A Wearable Experiment to Radiate Prosocial Wellbeing Through Psychophysiological Mirroring of Laughter

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Abstract

Based on a practical somaesthetics framework emphasizing the values of self experiences, this paper presents the design rationale of a responsive dress, Laughing Dress, which employs laughter as an agent to highlight the unobvious and unspoken social distance between strangers and inverting our cultural notion of public self-containment. The proposed wearable dress is used to investigate the concept, "disruption for reformation". Throughout the design process, the prototype addressed the research question, "Can exposing self-representations through synthetic sound as inner voice and rhythmic light as somatic energy rattle and provoke reposition of us against existing social norms of private-public space?" The research instrument aims to break personal boundaries by magnifying wearer's self-presence, enticing a psychophysiological mirroring of laughter in another entity, and evoking a sense of curiosity through a display of visual aesthetics. The unusual display and magnification of self-presence within public setting contributes to disruption of social expectation on self-containment in public, reflection upon the organic form of human-to-human interaction, and initiation to realign our behaviour.

Keywords

Wearable Technology, laughter, responsive wearable, psychophysiological mirroring, social mimicry, emotion contagion, prosocial behaviour, social convention

Introduction

City is built upon decades of structures and regulations, where its culture plays a major role in its inhabitants' social behavior. Social changes emerged from new innovations and political movements reconcile behaviour incrementally, but the repercussion might be far-reaching. Advancing technologies have created a new era of communication where people of different location and time are able to connect and reconnect quickly and effectively via telecommunication. The emerging behaviour led to the major shift of attentional focus towards handheld devices and other forms of electronic, thus consequencing on a lack of face-to-face communication between one another.

Laughter is a universal form of human communication that indicates intrinsic emotion, mood or personal expression outwardly. Neuman et al. describe this involuntary mimicry of expression as mood contagion, which aligned with Van Barren et al.'s view point of a mirroring of postural, emotional, and behavioural reaction from the observer [9, 20]. Laughter's contagious ability makes it an intuitive, yet fitting medium outcasting positive energy from oneself to another, thus disturbs the social silence within a self-containing culture and invites a merging of personal space.

Research Potential

Advances in telecommunication technologies have allowed our communication across distances to be instantaneous, efficient, and dynamic. While they have allowed for users to remain socially connected across multiple platforms simultaneously in the digital realm, it has also created a phenomenon of physical isolation between users in our physical world, resulting in the loss of intimacy and connection between persons.

A recent meta-analysis of social interaction in Vancouver, Canada, demonstrates that large numbers of residents in metro Vancouver experience social isolation and disconnection [21]. The largest community foundation, Vancouver Foundation, conducted a mixed method study with 3,841 participants in 2012, where 34% of the participants felt difficult to build new social connection in Vancouver. 60 % of the participants only have short conversation with any of their neighbors less than 2 or 3 times a month. Moreover, 26 % of house tenants never speak with their neighbor more than once a year. 25% of the participations felt lonely, where young adults, new comers to the country, and new members of the neighborhood aged 25 to 34 experienced social isolation the most. In addition, Perissinotto et al. pursued a longitudinal cohort study of 1604 participants in psychological and health condition and found that 43% participants experienced a lack of social contacts and felt disconnected with their community [11]. They assert that the social isolation in adults older than 60 years could cause some functional decline in mobility of their body and even death.

The desire to revitalize the diminishment of face-to-face communication in our technological advancing society motivated a research exploration on the concept of "disrup-

tion for reformation" through interactive public art. We implemented a research prototype that encompasses materiality, poetics, and semantics of interaction for practical somaesthetics. The interactive dress aims to investigate whether a combination of synesthetic laughter with rhythmic light patterns provides sufficient somatic stimulations to provoke self-reflection and induce physiological mirroring of positive bodily expression for behavioural changes among others in public settings [Figure 1].

Research Domain & Related Work

Catalytic creations can cause social changes. We see the potential of disruptive innovation to trigger realization, reflect, and reactions to ingrained social norms. With the overarching inquiry of "whether a display of self-representations through synthetic sound as inner voice and expressive light as somatic energy rattle and provoke reposition of self among others within the same public space", the research instrument, Laughing Dress, ameliorates the domains of interactive body visualization art, psychophysiological mirroring of laughter, and practical somaesthetic.

Public Art on Body Visualization

The initiation to cause change in our society calls for a work that engages the public. This elicited researches and works to explore the notion of self as an agent to transform one's situated space. Rafael Lozano-Hemmer's Pulse Room [8] bio-detects and translates participants' unique heart rates into one of the 300 incandescent lamps within the overall installation space. This process leads to 300 individual flickering light patterns as means to explore self-regulation of one's intimate heart within public space. George Zisiadis's Pulse of the City [22] converts a pedestrian's real-time pulse data into music that projects through a speaker at one of Boston's city sidewalk. This installation aims to reconnect pedestrians with their body rhythms while celebrating their use of public space in a playful manner. Additionally, installation works such as Feel_Perspire [4] and Pulse and Bloom [14], highlight the potentials of displaying biofeedback interaction for audiences' reflections upon the relationship of their personal bodies within public and social realm. Thus, inspired by the problem of self-isolation within public spaces, the display of personal body visualization on the Laughing Dress is a viable form for a controversial interplay between private and public.

Psychophysiological Mirroring of Laughter

Laughing is one of the natural body expressions that represent joyful emotional states in ourselves [15]. Provine further highlights the contagious quality of the sound of laughter and its ability to increase feelings of warmth and connection between individuals [12, 13]. Fukushima et al explored the concept of psychophysiological mirroring behaviour by developing a system, which produces laughing soundtracks that synchronize with the user's desire to laugh in order to induce more laugher [3]. Through the experimental study, they demonstrated that the synthetic

laughter extended the duration of user's laugh. Shahid et al.'s study [19] with the Adaptive Affective Mirror further reinforces the potentials of laughter as audiovisual feedback to elicit positive emotions from users. Through Laughing Dress, we hypothesize the following: Laughter is a contagion for happiness, which can foster opportunities for social interaction between strangers.

Practical Somaesthetics

Practical Somaesthetics is one of three fundamental branches of Somaesthetics introduced by Richard Shusterman [18]. It highlights the participants' aesthetic appreciation of bodily experience and their embodied reactions to the interaction. Through soft(n) [16], Schiphorst argues the consideration of poetics, materiality, self-experience, and interaction semantics as invaluable design resource in the craftsmanship of embodied interaction. Exhale [17], Cardiomorphologies [7], and Below the Belt [5] examine the correlation of personal breath and emotional expression between individuals during the making of interactive experience across bodily and social realms. These bio-interactive installations align with the framework as they afford somatic experience through the processes of self-awareness, -reflection, and -representations to provoke understanding on the research concept and engage the audience within their situated, public space. Wo.Defy [6] further highlights the use of this framework by crafting a wearable, narrative space that allows the wearer and audience to culturally reconnect and reengage with the Chinese suffragette history from the late 19th to early 20th century. In our motivation to reveal the self-lived experience to the public realm, Laughing dress applied the bodily practices in somaesthetics framework to magnify self-representation of wearer, disrupt social boundary, shift the attention of passerby, and reform social interaction.

Figure 1. Laughing Dress. © SFU SIAT Soma Embodied Wearable Group 2014

Design Rationale: Laughing Dress

We aim to probe with the expression and communication of laughter on interactive wearable to encourage prosocial behaviour between the wearer and speculators within a public space. The materiality of raw technologies on the Laughing Dress and the poetic expression of wearer's presence as visual aesthetics serve to welcome interaction

through honest epiphany of the wearer's being. To help establish a connection between individuals, the prototype's interaction module is driven by interpersonal proximity to obscure the boundary between personal and public space. The subconscious psychophysiological mirroring of synthetic expression in the body and the generated opportunity to connect among one another stimulate thoughts about the disruptive experience as ways to reflect upon our being. Laughing Dress amplifies wearer's presence both visually and audibly as a non-conventional paradigm to rattle existing social structure of public behaviour.
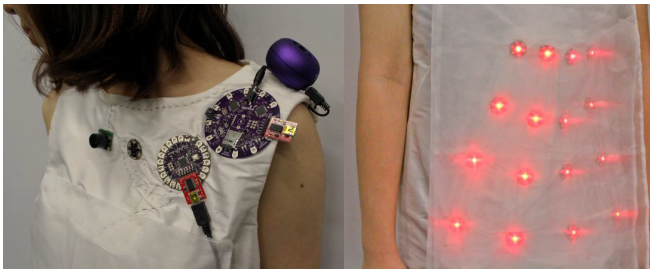

Figure 2. (Left) 4 series of Lilypad LED Pixels, (Right) From left to right: Ultrasonic distance sensor, tri-axis accelerometer, Lilypad Arduino microcontroller, Lilypad MP3 player, mini speaker. © SFU SIAT Soma Embodied Wearable Group 2014

Materiality and Poetics of Revealing Inner Self

Laughing Dress displays wearer's body state and presence as synthetic positive expressions to external entities to establish curiosity and conversation in hopes to foster social comfort and trust. With laughter as agent for emotional transference through psychophysiological mirroring, we translate the by-product of laughter into a series of expressive light patterns. The generated lights accompany the simulated sound of laughter on the wearable prototype as an allegorical reference to the invisible energy radiating from the wearer's laughter. The tri-axis accelerometer at the collarbone region cause changes to the LED light pattern at the lower torso region [Figure 2]. As the gestural movements of the wearer increase, the XYZ values detected by the accelerometer increase, which maps to a higher intensity output in the LED lights [Figure 3].

The exposing technologies on the soft interface align with the conceptual intention to reveal the authentic self; the work extends an invitation to the spectators to overcome self-containment. The visual aesthetics of Laughing Dress represents the wearer's presence, which breaks the veiled social boundary, initiates opportunities for social interaction, and aims to increase prosocial behaviour between the wearer and her spectators.

Interaction Semantic: Breaking Private-Public Boundaries

We employed a human-computer interaction approach to explore a solicitation of positive face-to-face communication; the dress elicits a positive feeling and fosters trust

between strangers to disrupt against our culturally accepted practice on personal space. Research highlights that physical distance correlates to the social distance between two persons [2]. Using an ultrasonic proximity sensor at the collarbone region, we map the amplification of the laughing sounds to the physical distance between the wearer and spectator; the increase in volume indicates a closer social distance between the two. As a result, the expressions of laughter infers to the intensity of positive mood generated from the interaction between the wearer (conceptualizer) and participating spectators (interlocutor).
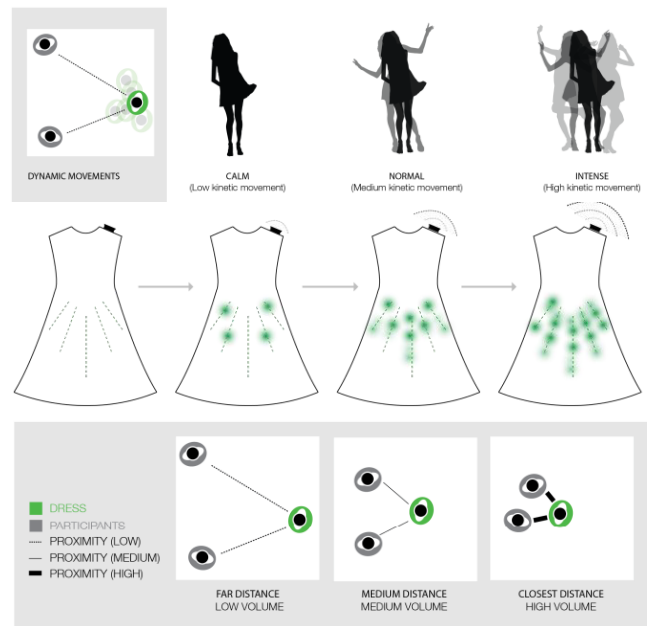

Figure 3. The Interaction Model (Wearer's Moveents, Sound & Light Output, Proximity) © SFU SIAT Soma Embodied Wearable Group 2014

Somatic Experience for Reformation

While individuals differ in their sensitivity towards emotional contagion [10], research indicates positive mood has greater inter-influences than negative mood [1]. As a result, Laughing Dress uses laughter as a positive emotional contagion to encourage social interaction between strangers within a public space. Through the wearable display of laughter accompany with light pattern expressions, the dress transmits enjoyment and positive mood from the wearer to the spectators through the involuntary mimicry of laughter. The interaction aligns with Neuman et al.'s description of mood contagion [7] and reveals a similar impact as Van Baaren et al.'s as they claim that the wearer's facial, postural, and behavioural expressions can produce movement, facial, and vocal mimicry synchronously as evidences of emotional responses [20]. To foster positive social bonding in a public space, Laughing Dress can be used to encourage spectators to smile, laugh and make eye contact, then stimulate prosocial responses and behaviour between the wearer and spectators through psychophysiological mirroring of positive audiovisual expressions.

Conclusion and Future Work

Laughing Dress is a research instrument that aims to investigate whether an interactive garment can repurpose an existing human quality, laughter, within an everyday design context to highlight the salient proximal distance between people within public spaces and bear prosocial behaviour through involuntary mimicry. This interactive public work employs a disruptive medium for self-reflection to cause reformation of self, towards others, and within our society. Laughing dress generates visual and audio expressions by means of one's physical energy and the proximal distance between individuals of a shared space. The alienation of this familiar bodily experience arises awareness, induces interest, and creates dialogues among strangers; the psychophysiological mirroring encourages prosocial behaviour towards one another, which challenges the existing self-containing culture.

We believe that laughter holds a charismatic quality where people of all ethnic background can understand intrinsically. We aim to take the responses from Laughing Dress experience to proceed forward to a practical solution where an appropriation of laughter can be used in an everyday application to elicit social connection, positive attitude, and prosocial behaviour in public setting.

Acknowledgements

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