

Playformance: The Virtual Amplification of Spontaneous Hand Gestures in Performance Art

by
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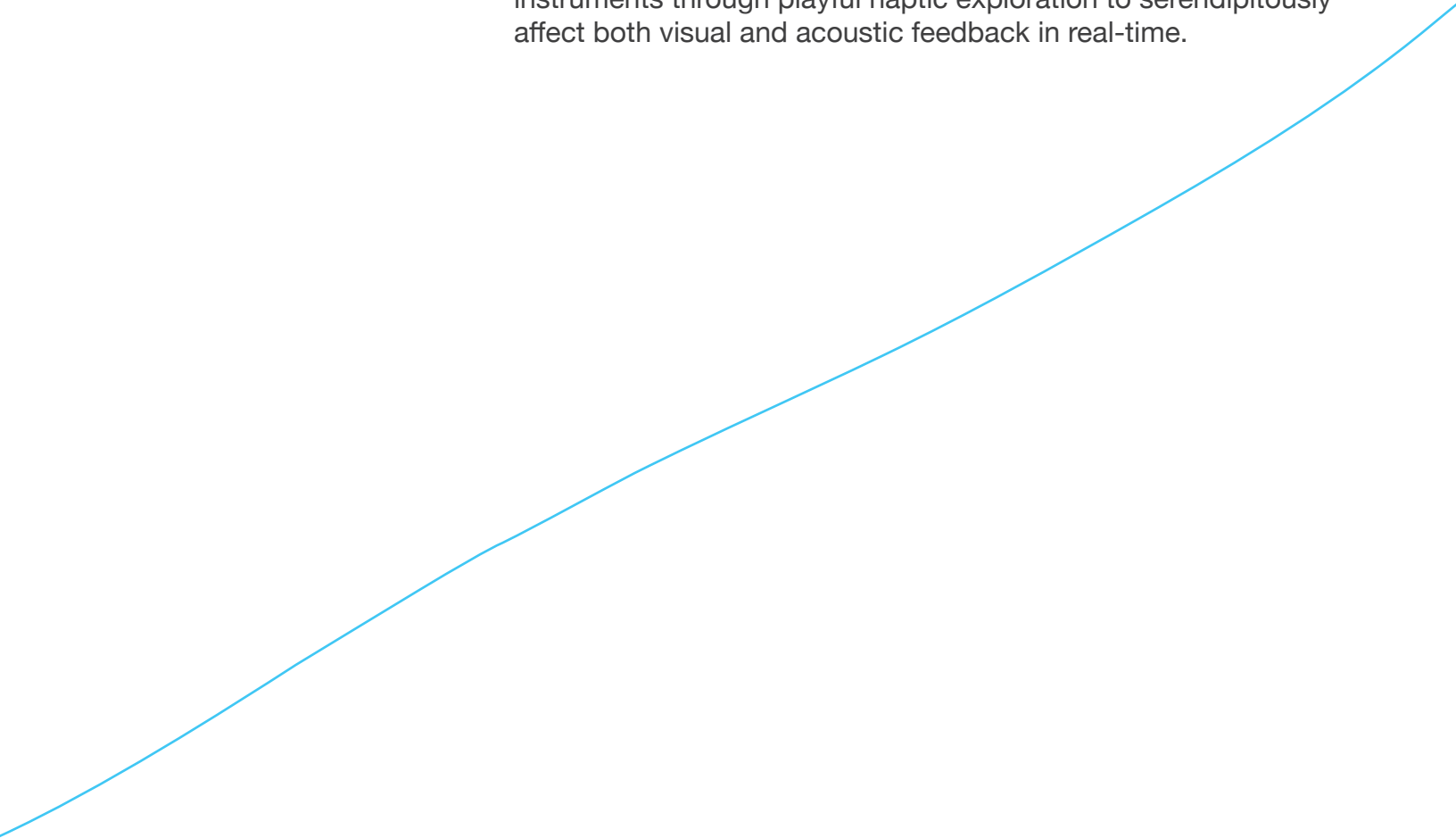
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Abstract

Playformance (an originally-coined term) offers the space for performance artists to rethink their art practice in new ways through the incorporation of augmentative technology. In this line of research, spontaneous hand gestures (in addition to other forms of movement) serve as a kinetic form of creative articulation, and are translated to affect projected graphics rendered live. By situating interactive technology as an extension of the artist's expression, *playformance* posits that this user-authored virtual output has the potential to convey the user's inner thoughts and/or motives through ludic performativity. In-depth contextual inquiry and user-experience-enhancing compliance design, inform the creative and technical process of five diverse, original and custom-made networked-performances: *Dissolving Self*, *Blendism*, *Havabazi Tuno*, *Jadoo Bānoo*, and *Havabazi Avesta*. Findings conclude that the director must design a visceral experience for the user, which, in turn subsequently felt and understood by the audience as well. With staged performances, come a divide between the passive audience and active performer. Inspired from this, *playformance* also includes the conceptual development and production of *Mirada*, an interactive installation, in which users collaboratively engage with sensor-embedded abstract instruments through playful haptic exploration to serendipitously affect both visual and acoustic feedback in real-time.



for maman & baba

*with a special thanks to my
performers,
woodworkers,
technologists,
musicians,
sound designers,
seamstresses,
funders,
academic advisors
and consultants*

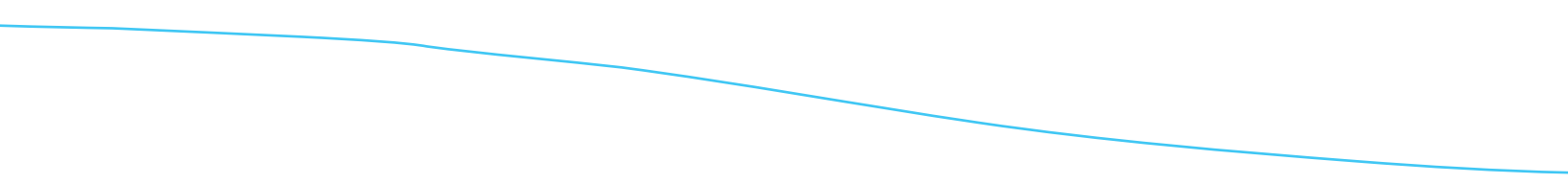
*without you, none of this
would have been possible*

*Marina Abramovic
Ariel Balevi
Tom Barker
Jennifer Blakney
Philippe Blanchard
Monica Contreras
Isla Craig
Andrew Forbes
Paula Gardner
Selmin Kara
Larry Kwok
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Mitzi Martínez
Denise Mireau
Carlos Montenegro
Cris Mora
Nick Puckett
Essa Serhan
Richard Tijerino
Yuxi Wang
Emma Westecott
Bānoo Zan*

This is just the beginning

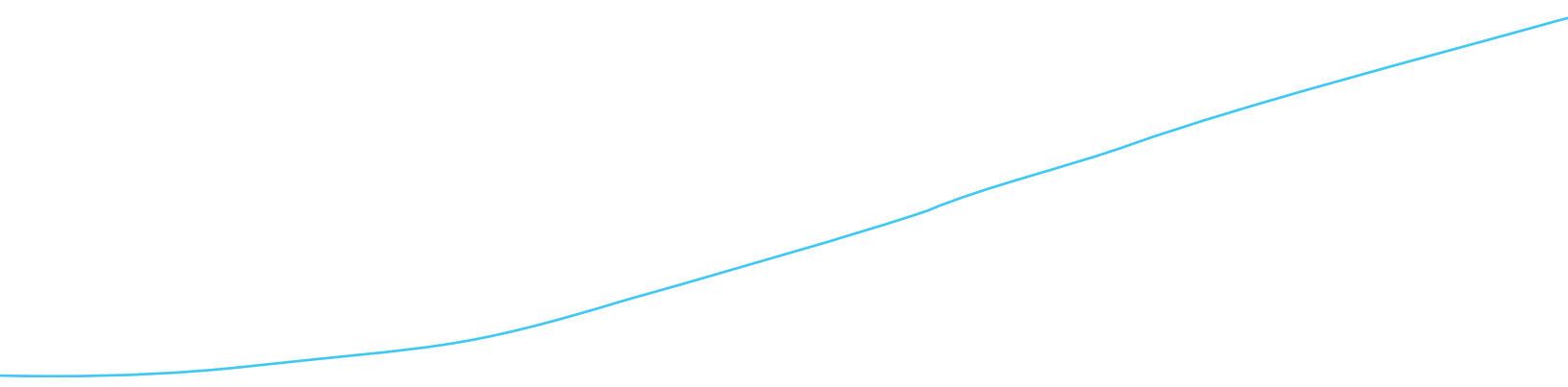
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Introduction

Playformance (an originally-coined term) is motivated by my fascination with the potential of interactive technology and how it can inform the conventional performance experiences that we are accustomed to. Claudio Prati and Ariella Vidach's interactive dance performance at *Digifest 2012*, which created abstract *soundscales* in real-time through worn accelerometers on wrists and ankles, prompted me to ponder the possibility for creative expression in performance art through body technologies. Ignorant of the long tradition of augmentative technologies in performance, I had my first wide-eyed attempt at this synthesis in April 2013 with the *Dissolving Self* project – a great learning experience in theatre production design, creative direction and user interaction design with wearable technologies. After the show, a friend asked: 'Who were you doing this for? The audience or the artist?' I immediately replied that it was for the audience, but after a bit more experience in these types of performances, I realized that the more rewarding and inspiring aspect of the creative process was in designing an interaction that was artistically meaningful and viscerally felt for the performance artist. Synergy between performer and technology is key because, as I have learned, the technology affects how the performer feels on stage and alters how he or she would normally

perform. This awareness drove me to focus more on the artist as opposed to the audience in considering what determines a successful performance.

This focus also speaks to the attention I direct toward the creative process rather than the end result. Performances are always works-in-progress, with the performer (the human on stage) being the focal point. Technology adds to his or her craft, or enhances the concept of the artwork. If the technology can inspire the performer to facilitate one's creative expression, then the incorporation of a worn sensor or a motion capture camera truly adds to the quality of the artwork, which is in turn perceived by the spectator.

The title of my research – *playformance*, was inspired by the ludic unpredictability that comes from my experiences working with performers in rehearsal and how interactive technology can have artists rethink their relationship with a poem, story or rap that they've known so well. Because projected graphics or sound filters are controlled by the performer and rendered live, the performer can explore when (and to what degree) to affect the mediated output as opposed to having to adhere to a linear, predetermined choreography. *Playformance* has the potential to offer a quality of liveness to the performance shown through unique instances, which has been both challenging and inspirational for the production team as well as the performer as we have had to leave our comfort zone. Not always, but most of the time this has been a positive and instructive experience.

Objective

The augmentation of live performance art with technology opens new methods of self-expression for the performance artist. My research posits that corporeal movements such as hand gestures, which affect virtual representations have the potential to articulate the performance artist's underlying thoughts or motives. Interactive technology acts as an amplified extension of the artist, in the same way that a megaphone increases the volume of a speaker or an elaborate costume adds to a performer's stage persona.

Literary scholar and new media critic Marie-Laure Ryan traces the Latin root of the word virtuality to *virtualis*, meaning the potential: "The virtual is not what is deprived of existence, but that which possesses the potential, or force of developing into actual existence" (Ryan, 1999, p. 88). My research aims to show how situating the performance artist as the actuator of co-authored virtual output re-frames interactive technology as an extension of the self with the potential to amplify creative expression. Susan Broadhurst, Head of Drama Studies of the *BitLab Research Lab* at Brunel University, explains that in performances, the body is coupled with unifying technologies that inform and recreate the

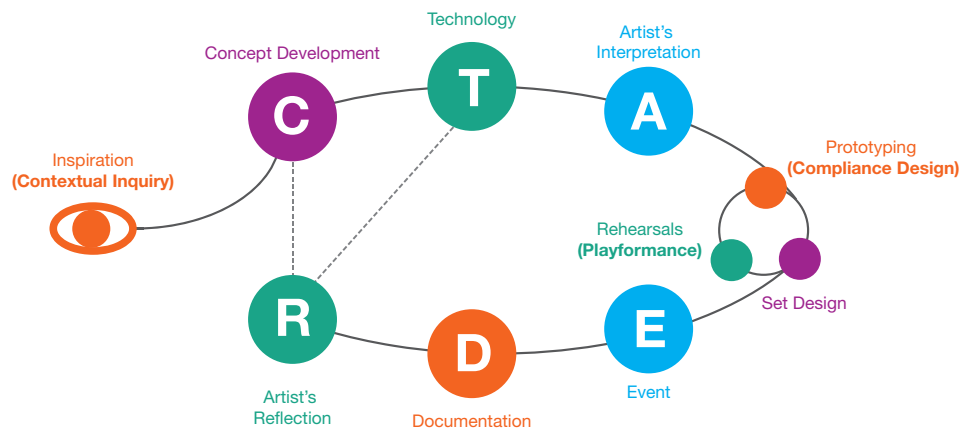
performer's experiences with the world: "This intertwining of body, technology, and world is important since instead of abandoning or subjugating the physical body, instrumentation and technology extends it by altering and recreating its embodied experience. The body, in turn, creates new technologies and instrumentation to bring potential creativity and mediation in the corporeal world" (Broadhurst, 2006, p. 149).

The Process

My role in the development and production of technologically mediated performances is that of a creative director that aims to build a synthesis between technology and art. By working with artists, a researcher can form an understanding of their respective creative styles and suggest various technologies that may hold the potential to act as an extension of their bodies to translate their creative articulation in ways they've not previously considered. It's not about attempting to make their work better, but rather exploring new visceral and unpredictable ways of performing that are dynamic, exploratory and emergent. This is followed by a closer look into my method of contextual inquiry, compliance design, playformance and networked-performance production.

Fig. 1: My Creative Process

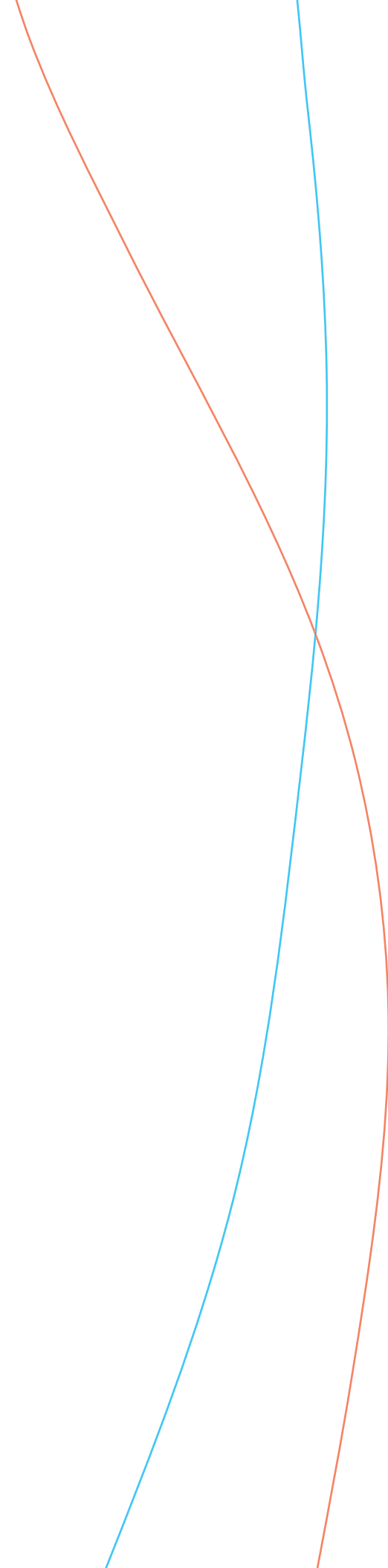
From inception to execution, this figure describes one of the ways that my process of producing a networked-performance has manifested.



Contextual Inquiry

My framework for navigating this analysis is derived from design researcher Karen Holtzblatt's immersive ethnographic technique: contextual inquiry. This research method reveals how technology can impact the way in which people work. Further, it carefully examines the creative process of the artist and emphasizes on-site participation, which, according to Holtzblatt, "is a precondition to understanding users' tacit knowledge" within their craft (Hanington & Martin, 2012, p. 46).

This research has shown that performers cannot be expected to know which (if any) sensors or other technologies could be used



to augment their performance. One can undermined his or her research objectives in this field of inquiry by asking too much of a performer. This point is further emphasized by adding that most performance artists in this body of research hold quite a negative view of technology, or rather feel that it is out of their grasp. Frankly, most of the performers, such as the dancers, poets and storytellers that I have worked with, don't even feel comfortable with smart phones, so one can imagine their resistance to incorporating technologies and an in-depth understanding of the creative process and performative style of the artist at hand; this reflective contextual analysis is essentially a partnership, similar to the one between a master and an apprentice (Beyer & Holtzblatt, 1997). It also helps to have an awareness of the ways in which performance and technology have converged in the past to be able to further generate creative technological applications to the performance at hand.

In retrospect, I did not take the time or attention to properly build trust through a partnership with my performers in my earlier work. This was evident in the *Blendism* project, which, in my defense, was meant to simply be an undirected studio experiment where performers were not given any introduction to the technology and there was no central concept to the performance. After a holistic analysis of my research, I realize that this uninspired approach caused both the work and the dynamic of professional relationships to suffer. But such oversights paved the way for a more responsible approach in my ensuing work with performance artists and new media. If technology is meant to be an extension of the performance artist's creative expression, then the concept must be developed in concert with the artist's intent and his or her bodily movements and gestures.

The conceptual development of my work with Bānoo Zan and Ariel Balevi started with my attendance of their shows. While watching Balevi perform, I noticed his widespread and sweepingly slow gestures, as well as his interest in mystic Sufi stories. Customary of Eastern philosophies, Balevi refers much of his work as personally spiritual and metaphoric:

“The spoken word becomes an image, an image of myself in a dream where I can become a prophet with a nimbus of light, or tears wept from an eye that wonders at words transformed into an unexpected vision, or a cloud that surrounds me in all the shades of colour hidden behind the sound of each syllable”.

Studying his passages was my point of departure when designing visualizations that would augment his work. This eventually led to the development of *Havabazi Avesta*: the telling of the Zoroastrian creation story Avesta, augmented by abstract visualizations chosen together with the artist that speak to the ineffable quality of the tale.

Compliance Design

Another example of how contextual analysis informed the technological extension of the performer's creative articulation is evident in the *Havabazi Tuno* project, which called for a good understanding of the DJ's musical style and persona. When listening to his podcasts, I realized that Tuno is very much a hip-hop and break beats type of DJ. Getting a feel for his performative style allowed me to better offer appropriate suggestions to how technology could augment his live performance.

Central to creating a meaningful experience for the performer is designing (mapping) the relationship between live movement and its corresponding translated and/or amplified output. Robert Wechsler, the Artistic Director of the award-winning interactive dance company *Palindrome*, provides an overview of the mapping structure of any given interactive technology, which is divided into three parts: input, output and compliance. Input examples include (but are not limited to) relative position of body or number of bodies within the performative space, speed or change in speed of a part of the body, hand gestural motions, and biometric data such as heartbeat or temperature. Outputs can come in the form of the manipulation or triggering of audio or visual media, the activation, quieting or amplification of mechanical devices such as fans or servos or of stage lights (moving or stationary).

Compliance* refers to the nature and psychology of the designed relationship between the input and output, with each relationship offering different "dispositions, directions and finesse" (Wechsler, 2006, p. 8). More movement may result in a stronger filter superimposed over a projected video or the speed at which a streak of text animates across the side of a building, but because mapping refers to the kinds of relationships between actions, there are numerous possible ways to setup an interaction. Sometimes a negative correlation can be designed if it makes sense for a narrative or renders a viscerally felt experience for the performer. For example, the increasing distance between the hands of a rapper could be mapped to a decrease in the volume of the background audio track, in order to direct emphasis on the spoken words at that moment as a way of saying "OK audience, what I am going to say now is important so pay attention" through a technologically-mediated hand gesture. One criterion for establishing an input-output relationship can be set by asking whether the interaction with media on stage could be created with cues or from the push of a slider under a technician's thumb. If the performance can be augmented by the intervention of a technician behind the stage cuing media, then the audience has no reason to believe that a 'live' and thus notable effect has taking place before their eyes. Wechsler explains, "since the experience might have been created another way, the observer simply has no sense that anything special has taken place" (Wechsler, 2006, p. 14).

* My use of Compliance Design does not refer to the inclusive design use of the term, but specifically to Robert Wechsler's definition.

Playformance

Another criterion for effective compliance design is whether or not the performance artist underwent a visceral and embodied experience during the proposed interaction: “It [the compliance design] is unlikely to be something that the performer knows in their tactile or kinaesthetic sense and since it is not felt by the performer, it is not likely to be felt by the audience either” (Wechsler, 2006, p. 14). Compliance design is significant to the quality of interaction between performer and technology.

Critical to my research is the element of play, or the affordance for the performer to incorporate ludic performativity or play into their performance, which, I argue, has the potential to transcend the default biological framework and enable new possibilities of bodily expression of which neither the performer nor the viewer have considered.

From the practice of emergent design and research-through-prototyping, playformance explores the limitations and affordances of augmentative technology through ludic performativity, where the artist serendipitously interacts with technology without any predetermined purpose; this is similar to what Donald Schon describes as a “conversation with the material of the situation” (Schon, 1984, p. 175). Design researcher Rachel Philpott explains, “the purposeful purposelessness of play cultivates a very particular mind state in which one is relaxed enough to relinquish control and allow the unknown to occur” (Philpott, 2013, p. 2). This mind state that Philpott describes is exactly the place that a performer can discover new ways of creativity through embodied articulation. Looseness or openness with the artistry of the performer takes advantage of the improvisational potential of a performance which “generates singular moments” that are perceived by the audience as being unique, and thus special (Wechsler, 2006, p. 5). Sometimes it is practical to include a technician to prompt sequences in a performance, but Wechsler’s argument is referring to the replacement of live body data with a technician, rather than a technician controlling one component.

When the performance is not married to a preferred end result or limited to a strict and linear choreography of what is supposed to happen, a more embodied and meaningful interaction can be experienced for the performer. This is not to say that a Leap Motion or a Microsoft Kinect will always become as fundamental to a performer’s work as a microphone or a lighting rig – this would be a rather reductive take on this research and misses the point entirely. Playformance is process-driven research that aims to start a conversation where new forms of expression can be explored in depth. Interactive technology situates the human as the variable in that it is the human that engages with the technology. It is the human that is the initiating input, with his or her movements

translated by the technology. Katherine Hayles explains that it is this variability in the user that brings forth the improvisational affordances of interactive technology: “Embodiment is akin to articulation in that it is inherently performative, subject to individual enactments, and therefore always to some extent improvisational”(Hayles, 1999, p. 197).

When we choose a technology that we think might capture the respective expressive nature and/or stage presence of a poet, a DJ or a dancer, we bring certain assumptions to how they will react to it and how the technology in question will read their movements. Such assumptions in my research have almost always been inaccurate. In the *Dissolving Self* project, allowing the space for playful exploration of the technology has shown that when the performer spins abruptly, the affected media (the metaphoric sphere) reacts in a very responsive and visceral way – this led to the incorporation of this sequence into the piece. With the *Blendism* project, I simply placed a contemporary dancer, singer, live video feed, worn sensors and a projection together in a room and hit record on the camera. This studio performance brought about more questions regarding compliance and set design than it did answers, which is why it was a fruitful learning exercise, specifically in revealing how video filters enhance different dance sequences or the way in which infrared LEDs read the singer’s hand movements – and, more importantly, when and why they did not.

User-testing for both the *Havabazi Tuno* and *Jadoo Bānoo* projects allowed the space for the user to independently understand the type of kinetic gestures the Leap Motion controller most consistently reads, which is fundamental in user-centered compliance design. This was done by allowing the time for the performers to play games like BoomBall or Lotus with the Leap Motion. After playing such games with the technology, one of my performers, Zan, adjusted the setup of the Leap Motion to be positioned at her side, in order to allow just her left hand to hover over the sensor. This ended up being a more natural interaction for her, and though it sounds simple, it validates the value of ludic performativity in the synthesis of performance and technology.

Networked- Performance Production

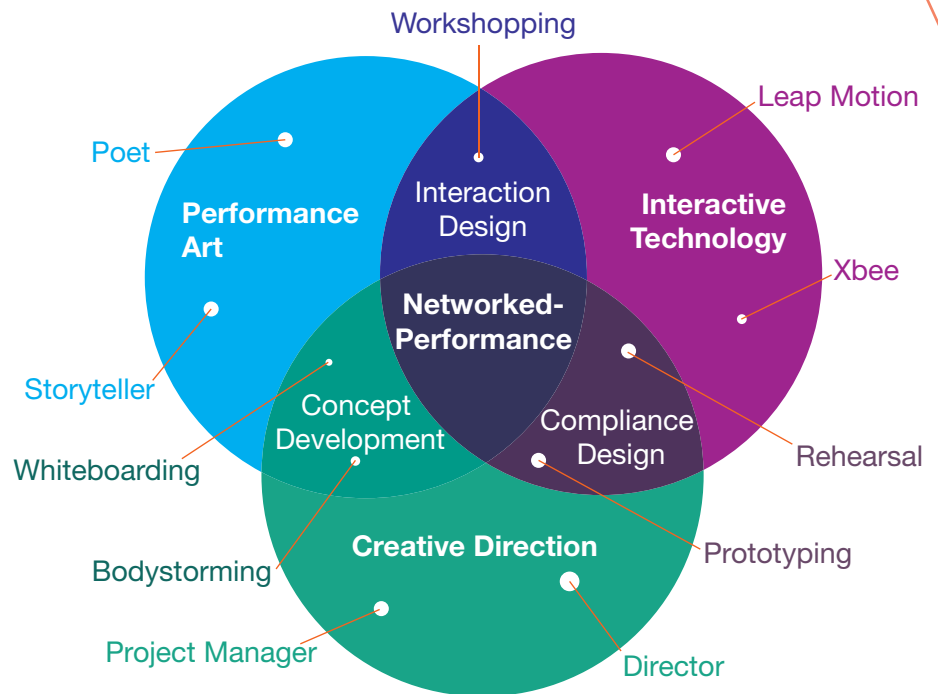
Turbulence.org, a blog promoting the work of digital artists that converge with interactive technologies, defines networked performance as a “real-time, embodied practice within digital environments and networks...” (“Networked-Performances,” 2004). I add to this that a networked-performance is also an art practice, where the kinetic articulation of a performer is translated and amplified through technologies with augmentative potential such as wireless telecommunications, sensor technologies, and motion

capture. As the performer commits to an action, the mediated output responds in real-time, which in turn is experienced by both the performer and the audience, thus creating a feedback loop (a network). I use the analogy of a conversation when describing the nature of networked-performances.

Conversations are open, spontaneous and reactionary while still framed by predetermined rules, like not talking at the same time or interrupting the other in mid-sentence. If such rules are persistently broken, the event ceases to be a conversation and turns into something entirely different. As there are rules of engagement within conversations, so are there rules in networked-performances. It is not that one needs a stage, or even an audience, but there must be a feedback loop through which the technologically translated movements of the performer are virtually amplified and then felt by the performer in some way.

Fig. 2: Synthesis of a Networked-Performance

This Venn diagram describes my experience of producing networked-performances. Their independent and conjoined components comprise a synthesis of performance art, interactive technology and creative direction.



My research-through-prototyping consists of the production of five networked-performances and one interactive installation described in chronological order: 1. *Dissolving Self* was a staged production where the corporeal movement of a Sufi whirler was translated to affect the nature of a graphical sphere that served as a metaphor for the cosmos. Though this performance amplified the entire movement of the body rather than hand gestures, it was a great learning experience in compliance design through ludic performativity, which is why it is relevant to this body of

research. 2. *Blendism* was a studio experiment that mapped the hand movements of a singer to affect a graphical mesh that was superimposed over a live video feed of a contemporary dancer. 3. *Havabazi Tuno* is an on-going project that allows a DJ to control sound filters and VJ software with gesture-recognition technology through the relaying of MIDI messages. With this project, I was motivated to explore how interactive technology could offer a more performative experience for a DJ, through the embodied control of both virtual graphics and sonic manipulation. 4. *Jadoo Bānoo* was a networked-performance where the words of the performer's spoken poem were animated on and around her, and follow in the path of her hand gestures in real-time. This was conceived concurrently with 5. *Havabazi Avesta*: an on-going project of the telling of a Zoroastrian creation story where abstract cosmic-like graphics are controlled by both off-stage technician key-presses and the hand gestures of the performer.

The final project in this research is 6. *Mirada*, an interactive installation specially designed for the OCAD Digital Futures Program graduate exhibition. Through playformance and compliance design, *Mirada* allows three gallery patrons to interact with abstract wooden instruments that affect the visual characteristics of a 3D graphical flame and an immersive *soundscape* while a shaman storyteller recites mystical stories. The installation differs from all the other projects in that it is the only one that involves haptic interaction and situates the viewer (the gallery patron) as a performer through the controlling of translated audiovisual output.

Performance & Technology: A Selected History

Derived from the in-depth historical research of Steve Dixon, the following selected genealogy helps to contextualize my work within the lineage of performance and technology by placing it among the related works. It is organized into four seminal periods: Futurist Performance (1910s-1930s), The Augmentative Screen (1930s-), Cybernetics (1960s-1970s) and Digital Performance (1980s-).

Early examples include the *deus ex machina* narrative tactics of Greek theatre, which used cranes to introduce actors playing gods into a scene, and the sixteenth century Italian artists mounting perspective paintings to give the illusion of depth to a stage backdrop. The twentieth century has seen the use of gas and electricity to run stage effects such as lighting, followed by the employment of computers, cameras and software to control multimedia during live events (Arndt, 1999, p. 66).

Futurist Performance (1910-1930s)

One of the first modern movements that put technology at the forefront of performance was futurism, which drove much of the aesthetics, philosophies and practices of avant-garde artworks during the early-twentieth century (Dixon, 2007, p. 47). New technologies fuelled the futurists to develop a convergence of technology in all types of performance art. This synthesis took the form of dynamic lighting effects, mechanized costumes, and visual displays all intended to “experiment with various psychological and physical relationships between the spectators and the performance” (Kirby, 1986, p. 152). The futurist movement was fascinated with the “technological change and contingent cultural and sociological transformation” (Dixon, 2007, p. 64) spurred by the advent of cars, planes and most notably, electricity.

Futurist manifestos, such as *The Futurist Synthetic Theatre* (1915), *Futurist Aerial Theatre* (1918) and *Eccentric Theatre* (1921), parallel the inquiries of today’s digitally-mediated performance, such as performance through play and technology as an amplifier or extender of articulation (Dixon, 2007, p. 53). In Russia, the *Eccentric Theatre* manifesto begged the performer to “forget about emotions and celebrate the machine”, and went on claiming that in this “mechanically exact” theatre, the performer becomes “inventor-improvisor” through mechanized movement (Kozintsov, 1975, p. 95). In this “new” theatre Yuri Annenkov’s 1921 manifesto, *The Theatre to the End*, envisions the modern artist as being empowered by technology and defined by it within digital performance practice: “The master of the new theatre will have a conception of theatre completely different from that of the contemporary playwright, director, stage designer. Only the mechanical and the electric will be the creative ones in the new liberated theatre” (Deak, 1975, p. 91).

Not unlike today, technological advancement inspired the futurists to rethink the role of technology in their artwork: “Central concepts and practices within contemporary digital performance constitute not merely a lineage that can be traced back to futurism, but fundamentally encapsulate and extend the futurist project” (Dixon, 2007, p. 64).

The Augmentative Screen (1930s-)

In the 1920s, artists began to install imagination and a sense of wonder with onstage screens, which projected photographs and moving images during cabaret and music hall performances (Dixon, 2007, p. 74). The French magician Horace Goldin juggled with real and filmed objects to stun audiences, and Robert Quinault played with time perception by projecting slowed down versions of the same dance sequences that he was enacting live (Bowers et al., 1998). In 1927, French dramatists such as Paul Claudel experimented with the screen to enhance and intensify the ambience of the narrative, which, according to English writer Frederick Lumley, “open a road to dreams, remembrances

and imagination” (Lumley, 1972, p. 74). Theatre designer Robert Edmund Jones claimed that this synthesis between live performance and screen-based media was the birth of a new art form: “in the simultaneous use of the living actor and a talking picture...there lies a wholly new theatrical art...whose possibilities are as infinite as those of speech itself” (Robert Edmund Jones, 1929, p. 40). His discourse on virtual theory calls for the union of the imagined, on-screen media and the living physical body to make the performative artist-subject whole. Jones’ theatre is concerned with the “symbolic unification in space and time -- real and virtual, mind (film) and body (stage)” (Dixon, 2007, p. 82).

In *Film and Cinema*, Allardyce Nicoll explains that audiences place a higher degree of authenticity to what they see on the screen due to the cinematic process, which demands more complex characterization, while theatre appears as more of an elaborated ruse with its exaggerated gestures (Nicoll, 1936, p. 171). He posits that film and theatre remain contrasting mediums with film being truthful, complex and real, and theatre being false, simple and illusionary. Influenced by Nicoll’s theory, the multimedia theatre company, *Chameleons Group* situates the stage and the screen as two opposing entities representing an inner and outer character (Dixon, 2006, p. 24). The projected screen offers an opportunity for the theatre dramatists to convey the subconscious of their characters because the moving image “is thought before thought becomes articulate [and] made visible” (Robert Edmund Jones, 1929, p. 40). The on-stage performer would convey the character’s outer being and the on-screen image would represent the inner world of the subconscious, imagination and dreams. This idea of the augmentative screen serving as the “inner performer” has been a theme in my work as well, whereby co-authored graphical projections convey an effable quality to the performance that speaks to the artist’s hidden motives or persona.

This synthesis of new technologies and performance art, or what Jones referred to as the “theatre of the future” (Robert Edmond Jones, 1992, p. 40), has always been of great interest to avant-garde artists across historical time periods. But due to the political and economic situation of the 1930s, including the American depression and the rise of fascism in Spain, Italy and Germany, such experimental artworks were almost non-existent. The 1930s to the 1950s marked a halt of multimedia performance, which is evident in RoseLee Goldberg’s history of performance art that includes over a hundred pages documenting the period of 1909-1932 and merely four pages accounting for the period of 1933-1951 (Goldberg, 1979).

Cybernetics (1960s-1970s)

Bridging today's use of computers in performance were the artistic endeavours of the 1960s and 1970s in the United States, which offered a more liberal political and cultural climate where "theatre loosened its ties from dramatic text and reinvented itself in happenings and myriad vibrant forms of interdisciplinary, visual, and environmental performance" (Dixon, 2007, p. 89). This transformation of performance art took shape in Robert Whitman's multimedia happenings, in what dance historian and critic Sally Banes describes as a "magical, mythic aura...fairytale for Americans" (Banes, 1998, p. 141). Whitman was one of the ten artists that collaborated with electronic engineer, Billy Klüver in *Nine Evenings: Theater and Engineering* (1966). Ten performances took place over nine evenings featuring technologically mediated performances that relayed choreographic instructions via walkie-talkie. The event's program notes: "Event continuity to be controlled by *TEEM* (theatre electronic environment modular system) [and] will consist of sequential events that will include movie fragments, slide projections, light changes...and various photochemical phenomena, several involving ultraviolet light" (Wardrip-Fruin & Montfort, 1966, p. 219).

The advent of computers brought a substantial shift in art creation due to the inclusion of a large number of non-artists, such as engineers and computer system designers (Reichardt, 1971, p. 11). Collaborative large-scale events such as Klüver's work and *The Cybernetic Serendipity: The Computer and the Arts* exhibition at London's Institute of Contemporary Arts (1968) brought together artists and engineers to push the potential of computers as "quasi-autonomous art-makers" (Dixon 100). Artworks include Gordon Park's *Colloquy of Mobiles* — machines that created their own drawings or Margaret Masterman's *Computerized Haiku*, that "emphasized the creative partnership and cybernetic feedback relationship between human and machine" (Dixon, 2007, p. 101). The non-artist is empowered by the computer algorithms as they provide a framing structure and "formulaic tricks in the same way traditional poetry applies the tricks of alliteration, rhythm, [and] rhyme" (Dixon, 2007, p. 101).

The multidisciplinary nature of the cybernetic movement that brought together art and technology lives on in today's maker movement where designers and artists that do not necessarily come from a strong computer science background (like myself) can now hack into technologies to produce integrated artworks. With increased development of technology came lower barriers to entry for the technologically curious artist, with the most prolific being Laurie Anderson, whose work started in the late 1970s.

Digital Performance (1980s-)

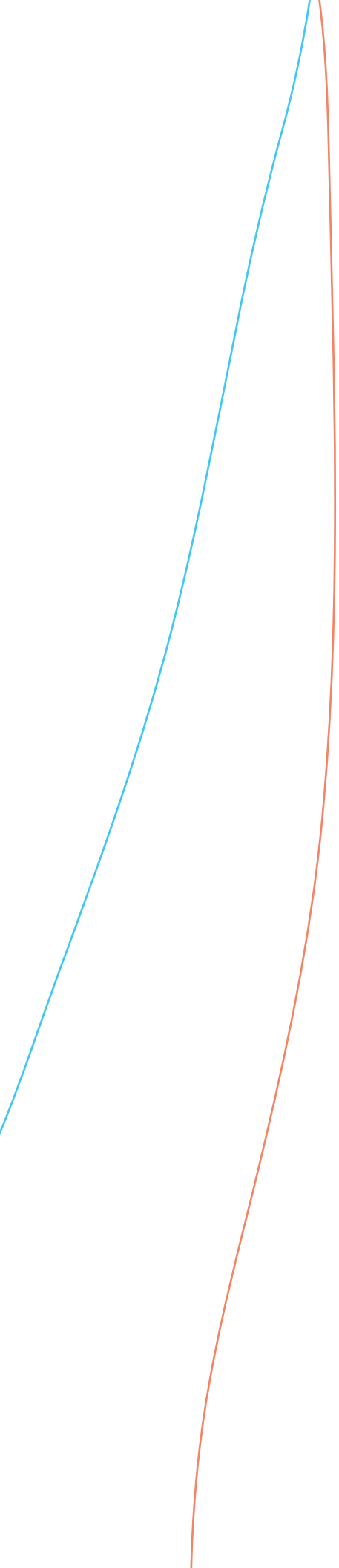
Anderson was an early adopter “of digital techniques in music, narration, elaborate multimedia theater events, and visual and electronic art works” (Dixon, 2007, p. 107). An interesting, early version of motion sensing was Anderson’s *For Instants* (1976-77), where she laid down in front of a candle and its flame flickered from her speech and breath. As the candle flickered away from her, it cross a photocell beam that triggered stage lights on and around on her. This elegant interplay between a simple candle and digital technology created an amplified extension of the performer, which in this case was Anderson’s voice.

Anderson, like other artists of the digital age including David Rokeby and Janet Cardiff, pioneered the hacking of technologies to make art. The 1984 release of Apple’s first PC equipped with integral painting and drawing software would underline the computer’s role as an art-making-machine accessible to all. Subsequent digital developments that have lowered barriers to the synthesis between performance and technology, include microprocessors such as Arduino and Raspberry Pi, simplified visualization softwares such as Processing and node-based programs geared for artists such as MaxMSP, PixelConduit, and Isadora. I situate my design practice and research within this wave of ‘hackable’ hybrid media, as a creative director, multimedia designer and producer of performative artworks that are amplified and mediated through the augmentation of technology.

Kinesics: The Articulating Hand

My interest in exploring the synthesis between technology and performance began with the *Dissolving Self* project, and because of the dynamic creative process and novel potential I wanted to further research the production of networked-performances. I also felt that to dig deep I needed some sort of restriction in terms of the types of performances I would develop. Inspired by research on spurring creativity (Brummer, 2013), I have been able to think more creatively by placing delimiters on myself such as sticking to only three colours when brainstorming brand identity or limiting the length of a particular motion graphic clip to ten seconds. For visual artist Phil Hansen “thinking outside can cause certain restrictions to creativity, which means that people need to go back inside of the box to discovery creativity” (Panganiban, 2013).

I wanted to restrict the performative movement (the input) instead of limiting the translated media to only visualizations or sound. I began to think about the form of kinetic input that is the most expressive and ubiquitous across genres and cultures, and I looked to my hands. I soon realized that I do not know exactly why we gesture when we interact or perform. Is it a form of semantic language? Is it purely cultural? Is it an interpersonal tactic to draw attention to what is being said? We all have theories. As



performance focuses on hand gestures as the live kinetic input, it is important to better understand the nature of these movements and how they relate to creative expression in performance.

The movement of hands when we speak is almost ubiquitous across the various cultures and eras of human history. The first attempt to make sense of the world took place in and around our palms; this “primitive stage” (McNeill, 1992) of thought held hand gestures as the first natural form of communication: “The first open system to involve en route to human speech was a manual gestural system...[T]his paved the way for the evolution of the open vocalization system we know it’s speech” (Rizzolatti & Arbib, 1998).

Pioneering nonverbal communication researcher, Paul Ekman offers a taxonomy of gestures, which I have abbreviated into three main categories: emblems, manipulators, and illustrators (Ekman, 1977, p. 49). Emblems are most similar to independent words and carry specific, recognized meaning within a culture such as a peace sign or a thumbs-up. These movements are associated with a “precise meaning” (Ekman, 1999, p. 39) and are enacted in a presentational format, directly in front of the performer with a sudden beginning and end. Manipulators are touching behaviours, such as an itch, or the rubbing of one’s forehead to reveal internal states such as nervousness or acts of self-comfort. Illustrators are the most common gestures and could not be acted upon without speech; “They are intimately related to the speaker’s speech on a moment-to-moment basis, usually augmenting what is said, but sometimes contradicting it” (Ekman, 1999, p. 41). These gestures facilitate speech and cognition in the speaker and accompany or reinforce verbal messages (Bull, 1987; Ekman, 1999, p. 43; McNeill, 1992). Due to their spontaneity and role in speech augmentation, illustrators are the main types of gestures that will be examined to explore how performative artists express themselves.

Fig. 3: Types of Illustrators

This chart describes Ekman's seven types of illustrators and the performative context in which they could be used.

Type	Description	Performative Example
Batons	Brief, repetitive, simple gestures used to stress a particular phrase or word	Rapper emphasizes the rhyming words by alternating hands when 'shop' and 'dropped' are spoken: 'took the chevy to the chop <u>shop</u> , got the damn top <u>dropped</u> '
Beats	Rhythmic movements that convey the pacing or sequential flow of speech	Comedian jerks his arms forward after every sequential action is told his 'guy goes to a bar...' story-joke
Ideographs	Indicative of an abstract "sketch" to the direction or course of a thought	Griot teller describes his creative process by pointing as his head to indicate that it first starts with thought, then trembles his hands so as to say 'now you share it with the world'
Deictics	Pointing gesture to a referenced object; can be used independently of speech	Protest poet points to an audience member as a call of action and says: will you stand for this injustice?
Kinetographs	Depicts a bodily movement	Storyteller speaks of a drunken night and makes motion of drinking a beer by tipping hand with only the pinky and thumb pointed out
Spatials	Depicts a spatial relationship	Actor giving directions to his house straightens fingers and points them leftward to indicate an upcoming left turn to cab driver
Pictographs	The drawing of a picture of their referent	Spoken word artist tells the tale of writing a Dear John letter on the bathroom mirror with lipstick. The initials of her name is gestured with her index finger

During this investigation in kinesics, I often came across sweeping views on the meaning of hand gestures: "Gestures are an integral part of language as much as are words phrases and sentences; gestures and language are one system" (McNeill, 1992). Some poetically imply that gestures are in fact a form of language on their own: "We respond to gesture with extreme alertness and one might also say in accordance with an elaborate and secret code is written nowhere, known to none and understood by all" (Sapir, 1995). Such broad statements that suggest gestures contain the same amount of information as verbal communication left me skeptical. Do the movements of our hands as we speak convey actual information just as our words do? If gestures that accompany speech are indeed acted by the majority of people, how much communicative value do they hold?

What Hand Gestures Don't Do

Studies have shown that the semantic content of hand gestures is negligible at best. The movement of hands during speech do not "enhance, modify, or affect in any material way" the amount of information in verbal discourse (Krauss, Dushay, Chen, & Rauscher, 1995). Hand gestures simply do not contain the same level of semantic meaning as independent words do and are rigged with subjectivity as they can embody several different meanings and interpretations (Feyereisen, Van De Wiele, & Dubois, 1988). In one study conducted by Robert Krauss, a professor at Columbia

University and a leading researcher in nonverbal psychology, the description of abstract graphic designs and sounds was described by one participant to another either face-to-face or through an intercom. The study showed that the accuracy of the face-to-face retelling of the description by the second participant was more or less the same as compared to when the participant only heard the description over the intercom.

In other words, watching someone verbally describe abstract objects or sounds in addition to viewing their kinesics gestures did not actually offer a more informative description than if the description was only heard over an intercom. This is not to say that hand gestures do not have the capacity to convey some semantic information. As mentioned previously, emblems refer to independent words, and some types of illustrators such as deictic or spatial gestures that are clearly used to refer to an area of a space, or to give directions do hold semantic value. It should also be noted that the type of communication that is asked of the participants in these studies tends to be very task-orientated, concrete rather than the abstract, literal rather than the figurative and does not deal with more conversational matters such as opinions, beliefs and feelings (Krauss et al., 1995).

If gestures do not hold semantic value, then what do they do? Further investigating in kinesics study, I came across theories that explored the extent to which gestural movements aid lexicon access for the speaker.

What do Hand Gestures Do Then?

Across cultures and generations, when we speak, our hands move seemingly involuntarily. Studies have also shown that we tend to gesture more when we are in face-to-face interactions than when we are communicating over the phone (Rimé, 1982); when one is prevented from gesturing by arm restraint, the quality of their communication (especially those concerning spatial information) is greatly lowered (Rauscher, Krauss, & Chen, 1996). In one study, when the limbs of a participant are immobilized, a decrease in “the vividness of speech imagery” was observed (Krauss et al., 1995). To test this claim that “gestural accompaniments to spontaneous speech can facilitate access to the mental lexicon” (Rauscher et al., 1996), participants in a study were videotaped as they described the sequential narration of animated action cartoons to listeners. It was shown that during segments of the narrative retelling where spatial information was important to the description of the cartoon, speakers spoke less fluently when they were not permitted to gesture. The results confirm the assertion that gestural restriction limited lexicon access of the speaker.

From my research in the meaning and intent behind manual movement, I conclude that hand gestures essentially work as metaphoric cherry pickers that help the speaker to better navigate

one's mental banks of adjectives, nouns, and adverbs while speaking. The research of Krauss posits that our two hands are articulating tools that facilitate vivid oration. This supports my rationale to technologically translate spontaneous hand gestures as an augmentative form of embodied creative articulation for performance artists.

The Networked-Performances

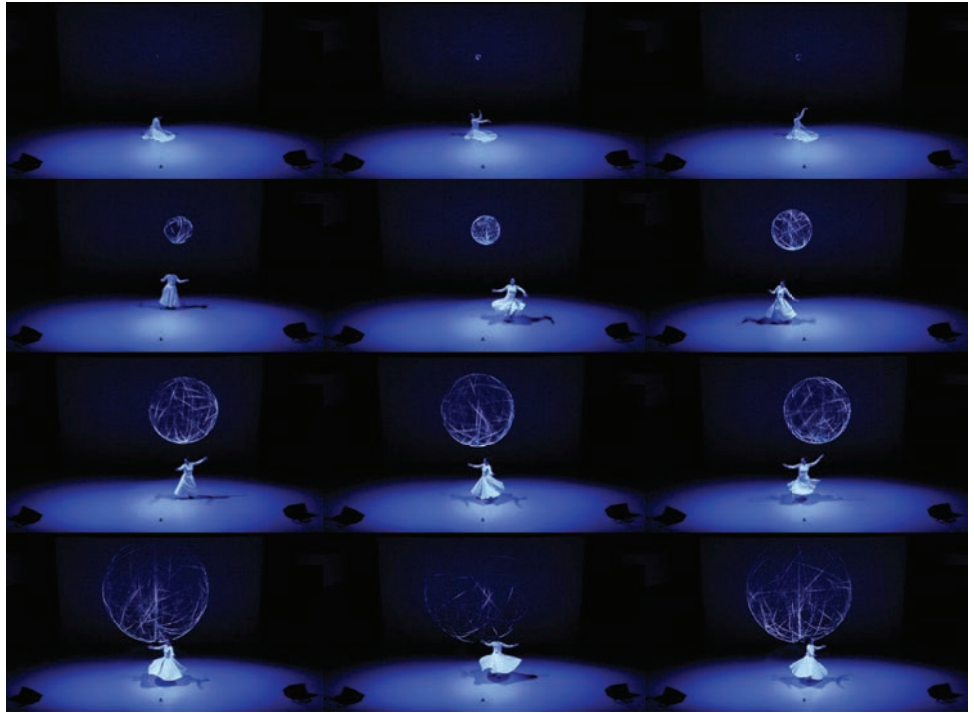
Perform Space, a research project conducted in 2002 by the University of Art and Design Basel, defines performativity as “the necessary performative aspect of a condition, an event or object” and is related to the operative and procedural components of an occurrence (Stoian, 2003). The performative quality of an artwork lies in the process in which it is realized or experienced, rather than through the qualification of a resulting artifact: “something is not performative in itself, but rather becomes performative by being enacted and experienced within a specified framework” (Stoian, 2003). A painting that rests on a wall to be viewed by onlookers would not fit into this definition of performative art because the desired result is the physical painting itself, but if the focus of the artwork is on the process through which the painting was realized, then it would be considered performative because enactment would be key to its intent. Performance art in the form of slam poetry or storytelling performances is an enactment or event, which is experienced and measured against some standard – a system or established pattern – and is in accordance with a certain presentational or framed criteria (Stoian, 2004, p. 1). Performance theorist, Richard Schechner defines performance art more broadly by extending its examples to human practices, such as those dealing with social or political discourses (Schechner, 2013) but when describing my networked-performance productions in the body of research, the term performativity will be used to describe the staged (including installations) modes of performance art.

Dissolving Self

In the spring of 2013, I conceived, curated and directed a networked-performance entitled *Dissolving Self* for the HASTAC conference hosted by York University. This collaborative piece featured a contemporary dancer that performed the mystic Sufi ritual of whirling as part of the theatrical experience. Whirling has a long tradition in the Middle East amongst the Sufi Dervishes of the Mevlevi order as a form of physical meditation, where the devotee undergoes a shamanistic trance-like state in an effort to praise The Devine. In Coleman Barks' *The Red Book*, the Sufi mystic poet Rumi likens the devotee to a lover and states: “...the lover wakes and whirls in a dancing joy, then kneels down in praise” (Barks, 2008, p. 162).

Fig. 4: Performance Photos

The *Dissolving Self* premiere at York University, April 2013.



As commonly represented in Sufi poetry, The Devine is symbolized by the Sufi as the orbiting planets above, and the whirling movement is intended to mimic the movements of these heavenly bodies (Barks, 2008, p. 187; “The Sema of the Mevlevi,” 1998). This bodily interplay between the devotee and the cosmos inspired me to think about how the union of technology and dance could convey the inner intent of the performer and offer a symbolic representation of the Sufi’s cosmos, which was ultimately illustrated as a live rendering of a graphical sphere.

The performer, Denise Mireau was equipped with a velcro-fastened belt that held a radio module (Xbee), a battery and a gyroscope to send the speed and direction of her rotations to a visualization software, (Processing) which would in turn alter the size of the sphere in real-time. Mireau’s lateral movements were also being tracked with a Microsoft Kinect, which was placed at the foot of a front-projected cyclorama screen, and thus situating the performer in-between the Kinect and the audience. This technical arrangement was intended to explore how the real-time mapping of the whirler’s anthropometric motions could be amplified and translated into a metaphor for the cosmos: a projected oscillating graphical sphere set against a void of black that playfully morphs by the presence and movements of the performer.

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Fig. 5: Documentation

Clockwise from top left:

- Worn belt with sensors
- Sound design interface
- Arduino Fio, battery, Xbee & gyroscope
- Set design & on-site testing
- Technician work station behind screen
- Set design & on-site testing



Dissolving Self offered four sequential segments – wonder, curiosity, interplay and embrace – which highlighted a progressive linearity of reconfigured bodily movements and mediated reactions to convey the evolving relationship between the performer and the sphere (the virtual other), which Mireau describes: “On stage, I felt the presence of the sphere. I felt that I had a dancing partner”. The improvisational nature of the work came about by Mireau deciding when one sequence would end and when another would begin. Simply observing the performer playfully dance with the worn technology in rehearsals developed the order and nature of the kinetic interaction of the four sequences:

Wonder

The mortal (the performer) emerges from a fetal position under a bluish moonlight and is in awe of her newfound world, but oblivious to the small-but-growing sphere above her. Characterized by inconspicuous, slow, exploratory movements. Mireau describes this segment: “When I knelt down in the darkness a quiet feeling came over me. It was wonderful to feel the lights come up as I slowly began to rise. My favourite part was the sound syncing with the movement of my hand”.

Curiosity

Now aware of the sphere (or a higher power?) the mortal begins to direct attention to the massive heavenly body above. The mortal gazes at the sphere, and steps back from screen to fully grasp its trace-like oscillating nature.

Interplay

From curiosity comes direct interplay with the sphere, with the mortal now holding agency and actively exploring her space. The mortal begins to move laterally and the sphere follows her; this is ensued by short playful spins that move side to side. “After I rose and faced the sphere I had a wonderful feeling of play between my movements and the sphere. The whirling produced a calm feeling in me”, explains Mireau.

Embrace

At this final segment, the mortal begins to whirl as an attempt to be closer to The Divine (represented by the sphere), which in turn reacts by increasing in size to the speed of her rotation. Stage fades to black as the sphere diminishes, representing the climactic unity as the two figures (the mortal and the sphere) dissolve into one another. “The whirling produced a calm feeling in me. Again I could sense the presence of the sphere growing along with the intensity of the music. It was beautiful”.

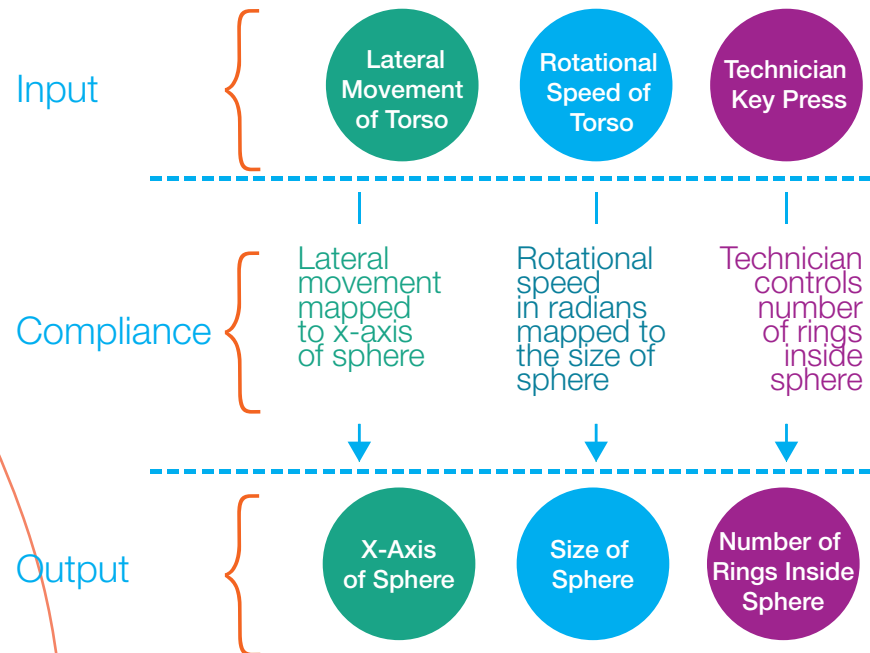
Digital choreographer and performer, Carol Brown describes the use of narration in networked-performances as a technique that gives meaning to the interaction between the performer and what Brown refers to as the “virtual other”: “Stories are one way through which we find our orientation in the world; they provide locative maps for navigating the unfamiliar and for making connections between fragments of reality, virtuality and fantasy”(Brown, 2006, p. 94). If the intention is to offer a narrative experience, then the interaction between corporeality and virtuality can be choreographed in a way that fits into a particular narrative

sequence, which of course came with its own design challenges.

Compliance design was key to this project because the sphere reacted in unpredictable ways, which caused the input/output relationship to fall outside the intended narrative experience. Consistent with the influential statement of American performer and choreographer Martha Graham, “movement never lies” (Graham, 1991, p. 4), user testing in rehearsals proved that even the most subtle movements of the performer caused the sphere to jitter in size.

Fig. 6: Compliance Design Matrix

Illustrates the input/output relationship of the *Dissolving Self* project.



The sphere was affected at times by predetermined technician-controlled actions (key presses in the visualization software) and at others, live-data (mapped radians of rotational data) from the gyroscope, which was only activated when the performer began to whirl in the third and fourth segments. Swapping input from live-data with technician key presses also gave the sphere an autonomy of its own, which purposefully spoke to its unreachable and larger-than-life characteristic. This degree of designed independence of the sphere as it related to the performer was inspired by Brown’s critical reflection on her own 2003 networked-performance, *Spawn*, which employed a camera-based interface to harness live corporeal data of multiple on-stage dancers: “The digital is conceived as a separate dimension informed by the embodied presence of the performer yet retaining and independent morphology and motility” (Brown, 2006, p. 87).

Dissolving Self travels across mediated and physical spaces by allowing the performer to become more aware of her body’s proprioception and how her movements can be reconfigured by and translated into the hovering sphere. This idea of playformance

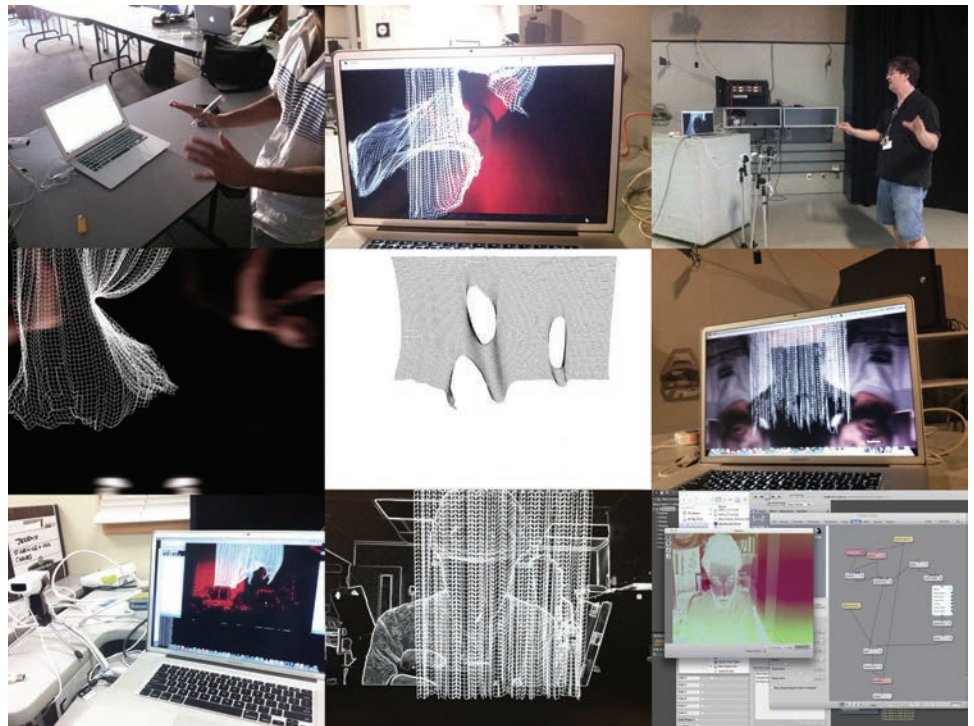
to explore the potentials and limitations of technology was also inspired from Brown's import on creating a shared sense of presence and a shared sense of play between the performer and the virtual other (Brown, 2006, p. 94).

Blendism

My first networked-performance that situated spontaneous hand gestures as the kinetic input to affect media was *Blendism*. This project involved several elements such as a cappella singing, contemporary dance, and hand gestures that controlled the movement of a projected graphical mesh superimposed over a filtered live video feed. A tripod-mounted Nintendo Wiimote that pointed at the singer, Isla Craig read two infrared LEDs each woven into a pair of custom-made gloves. The x and y positions of each hand moved the graphical mesh, and the more swift gestures were programmed to cause the mesh to rip and fall apart, which created an interesting visualization. Opposite the singer was a contemporary dancer, Julia Male whose movements were being filmed and projected live. The mesh was customized from a pre-existing Processing sketch, and through the middleware program, Syphon, my production team and I were able to place the live animation of the mesh overtop a video feed with the node-based video software PixelConduit.

Fig. 7: Documentation

Various photos showing testing of technology and different iterations of the projected graphic mesh and video filters.



When testing the performance of a filtered live video feed with various superimposed graphics, we noticed a rather distracting degree of latency between the movements of the singer's hands to the corresponding reaction of the dynamic graphic. Latency between on-stage movements and its corresponding graphic was a slight problem in the *Dissolving Self* project, but with *Blendism*, the delay was quite prominent due to the amount of rendering that the combination of a filtered video and high fidelity animations

caused. I began to look at how other new media artists and came across the *Senseable* project of the MIT Media Laboratory, which helped to articulate the problem. As Aylward and Paradiso suggest: “[latency] is unsuitable for triggering sudden events or percussive sounds as human tolerance to latency [for these types of effects] is quite low” (Aylward & Paradiso, 2006). The technology we had access to at the time didn’t have the rendering power to reduce the latency, so we decided to minimize its optical effect by choosing the mesh visualization because of its more fluid-like movements making it harder for the viewer to notice a delay between the initial corporal gestures (the input) and its corresponding visualization (the output). Similar to the way that the *Senseable* project avoided percussive sound effects as the chosen translated media, we chose a graphic that was slow to change, which made the latency between input and output only marginally noticeable.

Fig. 8: Performance Photos

Studio photos showing the wearable component, set design and performer movement, June 2013.



The chosen augmentative technology: infrared LEDs came with interaction shortcomings as they were only read by the sensor when pointed directly straight, thus offering a very limited range for data capture. Requiring the singer to consistently be mindful of the orientation of the LEDs while performing was too much to ask, so what resulted was a blatant disconnection between the movements of the her hands and its mediated reaction in the projected mesh:

“The technology didn’t feel as seamless as I would have liked it. I had to think about my gestures to make sure it was making contact with the sensor. If I was more freed up in my performance and movement I would have felt more as if I was performing in my natural state” explains Craig.

Effectually, the singer couldn't tell which motions were affecting what, and by how much. *Blendism* didn't adhere to the principle of smart compliance design, which is to offer a visceral experience for the artist that is both felt and seen.

Producing and directing a few more performances, I've realized that the reason *Blendism* failed was because I didn't consult with the artists before the rehearsal to make them part of the conceptual development. This oversight created a disconnection between the projected visualization, the lyrics of the singer and the presence of the dancer. As a result, both artists didn't feel terribly connected to the project. No matter how novel or responsive, a device is, one cannot simply equip artists with technology and hope to produce artwork that is a reflection of their expression.

At this early stage in my research-through-prototyping, I didn't exactly know what I was looking for. Theories of playformance, compliance design or even embodied articulation through the amplification of gestures weren't fully conceived yet. It was one of the most experimental projects I've conducted and taught me the value of concise contextual inquiry in forming a partnership with the artists. Only through involving the performers in the creative process do you allow the mediating technology to serve as an extension of their artistry. This also promotes commitment from the performers and invested ownership to the artwork, as hardly does one get it right in the first rehearsal.

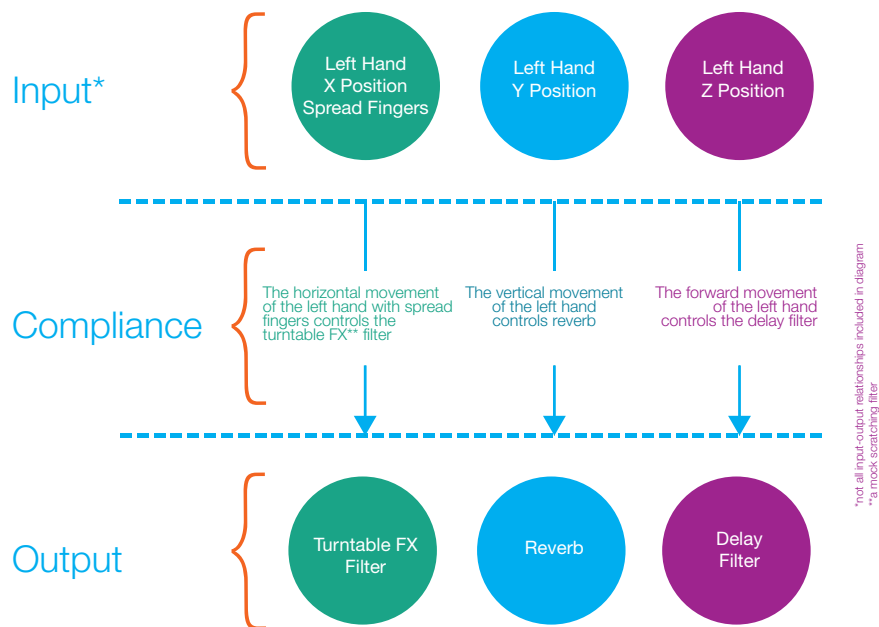
Havabazi Tuno

Havabazi Tuno is an on-going project, where I created a custom interface that allows a DJ to control sound filters of pre-selected tracks as well as projected visualizations with hand gestures captured from the Leap Motion controller. Middleware (GecoMIDI) converts the x, y and z coordinates of each hand as well as two discrete gestures: collapsed fingers and spread fingers, which are mapped to MIDI messages and sent to the digital vinyl software, Traktor commonly used by electronic DJs including the project's artist, DJ Tuno.

Havabazi Tuno was inspired by the *Kludge!* project of Pablo Guadalupe and Caen Botto that offers "a total, real-time, audiovisual experience in which live, techno music and futuristic visual landscapes are generated by a dynamic performance" (Guadalupe & Botto, 2006). Two electronic DJs are donned with instrumental prototypes and sound controllers such as the chest-worn percussive amplifier (DRUMVEST) and sensor-rigged gloves (DATAGLOVES) that bring out their performative potential through embodied haptic interaction: "The interweaving of the senses lies behind this AV performance that blends sound and vision as an inseparable entity." *Kludge!* inspired me to think about how technologically mediated gestures could address the lack of focus given to the performativity of a DJ.

Fig. 9: Compliance Design Matrix

Shows the input/output relationship of the *Havabazi Tuno* project.



The compliance design of this project was developed by listening to Tuno’s podcasts and getting a feel for the types of music, transitions and filters he already incorporates into this work. Once we selected a number of filters, Tuno chose which gestures were to be altered by which effects and by how much. Our first live set was for the eLeo exhibition in the fall of 2013 at OCADU, which generally received good feedback. Onlookers were engaged and curious about how mid-air gestures were controlling effects, but further work was needed to incorporate a more responsive VJ system as well as a proper mapping design to soften some of the more aggressive filters such as beatmasher, which is similar to a skipping record effect. For the performer, the project offered unpredictability and allowed the exploration of various sonic effects, which added thrill to the performance: “My experience using the Leap Motion in a live DJ set was exciting and has inspired me to look at how I can further augment a performance with interactive systems” explains Tuno.

The eLeo exhibition essentially served as a playformance rehearsal; through undirected use of the interface, we were able to gain insights about what gesture-effect couplings the audience responded to and which went unnoticed. We found out that for a more embodied and meaningful interaction, the chosen gesture should be mapped to a particular sound effect that reflects the kinetic nature of that gesture. *Reverb*, for example, is a progressive filter that is best suited for a vertical motion, as it has a wind-like sound to it, while it made sense to map *Turntable FX*, a mock-scratching effect, to a horizontal gesture, mimicking the tactile movement of vinyl scratching. The exhibition also showed us that we needed to improve the depth and variability of the VJ software. After some research, we chose Modul8 as the VJ software due to

Fig. 10: Performance Photos
Havabazi Tuno at the eLeo exhibition,
November 2013.




its simple MIDI integration with the Leap Motion (via GecoMIDI). Gestures were then mappable to any number of visual effects such as alpha channels, RGB values, media set transitions, luma keys, transformers, noise and blur to name a few.

Jadoo Bānoo

The concept for the *Jadoo Bānoo* was co-created with Iranian poet Bānoo Zan the using the Leap Motion controller. This customized networked-performance animated and projected the words of her tribute poem to Nelson Mandela, entitled *Tata*, on and across the stage. The disorderly path of the words was formed by the hand gestures captured over the Leap Motion and the font size was determined by the speed of the gestures. *Jadoo Bānoo* uses the performer's spontaneous movements as embodied acts of articulation to translate spoken poetry and explores how the performer spatially interacts with and within the virtual representation of her own poetic text.

The projection of words rather than images was preferable for Zan because images can limit the interpretation of poetry, whereas words can be open to any association. The inspiration for the project came from Zan's frustration with political poetry that is suspect among activists because it is multi-layered and evocative rather than stative: "Political poetry tends to go under-appreciated and evokes mistrust; it is an incomprehensive yet urgent message. That is how I feel when I perform my politically charged poetry. I feel part of the message gets lost". says Zan who also wanted the projected words to be metaphors for the significance of Mandela's experience, and not his biography, which is why they were designed to be unreadable and chaotic. "It [the projected flurry of words] is an invitation to experience the *Tata* poem in an abstract way".



The words alternate between the colours of the South African flag to situate the piece in a geopolitical context, and a barbwire graphic is revealed as the words appear. Zan explains: “I thought colours were much better imagery to invite the audience to listen to the voice of the persona. And also the subtle emergence of a barb wire silhouette superimpose over the words gradually hint at Nelson Mandela’s long prison term that has had far-reaching impact on his country and the world” (source). Such simple elements of the project, in which the performer co-creates the design of the affected media, helped to build a stronger personal connection between Zan and the networked-performance.

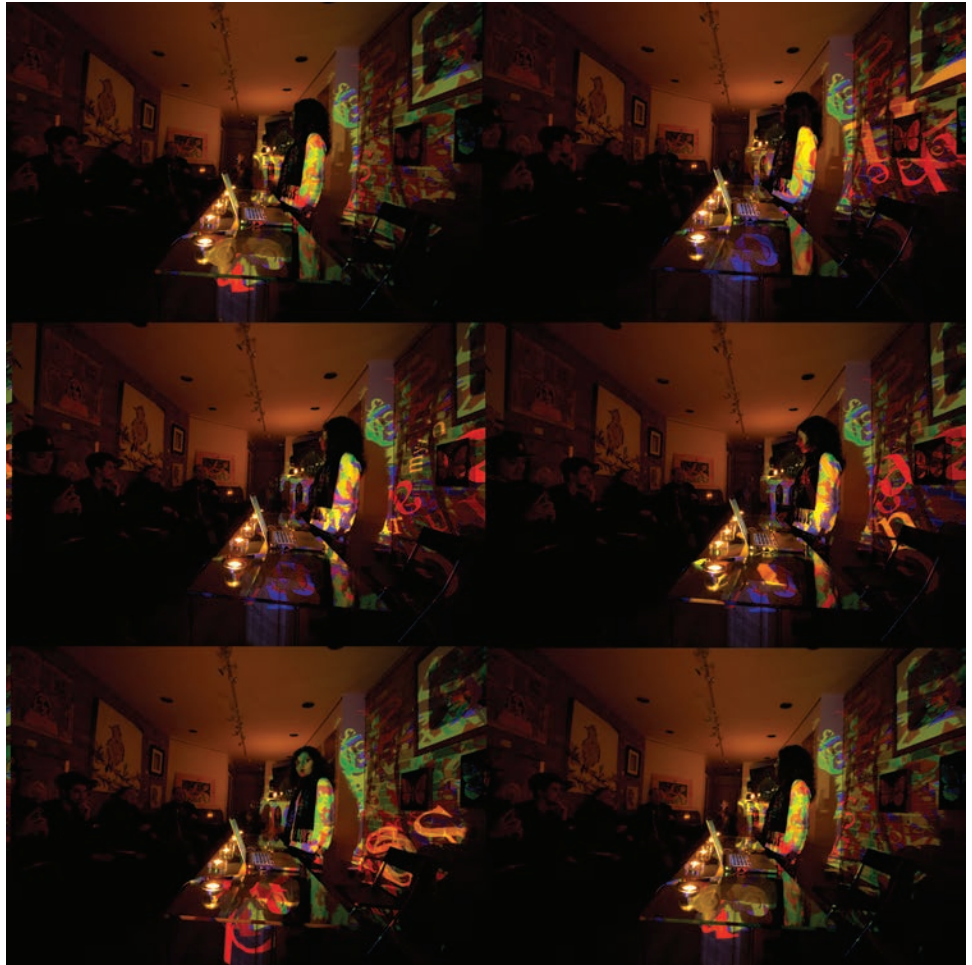
Consistent with my interest in ludic performativity, the use of interactive technology that translates spontaneous hand gesture to graphics in real-time added an improvisational nature to the performance, which for Zan was in line with the way poetry is received by readers and audiences:

“Once a poem is published or delivered, it starts a life of its own and will have as many unpredictable interpretations as it has readers. The poet can no longer decide which words evoke which emotions and thoughts. By performing with interactive technology, as a poet, I was all the time conscious of the fact that I am not in control, and it enhanced my excitement and wonder during the performance”.

The project was inspired by Camille Utterback’s award-winning interactive installation, *Text Rain* (1999), which creates “a relational feedback loop between text and activity” (Stern, 2013, p. 17) by inviting users to catch falling virtual letters derived from a poem about corporeality and language. With a live video feed, the users see themselves on a projection screen that is superimposed with letters descending on and over their bodies reminiscent of rainfall: “Like rain or snow, the letters appear to land on participants’ heads and arms. The letters respond to the participants’ motions and can be caught, lifted, and then let fall again” (Utterback, 1999). Utterback’s artistic interest lies in how “we use our bodies to create abstract symbolic systems, and how these systems (language for example) have reverberations on our physical self” (Utterback, 2013). Both *Jadoo Bānoo* and *Text Rain* rethink how the performer-user relates to his or her space, and playfully explores the manner in which this relation is altered by the augmentation of projected text: “We manipulate the abstract symbolic space of language both physically — with our mouth and hands, and mentally — with our thoughts” (Utterback & Achituv, 2000).

Fig. 11: Performance Photos

Jadoo Bānoo at the Queen East Gallery,
December 2013.



Ultimately, a shortcoming of this project for Zan was the “forced and unnatural gestures” that the Leap Motion required, which left the performer feeling “self-conscious” during the performance. For this reason, I arrived at the conclusion that future developments could include the replacement of the Leap Motion with a PrimeSense camera or a wearable sensor to track the z and y positions of the performer's hands. The augmentation of either one of these technologies would allow Zan to move more freely on stage without having to adhere to the Leap Motion's restricted sensor range. Unfortunately, we did not have the time to address this concern as the project began to interfere with the production schedule of the exhibition installation, *Mirada*.

Havabazi Avesta

Havabazi Avesta is the Turkish storyteller Ariel Balevi's adaptation of the Zoroastrian creation story *Avesta*, which echoes both Biblical stories and the mythology of ancient India. Like *Jadoo Bānoo*, this project uses the Leap Motion to translate projected abstract visuals that float on and around the performer through front-projection. The first rehearsals used the Viz.it software to control the shape, colour, size, opacity and texture of kaleidoscopic graphics that are set in a void of black and are designed to situate the storyteller among the cosmos. The creative process has been a “journey of self-discovery” says Balevi in that “these myths are often metaphorical of an individual's own conceptions of the world”.

Themes of eternity, temptation and universal humanity are explored, and abstract graphics are used to avoid any sort of literal translation and also to allow the space for the viewer to interpret these larger-than-life concepts in their own way. For Balevi, working with serendipitously generated abstract emanations of his tale gave him the opportunity to rediscover his own work: Playfully interacting with images, which were generated by my own spontaneous gestures made me rediscover my own stories, offering insights into a story that I thought I already knew. Graphic images offers me an experience of surprise that I sometimes have when some listeners pick up on the humour or mystery of a part of a story, which I had never before considered.

Havabazi Avesta allowed Balevi to extend and abstractly translate his corporeal movements on-stage, which opened inroads in his performative expression through undirected impulsive exploration. In effect, the performer was able to transcend the default biological framework and discover new possibilities of bodily expression, which he had not previously considered.

Fig. 12: Ludic Exploration

Balevi testing various graphics generators in rehearsal.



With the Viz.it rehearsals, the Leap Motion translated the gestures of the storyteller. The vertical motions altered the size, the horizontal motions controlled the brightness, and the forward/backward motions controlled the form of the graphics. After playfully exploring for some time with the technology, and observing its interaction with the performer, we decided that there should be a correlation between the intonations of the spoken words with the characterization of the graphics. For example, during the utterance of more aggressive words such as 'evil' or 'forbidden', the performer would increase the distance between his hand and the sensor to increase the size of the projected graphic or when the villain steps towards the protagonist, a jittering lateral movement would dim and brighten the abstract graphic. In line with Wechsler's theory of proper compliance design, this technique created a more visceral experience for the performer with regard to the connection between the spoken word and the mediated output.

The stage lighting for *Havabazi Avesta* was designed to create a dim, vapid space with the only source of light coming from the projected graphics. This gave the teller an almost holy presence on stage, which fit perfectly to his mystic story of how life came to be on Earth. The artistic connection made between spirituality and lighting design was inspired by film theorist and perceptual psychologist, Rudolf Arnheim; he expresses his thoughts on light and spirituality: “Even psychologically it [light] remains one of the most fundamental and powerful of human experiences, an apparition understandably worshipped, celebrated, and importuned in religious ceremonies” (Arnheim, 2004, p. 303).

Fig. 13: Studio Photos

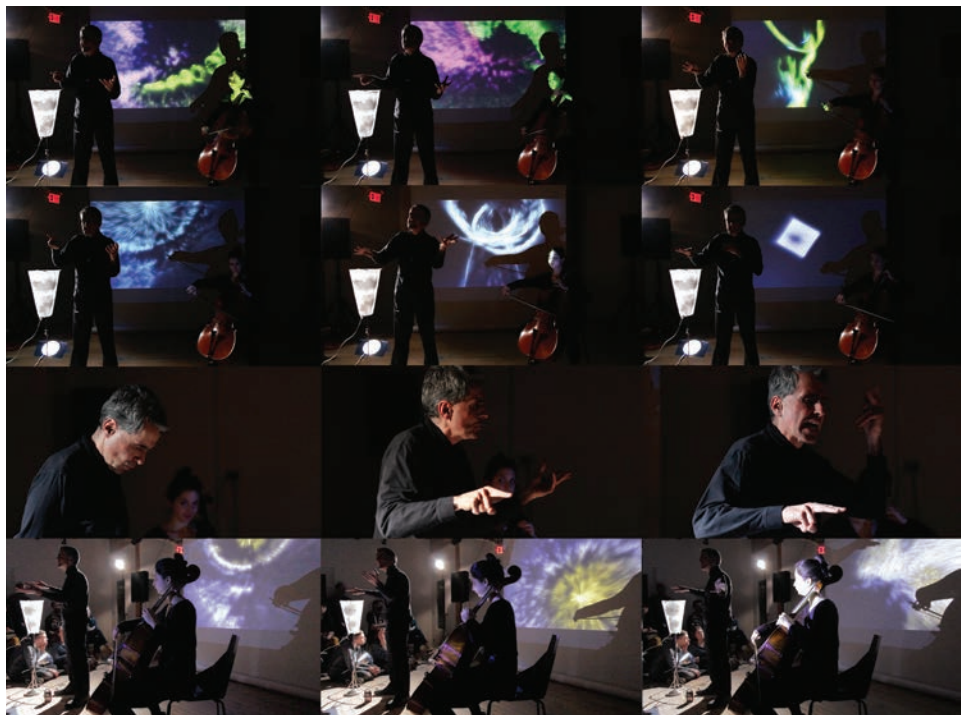
One of the earlier studio rehearsals with the Viz.it software, September 2013.



As with *Jadoo Bānoo*, rehearsals also showed us the limitation of the Leap Motion, which of course only works when the performer's hands are hovering over it — clearly not a natural movement for a storyteller. We felt that it was a bit distracting for Balevi to perform in this fashion, but because we liked the visual quality of the Leap Motion software and how it conveyed the intended experience, we decided to build a narrative context around this interaction instead of replacing it with a wearable sensor. While I was watching Balevi

playfully explore the technology, his posture and hand gestures resembled that of a man warming his hands over a fire. I immediately thought that we could incorporate the narrative of a shaman reciting folklore to his tribe around a campfire at the onset of the performance. Also, our intentionally dimly lit stage made Balevi's hand gestures difficult to see, which was problematic because I wanted to underline the connection between the movements of the performer and the visualizations they were actuating. I addressed both of these concerns by purchasing a flexible strip of RGB LED lights called BlinkyTape, which was wrapped around a tripod that the Leap Motion was mounted on and programmed it to emit a flickering flame-like hue that illuminated Balevi's hovering hands. At the start of the performance, Balevi said, "Come. Come out of the cold and gather around the sacred fire for I will tell the tale of...". Right from the start, this gave a contextual purpose for the manual and corporeal position of the performer by weaving it into the performative narration.

Fig. 14: Performance Photos
Havabazi Avesta at *Intersections14*,
March 2014.



In the spring of 2014, a live-performance of *Havabazi Avesta* was shown at *Intersections 2014*, an academic conference that explores alternative modes of thought and discourse, which blur lines between emotion, bodies, and the psyche ("ThinkingFeeling," 2014). To diversify our research, we decided to use the *Midnight* software as the graphics generator as opposed to *Viz.it*. *Midnight* also allowed for key-presses to control the kinetic and visual quality of the projected particles, such as colour, speed, form and shape. This screening included Jennifer Blakney, a improvisational cellist to provide acoustic accompaniment to Balevi's oration.

Another area of interest in my research of performance and technology is blurring the line between user and performer, which was part of the motivation of the *Mirada*** installation as it requires active engagement with technology, rather than the staging of a spectacle to be viewed passively. The five networked-performances mentioned previously are the direct result of the four methods of my research (contextual inquiry, compliance design, playformance, and networked-performance production). The *Mirada* installation is an element in this research inquiry, which has been inspired by some of the aspects of this methodology rather than of its entirety. This move away from staged work to a participatory installation that brings a methodological shift to my research. Yet the key foundational elements of meaningful compliance design and providing the space for undirected play are still relevant as they have continued to inform the conceptual development and production of the *Mirada* installation. The logic behind this shift has to do with the research potential of including direct interaction between the performance artist and the user. The exhibition of the *Mirada* installation also introduced a rather unexpected change of focus with regards to whom the experience is designed for. The five networked-performances and their theoretical framework have focused on placing the performing artist at the forefront of the design intent. It was realized that the inclusive nature of the *Mirada* installation situates the user (the actuator of audiovisual media through the interaction of abstract instruments) as the more appropriate focus of the designed experience. The original intent of *Mirada* was to offer a new platform for a storyteller to perform, but after much reflection, I have concluded that its research merit is derived from situating the user as the performer, with the role of the performative shaman being that of an auxiliary provider of narrative contextualization. In the case of the *Mirada* installation, playformance is, then, reformulated as the user's playful interaction within the augmented narrative performance.

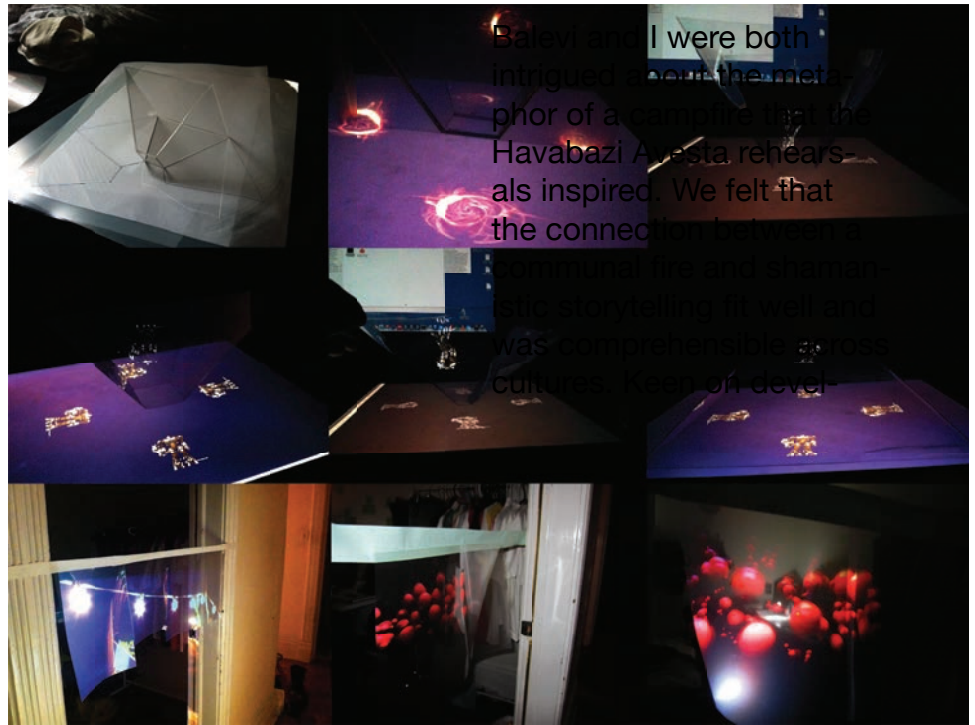
Conceptual Development

In efforts to evade a messy live staged-performance in an uncontrollable, crowded gallery, I was advised to simply display documentation of a previously recorded performance. This was considered by looking at ways to make a pre-recorded video more life-like and I immediately thought of the 2pac 3D projection featured at the *Coachella* music festival in 2012, which was essentially a large scale pepper's ghost effect (Geere, 2012). When a reflective, transparent surface is angled to a display screen or a mirror reflecting projected light in a dark space, the video content gives the illusion of depth to the viewer. Part of what made this piece such a visual sensation was that the audience was quite a distance away from the stage, which is a requirement of making this optical illusion believable. Creating distance between any visual content and the gallery patron was a physical impossibility that led me to think of another route.

**related work that deals with the interplay between technology and myth and mysticism in contemporary culture includes Erik Davis' *TechGnosis: Myth, Magic, and Mysticism*.

Fig. 15: Documentation

Prototyping with various volumetric displays and holographic screen films.

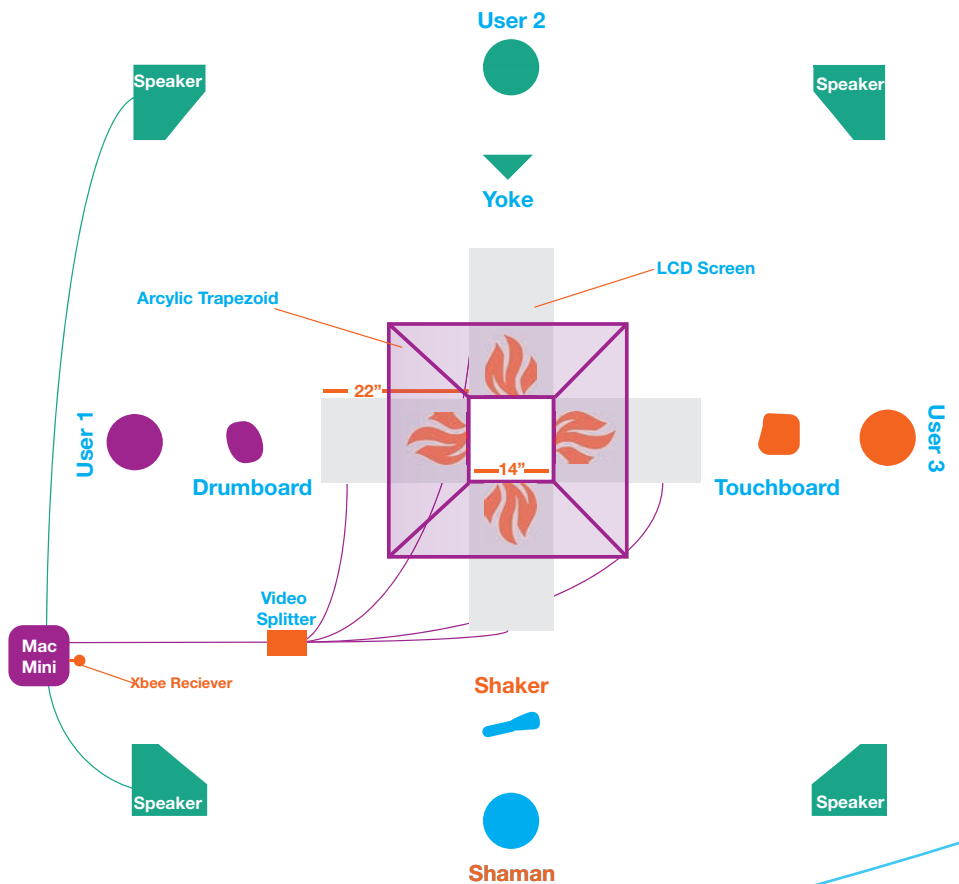


Balevi and I were both intrigued about the metaphor of a campfire that the *Havabazi Avesta* rehearsals inspired. We felt that the connection between a communal fire and shamanistic storytelling fit well and was comprehensible across cultures. Keen on developing this visual element further and working within the confinements that come with a group exhibition, it was decided to create a 3D projected graphic flame as opposed to a life-size projection of Balevi in a pre-recorded performance. This would end up serving at the central visual component in the installation, which also involves sound design and haptic interaction — two research areas that I am also interested in digging deeper into in future projects and collaborations. Haptics refers to the sense of touch (taction), body position and movement (kinesthesia) in relation to physical investigation (Chowning et al., 2001, p. 229).

A transparent trapezoid was built as the reflective display because it allowed four reflections of the flame to be seen at once, giving a quasi-360 degree effect to the flame. The above image includes prototypes of one of our early trapezoids, and also includes testing with holographic screen film, which is essentially a transparent adhesive material that is placed over glass to intensify rear-projected light. Prototyping with this material from five different suppliers indicated that for the type of screen reflection system we had, the holographic film was not appropriate since it added a slightly cloudy reflection on the trapezoid. We decided to not use it, as holographic screen film is better suited for projected images that are quite a distance away, such as the 2pac Hologram mentioned previously, or the Kate Moss Hologram showed at the 2006 Paris Fashion Week (Akbar, 2010).

Fig. 16: Installation Design

Overhead view of the *Mirada* installation.



The *Mirada* installation is co-created with the Toronto-based creative technologist, Jeremy Littler and is led by a shaman that guides participants to interact with abstract musical instruments that are embedded with wireless sensors. These four wooden artworks described in the table below control parameters of an immersive soundscape environment and also affect the characteristics of the central 3D projection of the graphical fire in real-time. Fire, among the first human technologies, is chosen as a central element to bring three people together to hear the tales of a shamanistic storyteller. Following my research inquiry, gallery patrons explore a live and generative creative process with interactive technology through ludic and haptic performativity and collaborative meaning-making. Figure 16 gives an overhead layout of the installation.

The appropriate sensors for each type of interaction are embedded into the abstract instruments and through both touch and movement, they send MIDI messages to AudioMulch and Processing via Arduino Fio powered Xbees, which are prototyped and designed by Jeremy Littler. Four 24" LCD screens are placed on a black-cloth covered table and in the center of the screens is an acrylic trapezoid that allows the reflected flame of the screens to be casted on each of the four corresponding acrylic panels. A video splitter replicates all four video feeds, which is connected to a Mac Mini, and under the table are four speakers and a subwoofer.

Jeremy and I matched the Eastern mystic narrative of the performance to the aesthetic of the installation, which can best be described as organic, tribal and ethereal. Consistent with this theme, we also wanted to hide the appearance of technology within organic materials to inspire wonder as to how seemingly inanimate objects (the four abstract musical instruments) can change the movement, hue and activity of a communal fire and the surrounding ambient sound. In our world of ubiquitous computing, we seem to want to reduce the physical presence of technology and at the same time intensify its utility. Bolter and Grusin's notion of "transparent immediacy" refers to the intent of "making a viewer forget the presence of the medium" (Bolter & Grusin, 2000, p. 272) speaks to this observation. Technological development continues to make our devices smaller and less noticeable while providing faster downloads, longer battery life, and more vivid screen displays, such as the lineage of the iPhone or the iPad. However, with this developmental trajectory, haptic mediums have been left behind for sleek glass touchscreens and gesture-based interfaces, which we felt is unfortunate because touch and movement offer a world of stimulating cognitive feedback for the user. It was important for Jeremy and me to fill this gap through the inclusion of haptic interaction into the *Mirada* experience.

Abstract Instrument Design

Four instruments — touchboard, shaker, yoke and percussive tablet (drumboard) — were chosen for each panel of the central display trapezoid, because each is associated with a very different type of interaction: touch, shake, maneuver and hit respectively. The interaction for each object was staged by giving certain actions prominence through "sets", which are "critical for interactions that are embodied rather than verbalized" (Ju & Leifer, 2006, p. 4) and refer to how one can interpret the interaction through an object's physical and visual form. In our case, this was conveyed through shape, texture (grain), colour, and weight. We were more interested in abstraction rather than literal versions because abstraction helps to invoke haptic engagement that leaves space for the user to create his or her own meaning with the instrument and how it fits into the context of the installation. In other words, nonliteral designs allow room for interpretation — more freedom to form one's own experience. To put it simply, implicit interaction aims to design objects that people can engage with intuitively (Ju & Leifer, 2006, p. 6; Nielsen, 1993; Reeves & Nass, 1998).

A strategy in implicit design is leveraging conventional behaviors and patterns, such as keeping quiet when a performance is occurring on a stage or pushing (as opposed to pulling) a knobless door with a horizontal bar on it. Through this approach, as designers, we can communicate the role of each instrument and introduce its affordance. Initial inspirations of the look and feel of the instruments came from studying the material and shape

Fig. 17: Abstract Instrument Design
 This chart compares Mirada's four abstract instruments by their respective interaction, wood type, technological components and design.



Object	Implicit Interaction	Wood Type	Hardware	Image
Touchboard	User either rubs finger along copper tape that is embedded on a texturized topographic surface or hover hand over it. Object rests on lap of user like a slide guitar	Peruvian Walnut (<i>Juglans Olanchana</i>) - Medium to coarse grain - Deep chocolate colour	Copper tape acts as a thermostat using the user's body as conduction. Hand movement along and above the copper alters voltage, which serves as an analog input.	
Shaker	User holds object in hand and shakes it like a maraca	Tigerwood (<i>Astronium Graveolens</i>) - Irregular streaks - Durable & stiff	The handle contains an accelerometer that measures the change of speed of the movement of the object	
Drumboard	User strikes or taps any segment of the flat surface of the object with the most responsive area being the hide-covered head. Object rests on user's lap	Cocobolo (<i>Dalbergia Retusa</i>) - Fine even texture - Natural luster	Underneath the hide-covered head of the object is a piezo sensor that measures local vibration	
Yoke	Like the yoke of a plane, user pivots this hand-held object to alter its orientation	Honduran Mahogany (<i>Swietenia Macrophylla</i>) - Chatoyancy effect when angled to light	Object is embedded with a gyroscope that reads its positional data like a compass	

Fig 18: Instrument Research

Research in various tribal musical instruments from Africa and the Middle East.



of primitive Asian and African musical instruments. These tribal instruments inform “interaction analogues” (Ju & Leifer, 2006, p. 3), which help users guess what they are supposed to do with an instrument that resembles conventional objects. For example, the drumboard has intentionally been designed to be smooth and hollow to invite the user to strike it as one would a drum, while the yoke is reminiscent of the arrow of a compass to elicit directional gestures. We aim to find the balance between abstraction and convention to help users get the most out of the installation experience.

Insight was gained by looking into the instrument design by looking at the work of haptic researchers, such as David Katz and James Gibson, who have theorized the role of gestural movement in “haptic exploration” (Gibson, 1983). For Katz, the hands are to haptics what the eyes are to sight (Chowning et al., 2001, p. 234). Placing your hand on a flat object informs you about its form, but only with movement can you feel the texture of an object. Katz was first to make this distinction between active and passive touch with the hands, in that when a user independently moves his or her hands (active touch), a vivid account of the material in question is derived, but when the material is passed under the fingertips (passive touch) it is much harder to make an account of the character of the material (Katz, 1989). Katz’s research has inspired us to work with woods with diverse grains that offer a more varied touch experience for the user. We have been mindful of how the sense of touch relates to the implicit interaction of an object. For example, we chose to use Peruvian Walnut (*Juglans Olanchana*) for the touchboard because its coarse grain (“Peruvian Walnut,” 2010) produces a more complex textural experience for the user.

Fig. 19: Foam Prototyping

Examples of the foam prototypes that were created to gather user feedback.



Conversely, because of the striking nature of the interaction that the drumboard requires, we used Cocobolo (*Dalbergia Retusa*), which has a smooth grain and a fine, even texture that resembles drum hide (“Cocobolo,” 2010).

In the end, the *Mirada* installation accidentally became an element in my research that was informed by the theoretical framework of the playformance project, rather than a direct result of it. Although the premiere exhibition of *Mirada* in April 2014 included a performer-shaman, Jeremy and I have learned that this feature is not fundamental to the artwork. Furthermore, I would argue that the user (the individual/audience that interacts with each instrument) essentially serves as the performer in this instance, and as such the research practice of contextual inquiry became irrelevant as we were not working towards building a custom system for one individual any longer — we were designing an experience for the general public. That said, the aim of compliance design to offer a meaningful experience for the user/performer still remained key to the development of the installation. For example, user-testing informed the mapping of sound filters such as reverb and delay to the maneuvering of the gyroscope and

the movement of the shaker respectively. This was very similar to the developmental process of the *Havabazi Tuno* project, with the difference being haptic input as opposed to mid-air gestures. User-testing also helped to design responsive visual reactions, such as increasing the opacity of the fire each time the drumboard was struck and the desaturation of its colour from the input of the touchboard.

Conclusion

The five networked-performances have established the importance of building trust and a supportive partnership with the performance artists through in-depth contextual analysis, which can be achieved by making artists a vital part of the conceptual development of the performance from inception.

The interaction between the user and the technology must be natural enough so as not to hinder the ludic exploratory quality of the performance with jarring technical distractions, as was seen in *Blendism*. Yet for all of the networked-performances this proved to be difficult– the presence of technology was evident to the user, which in turn affected the manner in which they performed. It was realized that the augmentation of technology to live performance adds a sense of spontaneity and excitement for the performer, which is induced by responsive compliance design. This causal relationship between input and output should offer a visceral and meaningful experience for the performance artist, which will subsequently be seen and understood by the audience as well. To do this effectively, the creative director needs to prioritize the designed interaction between this mediating technology and the performer over simply framing the artwork as a spectacle to be observed.

As seen in some of my networked-performances, most notably, *Dissolving Self*, the serendipitous graphical output acted as a secondary performer that accompanied the ludic movement on stage. This further underlines that fact that interactive technologies that harness corporal movements via live data encourage the performance artist to break away from his or her comfort zone and interpret their artwork in a more embodied and unpredictable way.

Moreover, rehearsals and even the staged-performance should allow the space for the performance artist to explore the technology without direction or a fixed, predetermined choreography. This will inform both user experience and conceptual development, but must come with a time limit because the creative merit of a networked-performance benefits from having a set deadline – a time, and place for the work to be shown publicly. This is also the limitation of staged performance due to

their reliance on events and venues, which is why the development of an installation such as *Mirada* has the potential to diversify the contextual reception of this synthesis between performance and technology, while still contributing to the study of technologically-mediated ludic performativity.

The *Mirada* installation allows the user to playform directly with technology to affect serendipitous visual and acoustic feedback. The mapping of the casual relationship between input and output in this installation has been informed greatly by the production of the five networked-performances because the same principle of designing a visceral experience for the user remains relevant. Similar to the *Havabazi Tuno* or *Jadoo Bánoo* performances, performer/user engagement is fundamental in the *Mirada* installation as it allows the space for undirected play with technology to spontaneously induce its translated output (dynamic soundscape and visual characteristics of the fire). Despite these developmental similarities with previous works, *Mirada* is a categorical shift from the other projects in that this installation is designed for the user of the abstract instruments rather than the performative shaman. It is the user that playforms with each instrument to serendipitously affect both audio and visual feedback, and thus the challenge has been to build a meaningful and engaging experience for the user. Notably, this fact only became evident after reflecting on the exhibition. Essentially, Balevi aided users to interact with the technology by providing a contextualization through storytelling rather than directly inducing the affected media himself.

Moving Forward

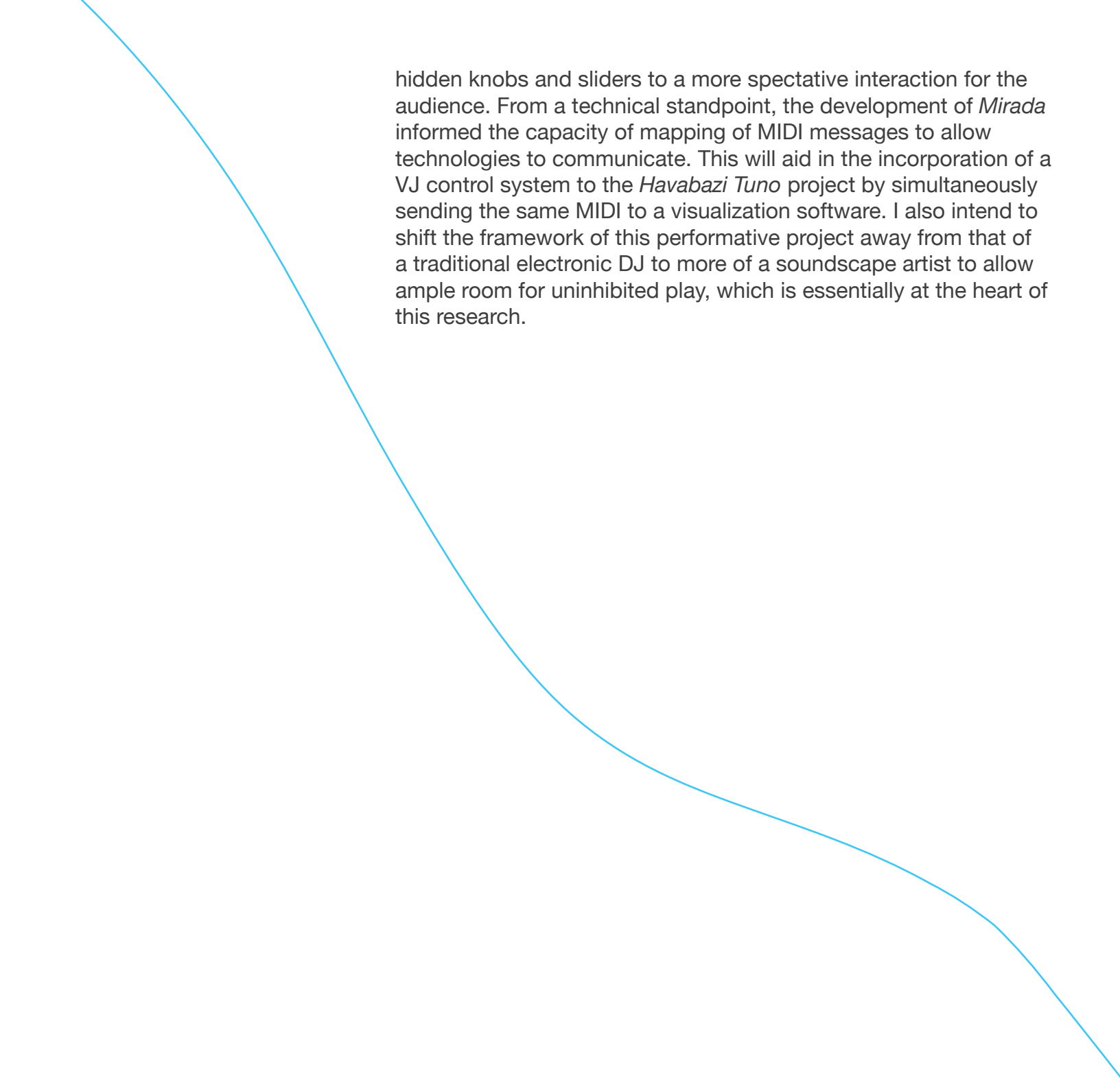
The merit in the development of my five original performances and one installation is the affective experience that is staged through the unpredictable nature that interactive technologies offer. The *Mirada* installation features elements that hold a lot of creative potential for my design practice such as haptic interaction and the incorporation of volumetric displays.

The challenge that came with the production of the four instruments used in the installation was conveying how to “use” it without explicit instructions. This was accomplished through the design of its shape, weight, and orientation of the object as it relates to the body of the user. The premiere exhibition of *Mirada* also underlined the rationale to hide wireless sensors within organic material. This has created a broader space for interpretation, and also enabled a richer narrative component, which was contextually facilitated by a performative shaman. I intend to conduct further research in the conceptual development and production of such abstract instruments, including the use of diverse organic materials such as actual plants, and hand-held paper artworks.

The other promising research element of the *Mirada* project was the incorporation of a volumetric display which was essentially a Pepper’s Ghost effect with four viewpoints. Since the release of *Minority Report* (2002), we have been fascinated with heads-up displays (HUDs) and this has continued to be featured in countless sci-fi films such as the *Iron Man Trilogy* (2008, 2010 & 2013) and *Gravity* (2013). I plan to replace the four screens used in the *Mirada* installation with a single projector, prisms or mirrors. This would greatly reduce production and setup costs, allowing for greater modularity and would further hide the technology by situating the source of the visual content away from the viewpoint of the participants.

In terms of the staged works, I was most inspired by *Dissolving Self* and *Havabazi Tuno* due to the spiritual undertones of the former and contemporary applications of the latter. Through the abstraction of the body, *Dissolving Self* holds the potential to design a meaningful experience for both the performance artist and the viewer, which transcends physicality to emanate the ineffable — a shamanic meditative unity with a greater power. *Dissolving Self* will be shown at the International Symposium on Electronic Art (ISEA) in Dubai with Denise Mireau. This opportunity will allow us to further improve the performance’s human-computer interaction as well as development of a custom sound generator influenced by the worn sensor in real-time — similar to that which was made for *Mirada*.

Though further research is needed to adding a wider array of gesture inputs, *Havabazi Tuno* allowed the DJ to move away from



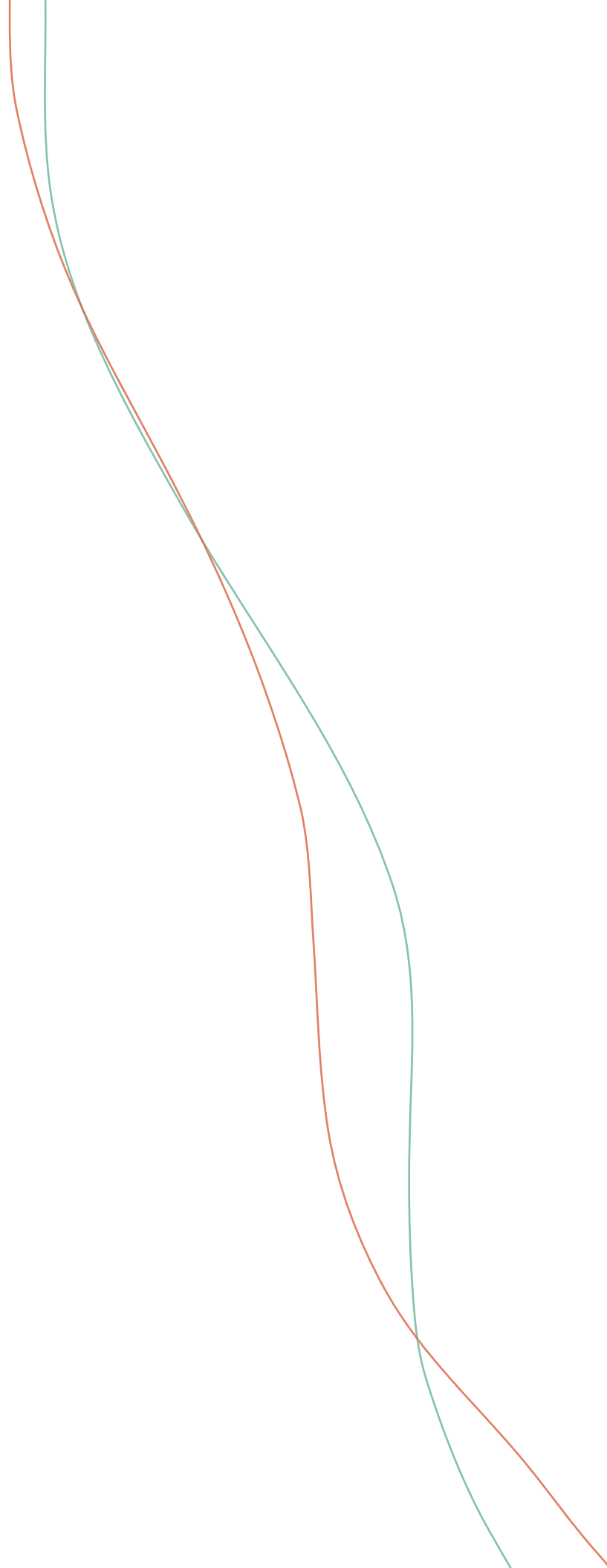
hidden knobs and sliders to a more spectative interaction for the audience. From a technical standpoint, the development of *Mirada* informed the capacity of mapping of MIDI messages to allow technologies to communicate. This will aid in the incorporation of a VJ control system to the *Havabazi Tuno* project by simultaneously sending the same MIDI to a visualization software. I also intend to shift the framework of this performative project away from that of a traditional electronic DJ to more of a soundscape artist to allow ample room for uninhibited play, which is essentially at the heart of this research.

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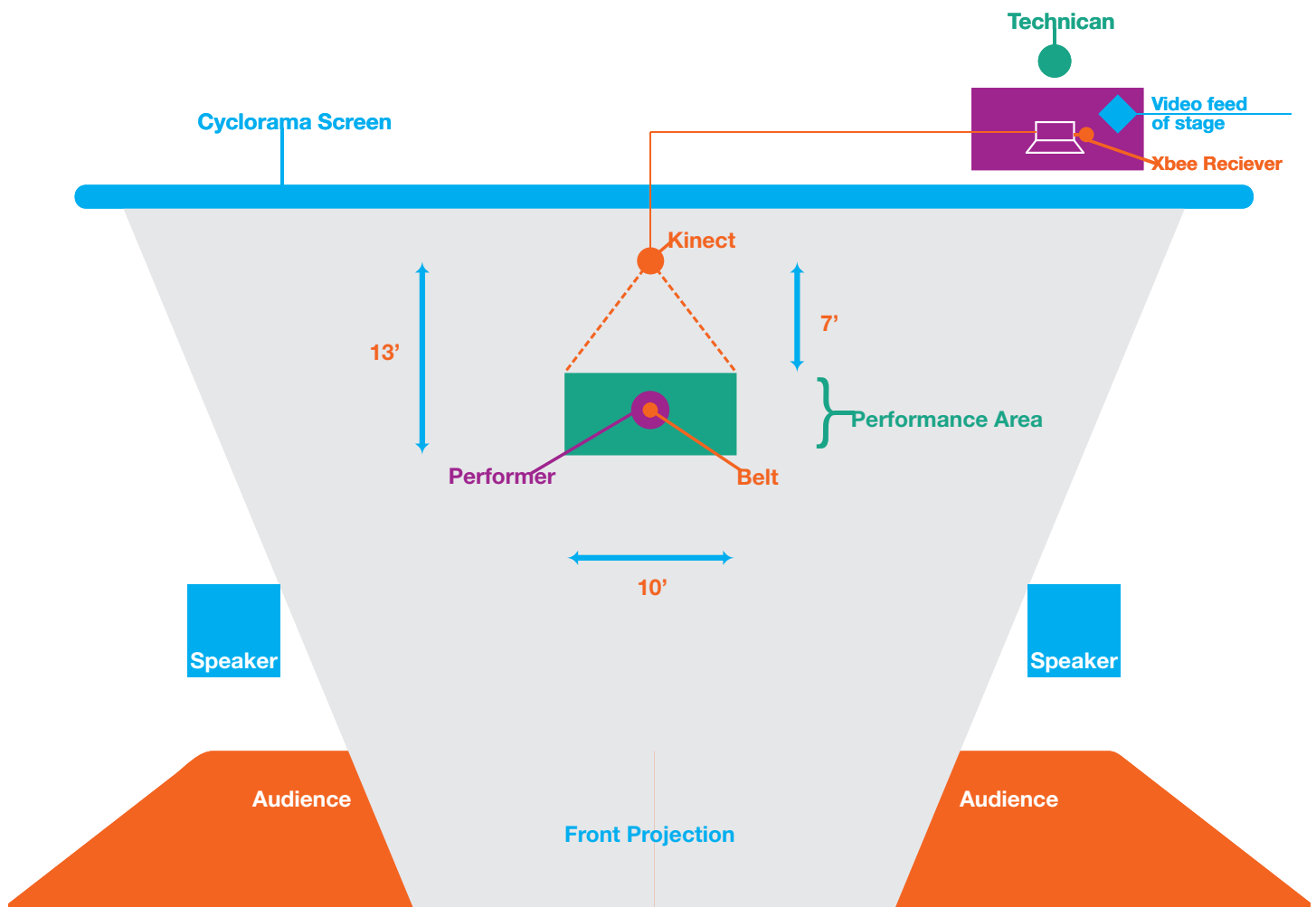
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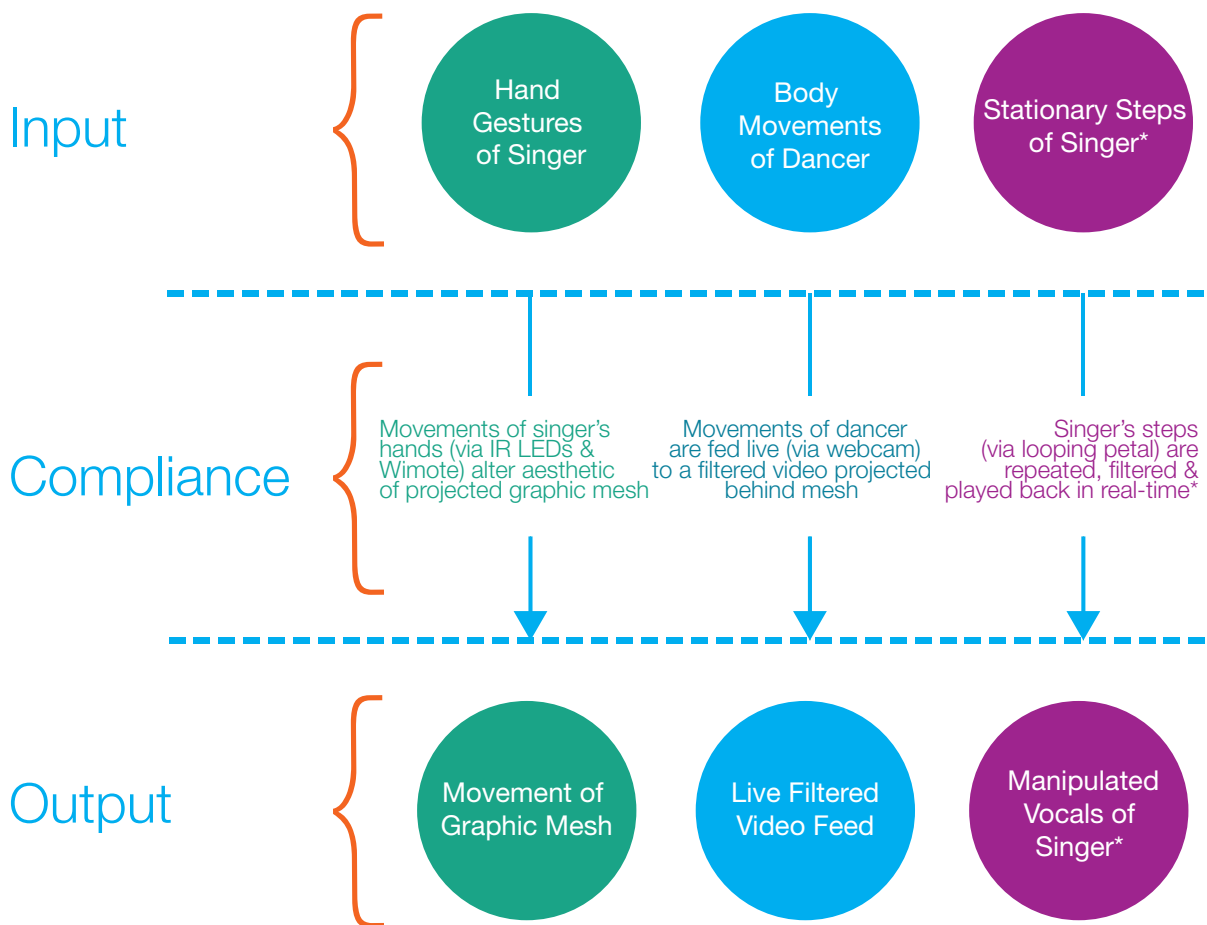
Appendix A

Dissolving Self Set Design An overhead layout



Appendix B

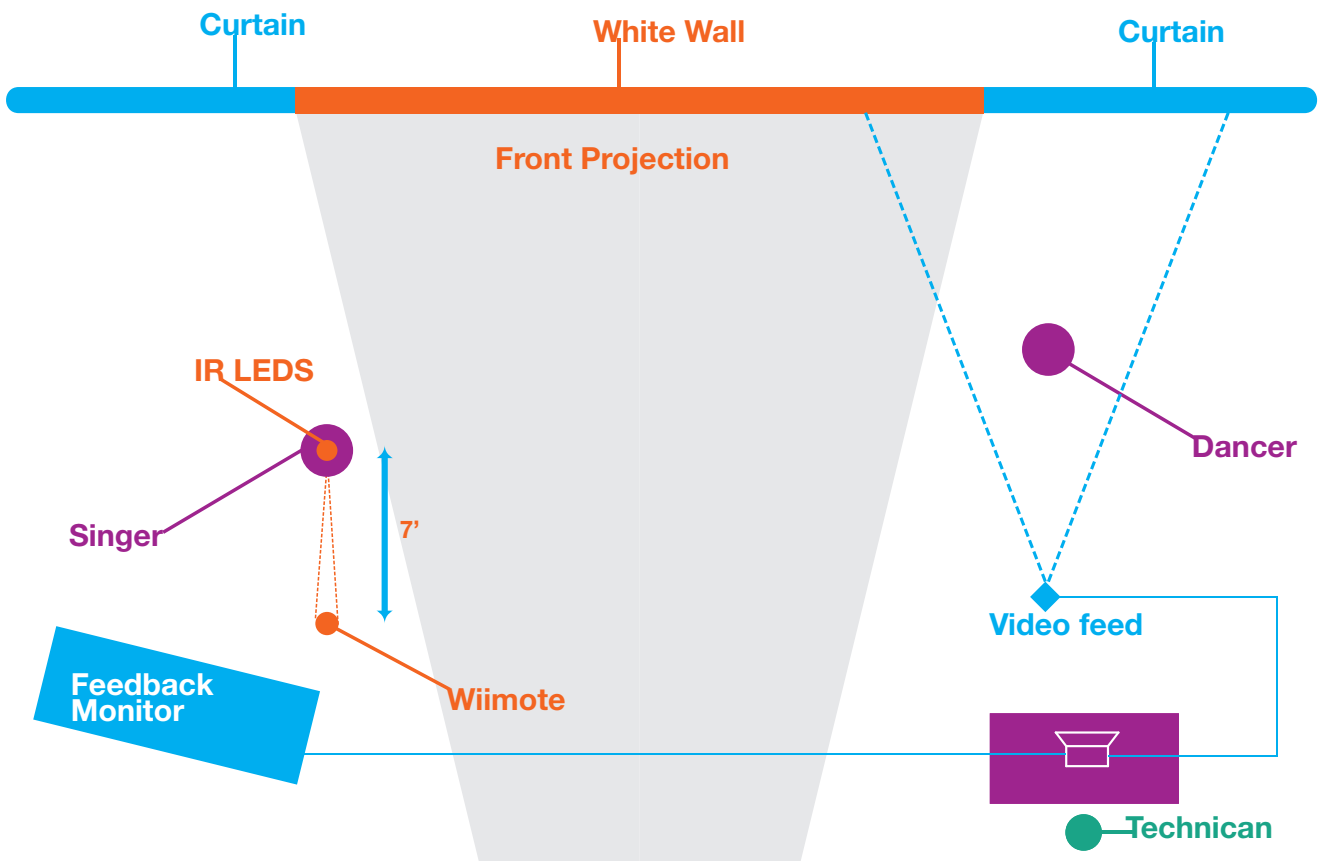
Blendism Compliance Design Matrix
Illustrates input/output relationships



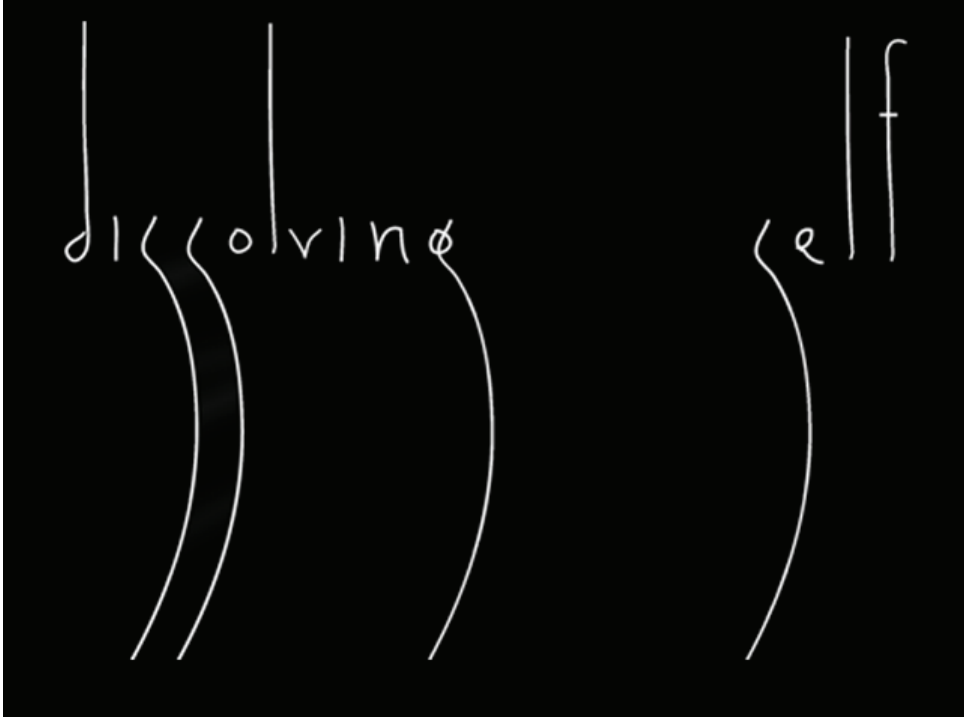
*Outside of the research of this thesis as this is already part of the artist's craft, and not part of my performative augmentation

Appendix C

Blendism Set Design An overhead layout



Appendix C



You are cordially invited to the premiere of *Dissolving Self*, a contemporary dance performance which employs wearable technology and motion capture to augment a woman's path towards finding Divinity.

This performance was funded by the OCAD University Digital Futures Initiative and is part of the HASTAC 2013 conference.

This Friday at 18:30
York University, Tribue Community Recital Hall
(Accolade Building East, see map below)


Maziar Ghaderi
Original Concept & Creative Direction

Ryan Maksymic
Technical Direction

Carlos Montenegro
Sound Design

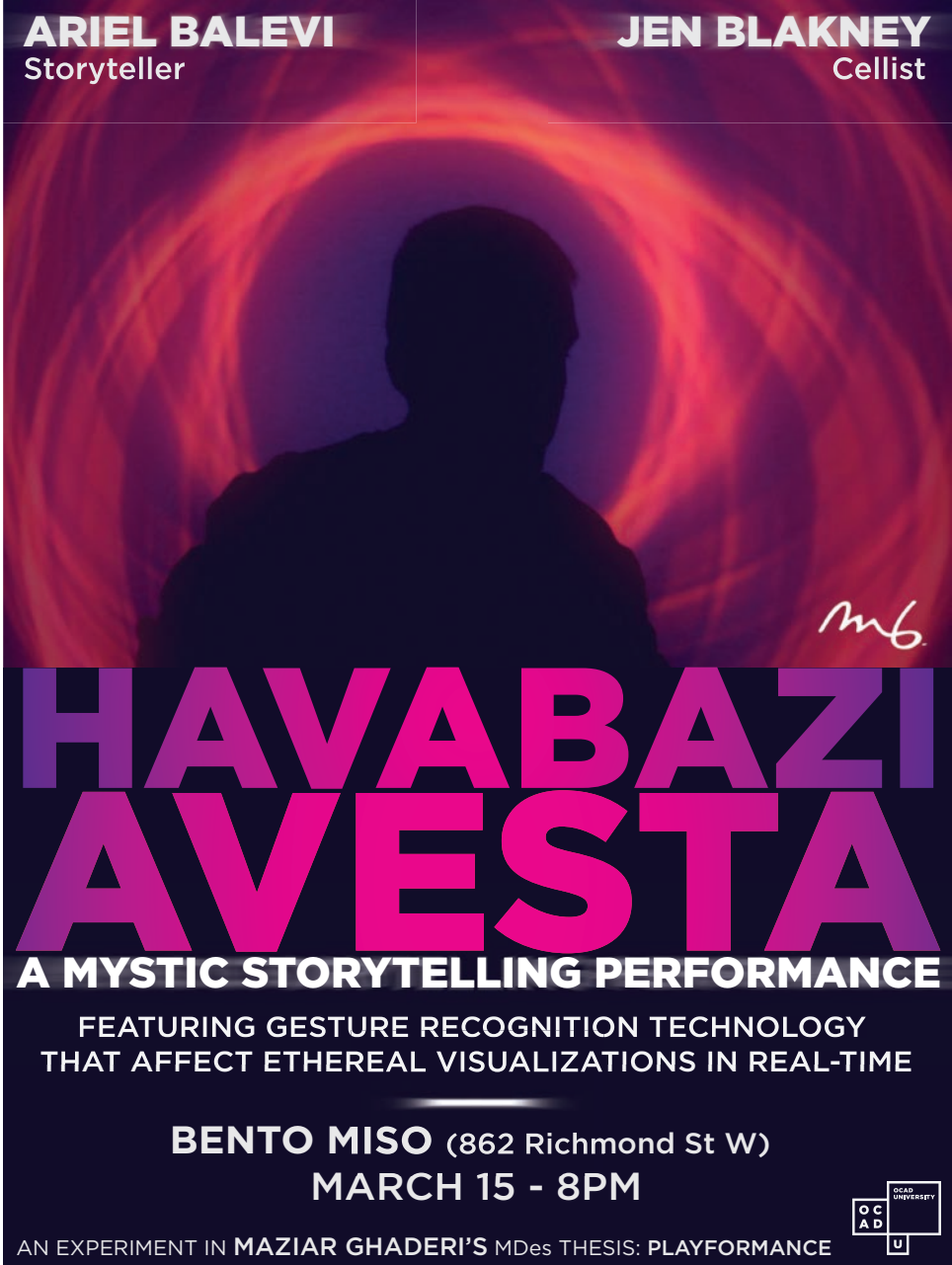
Denise Mireau
Choreography & Dance

Yuxi Wang
Costume Design



Dissolving Self Promotional Poster

Appendix D



ARIEL BALEVI
Storyteller

JEN BLAKNEY
Cellist

mb.


HAVABAZI AVESTA

A MYSTIC STORYTELLING PERFORMANCE

FEATURING GESTURE RECOGNITION TECHNOLOGY
THAT AFFECT ETHEREAL VISUALIZATIONS IN REAL-TIME

BENTO MISO (862 Richmond St W)
MARCH 15 - 8PM

AN EXPERIMENT IN MAZIAR GHADERI'S MDes THESIS: PLAYFORMANCE



Havabazi Avesta Promotional Poster

Appendix E & F

Havabazi Avesta Rehearsals



Jadoo Bānoo Rehearsals



Appendix G & H

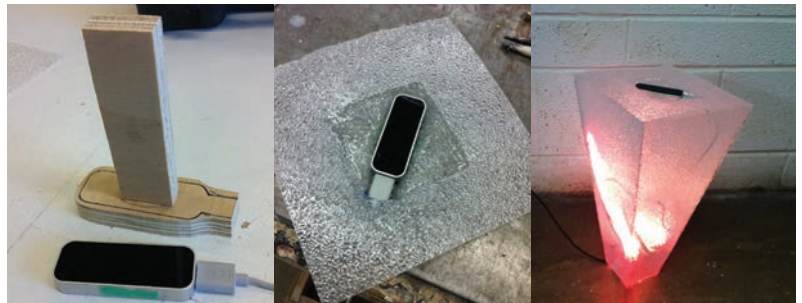
Abstract Instrument Production

Various photos of my trip to Nicaragua to construct the wooden instruments for the *Mirada* installation.



Fire Stand Production

Documentation of the vacuum forming and production of the fire stand used in the Havabazi Avesta performance.



Volumetric Display Production

Photos of the laser cutting of the wooden frame used for the volumetric display (top) as well as photos of an earlier prototype (bottom).



Appendix I

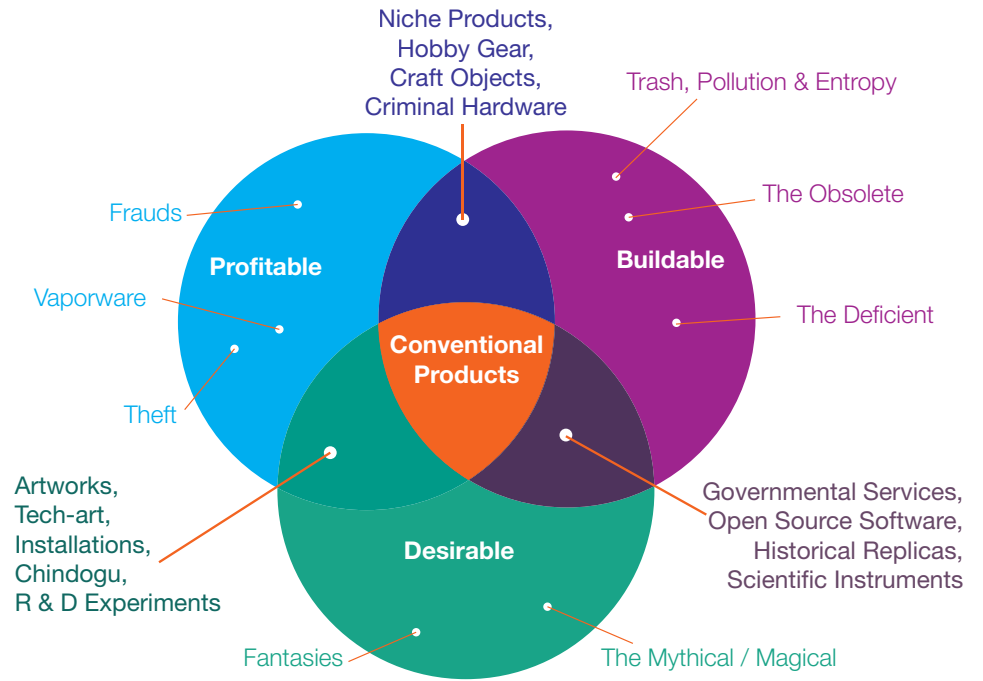
Mirada Exhibition
Event photos of the installation.



Appendix J

The Composition of a Conventional Product

A Venn diagram that illustrates the three components of conventional products: buildability, profitability and desirability. This has informed the commercialization of the *Mirada* installation.



Appendix K

Research Ethics Board Approval



Research Ethics Board

January 30, 2014

Dear Maziar Ghaderi,

RE: OCADU 138 "Playformance Installation."

Amendments One and Two.

The OCAD University Research Ethics Board has reviewed your two recent amendments and these are approved. Your final approval number remains **2013-40**.

Best wishes for the successful completion of your project.

Yours sincerely,

A handwritten signature in cursive script, appearing to read 'Tony Kerr'.

Tony Kerr, Chair, OCAD U Research Ethics Board



Research Ethics Board

October 15, 2013

Dear Maziar Ghaderi,

RE: OCADU 138 "Hands that talk: a cross-cultural exploration of body-language in storytelling."

The OCAD University Research Ethics Board has reviewed the above-named submission. The protocol and the consent form dated October 15, 2013 are approved for use for the next 12 months. If the study is expected to continue beyond the expiry date (October 14, 2014) you are responsible for ensuring the study receives re-approval. Your final approval number is **2013-40**.

Before proceeding with your project, compliance with other required University approvals/certifications, institutional requirements, or governmental authorizations may be required. It is your responsibility to ensure that the ethical guidelines and approvals of those facilities or institutions are obtained and filed with the OCAD U REB prior to the initiation of any research.

If, during the course of the research, there are any serious adverse events, changes in the approved protocol or consent form or any new information that must be considered with respect to the study, these should be brought to the immediate attention of the Board.

The REB must also be notified of the completion or termination of this study and a final report provided before you graduate. The template is attached.

Best wishes for the successful completion of your project.

Yours sincerely,

A handwritten signature in cursive script, appearing to read 'Tony Kerr'.

Tony Kerr, Chair, OCAD U Research Ethics Board

Appendix K

Media Kit (Links)

1.Dissolving Self - Performance 04/2013

<https://vimeo.com/maziart/dissolvingself>

2.Blendism - Studio Performance 06/2013

<https://vimeo.com/maziart/blendism>

3.Havabazi Tuno - Performance 12/2013

<http://vimeo.com/maziart/tuno>

4.Jadoo Banoo - Studio Rehearsal 11/2013

<http://vimeo.com/maziart/banoo>

5a.Havabazi Avesta - Studio Rehearsal (Airbow) 11/2013

<https://www.youtube.com/watch?v=2g70plXeFkA>

5b.Havabazi Avesta - Studio Rehearsal (Viz.it) 11/2013

<https://www.youtube.com/watch?v=GQyUvAQkhcs>

5c.Havabazi Avesta - Performance 03/2014

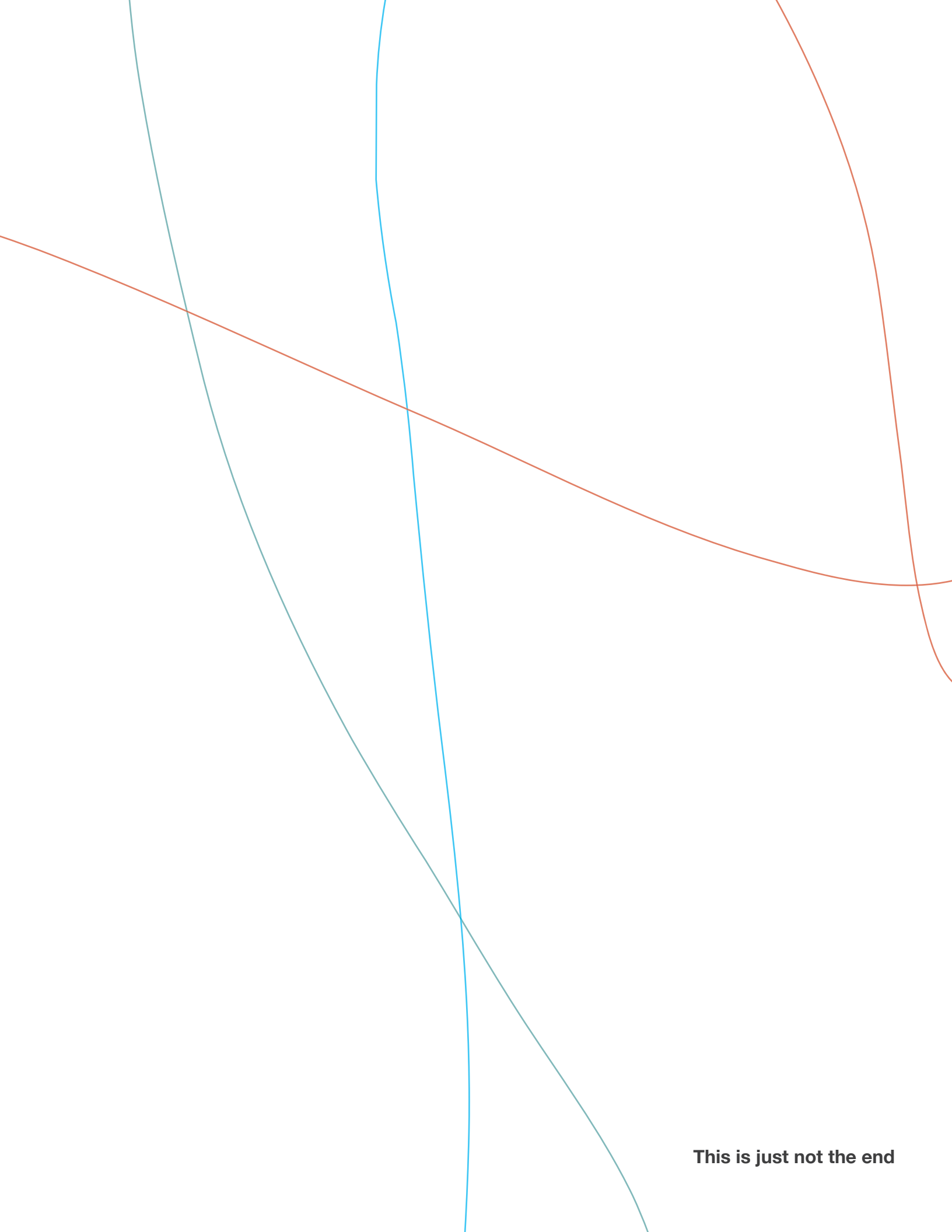
<https://vimeo.com/maziart/havabaziavesta>

6a.Mirada - Promotional Teaser 03/2013

<http://vimeo.com/maziart/miradatrailer>

6b.Mirada - Exhibition Trailer 04/2013

<https://vimeo.com/maziart/mirada>



This is just not the end



About the Author

Maziar Ghaderi is a Toronto-based multimedia designer, producer and director that works with visual media and interactive technology. His research is situated at the intersection of technology, experience design and creative direction. Maziar has had his work shown at *eLeo*, *SIGGRAPH*, *Interaction13*, *Toronto Wearables Meetup*, *Mesh*, *Intersections14*, and the *Ontario Centre of Excellence* and has co-authored academic articles for several design conferences.

Other notable projects include his work for Marina Abramovic at the *2013 Luminato Festival* as a media producer and on-site technician, in addition to content creation and live VJing for the state-of-the-art interactive theatre piece, *Faster Than Night* which premiered at Harbourfront Centre in May 2014.

Latest CV download here: maziart.ca/MaziarGhaderiCV.pdf



About the Technical Director of the Mirada Installation

Jeremy Littler is a Toronto-based emerging technologies and eLearning specialist at Ryerson University. He currently manages the Mixed Reality Production Cluster in the Faculty of Communication and Design. In this role he has developed sophisticated mobile, physical computing, data visualization and 3D printing/fabrication facilities. In addition to constantly researching embedded and wearable technologies, he is actively involved in the design of next generation media distribution and 3D display systems. Jeremy's accessibility and eLearning focused webcasting applications have been utilized extensively by educational institutions and non-government organizations in Canada and the United States. Jeremy completed a Master of Arts in the Communications and Culture program at Ryerson/York University in 2008.

In 2013, Jeremy partnered with Maziar Ghaderi to present Augmenting Performance Art with Interactive Technology at SIGGRAPH Anaheim. He has also presented at the Canadian Film Centre (MARS) at the Canadian Women in Communications Conferences. In 2010, Jeremy was the technical architect of *v*, the first simultaneous multi-location mobile webcast of *Nuit Blanche*. He currently manages Ryerson/Podcamp Toronto conferences and provides technical/media production guidance for numerous projects and events within FCAD. Jeremy's research encompasses mobile/embedded technologies, bio-articulation, customized electronic interfaces and virtual reality applications. Jeremy positions his work as an exploration of the potential for soundscape design, storytelling and artistic expression within unique performance environments.



m6.

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Toronto, Canada

maz@maziart.ca

