

The Printing Dress: You are what you Tweet

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Abstract. You are probably familiar with the old saying, “You are what you eat” but how about, “You are what you tweet?” What if this concept were incorporated into garments of the future? Would you censor yourself, knowing you would reveal your statements to the world around you? The “Printing Dress” is an artistic piece that explores the notion of wearable text and its potential impact on the future of fashion, as well as our social identity. Built almost entirely of paper, the dress enables the wearer to enter “thoughts” on to its fabric and wear them as public art. By selecting materials and technologies that draw on the past, present, and future of communication media, we encourage viewers to reflect on the path that has brought us to ubiquitous digital communication and to contemplate its forward evolution.

Keywords: Wearable Text, Social Identity, Fashion Technology, Paper Dress, Wearable Technology, Texting, Anonymity, Accountability

1 Introduction

Fashion and technology have become increasingly intertwined over the past few years. The ability to incorporate electronics into clothing has recently become more accessible thanks to the emergence of prototyping tools such as Arduino [2], an open source physical computing platform. More specifically, the Lilypad Arduino [12] has provided a set of sewable electronic components that has facilitated the creation of independent, interactive fashion. This has opened the door for artists and designers to explore new methods of interacting with technology while communicating with broader audiences [5]. Recent consumer examples point to the sports and medicine industries, where companies such as Nike and Philips are now integrating sensors into clothes and wearable accessories to monitor body signals. However, it’s the application of these technologies into the social milieu that motivates many artists. In the past five years, our social world has exploded; we can now connect to anyone, anywhere in the world and monitor our lives thanks to technologies such as Twitter and Facebook. With one simple click, we can broadcast to millions; communication has never been more accessible or some would say rampant. This explosion of digital communication led us to design a piece that attempts to illustrate that what we choose to communicate might ultimately change the day we begin to truly wear it.

1.1 Concept

The “Printing Dress” symbolizes the evolutionary phases of communication (past, present, and future) and their impact on society. Inspired by technologies of the past, we intentionally designed the style of the dress to reflect on the monochromatic origins of printing and type. It was our way of paying homage to one of the most profound advancements in communication, the printing press [21]. Almost overnight, printing transformed longhand into an assembly of glyphs comprised of letters and numbers. This streamlined the sharing of ideas and made replication of the printed word accessible worldwide. While making a paper dress is not novel to fashion (for example, artist Isabelle de Borchgrave is currently showing Pulp Fashion [4] at the Fine Arts Museum of San Francisco), we intentionally used it to symbolize the past.

But in order to capture present-day communication media as well, we turn towards the digital, where text has now become pervasive. Technologies such as Twitter and Facebook have become communication hives, where we constantly buzz for the latest news from our friends and people worldwide. According to recent reports [18], it is estimated that Twitter exceeds almost one billion tweets a week, all of this being fueled by our ability to tweet in a huge variety of environments, thanks to mobile technologies. We integrated the notion of “texting” on the go into our submission by designing a custom keyboard, based on capacitive sensing, into the dress. Stylized to reflect an old typewriter, the keys are placed so as to be viewed from the perspective of the wearer as well as that of an onlooker. The keyboard enables you to enter text just as you would a mobile device. So while created from materials of the past, the dress incorporates technologies of today by enabling the wearer to digitally send text to a display, or in this case, the skirt, which leads us to our last reflection, the future.

Broadcasting our thoughts out to the world isn’t in itself futuristic, but we believe that enabling us to publically wear them is. And this transition to “wearable thoughts” would bring consequences: an author can no longer assume anonymity if he/she has to wear the words she/he publishes. Even today, many words go largely unchallenged, and pervasive technologies have enabled people to cyber-bully or worse, virtually spew hatred without any real consequence. The notion of wearing what you say, in the instant you say it, serves as instant accountability and raises questions around social identity. We might say one thing to a group of people, and then turn around and say something entirely contradictory to another, but if our words were to remain with us, even “on” us for a duration of time, how might that impact our behavior? Perhaps it would usher in a new age of responsibility, where people would inherently become more conscious of what they say because it would literally reflect “on” their character regardless of when and where it was said.

2 Execution

The dress consists of three main pieces: the top bodice, corset and skirt. All three pieces are composed of paper and are machine-stitched. The most technical and complex of the pieces, the corset, contains thirty custom-made keys, which are

assembled into a QWERTY keyboard layout. The initial idea was to use only conductive ink and draw the letters onto the paper to create a very lightweight instance of this concept. We did some initial experimenting but found that conductive ink wasn't flexible enough to handle the bending of the paper, and the traces often broke. We decided to use a more conventional solution – both solid and stranded wire.

The technologies we used included: four Lilypad Arduino boards, one USB hub, one laptop, a capacitive keyboard, solid and stranded wire, and a short-throw projector. The dress form consists of a wire mesh and has been attached to an 80/20 aluminum stand. The skirt hangs over the projector and hides it from view. We run standard USB cables from the Arduino boards down the back of the stand and feed them into one USB hub. The hub is then connected to a laptop running a Processing sketch. Each time a key is pressed, it sends that letter to the laptop, which then displays the character as animated text. The laptop is connected to a short throw projector, at a resolution of 1024x768, projecting the animation on to the skirt. (See Figures 1 and 2)

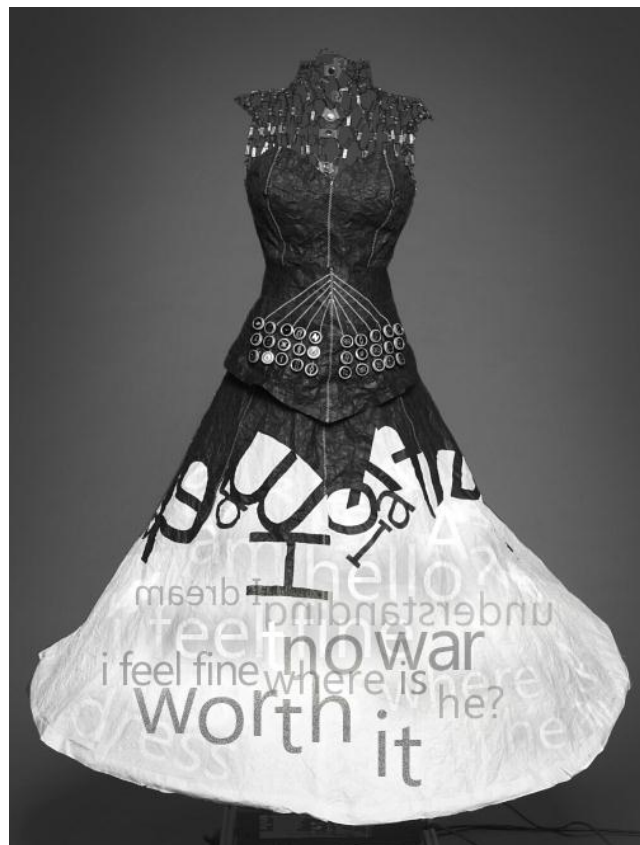


Figure 1: The Printing Dress.

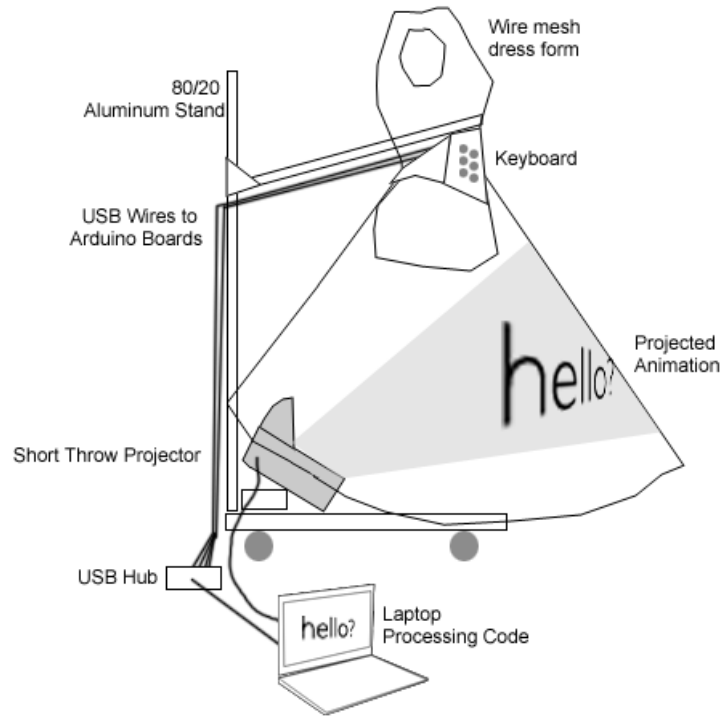


Figure 2: Dress setup.

2.1 Letter Key

Each letter key consists of four stacked layers of laser-cut acrylic that were assembled and glued by hand (Figure 3). Each key also contains one Lilypad LED. In order to capture capacitive input, we connected Arduino pins to two small metal beads that are attached to the surface of each key. An Arduino sketch running on each Lilypad measures the capacitance (time to charge) of these pins. A pin connected to a touched key returns a higher value. Each letter has been bi-directionally designed so that both the wearer and the observer can read them.

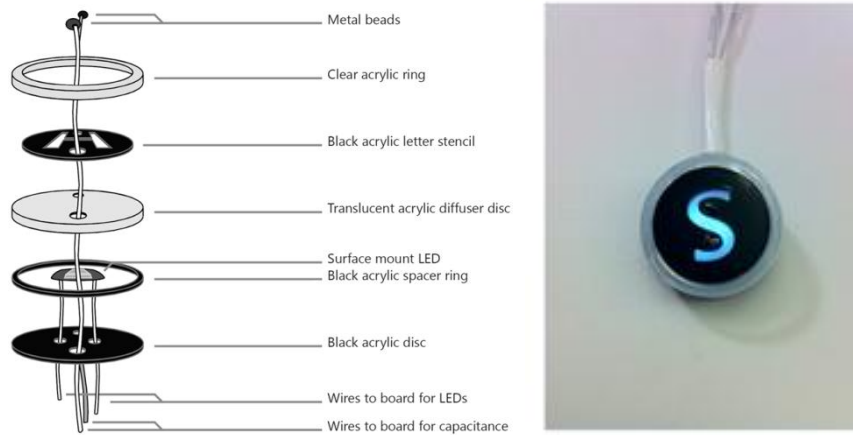


Figure 3: Construction of each letter key.

2.2 Capacitive Keyboard

The full keyboard contains 30 acrylic keys which were carefully inserted by hand into a paper corset (Figure 4). We divided it into two angled 5x3 grids falling on the left and right side of the dress. Each grid consists of five columns of three keys. Each key has been soldered onto a Lilypad board (total of two boards per side) for monitoring capacitive input and for powering the LEDs. (Figure 5)



Figure 4: Capacitive keyboard – with bi-directional keys.

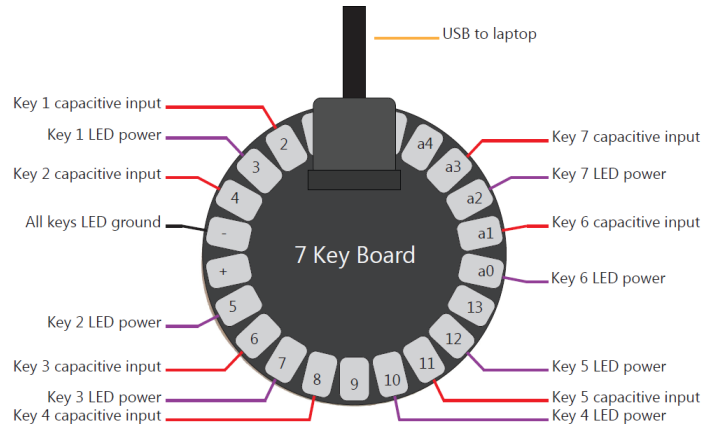


Fig 5A: Pin-to-key layout on Arduino board one (left side grid).

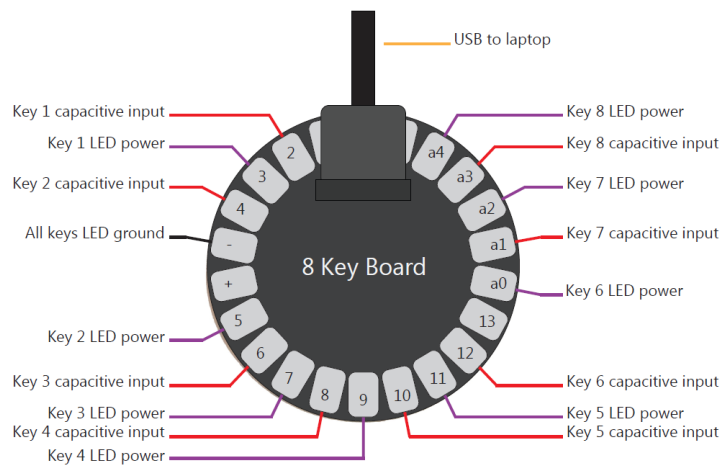


Fig 5B: Pin-to-key layout on Arduino board two (left side grid).

When capacitive input is detected for any key, the Arduino board switches on the LED in that key, then sends the character associated with it through the USB cable to a serial port on the laptop. A Processing [15] sketch runs on the laptop and monitors communications on the serial port, displaying the character received on-screen using the NextText library for Processing [14]. As letters are entered, the words are projected onto the skirt of the dress, where they drift along random paths. The color and opacity of the words are also generated at random. After 500 milliseconds, the LED on the key turns off. The projected words continue to drift and fade away after 30 seconds.

3 Summary

While we are aware that wearable technologies can be as subtle as a soft tap on your shoulder, we intentionally designed this piece to be anything but subtle, to reflect its message. Some may be repelled by its ostentatious presentation, while others might dare to imagine a more transparent and open world. It is our hope that this piece will inspire conversations that go beyond fashion or technology to topics such as awareness, accountability, privacy and identity. Awareness of what we put out into the world, whether they are in the form of words, thoughts, or actions...the sheer volume of thoughts we put forward does have an impact on others, as well as ourselves. While the crumbling wall of privacy continues to fall, and we become more transparent to those around us, we must be ready to face the ultimate test of transparency, our true self.

References

1. AIST: Conductive Fibers (Integrating Capacitive touch sensors into nylon fibers) (2011): <http://www.engadget.com/2011/03/04/japanese-researchers-weave-capacitive-touch-into-large-area-text/>
2. Arduino: <http://www.arduino.cc>
3. Berzowska, Joanna: Electronic Textiles: Wearable Computers, Reactive Fashion, and Soft Computation (2005): <http://xslabs.net/papers/textile05-berzowska.pdf>
4. Borchgrave de, Isabelle: Pulp Fashion Exhibit, San Francisco Museum of Modern Art (2011): <http://legionofhonor.famsf.org/legion/exhibitions/pulp-fashion-art-isabelle-de-borchgrave>
5. Buechley, L. and Hill, B. M. 2010. LilyPad in the Wild: How Hardware's Long Tail is Supporting New Engineering and Design Communities. In Proceedings of Designing Interactive Systems (DIS), Aarhus, Denmark, 199-207.
6. Coelho, Marcelo & Hall, Lyndl & Berzowska, Joanna & Maes, Pattie: Pulp Based Computing: A Framework for Building Computers out of Paper (2007)
7. Dill, Lesley: Data Dress (2010): <http://reckon.posterous.com/data-dress>
8. Electric Foxy (wear+sense+connect+react beautifully), <http://www.electricfoxy.com>
9. Emirhan, Kami: Fiber Optics in Textile (2005): http://newmedia.yeditepe.edu.tr/pdfs/isimd_05/14.pdf
10. Hamish, Morrow, Light Colored Dresses, <http://www.fuelyourcreativity.com/clothing-art-less-function-more-fashion/>
11. Kurbak, Ebru & Yayuz, Mahir Mustafa: News Knitter (2007-2008), <http://casualdata.com/newsknitter/>
12. Lilypad Arduino: <http://www.arduino.cc/en/Main/ArduinoBoardLilyPad>
13. Mistry, Pranav & Maes, Pattie: Sixth Sense – A Wearable Gestural Interface (2009)
14. NextText library for Processing: <http://www.nexttext.net/>
15. Processing: <http://www.processing.org>
16. Royal Philips Electronics: Bubelle the Emotional Sensing Dress of the Future (2006)
17. Seymour, Sabine, C.: Fashionable Technology: The Intersection of Design, Fashion, Science, and Technology (2009)

18. Softpedia: <http://news.softpedia.com/news/1-Billion-Tweets-per-Week-for-Twitter-s-5th-Birthday-189640.shtml>
19. Solove, Daniel: Do Social Networks Bring the End of Privacy? *Scientific American* (2008): <http://www.scientificamerican.com/article.cfm?id=do-social-networks-bring>
20. Talk2myShirt (everything you want to know about Wearable Electronic), www.talk2myshirt.com/blog
21. Wikipedia: http://en.wikipedia.org/wiki/Printing_Press