We are living in an era of widespread digitization. As technology rapidly advances, it increasingly infiltrates all aspects of our lives, from the mobile phone we check first thing in the morning to the washing machine that sings with every completed cycle. These devices were developed to streamline our lives: mobile phones are clocks, calendars, cameras, and more all in one handheld device; washing machines do a fantastically thorough job without the need for us to get our hands dirty. The latter specifically is an example of automation, which refers to the mechanization of tasks formerly performed by humans. Like a washing machine, automation is meant to save us time and energy. It often eliminates the need for strenuous physical labor, and works faster than a human would be capable of. In the case of manufacturing it also means higher production rates, more items for consumers to buy, and more money for big corporations. But what of the workers whose place in the assembly line has been taken by a machine?

Technology is as disruptive as it is innovative. Over the course of several hundred years, technology has continuously transformed the world of work as we know it, and in doing so has repeatedly shaken the social, political, and economic structures of society. Since the first Industrial Revolution of the 1700s, automation has been one of the greatest agitators; wielded as a threat by employers everywhere to keep workers from advocating for themselves. The looming possibility of inevitable mass job displacement at the hands of machinery has resulted in centuries of persistent anxiety, and the concept of human workers as expendable and easily replaced by automation has spurred countless labor movements and academic research.

Modernity has shown us that digitization and automation can spread much farther than factories and manufacturing. Although it has certainly caused the displacement of workers, it has also created countless new opportunities for today's workforce, such as the gig economy and microwork. But some have raised the argument that these opportunities do

more harm than good, and have enabled major corporations to develop new ways of exploiting workers. This essay seeks to further explore the ethical, legal, and social issues surrounding the increasing digitization and automation of labor, and how technology is changing the world of work as we know it, for better or for worse.

Although the digitization and automation of work has resulted in higher productivity and generally more convenient living, it has also caused a variety of complications for the modern workforce. It has facilitated new forms of worker exploitation by major corporations through the gig economy and microwork, and has the potential to create socioeconomic crises such as mass job displacement and the polarization of wages.

Before we begin to discuss workplace automation in a contemporary setting, it is important to provide brief historical context. The first Industrial Revolution, which began in England in the 18th century and spanned well over a hundred years, saw steam power and mechanized production transform Western society through increased production and urbanization (Philbeck & Davis, 2018). But these changes were not welcomed unanimously, as demonstrated by the Luddite movement of the 19th century. The Luddites, a group of English textile artisans, destroyed textile machinery in protest of what they believed was the destruction of their way of life (Autor, 2015). Their anger is understandable. One of the biggest ways automation boosts productivity in manufacturing is through the division of labor: as larger tasks are separated into multiple sub-tasks, they inevitably lose some of the skill required to perform them.

For example, if one human worker is responsible for sewing buttons onto a jacket, they would have to sew each individual button onto the fabric one at a time. There would inevitably come a point where the worker would have to pause and re-thread their needle, or fix any possible mistakes they make. These lost seconds may seem insignificant, but time is incredibly valuable in manufacturing. A machine would be able to sew all the buttons onto

the jacket simultaneously, and periodic maintenance would ensure that it had the necessary amount of thread to complete each day uninterrupted. The human worker who initially landed their job through demonstration of sufficiently rapid sewing skills would be effectively replaced. It is possible that they could undergo training and fulfill the maintenance role required by the new machine, but that is up to whether or not the employer deems them worthy of the necessary time and money. Capitalism thrives off of paying the least amount of money possible for the most amount of work (Taylor, 2018), so it is likely that even if they were switched to the maintenance position, their wages would drop. After all, they are no longer threading needles and attaching individual buttons by hand, but simply reloading a machine, which doesn't require much skill at all.

The mechanization of factory manufacturing in the Industrial Revolution can be viewed as the first major case of workplace automation. From the power loom to assembly machines, automation primarily began to make its mark by completing tasks faster and better than human workers. This unprecedented efficiency and productivity not only delighted the public with a wider variety of items and cheaper prices, but spurred a wave of entrepreneurs to pursue further developments in automation (Philbeck & Davis, 2018). The infinite possibilities of technology had charmed the masses, and would continue to do so for the next few centuries. The more complex it became, the more the world changed, and the less consumers sought to understand it. Most people were content to simply accept new gadgets and processes as gifts of modern innovation, with little regard for how or why they work.

Companies utilize this lack of curiosity surrounding technological innovation to exploit human workers. In her 2018 article "The Automation Charade," Astra Taylor introduced the term "fauxtomatons:" invisible humans who do what many would believe is the work of algorithms. This usually involves screening and censoring digital content by flagging traumatic images; consequently preventing them from flooding popular online

platforms such as Facebook and YouTube (Taylor, 2018). Sorting through an endless stream of vulgarities and violence, showing algorithms how to identify specific objects, labeling videos, and other menial digital tasks can be referred to as “clickwork” (Jones, 2021a).

The automatons performing clickwork are often located in the slums and refugee camps of poorer countries, where they access these jobs through shady sites that operate under “neutrality;” meaning they won’t be involved in disputes between workers and employers. Neutrality also allows employers such as Google and Microsoft to move anonymously through these sites, offering questionably paid tasks to whoever is desperate enough to take them, and then leaving without a trace. Because employers want to maximize the amount of tasks completed in the shortest possible time frame, sites also allow them to create time limits on tasks. But these time limits are often concealed from workers, and as they struggle with unreliable internet connection, server issues, and other problems beyond their control, they often find that the tasks they accepted took longer than expected, and will now go unpaid. Workers who dare to raise complaints over unfair treatment can be penalized with expulsion from the site, usually without notification (Jones 2021b).

Despite the obvious ethical and legal concerns surrounding clickwork, it is openly promoted by the World Bank, who claim these opportunities of “micro employment” can become a social ladder for the world’s most disadvantaged communities. By performing this low-paid digital labor for companies located thousands of miles away, these individuals will learn valuable technological skills that could eventually lead to more traditional employment. In reality, there is little evidence of workers achieving social mobility due to micro employment (Jones 2021a). Microwork comes with no benefits, stability, or security. It is not a revolutionary new form of employment, nor is it capable of guiding victims of global conflicts toward a better life. It is simply the modern continuation of a persistent historical phenomenon: the targeting and exploitation of vulnerable groups by large corporations

seeking cheap labor. In the Industrial Revolution it was children being carted off to coal mines and the assembly line, in the 21st century it is refugees and other impoverished individuals staring at a screen. Both groups are rendered totally helpless by their employers, and any sign of dissent or protest means losing a vital source of income. Employers have no issue getting rid of them, because they know there will always be someone equally as desperate waiting to take their place.

Technology has created wider and less regulated avenues for companies to source workers, and they are able to do so with little scrutiny from consumers, who blindly engage with the products of fauxtomatons and microwork as part of their everyday life. Consumers will spend hours scrolling through generally pleasant social media platforms and click on bridges and cars to prove they are not robots while completely oblivious to how these features function in the first place. They believe that it is all the work of complex, advanced algorithms designed by the geniuses of Google and other big names; work that is totally beyond the comprehension of an ordinary person such as themselves. It helps that these big names have built a reputation for themselves as innovators of tomorrow; powerful entities who have revolutionized life as we know it and will continue to do so. They have given us fun new forms of entertainment, near infinite databases of knowledge, and more. Consumers will rarely trouble themselves with how their inventions were made as long as they continue to work.

In addition to the goods that we consume, the services that we use have also been transformed by digitization and automation. With a few taps, we can not only order takeout or food delivery, but we can organize rides and book vacation accommodation. Individuals offering up their own personal services on online platforms such as AirBnB and Uber is what can be referred to as the gig economy. In recent years, the gig economy has expanded to become a significant presence in today's workforce. A survey conducted by the University of

Hertfordshire showed that in 2019, around one in seven working-age British adults had at some point worked for a gig economy platform (Partington, 2019). A report by the University of Hertfordshire and the consultancy BritainThinks found that in 2021, this number had gone up to nearly one in four working-age adults (Butler, 2021). Gig work is often focused in urban areas, and usually occupied by individuals younger than forty (Partington, 2019). The specific platform being used acts as an intermediary between the worker and the consumer, with each completed service treated as its own separate contract (de Ruyter, et al, 2018).

The gig economy promotes itself as an opportunity for people who wish to be self-employed and have the freedom to choose where and when they work. Apps such as Uber and Deliveroo draw workers in with the promise of flexibility and not having to answer to a manager. Although drivers and couriers may not be receiving instructions from someone face to face, they are not necessarily enjoying total independence, either. A case study conducted between September of 2014 and December of 2015 found that the Uber app utilizes algorithms as a tool to both indirectly control drivers and distance them from the Uber company. Uber communicates with drivers through email, text, and app notifications. The latter specifically are a constant presence in the lives of drivers; they encourage them to check into the app multiple times throughout the day, and inform them of peak ride request hours (Rosenblat & Stark, 2016).

However, when the app shows available rides to drivers, it often withholds the passenger's destination and how much they will pay. Drivers are allowed a very tight timeframe of about fifteen seconds to accept the ride, which results in frequent "blind ride acceptance." Even if drivers later determine that a ride is unprofitable, they risk account deactivation for canceling those rides in favor of more profitable rides (Rosenblat & Stark, 2016, p. 3,762). This situation is eerily reminiscent of the way that clickwork sites place unreasonable and undisclosed time constraints on tasks, and threaten to meet any worker

complaints with site expulsion. Both scenarios result in the worker being forced to accept that they will often be paid less than they would hope for, and both are possible due to the careful design and implementation of algorithms. In addition to blind ride acceptance, the study also found that Uber tends to set minimum fares as low as $5 for busy locations; supposedly to entice customers. After the deduction of commissions and other fees, it is possible that a driver in Savannah, Georgia could have made as little as $3.20 per ride in 2015 (Rosenblat & Stark, 2016, p. 3,762).

Like most gig work platforms, the Uber app is structured so that drivers are compelled to take on as many rides as possible in order to make a profit, pushing themselves to the limit and working for long hours to receive unpredictable wages. But while Uber has numerous digital channels to contact, influence, and monitor their drivers, drivers struggle to contact Uber and receive responses beyond those generated by a template. Uber specifically refers to their drivers as “driver-partners” rather than employees, so as to further separate Uber drivers from the company. If drivers do not possess official employee status, then Uber is not obligated to treat them as such, meaning drivers are not entitled to traditional job benefits, protection, or even the right to negotiate the terms of their work. Just as clickwork sites hide behind the strategic status of neutrality, Uber treats drivers as independent contractors who are working for themselves through the Uber app. In legal disputes, Uber will always prioritize the customer above the driver, and blame any issues of driver payment on software connectivity issues rather than algorithmic inequality (Rosenblat & Stark, 2016).

The rapid growth of the gig economy was made possible by a simple case of supply and demand. As corporations created apps and platforms that would provide on-demand goods and services, consumers eagerly took advantage of these new conveniences. Workers, drawn in by promises of freedom and flexibility, migrated to the apps and platforms to meet the increasing requests of consumers. The acceleration of gig work has outpaced the

progression of the rights and protections that are necessary to prevent workers from being exploited. By manipulating the rhetoric of independence to dissociate workers from the company, and blaming pay and other business disputes on the shortcomings of software, Uber and other gig economy giants utilize digitization to commodify and mistreat workers.

Alongside technology, the relationship between work, society, and the economy will continue to change. Capitalism, like software, is constantly updating (Mokyr, 2013). We are living in an age of unprecedented interconnectedness, access to knowledge, and emerging breakthroughs in advanced technological fields such as artificial intelligence and robotics. We may refer to this period in time as the "Fourth Industrial Revolution," a term coined by Professor Klaus Schwab of the World Economic Forum in 2015. According to Schwab, we have previously experienced three industrial revolutions, each characterized by their own specific technological advancements: the First Industrial Revolution and steam power, the Second Industrial Revolution and electricity, and the Third Industrial Revolution with electronics and information technology. The Fourth is the continuation of the Third, and "represents a series of significant shifts in the way that economic, political, and social value is being created, exchanged, and distributed" (Philbeck & Davis, 2018, p. 17).

Earlier in the essay, it was stated that one of the primary concerns surrounding automation and digitization in work is the possibility of mass job displacement. The issue of technology and unemployment is not as simple as the former directly causing the latter. Although automation and digitization does jeopardize routine occupations such as bookkeepers and secretaries (Peetz, 2019), it also creates new opportunities in fields like software development and user interface design. However, these roles usually require a higher skill set and formal education or training. On the other end of the spectrum, low-skill jobs that complement automation, such as technical assistants (or the machine threader from our mechanized sewing example), have multiplied (Autor, 2015). In between high-skill and

low-skill occupations, the “middle-skill” jobs are being rapidly emptied out by technological change (Scarpetta, 2018, p. 52). The polarization of the types of work available and the pay they result in pose challenges to both the workforce and the government.

Workers who are displaced by automation may struggle to find employment again due to a variety of factors, such as their age or physical location. In the case of the former, managers may prefer to hire younger individuals with more desirable credentials; employees who they view as worth the time and money it would take to train them to deal with the machinery. In the case of the latter, it is possible that entire areas will become dominated by specific types of manufacturing, which would leave workers with incompatible skills and qualifications stranded. It has been shown in the past that this “structural unemployment” is best dealt with by governments capable of actively training and retraining displaced workers, “because the market will not do it, left to itself” (Peetz, 2019, p. 96). It is more than likely that the Fourth Industrial Revolution will leave many workers displaced and struggling to re-enter the workforce, but there are ways to approach this issue.

In the 1970s, Singapore began to push for increased automation throughout its electronics sector as a way to compete with overseas manufacturers. By encouraging both automation and the further education and training of workers, Singapore was able to successfully incorporate technology into the industry without sacrificing human labor. Surveys conducted in the 1990s showed that after undergoing training and adjusting to their new roles, a majority of electronics workers felt their skillset had been advanced by the introduction of technology rather than rendered useless. Workers were able to experience greater satisfaction from their daily work, and arguably better job security, as it was unlikely employers would let go of employees they invested resources to train. When the industry experienced a labor shortage of skilled workers, employers adapted by training less qualified

but technically inclined workers, and established annual certification tests to continuously reinforce their skills (Yun, 1995).

The Fourth Industrial Revolution will result in the erasure of certain jobs and the polarization of what remains, but we are undoubtedly capable of mitigating some of these issues, as demonstrated by Singapore. It is possible for the workers with the greatest risk of being displaced by automation – those who formerly occupied routine, "middle-skill" positions – to be effectively reintegrated back into their respective industries. Investing in the training and retraining of the workforce is the key to reaping the benefits of technology whilst compensating for the inevitable losses that will come with it. Although workers may initially experience pressure and anxiety with handling expensive equipment (Yun, 1995), or "automation tension" in the words of Henry Winthrop (1958, p. 406), their new positions ultimately benefit them with greater job security and wages. To avoid worsening existing inequalities, we must strive to implement automation on our own terms (Dellot & Balaram, 2018).

Technology brings change, for better or for worse. It has transformed every aspect of our daily lives, from the way we live to the way we work. But the processes of automation and digitization that provide us with modern conveniences like on-demand food delivery and social media are often more closely intertwined with human workers than we may be led to believe. Workers from the poorest parts of the world, usually victims of civil unrest and war, are often the ones who perform the menial digital tasks algorithms cannot. These fauxtomatons, hidden from consumers behind the facade of elite technology, are exploited by corporations such as Google and Microsoft who take advantage of their desperate situations to pay them abysmally low wages. They supply these clickwork tasks on shady third-party websites where a policy of "neutrality" allows them to exercise anonymity and deny workers any semblance of a voice or protection.

Similarly to microwork, the gig economy manipulates the concept of independent, flexible work as a way to dissociate gig workers from companies and subject them to unfair policies and payment. The online platforms that form the basis of the gig economy are framed as intermediaries that connect gig workers to customers; any profit gained or lost can be attributed to the app, not the company. In the case of profit gained, employers such as Uber are able to present these service-by-service successes as products of their own ingenuity. In the case of profit lost, Uber can blame disputes upon the complexities of technology, and the driver's inability to properly utilize them. This tactic of neglecting responsibility is made possible by the physical and legal distance between Uber and their "driver-partners" and unequal systems of communication.

One of the most significant ways that automation has changed the world is its incorporation within the manufacturing industry. Since the Industrial Revolution of the early 18th century, automated machinery has proven itself worthy of replacing human workers through increasing production rates and improving the overall quality of output. The threat of mass job displacement that has spurred hundreds of years of anxiety is very real, and it has happened in the past. Middle-skill, routine jobs were widely erased by automation, whereas low-skill maintenance and high-skill professional occupations experienced a boom. The polarization of the job market has the potential to permanently unemploy large numbers of workers, but there are ways we can approach this problem, such as implementing structured programs to continuously train and retrain the workforce to meet the constantly changing requirements of automation.

The automation and digitization of work has saved us time, energy, and money. It has rendered numerous occupations irrelevant, but also created countless new jobs, some of which involve significant power imbalances between employers and employees that leave workers vulnerable. But the complications to the workforce caused by technology are not

impossible to manage. If we embrace automation and digitization on our own terms, if we continue to prioritize and investigate the welfare of workers in these new digital occupations, then we will be able to enjoy the benefits of modern innovation while worrying less about how they came to be in our hands. In the words of Daniel Akst: “The robots will surely keep coming, and keep doing more and more of the work we have long done. But one thing they won’t be able to do – at least not anytime soon – is tell us what we owe each other” (2013, p. 14).

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