Science and Technology connect the world today. It is an age of digital space and computers. Computers are getting stronger daily as we move towards science and technology advancements. The study of computers and computing is Computer Science. It includes the theoretical and algorithmic foundations, hardware, software, and their uses for processing information.[1] The study of Computer Science is deep and diverse, so it needs equally intelligent manpower to run the present Tech world and develop new inventions. This has been possible due to the contributions of both male and female mathematicians, scientists, inventors, and programmers throughout the century. Historically programming was a female dominated job, but women today hold only 28% of computing and mathematical jobs in the US.[2] The Tech Industry grows every year, advancing to a trillion-dollar sector during 2022 in the US alone.[3] While the digital revolution has expanded opportunities for women in the workforce and challenged traditional gender roles, societal and cultural barriers poses the risk of perpetuating existing patterns of gender inequality in the technology industry, highlighting the need to question ongoing efforts to promote diversity and inclusivity.

The Digital Revolution (also known as the Third Industrial Revolution) is the shift from mechanical and analogue electronic technologies from the Industrial Revolution towards digital electronics which began in the later half of the 20th century, with the adoption and proliferation of digital computers and digital record-keeping, that continues to the present day.[4] It also refers

---

[1] Geneva Belford, "Computer Science," in *Britannica*, last updated November 9, 2022, https://www.britannica.com/science/computer-science.
[2] Emma Goldberg, "Women Built the Tech Industry. Then They Were Pushed out.," The Washington Post, February 19, 2019, https://www.washingtonpost.com/outlook/2019/02/19/women-built-tech-industry-then-they-were-pushed-out/.
[3] Julio Santos, "US Tech Sector to Reach $1.8 Trillion in 2022," Globalfy, September 21, 2022, https://globalfy.com/blog/us-tech-sector-to-reach-1-8-trillion/.
[4] Steven E. Schoenherr, "The Digital Revolution", archived on 7 October 2008. https://web.archive.org/web/20081007132355/http://history.sandiego.edu/gen/recording/digital.html.

to the sweeping changes brought about by digital computing and communication technologies during this period. This can include phones, the Internet, social media, Artificial Intelligence (AI) and more. Today, almost everything is digitalized. There's rarely any goods or services that haven't gone through their own digitalization. From healthcare and marketing to learning, it is limitless. In many ways, digital spaces have turned to a 24/7 living lounge unlike the old-school short netsurfing after school thing. Hence, it has resulted in a modern digital economy. Digital technology has altered how people communicate, inform themselves, and connect to one another. It has significantly shaped how people experience their time. It has also grown existing and new forms of activism. At the same time, it has also transformed the global economy by affecting the production and consumption patterns among consumers. This has led to the rise of "data" as an asset that is analyzed to support new forms of capitalistic consumption.

The digital revolution has the potential to significantly enhance well-being, productivity growth, social, and economic results worldwide. However, an enormous digital gender gap still exists. It restricts the equitable attainment of the benefits of digital revolution. Despite several significant research initiatives, interventions, and policies aimed at advancing women's empowerment and gender equality, the results seem weak. The United Nations University (UNU)-led EQUALS Research Group's analysis demonstrates that "a gender digital divide persists regardless of a country's overall ICT [information and communication technology] access levels, economic performance, income levels, or geographic location."[5] Therefore, despite the potential for promoting greater equality, women are underrepresented in the digital revolution in high-, low-, and middle-income nations.

[5] Araba Sey, Nancy Hafkin, *Taking stock: Data and evidence on gender equality in digital access, skills and leadership*, (United Nations University Institute on Computing and Society/International Telecommunications Union: Macau, 2019), https://i.unu.edu/media/cs.unu.edu/attachment/4040/EQUALS-Research-Report-2019.pdf.

Digitalization has triggered both utopian and catastrophic future ideas, like previous periods technological development. Digital technologies have the potential to significantly boost women's economic involvement and social autonomy. Particularly in low- and middle-income countries, various technologies allow women to get around some of the traditional mobility and cultural hurdles they encounter offline. For example, women in Nepal who cannot come protest outside support the feminist movements through social media like Twitter and Instagram. Hashtags like #RageAgainstRape and #IStandWithHer remain trending.[6] Furthermore, efforts have been made to promote women's digital empowerment through various initiatives and projects aimed at improving their access to technology. Examples of these initiatives include the 'Connected Women' program, which addresses the barriers to women accessing and using mobile internet, and the 'Digital Gender Gaps' project, which tracks progress on gender inequalities in internet and mobile access. The Sustainable Development Goals have also pledged to enhance the use of technology to promote women's empowerment (Goal 5b).[7]

But at the same time, there seems to be a greater gender divide. The world we experience shapes us and we shape the world around our experiences. Culture impacts the ideologies we have and the world we experience, and digital space is not an exception to it. At the end of the day, online spaces are only a reflection of the world we live in. Although initiatives aimed at advancing women's digital empowerment have been implemented with well intentions and have had some success, inequalities in access to ICTs still exist, as do men's control over women's use of ICTs. It is estimated that women's access to the Internet and mobile phones is only about 85% of men's access on average. More than 1.7 billion women in the Global South lack Internet

[6] Arun Budhathoki, "Nepal's #RageAgainstRape Movement Sparks Hope", *The Diplomat*, August 13, 2018, https://thediplomat.com/2018/08/nepals-rageagainstrape-movement-sparks-hope/.
[7] "Sustainable Development Goal 5: Achieve Gender Equality and Empower All Women and Girls," United Nations (Department of Economic and Social Affairs), accessed May 6, 2023, https://sdgs.un.org/goals/goal5.

access. Additionally, approximately 327 million fewer women than men have a smartphone and can access mobile Internet worldwide. The focus on "ICTs for women's rights" and initiatives aimed at empowering women through digital technology is often limited to the issue of access, which is not sufficient. Feminist critiques of ICT call for a broader consideration of power and inequality. This includes examining the impact of the growing concentration of economic and political power in the tech industry and its resistance to regulation on gender-responsive digital technology. By constructing gender inequality and gap in the Tech Industry as mere nit-picking, it normalizes heteronormative, hegemonic masculinity and patriarchy. The structural biases and prejudice that exist today limits women from fully gaining from the digital revolution.

The Internet first started as a neutral platform to share, connect, and learn. Over the years, western big tech companies have taken over the Internet and its comprising spaces. Often referred to as FAANG, Facebook, Amazon, Apple, Netflix, and Google are the Top Tech Companies whose combined market value exceeds $3 trillion.[8] These figures illustrate the power and money Tech Industry overhauls. As the world moves on to a digital space every day and grows tremendously, there's more opportunities for these companies to make money and profit. For example, Apple sells Technology devices like phones and laptops so people can access the internet and stay updated. They have monopolized their system by creating cloud based on their own server, building a loyal audience who use their products. As of 2022, iPhones have a 50% market share in the US smartphone industry and 1.2 billion+ iPhone users worldwide.[9] Several other Tech companies like Meta (previously Facebook), Amazon, and Twitter use their own tech

[8] "FAANG Stocks," Corporate Finance Institute, October 18, 2022, https://corporatefinanceinstitute.com/resources/knowledge/trading-investing/faang-.
[9] Daniel Ruby, "26+ IPhone User & Sales Statistics (Fresh Data 2022)," Demand Sage, October 14, 2022, https://www.demandsage.com/iphone-user-statistics/#:~:text=There%20are%20more%20than%201.2,million%20iPhones%20in%202021%20alone.

products to make sales and gain value in the market. From e-commerce to anything one accesses on the Internet through their devices are all connected one way or another to Technology and the companies that made them. And hence in one way or another the consumers are connected to the Tech Companies they buy from. This enables market monopolization and hence more power over data. In a world where consumer habits are a mere data figure to sell products, it is not news that these major online platforms are found to be involved in spreading misinformation, hate speech, online harassment, and abuse.[10] Online algorithm works in interesting ways to provide consumers their own online space, making it a much smaller and narrower space. It is more constricting than one would imagine it to be. Notably, these huge amounts of data mining and algorithm bias can perpetuate the prevailing social inequality. Instead of working towards a revolution for women and other marginalized communities, it can risk freedom and enable digital forms of the same hegemonic system.

Algorithms are simply the instructions that tell a computer what to do. Algorithmic AIs today work to predict future trends using existing user data. This determines the content users view in social media, the search results in Google, the decisions of shopping, what news gets to a user and so much more. As the world moves into a increasingly digital space, algorithms are required to make complex decisions. These decisions are not always unbiased. For example, facial recognition software is getting used increasingly in law enforcement and has the potential for race and gender bias. In February 2018, Joy Buolamwini at the Massachusetts Institute of Technology found that three of the latest gender-recognition AIs, from IBM Microsoft and Chinese company Megvii, could correctly identify a person's gender from a photograph 99% of

[10] Terry Gross, "Reporters Reveal 'Ugly Truth' Of How Facebook Enables Hate Groups And Disinformation," *National Public Radio*, July 13, 2021, https://www.npr.org/2021/07/13/1015483097/an-ugly-truth-how-facebook-enables-hate-and-disinformation.

the time – but only white men. For dark-skinned women, accuracy dropped to 35%. That increases the risk of false identification of women and minorities. Ultimately, it depends on the data on which the algorithms are trained. If the data contains way more white men than black women, it will be better at identifying white men. IBM quickly announced that it had retrained its system on a new data set, and Microsoft said it has taken steps to improve accuracy.[11]

There is so much inequality in the present world. Anything that doesn't try to eliminate these imbalances will merely reflect them. Likewise, AI reflects and replicates biases of past (and present) in future (and present).[12] There are challenges within the tech industry itself. This poses questions about who gets to design these systems and whose interests are being mirrored in their creation. The field needs to focus on developing precise techniques to address biases in training data. Meanwhile, the lack of diversity in computer science graduates and tech company hiring practices is concerning. In 2021, women earned only 18% of undergraduate degrees in computer science.[13] It's not just about increasing the representation of underrepresented minorities in undergraduate education, but also about creating inclusive practices within tech companies. After obtaining a diploma in computer science, women face greater challenges in finding employment in the field than men. Data from the National Science Foundation reveals that only 38% of women who majored in computer science work in the field, compared to 53% of men.[14] This trend is referred to as a "leaky pipeline," meaning that women are less likely to

---

[11] Joy Buolamwini, Timnit Gebru, "Gender Shades: Intersectional Accuracy Disparities in Commercial Gender Classification." *Proceedings of Machine Learning Research 81:1–15, 2018 Conference on Fairness, Accountability, and Transparency*, http://proceedings.mlr.press/v81/buolamwini18a/buolamwini18a.pdf.
[12] Daniel Cossins, "Discriminating Algorithms: 5 Times AI Showed Prejudice," New Scientist (New Scientist, April 27, 2018), https://www.newscientist.com/article/2166207-discriminating-algorithms-5-times-ai-showed-prejudice/.
[13] "Women in Computer Science & Programming," Women in Computer Science: Getting Involved in STEM, December 22, 2022, https://www.computerscience.org/resources/women-in-computer-science/.
[14] National Science Foundation, National Center for Science and Engineering Statistics. 2019. *Women, Minorities, and Persons with Disabilities in Science and Engineering: 2019.* Special Report NSF 19-304. Alexandria, VA. Available at **https://www.nsf.gov/statistics/wmpd**.

remain in STEM jobs after graduating with a STEM degree. This isn't simply a question of the need to change the demographics in undergraduate education. It is also important to question the practices of inclusion within tech companies.

Women have suffered for centuries and while feminist movements have tried to ease the inhumane behavior women face and gain equality, women continue to get discriminated in many ways. The lack of inclusiveness is evident in the tech sector. As mentioned before, women earned only 18% of undergraduate computer science degree. A significant percentage of women who enter the tech industry drop out by the age of 35, with a rate of 50% compared to 20% in other fields. Women in tech classes at universities also have a higher dropout rate of 37%, compared to 30% across all degree programs. As a result, women leave tech jobs at a 45% higher rate than men. The reasons for leaving the industry vary, with poor company culture being cited by 37%, job dissatisfaction by 31%, interest in a different role outside of tech by 22%, and a lack of workplace diversity by 10%.[15] The retention of women in IT roles largely depends on workplace culture and inclusivity. While it's important to recruit women, organizations must also create an inclusive environment to keep them. However, there is a significant gap between how leaders and employees perceive inclusivity in the workplace. Accenture found that 68% of leaders believe they have created empowering environments, but only 36% of employees agree. According to Accenture, if all companies were as inclusive as the top 20% of companies in the study, the annual attrition rate of women in tech could drop by up to 70%.[16]

[15] Sarah K. White, "Women in tech statistics: The hard truths of an uphill battle," *CIO*, March 13, 2023, https://www.cio.com/article/201905/women-in-tech-statistics-the-hard-truths-of-an-uphill-battle.html.
[16] Accenture, Girls Who Code, *RESETTING TECH CULTURE 5 strategies to keep women in tech* (2020), https://www.accenture.com/_acnmedia/PDF-134/Accenture-A4-GWC-Report-Final1.pdf

Contrary to popular belief, inclusiveness in the workspace does not end with hiring women and minorities. It merely makes these issues visible. Sarah Banet-Weiser explores visibility politics in her book "Empowered: Popular Feminism and Popular Misogyny".[17] In media today, it is important to be seen as inclusive and diverse. Social media has made calling problematic companies out easier, holding them accountable. But visibility is not a fixed state and needs continuous growth and evolution. However, in a media landscape driven by profit, competition, and consumerism, just being visible does not ensure that gender, race, and sexuality will be free from discrimination. The popular feminism discussed in the book often gains visibility by not challenging the fundamental structures of inequality. In other words, for some images and practices to become visible, others must be pushed into invisibility. It is influenced by both neoliberal and liberal feminist ideas. It has emerged from an increasing recognition of gender disparities in dominant economic fields, such as the lack of female CEOs, Hollywood directors, and representation in technology and media industries, as well as heightened awareness of sexual harassment in corporate settings. This often prioritizes bringing more women to the table without necessarily challenging the underlying structures that created the disparities in the first place. Although having more women present is important, it does not necessarily challenge dominant patterns of sexuality and ideology that support exclusion. This approach is similar to liberal efforts to include people of color within a widened field of whiteness, which does not address the underlying racism that defines the boundaries of whiteness.

The emphasis of inclusion has become corporate-friendly due to the rise of neoliberal commodity activism, where companies use women's issues to sell their companies and products.

[17] Sarah Banet-Weiser. *Empowered: Popular Feminism and Popular Misogyny* (Duke University Press, 2018). https://doi.org/10.2307/j.ctv11316rx.

These acts do not challenge the market and instead contribute to it. Feminism has become a marketable product and certain expressions and politics are brandable within the context of neoliberal brand culture. Scholars of feminist studies, critical race theory, and cultural studies have long been examining the politics of visibility, which refers to the process of making visible a historically marginalized political category, such as gender or race, through various means such as media representation, laws, and policy. This coupling of "visibility" and "politics" forms a political identity that seeks to bring about social change beyond mere visibility. The term "politics" here describes the practices that surround visibility.

Representation has always been important for marginalized groups because it signifies acceptance and recognition within the dominant society. “To demand visibility is to demand to be seen, to matter, to recognize oneself in dominant culture.”[18] The insistence of women, racial minorities, queer communities, and working class’s visibilty has been critical in the growth of their rights. For example, the portrayal and representation of Asian Americans (May is AAPI Heritage month!) in media was criticized it was to change the way identities are valued.[19] Although visibility does not always lead to social change, it is an essential part of a political struggle that aims to bring about change. The economies of visibility have caused a fundamental change in the politics of visibility, leading to a shift where visibility itself is seen as the ultimate goal, rather than a means to achieve a particular objective. As a result, categories such as race and gender have transformed their logics from the inside out, so that representation itself becomes the main focus, rather than the underlying social structures that shape these categories. This restructuring separates representation from much needed action and makes visual

[18] Banet-Weiser, *Empowered: Popular Feminism and Popular Misogyny*, 22.
[19] Michelle K. Sugihara, Jess Ju, “Media Matters: Why Asian American Representation in Media is a Social Justice Issue,” *Asian American Policy Review* Vol. 31 (Spring 2021), https://aapr.hkspublications.org/2022/05/16/media-matters-why-asian-american-representation-in-media-is-a-social-justice-issue/.

representation the sole political action. As a result, identifying one's company as one that has representation becomes a sufficient political action. That announcement becomes both the radical move and the end in itself.

Even then, representation is hardly visible in the tech industry. The structural issues cycle in ways to discriminate against women and minorities. From less representation, workplace harassment to lower pay, women face so many issues in their "inclusive" companies that hire women for the sake of two points in media. To understand gender-based digital exclusion (and inclusion), the larger societal and institutional changes that shape the technological landscape must be considered. This, in turn, demands a shift away from a narrow focus on improving women's access to and use of digital technology on the one hand, and 'getting more women in tech' on the other. Although technology can present new opportunities for women's empowerment, there is still a lack of comprehensive policy on promoting women's participation in the digital revolution. It is important to recognize that technology alone cannot address the systemic issues driving the digital gender gap. Instead, there should be a focus on implementing concrete actions that foster women's and girls' full participation and inclusion in the digital revolution, while addressing deeply ingrained stereotypes, practices, and norms that lead to discrimination and even violence against women. It's important to note that there is no one-size-fits-all solution to closing the gender digital divide, as gender inequality arises from various intersecting economic, social, political, and cultural barriers.