Moral Arguments on Engineers' Actions when Desigining Social Media for Addiction

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction

Social media is designed for addiction. Andreassen and Pallensen (2014, p. 287) define social media addiction as "being overly concerned about social media, driven by an uncontrollable motivation to log on to or use social media, and devoting so much time and effort to social media that it impairs other important life areas." Technology companies are purposefully designing their product and algorithms to be as addictive as possible due to the competitive nature of the social media platform landscape. The engineers who write these algorithms contribute to this addiction by purposefully designing their algorithms to be as addictive as possible. Since all social media sites are vying for a limited resource, the user's time, if a user switches from one platform to another, the first one loses out on business. In a competitive market that is expected to be valued at "$43.39 billion dollars in 2022," this means that the company with the most addictive algorithm would make the most money because users would be spending the most time on that company's platform (Social Networking, n.p.).

By designing for addiction, big technology companies have an extremely strong hold on their users' lives because of reliance on the company's product. Kirik et al. (2015, p. 111) states that reliance turns into social media addiction if it is an "unhealthy dependence" and "ruins daily, social, and working life." Everyone can find content on social media platforms that they are interested in, leading to addiction. However, there is a certain subset of the population that is disproportionately affected by and targeted by the addictive nature of social media platforms.

This subset of the population are teenagers. Many teen lives are affected by extensive phone and social media usage, which inhibits their daily functions and severely impacts their future. It also impacts their mental health in a multitude of ways. If this is not explored, there

could be even more destructive phone habits found in later generations where there is an even greater reliance on social media and online media because they have grown up with technology. Engineers have an important role in social media addiction because they design the algorithms to be addictive, which reflects the need for an emphasis on moral responsibilities and ethics in technology company cultures. This paper examines the ethics behind technology companies designing their products and algorithms to be addictive and the impact social media addiction has on different populations to understand why certain populations are disproportionately affected.

Understanding Social Media and Addiction

Technology companies purposefully design their product and algorithms to be as addictive as possible so users will spend the most amount of time on their platform, generating revenue for the company through advertising. McNamee (2018, n.p.) states that these technology companies use "techniques common in propaganda and casino gambling, such as constant notifications and variable rewards" to make their platform addictive. These techniques paired with instant gratification make social media platforms posed to easily foster psychological addiction.

Woodward (2022, n.p.) found that over 210 million people worldwide suffer from social media addiction, which is 4.69% of the 4.48 billion total social media users in the world. In the United States, experts estimate that about 10% of social media users are addicted. Of all the age groups that use social media, Gen Z and Millenials are the biggest social media users and teenagers are found to be the most affected by social media addiction. Older aged people in the range 65+ years old are the least likely to be addicted because they never adapted to social media like the other age groups while teenagers ages 15-16 years old are the most prone to develop internet addiction.

With young impressionable minds, social media platforms prey on teenagers' "tendency to be impulsive, their need for a widespread and growing social influence, and the necessity for them to reaffirm their group identity" (Corporativa, n.p.). Andreassen et al. (2017, p. 288) describes social media as a platform where this younger generation can "explore and develop their identities and culture without interruption from parents or those in a position of authority." This is something specific to this age group, making them more prone to social media addiction.

Teenagers and young adults also suffer the most from the fear of missing out (FOMO). Through using social media, young users attempt to find connections online and feel like they are a part of a larger online community. Social media enables this by allowing its users to stay continually connected to what others are doing. This fosters a feeling of needing to stay up-to-date with the activities of their social circles at all times. If they don't, they feel left out of their friend circle, cementing social media as an integral part of their life. Fear of missing out thus feeds social media addiction because social media plays a crucial role in the leisure and social lives of teenagers and young adults and makes them feel in the loop of what is going on in their social circles.

In addition to FOMO, traits that makes people more susceptible to social media addiction include "low self-esteem, personal dissatisfaction, depression and hyperactivity, and [a of] lack affection" (Corporativa, n.p.). This once again fits the category of young people. This group of the population is going through many life stage changes and commonly exhibit the characteristics listed above. This leads to extensive social media use because once again, they yearn to be accepted and wanted so they try to find connections online. This is also related to the echo chamber effect. Once a user expresses an opinion that the algorithm can pick up on, the algorithm will recommend the user content that fits their view. Their opinion will be echoed back

through these recommended videos, reinforcing their individual belief system and declining exposure of the user to other opinions such as dissenting views, thus making them feel like they are accepted. This acceptance is a feeling that they can't get elsewhere, which encourages their social media usage.

The Family Institute at Northwestern (2020, n.p.) found that teen girls' mental health is disproportionately affected by social media addiction and that social media addiction is significantly higher amongst young single women. Young girls are especially affected by social media because they are attached to the content that they post. Compared to boys who typically share things that are funny or entertaining, teenage girls are "really using social media to connect with other people" (Northwestern The Family Institute, 2020, n.p.). They yearn for a feeling of belongingness. Young teenage girls use social media to present themselves how they want to be seen, but this makes them worried about how others perceive them. So it is no surprise that this negatively impacts their mental health, mainly their body image. The external pressure on girls to look a certain way due to societal standards and social media only exacerbates this issue.

There are markers found in social media addiction that are the same as identifying any addiction such as social isolation, preoccupation with your next "fix", allowing addiction to take up time, increasing use/substance, hiding your use of substance, anxiety, depression, irritability, isolation, and loss of control (RehabCenter, 2019, n.p., Corporativa, n.p.). An experimental study concluded that people in a Facebook addiction study: "have a hyperactive amygdala-striatal system, which makes this 'addiction' similar to many other addictions" but "do not have a hypoactive prefrontal lobe inhibition system, which makes it different from many other addictions, such as to illicit substances" (NHS, n.p.).

Social media is found to be more addictive than traditional products associated with addictive behavior such as alcohol, drugs, and cigarettes. This is because access to them is simple and free. Bhargava and Velasquez (2021, p. 321) labels social media as an attention-economy business which means that it hinges on keeping users active on a platform for prolonged periods of time. Since the company makes money off of advertisement, they want an engaged audience because the longer a user spends on the platform, the more likely they are to be exposed to, influenced by, and engaged with advertisements so the company can charge the advertisers (Bhargava & Velasquez, 2021, p. 321).

With a product that has such a high likelihood for addiction and with a growing number of cases around the world, social media companies should feel responsible and take action to prevent and minimize the possibility for addiction. Analysis of the moral and ethical responsibilities that software engineers who code social media platform recommendation algorithms have show that currently these engineers are not acting in accordance with their own moral principles.

Interactions Between Engineers, Executives, and Users

Using Neeley and Luegenbiehl's discourse framework along with virtue ethics as a system, this paper explores how engineers at big technology companies do not recognize ethical issues. Neeley and Luegenbiehl's (2008, p. 248) framework discusses how groups and organizations should "move beyond the discourse of inevitability" and towards "emphasizing an ideal of individual ethical responsibility in team-based and large-scale engineering design." Although broad, Neeley and Luegenbiehl's discourse framework can be applied to big technology companies that make social media platforms.

Neeley and Luegenbiehl (2008, p. 247) state that “larger-scale forms of technological development … are typically seen as being out of the control of individuals.” This is very true in the case of big technology companies. In big technology companies that make social media platforms, there are three main actors in the platform network.

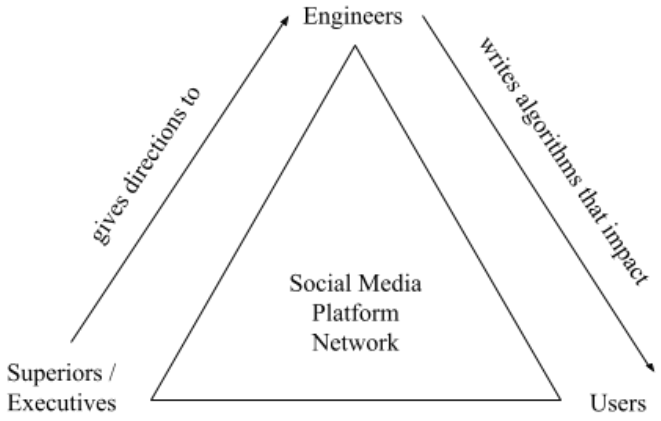

Figure 1: Executives give directions to Engineers who write algorithms that impact Users (Created by Author)

The first main actor is the users who use the social media platform. They have the potential to become addicted to the social media platform and are the ones targeted by the other two main actors. The users are motivated to use the product due to reasons such as FOMO and the longing to belong. The second main actors is the software engineers who code the algorithms for the social media platforms. They are the ones who actually write the algorithms that impact the users by making the social media platform addictive and are motivated by personal gain. They must listen to their superiors in order to keep their job. The third main actors is the superiors of the software engineers, or the executives. They are motivated by monetary gain and are the ones that drive their platform to be as addictive as possible. By having a platform that is

the most addictive, the platform will have the most amount of users and be successful and profitable.

When the user decides to use the social media platform, the algorithm can then learn the user's behavior. The algorithm is then able to personalize the user's feed and recommend content to the user that is to their liking, which in turn encourages the user to spend more time on the platform. The user's actions determine how much control the big technology company's product has on them. However, it is not entirely the result of the user's actions that contribute to if a user gets addicted to social media. The software engineers who wrote the code for the algorithm as well as the executives who push for a successful platform are also responsible.

However, in a company structure, especially a large company, an individual may easily feel like they are not responsible because they do not wield any power. This is especially true in this case since superiors/executives interact with the engineers by giving orders to them as subordinates. So even if they know how their algorithm contributes to social media addiction, they feel like as an individual, they don't have much influence on the product and thus do not share the burden of the responsibility.

This is something highlighted by Bhargava and Velasquez (2021, p. 342) who champion "not divorcing business ethics and engineering ethics". While the specific issues of how exactly to design a social media platform may turn on questions of engineering and its ethics, many of these decisions are made by the company's managers and are prompted by the incentive structure of the company (Bhargava & Velasquez, 2021, p. 343). This relates to virtue ethics as a system where "be conscientious, foresee consequences, maintain moral autonomy, and accept accountability" makes a system an ethical system (Martin & Schinzinger, 2005, p. 72).

Be conscientious	A primary obligation to protect the safety of and respect the right of consent of human subjects
Forsee consequences	A constant awareness of the experimental nature of any project, imaginative forecasting of its possible side effects, and a reasonable effort to monitor them
Maintain moral autonomy	Autonomous, personal involvement in all steps of a project
Accept accountability	Accepting accountability for the results of a project

Table 1: Four elements of morally responsible engineers (Martin & Schinzinger, 2005, p. 72)

Being conscientious means to "protect public interest, welfare, and safety; respect the right of informed consent; and design systems so that they have a safe exit" (Martin & Schinzinger, 2005, p. 72). Users of social media do not fully read the terms and agreements and since social media algorithms are designed to be addictive, they have no safe exit and don't know how dangerous addiction to the platform/product is. This is problematic on part of the software engineers and executives because it unjustifiably harms users in a way that is both demeaning and objectionably exploitative (Bhargava & Velasquez, 2021, p. 335).

Virtue ethics as a system also includes accepting accountability for the results of a project. Martin and Schinzinger (2005, p. 77) describe this as "taking responsibility for your actions, recognizing the obligation to explain your reasons, [and] viewing yourself as part of some larger enterprise that has authority to set standards." The software engineers who work on social media algorithms should be held responsible for unintended consequences, which includes social media addiction. They should feel compelled and empowered to speak up if they think that

the degree to which the algorithm is designed to be addictive is dangerous and they should have some input and feel responsibility for the results of their project.

However, this presents a conflict of interest for software engineers in traditional technology companies such as big tech companies. Since they want to have job security, they must follow their superior's orders, which means that they must make the platform as addictive as the superior wants it. But if they believe that is a degree to which it is dangerous, there will be internal conflict. In virtue ethics, Martin and Schinzinger (2005, p. 72) state that the engineer must maintain moral autonomy and have autonomous, personal involvement in all steps of a project. This means to "think critically about expected customs and practices, commit to acting in accordance with your own moral principles, [and] "own" your power to act" (Martin & Schinzinger, 2005, p. 75). Martin and Schinzinger (2005, p. 72) highlights the importance of acting virtuous and speaking up against those in power.

Analysis of Moral Arguments on Engineers' Actions

In this section of the paper, the extent to which virtue ethics as a system and the effect of understanding the effects and harms of social media addiction impacts engineers' behaviors will be examined. The scale at which the business operates and how that impacts actions of engineers will be investigated using one specific case as an example. Earlier in the paper, Matthew Woodward's blog was cited for the statistics on social media addiction. Matthew Woodward runs a business increasing traffic and sales of digital businesses focusing on search engine optimization and link building. As cited from his website, Matthew Woodward (n.p.) can help "create an intelligent SEO strategy, diagnose your SEO problems, [and] recover from search penalties."

In big tech companies, as explained in the previous section, software engineers do not feel like they have much influence. As a small fish in a big pond, they think that there is nothing they can do because they have now power. However, since Matthew Woodward is a consultant helping a small company, he should feel much more responsibility compared to a software engineer at a big technology company. He has much more influence on the business through the services that he provides and can make a big difference. As a result, this is a good case study to examine if awareness of the harm algorithms can have impacts engineers' actions.

In "Ethics of the Attention Economy: The Problem of Social Media Addiction", Bhargava and Velasquez (2021, p. 328-338) identify three main moral arguments against social media and how social media platforms and algorithms are contributing to addiction. These are detailed in the table below using an explanation of each argument. These arguments are cross-examined with Matthew Woodward's website to see if awareness of the harmful effects of addictive algorithms have an impact on how he runs his business of increasing traffic to digital businesses. For each argument that Bhargava and Velasquez make, key findings on Matthew Woodward's website are listed.

Argument	Explanation	Key Findings
Harm Argument	As the addicted person devotes more time to social media, the individual will necessarily have less time to devote to school, work, sleeping, caring for himself or herself, interacting with family, and face-to-face socializing with friends.	There is an identification of harm and even an explanation of the consequences of social media addiction, but there is no mention of how to mitigate the harm in his statistics post. Similarly, there is no mention of this in the rest of his blog.
Adding Insult to Injury Argument	User's engagement with social media produces an addictive feedback loop: the more one uses the platform, the more data the platform's algorithm has about what keeps that particular user engaged, and the more the algorithm feeds that particular user precisely the content that will keep them engaged even longer, and so the more addictive the platform becomes for that particular individual.	This idea is reflected in his blog in that one of the services he provides is advising clients on how to build backlinks. Backlinks drive more traffic to a particular site and is a way of keeping a user engaged online. This is the exact opposite of what the argument makes because if a user is addicted to a site, having a link to that particular site show up in other places would fuel that addiction and remind the user to click on the site and return back to it.
Exploitation Argument	Social media companies exploit the desire or craving to use their platforms that is the result of becoming addicted to those platforms, and the companies profit when this craving leads their users to engage with the platforms. The pervasiveness and importance of the internet in our lives create an inescapable vulnerability to exploitation that makes addicting users to social media especially invidious.	This is identified in his statistics post but there is no mention about what is done to avoid this exploitation. Additionally, there are no suggestions for how others can avoid doing this to users in the statistics post or elsewhere on his blog.

Table 2: Moral arguments against addictive social media platforms as explained by Bhargava and Velasquez and the effect of it on an engineer's actions (Bhargava & Velasquez, 2021, p. 328-338).

Backlinks are links from one website to another and are considered votes for a page in search engine rankings. Thus, a site with a large number of backlinks has high organic search engine rankings.

Due to the harms associated with internet addictions, it is wrong to use these algorithms to addict users. Bhargava and Velasquez state that the benefits can not justify the assaults on human dignity that result from the harms associated with those addictions. Additionally, they state that the users of social media platforms are injured in a way that is demeaning, thereby adding insult to the injury. Finally, they argue that addicting users to social media constitutes a

particularly objectionable form of exploitation. Despite these moral problems, the business incentives drive engineering behavior. However, business ethics and engineering ethics should not be viewed as divorced from each other. Rather, design and engineering ethics are also business ethics. In the case of the internet and addiction, engineers who work on increasing usage of a site or platform by monopolizing on a user's time are inflicting harm on the users. It is morally wrong by design and it also is wrong to implement this in business and use it in practice.

Through analysis of Matthew Woodward's blog, it is revealed that even if an engineer is aware of the moral arguments made against addictive social media platforms and has power to make a difference, they do not act on it. After analyzing the social media addiction statistics post that Matthew Woodward made along with the rest of his website, particularly the testimonials, it was found that although the arguments were identified in some way, meaning he was aware that these problems existed, they were not addressed. This illuminates how business ethics and engineering ethics should be intertwined.

Conclusion

The actions of engineers in the technology field working with social media, specifically recommendation algorithms, currently show a lack of moral responsibilities and ethics. Through a case study analysis of Matthew Woodward and his consulting business aimed at increasing traffic to particular sites, it has been found that even with an awareness of the moral issues of certain practices, the business incentives will win over. Due to the competitive nature of the social media business and the internet in general, this is a phenomenon that can be generalized to the entire industry. All companies face this exact same dilemma.

This is an even more apparent and greater issue for a big technology company. The engineers who work on the recommendation algorithms are just one individual in a big corporation. They would feel like they have a smaller influence on the business than Matthew Woodward does and thus an even smaller responsibility. Individuals are not currently acting in accordance with their own moral principles. This makes change in attitudes and behaviors even more difficult.

However, there may soon be a fix to this problem. Social media addiction is recognized as an issue that needs to be addressed. Social media companies are not currently being held responsible for their business practices and they need to be. This is due to the fact that there are no regulations around social media right now. As a result, there needs to be government intervention.

Congress could use these conclusions in part of a decision-making process on designing regulations for big technology companies. Particularly, this could help the Filter Bubble Transparency Act that would "require platforms to offer a version of their services where content is not selected by "opaque algorithms" that draw on personal user data to generate recommendations" (McCluskey, 2022. n.p.). These findings would advocate for regulating these companies that make social media platforms and for the Bubble Transparency Act. Additionally, engineers in technology companies can use these results when thinking about the products that they create and design and the impact that it has on people in society who use the products. This will emphasize the importance of morals and ethics when designing for addiction.

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