are presented to in the real and the virtual world. I hope that the invention of new tools will address people's life situations and life conditions in hybrid spaces and reach much more profound levels of communication!

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Crafting the Wearable Computer

Sarah Kettley

This extended abstract outlines a novel methodology for the development of computational wearable artefacts as everyday sites for authentic engagement. Contemporary Craft was reflexively analysed as a rich resource for such an approach through the collaborative realisation of a suite of wirelessly networked 'Speckled Jewellery'. The key contributions for the Wearable Computing community comprise a set of preliminary protocols for craft in design, a novel approach to the identification of distributed user groups, and a new method for the evaluation of wearable artefacts for authentic experience.

Background

Wearable Computing as a cultural artefact

Wearable Computing in 2002 was a field with an overriding aesthetic essentially indebted to the borg (Rhodes & Mase 2005). Early dissatisfaction with the aesthetics of wearables (Co 2000, Orth 2001) has informed more recent user centred approaches to challenging the implicit determinism of the field, and a perceived disjoint between the vision of developers and actual experiences in use (Boehner et al 2005, Dunne et al 2005, Watier 2003, Viseu 2005). The work presented here is a part of that discourse, and took as its starting point a white paper published in 2001 describing the everyday as the field's 'final frontier' (DeVaul et al 2001).

Towards authentic experience

In seeking to understand what the everyday might mean for Wearable Computing, consumer demand for authentic experience was identified as a key driver. Market research was finding a significant shift towards the 'slow', towards quality, the unique and the exclusive (Lewis & Bridger 2000). 'Authentic' products and services embodied stories and took responsibility, were from identifiable producers and places, and represented a niche market that was yet significantly widespread. Drawing on the philosophical and pedagogical literature (Golomb 1995, Tochon 2000), a working definition of authentic experience was arrived at which resonated with contemporary work on 'seams' and ambiguity in Interaction Design (Chalmers & MacColl 2003, Gaver et al 2003). In this view, contexts for active meaning making are emphasised through ambiguity in the objects and their presentation in relation to existing lifeworlds (Hallnas & Redstrom 2002, Kettley 2005a).

Contemporary Craft as a design resource

In employing Craft as a design approach, it was necessary to differentiate between the more traditional craftsmanship and contemporary practice. A sub-project for a patchworked comfort blanket for young children (Kettley & Smyth 2004) and two empirical investigations with contemporary makers resulted in a series of protocols for contemporary craft for design. These included an emphasis on emergence and risk taking, on material knowledge (expanding 'material' to cover human interactions and technologies), and an undecideability in framing outputs (Kettley 2005b, Kettley 2005c). Contemporary Craft was found to offer not only many of the internal characteristics of authenticity as mentioned above, but also the interactional qualities of risk and ambiguity that provide a rich context for human meaning making and thus authentic experience.

An everyday lifeworld and objects as actors

It was important for this view of authentic experience that the user group already be enacting the everyday through existing social ties, and a friendship group was identified to take part in the project over two years. The discovery and description of these five women's lifeworld became an important part of describing the texture of an everyday that wearables might want to inhabit. The methods used to do this included 'cultural probes', a social distance questionnaire, and self-monitoring measures drawn from psychology (Ethington 1997, Gaver et al 2004, Gangestad & Snyder 2000). In seeking to account for the ways in which novel objects are configured by people, Actor Network Theory offered a particularly flexible set of principles from which to work. Like craft, it is characterised by undecideability, and levels the impact of objects and ideas with that of the human actor within a network of meaning (Latour 2005). It is scalable, meaning that an object can also be viewed as a collection of formal and behavioural elements, acting as a

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composite agent (Ellis 2004), and it enabled the researcher to approach the act of adornment as an act of bringing a wearable artefact into play.

Speckled Computing - an enabling technology for wearable applications

Speckled Computing is a European funded project aiming to provide Ubiquitous Computing with a generic enabling technology in the form of very small wireless transceiver nodes with programming and sensing capabilities (Arvind & Wong 2004). Deployed in large numbers, speckled networks will be capable of self organisation and may be used in medical, and stock control applications, as well as full size gaming and art. Currently building a 5mm cubed version, the vision of the research is that of a one millimetre cube form that may be embedded within other materials and mechanisms to enable it in situ. The Crafted Wearable project made use of the ProSpeckz II and the ProSpeckz 2K prototypes in two iterations, and the suite of jewellery evaluated at the Royal Scottish Museum in October 2005 represented the first working application of the technology.

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Speckled Jewellery

Five pendants communicating at a frequency of 2.4GHz were constructed, one for each of the friends. The interface consisted of five coloured light emitting diodes, each a unique identifier for a node in the wireless network. Within a range of approximately twenty metres, these would flash at one of three rates to indicate the distance of the other detected nodes. Three distances were set as thresholds based upon social distances found in greeting habits with the women, arrived at through drama activities and discussion. These were defined as *intimate* (up to thirty centimetres), *social* (between thirty centimetres and a metre), and *distant* (over one metre).

Evaluation

There were three elements to the evaluation: an informal out-of-the box session, a task-based session at the Royal Museum of Scotland, and an individual interview. The first two provided a rich set of audio visual data, and the last were captured in notes taken by the researcher. The transcriptions of all of these were then analysed using Discourse Analysis (Coates 1996, van Dijk 1997). Axial coding, a technique found in Grounded Theory (Borgatti 2004), was applied to draw out three major strands of a narrative recounting what the participants made of the objects, *how* these configurations were arrived at, and where this sense-making took place. To relate this narrative back to the aims of the research, a novel technique was devised to give an indication of the notional closeness of the system to the women's lifeworlds. In this method, affective comments are plotted against four notional spaces - the immediate situation, the participant's own lifeworld, others' imagined lifeworlds, and fantastical worlds (Kettley & Smyth 2006).

Results and reflection

Overall, the women in the friendship group were found to successfully negotiate existing configurations of the objects as adornment and communication device, and had no difficulty in creating a new hybrid identity for the objects, describing them at an early stage as being 'useful jewellery', 'like nothing else', and as being able to 'stand on its own as it is'. The novel plotting technique revealed most responses to be concentrated in the positive sector of the 'own lifeworld' band (i.e. the situated everyday), meaning that the women were able to make sense of the objects in relation to their own experiences. The crafted objects exhibited a multivalent internal visual language that invited wide ranging associations, and a cultural ambiguity open for negotiation in social interaction, providing an ongoing and dynamic context for authentic experience. Future directions for research include crafted interactive objects with increased levels of functionality.

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Art by Telephone: from static to mobile interfaces [1]

Adriana de Souza e Silva

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Abstract

This paper investigates artworks that use telephones as interfaces. Considering telephones as telepresence technologies, it focuses on the point of transition from the fixed to the mobile telephone, exploring how artistic practices change when one component is added: mobility. In addition, location awareness capabilities transform cell phones into more than voice devices. Consequences can be perceived on artistic experiences that bring the medium into public spaces, transforming them into ludic, and collective interfaces, pointing to how mobile technologies can be used in the future. From a broader perspective, this study addresses how art mediated by technology deals with the connection between physical and digital spaces.

Keywords

Telephones, mobile interfaces, cell phones, virtual, physical, telepresence art

This paper investigates how the artistic approach toward telephones changes when they become mobile. The transition occurs mainly because cell phones are no longer only voice devices. Mobility and location awareness transform them into social and ludic technologies, giving them the ability to merge physical and digital spaces, and to find one's relative position in the globe merely with a personal handset. Examples of artworks with fixed and mobile telephones help to clarify this transition.

Reviewing artworks with telephone handsets [2] helps us to remember how the device has previously been used as an artistic interface, and to imagine new approaches when this interface becomes mobile.

1. Some early experiments on telephone-based art

Very early on, some artists started to use telecommunication media to develop projects. Experimenting with remote-controlled creation may have been the first use of telephones to produce art. Considered one of the first to create a telepresence piece, László Moholy Nagy experimented using the telephone to transmit directions for fabricating enamel tile paintings. He wrote:

> *In 1922 I ordered by telephone from a sign factory five paintings in porcelain enamel. I had the factory's color chart before me and I sketched my paintings on graph paper. At the other end of the telephone the factory supervisor had the same kind of paper, divided into squares. He took down the dictated shapes in the correct position. (It was like playing chess by correspondence.) One of the pictures was delivered in three different sizes, so that I could study the subtle differences in the color relations caused by the enlargement and reduction [3].*

Eduardo Kac suggests that nobody knows whether Moholy-Nagy's story is true or not, because his wife stated that in fact she ordered the paintings in person. Moholy-Nagy's work, whether actual or apocryphal, demonstrates that the artist could be removed from the location of artmaking.

In 1969 the Chicago Museum of Contemporary Art organized an exhibition called *Art by Telephone* that somehow repeated Moholy-Nagy's experiment. Thirty-six artists were asked to place a phone call to the museum and to instruct museum staff about what their contribution to the show would be. The museum then produced the pieces and displayed them. The telephone as a new artistic medium was not explored as a creative medium in *Art by Telephone*; it was only used as a remote interface to accomplish something that could be done, for example, if the artist went to the museum and talked to the curator.

Kac [4] says that one of the few creative uses of the technology by an artist in this exhibition was accomplished by Robert Huot. The artist

> *potentially involved all visitors of the museum and attempted to generate unexpected first meetings by employing chance and anonymity. Twenty-six cities in America were chosen, each starting with a letter of the alphabet, and twenty-six men named Arthur were selected, one in each city. Each Arthur's last name was the first listing under the initial letter of the city (Arthur Bacon, in Baltimore, for instance). The Museum displayed a list of all cities and names, and invited visitors to call and ask for "Art." The work was the unexpected conversation between "Art" and the visitor, and its development totally up to them.*

Huot's piece presents the artist as the creator of a context, in which the visitor participates in the creative process. Here the telephone is used to turn artmaking into a social experience. Generally, up until the end of the 1990's artworks that used telephone handsets were almost all restricted to calling another party, using the phone's ring as an artistic element, and recording voice messages.

More recent pieces that employed the telephone include the works developed by the Disembodied Art Gallery, a British Group that explores conceptual and telecommunication-based art. For instance, *Babble* was a telepresence-art installation created in 1993 that received over 70 voice contributions from the United States, Australia, Japan, and Europe. Callers telephoned a U.K. number and could record poetry, stories, and thoughts on an answering machine. Then these messages were collected and replayed automatically to visitors of the gallery whenever a member of the public entered the installation room. *Temporary Line* (1993/94), another piece by the Disembodied Art Gallery, was an audio-reactive sculpture constructed from telephone handsets. Whenever a member of the public walked close to the sculpture, the sound of whispering voices would dart around the sculpture, from telephone handset to telephone handset, at random around the feet of the visitor.

In the last ten years, cell phones have become highly popular among telecommunication technologies, exceeding the number of existing fixed landlines and personal computers. Cell phone ownership has increased much more rapidly than PC ownership because of its relative affordability. This gap is markedly larger outside the U.S.

The common idea behind most of these projects is not so much to explore synchronous communication, as is considered the general use of the telephone, but to investigate the use of a recorded presence or voice as a past presence. Telephones have been considered the ultimate virtual medium [5], because they eradicated the distance between disembodied voices. Therefore it transformed the pure element of voice into presence: an absent presence. The above mentioned artists used the communication technology to emphasize not only this removal in space, but also a removal in time, by bringing past recorded voices into the immediate present.

Heath Bunting, a contributor to the Disembodied Art Gallery, created a piece that incorporated the use of the Internet to reach a more spatially distributed audience. The 1994 piece entitled *Kings Cross Phone-in* scattered numbers of the telephone kiosks around Kings Cross British Rail station using the Internet and asked whoever found them to choose a number and call it at a specific time and chat with whoever picked up the phone. Likewise, in December 1996, StallPlaat created *The Answering-Machine Solution C.D.*, a large collection of 30-second tracks that could be used as answering machine messages to celebrate their 100th CD release. Keith de Mendonça, from the Disembodied Art Gallery, provided the front cover for the CD and an answering machine message.

Also using telephones in public space, Stephen Wilson created a telephone-based project called *Is Anyone There?* (1992) during one week in San Francisco. In the project, a computer-based system with digitized voice capabilities made hourly calls to five ringing pay phones on the streets with the aim of involving whoever answered the call in a conversation about life in the city. The system used intelligent response programming to engage passersby into a short dialog. The conversations were then digitally stored in a database and accessible through an installation which included a database of these recorded calls. In the gallery, the installation changed randomly to a real time mode that placed live calls to the pay phones, linking viewers with a real person on the street. With this piece, Wilson tried to explore random communication between unknown people, placing the user as a content creator. Furthermore, he looked into possible developments for artificial intelligent systems, by analysing dialogs between computers and humans.

It is possible to perceive two characteristics in the above mentioned works. First, although they could have been performed in urban spaces, such as Is Anyone There?, they were still connected to a fixed place, like a pay-phone. Second, the pieces mostly transmitted voice and stored voice messages. This scenario changes with mobile phones.

2. Mobile phones: Bringing the interface into public spaces

In the last ten years, cell phones have become highly popular among telecommunication technologies, exceeding the number of existing fixed landlines and personal computers. Cell phone ownership has increased much more rapidly than PC ownership because of its relative affordability. This gap is markedly larger outside the U.S. In the United States, the rates of cell phone ownership and PC ownership are almost the same: 54.30% to 65.89% respectively [6]. However, in countries where fixed telephone lines are expensive and not so widespread, the difference is substantial. For example, in Brazil 26.36% of the popu-

lation owns a cell phone, while only 7.48% have PCs. The same difference applies to other countries in Latin America, such as Paraguay and Mexico. Likewise, in Japan there are more than 86 million mobile users (67.96%) as opposed to 48 million (38.22%) PC owners. Finally, in Finland 90% of the population uses cell phones while only 44.17% have PCs at home.

The large number of cell phones in use worldwide makes them significant social and communication tools. Moreover, the use of mobile phones as artistic interfaces both reaffirms their popularity, as well as indicates new uses for the technology. The artistic use of mobile communication interfaces is an arrow pointing toward two directions. First it draws our attention back to past telephone-based artworks. Second, it foresees new uses for the mobile interface. Although in the United States and in most countries of Latin America, the cell phone is mostly used to speak, much like a "mobile telephone," developments of the mobile Internet, SMS (Short Message Service), camera phones, and location-based services, mostly in Japan and Scandinavian countries, transform the mobile into more than a telephone.

Telecommunications-based art is primarily concerned with connecting distant and contiguous spaces. According to Frank Popper [7], communication art has six main characteristics: (1) it stages physical presence at distance, (2) it telescopes the immediate and the delayed, (3) it focuses on the playfulness of interactivity, (4) it combines memory and real time, (5) it promotes planetary communication, and (6) it encourages a detailed study of human social groupings. In a broader sense, it can be said that telecommunication art not only foresees new developments for existing technologies, but also changes our perception of space. It focuses on the relationships between participants, rather than on the creation of material objects [7], in a situation where the author is the context provider, not the content creator.

While the fixed telephone connected specific places, cell phones connect people who roam through urban spaces. Mobility strengthens the playfulness of interactivity, transforming urban spaces into a hybrid reality. Hybrid spaces are created by the merging of physical and virtual spaces. These hybrid spaces incorporate mobility and sociability.

When cell phones arose, as in the early days of the telephone [8], they were regarded as mediums to transmit messages, and generally only urgent messages. Even now, cell phones are viewed in many parts of the world as mobile telephones, that is, a telephone that can be carried around, used mostly for voice conversations. However, the incorporation of new functions such as text messaging (SMS), multimedia messaging (MMS), and location-based services contribute to the creation of new meanings for the mobile interface. The cell phone's potential for making new art is explicitly highlighted in cities with dense populations, because there is more potential for people to interact with each other. The emergence of nomadic technology devices allows whole cities to be used as a "responsive surface," or as a game board. It is as though the urban space has become a map of itself, a place for interaction and long-distance contact, without the need for a restricted or fixed space.

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The following works use cell phones as promoters of collective and social actions in public spaces. They envision the phone no longer as only a voice transmission device, but also as a musical instrument, and a game controller [9].

3.1. *Dialtones:* a telesymphony.
In the Ars Electronica 2001 in Linz, Austria, Golan Levin and the Ars Electronica Festival used the audience's cell phones to create a music concert at the Brucknerhaus Auditorium. Prior to the concert, members of the audience could register their cell phone numbers in kiosks, after which they would be assigned a seat in the auditorium and have a set of ringtones downloaded to their phones. Knowing each person's position in the auditorium and their respective ringtones, the computer could call them and produce a musical symphony, which was eventually a product of collective authorship.

[Picture 3: Dialtones in Austria 2001. The audience is able to see a mirror of itself on the ceiling, where the spotlights point to the actual ringing phones. The two projection screens placed on the side of the stage show the graphic interface used by the performers to trigger the audience's phones, constituted by the spotlights projected on the audience. © 2001 Golan Levin]

This piece was innovative because it used cell phones as musical instruments. Although Dialtones is not a communication experience and it does not include voice, it can be regarded as a social and collective action happening in public space [10]. The distance from the mobile phone as a two-way voice communication device becomes even stronger when cell phones' power is used to create collective games.

3.2. *Blinkenlights*: the cell phone as a remote controller and game device

In 2001, the Chaos Computer Club transformed an eight-story building in Berlin's Alexanderplatz into the world's biggest interactive computer display. One hundred forty-four lamps were arranged behind the building's front windows, which were independently controlled by a computer to produce a monochrome matrix of 18 x 8 pixels. Users could "control the building's façade" either via their cell phones or Internet, creating animations, playing Pong, or sending love letters.

Participants could use their mobile phones to call a specific number and play Pong against the computer. At first they heard instructions like "use the 5 to move the paddle up and 8 to move it down." If a second person called the system simultaneously, one caller played against the other. The difference between *Blinkenlights* and ordinary computer game was the size of the "screen": a whole building in the middle of "Alex".

Blinkenlights transformed cell phones into game devices, and brought the game board/screen outside into social urban spaces. The enlargement of the game board to the size of a building façade immersed large numbers of players and passersby into the game, transforming physical space into the game board. The possibility of carrying around the game control (that is, the cell phones) allowed people to interact with the screen and with each other in an open space. Blinkenlights explored the cell phone's potential to engage large groups of urban users and viewers in a hybrid space that is both virtual and physical.

3.3. Broadening the concept of mobile technologies: Blast Theory

Although the British group Blast Theory did not work with cell phones initially, their projects foresee new ways mobile communication devices may function in the near future. In conjunction with the Mixed Reality Lab at the University of Nottingham, England, Blast Theory employs handheld computers and wireless devices to mix physical and virtual spaces, transforming the city into a playful multiuser experience. Their work focuses on developing games that happen simultaneously in physical and digital spaces, integrating and forming communities between players who walk on the street and online players. In their games, an action in the physical space might influence a decision in digital space and vice versa.

Street runners were equipped with handheld computers connected wirelessly to the Internet, GPS receivers, and walkie-talkies to communicate with other users. Up to 20 people could be online simultaneously. Online players ran away from street players in order to elude capture. If a street runner caught a virtual player, she was supposed to take a picture at the place where the chase ended, which was obviously an empty space. Street runners caught an online player if they were within 5 meters of each other.

Their first collaboration, *Can You See Me Now?* [11], resembled a traditional Pac-Man game played in hybrid space. Players from anywhere in the world could play online against the members of Blast Theory. Tracked by satellites, Blast Theory's runners appeared on a virtual map of the city center next to online players. On the streets, handheld computers showing the position of online players guided the runners in tracking online players down. Street runners were equipped with handheld computers connected wirelessly to the Internet, GPS receivers, and walkie-talkies to communicate with other users. Up to 20 people could be online simultaneously. Online players ran away from street players in order to elude capture. If a street runner caught a virtual player, she was supposed to take a picture at the place where the chase ended, which was obviously an empty space. Street runners caught an online player if they were within 5 meters of each other. The game has been played on specific days in Sheffield (UK) in 2001, in Rotterdam (Holland) in February 2003, and in Oldenburg (Germany) in July 2003 [12].

Similarly, their recent collaboration, *Uncle Roy All Around You* [13], sets online players alongside players on the streets. Street players search for Uncle Roy with the aid of handheld computers. On the other hand, online players search for the street players and also for Uncle Roy in a virtual model of the same physical area where the street players are running.

Online and street players must work together, and they have 60 minutes to complete the task. Street players can see online players on the map of their handheld computers and online players also see street players in the virtual modeled city. During the gameplay, online and street players can communicate through walkie-talkies and ask each other for help. The game was played in 2003/2004 in Westminster, Manchester, and West Bromwich (UK).

With the increasable availability of 3G phones [14] that incorporate all of the above mentioned features, Blast Theory started using cell phones as their primary interface. Their most recent project *I Like Frank* [15] is a similar experience that uses 3G cell phones to connect virtual and physical players in Adelaide, Australia (2004). Blast Theory looks to establish cultural spaces for mobile devices via games. Future games might allow the public to play on the streets using their own cell phones. The rapid worldwide spread of 'smart' phones may increase the potential for this type of games and ludic experiences with cell phones to bring together users in different and distant places in the world.

Within this context, it is important to understand that when mobility was added to telephones they became more than mobile phones. Mobility brought new artistic meanings to the telephone interface: bringing phones into the city space, releasing them from a fixed place, transforming them into collective/social mediums and ludic devices. Henry Jenkins [16] suggested that "games have been to the PC what NASA was to the mainframe - the thing that pushes forward innovation and experimentation." Location-based activities will play the same role for cell phones, differentiating them from fixed phones, and increasing their power for communication and community formation.

Mobile and pervasive technologies help us to be aware of the physical space in which we live. Digital technologies in the 1990s have been mostly criticized for creating sociability in a virtual space, which was disconnected from our reality, placing users in a simulated and "unreal" world. Mobile technologies bring these multiuser and playful experiences to physical spaces, encouraging users to go out on the streets, and bringing new meanings to familiar spaces.

As art always foresees new uses for technologies, it is wise to look at these artistic experiments and try to picture the future, imagining how contemporary society will incorporate mobile devices into its everyday activities. Mobile phones are no longer just telephones.

Notes:

1. This article comes from my Ph.D. dissertation, titled From cyber to hybrid: Relocating our imaginary spaces through mobile interfaces, defended in the School of Communications at the Federal University of Rio de Janeiro, Brazil (2004).

2. Other telecommunication media, such as satellites, slow scan TV, and even those which use the telephone network, like modems, videophones, and telefacsimiles, are outside the scope of this review. Some examples of telepresence art with satellites, and the transmission of data via modem, faxes, and slow scan TV are "Hole in Space" (1980) from Kit Galloway and Sherrie Rabinowitz, and "The World in 24 Hours"(1982) from Robert Adrian. Other examples can be found in Stephen Wilson's *Information Arts* (2002), Frank Popper's *Art of the Electronic Age* (1993), and Heidi Grundman's *Art Telecommunications* (1984).

3. Moholy-Nagy Apud Eduardo Kac, "Aspects of the Aesthetics of Telecommunications," in John Grimes & Gray Lorig (eds.), *Siggraph Visual Proceedings*, New York: ACM, pp. 47-57 (1992) <http://www.ekac.org/Telecom.Paper.Siggrap.html> (01 Sep. 2003).

4. Eduardo Kac [3].

5. Stephen Wilson, "Chapter 6: Telecommunications," in *Information Arts: Intersections of Art, Science, and Technology,* Cambridge: MIT Press, p. 489 (2002).

6. All statistics provided by the International Telecommunication Union, 2003. <http://www.itu.int/ITU-D/ict/statistics/> (16 August 2004).

7. Frank Popper, *Art of the Electronic Age*, New York: Harry N. Abrams, Inc., Publishers, p. 127 (1993).

8. See Diane Zimmerman Umble's article, "Sinful Network or Divine Service" in Lisa Gitelman and Geoffrey B. Pingree, *New Media - 1740-1915*, Cambridge, Massachusetts: The MIT Press, p. 143. About the first days of the telephone in Lancaster, England, around 1910: "Telephone company advertising in the village weekly newspapers amplified these themes by emphasizing the value of the telephone in times of emergency: accidents, fires, illness, stolen horses, mad dogs, robbers, and threatening weather."

9. Other examples of artworks with cell phones can be found at Stephen Wilson's compilation under "Telecommunications: Telephone Art/Cell Phone" <http://mercury.sfsu.edu/~infoarts/links/wilson.artlinks2.html> (16 August 2004), and in Golan Levin's list "An Informal Catalogue of Mobile Phone Performances, Installations and Artworks"

<http://www.flong.com/telesymphony/related/index.html> (16 August 2004).

10. A past work combining telephones and music was *Telefonmusik, Wiencouver IV* (1983) in Heidi Grundman (ed.), *Art Telecommunication*, Vancouver, Canada: A Western Front Publication, pp. 112-125. (1984). However, whereas this project was mostly concerned with the idea of transmitting and receiving music over the telephone, Dialtones transformed the cell phone in the music instrument itself. In 1983, one of the major characteristics of the project was the limited frequency bands which the telephone could provide for music broadcast. In 2001, Midi (Musical Instrument Digital Interface) ringtones enables the creation of polyphonic musical compositions simulating an orchestra on the handset.

11. Blast Theory <http://www.blasttheory.co.uk/work_cysmn.html> (26 Jan. 2004).

12. *Can You See Me Now?* was nominated for an Interactive Arts BAFTA in 2002 and has won the 2003 Prix Ars Electronica Golden Nica for Interactive Arts.

13. Blast Theory <http://www.uncleroyallaroundyou.co.uk/> (26 Jan. 2004).

14. Blast Theory <http://www.ilikefrank.com> (17 May 2004).

15. Third Generation Cellular System. "Third Generation Cellular Systems include the possibility to offer data services without the need of establishing a connection (permanent connection) and speeds up to 2 Mbps. The main systems are WCDMA and CDMA2000 1xEV. The ITU refers to 3G as IMT-2000." <http://www.teleco.com.br/glossario.asp?termo=3G> (10 Jan. 2004).

16. Henry Jenkins, "Games, the New Lively Art." <http://web.mit.edu/21fms/www/faculty/henry3/GamesNewLively.html> (16 August 2004).

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Segue

un chien antediluvian
Nathaniel Murray

What and Why Is High-Pop? Or, What Would It Take to Get You into a New Shakespeare Today?

Brian Cowlishaw

A recent *New Yorker* film review observes wryly that filmmakers, desperate for more Jane Austen novels to film but having filmed them all to death, have now had to resort to her life for material in *Becoming Jane*. It's true: an awful lot of Jane Austen films have been produced in the last fifteen years. Not only that, they've been popular. Googleplex-goers just can't get enough witty, romantic Regency banter. This is one prominent current example of the phenomenon that is "high-pop"-"high culture" repackaged and resold as popular culture.

The name "high-pop" comes from a 2002 book edited by Jim Collins, *High-Pop: Making Culture into Popular Entertainment*. Collins observes in his introduction-and the book as a whole supports the idea-that high-pop has made huge gains, in both influence and marketability, in the last few decades especially. Subjective experience certainly suggests that this is so. Since my childhood (I was born in 1964), I have witnessed many groundbreaking, hugely popular instances of High-Pop: the existence and success of Masterpiece Theatre. Around-the-block lines for the King Tutankhamen museum exhibits. The Steve Martin hit song "King Tut." Smash-hit Broadway musicals adapting canonical authors' works: *Cats*, based on poems by T. S. Eliot; *Les Miserables*, based on Victor Hugo's massive historical novel; and now *The Woman in White*, based on Wilkie Collins's Victorian thriller. Movie adaptations of Shakespeare's plays, such as *Ten Things I Hate about You* (The Taming of the Shrew) and *She's the Man* (Twelfth Night)-to say nothing of the many "straight" big-budget Shakespeare film productions, by stars such as Kenneth Branagh and Mel Gibson. There have always been connections and overlaps between high and popular culture: for example, television in its early days touted itself as the way to bring great literature, higher education, and highbrow entertainment to the American masses. At least, television made this claim briefly, before, say, Uncle Milty in a dress won the day. But the great prominence, cultural power, and potent marketability of high-pop today are new and special.

That high-pop should be so prominent today-any time, really-makes no obvious sense. After all, we make an offhand distinction between "high culture" and "popular culture," and generally consider the distinction self-evident enough not to define our terms. This distinction implies-and we most often find-that that which is popular is not "high," and that which is "high" is not terribly popular. (At least, comparatively speaking. People do pay, for example, to attend opera performances; but gross ticket sales will never approach *American Idol*'s moneymaking might.) It would therefore seem futile to bring to the popular market a work of high-pop, one based on something not especially popular to begin with. "Wagner's Greatest Hits" are still works composed by Wagner; they will never sell anything like "The Eagles' Greatest Hits" (the bestselling rock album of all time). In a way, selling high-pop is like selling chocolate-covered ants from a mall kiosk: a select few may gasp with delight over every one of the product's fine qualities, but most people will not willingly give the product a try. Consider also the chain bookstore. There, in a great barn of a building, tucked into a corner (never near the door, cash register, or other high-traffic location), behind rows upon rows of "best-sellers," sits one small, lonely shelf labeled "Classics." If "classics" sold more copies-and overall they don't, despite Oprah's including *Anna Karenina*, *Night*, and the works of William Faulkner in her Book Club-then the proportions of shelf space allotted would be quite different.

In a way, selling high-pop is like selling chocolate-covered ants from a mall kiosk: a select few may gasp with delight over every one of the product's fine qualities, but most people will not willingly give the product a try.

And yet high-pop is huge business, as King Tut and company illustrate. Why? Three reasons related to human nature suggest themselves, as do two reasons related to specific, recent changes in our material realities.

First, high-pop alleviates our "slummer's guilt." After we receive a certain amount of education-for example, after we complete a certain number of literature courses, and read a certain number of works approved as high culture-we develop slummer's guilt. That is, we feel guilty when we take joy from works that are not high culture; we expect our own tastes to have been refined more thoroughly. We gulp down a Harlequin

Romance, or a gritty detective story, with much the same feeling a dieter experiences gulping down a double bacon cheeseburger. We heartily believe we should consume more edifying things, but the "junk" is so enjoyable. High-pop takes the edge off that guilt. Watching a movie version of *Vanity Fair*, as opposed to reading Thackeray's novel, or reading Fforde instead of Pope, at least produces less guilt than would real slumming--e.g., reading Stephen King, who has publicly described his own books as "the literary equivalent of a Big Mac with fries." It's as if someone strongly craves a hot dog, but knows that a hot dog is something she really shouldn't eat. So, to get around the ban on hot dogs, she collects relatively high-quality, low-fat meat scraps and puts them through the standard hot dog-making process; then she eats the product, telling herself, Well, I'm not *actually* eating a hot dog. I'm satisfying my craving for a hot dog, true. And yes, this looks like a hot dog, and it is in fact made just like a hot dog. But see, it's not so bad for me! Consuming high culture in the form of high-pop works much like that. We enjoy the best of both worlds: the content of high culture (sort of-more on this below), with the accessibility of popular culture.

High-pop also appeals to the cultural snob, the smarty-pants, inside us all. We enjoy catching the high-culture references and associations. It makes us feel superior, elite, in the know. We like to imagine that we, a few standard deviations above the norm, "get" the work of high-pop in a way that others must surely not. We cling to this belief despite the fact-which we hide even from ourselves-that when it comes to identifying high-culture references, the bar is actually set pretty low. For example, when a literary work is referred to in high-pop, one generally need not even have read it; it is only necessary to have heard of it. Often one only needs to pretend plausibly that one has heard of it. I invite you to perform a little self-test here. In David Lodge's novel *Changing Places*, professors in an English department play a (disastrous) cocktail party game called *Humiliations*: they name the most canonical work of literature they have never read; the person with the most canonical work wins. Ask yourself that question: What's the most canonical work of literature I have never read? Have I ever-with a colleague, a student, a friend-allowed anyone to maintain the mistaken impression that I am intimately familiar with this work? At least passively, by not going out of my way to admit, "You know, I've actually never read that"? How can anyone not have at least one skeleton of this sort in the closet? And yet we nod and smile knowingly: "Ah yes, James Joyce's *Ulysses*…" High-pop flatters our cultural smugness-even if it's not entirely earned.

Third, high-pop sells because of the way consumers buy. Specifically, those people who do consume works of high culture-or at least, people who see themselves as loving high culture, and who *fully intend, as soon as possible*, to consume more (see the previous paragraph)-tend to buy lots of them. For example, the small percentage of the general public that actually spends ten hours or more per week reading, is the group that buys most of the books. In that way, high culture is like wealth: a tiny segment of the population owns almost everything. People tend to be heavy users or nonusers; there are relatively few users in moderation. So, while the gold mine may be small, it's rich.

These three timeless factors-slummer's guilt, cultural smugness, and in-for-a-penny-in-for-a-pound consumption-guarantee that high-pop will always remain at least somewhat saleable.

The existence and popularity of high-pop reveal, and bank on, the self-contradiction built into our attitudes toward high culture. On the one hand, we lament the fact that high culture isn't very popular-that most of the philistine world just doesn't "get it," and isn't that tragic. On the other hand, we need the same exclusivity we lament, because if everyone were as culturally hyperliterate as we (think we) are, then in what exactly would we excel?

Jasper Fforde's *Thursday Next* novels exemplify the very essence of high-pop. As even their titles suggest, they are absolutely crammed full of high-culture references and general bibliophilia: *The Eyre Affair*, *Lost in a Good Book, The Well of Lost Plots, Something Rotten,* and *Thursday Next: First Among Sequels*. This, in a highly accessible, witty, amusing series of detective novels: high-culture content in popular-culture form.

High-pop also appeals to the cultural snob, the smarty-pants, inside us all. We enjoy catching the high-culture references and associations. It makes us feel superior, elite, in the know.

Fforde knows his audience: the group described above, who may in fact be highly literate culturally, but who at least want to enjoy feeling so. For that crowd, if one high-literary reference is appealing, than two will be twice as good. Ten will be heaven. So he shoehorns in references to multitudes of canonical British authors: Shakespeare (who functions as shorthand for all respectable English literature), Marlowe, Byron, Coleridge, Wordsworth, the Brontes, Lewis Carroll, Beatrix Potter, Dickens, George Eliot, Milton, Dryden, and many others-in just the first two novels of the series. By the end of the series, it becomes seriously difficult to think of a (British) canonical author whom Fforde has not squeezed in. (In the third book, he

begins to run out of canonical works and authors; he commences running through "the orals," including nursery rhymes.) He panders constantly to readers' professed bibliophilia. Imagine the excitement his readers must feel when they daydream about working in an office like the LiteraTecs', where Thursday Next works:

> The room was like a library from a country home somewhere. It was two stories high, with shelves crammed full of books covering every square inch of wall space. A spiral staircase led to a catwalk which ran around the wall, enabling access to the upper shelves. The middle of the room was open plan with desks laid out much like a library's reading room. Every possible surface and all the floor space were piled high with more books and papers . . . (The Eyre Affair 130)

But then again, if everyone liked high culture, or even its cousin high-pop, where would the snob appeal go? Pleasant as it is to imagine a world in which everyone lives and breathes high culture, if everyone did, then we would no longer stand out. Our perceived superiority: pfft. In an important sense, high culture that is widely popular in the same way that, say, American Idol or Tom Cruise movies are widely popular, is ontologically different; it is not really high culture any more.

This sort of "book porn" permeates the series.
But everyone in this readership knows its inherent problem: it's lonely at the top. So Fforde has created a world much like ours in most respects, except, significantly, that everyone is simply mad about canonical literature. Thus he fulfills the fantasy for which we often pine: if only everyone loved high culture as much as we do! For example, in Fforde's world, Shakespeare's Richard III is as popular, and as inspiring of audience participation, as The Rocky Horror Picture Show. People go out to see "R3," as they call it, multiple times per week. Regulars go hundreds or thousands of times. There is no permanent cast: the parts are all played by audience members, who all know all the lines. As in Rocky Horror, there's a long series of gags the audience performs; for example, when Richard limps onstage and opens his mouth to speak, the audience yells, "When is the winter of our discontent?" The actor's answer: "Now is the winter of our discontent…" When Richard says the word "summer," "six hundred people placed sunglasses on and looked up at an imaginary sun" (The Eyre Affair 183). Later in the show, "'I that am rudely stamp'd . . .' muttered Richard, as the audience took its cue and stamped the ground with a crash that reverberated around the auditorium" (184). In Fforde's world, one need not even go to the theater (stage or cinema) to hear Shakespeare performed. In super-busy places such as train stations and airports, one can find and operate a WillSpeak machine. Insert a coin, and inside a little enclosed bubble like a gumball machine, a steel mannequin comes to life and starts spouting a famous soliloquy, gesturing with its little mechanical body.

Not only academics, but everyone in Fforde's world loves literature passionately. Whole societies go door to door, like Jehovah's Witnesses or Mormon missionaries, evangelizing people to believe that Francis Bacon or Christopher Marlowe actually wrote Shakespeare's plays. And rabid fans legally change their names to those of poets by the thousands: "Miltons were, on the whole, the most enthusiastic poet followers. A flick through the London telephone directory would yield about four thousand John Miltons, two thousand William Blakes, a thousand or so Samuel Coleridges, five hundred Percy Shelleys, the same of Wordsworth and Keats, and a handful of Drydens" (106). In Lost in a Good Book, an ordinary sale at a bookstore quickly becomes a bloody free-for-all: the masses literally beat each other senseless for their chance at cut-rate classics.

Furthermore, in Fforde's world, it's not only adults who love high culture. The love begins early:

> [A] couple of young Henry Fielding fanatics were busy swapping bubble-gum cards.
> "I'll swap you one Sophia for an Amelia."
> "Piss off!" replied his friend indignantly. "If you want Sophia you're going to have to give me an Allworthy plus a Tom Jones, as well as the Amelia!"
> His friend, realizing the rarity of a Sophia, reluctantly agreed. (31-32)

We lonely high-culture lovers love to daydream, wistfully, of the day when such a proper state of things might exist.

But then again, if everyone liked high culture, or even its cousin high-pop, where would the snob appeal go? Pleasant as it is to imagine a world in which everyone lives and breathes high culture, if everyone did, then we would no longer stand out. Our perceived superiority: pfft. In an important sense, high culture that is widely popular in the same way that, say, American Idol or Tom Cruise movies are widely popular, is ontologically different; it is not really high culture any more.

Culture can only be "high" if it is perceived to stand "above" other forms of culture. If high culture were really popular, and popular culture were really high, then the categories would no longer be called by those names, because the distinction would no longer exist. In other words, there never can be a world like the one Fforde describes: the moment high culture becomes that popular, and/or popular culture becomes that high, is the same moment in which the desire for the (personal) distinction which originally made us imagine this wonderful highbrow world disappears. The daydream must always remain unfulfilled. High-pop keeps the daydream both alive and unfulfilled-just the way we need it.

These are the complex reasons why high-pop will always flourish. But there are two reasons why high-pop flourishes now specifically: recent changes in the status of art objects, and recent changes in the way business is conducted generally.

Walter Benjamin's concept of the "aura" helps explain the first of these two reasons. In his famous essay "The Work of Art in the Age of Mechanical Reproduction," he writes:

> In the case of the art object, a most sensitive nucleus-namely, its authenticity-is interfered with whereas no natural object is vulnerable on that score. The authenticity of a thing is the essence of all that is transmissible from its beginning, ranging from its substantive duration to its testimony to the history which it has experienced. Since the historical testimony rests on the authenticity, the former, too, is jeopardized by reproduction when substantive duration ceases to matter. And what is really jeopardized when the historical testimony is affected is the authority of the object.
>
> One might subsume the eliminated element in the term "aura" and go on to say: that which withers in the age of mechanical reproduction is the aura of the work of art. This is a symptomatic process whose significance points beyond the realm of art. One might generalize by saying: the technique of reproduction detaches the reproduced object from the domain of tradition. By making many reproductions it substitutes a plurality of copies for a unique existence. And in permitting the reproduction to meet the beholder or listener in his own particular situation, it reactivates the object reproduced. These two processes lead to a tremendous shattering of tradition . . . (221)

In other words: each work of art-of high culture-possesses a special aura of authenticity. It is an original, unique, *physical* object. Copies of that object will never possess the unique importance, authority, and history of the original. In modern times we have perfected techniques for making good copies; consequently, we have destroyed the aura around original works. There is no longer anything sacred about original works of art.

High-pop exists and flourishes now in particular because the cultural conditions are now right for it to exist and flourish. In the last few decades, the processes of mechanical reproduction have made incredible advances, to the point that now we can lay hands on a copy of almost any work of art in the world, almost instantly. In the early 1980s, the VCR gave every household, even non-affluent ones, the ability to watch their own copies of movies on demand. In the 1990s, the DVD player dramatically improved the quality of copies again. The computer and the rise of the Internet in the 1980s and 90s, respectively, conferred the ability to transmit text and visual images quickly, faithfully, and cheaply. Digital cameras, which constantly improved in those decades also, have considerably enabled the process. Consequently, in Benjamin's terms, the aura has virtually disappeared from works of art, in both senses: virtually disappeared, and virtually disappeared.

High-pop exists and flourishes now in particular because the cultural conditions are now right for it to exist and flourish. In the last few decades, the processes of mechanical reproduction have made incredible advances, to the point that now we can lay hands on a copy of almost any work of art in the world, almost instantly. In the early 1980s, the VCR gave every household, even non-affluent ones, the ability to watch their own copies of movies on demand.

This is a fundamental change in the cultural status of art objects. Before the modern disintegration of the aura, art had a quasi-religious aspect, or what Benjamin calls a "cult value" (224). In early human history, reproducing sacred statues or paintings would have constituted sacrilege. But now we feel differently: why in the world should we not copy a work we like? Why should the "work of art remain hidden" (224) when it's essentially just another object, when we can send it all over the globe instantly, and when we can make a buck on it, as well?

Still, even now we can recognize traces of art's original cult value still lingering. In auctions, original paintings

and manuscripts command record high prices. Tourists with cameras perennially form long lines in front of the *Mona Lisa* in the Louvre in Paris; they want proof for their friends that they have stood in the original sacred presence. It's telling in this regard, too, that in Fforde's world, most of the LiteraTecs' time is spent locating and exposing forgeries of literary masterpieces. The main plot of *The Eyre Affair,* for example, revolves around first the original manuscript of Dickens's novel *Martin Chuzzlewit*, and then of course the original manuscript of *Jane Eyre*. Authenticity and the continuing safety of "national treasures" are of the greatest concern. The intensity with which we protect and celebrate the tattered remainder of art's aura points up just how degraded is its state.

This set of circumstances, again, allows high-pop to flourish. We feel few qualms about, say, turning Beethoven's Fifth Symphony into a disco song, produced in the 1970s, called "A Fifth of Beethoven." It doesn't strike us as sacrilegious to transform Dickens's gloomy, last, unfinished novel *The Mystery of Edwin Drood* into a comic musical that invites the audience to vote on whodunnit. High culture is no longer sacred, so why not mess around with it? Why not turn high culture into high-pop? Pre-twentieth-century art is especially useful this way, because most of it is in the public domain. One need not haggle with Charles Dickens, say, for the rights to his work.

The final reason for high-pop's recent success has to do with new economic realities. As a recent New Yorker-article-turned-book shows, the "long tail" is rapidly becoming a viable new model for many kinds of businesses. As Chris Anderson explains in *The Long Tail: Why the Future of Business Is Selling Less of More*, the "blockbuster" has long been the standard product offering and marketing goal. That is, businesses would try to sell millions of copies of a few carefully chosen items. The general public had few choices, and throngs of people would make the same choice. (For example, think of television before the widespread adoption of cable: in each major market, viewers had only PBS and a couple of privately owned channels to choose among.) But now, Anderson argues, the rules are changing radically and quickly. Business such as Amazon.com now use the "long tail" model: instead of selling lots of a few different things, they sell a few of lots of different things. Blockbusters-bajillion-selling books, movies, albums, etc.-are no longer needed or expected. Instead, the plan is to identify and exploit every possible niche in a splintered marketplace-to sell a thousand copies each of a thousand different books rather than a hundred thousand copies each of ten books. (Think of today's highly specialized cable offerings.)

High-pop is just such an exploitable niche. For reasons discussed above, high-pop will never be the most popular pop culture. But its consumers will always be a distinct, attractive, and relatively affluent niche in the marketplace. That is why high-pop does big business now specifically. It will continue to do so until and unless our fragmented, computer-saturated, hypercapitalist way of life changes radically.

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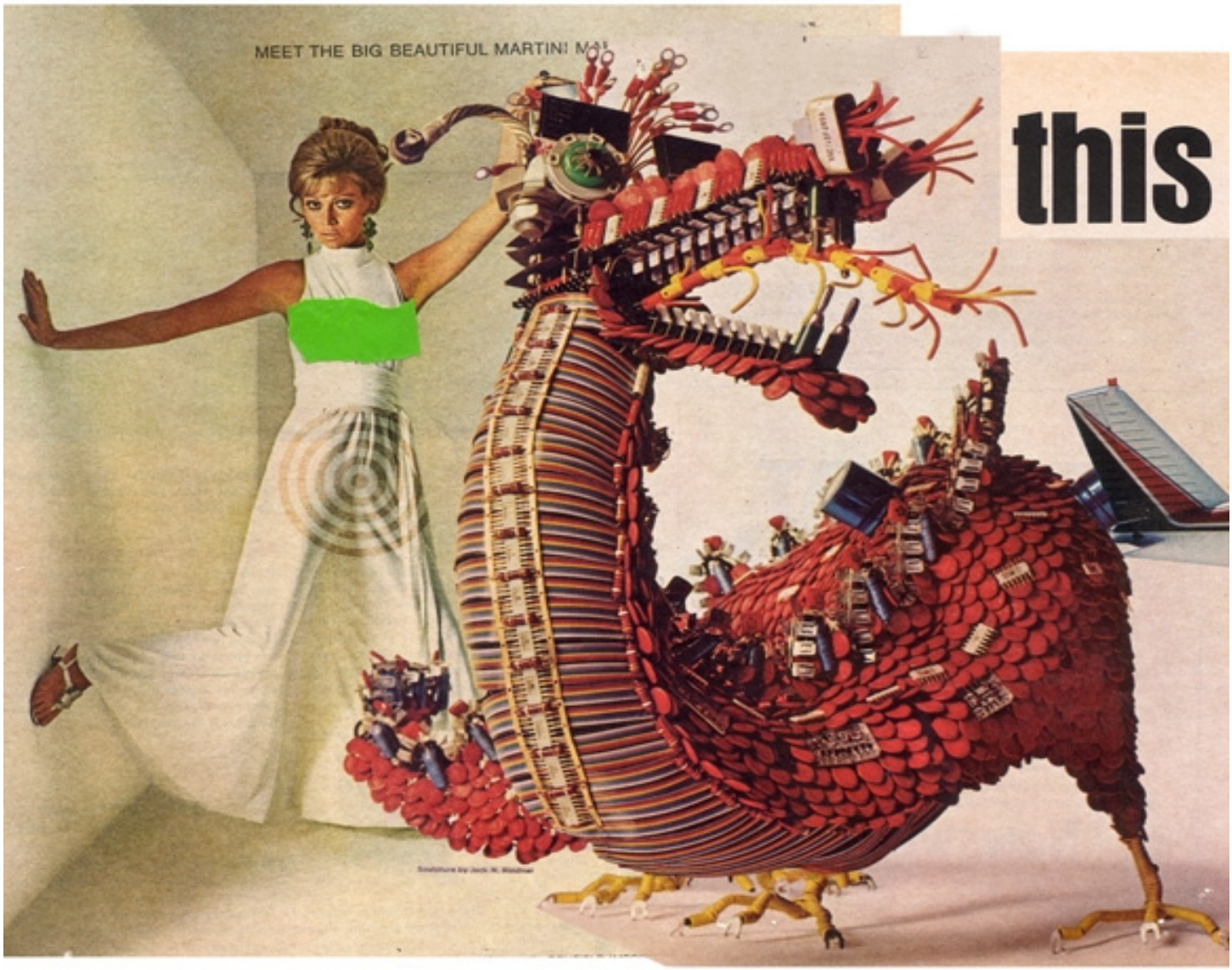
Segue



Fashionably Technological (This Could be You) - Nathaniel Murray

SOCIAL FABRICS:
LEONARDO Educational Forum Exhibition
College Art Association 2008, Dallas

Curators' notes

Social Fabrics: Wearable + Media + Interconnectivity is a time-based exhibition designed as a modified runway show of art works utilizing wearable media and technology. It is sponsored by the Leonardo Education Forum and hosted by the 2008 Annual Meeting of the College Art Association in Dallas, Texas, February 22, 2008.

Works in this exhibition are wearable. But more than this they enable their wearers to communicate with other individuals, forming social groups; or, they communicate with others by visualizing an indexing process (they index wearer's bodily functions or environmental factors and make these visible to others); or they communicate through age-old practices of critique, or formal inventiveness. Social identity is always solidified through garments and fashion. Social Fabrics focuses on the social and interconnective dimensions of new media-based, wearable art and design.

Artists in this exhibition enlarge the conceptual and aesthetic potential of wearable media in specific ways. The exhibition is intended to demonstrate convergences between individual expression and statement making, on the one hand, and the phenomenology of "network society" on the other. Technological garments or accessories with social capabilities are presented alongside works that, while not employing technology outright, comment or critique the implications of our digital media-infused and fashion-driven lifestyles. Participating works are objects (garments, handbags) or systems (hardware, software) or both. Some are mini performances or events and interact in various ways with the event context. Social Fabrics is honored to present pieces by established figures and emerging artists working in this arena.

We want to thank the College of Art + Design and the Laboratory for Creative Arts and Technologies at Louisiana State University, and members of the Leonardo Education Forum for their support. Special thanks to Edward Shanken.
Susan Ryan + Patrick Lichty

Teresa Almeida

Lags

2007, batik textiles, intercontinental flight free accessories, miscellaneous electronics,LEDs, conductive thread, Velcro, batteries, micro fan, touch switch.

Lags are a series of patches for coping with social jet lag. According to European researchers, social jet lag puts us at risk of chronic fatigue and manifests itself when our body's circadian rhythm is out of sync with the demands of our environment. Our behavioral patterns may alter, and despite all the modern technologies available we still fall out of logic. Lags are the result of living in a mirror-world and are out of tune with the environment. They are the outcome of my current stay in Southeast Asia. Having moved there for work, I have felt again the urgent need to adapt. This constant need to cope with new surroundings is indeed a source of stress and exhaustion. The space/time dislocation and the mismatch of our bodies no longer fitting their surroundings are the motifs for Lags, which are part of my ongoing research on wearable coping mechanisms for urban spaces. Lags are designed for an office site: EyeLag consists of a pair of goggles equipped with a warm yellow light on the inside, reassuring sunlight; HeadLag is a bracelet and soft pillow, for when one needs to nap.

Teresa Almeida

Modes for Urban Moods: Space Dress

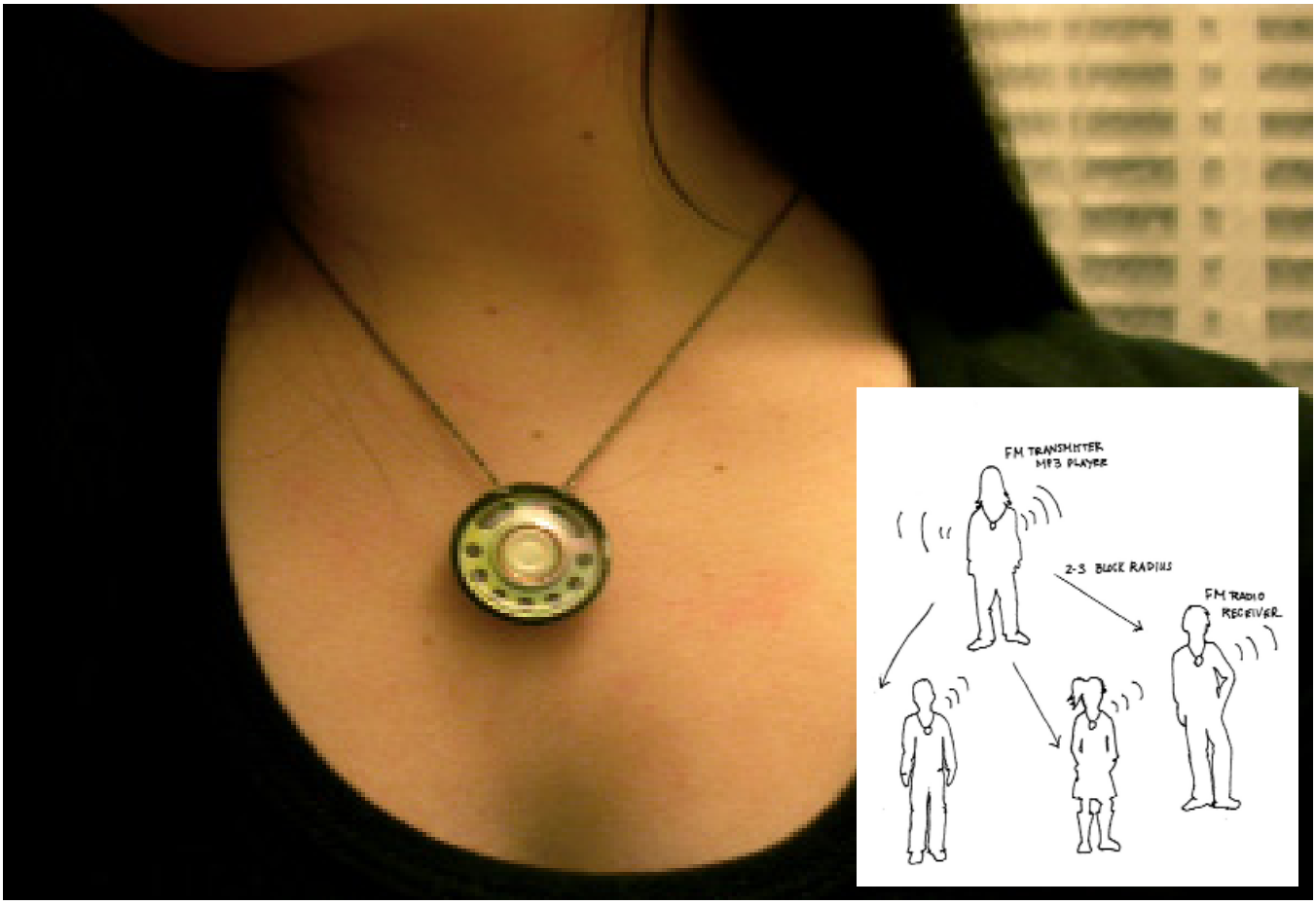
2005, ripstop nylon, micro fans, switch, circuit board.

Modes for Urban Moods are a suite of wearable coping mechanisms which explore relationships in public spaces and materialize invisible social networks. They are tactile, spatial, sculptural expressions fashioned to the body. *Space Dress* inflates according to its user's will and specific situation. It is designed to cope with stress, anxiety, and claustrophobic situations--or simply provides comfort. It was originally designed for rush hour in the NYC subway system. Other works in the Modes series (not displayed) are: *Wings*, a mechanism to help managing stress by controlling breath and forcing rhythm; *Loud Bubble*, ear muffs mechanism to help restricting (visualizing) noise pollution, connected to a microphone that picks up sound and transforms it into soap bubbles (it can also be used as a prop at urban events and parties); and *Emergency Ring*, jewelry with an inflatable mechanism ready to pop up in case the wearer decides it is necessary due to emergency or loneliness.

Theresa Almeida is a Portuguese artist and currently Lecturer in Design Research at Limkokwing University of Creative Technology, Faculty of Design Innovation, in Cyberjaya, Malaysia.

Rachelle Beaudoin, Jeanne Jo, and Islay Taylor

BFFM



2007, necklaces with FM radio transmitter, FM receivers, speakers, conductive thread

BFFM allows wearers to send and receive audio files from their peers without any legal repercussions. A necklace acts as an FM radio transmitter, transmitting sound for the radius of a few city blocks. Four other necklaces are radio receivers, complete with built-in speakers. A message from the transmitting necklace is broadcast to the receiving friends and those around them, creating a system of temporal file-sharing. Like the boom boxes of the 1980s, the necklace is an attention-getting device and can play audio in public places. Similar to a friendship bracelet, the necklace is a wearable visual indication of intimacy. However, it is also provides an audio connection from friend to friend.

Rachelle Beaudoin, Jeanne Jo, and Islay Taylor

Ear Buddies

2007, modified headphones

Ear Buddies reverses the private space implied by the presence of personal audio headphones. Wearing headphones in transit or on a daily commute can be a signal to others that the wearer wants to be left alone. Headphones limit our ability to interact with others and can render questions, conversations, and even cries for help inaudible. The ubiquity of headphones in our digitally mediated society reduces our sense of interpersonal connection. Ear Buddies allow wearers to share audio with others through a modified group headphone set. The headphones create closeness and physically link the listeners to each other. Traveling en masse, the group must navigate together and act as a single unit rather than a collection of individuals.

Rachelle Beaudoin is a new media artist working in performance, wearables, and installation. She is currently living in New Hampshire and teaches at Keene State College and Chester College of New England.

Jeane Jo is from Massachusetts and Nevada and studies Digital+Media at the Rhode Island School of Design.

Islay Taylor holds a MFA in Jewelry and Metalsmithing from the Rhode Island School of Design

Protect/Detect: Cloak + Microphone V. 1

Margarita Benitez

2007, cloak made of EMF shielding fabrics, wearable inductive microphone and speaker

With the simple act of walking in public we are constantly bombarded with EMF waves (Electromagnetic Fields) as they radiate from the growing number of portable electronic devices. Protect/Detect is a series of wearables that address the theme of technological infiltration in public space.

Protect/Detect: Cloak + Microphone V.1 comments on the technologization of the public arena and tries to alert individuals to the invisible presence of technology. The cloak is made of conductive fabric. Both the shiny copper exterior and the gridlined cotton interior are EMF shielding fabrics. This gives the wearer double the protection from EMF waves that they may encounter in their environment.

The inductive microphone necklace is designed from rapid-prototyped material and houses an amplifier, battery, and speaker. It audifies the EMF waves through its built-in speaker for those in the wearer's proximity to hear. This hidden soundscape of the public environment comes alive with drones, tones, and beeps in a real-time audification of otherwise silent signals, while the viewer remains protected in the safety of the shielding cloak.

Margarita Benitez is a Miami- and Chicago-based artist.

Skorpions

Joanna Berzowska and Di Mainstone XS Labs, Montreal
With Marguerite Bromley, Marcelo Coelho, David Gauthier, Francis Raymond, and Valerie Boxer.

Supported by the Canada Council for the Arts

Enleon, 2007, felt, leather, lamé, chain mail, SMA, custom electronics
Skwrath, 2007, leather, silk, SMA, custom electronics

Skorpions are a set of kinetic electronic garments that move and change on the body in slow, organic motions. They breathe and pulse, controlled by their own internal programming. They are not “interactive” artifacts insofar as their programming does not respond to sensor data. Rather, they are living behavioral kinetic sculptures that exploit characteristics such as control, anticipation, and unpredictability. They have their own personalities--their own fears and desires. *Skorpions* integrate electronic fabrics, the shape-memory alloy Nitinol, mechanical actuators such as magnets, soft electronic circuits, and traditional textile construction techniques such as sculptural folds and drapes of fabric across the body. The cut of the pattern, the seams, and other construction details become important components of engineering design.

Skorpions shift and modulate personal and social space by imposing physical constraints on the body. They alter behavior by hiding or revealing hidden layers, inviting others inside the protective shells of fabric, erecting breathable walls, or tearing themselves open to divulge hidden secrets. *Skorpions* reference the history of garments as instruments of pain and desire. They emphasize our lack of control over our garments and our digital technologies. Our clothes shift and change in ways that we do not anticipate. Our electronics malfunction and become obsolete. There are five *Skorpions* at present: *Enleon, Luttergill, Slofa, Skwrath* and *Glutus.*

Two *Skorpions* are represented in Social Fabrics:
Enleon is constructed out of heavy hand-made felt, creamy leather, and reflective lamé lining. It is shaped like a large bilateral symmetric pod that encloses the body from front and back. The materials are perforated with small decorative holes that allow some airflow around the body. Each side features six scattered scales that rise and lower in order to reveal a mirrored lining. The movement is activated by beaded shape memory alloy (SMA) coils, controlled through custom electronics. A sculpted felt mask obscures the face with reflective chain mail.

Enleon mirrors your every fear and desire. Its soft pod shell encases the host like a clam. Its seductive flaps move up and down to reveal reflective scales that mirror your own insecurities. *Enleon* is everything to everyone, but its multifaceted personality also makes it inscrutable and enigmatic. Some say that its reflective exterior disguises a malignant envy, rotting inside. *Skwrath* is a quilted leather bodice constructed out of stony leather lined with blood red silk. It integrates a sculptural wing-like collar around the head that can be used to conceal the face of the host and can be torn open to reveal the scarlet lining. The abdomen is made up of three interlocking leather segments or plates, embroidered with threads of SMA, which are activated through a custom electronic board to contract and curl back to reveal deep slashes of red silk.

Skwrath is a lone warrior acting on instinct. Its leather carapace snarls and retreats over its bloody red interior. Its face shield hides and disguises the host's intentions and emotions. Only one eye is revealed. Its skirt contracts to warn people to keep their distance, to stand back. When they get too close, its plates crawl back and retract. Blood gushes forth. The interlocking plates of the *Skwrath* armor twist around the body like a spiraling abdomen.

Joanna Berzowska is Associate Professor of Design and Computation Arts at Concordia University and the founder and research director of XS Labs.

Di Mainstone is a British fashion designer specializing in interactive couture.

XS Labs is a design research studio focusing electronic textiles and wearable computing, located in Montréal, Canada.

Digital Mallarmé:
Virtual Techno-Poetry in Motion

Kathy Bruce, James Cook, and Alastair Noble

2008 , screen mesh, fabric, bamboo frame,
Japanese rice paper, LCD displays, video monitors, CD player, power packs

It is our intention to move the exploration of poetic text into a virtual social experiment by developing moving digital interpretations of poetry in the form of contemporary techno-fashion statements. This garment, Digital Mallarmé, displays text with interpretive digital video images extracted from the poem, Un coup de dés jamais n'abolira le hasard (A throw of the dice will never abolish chance;1897), written by Stéphane Mallarmé, an influential French symbolist poet (1842 -1898). His work was revolutionary and subsequently influenced artists, poets, and musicians throughout this past century. His innovative approach is particularly evident in this poem in which the text changes in size and font styles as it crosses the open pages of the book. The content addresses the mysteries of time, space, and destiny. In Mallarmé's planned edition there are twenty pages, eleven openings, and eight different type sizes or styles mixed throughout with some italicization and some text left blank.

Our presentation of this text using digital media emphasizes the distinctive structure of the text and its unique typographical layout. The presence of the digitalized text coupled with the spare page-like field of the garment emphasizes Mallarmé's own obsession with the blankness of the page. In this piece the monitor screens are initially hidden from view until the wire mesh waistcoat is opened like the pages of a book to reveal digital images. The garment is transformed into a power book or a communicating vessel of poetic verse and imagery. Our objective is to create live wearable poetry in motion using a virtual representation of sound bytes and "moving pages" that interactively expresses some of the essential qualities of Mallarmé's poem.

Kathy Bruce is an artist who concentrates on individual and collaborative interpretation of poetic texts as collages and sculptural costumes.

James Cook is Chair of the 3D Division in the University of Arizona Tucson School of Art. He has exhibited his work internationally.

Alastair Noble is Assistant Professor of Art at Lafayette College in Easton, Pennsylvania, and has exhibited internationally as a sculptor and installation artist. His work represents poetic and literary texts within illuminated environments.

Geraldine Juárez

Postal Gown by Freewear

2007, USPS envelopes, freecycled notions, machine sewn seaming.

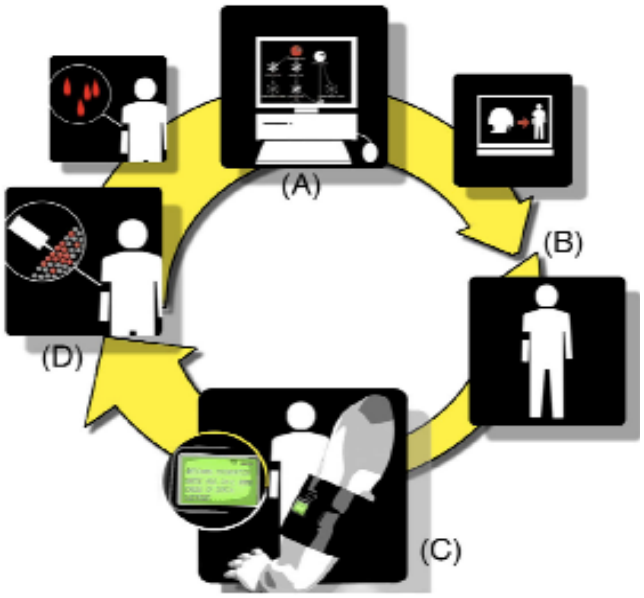
Freewear is an ongoing project that explores the possibilities of creating garments out of free materials provided by the city. The *Postal Gown* is the first product of *Freeware* which was made using Postal Tyvek envelopes that can be found in any post office or ordered from the United States Postal Service website. All the notions needed to sew the dress in its totality were freecycled--part of a network of gift-economy named Freecycle. The Postal Gown is a revival of the Paper Dress of the 60s, which was extremely popular because it only cost one dollar and was disposable. The *Postal Gown* does not have to be thrown away after use and is completely free, encouraging users to refuse to pay for materials and to reuse stuff that otherwise will turn into waste.

Along with the exchange of goods, *Freecycle* also entails an exchange of stories: you are open to encounters with strangers and with the city itself that may have been otherwise foreclosed by dominant modes of exchange and consumption. Hacking the Post Office to get the main resource enables users to detour the purpose of the infrastructure to their own benefit.

Geraldine Juárez is a designer from Mexico City based in Brooklyn, where she is Senior Fellow at Eyebeam and forays around the city for low-tech crafts and artifacts that enable moneyless interaction and deal with consumption issues.

Matthew Kenyon

Improvised Empathic Device



I.E.D Armband process diagram:

(A) Information on new U.S. casualties is data mined. (B) Data of recent casualties is sent wirelessly to the I.E.D armband. (C) Data is displayed on the LCD monitor. (D) A solenoid armed with a needle stabs the wearer-once for each new casualty.

2005-present, custom software and hardware.

The premise of the *I.E.D.* (Improvised Empathetic Device) project is to give real and physical presence to the death and violence occurring in the Middle East, by creating direct physical pain from the event of each soldier's death, rather than allowing their death to be relegated to small or no print. *I.E.D* is a wearable computing device that is connected wirelessly to a server running custom data-mining software. Within a black armband, various hardware is installed to control its operation. This hardware consists of a custom circuit board modeled after a map of Iraq that is powered by a nickel cadmium battery, a modified alphanumeric text pager, and a solenoid linear actuator.

In *I.E.D* a custom software application continuously monitors the web for accumulation and personal details of slain U.S. soldiers in real time. When new deaths are detected the data is extracted and sent wirelessly to custom hardware installed on the *I.E.D.* armband. The LCD readout displays each soldiers' name, rank, cause of death, and location and then triggers an electric solenoid to drive a needle into the wearer's arm, drawing blood and immediate attention to the reality that someone has just died in the Iraq war that is raging far away.

Matthew Kenyon is an Assistant Professor of New Media at Pennsylvania State University, where he teaches physical computing, game art, and 3D animation. He is interested in the convergence of art and emerging technologies.

Speckled Jewelry

Sarah Kettley and Frank Greig
Speckled Computing Consortium, Scotland

2005-06, Perspex, Formica, silver, polymer clays and custom electronics
(ProSpeckz II prototypical wireless transceiver nodes, LEDs)

Speckled Jewelry comprises five wirelessly networked neckpieces for a friendship group. Built at the workbench and deliberately merging traditional craft techniques with emerging technology, these pieces represent a new form of creative practice and offer new forms of experience to the wearer.

Each piece incorporates a prototype wireless sensor node or "Speck," which acts to locate and identify other specks within a range of approximately 20m radius. This information is then visualized through five dedicated LEDs, which flash at different rates to reflect three social distances. These are distances at which ways of greeting have been observed to change: intimate (under 30cm), social (30cm to 1m), and distant (over 1m and up to the range of the wireless connection, i.e., approx. 20m). These distances accord with Edward T. Hall's observations and identification of Proxemics (The Hidden Dimension, 1966). When wearers of *Speckled Jewelry* observe the flashing, they can choose to act on this augmented social proximity information or not. The jewelry is the first successful application for *Speckled Computing*, an emergent technology being developed by a research consortium of five universities in Scotland, and related to the Smart Dust project http://www.specknet.org). The vision of this research program is the development of a 1mm cubed programmable sensor node, deployed in large numbers and capable of self-organization. This project was a part of Kettley's doctoral research, and she continues to work with the consortium on wearable concepts (http://www.dcs.napier.ac.uk/~cs179/ensemble/ensemble).

Sarah Kettley is an independent artist researcher. Frank Greig is a lecturer in embedded systems at Napier University, Edinburgh. Both are members of the Speckled Consortium, Edinburgh.

Stir It On!

Younghui Kim

Stir-It-On Illustration by Younghui Kim, 2007

2007-08, QProx 113 Touch Sensor, conductive thread and fabric, LEDs, Arduino board

My focus is to integrate technology seamlessly into everyday life design such as fashion. Through fashion and technology I intend to express my everyday observations and my projects are my personal remarks on today's society.

Stir It On! is an interactive skirt that reacts to any close encounter on its surface, such as bumping or touching. The *Stir It On!* skirt has design patterns on the surface emit subtle lights when they are stirred by objects or persons passing by. The piece was inspired by bioluminescent bay organisms called Dinoflagelates that react with luminescent glow when they are agitated. In everyday lives, especially in crowded urban cities, many people pass you near or even touch or bump into you. This is especially true in Seoul, Korea. Depending on the wearer's perspective, this interactive reaction of the *Stir It On!* skirt can express either an alarm that says "stay away"" or a playful request to come closer. Multiple Stir It On! skirts will behave more like Dinoflagelates when they activate each other.

Younghui Kim is a New York City-based designer. For the last 14 years, she has worked in various media, including environmental graphics, print, motion graphics and interactive media, and has been recognized with several interactive design awards and presenting at conferences such as Siggraph, HCI Design and Ubicomputing.

Negotiations

Daniela Kostova & Olivia Robinson (w/ Galina Kumanova & Kelly Bogan)

2006-07, custom software, wireless monitor and transmitters, wireless surveillance camera, video camera, webcam, laptop computer, chroma key fabric, fabric, and foam.

Negotiations is a project that explores cross-cultural communication and interpretation. Over a period of two years Daniela Kostova and Olivia Robinson developed an interactive system that utilizes blue screen video techniques as a tool for manipulating human bodies moving through unknown environments. The system has been performed in three distinct public environments: Sardinia, Italy; New York City, USA; and Sofia, Bulgaria. As both a conspicuous costume and virtual assimilation act, each performance has fostered the development of a site-specific story. Recurring themes that emerged from the performances include: estrangement and integration; cultural economics of "authority"; placidity of legality, territory and ownership; and mediation of experience. The handheld monitor which displays the "negotiated" video in real-time becomes the focal point, allowing relationships to form during performances and highlighting the double-consciousness[1] of cross-cultural communication.

The *Negotiations* system uses readily available computer and surveillance technology to create the real-time video. Two characters embody the system, an Alien (in blue) and an Authority (in black). Each has a video camera which is linked to a computer embedded in the Authority's costume. Custom software composites the two video streams to create a negotiated final video. The resulting imagery is solely from the Authority's point of view wherein the Alien has been replaced with her or his own point of view. The Alien carries a small monitor where s/he and passers-by can view the final video as it is being created. The Authority rarely takes her camera off of the Alien, the surveilled subject.

Daniela Kostova is a Bulgarian artist, curator, and former director of the Irida Art Gallery in Sofia. She currently lives in the U.S. and teaches at Rensselaer Polytechnic Institute and curates the BioArt program there.

Olivia Robinson lives in upstate New York and teaches at Syracuse University where she is the coordinator of the Fiber/Material Studies program.

1 Double-consciousness, in its contemporary sense, is a term coined by W. E. B. Du Bois. The term is used to describe an individual whose identity is divided into several facets. "It is apeculiar sensation, this double-consciousness, this sense of always looking at one's self through the eyes of others, of measuring one's soul by the tape of a world that looks on in amused contempt and pity..."

Monitor I Audio-Activated Bra

Heidi Kumao

Audio-Activated Bra, 2001, bra, custom electronics, 180 LEDs, 2 9-volt batteries

I work at the intersection of sculpture, theater, and engineering to create "performative technologies." These are devices developed specifically to re-enact an event, perform a task for the viewer, or mediate social interactions and my roles as woman, teacher, wife, and daughter. Each work generates artistic spectacle using forgotten technologies from previous centuries and powerful tools from the digital age. These have included electronic wearables, kinetic sculptures and “cinema machines.”

I view performance as an integral part of everyday life: as a means to define our identity and sexuality, as an examination of roles we play as employees or family members, and as a tool for selfexpression Without a proper stage, we perform every day, unconsciously or consciously. As an artist, I present carefully sculpted moments from these “everyday performances.” My work relies on time-based media: art forms that unfold over time, ideas that become clearer with repetition and looping, installations that reveal the synergy between image, object and movement. By synthesizing an experience, I am acting as a theater director--animating objects, restaging memories, and ultimately exposing the theatricality underlying so many aspects of our lives. "Wired Wear: Mediating Everyday Performances" is the title of a two-part project consisting of women’s clothing embedded with custom circuitry and humorous, instructive videos in which I demonstrate their use. Each garment is fitted to my body’s measurements and is designed to fill a specific personal or psychological need. By wearing them in ordinary social situations and public

Monitor II: Audio-Activated Dress

Heidi Kumao

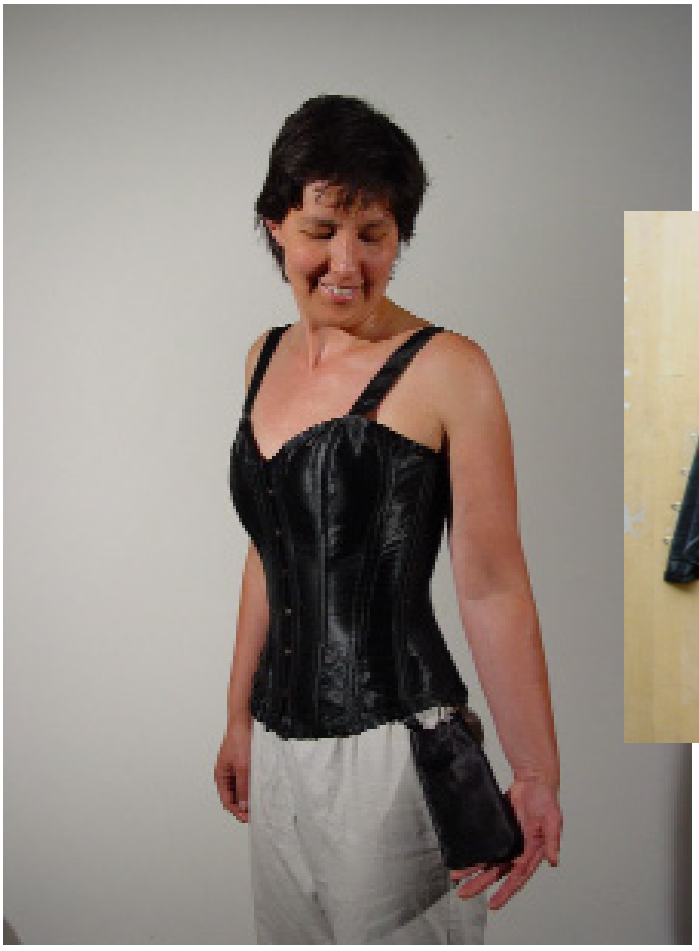
Audio-Activated Dress, 2005, 500 LEDs, microphones, custom electronics, purse, batteries

places, I use technology to mediate my everyday “performances” as a woman, teacher, and citizen, expanding performance beyond the athletic, economic, or theater contexts.
The *Audio-Activated Bra* uses a circuit designed after a stereo monitor. Ambient sounds trigger concentric rows of LEDs incrementally, and the sensitivity dial ensures that the extra bright central lights are only triggered by the loudest sounds.

The *Audio-Activated Dress* is embedded with 500 LEDs (light emitting diodes) and custom electronics that make it sensitive to sound. The LEDs are arranged in columns which light up from the bottom; softer sounds light up the lower parts of the dress while louder sounds cause entire columns to be illuminated. The handbag contains the custom-made rechargeable battery pack and the bulk of the circuitry. The circuits sewn into the dress are connected to the electronics in the handbag with a quick connector. The knobs on the purse adjust the sensitivity of the microphones sewn into the chest so that the loudest sounds will cause the columns to reach their peaks. Pounding music causes my dress to pulse with light as I actively monitor the sound intensity of the surrounding environment.

Posture Generator

Heidi Kumao



Posture Generator, 2005, custom corset, speakers, custom electronics, 9-volt battery.

The Posture Generator consists of a custom-made corset fitted with bendable resistors in place of the corset stays for measuring posture degeneration. The controlling circuit is stored in the handy side pocket (left). When my posture degrades, speakers embedded in the bra release an irritating squeal, reminding me to stand straight.

Heidi Kumao is an Assistant Professor at the University of Michigan School of Art and Design at Ann Arbor, Michigan.

Taiknam Hat

Ebru Kurbak, Ricardo Nascimento, Fabiana Shizue

2007, feathers, fabric, detecting/motion-driving system, radio frequency detector, microcontroller, motor.

Taiknam Hat is a kinetic headwear that reacts to the changes in surrounding radio frequencies. The project is to materializes the invisible and contributes to the awareness of increasing ambient electromagnetic radiation. All electromagnetic waves that radiate from physical devices creates an invisible landscape that interacts with physical space and its inhabitants. This landscape is creating a new form of pollution, electrosmog, which has biological effects on all living beings. *Taiknam Hat* is an attempt to materialize the electrosmog, especially that created by ubuquitous cellphones by emulating horripilation, an automatic reaction of living creatures to sources of irritation and stress. Horripilation, which can be defined as the erection of hairs or feathers in various species under certain emotional conditions, is a temporary and local change in the skin. It is referred to as part of the “fight-or-flight” response. Animals respond to threats with a reflex that results in either the animal fighting (anger emotion) or fleeing (fear emotion), and horripilation can be clearly observed in both reactions. In some animals, especially in birds, horripilation is also attached to another instinct, that of "selfdisplay/signaling." *Taiknam Hat* utilizes horripilation in birds as a metaphor to express our bodies’ irritation towards electromagnetic radiation, and as a signage of their existence. The headwear employs movable feathers that activate and move according to the existence and amount of radio frequencies at a certain location while the person who wears the hat strolls through space.

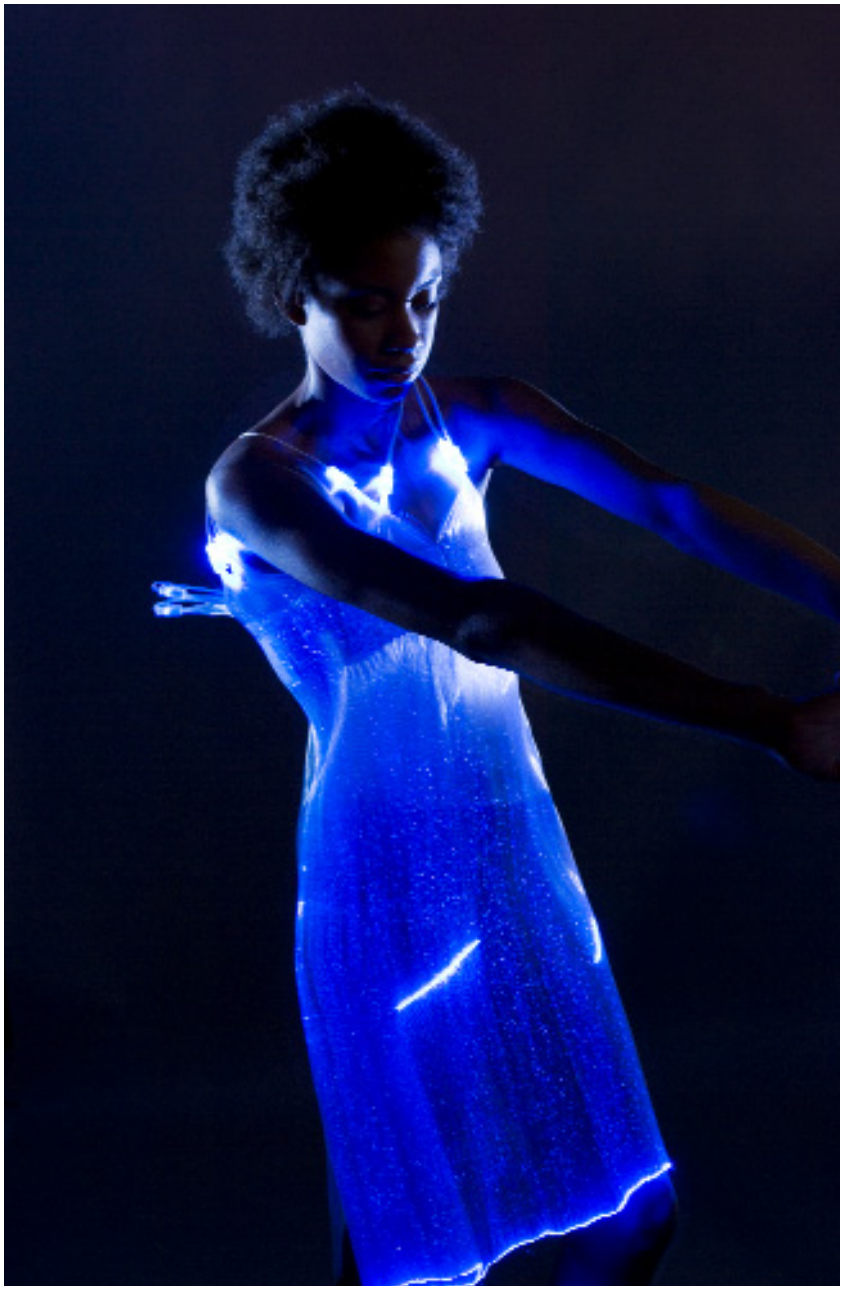
Ebru Kurbak is a PhD Candidate in the Department of Space and Design Strategies, Kunstuniversität Linz, Austria.

Ricardo Nascimento is a graduate student in the Interface Culture Department, Department for Media Studies, University for Art and Industrial Design, Linz.

Fabiana Shizue is an independent designer, artist, and illustrator from São Paolo, Brazil, living between Turin and Linz.

Wearable Patterns

Anke Loh w/Alan Sahakian, Jonathan Bender, Linda Buzzi



2007-08, luminex fabric, LEDs, sensors, circuits

As a wearable language, patterns play a concrete and objective role in determining the extent to which we come to life in any given place. --IT + Textiles[1] Two optical-fiber dresses made from Luminex fabric are illuminated by LEDs and display moving color patterns. As the models approach one another, patterns on their dresses interact and co-adjust to complement each another. The experiment explores revealing interactive and evolving patterns, manifested as wearable sketches reflecting personal expression, environmental change, and social constructs. Ultimately, this pursuit examines how non-verbal communication can hide or reveal aspects of one's self.

Anke Loh is Assistant Professor in the Department of Fashion of the School of the Art Institute of Chicago. She concentrates on textile innovations and has worked with experimental light-and temperature-sensitive materials

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Alan Sahakian is Professor of Electrical Engineering and Computer Science and Biomedical Engineering at Northwestern University's McCormick School of Engineering and Applied Science in Evanston Illinois at Northwestern University's McCormick School of Engineering and Applied Science in Evanston Illinois.

Jonathan Bender and Linda Buzzi are Electrical Engineering seniors in Northwestern University's McCormick School of Engineering and Applied Science in Evanston Illinois.

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[1]IT + Textiles, Maria Redström, Johan Redström, and Ramia Mazé, eds. (IT Press: Helsinki,2005).

Logoknit Facemask

Cat Mazza

Logoknit Face Mask, 2008, yarn and knitPro freeware

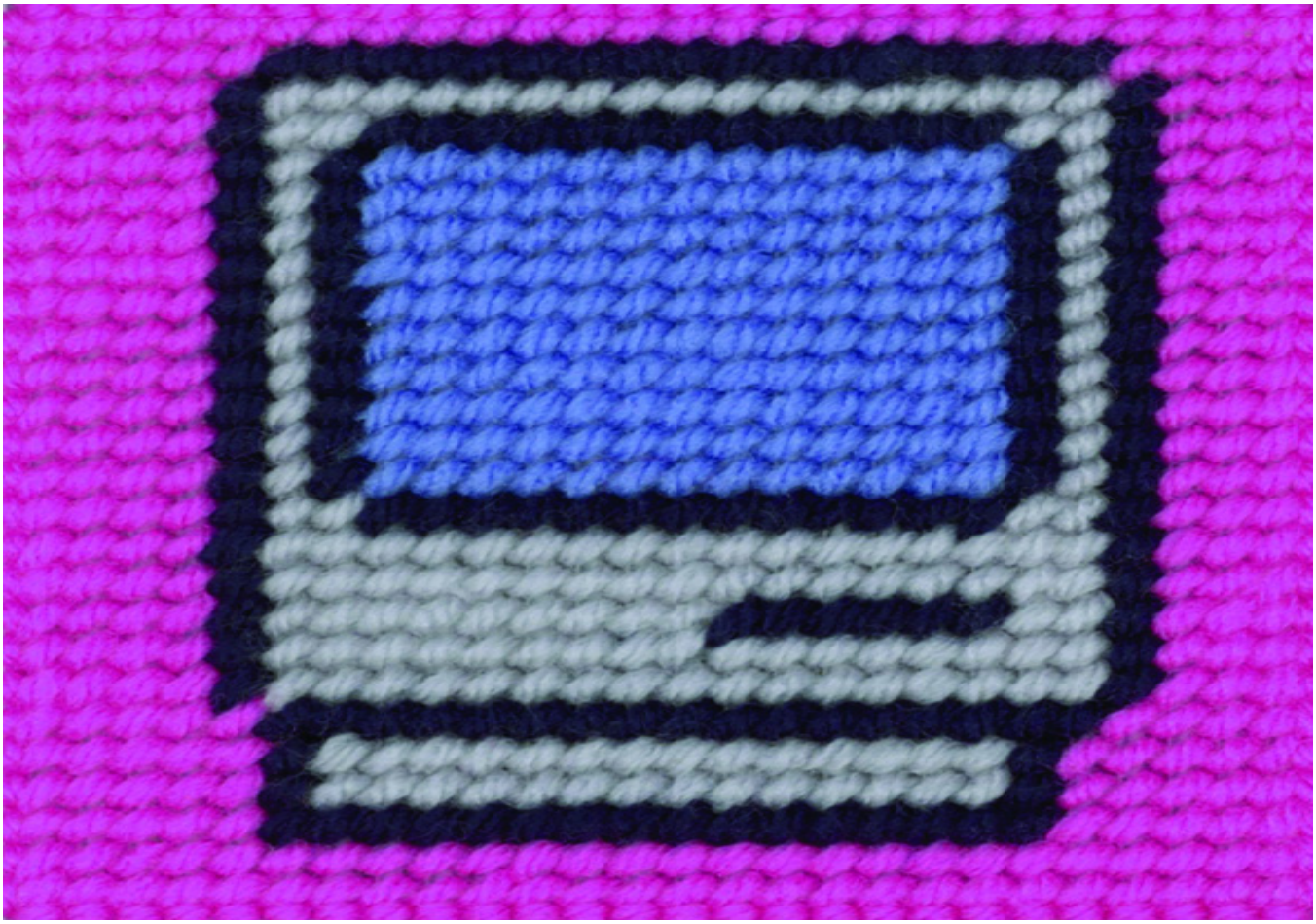
Pre-industrial textiles often include patterns that represent stories of cultural heritage using various lettering, geometries, and pictograms that illustrate landscapes, native animals, and notions of everyday life. Aesthetic styles and techniques vary between culture and region, however, as patterns were often inscribed on a two-color grid chart that could be appropriated, modified, exchanged, and passed down to succeeding generations. The free web application

knitPro was developed to mimic this tradition through digital distribution, and by easily allowing worldwide craft hobbyists to translate digital images into needlecraft grid patterns. KnitPro users upload thousands of patterns per week that feature everything from graphics of lo-tech video games to candid snapshots, pop celebrities and symbols of political uprising. KnitPro takes an uploaded digital image, lowers the resolution and charts a grid over the pattern to read and stitch from.

(continued)

Logoknit Facemask

Cat Mazza



The purpose of *knitPro* is to use digital media toward advancing the vitality of contemporary craft, but also to promote handcrafting as a compelling micro-economy produced outside of the labor exploitation of the global garment industry. Knitted examples on the *microRevolt* website are mostly logoknits--knitted garments stitched with logos of corporate sweatshop offenders. These garments are part of a larger artistic practice and web based project (www.microrevolt.org) developed to create dialog about authorship, production, and labor injustice in global apparel.

Cat Mazza is an artist whose work combines knitting, digital media, and labor activism.

Secret (Clothes Make the Man)

Ryan McCabe

2008, performer, coat

Secret (Clothes Make the Man) is a performance for solo performer utilizing an interactive "sensor coat" to trigger and manipulate audio events. The majority of the audio content is appropriated from a 1950s inspirational/self-help album entitled *Earl Nightingale Gives You . . .The Strangest Secret* in which the listener is told "how to attain the rich full measure of success and happiness that can surely be yours."

The performance takes the form of a social critique, a negotiation between Fashion and the Ego, between well-worn cultural platitudes and self-mediation. The technology in this work acts as a mediator, a bridge between the performer and the social "skin" of the garment. The technology is hidden from the viewer, discretely sewn into the lining of the coat, but is certainly not mute; instead, the various sensors map the often pedestrian movements of the performer (buttoning the coat, fixing the lapel, brushing lint from the arm) and transform these movements into an aural critique of self-image and public facade. Technology thus exposes passive social expectations (based on projected "image" and social actions) and critically engages the role of the individual in a "mediated" sphere of social interaction.

Ryan McCabe is Director of Academic Technology at the Maryland Institute College of Art.

Conversation Loom

Kristen Nyce

2007, balsa wood

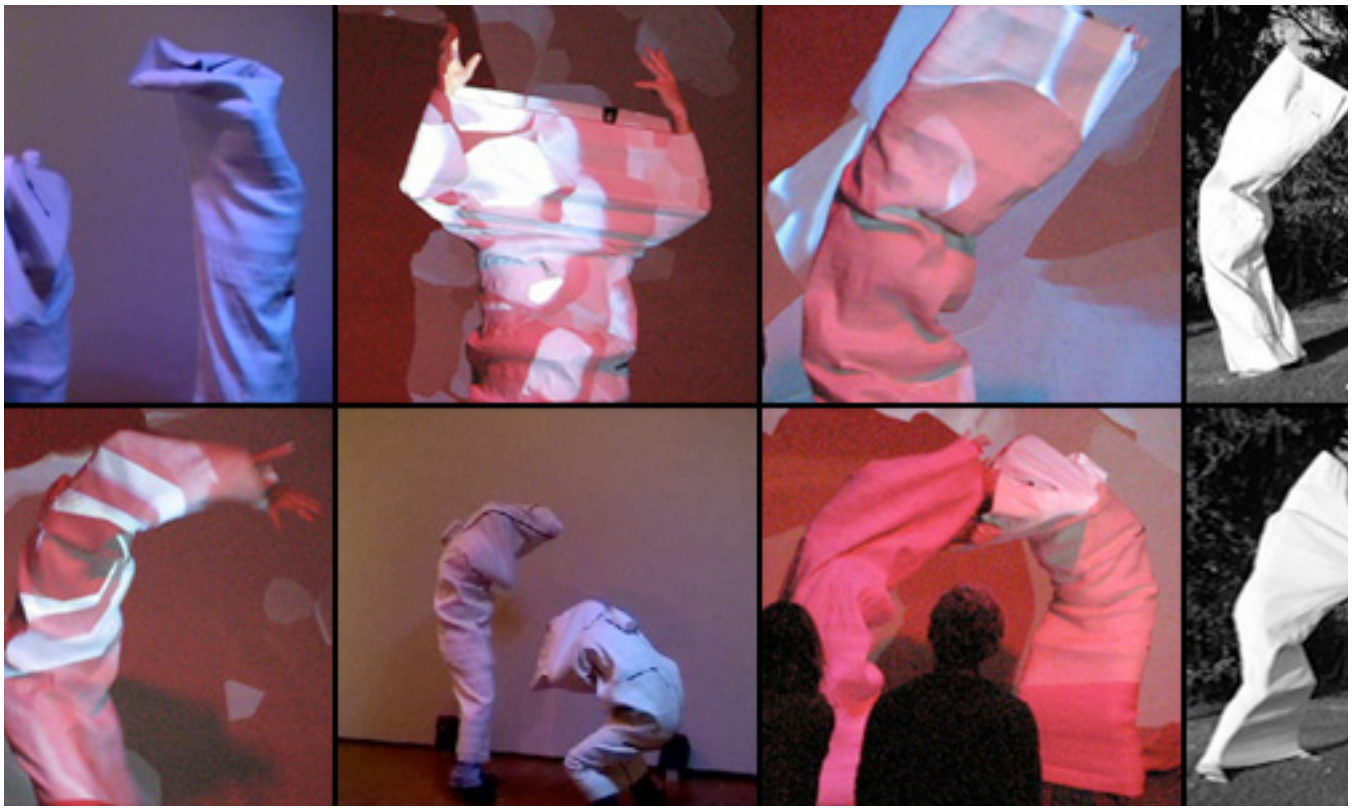
Weaving traditions throughout the world are rich with texture and symbolism. Knots and patterns in textiles come together to communicate profound statements of belief, tradition, and history. In many instances the process of creating the textile is equally symbolic and important. The creation of cloth often follows strict rituals and is seen as a spiritual journey.

After learning how to weave, I became interested in the process and creation of tactile modes of communication. As a result, I investigated ways in which the symbols and textures of a textile can manifest meaning, as well as the ways in which techniques and tools create that meaning. *Conversation Loom* and *Mouth Loom* are the first products of these investigations. *Conversation Loom* is a continuation of Mouth Loom, a loom created to weave small strips of fabric using the movements of the mouth. As a loom, it uses the mouth (to move warp threads) and hand gestures (to move weft threads) combined to create a tactile record of speech. Similarly, *Conversation Loom* serves as an instrument to create a tactile record of a conversation between two or more people. Resting on the shoulders of each weaver, and connected by warp threads, it will function with two heddles operated by the up and down movements of the chin while talking.

Kristen Nyce is a sculptor and performance artist with a background as a violinist, currently living in Washington D.C. area.
2007, white elastic stretch band pipes with zippers, 2 Bluetooth Create USB interfaces, 2 accelerometers, and 10 linear

Vacuole Robes

Anne-Marie Skriver Hansen



spring-loaded potentiometers

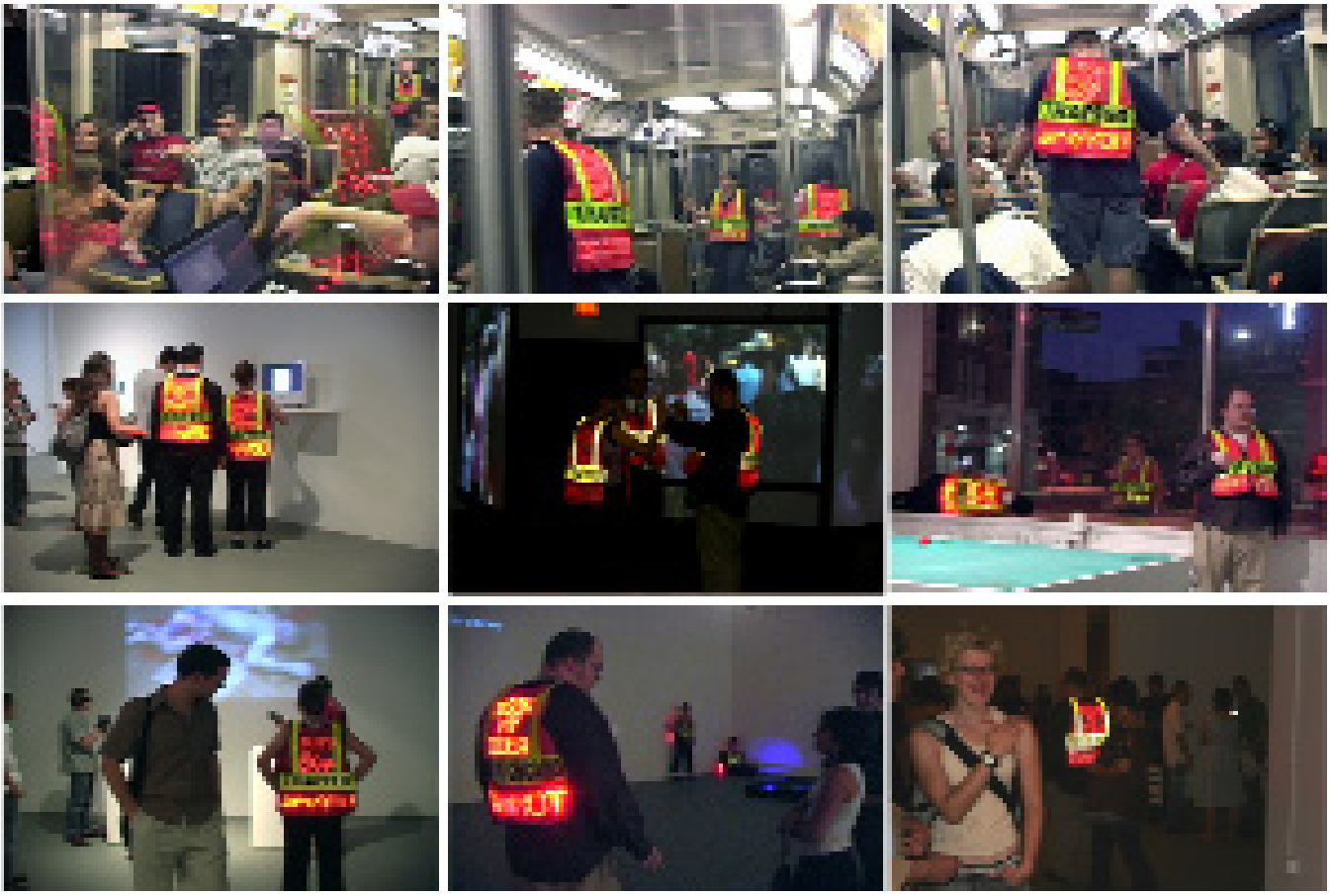
With physical interface experiments I investigate the area between people's physical and social needs and boundaries. Through the means of physical interaction I change the viewer's role, so that the viewer is an enactive interpreter of my work. The intent is to give the viewer as a participator a physio-aesthetic experience that may change his/her kinesthetic perception and physical interaction with other people. The *Vacuole Robe* interface is an attempt to provide a feeling of oneness between two people. When two people interact with each other through the sound medium of the *Vacuole Robes*, they create a soundscape that they both can contribute to on a continuous basis. This oneness is at one level further emphasized in the interface, because each participator cannot see, but only hear, the combined result of their common movements. At another level, each participator is separated from the other by being surrounded by the cocoon-like robe that exhibits their bodily shape and movements as an anonymous living sculptural shape. By separating each participator from the awareness of each other's looks while they interact with the work, I try to create an ambivalent feeling of being exhibited--and at the same time safely enclosed and hidden--in the piece itself.*Vacuole Robes* draws upon the idea of design noir, a term coined by Dunne and Raby.[1] Just as the term film noir references films that emphasize moral ambiguity and sexual desires, the term design noir covers objects that encourage hidden desires to unfold through interaction. The Vacuole Robes do not necessarily support sexual desires, but they challenge forms of communication that have become superfluous in a time when the spoken and writtenword dominates.

Anne-Marie Scriver Hansen holds a Masters in Interaction Design from Designskolen Kolding, Denmark, and Master of Fine Art, University of California, Santa Barbara.

[1] Anthony Dunne and Fiona Raby, Design Noir: The Secret Life of Electronic Objects (Birkhäuser: Basel, 2001).

unspoken_dallas_caa

Hoyun Son



2005-present, site-responsive public performance with 3 LED vests (municipal safety vest, LED, stenciling)

In the *unspoken_series*, which is a site-responsive public performance, I use text spelled out with LEDs on the backs of orange safety vests worn by performers as a means of communication. The performances are not staged and occur in public spaces like the subways, and social gatherings like gallery openings, where public etiquette filters out individual feelings and interaction. The inspiration for the *unspoken_series* came from Chicago's decision in late 2005 to change the crosswalk signals on Michigan Avenue from blinking red hands to counting down. In the unspoken series I am questioning how this change can be a quick reference to pedestrians but also a means for an authority system to control the public's brain, mind, and body. I used texts that subtly provoke the private space between individuals who are otherwise adhering to social etiquette. For example, the text "I want to fart, make me happy!" brings individuals, even strangers, together from sharing giggles to conversations. In choosing the text, I explore issues specific to the particular city, the main target audience, and generally suppressed emotions in public spaces In order to attract the public's attention, the municipal safety vests used were similar to those worn by Chicago traffic officials and security personnel. However, to trigger suppressed emotions, "City of Chicago" was replaced with "Mind of Chicago," "Traffic" was replaced with "Trapped," and "Security" was replaced with "Secrecy." I used materials and tactics commonly used by authorities to suppress the individual mind and the unspoken voice in public situations to actually trigger the opening of them.

unspoken_dallas_caa is a unique version of the piece designed for the audience at the 2008 College Art Association Annual Meeting.

Hoyun Son was born in South Korea and lives and works in Chicago.

Barking Mad

Suzi Webster and Jordan Benwick

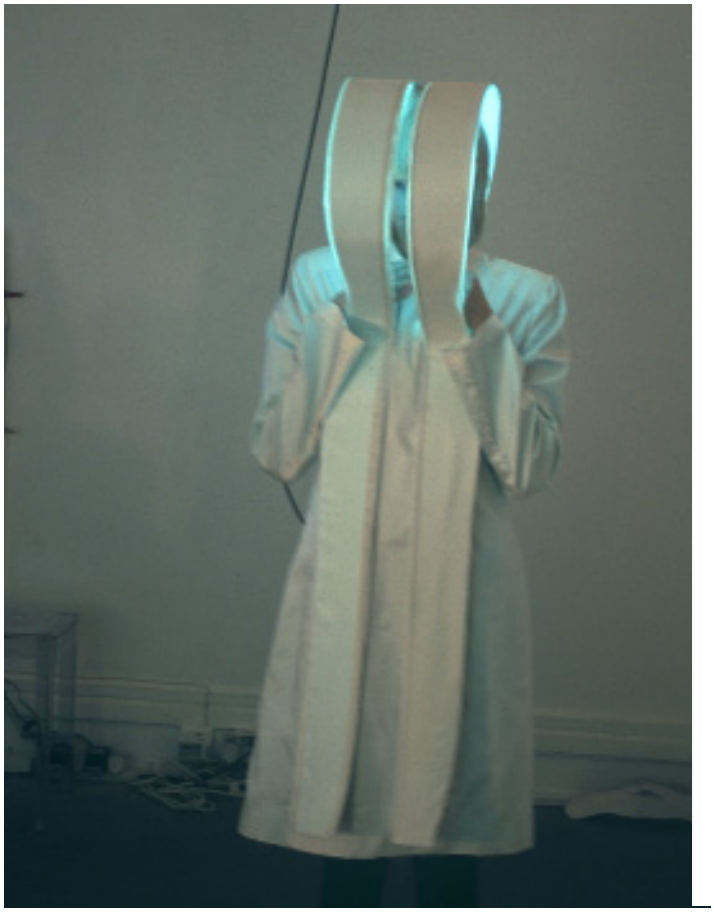
2006-07, coat, proximity sensors, galvanic skin response (GSR) sensor, flat panel speakers, crowds

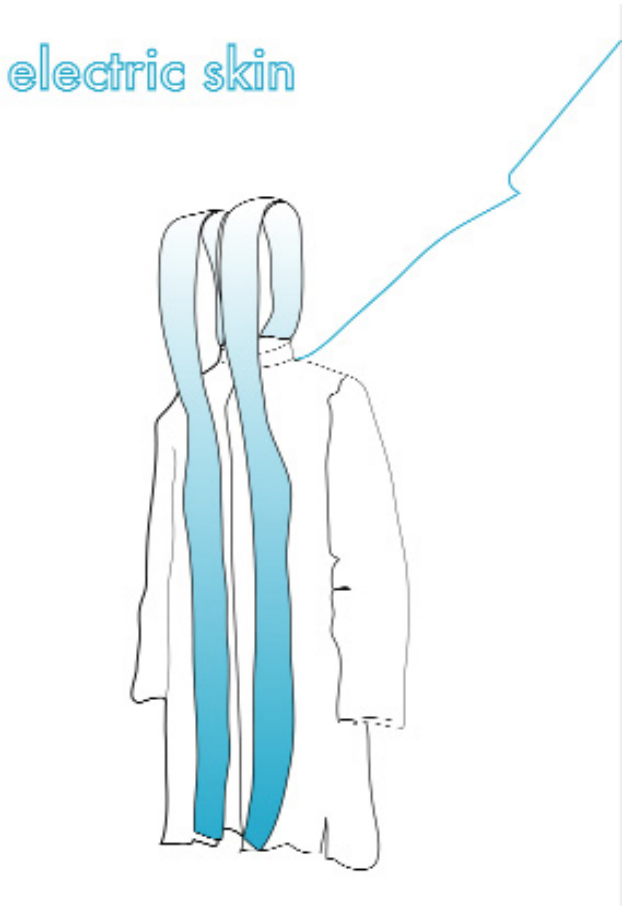
Technology enables us to listen in on the mysterious and invisible signals that emanate from our bodies. Mostly this data is used for medical purposes, but as artists we transform this private bio information into a metaphoric wearable display of color, light, sound, or vibration. We are interested in what is lost, found, or suggested by this transformation, and how it explores the ways in which technologies impact and shape our experiences of being human. We are inspired by technology that is networked, mobile, soft, and responsive to the body, rather than rigid and boxy, tethered to the desktop, confined to the tyranny of the screen. Our wearables are hybrid works that are responsive and dynamic; that explore intersections between sculpture and performance, fashion and computing, the body and its context, and public and private, all in a critical way.

Barking Mad was designed to help shy, stressed people deal with situations of urban overcrowding. Proximity sensors respond to infringements on personal space by emitting the sound of a barking dog through flat panel micro speakers in the ultimate urban survival coat. Depending on the level of personal space required, the sound ranges in strength from a poodle's yap to the bark of a rottweiler.

Electric Skin

Suzi Webster and Jordan Benwick





2006, Elumin8 printed LEDs, silk, sensors, breath, electricity

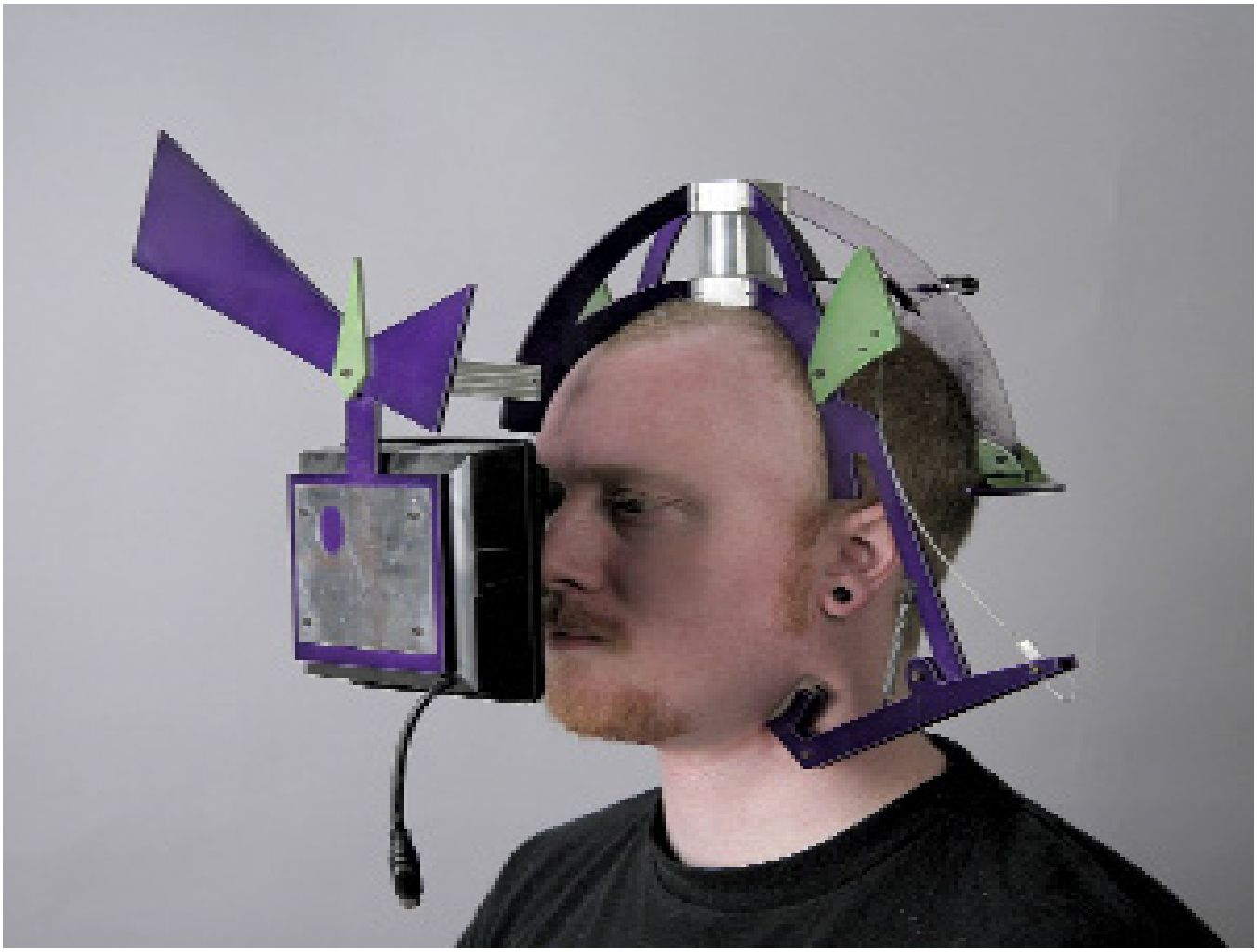
Electric Skin is a bio-responsive garment that turns the intimate breath of the wearer into pulses of electric aqua light. The inhalation and exhalation of the wearer activates a breath sensor that dims and brightens the printed LED of the garment. The wearer is connected to the national power grid by an umbilical cord/power cable, and while this creates a seductive light, it also creates a frisson of danger and unease.

Suzi Webster is a Canadian multimedia artist and part of the digital visual arts faculty at Emily Carr Institute of Art, Design, and Media in Vancouver.

Jordan Benwick is an artist/programmer who creates real-time generative audio/video and timebased artworks that frequently work involve music, networks and remote control.

Looking Ahead/Seeing Inside

Chris Wille



2004, machined and powder-coated aluminum and brass, wireless camera, LCD screen, camera aperture

I situate my work within the history of wearability in jewelry, updated with modern technology. I am a metalsmith interested in extending the tradition of jewelry and body adornment by incorporating wearable technologies that either affect the viewer or allow the viewer to affect their environment. These wearable machines reinterpret our everyday interactions and address ideas of control and vulnerability. I build retro-futuristic adornments informed by ancient armor reinterpreted through cyborgian themes.

I use an intermedia approach. I merge existing and emerging media and materials including metals, plastics, silicones, ferrofluid, fabric, found objects, wireless cameras, closed circuit television, and programmable chips, as well as "hacked" circuits from many components gathered from the everyday. I incorporate electronic and mechanical devises to achieve a broad range of functions and motion. Additionally, there is a performative aspect to my work that, in combination with the above, allows me to explore a range of contemporary social themes. My curiosity about these themes has grown from my experience of the times I live in.

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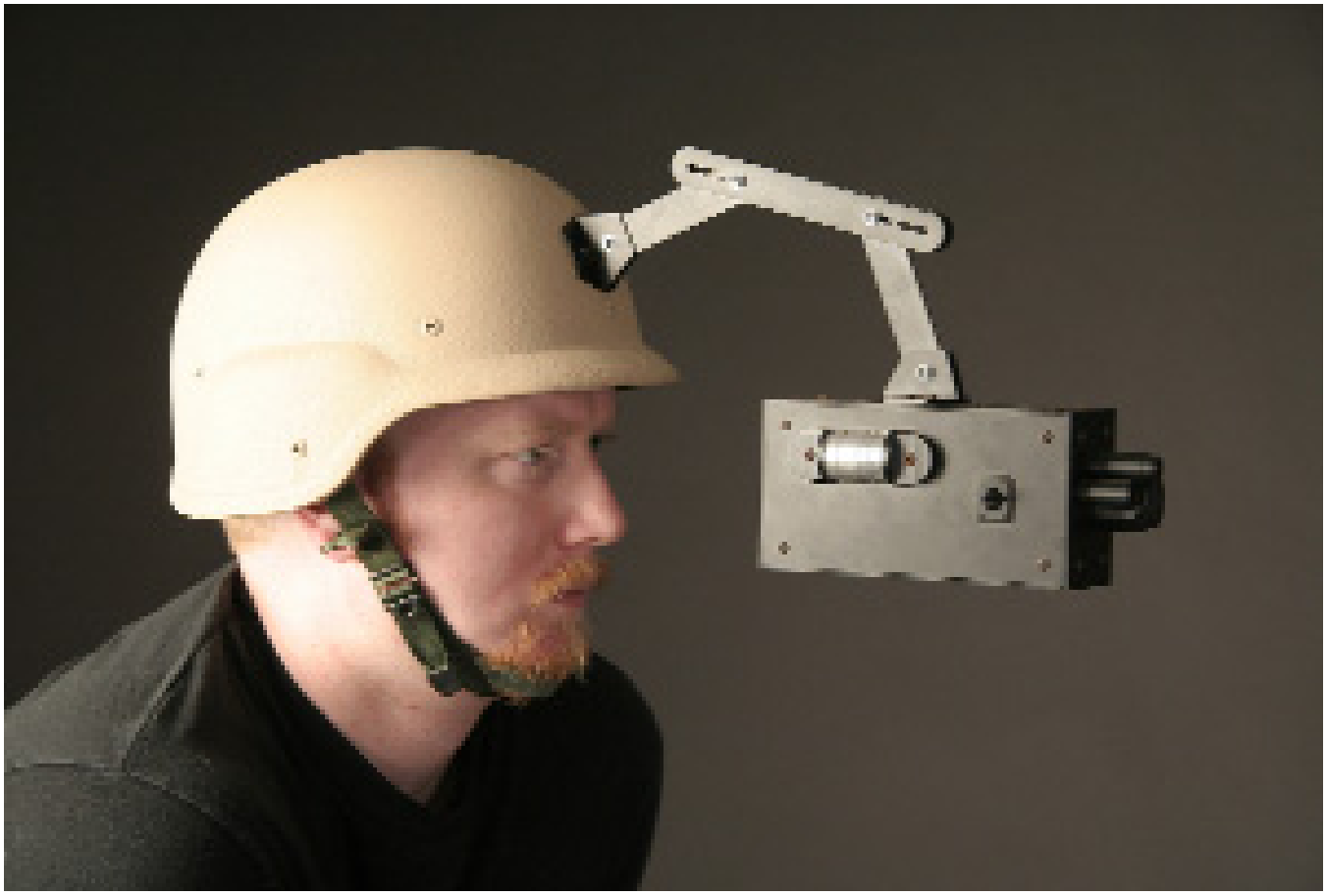
With God on Our Side

Chris Wille



2005, powder-coated aluminum, colored Plexiglas, electronic components, military issue Kevlar helmet

Technology is developing exponentially and becoming smaller and more ubiquitous. The military, research institutions, and corporations all push us forward into what was once the realm of science fiction. As reality now mirrors yesterday's fiction, I look to today's science fiction in order to dream up new incarnations of potential devices from the future. Though I do not know exactly what this future will look like, I imagine it being rather grim. This explains why my work is heavily weighted with by dystopian themes where issues of control and vulnerability play themselves out.

Chris Wille received his MFA in Jewelry/Metals from Illinois State University and currently teaches part time at art centers in Illinois.