Engineering the Future: Exploring self-reflexive thoughts in the virtual reality developer community and their considerations of privacy issues that will shape its future.

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People may tell you this [current VR technology] is the second coming. That this is the end. Not even close. I’m going to make you dream this, feel this, I’m going to make you smell this and forget that here is here. That’s where we’re going. I would say this is the Model T. We haven’t seen the Ferrari yet. (David, interview 2017)

1 Introduction

This essay explores the perceptions and attitudes of individuals in the virtual reality (VR) developer community at a micro-level. With this paper I aim to discover what types of issues are being discussed within the VR community and how their considerations of current technical advances impact related thoughts. Closer inspection of this topic is warranted by anthropologists because VR is poised to have a dramatic impact on society. Escobar has already made the case for anthropological study related to technology noting, “Computer, information, and biological technologies are bringing about a fundamental transformation in the structure and meaning of modern society and culture” (1999: 211). He further points out that, “Anthropologists might be particularly well prepared to understand these processes if they were to open up to the idea that science and technology are crucial areas for the creation of culture in today’s world” (ibid: 211).

Although we can only speculate about possible consequences, it seems reasonable concur with Blascovich/Bailenson (2012) who mention that VR has the potential to play a tremendous role in mediating people’s lived experience. This includes the capacity to transform the way we interact with each other, reshape the way we make meaning of the world and impact both existing and evolving power relations and power structures. A bevy of new technological affordances give today’s developers unique opportunities to create awe-inducing and potentially life altering experiences for virtual reality users. However, the usage and implementation of these affordances could come with a large metaphorical price-tag for society and the decisions developers make today could have ripple effects that reverberate far into the future. These considerations make developer reflections an important area of study.
For those unfamiliar with virtual reality, it will be helpful to have a brief introduction to the technology so I will provide a mere snippet of its history to offer some context before moving on to details about my research. It has been suggested that conceptual elements of virtual reality can be traced back to antiquity (Grau 1999). For the purposes of this paper though I find it more useful to begin with the 1832 creation of a cumbersome contraption that predates the photograph known as the stereoscope, which used mirrors at 45° angles to create optical illusions (Jerald 2016: 17). A couple decades later the inventor of the kaleidoscope David Brewster miniaturized the technology to create a consumer stereoscope product whose design is shockingly reminiscent of the contemporary Google Cardboard viewer (ibid: 18). Due to length limitations of this paper I must bring the conversation up to speed and jump to contributions made in the 1960s by Morton Heilig (who patented the Head Mounted Display or HMD), Tom Furness and Ivan Sutherland (ibid; Steinicke 2016) whose efforts helped the “U.S. Air Force and NASA ... build[d] [the] first VR systems intended primarily for training, simulation, and research” (Steinicke 2016: 6).

The term “Virtual Reality” (Heim 1995: 65; Jerald 2016: 26) was coined in 1986 shortly before the first wave of commercial VR took hold. A manic excitement for VR emerged in the early 1990s and predictions about its role in the future abounded but mass adoption by the general public never manifested. Jerald argued that the “technology could not support the promises of VR” (2016: 27) and Steinicke elaborated about consumer excitement fizzling because all they could see were, “a few colored polygons with low resolution and unacceptable latency” (2016: 7). VR companies shuttered their windows and the technology, as far as consumers were concerned, went into hibernation. Decades passed until the ubiquity of smartphones helped reenergize consumer VR because “high density display panels, gyroscopes, or accelerometers [are] built into most devices,” and “rapid
advancement in microprocessors and graphics cards” (Steinicke 2016: 7) meant that thousands of people could potentially use their phones to access mobile based virtual reality experiences. More importantly the emergence of sophisticated HMD hardware, starting in 2016 with Oculus Rift and HTC Vive, meant that early adopters with deep enough pockets could finally own the VR dream. Even though the Oculus Rift and HTC Vive HMDs currently retail for hundreds of dollars and additionally require a robust PC computer with a minimum price of around $1500, these costs pale in comparison to the 2010 list price of $24,900 for a nVisor SX60 system with comparable technical specifications (ibid).

2 Method

Preliminary research began by reading academic literature, observing live streams of VR conferences on Twitch¹ and watching developer talks on YouTube.² Additionally, I spent untold hours listening to podcasts, reading blogs, studying book excerpts and perusing news articles. I used this early research to inform myself about the way in which the larger scope of the VR community interacted with each other and also to become familiar with VR terminology and technical concepts. I started a Twitter account dedicated to immersive technology and joined several Facebook groups as well.

Fig. 1. Image by author. Meet Up Gathering. 2017, Digital photo. Los Angeles.

The participants I connected with belong to an interwoven community that is situated between offline and online environments thus I used both methods for observation and communication. I engaged in participant observation at Meet Up gatherings, technology conferences and networking events. I maintained extensive field notes and a journal during my research, which proved indispensable when I began organizing and sifting through my data. As suggested by

¹ Twitch.com
² Youtube.com
Boellstorff (2008) elicitation methods complimented my participant observation and I carried out a mix of structured and semi-structured single interviews ranging from 1-2.5 hours in length. Depending on participant preference, I conducted interviews in-person, over the telephone, via Skype video chat and as informal impromptu in-person conversations. Additionally, a couple of structured interviews occurred via email. With consent of participants, I recorded audio of the structured and semi-structured interviews which I later transcribed by hand. Although painstaking, I too found that this fostered an opportunity to get more intimate with the material (Boellstorff 2012: 110). After coding field notes, journal entries, transcripts and email responses two major themes emerged, access and privacy.

My own history with VR began as a wide-eyed kid during the short lived 1990s VR wave. Once it faded into an historical abyss now referred to as the “VR Winter” (Jerald, 2016: 27) I lost interest in the technology and thought it would remain a gimmicky novelty forever so I was filled with great trepidation during this modern day resurgence. I had my first encounter with present day VR while working for a film company that produced a highly regarded 360° video. Although it was an exciting undertaking, claims about the technology’s paradigm-shifting potential did not meet expectations and my feelings remained tepid upon observing relatively low resolution images with the Samsung Gear VR HMD. However, in the New Frontier section of the 2017 Sundance Film Festival I had my ‘ah ha’ moment - the kind that modern day VR proponents excitedly reminisce about. It was both the
creative uniqueness of the experience coupled with the better HTC Vive HMD that left me in awe. One particular piece left me giddy for hours and I could not stop thinking about it. At that moment it was clear to me that this version of VR was different. I became enthralled by the current state of the technology and was anxious to know where it was headed, how it might impact society and what kind of research I could get involved with. It was at the same festival where I met a Chief Experience Officer (CXO) of a VR company who initially agreed to let me explore opportunities for research at his company. Unfortunately, he cancelled our meeting at the last moment.

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The day we were finally scheduled to meet he cancelled on me. So, that has certainly been demotivating for me and leads me to believe future collaboration could be difficult and potentially not worth my time to attempt to research. Having put most of my research idea eggs in Chris’ company’s basket, I’ve been very anxious wondering what other VR research opportunities currently exist.

Concern started to mount with a looming deadline and I was frustrated and confused about what to do next. At the suggestion of an instructor I shifted my approach to find a different group of participants and went from there. Considering the duration of my research this essay should be considered a “mini-ethnography,” a term borrowed from a passage by Kahn’s professor (2011: 180). While I acknowledge that the short termed nature of my research is troublesome in regard to making concrete conclusions, I take the complications I encountered as a learning experience that will travel with me as I move forward in my scholarly pursuits.

Perhaps the biggest struggle I faced during my research was wrestling with the desire to a quote a sentence from one participant who specifically requested it not be used. I admit, there was temptation to just make certain the participant was completely anonymous because the statement was illuminating, insightful and provocative. However, in the end I decided to honor the participant’s request. My decision hinged more on knowing it would have been an unethical violation of trust rather than concerns raised by Bruckman, Luther and Fisesler’s (2015) about the likelihood of participants accessing anthropologists’ work with ease these days, although I recognize that is certainly true.

3 Access

I think we’re going to have this scenario where in the very beginning and this has been true of technology in the past you’re going to have this technology gap where folks that are experiencing the highest fidelity VR are people that can pay for it. And that experience right now from scratch would cost you something around 2,500 bucks and … the people that can afford to do that aren’t poor. And so … that’s another type of problem. (David, interview 2017)
A point reiterated by all participants was that access to affordable VR hardware is critical for mass adoption. The importance and availability of low cost mobile phone based VR hardware could not be understated. The two most referenced plug-and-play products were the Samsung Gear VR HMD (cooperatively produced with Oculus, who is owned by Facebook) and the Google Cardboard viewer. The Gear VR became available to developers in 2014 (Road to VR: 2015) and later to consumers for $200 (PC MAG 2014). The Gear VR requires a Samsung smartphone to operate and at the time of writing this paper the phone’s retail price hovers around $700. The second most recognized cost-efficient viewer was Google Cardboard, which also launched in 2014 and at the time was exclusively for use with Android phones. The initial price for Google Cardboard was $25 although the company released free downloadable templates and humorously suggested that people could make their own version using a pizza box (CNET 2014). In 2015, Google Cardboard introduced iOS functionality for Apple’s iPhone (Macworld 2016). Even though the Samsung Gear VR is superior to Google Cardboard both options are inferior experiences when compared to the PC enabled systems. Top of the line HMDs Oculus Rift and HTC Vive offer significantly better immersion but the costs are enormously higher. At the time of writing this essay, the costs range between $600 and $800, respectively. However, as previously stated the Oculus Rift and HTC Vive are not stand-alone devices and must be plugged into a robust PC computer system to work.
As Danah Boyd points out in discussing Rossler (2004), “People value privacy for diverse reasons, including the ability to have control over information about themselves” (2010: 12).

It’s very easy to give up a lot of information [using VR] and there’s just not been a lot of discussion publicly. And I think because mass adoption hasn’t occurred, it’s kind of a chicken-egg scenario where you’re not really talking about it cause not a lot of people care but when a lot of people should care we still may not be talking about it and it may be too late. (David, interview 2017)

The participant who was most vocal about privacy altogether had both the highest professional status and experience working in the VR field. Unsurprisingly, as a Chief Technology Officer (CTO) David was uniquely familiar with specifics about the evolution of VR and seemed to have unique access to information about where the technology was heading. His diverse knowledge and experience working across a range of sectors allowed for our discussion to traverse various topics from entertainment and education to philanthropic applications of virtual reality. When the topic of privacy surfaced he elaborated on something that I was completely unfamiliar with.
One of the unique things about privacy in virtual reality is what types of information can be collected about a user. It is duly noted that concerns related to technology and privacy exist irrespective of virtual reality (Marwick/Boyd 2014). However, different and perhaps more complex types of issues surface when considering privacy and virtual reality (Blascovich/Bailenson 2012; Madary/Metzinger 2016; O’Brolcháin et al. 2015; Steinicke 2016). It seems that only in the last year have issues of privacy in VR come to light in the public sphere and much of the news has been alarmist and dystopian (Business Insider 2016; Gizmodo 2016; The Intercept 2016). Concerns have even reached the policy level. United States Federal Communications Commission (FCC) Chairmen Tom Wheeler took note of privacy issues during his visit to Stanford’s VR lab (Stanford News 2016) and United States Senator Al Franken wrote an open letter to Oculus asking for them to clarify their privacy policy (Franken Senate 2016).

5 What is the big deal?

So, why all the fuss? The varying concerns are mostly related to biometric data tracking and collection. Body and eye gaze tracking are essential elements for VR functionality so the option to eliminate them is nil. In the near future we can also expect more sophisticated forms of biometric data analysis and tracking including things such as (micro) facial expressions, galvanic skin response (electrical skin conductance), electroencephalogram (electrical brain activity) and electrocardiogram (electrical heart activity). Developer excitement was palpable about integrating such technology to tailor a user’s VR experience by increasing or decreasing a game’s difficulty based on stress level monitoring, for example. This is but one of many possible usages. Blascovich/Bailenson point out that, “Virtual Reality provides
‘footprints’ that can reveal who a person is, what they plan on doing and whether they will succeed” (2012: 167-168). This goes far beyond gaming applications. It is not a stretch to assume that current intentions for collecting biometric data by large VR companies relate to enhanced marketing abilities (the modus operandi of Facebook who owns Oculus) but foreseeable trouble lies with the “‘dual use problem’ referring to the argument that any technology can be used for good or for evil” (Blascovich/Bailenson ibid: 227).

This is further complicated by something David told me related to photogrammetry, a scanning technology originally used to geologically survey and capture precise details about the surface of an object. It turns out, a human is one such object.

As we reach, you know, this kind of mass adoption area I don’t doubt that we’ll end up with either LIDAR or some kind of photogrammetry driven technologies on cameras or on VR headsets. Microsoft already showed something off. Imagine that I can scan you without your consent. Right, so we’re walking down the street and I follow you long enough … with my phone or whatever, I’ve now got a digital model of you and that digital model, if I’ve got the right application … these applications already exist. (David, interview 2017).

The impact of un-consented 3D body scans screams huge privacy issues for VR not to mention social, psychological, philosophical and even legal implications related to identity, self-image ownership and potential abuse by imposters. Possibilities for sexual exploitation exist, too. Pornographic websites³ already sell 3D body scans for VR and the phenomena of ‘revenge porn’ signals that sexual exploitation in VR could very well transpire. One of the reasons these issues are important for VR is because 3D body scans are already being used as avatars in virtual worlds. The technology is already quite good but Blascovich/Bailenson predict that “avatars will become perceptually indistinguishable from their flesh and blood counterparts in terms of how they look, sound, feel and smell.” (2012: 233).

A VR software developer had this to say about socio-cultural impacts a changing sense of privacy is already having,

There will be a lot of good that comes out of highly personalized experiences, but there are a lot of uncomfortable ways that complacency could be weaponized. We already see security neglect with people being unwilling to protect themselves against password theft, ignoring two-factor authentication, and that’s just the tip of the cyber-criminal. There’s an unwillingness to recognize just how identifiable you can be online and how easy it can be to link things together, especially if users aren’t taking the process of security seriously. It could also, though, fundamentally be a shift in how we think about a lot of societal issues and relate to each other - it’s easier than ever to find people who agree with us and form communities around that, so inherently, it could be a shift in how we perceive each other, either for good or for bad. (Lindsey, interview 2017)

She concluded on a positive note though and her comments echoed

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³ Example of a pornographic website selling 3D body scans for VR: vrgirlz.com
similar perspectives from other participants,

Right now, quite a few [VR privacy] conversations are happening in special interest groups and at different companies, and that’s a good step. Codes of conduct are fairly standard at physical-world events in the immersive technology space, but have yet to be strongly implemented and fully featured in many social worlds. People are working on it, which is extremely heartening. (Lindsey, interview 2017)

What I found particularly interesting is that these concerns are being raised by some developers themselves, albeit internally in their own community. This is compelling because past concerns about digital privacy have often been raised by journalists, scholars and privacy advocates. It often takes time for concerned citizens to pay any notice to these issues and they are rarely, if ever, brought up by companies themselves. Without transparent policies from VR companies or established legal frameworks related to VR privacy the public faces miniscule opportunities for awareness and may have a false sense of control over the collection and usage of data captured about them in VR. This stresses the importance of the VR developer community’s concerns about not having current guidelines.
At the moment, VR remains a niche consumer technology but predictions indicate that this is bound to change. Meanwhile, potential long term threats to user privacy exist based on current, and soon to be expanded, biometric data collected through usage of VR experiences. Additionally, concerns over abuse of realistic VR avatars could be warranted due to affordable consumer 3D scanning technology being on the horizon. Both of these factors exhibit a potential for dramatic socio-cultural implications. Some members of the VR developer community are voicing concerns over these issues and that seems like a positive thing. However, just having discourse about privacy will simply not be enough if they truly want to have agency over their role in shaping the future. One hopes that dystopian viewpoints will not seize the conversation, nor the future, but their conversations will need to move into action and quickly it seems if concerned developers truly want to protect what is perceived by some as a vulnerable future. Perhaps inspiration can be drawn from the academic community who recently set forth self-imposed guidelines regarding ethics related to VR research (Madary/Metzinger 2016).

Fig. 8. Road to VR Re-tweet by Twitter user. Privacy in VR is Complicated and It’ll take the Entire VR Community to Figure It Out 2017, iPhone screenshot (accessed 20 March 2017). Twitter.
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