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<div align="center">Artificial Intelligence and its Impact on Job Automation</div>

The late, great Theoretical Physicist, Stephen Hawking, once said, "AI is likely to be either the best or worst thing to happen to humanity." This is, without question, a pivotal time for the history of humanity, as we, as a society, make the conscious decision whether or not to delve full bore into the development and implementation of artificial intelligence within our daily lives. The concept of artificial intelligence was initialized in 1955 through a program called, Logic Theorist. Created by Allen Newell, Cliff Shaw, and Herbert Simon, and funded by Research and Development Corporation, the program was constructed to emulate "the problem-solving skills of a human" (Anyoha 2017). Although this is recognized by many as the first form of artificial intelligence, it lacked the necessary traction in order to become a mainstream success. However, over the next twenty years, as computers became faster and more capable, artificial intelligence began to prosper. With examples "such as Newell and Simon's *General Problem Solver* and Joseph Weizenbaum's *ELIZA*," the development and application of machine learning algorithms greatly improved (Anyoha 2017). This substantially extended the frontier of artificial intelligence, and lead to the increase of funding from government agencies like, the Defense Advanced Research Projects Agency. Unfortunately, as time progressed, the expansion of artificial intelligence was halted due to the lack of computational power. According to Hans Moravec, "computers were still millions of times too weak to exhibit intelligence" (Anyoha 2017). This hapless downturn for the progression of artificial intelligence was later galvanized in

the 1980s. Through the expansion of the algorithmic toolkit, and an increase in funding, "John Hopfield and David Rumelhart popularized "deep learning" techniques which allowed computers to learn using experience" (Anyoha 2017). Additionally, artificial intelligence garnered even more attention through the creation of "expert systems," by Edward Feigenbaum (Anyoha 2017). The development of artificial intelligence continued on a similar ascending trend through the 1990s and 2000s. This progression, in accordance with Moore's Law, leads us to where we are today—a world of "'big data,' [where] we have the capacity to collect huge sums of information too cumbersome for a person to process" (Anyoha 2017). As we reach this tipping point, where the impact of artificial intelligence has the potential to grow exponentially, a major social issue that arises is that of job automation. Many people fear that there is a strong positive correlation between the growth of artificial intelligence capabilities and widespread job loss. Even if this concern is valid, do the benefits of job automation outweigh, in terms of production, efficiency, and economy, the potential loss of jobs for people? —a serious concern considering today's circumstances. Bearing in mind the potential arguments for and against using artificial intelligence for job automation, I believe the expansion and implementation of job automation is a positive measure, particularly considering the efficiency and economy of a company; however, I am not ignorant to the fact of the importance to employ certain regulations and legislation when it comes to the potential power of artificial intelligence.

To begin, it is irrefutable that one of the key proponents to the implementation of artificial intelligence and job automation is the result of substantial growth in efficiency and productivity. Artificial intelligence, when compared to that of human capabilities, considerably outperforms the competition in terms of both efficiency and level of quality. In this day in age, there is no doubt that "machines and computers [are] able to efficiently replace human labor

when it comes to repetitive-task, purely mechanical, routinized work" (Lim 2017). Additionally, the scope in which artificial intelligence is being employed to compete with human tasks is growing day by day. When it comes to job automation, one of the prime examples we see is when artificial intelligence is paired with robotic systems to increase productivity and efficiency within company factories. In one study, done by Georg Graetz and Guy Michaels at the Centre for Economic Performance at the London School of Economics, they deduced that "robot densification increased annual growth of GDP and labor productivity between 1993 and 2007 by about 0.37 and 0.36 percentage points respectively across 17 countries studied, representing 10% of total GDP growth" (IFR 2017). Additionally, in another study completed in 2016, it also found that "investment in robots contributed 10% of growth in GDP per capita in OECD (Organisation for Economic Co-operation and Development) countries" (IFR 2017). The reason artificial intelligence and robots allow for an expansion in productivity and efficiency is because "AI-driven robots can make meaningful contributions to process improvement from the day they are deployed" (Lawton 2018). According to Jim Lawton, AI-driven robots possess the capacity to monitor, see, adapt, learn, deploy, and extend. They are able to distinguish an evolving workplace environment, and optimize their functionality. Robots are excellent at identifying the existence and configuration of particular parts, which allows them to execute different inspection and placement tasks. AI robots are able to detect and avoid collisions, predict and diagnose failure conditions, control other machines, and, contrary to humans, can work for hours on end without any breaks (Lawton 2018). Shockingly, these attributes are not even what separate AI-driven robots from humans. AI-driven robots, most importantly, have the aptitude to "realize when something is not working and will stop before damage is done, identify ways to improve the way a task is done, [and] collect data and perform analytics to help users make decisions

around process improvement" (Lawton 2018). Lastly, to put a number to the disparity in efficiency between AI-driven robots and humans, "AI-assisted visual inspection machines can detect faults with around 90% greater accuracy than a human and can do it in half a second" (Staff 2018). Considering this expansive evidence, it is undeniable that the pursuit of job automation, through the help of artificial intelligence, allows for companies to increase both productivity and efficiency.

Furthermore, using artificial intelligence in the quest for job automation provides the ability to tremendously improve the economies of individual companies, along with the world economy as a whole. In terms of individual firms, there are many economic benefits that coincide with the transition towards automation. Employing AI-driven machines allows for companies to produce their product at significantly lower cost; which, in turn, results in economies of scale. Additionally, automation "enables a greater economy of scope. This means that one factory is able to produce a greater range of goods; this diversity and product differentiation is as important for firms as lower unit labor costs" (Pettinger 2018). Moreover, a more automated work environment enables the company capability to "hire in other areas, increase their existing employees' wages, or start new off-shoot companies. This creates more money flowing through the economy and provides opportunities" (Lindley 2017). Lastly, as somewhat of a strategical benefit for companies becoming more automated, a reduction in the number of workers results in the lessening power of unions and strikes (Pettinger 2018). In terms of the economy as a whole, a reduction in labor costs results in lower prices for the consumer; which, provides the consumer with a greater disposable income that can be used to purchase a more extensive range of goods. Especially depending on the elasticity of a product, lower costs will increase the demand for that product, and can, consequently, allow for a company to grow

their profits. A more profitable company "enable[s] governments to receive more tax revenue to spend on public goods" (Pettinger 2018). Finally, in relation to the economy as a whole, countries have the potential to gain a comparative advantage as manufacturing is going to shift to the countries that automate, for the reasons mentioned above (Pettinger 2018). Artificial intelligence, along with job automation, has the great potential to leave a strong, positive, and lasting impact on the economy. An impact that greatly benefits the consumer, especially considering that 70% of the United States gross domestic product is personal consumption.

Understandably, and without question, the greatest argument against the use of artificial intelligence in the pursuit of job automation is the idea that it will destroy millions of jobs. Considering a multitude of factors, —including, but not limited to, economic, social, and technical—there is potential for one half of all global work enterprises to become automated. In a recent study, it was extrapolated that by the year 2030, "In the U.S., 39 million to 73 million jobs could be destroyed, [and,] [g]lobally, up to 800 million workers could be displaced" (Davidson 2017). Obviously, this is of critical concern; however, I disagree with the assumption that job loss to automation will result in horrific times for those in the labor force. To begin, let's start on a very basic level. With a thorough evaluation of the data concerning manufacturing employment as a percent of the total employment; since the industrial revolution, the percentage has been on almost a perfectly linear decline—disregarding occasional spikes during times of war. Quite evidently, "percent manufacturing has been shrinking [steadily] for a long time" (Alexander 2018). Again, on a very basic level, the trends are continuing on in a very similar manner, as they have for over one-hundred years. In sense, we are not experiencing anything new, and the changes we are experiencing, both economically and technologically, are proportional to the many years prior. Secondly, the idea that these workers will be permanently displaced by

automation only could hold true "if we think there is a *fixed amount of work* to be done in the economy. This idea, which gives rise to the notion that an increase in the amount each worker can produce with the help of technology, actually reduces the total number of jobs an economy can support, is known as the "lump-of-labor fallacy"" (Paul 2018). The United States economy is one that is constantly evolving, and creating new jobs. In a study conducted in 2017, the BLS Job Openings and Labor Turnover Survey calculated that the economy eliminated 62.6 million jobs, but, in the meantime, created 64.7 million different jobs (Paul 2018). Additionally, considering natural progression and evolvement, newer jobs tend to be more productive, result in higher wages, and elevate certain living conditions. It is difficult for people to keep perspective when the threat of potential job loss is looming; however, I personally believe that by the year 2030, as we advance, there will be a completely new sector of jobs discovered that does not currently exist today. It is important as a society to constantly be proceeding forward, become more advanced, and not take steps backwards. We cannot, and should not, halt progression over an irrational understanding of our ever-changing economy.

Bearing in mind the potential arguments for and against using artificial intelligence for job automation, I believe the expansion and implementation of job automation is a positive measure, particularly considering the efficiency and economy of a company; however, I am not ignorant to the fact of the importance to employ certain regulations and legislation when it comes to the potential dominating power of artificial intelligence. Elon Musk once said, "AI is a fundamental risk to the existence of human civilization" (Clifford 2017). Although there is no inherit evil with artificial intelligence, there is immense potential for it to be utilized in a manner that is destructive; especially considering the lack of attention currently being paid by our governing bodies (Reaney 2018). Our current society is at a tipping point where we can either

use artificial intelligence to ensure a better future, or destroy mankind. Personally, I believe there should be grave concern for when the time comes that AI-driven robots become smarter than humans. At this point, there are a number of digital, physical, and political dangers of artificial intelligence. These potential harms include things such as: automated phishing, faster hacking, fooling AI systems, automating terrorism, robot swarms, remote attacks, propaganda, automatic dissent removal, and personalized persuasion (Gershgorn 2018). The scariest thought is the fact that all of these can occur today, and artificial intelligence is not remotely close to being as advanced as it will be in the near future. There needs to be serious regulatory steps taken to ensure artificial intelligence remains in the hands of the right people, and cannot be used in robots that are physically superior to human beings. Contrary to the current concern about artificial intelligence and jobs, I truly believe this is the biggest concern we need to prepare for. In the end, I ultimately support the utilization and employment of artificial intelligence, as it follows the natural advancement of our society as a whole. It is the next step in our existence as mankind. It is what will allow us to become more productive and efficient than we ever have before in the history of this world. As well, it provides the possibility for the United States to further separate themselves as an economic powerhouse. Nevertheless, all things considered, we, as civilization, cannot afford to mess this one up.

Works Cited

Alexander, Scott. "Technological Unemployment: Much More Than You Wanted To

Know." *Slate Star Codex*, 20 Feb. 2018, slatestarcodex.com/2018/02/19/technological-

unemployment-much-more-than-you-wanted-to-know/.

Anyoha, Rockwell. "The History of Artificial Intelligence." *Science in the News*, Harvard

University - The Graduate School of Arts and Sciences, 28 Aug. 2017,

sitn.hms.harvard.edu/flash/2017/history-artificial-intelligence/.

"Artificial Intelligence Quotes: Bill Gates, Elon Musk, Stephen Hawking." *Supply Chain Today*,

7 Sept. 2017, [www.supplychaintoday.com/artificial-intelligence-quotes-bill-gates-elon-musk-](www.supplychaintoday.com/artificial-intelligence-quotes-bill-gates-elon-musk-stephen-hawking/)

[stephen-hawking/](www.supplychaintoday.com/artificial-intelligence-quotes-bill-gates-elon-musk-stephen-hawking/).

Clifford, Catherine. "9 Of the Most Jaw-Dropping Things Elon Musk Said about Robots and AI

in 2017." *CNBC*, CNBC, 18 Dec. 2017, www.cnbc.com/2017/12/18/9-mind-blowing-things-

elon-musk-said-about-robots-and-ai-in-2017.html.

Davidson, Paul. "Automation Could Kill 73 Million U.S. Jobs by 2030." *USA Today*, Gannett

Satellite Information Network, 29 Nov. 2017,

www.usatoday.com/story/money/2017/11/29/automation-could-kill-73-million-u-s-jobs-

2030/899878001/.

Gershgorn, Dave. "AI Experts List the Real Dangers of Artificial Intelligence." *Quartz*, Quartz,

22 Feb. 2018, qz.com/1213524/ai-experts-list-the-real-dangers-of-artificial-intelligence/.

IFR. "The Impact of Robots on Productivity, Employment and Jobs." *International Federation

of Robotics*, Apr. 2017, ifr.org/img/office/IFR_The_Impact_of_Robots_on_Employment.pdf.

Lawton, Jim. "AI And Robots: Not What You Think." *Forbes*, Forbes Magazine, 28 Aug. 2018,

www.forbes.com/sites/jimlawton/2018/08/22/ai-and-robots-not-what-you-think/#79e20c554858.

Lim, Diane. "Why Advances In Technology And Automation Are Good News For Human

Workers." *Forbes*, Forbes Magazine, 12 Oct. 2017,

www.forbes.com/sites/washingtonbytes/2017/10/12/why-advances-in-technology-and-

automation-are-good-news-for-human-workers/#42e69f023892.

Lindley, Michael. "Why Automation Is Good for the Economy." *Concept Systems Inc*, 28 Sept.

2017, conceptsystemsinc.com/why-automation-is-good-for-the-economy/.

Paul, Mark. "There Is Work To Be Done: AI And The Future Of Work." *Forbes*, Forbes

Magazine, 20 Aug. 2018, www.forbes.com/sites/washingtonbytes/2018/08/18/there-is-work-to-

be-done-ai-and-the-future-of-work/#55f0070f2665.

Pettinger, Tejvan. "Automation – Benefits and Costs." *Economics Help*, 16 Jan. 2018,

www.economicshelp.org/blog/25163/economics/automation/.

Reaney, Matt. "This Is Why We Need To Regulate AI." *Experfy Insights*, 31 Jan. 2018,

www.experfy.com/blog/this-is-why-we-need-to-regulate-ai.

Staff, RBR. "AI Is Making Manufacturing Great Again, Reshaping Business." *Robotics Business

Review*, Robotics Business Review, 12 June 2018, www.roboticsbusinessreview.com/ai/ai-

making-manufacturing-great-again/.