The Enchantment of Textiles

Studio subTela

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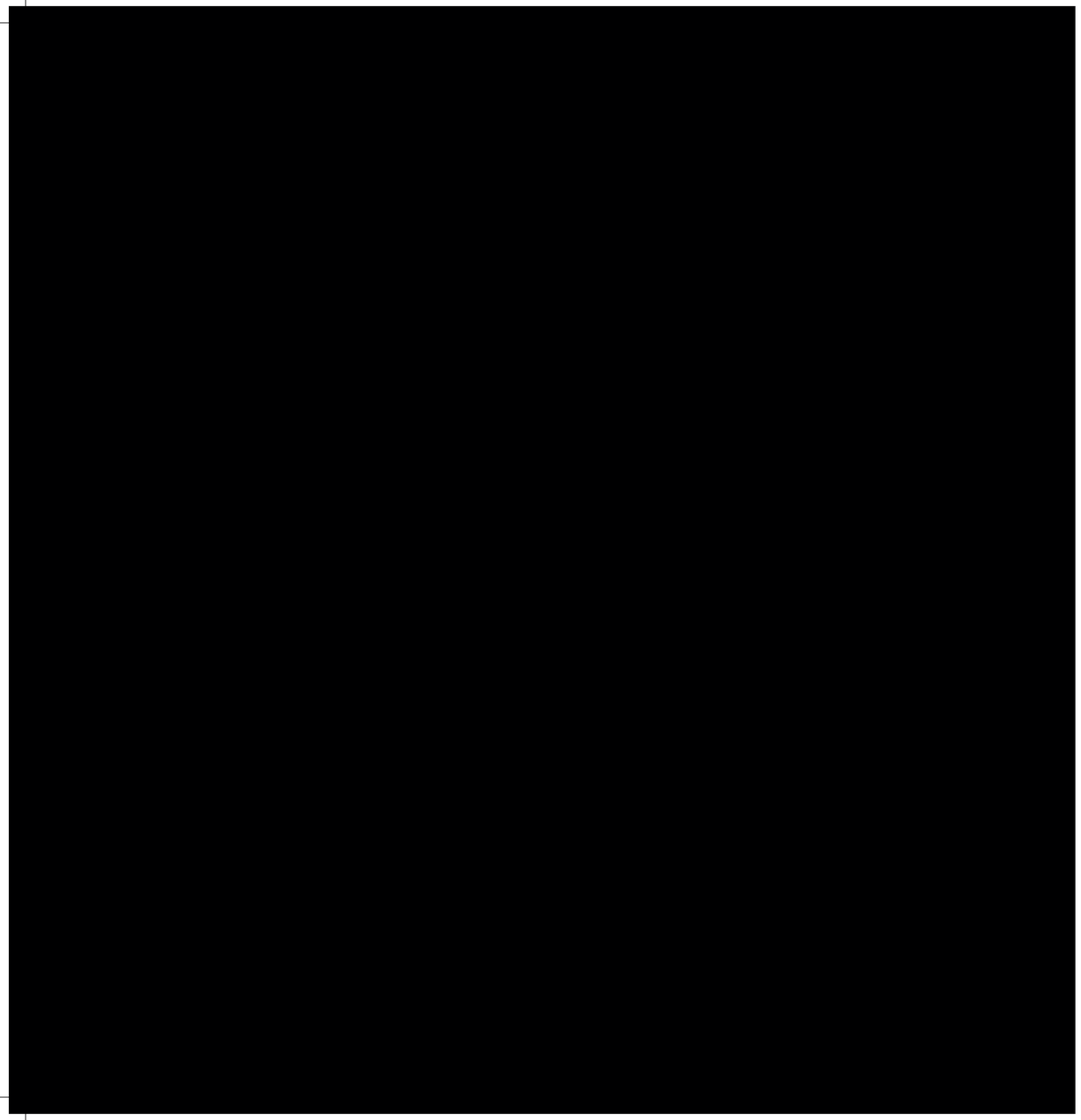

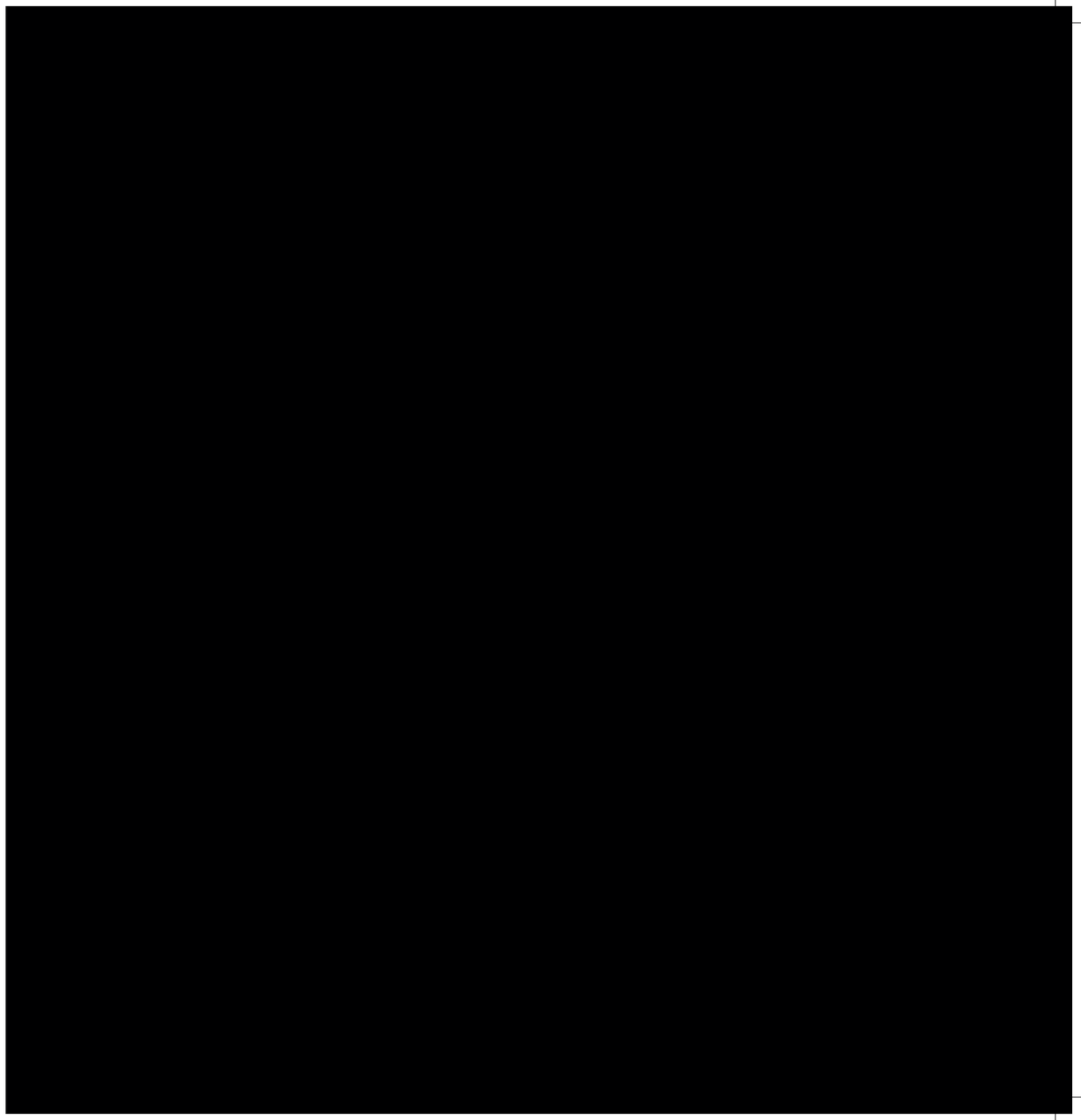

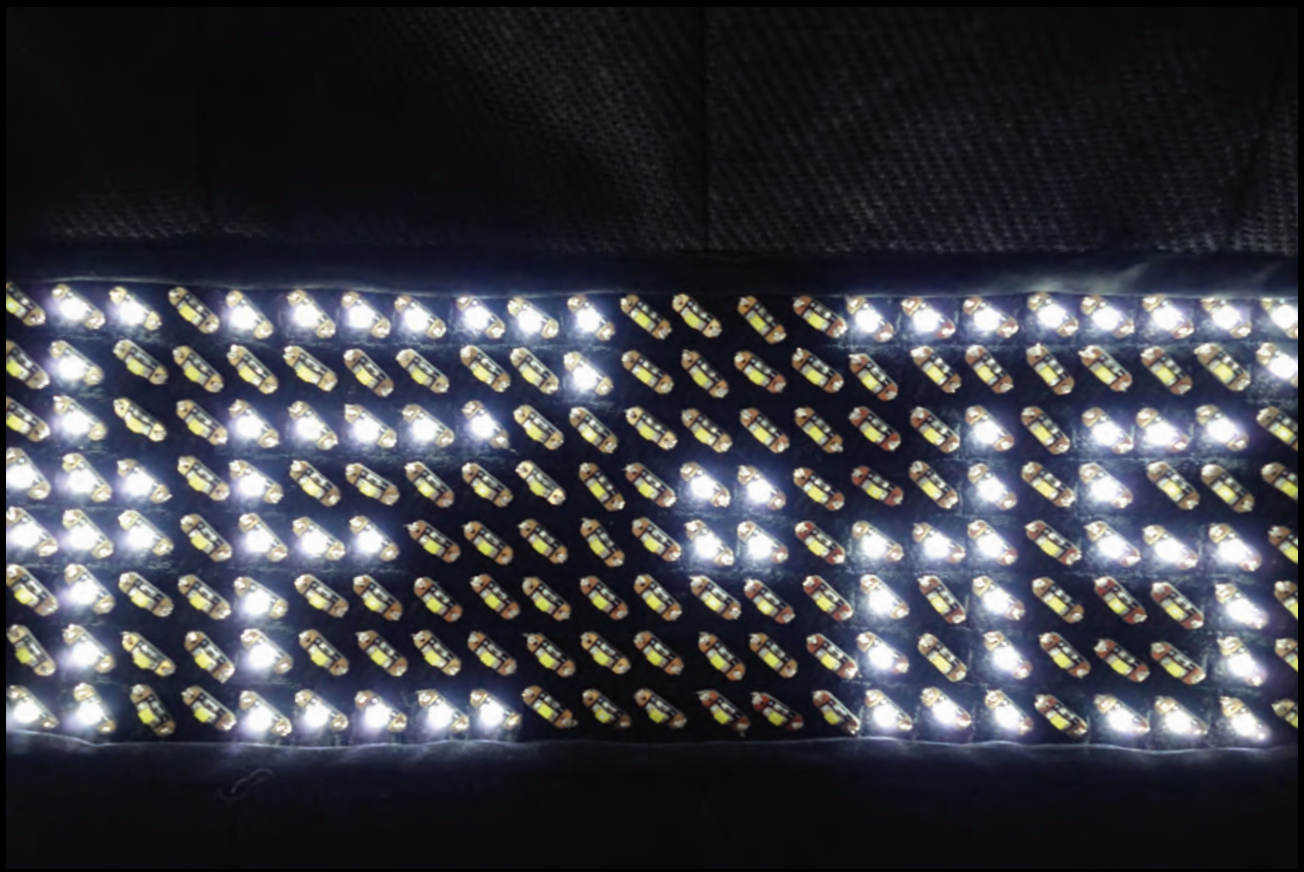

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Foreword

····· Ixchel Ledesma Guadarrama

The Enchantment of Textiles is a project that uses an interdisciplinary approach in the investigation of electronic cloth. Research involved studying the materials, techniques and meanings of historic textiles in some of the most extraordinary museums in the world. This knowledge has been transformed into a magical display of interactive objects that demonstrate what is possible when material languages meets digital culture. Barbara Layne is the Principal Investigator along with research collaborators Professor Janis Jefferies and Dr. Ahmed Kishk. The team includes a variety of research assistants and interns, and at times is expanded even more to include other researchers such as artist-designer-researcher Lauren Osmond (for Maxwell's Equations) and Marc-André Cosette who created soundscapes for several of the pieces. Artists from multiple disciplines worked alongside electrical engineers creating a vibrant community in which textiles continue to celebrate the beauty of fine craft, demonstrate the power of art and social issues and become a performative tool in which to explore poetry and movement in interactive spaces. The Enchantment of Textiles was created at Studio subTela, one of the research labs in the Textiles and Materiality Cluster of the Milieux Institute of Art, Culture and Technology at Concordia University in Montreal.

"La obra es un gran espacio vacío o en construcción que siempre se está llenando de nuevos contenidos, de nuevas imágenes. En este sentido podríamos decir: cuanto más grande es un maestro más vacía está su obra. Es un significante sin identidad, que se llena constantemente de nuevos significados. El origen se muestra como una construcción posterior."

Byung-Chul Han [1]

[1] Byung Chul Han, SHANZHAI, El Arte De La Falsificacion Y La Deconstruccion En China, Ed. Caja Negra Buenos Aires, Argentina, p. 23.

"The work is a large empty or in-construction space that is always filled with new contents, new images. In this sense we could say: the greater the teacher, the emptier their work. It is a signifier without an identity, constantly filled with new meanings. The original is shown as a later construction."

Byung-Chul Han [2]

[2] Byung Chul Han, SHANZHAI, El Arte De La Falsificacion Y La Deconstruccion En China, Ed. Caja Negra Buenos Aires, Argentina, p. 23. (Translated by Ixchel Ledesma Guadarrama).

I had the honor to work with Barbara Layne and Janis Jefferies during one of these collaborative projects at Studio subTela: one of the most extraordinary experiences of my professional and personal life. They have inspired my practice and their artworks entice me to become a part of the meaning of their creations.

Studio subTela works as a surface and a communicative space that urges collaborators to become personally involved. Each contributor is invited to leave a mark that records the presence of their own creative subjectivity. In this sense, The Enchantment of Textiles is not a singular vision. The project is comprised of two groups: Resonant Garments which include Maxwell's Equations (2016), and The Branko Belt Project (2017) and Provocative Spaces (2014-2019) in which multiple objects are designed to interact with each other and the public. Users become collaborators and contributors, capable of leaving their mark and imprinting their own subjectivity on the work.

Each piece in The Enchantment of Textiles embraces traditional hand craft techniques in combination with the latest technological developments. This combination bestows upon the artwork a magical twist, quite different from the historic and technical merits of traditional textiles. Through this approach the objects are both separated from and connected to the past, creating a new space beyond time. Within this new space all forms of communication are enabled (body – garment; garment – garment; garment – object; object – human). This complexity of interaction creates connections without hierarchy, where the spectator becomes collaborator in the creation of the work – acting and interacting with it.

The Enchantment of Textiles works as a space beyond time, remaining open and sympathetic to other contributors, thinkers, producers and users. How is an artwork able to constantly transform its own meaning? In this collaborative scheme the origin is shown as a posteriori construction, open to the collaborator and spectator, existing beyond time and boundaries of traditional communications.

Woven Magic: The "Secret Speech" of Interactive Textiles

Hilary Bergen

Vest (detail), China. 19th to early 20th century. Silk, linen, metal thread, paper; Embroidered, couched, satin stitch, fringed, satin. Gift of Fred Braida, T88.0251, Textile Museum of Canada.

"The distinction between subject and object is both real and illusory."

Theodor W. Adorno [1]

The act of weaving is an old art, abundant with mystery and myth. In some ancient cultures, the loom symbolizes the cosmos: the upper crossbeam represents Heaven and the lower beam, Earth. In this configuration, the snaking weft threads are the "planes of existence" which wind themselves around the longitudinal warp threads, the "rays of informing light or breath."[2] To think the loom in this way, as a microcosm of the enchanted world made up of interdependent and distributed agencies, conjures an interplay between existence and light (or the tangible and the barely-perceptible) that highlights the many unseen forces—the hum of "vibrant matter" that swirls all around us.[3]

"The Enchantment of Textiles" is comprised of such vibrant matter. The exhibition features a mirror, a tablecloth, a sampler wall hanging, a book, a wand and a pair of boots, among other objects, all of which are crafted with fidelity to historical techniques, enlivening them with traces of the past. But these items are also lively in other, mysterious ways. Embroidered with conductive thread and swathes of LEDs, these textiles are highly sensitive and capable of transmitting and receiving signals imperceptible to the naked eye. Is it the textiles that are enchanted, or is it we who are enchanted by them?

[1] A. Arato & E. Gebhard (eds.), The Essential Frankfurt School Reader. Continuum: 1997. 498.

[2] Snodgrass, Adrian. The Symbolism of the Stupa. Cornell Southeast Asia Program: 1985. 116.

[3] Bennett, Jane. Vibrant Matter: A Political Ecology of Things. Durham: Duke University Press, 2010.

The word “enchantment” implies the casting of spells, and indeed there is unseen “magic” at play here.

The pieces in this exhibition are arranged in relation to each other, binding them in a magical gathering—one that facilitates responsive potential. The collection displays objects of interactivity, not just decoration. The wand wants to be lifted, the book opened, the mirror gazed into. There is a kind of absent body evoked by the flock of objects; one might imagine a particular individual (a sorcerer, a witch or a collector) who has known these things intimately. The viewer of the collection can inhabit the space of this imagined body; they can stand under the wall hanging, raise the wand and open the book. They can participate in the interactive environment and play the sorcerer, so to speak. But when they do so, they will soon realize that their power, as sorcerer, is in fact distributed—it is only through the specific arrangement of the objects that surround them that they accumulate any sense of power at all. As Jane Bennett writes, “bodies enhance their power in or as a heterogenous assemblage.”[4] If our sense of what constitutes a body is expanded by this quote, it is not difficult to see how the objects of the collection themselves, drawn together in the gallery space, comprise a collective body that both exceeds and enchants human capabilities.

The textiles in this display are made of silk, linen and metallic thread; they invite touch and sight. They solicit human perception. The objects themselves can also perceive and interact with one another. They have an agency of their own. Responsive LED panels, electroluminescent thread and carefully crafted antennas embroidered onto the textiles broadcast and receive mysterious gestures, facilitating multiple channels of communication and performance.
A Tajima laying machine uses conductive thread to embellish the textiles with circuits and imagery based on pre-programmed designs. Returning to the image of the loom as interplay between light (or breath) and existence, the ambiguity between subject and object in the exhibition is escalated through the use of a process called “beam forming,” where signals are sent and received using multiple laid antennas to increase output and range.

The process of beam forming is highly sensitive to human and mechanical interference, changes in the antenna's spatial location or even simple movement, such as wind. In order to optimize communication in this sensitive space, the antennas were put through a rigorous process of mathematical design, computer rendering and testing, enabling the effective transmission and reception of signals in spite of real-world interference. These instruments were honed carefully by their makers so they could have a "life" of their own; invisible signals are transmitted between the textiles through waves that are not linear or straight, but rather spiral into a kind of collectivity; the signals are stronger and more efficient when working in a group. Given the historically communal nature of seamstress work, the collectivity implied in beam forming conjures the corporeal presence of women at work, adapting this formation to include the energy of non-human workers as well.

Consider the Rank Badge Jacket, whose embroidered Chinese emblems can transmit signals to the Sampler wall hanging. Inspired by 18th and 19th century East Asian silk rank badges which were embroidered with metallic thread, the Rank Badge Jacket is adorned with two interactive squares, one on each lapel, in which the emblem of the moon acts as antenna. When hanging on a body, the jacket's lapels close over one another, revealing one badge while hiding the other.

[4] Bennett, Jane. Vibrant Matter: A Political Ecology of Things. Durham: Duke University Press, 2010. 23.

Detail of "shadow" antennas from the Sampler, the Rank Badge Jacket and the Magic Wand #2.

The lunar symbol on the visible badge conveys signals to the wall hanging, pulling at it like the moon at the tide and triggering an LED light pattern that gives the appearance of falling rain. The dancing lights are also displayed as banners of ephemeral text that seem to disappear off the edge of the fabric. The text is made up of women's historical anecdotes about the practice of sampler-making, foraged by the design team. Because "text" and "textile" share an etymological root, meaning "to weave," the link between these woven objects and the telling of history (especially the domestic practice of oral storytelling) is made clear; both are creative practices that require an assemblage of participants.

The traditional function of the rank badge, as seen in 19th century court attire, was to convey one's title, rank and status through a pattern of symbols and images recognizable to those fluent in this visual language. "The Enchantment of Textiles" proposes a different kind of communication, one in which the human subject does not occupy highest rank.

The interactive objects in this exhibition are not hierarchical. They "talk" to each other using signals that grow or shrink in strength depending on factors such as proximity and external influence.

To conceive of these textiles as talking to each other is not so unusual given that in Mali, the Dogon people refer to the loom as possessing the capacity for "secret speech."[5] The Dogon proverb, "to be nude is to be without words," signifies the link between linguistic self-representation and personal identity as formed through clothing, but more importantly, in giving textiles the potential to communicate, the exhibition blurs the line between speaking subject and mute object, reminding us of the potential agency of objects.[6]

The word "enchant" is active in both directions; it means both the magic done to a thing and the delight we feel when witnessing magic. Similarly, in "The Enchantment of Textiles," there is no clear distinction between the subject that acts and the object that receives action. The magician is as much the designer as it is the visitor, the loom, the conductive thread, or the lively garments that converse with each other through signals and beams. Enchantment is in the in-between.

[5] "Weaving/Spinning." Martins, Kathleen and Ami Ronnberg, Eds. The Book of Symbols: Reflections on Archetypal Images. Taschen, 2010. 456-459. 456.

[6] Ibid.

The Enchantment of Textiles: Communication & the New Aesthetics

..... Janis Jefferies

The relationship between digital technology and materiality has been subject to cultural media theories for the past decade (Leonardi, 2010; Magaudda, 2011; O'Riordan, 2017). Among the most illuminating, Pink and Ardevol's (2016) anthology presents a body of work which explores how the human, digital and material can be brought together to intervene in the world at a time when the distinction between the virtual and material world is becoming increasingly blurred. Bruno (2014) also investigates the place of materiality in contemporary culture, and argues that materiality is not a question of the materials themselves but the substance of material relations, focusing on the space of those relations, and examining how they appear in different media, on film and video screens, in gallery installations or on buildings and people.

Despite these very recent interventions, the relationship between digital technology and materiality has been explored largely through a technology-oriented discourse, which has concerned itself with the immaterial and disembodied conditions of information (Hayles, 1999).

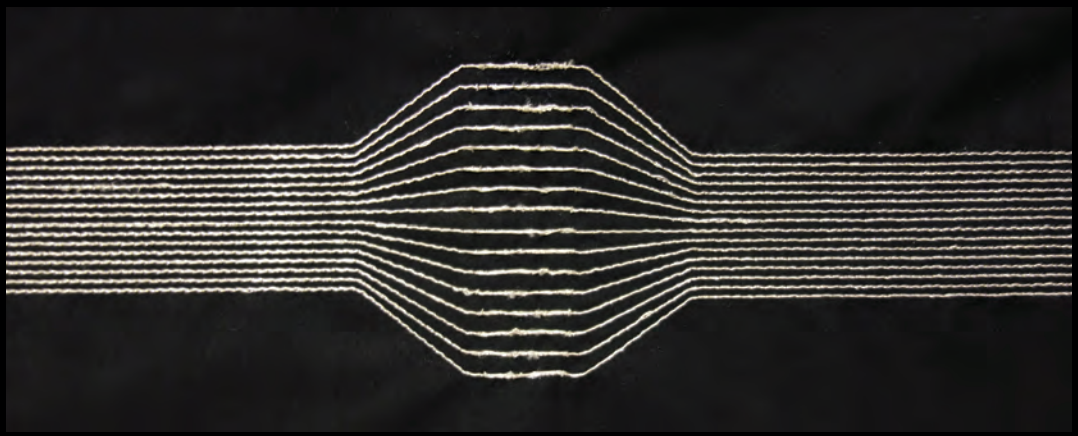
This problem is explored by Hayles (1999) in her seminal work How We Became Posthuman, which considers what has to be excluded in order to conceive of information as a disembodied entity. Munster (2006) defends an embodied sense of information aesthetics by considering the body in physical relationship both with, and to, information technology, arguing against the perception of materiality as a carrier for that which is considered ultimately more essential, i.e. information. In line with these new materialist accounts, it is possible to propose a more dynamic way of understanding artistic relationships to digital culture through an elaboration of methods that forge an embodied engagement with digital and technical processes.

"The need to understand the effects of the extensions of man [sic] becomes more urgent by the hour."

McLuhan, 1994, p.4

The term digital materiality recognizes that digital artifacts are not immaterial, they possess a physical dimension that was overlooked in earlier computational discourse which was primarily concerned with virtuality. Central to this shift is the notion of embodied interaction, which recognizes the fundamental importance of engaging and re-conceptualizing technology through the experience of the body and its senses, emphasizing engagement and practice rather than symbolic, dis-embodied rationality. In addition notions of digital materiality challenge binaries of hardware and software, the physical and the abstract, and lead to a reimagining of new forms of flexible interface such as intelligent textiles (Dias, 2013). Indeed, traditional methods of textile fabrication have been combined with electronics and new materials, to produce smart fabrics and objects with the ability to sense and react to environmental stimuli through mechanical, electrical, magnetic or other sources. Küchler (2008) has recognized that "the materiality of fibre and the structure of fabric is playing an increasing role in (re)animating the material world" (Küchler 2008:102) and acknowledges that textiles are the mediating surfaces between our bodies and our environments.

Recognizing the interdisciplinary nature of intelligent textiles and the limitations of dominant, technologically oriented discourse, Susan Ryan (2015) recognises this oversight, demanding that, for example 'the messiness of dress must be reconciled with the systematic programming of devices that seek affective returns' thereby suggesting that that the area, for example, of wearable technologies needs to become a "transversal practice" that draws from multiple contexts (Ryan 2015, 230). In Ryan's terms, there are many kinds of technologies that can be deemed 'wearable', from e-textiles and garments, connected biosensing devices to wearable computers but her main focus is on future-oriented artistic experimental garments to create a framework for them as "a speech act" or "utterance" (Ryan 2015, 139–140).



“Electronic textiles ask questions about the spaces we inhabit, about the territories that surround us and the relationships between places and people.”

Sandrine Beaud

On a material level, new and creative languages can enable, for example, garments’ historical characteristic of embodied speech as autonomous from the languages, intentions and meaning of the wearer. Arguably, it is not the wearer or the user and her/his body, that generate emotions and subjectivities but the garment or object itself (my emphasis) that opens up new perceptions, technologies and communication.

In the final sentences of Garments of Paradise there is an invitation to experiment with social speech. For Ryan (2015), ‘social’ has become a poisoned word, but in making and thinking through how the digital and material can be brought together; in assemblages of the living and the non living or the human and the non-human new affective relations can be formed.

The Enchanted Textiles Environment

The Enchanted Textiles exhibition and research project demonstrates many of the themes explored in the first part of this text, contributing new knowledge in terms of hardware and software design, in pedagogical and social research of responsive fabrics and re-conceptualizing technology through the experience of the body and its senses. Sensing fabrics, transmission devices, light emitting displays and other soft circuit elements are embedded in garments, wall hangings, and textile objects. Wireless transmission systems allow textiles to respond to human activity, thereby foregrounding ideas of the social, within a rich information and communications environment. The material world is being (re) animated particularly through research that involves the development of flexible, textile antennas connecting objects one to another thereby supporting Ryan (2015) that such connectivity may support communication as autonomous from the languages, intentions and meaning of the wearer or the user. Beam forming is a signal processing technique used in sensor arrays for directional signal transmission and/or reception. Antennas can excite one another becoming more powerful their relationship that is full of synergy. Conversely, they can also interfere with one another, interrupting signal strength.

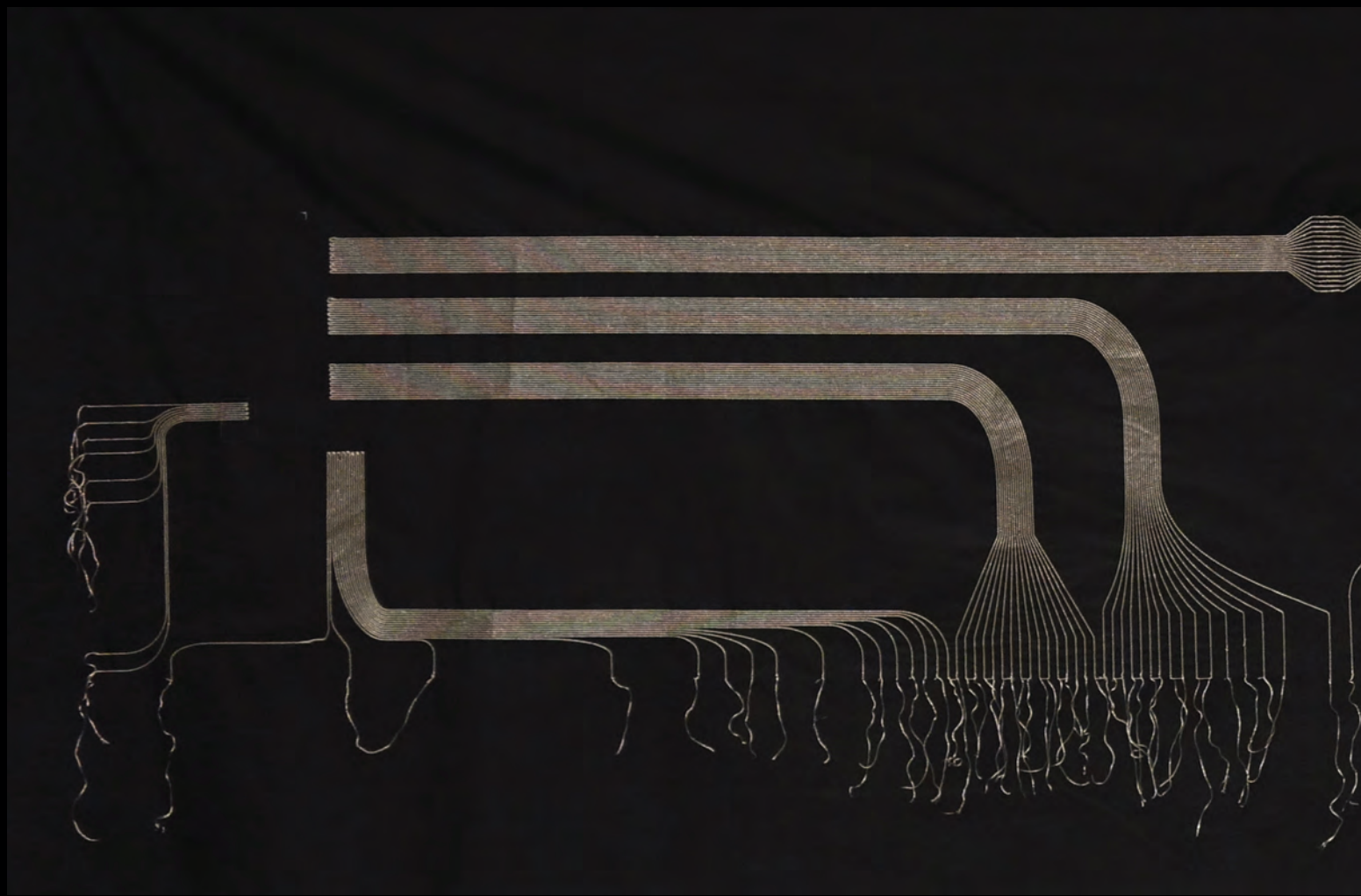
This is dependent on the specific antennae design and orientation to each other. Furthermore, they can be the signal can be bounced off of the walls of the space, respond to other wireless signals in the space, and also reflected by other objects and people, resulting in variable sensing data that can trigger unexpected responses. The Enchantment features new work made between 2015 and 2019. The project explores textiles in museum collections and uses traditional techniques, materials and structures to create a textile antenna that connects one object to another.

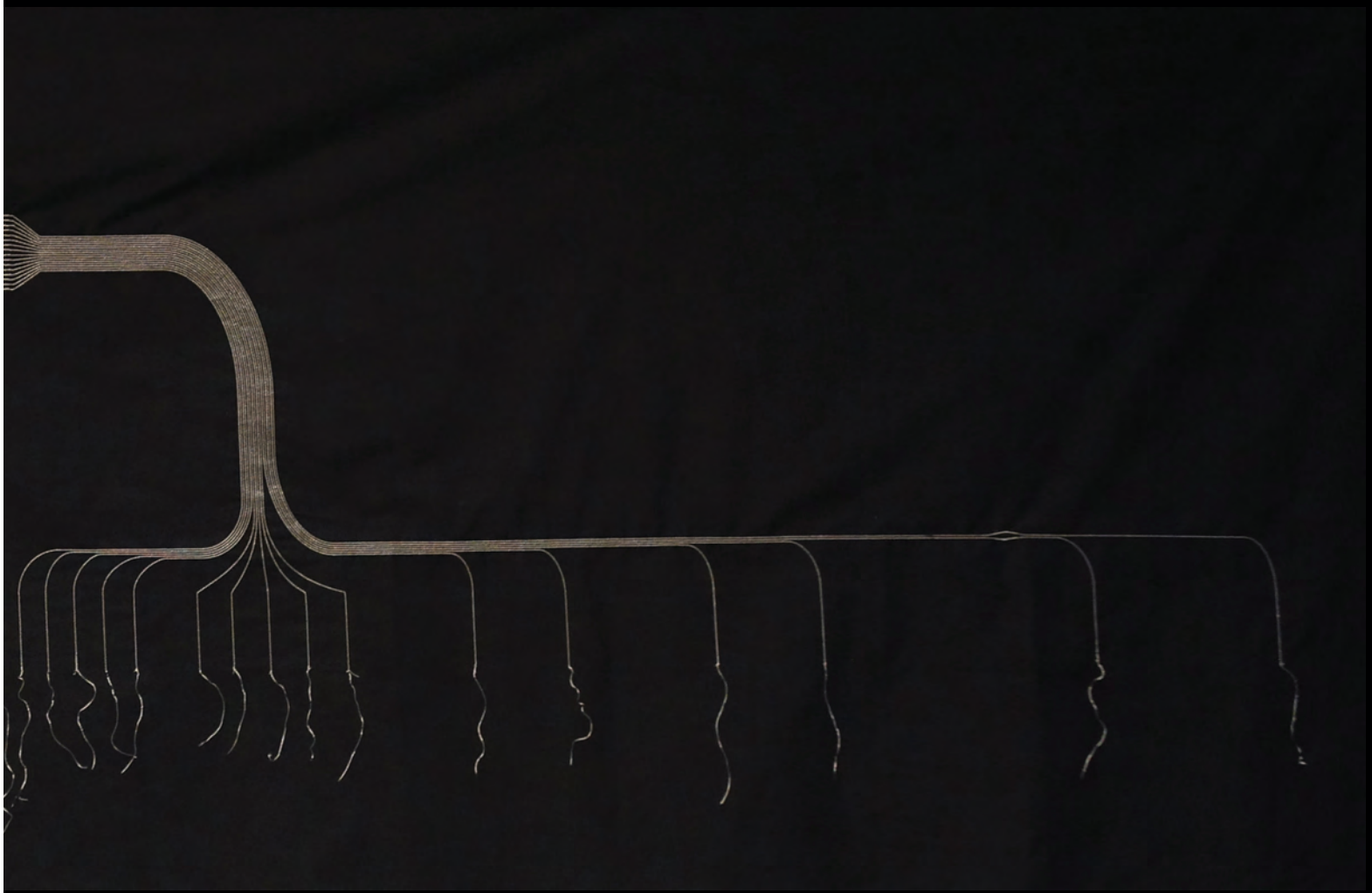
“Each team member at Studio subTela brought a unique set of skills and perspectives such as designing an antenna or by creating artistic garments which helped me become familiar with different terminologies and new points of view.”

Sareh Majidi

My role, as a cultural researcher, has been to join members of the SubTela team to explore textiles in the archives of museums in Toronto and London, studying, re thinking historic techniques and imagery and the relationship between digital technology and materiality, human and non human agency. There is an interdisciplinary research team made up of engineers, artists and cultural researchers who have been led by Professor Barbara Layne and based within Studio subTela at the Milieux Institute for Arts, Culture and Technology at Concordia University in Montreal, Canada. The Enchantment has been funded by the Social Science and Humanities Council of Canada and the Canadian Foundation for Innovation with support from the Milieux Institute for Arts, Culture and Technology at Concordia University.

For The Enchantment, the team has included Geneviève Moisan whose museum observations and technical skills resulted in the designs and production of the antenna patches and other components using the Taijma Laying Machine. Muhammad Mustafa Tahseen led the technical development of the antenna communication systems (supervised by Dr. Ahmed Kishk), Sarah Majidi documented the circuitry and code while Donna Legault and Fanny Savoie worked on the circuit preparation in conjunction with programming by Hesam Khoshneviss and Martin Peach. Using a system developed by Marc Beaulieu, RythÂ Kesselring created the flexible LED arrays along with Taijma production. Claire Nadon participated in museum observation as well as garment design, leather work and construction. Etta Sandry constructed objects and Tim Belliveau supplied the three dimensional vector drawings needed to verify antenna efficiency. Romain DeBeze created the archive database and Sandrine Beaud contributed to the documentation of work including video production and website design. However, none of the processes that have been described was a linear progression and everyone has been involved in multiple steps, with each consulting and learning from one other throughout the design, testing, debugging and garment production.





The Enchantment of Textiles

The Enchantment of Textiles was developed in two phases, Resonant Garments and Provocative Spaces. Garments include The Branko Belt Project, a suite of interactive clothing based on a medieval textile from the British Museum. The elegant dresses of Maxwell's Equations were developed in collaboration with Lauren Osmond addressing the system of electromagnetic radiation upon which all of the Enchantment of Textiles projects are based.

Provocative Spaces is an installation filled with clusters of interactive textile objects. These can be activated by the viewer, for example, The Table Runner can be activated with a Magic Wand or in a performative situation, could be triggered by the wearer of the Boots. "Activation" means that an LED display will feature scrolling messages that change according to the signal strength of the antennae connections or alternatively, can trigger original sound tracks inspired by historic textile objects. In line with Hayles (1999) that information cannot be separated from the material in which it is contained, The Enchantment of Textiles, draws on textiles from specific museum collections reworked in contemporary forms and garments. Traditional techniques, materials and structures are used create to flexible textile antenna that connects one object to another, producing an inseparable dialogue between non-human and human agency. In arts practice and research creation "matter becomes mobile" (Carter 2004, 182) and furthermore it "defends complex systems of communication against over-simplification" (Carter 2004, 13). Arts research, combining practice and creation, explores the always-unfinished processes that surround us, recognizing them as such. It cannot be deemed successful in simple or finite terms: it does not produce a singular discovery, but instead opens up new fields of understanding.

Arts research can also be seen as making alignments between diverse cultural elements in a unitary manner that, as Pickering has noted in his The Mangle of Practice, Time, Agency and Science (1995), scientific practice has often struggled with.

In his book, Pickering (1995) makes a strong case for a re-conceptualization of research practice in experimental science laboratories as a mangle, an open-ended, evolutionary, and performative interplay of human and non-human agency. While Pickering's ideas originate in science and technolgy studies (STS) the concept of 'mangle' captures what he describes as an entanglement between the human and the material arguing that the scientist should position themselves within culture rather than a neutral, objectified world.

Running concurrently with Pickering's theory about the nature of technological engagement in the laboratory as the mangle of practice and "material agency," there is a broad interest in re-examining the space of the studio as also a place for mangling practices. This can be evidenced by new and insightful texts, for example, Jacob and Grabner's (2010) anthology The Studio Reader. The anthology aims to resituate the studio as a site for contemporary and interdisciplinary modes of production and knowledge and includes artists' own reflections on the nature of the studio as it relates to their working processes. The Studio Reader focuses on pedagogy based in practice and the value of evolving an idea through the negotiation of the media, be it physical, digital, language based or otherwise; therefore it focuses on the material basis of learning. Jacob and Grabner (2010) contend that in studio-based environments, creative testing through making remains essential to knowing as a form of research that follows a path of unfolding ideas as the mind, hand and body, learn.

"Working at subTela, I learned about electronics and soft circuits — there are no classes that would expand my knowledge in that way, while learning how the research art world functions outside of the university walls."

RythÂ Kesserling

"I often base my artworks on textiles from the past and I thrive as an artist to learn ancient techniques and to re-actualize them through the means of the digital."

Geneviève Moisan

They discuss the auratic tradition of the modernist studio, a place designated for the production of autonomous work and disengaged artistic labour, where in isolation aspects of artistic competence have been refined.

However, they also suggest that the modernist studio has not always been a solitary lair shut off from the world, as it has also functioned as a place of instruction, and as a hub for social exchange and collective work (Jacob & Grabner, 2010). From seventeenth century Europe to mid-twentieth century

America, and on to the present day, modernism's romantic studio tradition has nurtured the production of individualism (Jacob & Grabner, 2010). In the romantic portrayal of the studio the artist is isolated from the ordinary world in order to realise their genius. This is not dissimilar to Pickering's suggestion (1995) that scientists have also been cut off from the ordinary world. Storr suggests that the workshops of William Morris in England and the Bauhaus in Holland, Frank Lloyd Wright's home and studio, Andy Warhol's factory, Joseph Beuys's pedagogical experiments, the decentred practice of fluxus, and the anti-studio positions of the 1960s and 1970s, shaped a post-studio condition on the European studio ideal.

Expanded definitions imply that studio and the lab are conjoined, defined by time, space, research as well as by making and social networks. Together they are complex sites for material and technological encounters, production and knowledge. In STS studies the (re) turn to studies of materiality and its interference with research processes has been a major achievement, as noted by Pickering1995; Harraway,1998; Barad,2012 and Simondon, 2012. How then should materiality be considered within explanations of research that cannot be reduced to 'pure' scientists accounts of their work or to re insert Hayles (1999) information cannot be separated from the material in which it is contained?

In Pickering's view, neither material nor human agency should be privileged within scientific accounts but rather reveal different influences which are temporally emergent from ongoing practice as worked through in an experimental lab.

The question, of what happens when we are actually engaged in a task and in the moment of its happening is co-connected to what might occur within an artists' studio as well as a lab. Pickering calls the place where work happens (and here workshop is also included), the "performative idiom" and within this place agency is the driving force between human and non human. Ideas of entanglement, meaning that between the human and the material, can be practiced both culturally and historically. Pickering's "tuning" metaphor is also helpful in that it invokes the sense of shared adjustment between team members, artists collectives and a researcher's active role in the learning process.

This kind of work toward a mutual "tuning," has to proceed over time giving rise to experiences that can be modified and changed, goals are re defined, decisions are shared, embodiments of practice emerge in real-time. Sensory engagement between human and no human are played out in aesthetic and technology experimentation.

"Working at subTela brings me out of the confines of contemporary art pratice, revealing different lifestyles, research methods and interests of the diverse team members."

Etta Sandry

Textiles, Senses & Models of Knowledge

The need, as outlined by Pink (2009), for attending to the senses in research and representation has become increasingly central to applied practice in social sciences and arts and humanities. Howes (2003) has referred to this shift as a 'sensorial turn' (p.xii) and there has been an increasing amount of theoretical exploration into sensory experience, perception, knowledge and practices (Ingold, 2000; Serres,1998). Both Howes and Ingold draw on textile material to draw attention to the intimate interrelation of the senses. Serres on the other hand (1998,100, 406), depicts 'tissue, textile, fabric' as 'excellent models of knowledge' whereby knowledge can be seen to be generated as both in the making (whether knitted, knotted, woven, non-woven, stitched or applied) and as perceptual experience by those who come to 'see' The Enchantment of Textiles. A textile entails a multitude of qualities that are directly linked to its structure and its textural abilities that can be explored tactually, visually but also though sound that generates cross modal experience within the installation environment. For example, collaborator Marc-André Cossette, a sound artist, sensitively considered the aspects of the textiles and explored how their motifs, meaning and stories could be experienced in two sonic soundscapes. In one instance as a silver embellished book is opened, the sound of fluttering pages is activated. Bird sounds which are allied to a Persian rhythm become evident as the viewer moves nearer the cloth framed mirror.

"Sound can be used in so many contexts but the ability to mold and shape sound according to visual or material practices is what is most interesting in the collaboration with subTela."

Marc-André Cossette

Critical Methodologies

In respect of Pink (2009), a critical methodology that departs from classical observational approaches is presented by insisting that ethnography is an experimental process through which understanding, knowing and knowledge are produced. She accounts for the performativity of methods, suggesting that ethnography is a process of creating and representing knowledge based on an ethnographer's own experiences (and therefore my own), which do not therefore claim to produce a universal account of reality. Pink (2009) also suggests that ethnography as a practice can be defined as an iterative-inductive research process. It is a method that I deploy in understanding how learning operates in these studio/lab/workshop environments. It is useful because it contributes to a wider discussion as to how learning that takes place amongst a team of researchers from very different disciplines. Pink's (2009) notion of sensory ethnography is significant for The Enchantment of Textiles as a research project because in this embodied sensory paradigm learning takes place in and through material physical experiences together with technological innovation across the studio/lab and Tajima workshop.

Consequently, it is now possible to rethink the lab and studio, research creation and arts practice through this iterative-inductive approach, a learning through the senses. Pink (2009) advocates such approach to sensory research by focusing on embodiment and feeling that does not fragment the senses; seeing and touching are not the same yet they are both sensations that originate in the same body, and their objects overlap and they share an experiential field. As such, Howes (2003), Ingold and Serres (1998) have more in common than may initially appear. An integrated understanding of the sensory field can enable new ways of thinking about how material agency operates to pedagogical affect within artistic, and, following Pickering, experimental science systems so that each can complement each other.

Context

The lab visits can be described as multisensory events, and as such, a context of emplaced knowing (Pink, 2009). How do the different members of the Studio subTela team understand and articulate their experiences of making by attending to their treatment of the senses.

Questions have been asked, conversations were made on a phone, notes were taken. These were later transcribed together with photographs of the team at work in the lab or workshop. I did not limit the understanding or interpretation of the experiences offered to simply conversational analysis but also took into account my own embodiment and how it impacted on the research enabling different forms of relations through joint and collaborative reflection and analysis of the research project.

"All of the projects necessitated the whole team to work together and we all taught something to one another along the way. Sarah showed Donna how to connect the antennas. She then taught RythÂ to do it and RythÂ taught Fanny and myself... I learned the Tajima machine and then I gave workshops to other team members, all passing knowledge from one to another."

Geneviève Moisan

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Museum Research

Detail of Altar Frontal: Christ Child and the Instruments of Passion. Musée des Ursulines De Québec. 1995.64

The Enchantment of Textiles is a Social Sciences and Humanities Research Council of Canada (SSHRC) funded project that uses an interdisciplinary approach in the investigation of electronic cloth. Barbara Layne is the principal investigator with collaborators Professor Janis Jefferies, Dr. Ahmed Kishk, Lauren Osmond and Marc-André Cosette. Research began with a study of original sources of embroidered metalwork (gold and silver threads) from historic textile collections in the Musée des Ursulines de Québec, El Museo de Textil de Oaxaca (Mexico), the Textile Museum of Canada (Toronto), the Victoria and Albert Museum and the British Museum (London UK). We observed ancient techniques and materials and also considered the meanings embedded in metal clothwork (who was entitled to wear precious metal textiles of the past and who has access to new technologies today?)

Traditional textile processes and experimental materials were applied to new ways of designing and implementing digital technology. Geneviève Moisan was crucial in the analysis of structural components, translating them into elegant contemporary designs. Sensing fabrics, transmission devices, light emitting displays, sound components and other soft circuit elements were embedded in garments, wall hangings, and textile objects.

Genevieve Moisan and Barbara Layne studying Altar Frontals at the Musée des Ursulines de Québec in 2014

Janis Jefferies and Claire Nadon in 2015 with embroidered Canopy in the archives the Textile Museum of Canada. T94.0787

Wireless transmission systems allow textiles to respond to human activity, resulting a rich communications environment. A novel technical achievement in this project was the development of textile antennas by Tahseen Mustafa (supervised by Professor Kishk). These antennas were painstakingly analyzed, rendered, redesigned and proven in an anechoic chamber to assure the highest level of efficiency. Gen and Tahseen were only two of a large team of research assistants and collaborators, each with their own particular skills and contributions, all essential to the success of the project.

The research underwent two production phases: Resonant Garments and Provocative Spaces. Resonant Garments includes the Branko Belt Project and Maxwell's Equations (in collaboration with Lauren Osmond). Provocative Spaces is an installation project that incorporates interactive garments and objects. These projects examine how an individual's movements and the manipulation of textile objects can create dynamic social situations.

"Through museum research, Studio subTela sought out to discover the techniques of metal thread-work in historic woven and embroidered fabrics (with consideration to the materials, processes, designs and the implications for culture/class) and to assimilate that information as a part of the evolution of textile technology."

Barbara Layne

The Tajima Laying Machine

Geneviève Moisan lays conductive silver threads at the Tajima Laying Machine.

Purchased through a generous grant from the Canadian Foundation for Innovation, the Tajima Laying Machine was installed at Concordia University in 2013.

The Tajima Laying Machine is used to lay the silver conductive textile antennas; to embroider insulating threads for channels that guide the conductive thread of the LED arrays; and used in the creation soft, pliable ribbon cables and other circuitry made of conductive threads. The machine has also developed systems for the laying of flexible touchpads and provides narrative embroidery details for many of the textile projects.

Initial Tajima support:
Martin Hoffman (initial testing) Jozseph Lincz (mechanical training) and Tobias Lembach (software training).

Concordia University technical support and assistants:
Marc Beaulieu, Geneviève Moisan, Caitlin Thompson, RythÂ Kesselring, Claire Nadon.

CFI research grant:
Barbara Layne with Joanna Berzowska and Erin Manning.

Resonant Garments

Embroidery detail on the back of the Rank Badge Jacket.

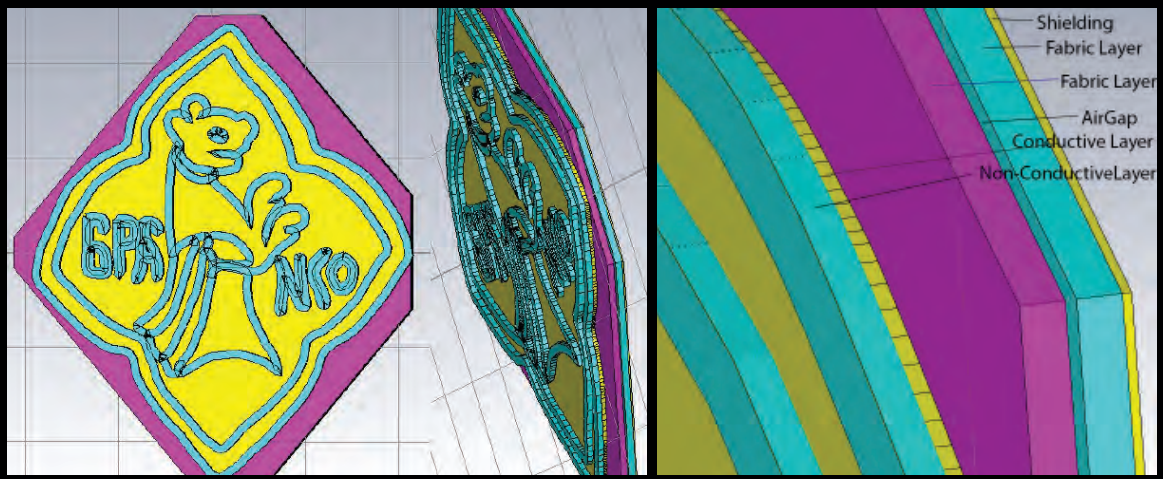
The Branko Belt Project

The Branko Belt Project is a suite of 3 receiver dresses and one transmitter coat. Each garment has an antenna embroidered on the front. When oriented toward one another, the LED display changes messages, depending on the signal strength. The project is inspired by the Branko Belt, a medieval textile observed in the British Museum. The antennas and scrolling narratives refer to the images on the original belt (a bear, a falcon, a wyvern and a panther) and the structural patterning of the laying also references the original metalwork. Curator Helen Wolfe provided generous support while at the British Museum.

Contributors: Genevieve Moisan, Tahseen Mustafa, Martin Peach, Ahmed Kishk, Hesam Khoshneviss, Claire Nadon, RythÂ Kesselring, Fannie Savoie, Donna Legault, Romain DeBeze, Sareh Majidi, Tim Belliveau.

Detail of the Branko Belt in the British Museum. Byzantine c.1350. Embroidered and couched with silver, gold, silk, linen, and cotton threads. BM 19901201.1

Three animals from the medieval Branko Belt were transformed into antennas for the electronic dresses: a bear, a wyvern and a falcon. The controller jacket features a panther antenna.



Antennas undergo rigorous testing including precise measurements of layers, rendering to determine RF specifications, testing in an anechoic chamber and proving in real-world situations. Functionality is optimized for maximum performance to transmit and receive messages.

Maxwell's Equations

Lauren Osmond & Barbara Layne

Video still from the Maxwell's Equations by Nina Bouchard.

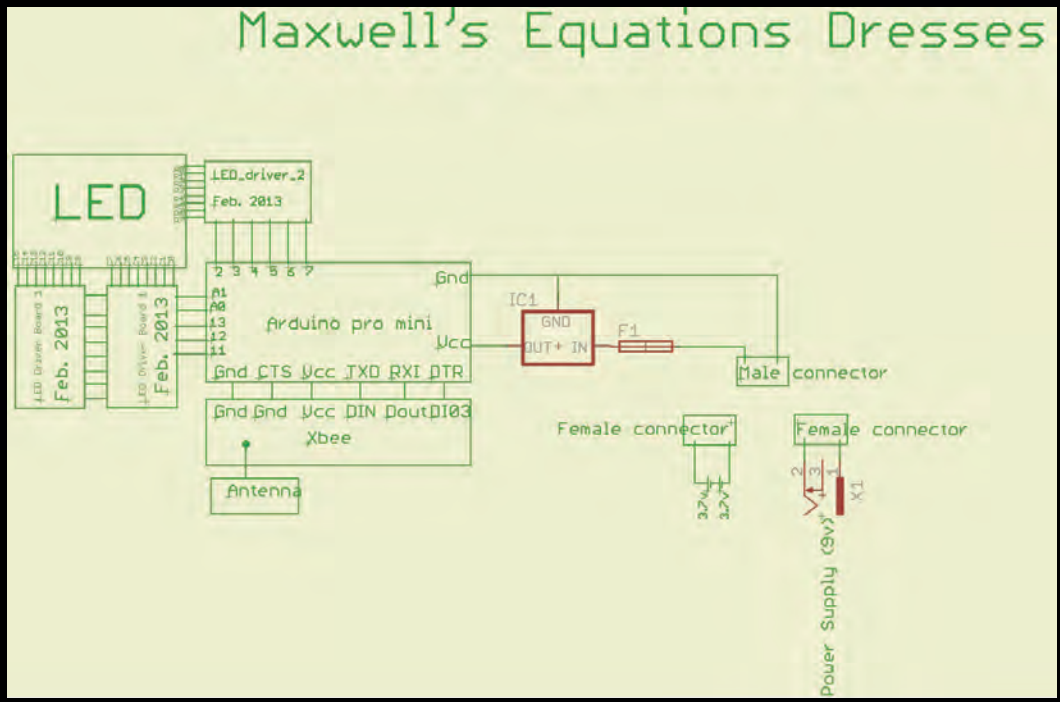
Maxwell's Equations consists of three garments that incorporate unique antenna designs that wirelessly connect the garments to one another. The designs draw inspiration from 19th century fashion and from James Maxwell's pioneering theories of electromagnetic fields. The antennas on the front of the dresses are in the shape of one of Maxwell's diagrams. When physically aligned, the strength of the wireless connection will change the messages in the LED arrays which include formulas, texts about and by Maxwell, and even some of his corny love poetry. The shape of each dress is inspired by one of the laws of the three physicists – Faraday, Gauss and Ampere – who developed fundamental formulas that contributed to Maxwell's theory.

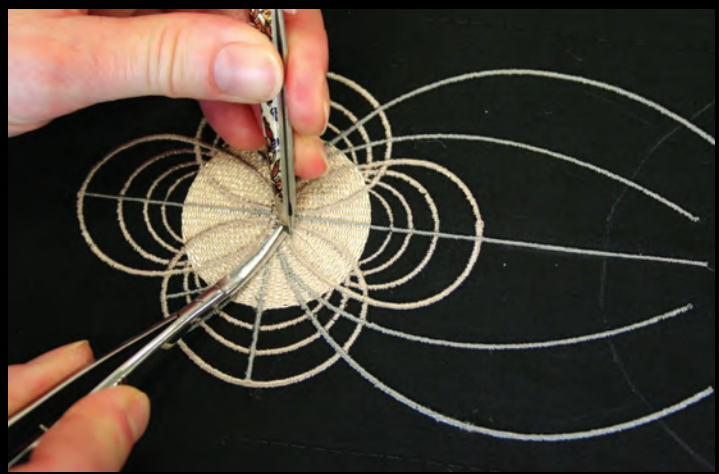
Lauren Osmond collaborated with Barbara Layne and Studio subTela to create Maxwell's Equations which was showcased at Subtle Technologies, Toronto, in 2016.

Contributors: Geneviève Moisan, Tahseen Mustafa, Ahmed Kishk, Donna Legault, Hesam Khoshneviss, Sareh Majidi, RythÂ Kesselring, Claire Nadon, Marc Beaulieu, Sareh Majidi, Janis Jefferies, Martin Peach.

Collaborator Lauren Osmond works on the Gauss Dress for Maxwell's Equations.


Maxwell's Equations
Faraday's Law


Maxwell's Equations Dresses
LED
LED_driver_2
Feb. 2013
Feb. 2013
Feb. 2013
Arduino pro mini
Gnd
Vcc
IC1
GND
OUT+ IN
F1
Male connector
Gnd CTS Vcc TXD RXI DTR
Gnd Gnd Vcc DIN DoutDIO3
Xbee
Antenna
Female connector
Female connector
X1
Power Supply (9v)



Provocative Spaces

The Table Runner, the Boots & the Magic Wand

The Table Runner, the Boots and the Magic Wand is an installation of 3 dynamic textile objects featuring flexible embroidered antennas that broadcast wireless signals connecting the objects to one another. The Table Runner is embedded with digital stories about magic tablecloths and historic events regarding tables and boots that are displayed through the LED array embroidered onto the fabric. Walking toward the table while wearing The Boots will activate the messages of the LED matrix. As the person wearing The Boots approaches the table, different messages will appear based on the intensity of the signal strength.

Since the viewers are not able to wear the Boots, a Magic Wand is available for them to use. Depending on the orientation and distance they are from the table, they can also trigger the tablecloth to change the scrolling text and reveal the different stories.

Contributors: Geneviève Moisan, Tahseen Mustafa, Ahmed Kishk, RythÂ Kesselring, Fanny Savoie, Claire Nadon, Etta Sandry, Marc Beaulieu, Martin Peach, Hesam Khoshneviss and Sareh Majidi.

The Mirror, the Coat & the Sensing Carpet

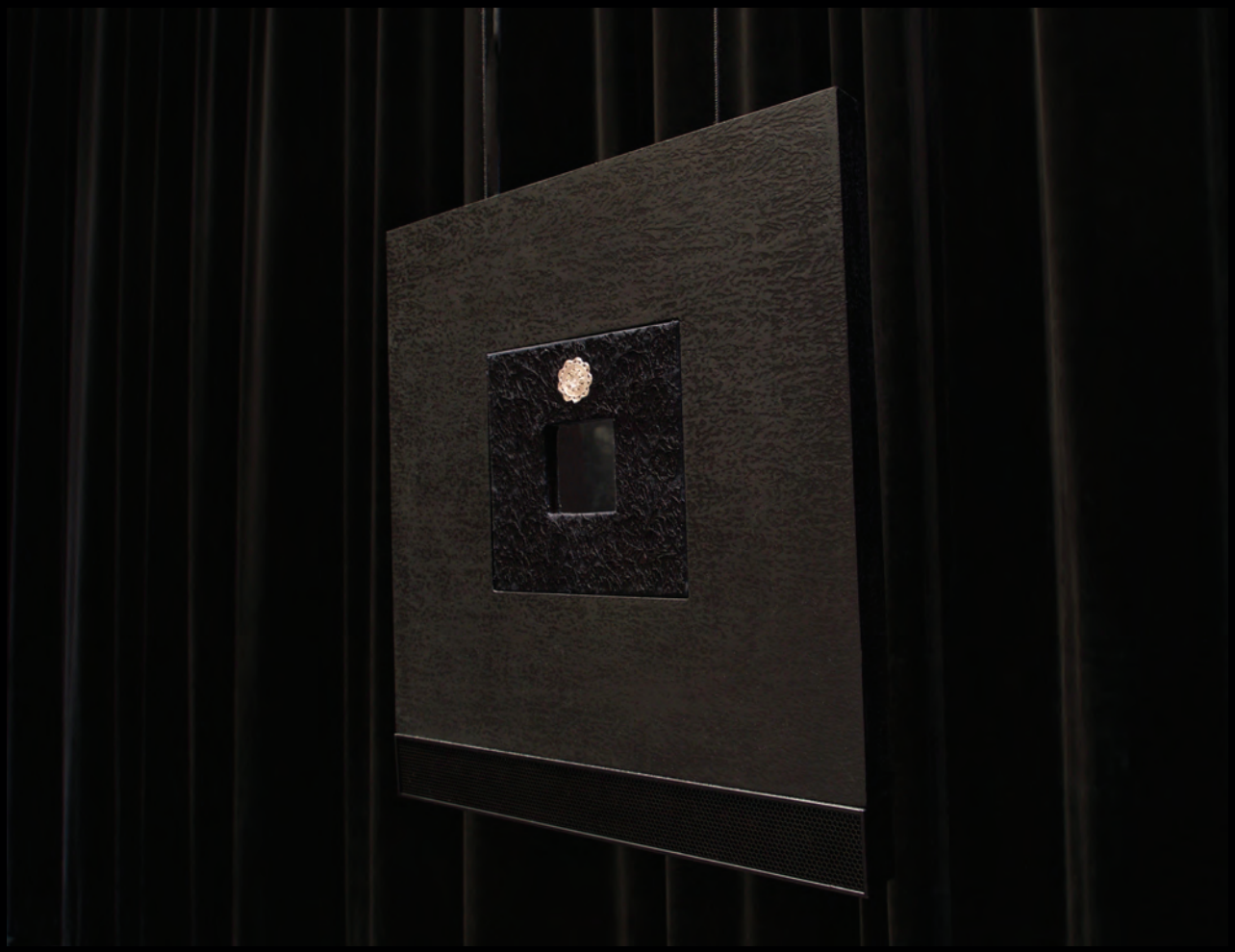
..... In collaboration with sound artist Marc-André Cossette

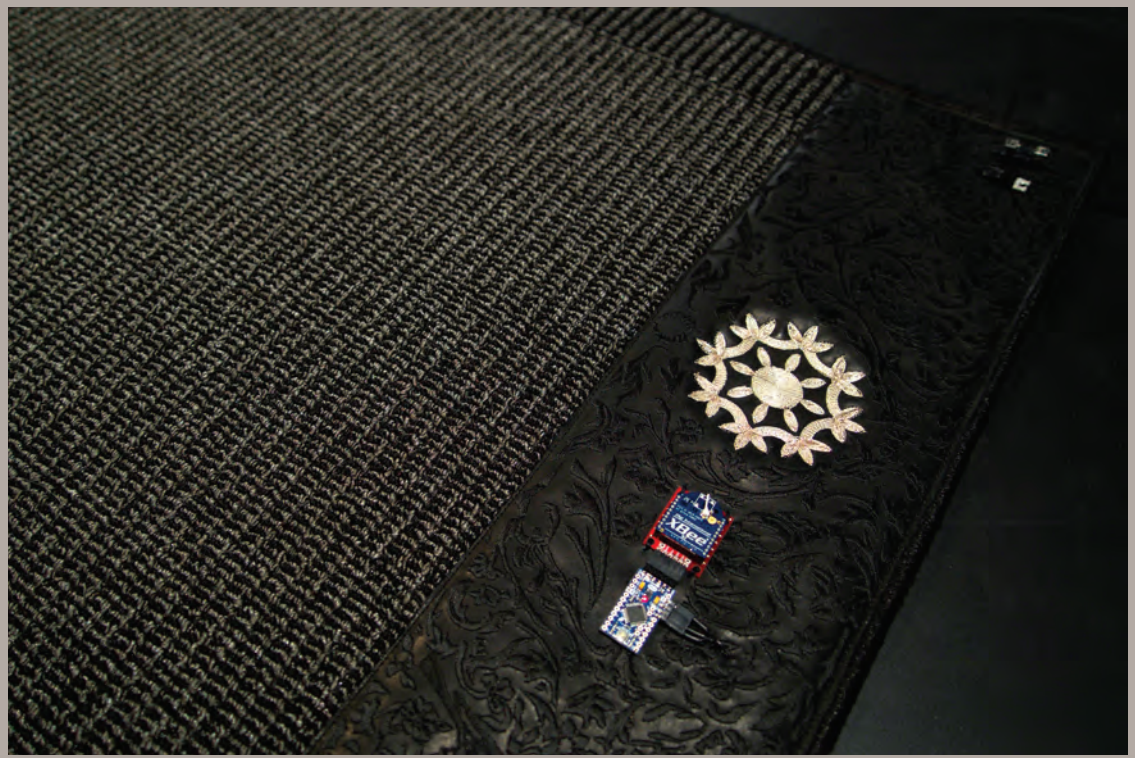
The small mirror draws the viewer closer and the sound increases in volume. The speaker is incorporated into the lower part of the frame.

A small mirror is mounted inside a frame embroidered with floral motifs and birds based on a 19th century Persian saddle from the Victoria and Albert Museum. This is surrounded by a larger frame that supports a directional speaker.

Nearing the mirror when wearing the embroidered coat, will wirelessly trigger a sonic environment. Alternatively, walking on the sensing carpet will also activate the speaker to play the sound component. The sound design is by Marc-André Cossette who was inspired by the birds in the embroidery.

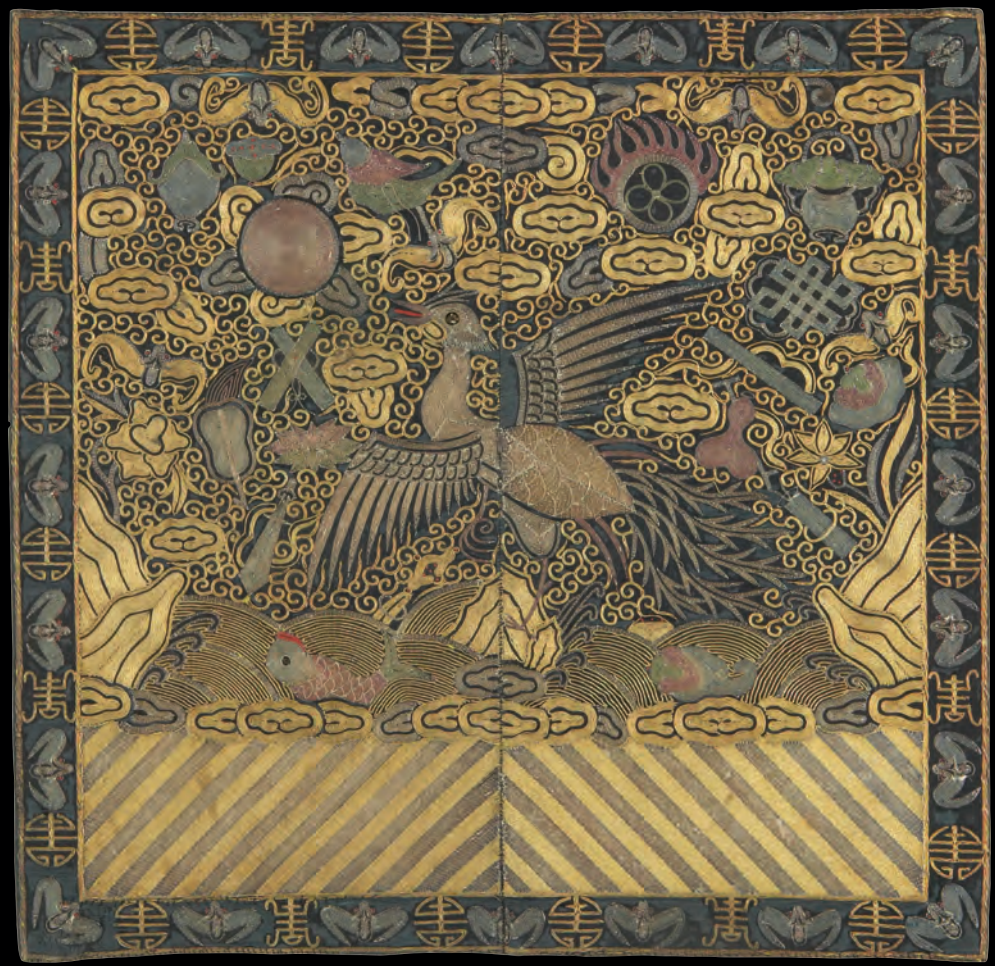
Contributors: Geneviève Moisan, Tahseen Mustafa, Ahmed Kishk, RythÂ Kesselring, Fanny Savoie, Claire Nadon, Martin Peach, Hesam Khoshneviss and Sareh Majidi.





Detail of Sensing Carpet showing embroidery on leather with laid antenna, Arduino microcontroller and X-Bee transceiver.

The Sampler, the Rank Badge Jacket & Magic Wand 2



Rank Badge (buzi) China. 1870-1929. Silk, cotton, metal thread; Embroidered, couched, satin. Gift of Fred Braida, T87.0198, Textile Museum of Canada.

The Rank Badge Jacket is inspired by historic Chinese garments that identify the social status of the wearer. The type of bird indicates the rank of a civil official and the direction that the bird is facing indicates the gender. The jacket in this project has an overlay “rank badge” that can be flipped to indicate wither male or female. On the back of the jacket is a double headed bird to further complicate the gendered situation.

Stitched samplers have traditionally been used to demonstrate embroidery skills, examining patterns, letters and images. The Sampler in this project is a display of various flexible antenna designs that were tested in our studio. The antennas are made of conductive silver threads. In the background various “shadow” antennas embroidered in black-on-black suggest further possibilities for antenna design.

When the Rank Badge Jacket approaches The Sampler, it will trigger the scrolling LED array in the wall hanging. Messages address issues of women and embroidery in the 19th century as well as issues of deception in rank badge heritage.
The jacket’s movement will change the signal intensity, revealing new messages. Since viewers are not able to wear the jacket, a Magic Wand is provided. When waving the Wand, the spectator becomes participant by changing the scrolling texts in the matrix of The Sampler.

Contributors: Geneviève Moisan, Tahseen Mustafa, Ahmed Kishk, RythÂ Kesselring, Fanny Savoie, Claire Nadon, Hesam Khoshneviss, Martin Peach and Sareh Majidi.


2017

The Book, the Sound Table & the Text Panel

In collaboration with sound artist Marc-André Cossette
with text by Hilary Bergen

The book cover includes embroidered portraits of research team members Janis Jefferies, Claire Nadon, Gen Moisan and Barbara Layne. The central motif is an antenna inspired by a Spanish cowl in the collection of the Museo Textil de Oaxaca.

Book Cover, England, 1634. Embroidered, satin weave with silk, purl, silver and silver-gilt thread. T.6-1988. © The Victoria and Albert Museum.

This book was studied in the Clothworker's Centre at the V & A Museum and served as inspiration for the Book, The Sound Table and the Text Panel.

The design of the book in this installation was inspired by the cover of a 17th century book lavishly embroidered with metal threads from the collection of the Victoria and Albert Museum. The cover of the electronic book in the installation has an antenna in the center surrounded with four medallions featuring embroidered portraits of Studio subTela members as they examine textiles in the museum archives. Opening the book will activate the sound component of the project, created by Marc-Andre Cossette. The tabletop itself is the speaker and the sound tracks are a combination of fluttering pages and Janis Jefferies' voice as she reads to the members about the metal work techniques they are observing. Inside the book is a small video monitor showing team members at work in the Textile Museum of Canada.

The wireless signal emanating from the book connects to a similar design on a corresponding wall panel. Embroidered text by Hilary Bergen surrounds the antenna design.

Contributors: RythÂ Kesselring, Claire Nadon, Tahseen Mustafa, Ahmed Kishk, Fanny Savoie, Martin Peach, Hesam Khoshneviss, Geneviève Moisan and Sareh Majidi.


To think the loom in this way, as a
world made up of interdependant an
an interplay between existence and
the barely-perceptible) that high
forces- the hum of "vibrant matt
The word "enchant" is active in both directions; it means both the magic done to a thing and the delight we feel when witnessing magic.
Similarly, in
Enchantment
Textiles," th
no clear dist
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action.
[1] A. Arato & E. Gebhard (eds.). The Essential Frankfurt School Reader. Conti
[2] Snodgrass, Adrian. The Symbolism of the Stupa. Cornell Southeast Asia Pr
[3] Bennett, Jane. Vibrant Matter: A Political Ecology of Things. Durham: Duk

"The distinction between subject and object is both real and illusory."
Theodor W. Adorno[1]

Woven Magic: The "Secret Speech" of Interactive Textiles

Hilary Berges

The act of weaving is an old art, abundant with mystery and myth. In some ancient cultures, the loom symbolizes the cosmos: the upper crossbeam represents Heaven and the lower beam, Earth.

In this configuration, the snaking weft threads are the "planes of existence" which wind themselves around the longitudinal warp threads, the "rays of informing light or breath." [2]

Enchantment is in the in-between.

To think the loom in this way, as a microcosm of the enchanted world made up of interdependant and distributed agencies, conjures an interplay between existence and light (or the tangible and the barely-perceptible) that highlights the many unseen forces- the hum of "vibrant matter" that swirls all around us. [3]

The word "enchant" is active in both directions; it means both the magic done to a thing and the delight we feel when witnessing magic.

Similarly, in "The Enchantment of Textiles," there is no clear distinction between the subject that acts and the object that receives action.

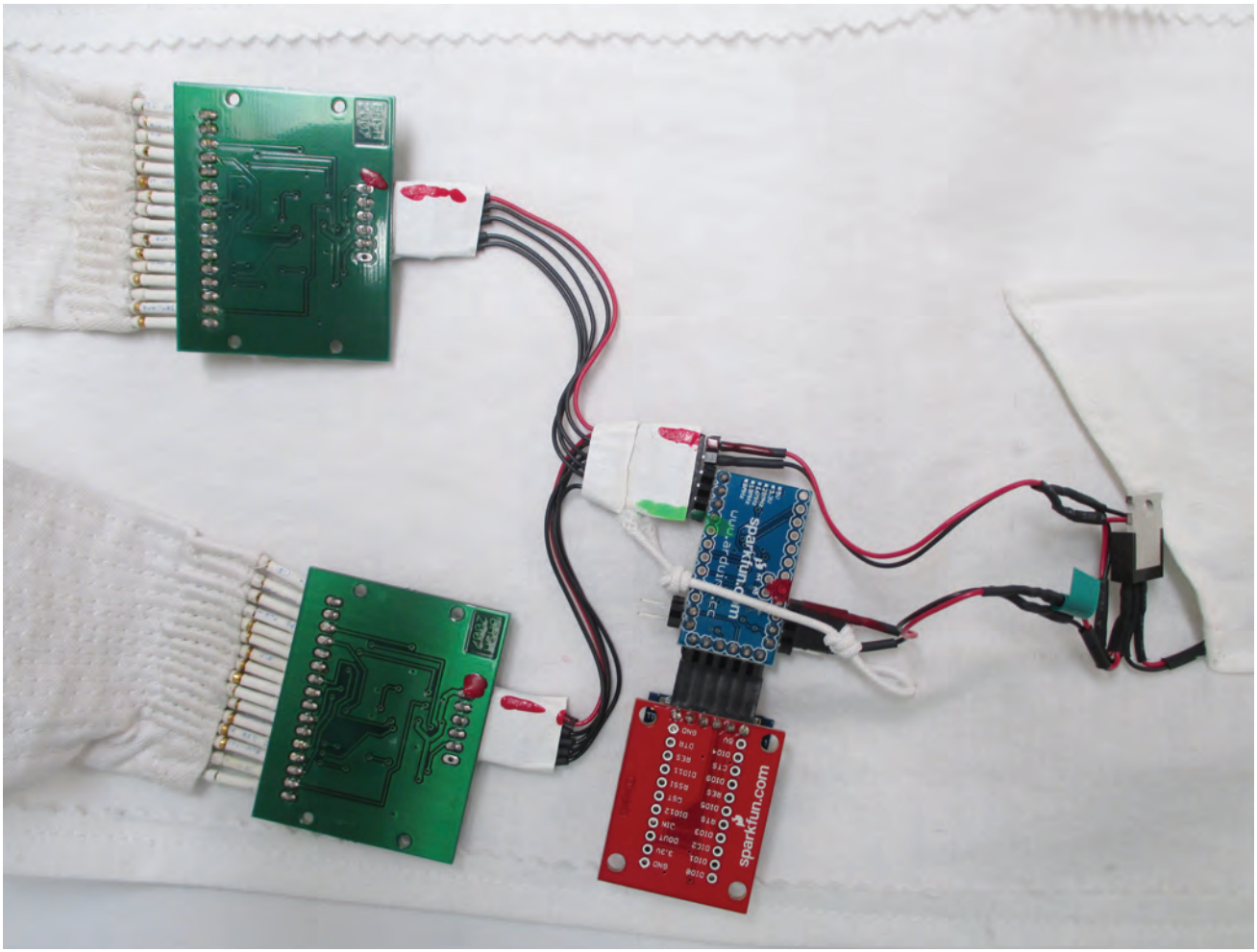
The magician is as much the designer as it is the visitor, the loom, the conductive threads, or the lively garments that converse with each other through signals and beams.

[1] A. Arato & E. Gebhard (eds.), The Essential Frankfurt School Reader. Continuum: 1997. 498.
[2] Snodgrass, Adrian. *The Symbolism of the Stupa*. Cornell Southeast Asia Program: 1985. 116.
[3] Bennett, Jane. *Vibrant Matter: A Political Ecology of Things*. Durham: Duke University Press, 2010.

Persuasive Textiles & the Improbable Environment 2009 — 2014

Detail of installation at the Museo Textil de Oaxaca, Mexico, 2014.

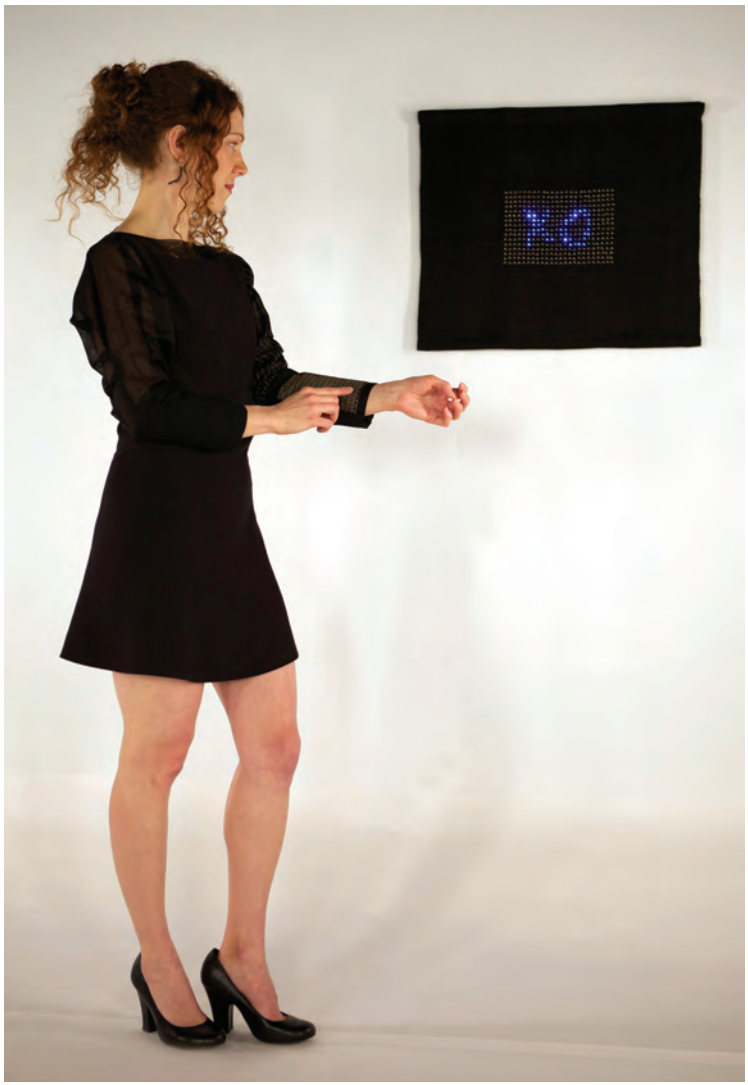
Currente Calamo & the White Touchpad Dress


sparkfun.com

Currente Calamo means running pen, which is Latin for “speaking off-the-cuff”. Display garments each have a handwoven LED matrix and a digital print that announces the bluetooth address of each garment. The displays can be re-programmed wirelessly, or activated with the White Touchpad Dress. The garments were designed by Isabelle Giroux.

Contributors: Isabelle Giroux, Hesam Khoshneviss, Diane Morin, Sara Gotowka, Emily Jan, Amanda Fauteux, Carissa Carman, Sareh Majidi, Azadeh Hamidi.

The Black Touchpad Dress



Drawings made on the touchpad's silver conductive grid will activate the corresponding LEDs that have been handwoven into the cloth.

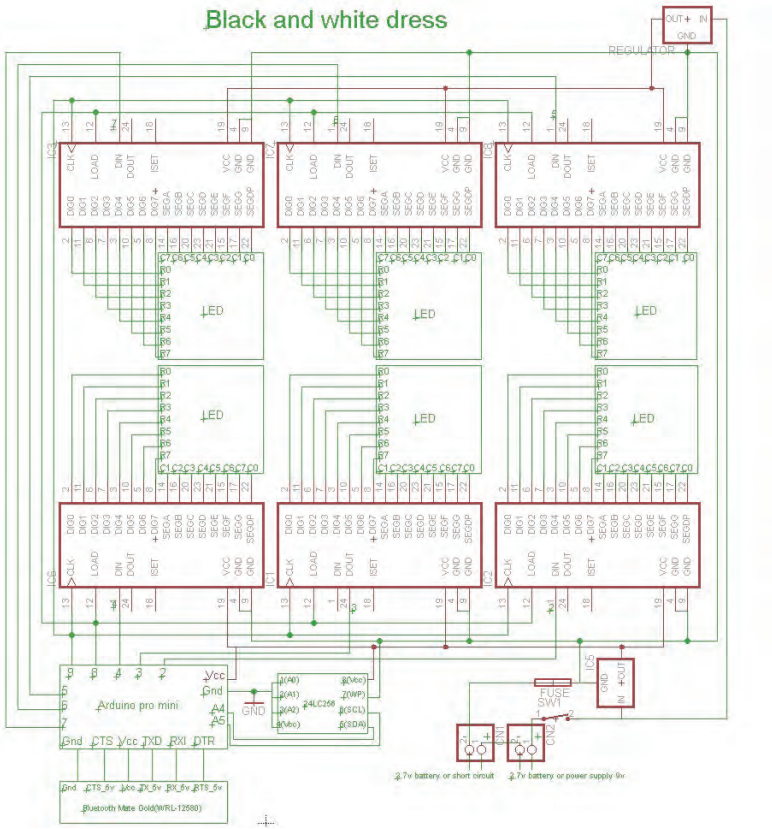
Contributors : Hesam Khoshneviss, Diane Morin, Emily Jan, Amanda Fauteux, Carissa Carman.

The Keyboard Dress

The embroidered “keyboard” of this dress acts as a display. When typing on a digital tablet that is connected wirelessly to the dress, the letters of the keyboard become illuminated. The back of the dress is connected with two silver ribbons. When clipped together, the dress is switched on and when unconnected, the dress is turned off.

Contributors: Hesam Khoshneviss, Diane Morin, Emily Jan, Carissa Carman, Sarah Gotowka, Meghan Price, Maryam Golshayan.

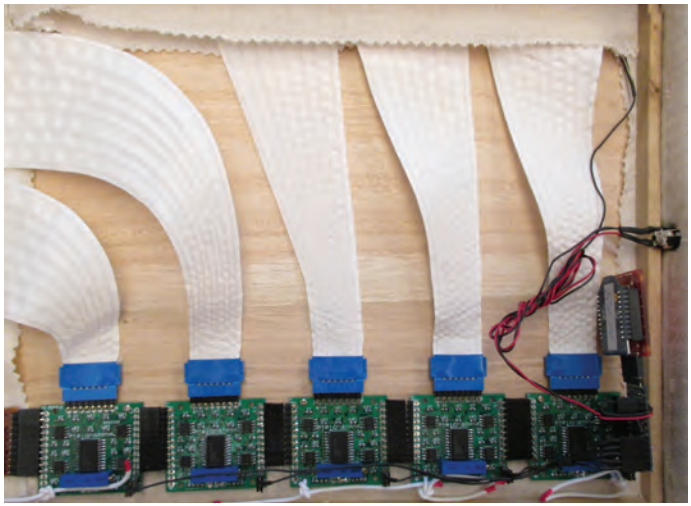
The Black & White Dress



The black and white dress features a handwoven display of white linen and yellow LEDs. The lower half of the dress is made of black felted wool. Texts or animations scroll across the LED array. A new animation can be quickly designed with a custom software that can runs on a personal computer. New images can be sent wirelessly to the dress.

Contributors: Hesam Khoshneviss, Diane Morin, Omer Baluch, Amanda Fauteux, Carissa Carman, Maryam Golshayan, Azadeh Hamidi.

The White Touchpad Box & the LED Display

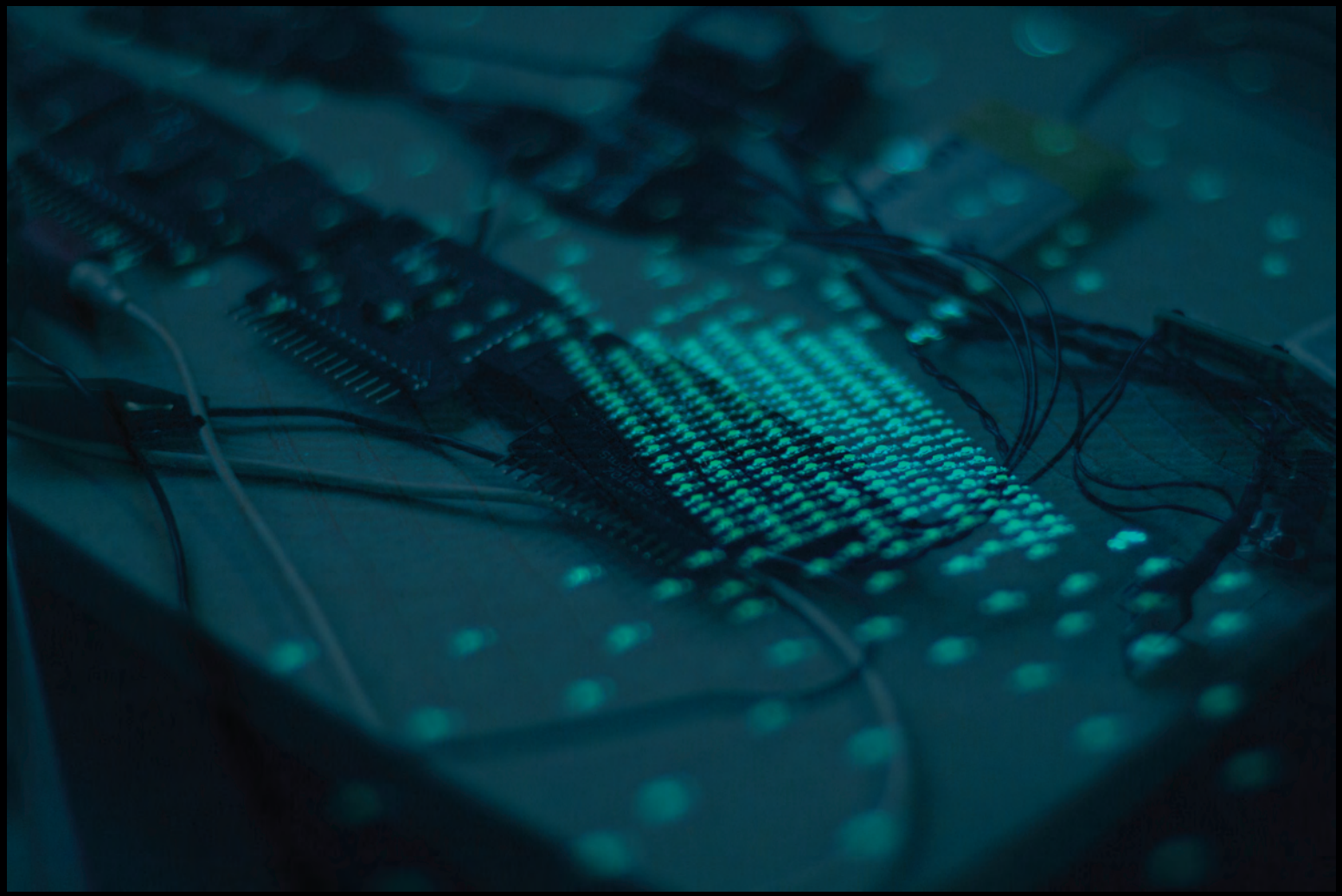


Touchpad interior: circuit made of silk and silver ribbons with electronic components.

A fabric touchpad is made of linen with embroidered lines of conductive silver threads. Dotted lines are negatively charged threads while solid lines are positive threads. Drawing on the touchpad with your finger will create a circuit as the electricity passes through the moisture of your fingertip. The location of touch is sent wirelessly to the handwoven LED panel, creating a drawing of lights. To “erase” the drawing, simply press your palm onto the touchpad.

Contributors: Hesam Khoshneviss, Darsha Hewitt, Emily Jan, Sarah Gotowka, Maryam Golshayan, Azadeh Hamidi.

About Studio subTela



“Developing intelligent cloth structures for the creation of artistic, performative and functional textiles.”

Barbara Layne is the Director of Studio subTela, one of the labs of the Textiles and Materiality Research Cluster at the Milieux Institute for Arts, Culture and Technology. She works with a team of graduate students from Visual Arts and Engineering at Concordia University and a variety of international collaborators. The Studio is focused on the development of intelligent cloth structures for the creation of artistic, performative and functional textiles.

Microcontrollers and sensors are paired with natural fabrics to create fabric surfaces that are receptive and responsive to external stimuli. Controllable arrays of Light Emitting Diodes present changing patterns and texts through the structure of cloth. Wireless transmission systems have also been developed to support real time communication including new research in flexible textile antennas. In both wearable systems and site related installations, textiles are used to address the social dynamic of fabric and human interaction.

https://subtela.hexagram.ca/

Team subTela

Team members Etta Sandry, Barbara Layne, RythA Kesserling and Tahseen Mustafa at work in Studio subTela.

Tahseen Mustafa and Martin Peach test the efficiency of textile antennas in the anechoic chamber.

Since its beginnings in 2000 Studio subTela was built on one fundamental unit: the research team. Consisting of various co-investigators, research assistants, interns and technical support people, the members bring a variety of creative approaches, a diversity of technical skills and often under the intense pressures of deadlines and distances. The commitment and inspiration of so many dedicated individuals have resulted in transformative projects grounded in solid science and expressed through wondrous, magical textiles.

Team members Donna Legault, Hesam Khoshneviss, Sareh Majidi and Tahseen Mustafa develop circuit schematics, coding and antenna design.

Geneviève Moisan, Tim Belliveau, Sareh Majidi and Claire Nadon test the antennas on the fronts of the garments.

Collaborator Marc-André Cossette and team member Fanny Savoie prepare an electronic board for the sensing carpet.

RythÂ Kesselring shows Barbara Layne a circuit she developed for the Table Runner.

Researchers

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Director of Studio subTela, Concordia University

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AHMED KISHK
Electrical Engineer, Concordia University

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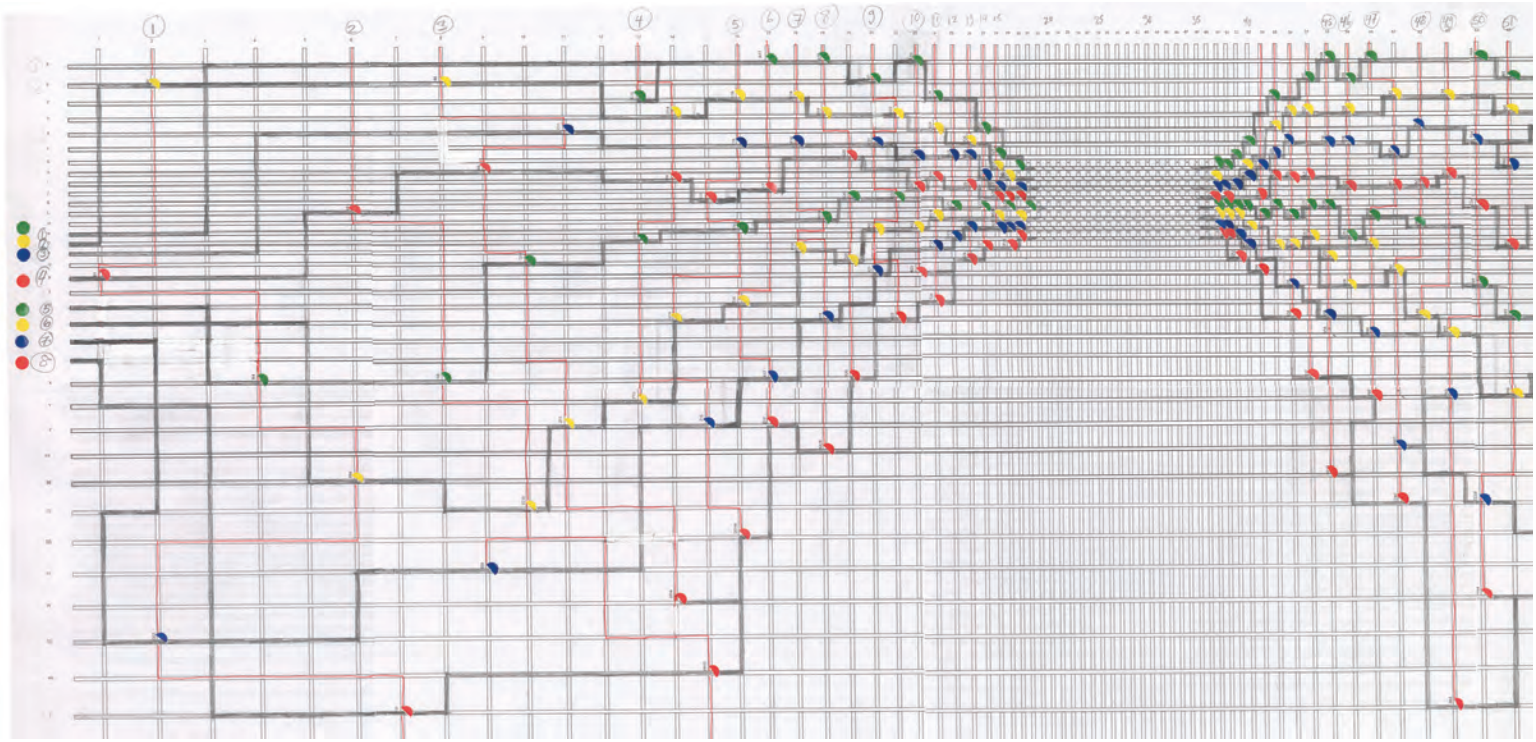
AGUSTINA ISIDORI
VJOSANA SHKURTI
THE BRITISH MUSEUM
THE TEXTILE MUSEUM OF CANADA
STUDIO SUBTELA

Models

SANDRINE BEAUD
MEGHAN RILEY
FANNY SAVOIE
EMELINE HOUSSIN
KIERAN STACEY
ANNE-SOPHIE HÉBERT
LINA THÉRIAULT
BEATRICE IP YAM
KESHA FRANK
MIKE LEE
YASAMAN SHAKIBI
GENEVIÈVE MOISAN
DIOSICELY DIAZ
MICHELLE SZIGETI



textiles and materiality research cluster

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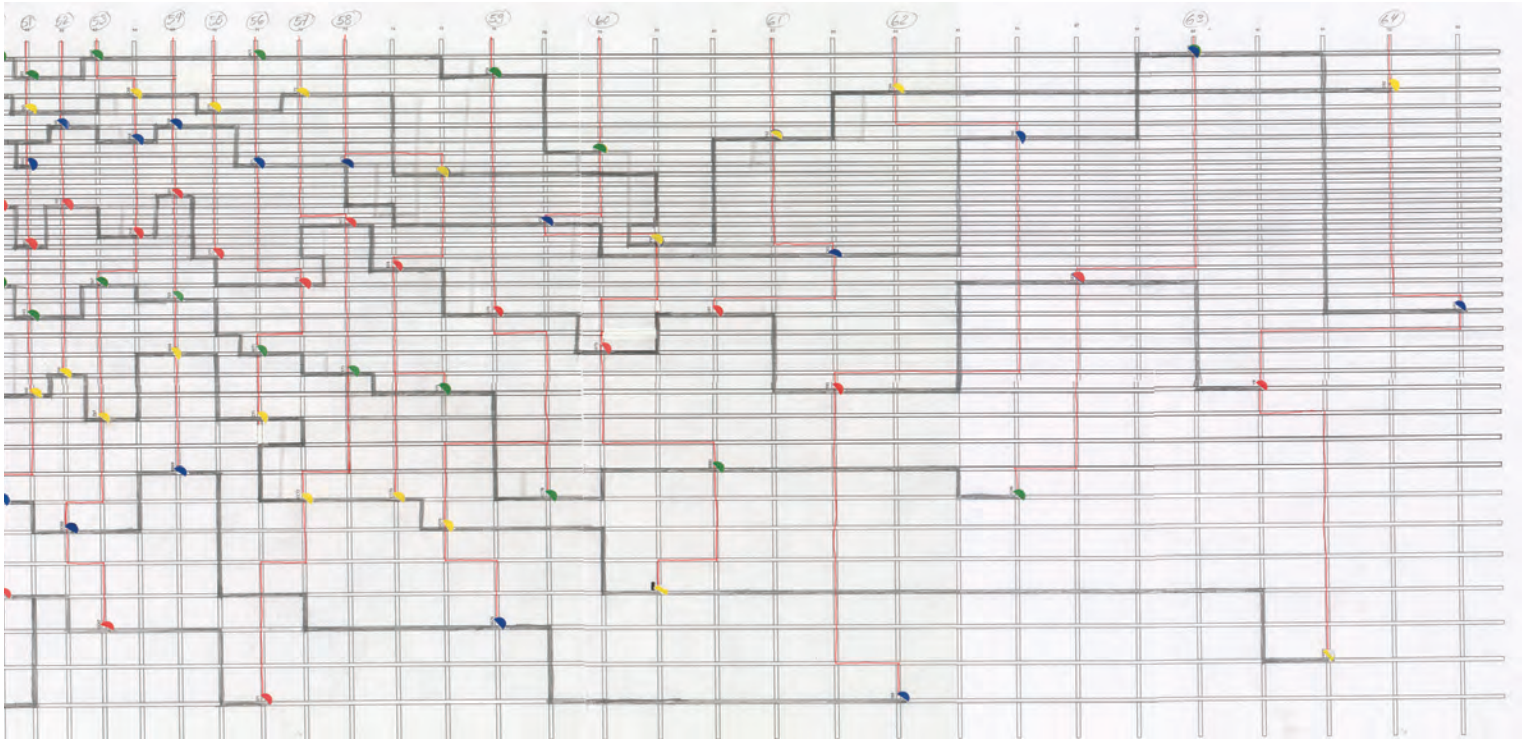

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Musée des Ursulines de Québec (Québec City, Canada)
El Museo de Textil de Oaxaca (Oaxaca, Mexico)
The Textile Museum of Canada (Toronto, Canada)
The Clothworker's Centre at the Victoria and Albert Museum and The British Museum (London, UK)

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