Between Fear and Astonishment: The Rhetorics of Wearable Technology

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This paper addresses the rhetorics of pervasiveness, privacy, and control in a time of wearable technology. By parsing the popular narratives about monitoring activity through wearable devices, pervasive data collection, and big data analytics, I highlight what we can learn from the development of this technological innovation. I argue that current narratives have hinged on the spectrum of fear and hype, whereas the impact of wearable technologies goes beyond that binary. With an eye toward its implication for composition pedagogy, I examine a few affordances and limitations of wearable technology in education and provide a call to action for how we could go about teaching writing with emerging technologies. I offer some instances of wearables deployment in the writing classroom as a way to demonstrate their usefulness.

Wearable technology became a hot catchword when Fitbit released its first wrist-worn device, the Fitbit Flex, in late 2013. It was the same year when Google released a beta version of its overhead mounted display device, the Google Glass (Explorer Edition). With surging interests from enterprise and consumer markets alike, wearable technology was soon hailed as the next cultural phenomenon (Cecchinato, Cox, & Bird, 2015). More fondly known as wearables, these embodied devices embed computational ability into objects we can carry on ourselves to perform tasks and track our behaviors (Pedersen, 2013). In a recent *Rhetoric Society Quarterly* special issue on rhetoric and wearables, editors Catherine Gouge and John Jones (2016) defined wearable technology “inclusively as those technologies, electronic or otherwise, whose primary functionality requires that they be connected to bodies” (p. 201). Similarly, in a *Computers and Composition Online* webtext, wearables have been identified as “hybrid, network-enabled devices that can be worn on or in the body, that are integrated with the user’s everyday life and movements” (Duin, Moses, McGrath, & Tham, 2016).

Wearables have managed to draw public attention, partially because of the cyborg potentials they promise (see Figure 1), but also because of the dystopian images such technology paints regarding privacy (Figure 2). The impact of the exchanges concerning public and private information is worth noting. Early in 2015, Google announced that it would stop producing the Explorer Edition of Google Glass (Luckerson, 2015), signaling one of the first industrial responses to the overwhelming public pushbacks against a device perceived as obtrusive. This article identifies the common narratives related to privacy and control in the use of wearables, and scrutinizes the ideas of surveillance, information ownership, and the rhetorics of pervasiveness in a time of ubiquitous computing. More importantly, I aim to highlight the impacts of these on composition pedagogy.

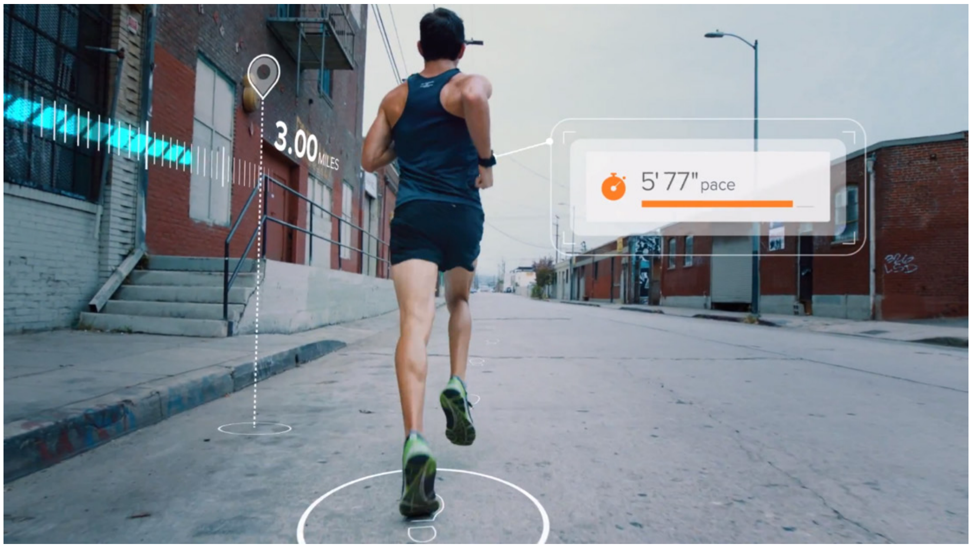

Figure 1: Screen capture of a Fitbit Surge commercial on YouTube (https://youtu.be/J3S3cNv0ntE).

Figure 2. Screen capture from Mashable's YouTube parody of a Google Glass commercial (https://youtu.be/FlfZ9FNC99k).

On Privacy, Control, and Corporations

Here is a case of wearables many of us may have heard of recently. In January 2016, Oral Roberts University (ORU) of Tulsa, Oklahoma, garnered media attention from all over for their latest institution-wide fitness program that requires incoming freshmen to wear Fitbit trackers to record 10,000 steps per day, with the information being made available to faculty members (Oral Robert University, 2016). As we would expect, there have been mixed reviews on this kind of integration—some say it is outright unlawful, while others think the integration was impressive. Critics of this program question the boundaries of student privacy (Allen, 2016; Irvin, 2016). What counts as public and what counts as private information? When it comes to student analytics, what's personal and what's open for sharing? Although there are federal regulations such as Family Educational Rights and Privacy Act (FERPA) and Health Insurance Portability and Accountability Act (HIPAA) in place, privacy is still an arguably vague concept for higher education due to its multi-layered definitions (Kotsios, 2015). The social constructedness of privacy—that our definitions of privacy are relative to the social conditions surrounding the issues we apply to such definitions (Nippert-Eng, 2010)—makes it difficult for administrators, faculty, and students alike to truly grasp the edges of privacy. While some think that student physical movement or campus mobility patterns are public data, others argue that these data reveal certain student behaviors and identities, and thus should qualify as confidential information.

The increasingly blurred lines between the personal and the public make for intriguing instances for scholars to critique and investigate wearables (Eaddy et al., 2004; Michael & Michael, 2013; Profita et al., 2013). Amidst these arguments is the growing dichotomy of trust and skepticism. And wearables become the scapegoat in between the binary. Those who trust that their personal data remain private tend to think they have control over what's recorded or tracked, aggregated, and shared by their wearable devices; those who on the other hand are skeptical about the security of their private information believe that Big Brother is collecting their data and using those data for commercial or other profit-making purposes (Zuboff, 2015). While these assumptions are seemingly true, the reality of wearables might be somewhere in between—in a grey area where users do have some form of control over what data their devices could collect but at the same time are subject to the reality that these data could serve more than just as aggregated intelligence. Wearables enterprises and the marketing firms they cooperate with can extract quite a bit of useful clues from the big data generated by the millions of users—regionally or worldwide—to create targeted services for specific demographics. Certainly, these corporations could also use the collected data to study social behaviors and tendencies, which might aid in the creation and selling of their next profit-generating consumer products and services.

This is true, at least, if we only consider businesses as profit-driven organizations that have little or no concern for the social well-being of people. The current scenario, however, is one that's more reassuring. With a growing emphasis on corporate social responsibility, many wearables and emerging technology enterprises—such as virtual reality and augmented reality headsets, medical devices, fitness trackers, and so on—are partnering with nonprofit or public institutions, like education, journalism, and social outreach, to improve quality of life through technology. Tech giants like Google and Microsoft are seen teaming up with schools and universities to co-create educational programs that seek to enhance student and teacher experiences by using new wearable devices. At our institution, the University of Minnesota–Twin Cities, we were able to secure an internal grant and partnership with Google when Google Glass was released to pilot different pedagogical frameworks for teaching with wearable computers (Duin et al., 2016). Besides the feedback Google received from our teacher-researchers, no other student data were shared with the company (we have worked to ensure that our file-sharing system is separate from Google's Explorers open cloud server). This instance, I observe, is one that breaks from the common presumptions of profit-driven corporations. Another example is from Microsoft. As part of their roll-out of the upcoming holographic mixed-reality headset, Microsoft has partnered with Case Western University to reimagine anatomy lessons (see Figure 3).

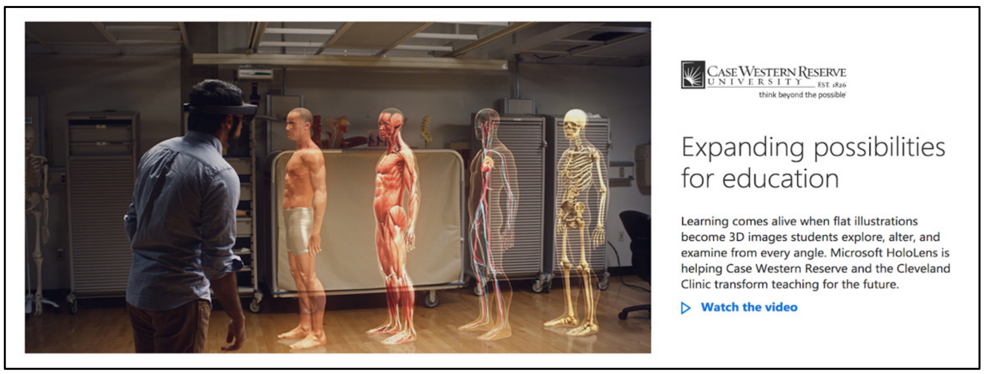

Figure 3. Microsoft-Case Western educational partnership. Screen capture from Microsoft HoloLens website (https://www.microsoft.com/microsoft-hololens/en-us/hololens-commercial).

On Surveillance and Sousveillance

The narratives on the pervasiveness of wearable technology often lead to discussions of surveillance (Mann, Nolan, & Wellman, 2003). More plainly, we are concerned with the always-on cameras and recorders that would capture our likeness and actions with or without our acknowledgment. Undoubtedly, it's easy for users to surreptitiously take photographs or record video or audio files using a smartwatch or smart glasses. Covert capture of videos and images of sensitive areas, as well as confidential information, is a very real concern. I recall personal anecdotes from members of my research group that their friends and family members would not allow them to wear a pair of Google Glass while in the company of others unless it is previously communicated and agreed upon. Given the speed with which wearable computers are being adopted and proliferated in various aspects of our lives, we can only look forward to a day when we no longer could ask another user to remove their wearables simply because we don't feel comfortable being a subject of the potential recording. It would be akin to asking a random smartphone user on the street to not use his or her phone in the open because you're uncomfortable with the fact that it's capable of recording you in the background.

In today's open society, everyday citizens assume freedom to express themselves in public domains but also want to be left alone in particular moments when they are not fond of being monitored. Critics argue that we live in a time where we are constantly watched, in one way or another, and there's no escaping of this reality (Lyon, 2001). On open streets and public squares, we are under the surveillance of traffic and city-owned cameras. In banks, airports, retailers, and businesses, we are again under the lens of closed circuit recorders. Each time we use a credit or loyalty card to make a purchase, our activities are documented. Even in the comfort of our own homes and personal workspaces, we are monitored by computers and phones. The websites we browse, the channels we watch, the emails we send, the keystrokes we enter… up to the conversations we have in the presence of these devices, can be recorded for tracking and data mining purposes.

The rise of wearables gives us the ability to watch and watch back through sousveillance, a juxtaposition of surveillance (Mann, Nolan, & Wellman, 2003). Sousveillance denotes bringing monitoring from high-up architectures—metaphorically and literally—down to the human level. In other words, everyday citizens can now be walking/traveling surveillances themselves with the help of wearable devices such as the new Spectacles by Snapchat and lifelogging cameras like the Sony Xperia Eye. These wearables use sensors to detect faces, smiles, and moments of interest. Common narratives for the use of these wearables revolve around freeing the wearers from holding or staring at a screen so they can regain the experience of staying connected with the real world. While the seamless interfaces of these wearables highlight the benefits of not needing to interrupt any moment with a glaring hardware, it downplays the fact that these devices are now omnipresent and can be used to monitor or spy on others. Steve Mann and his colleagues (2003) argued that this "inverse surveillance" makes for a new system of observation where "individuals now can invert an organization's gaze and watch the watchers by collecting data on them" (p. 336). They elaborate:

> Wearable computing devices afford possibilities for mobile individuals to take their own sousveillance with them. Given this frequent sociophysical mobility, it makes sense to invent forms of wearable computing to situate research devices on the bodies of the surveilled (customer, taxicab passenger, citizen, etc.). The act of holding a mirror up to society, or the social environment, allows for a transformation of surveillance techniques into sousveillance techniques in order to watch the watchers. (p. 337)

This transformation, while fearsome to many, creates new sociotechnical dimensions in composition and communication wherein our bodies become the subject that's subjected not just to scrutiny and quantification, but to subjective use for monitoring of others. Under this circumstance, we use our bodies not just as representations of our messages and meanings, but as an agent of vigilance for ourselves and others.

On Big Data, Wearable Computing, and Learning Analytics

Another hype around wearables concerns big data. Wearables provide continuous data collection that can lead to generation of big data (Greengard, 2015; Neff & Nafus, 2016). Big data analytics turn collected data into actionable insights for future services and products. With millions of users actively using and logging activity data (see Fitbit, 2017), and sharing them to cloud servers, companies get lured into mining these data for behavioral trends, activity of places or hotspots, verging fad, and even public opinion of some sort, just to name a few. In healthcare for example, medical and pharmaceutical companies can tap into these activity databases to study a certain population's exercise rates, diet choices, and other lifestyle factors that can help them develop health solutions that might appeal to the specific population of users (Varshney, 2003; Rutherford, 2010; Page, 2015). In sports, wearable analytics can quantify player movements and live actions, enabling smarter decisions from coaching staff (Chi et al., 2005; Rutherford, 2010). They can also enable predictions of player performance and provide insights on injury prevention and recovery time. And in education—Plato forbids—wearables are already proliferating inside and outside the classroom. With ORU setting a considerably radical precedent to wearables integration in higher education, we are seeing more analytical programs being designed and deployed to study student behavior, engagement level, and program assessment (Borthwick, Anderson, Finsness & Foulger, 2015).

Those who see wearables as valuable in a learning environment contend that these technologies can serve as personal learning tools with which students can access information on-the-go (de Freitas & Mark, 2003; Ponce et al., 2014). Aside from retrieving information, students may also use wearables to engage with instructors in different ways—through gestural input and tactile feedback, for example. Wearables enthusiasts argue that this enhancement of instruction through differentiation allows for universal design of learning, where students may experience personalized learning and more accessible instruction. Wearables may be used to help students see better, hear better, and participate more meaningfully in the learning process (Borthwick et al., 2015). Also, given the connectivity these devices afford, students may easily communicate with their peers and instructors, making learning a truly social and interactive activity.

On the one hand, wearables are valued as an asset that can enhance education. On the other, critics question the true intentions of integrating wearables in education, suspecting that the safety of students might be compromised. At the physical level, the proximity of the devices to the human body may cast danger to the user's health. For instance, the Wi-Fi connection on Google Glass measures 1.42 on the Specific Absorption Scale, a scale that determines the rate at which energy is absorbed by the human body when exposed to a radiofrequency electromagnetic field, and this is a level that is uncomfortably close to the maximum of 1.6 (Moskowitz, 2014). What's more, critics argue that there are holes in administration of wearable devices in an educational setting since the security of data gleaned from wearables is hard to guarantee. Schools and higher education institutions must comply with extensive legal requirements. When it comes to data storage and sharing, local districts need to negotiate the use of the data with and without parental permission, and need to treat the cloud vendor as if it were housed in-district (Brickman & Goelitz, 2014). Lastly, on interpreting student big data, critics worry that analysts may draw inaccurate inferences about students based on aggregated data. When examined apart from the in-situ context of learning, data analysts and education researchers may find student behaviors to be out of norm since academic big data do not usually contain contextual information such as cultural diversity, socioeconomic factors, and other student differences (boyd & Crawford, 2012). Given all these, the implementation of wearables is more often than not seen as a disruption rather than support for education. Yet, this does not mean that wearables have nothing good to offer to the classroom. Time and again, rhetoric and writing teachers find themselves at odds with new technological integration in the classroom, and scholars of computers and writing have consistently shown us that progress requires that we embrace both the risks and rewards of new technologies. While wearables might come across at first as invasions of privacy and distractions, their functions and features can be used to enhance learning. The next section includes some of these possibilities.

Implications for Composition Pedagogy: A Call to Action

I aim to demonstrate in this writing that popular rhetorics around wearables today have been about fear of privacy invasion and loss of control over personal information, as well as the hype around shiny new devices. However, these narratives don't take us far into the true implications for pedagogy. As of this writing, I have seen little evidence in scholarly literature that wearables work or otherwise for higher education purposes. The use of wearables in education is currently uncharted territory (Rogers, 2003). Elsewhere, I write with my colleague that emerging technologies such as wearables and other reality augmenting devices call for an expansion of digital literacy in the composition classroom (Tham & Duin, forthcoming). We are now at a time dealing not just with print hypertexts or screen-based visuals, but also with immersive contents that require our understanding of experience design and architecture, data analytics, and contextual awareness for privacy and identity security. As scholars of computers and composition, we need to move beyond the narratives of fear and hype, into critical examination of the use of wearables and emerging technologies inside and outside the classroom. Adding to digital literacy, we have the obligation to helping students identify the risks and rewards of wearables in their learning and personal development, and how they might behave as active and ethical citizens in monitoring and protecting themselves and others.

From my own experience working with and deploying these technologies in composition and technical communication courses, I have learned that students are becoming more and more comfortable with emerging technologies—even with the ones they have not experienced before or those with which they lack functional literacy—such that they are willing to try out new devices as part of their learning (see Figures 4 & 5). For instance, in Fall 2015, my students had tried using Google Glass to enhance their peer review activities. Responses from the students showed that students were not afraid to handle a technology that was brand new with little to no instructions on using it for educational purposes (Tham, 2017). Similarly, students in my Spring, Summer, and Fall 2016 writing courses have tinkered with Google Glass and Google Cardboard to learn about visual-digital rhetoric, the rhetorical situation, and audience analysis. In Spring 2017, students in my advanced rhetoric/writing course—Rhetoric, Technology, and the Internet—had spent the whole semester investigating emerging technologies such as HTC Vive, Apple Watch, and Google Cardboard as ways of understanding the rhetoric of reality in virtual, augmented, and mixed simulations, and how that reality affects the way we compose and communicate.

Figures 4 (left) & 5 (right). Students tinkering with Google Cardboard and HTC Vive in an advanced writing/rhetoric course.

The willingness of students to explore new tools present an opportunity for us to integrate low-stakes activities as a way of teaching rhetoric and writing. Our experience tells us that integrating wearables like Google Glass for writing in the classroom challenges conventional writing instruction and learning practices (see Tham, McGrath, Duin, & Moses, 2016 for sample assignments). Students begin to consider and employ modalities other than their immediate textual and visual resources—using gestures, space, and other combined modes—to communicate ideas. Writing, as we know it, is critically examined and employed as a means to expression, presentation, and argumentation that is not restricted by the alphabets. As instructors, we have become more aware of the affordances of wearables in enriching the writing experience and are pushed to be more creative in designing learning activities that help students see the values—as well as limitations—of new composing devices.

To that end, I echo Clayton Christensen's (2013) approach of disruptive innovation—where innovation begins "with a perceived need or desire, a vision, and latitude to explore possibilities" (Borthwick et al., 2015, p. 91). This ground-up approach to adopting new technologies in any given sector—such as education—does not rely on hype but rather intrinsic motivation for exploration. I believe that we are on the brink of something new with wearables and higher learning; therefore, I contend that researchers should seize this opportunity to further investigate teaching with new technology and not get stuck at fear or mere astonishment over wearables.

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