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EMPOWERING WOMEN THROUGH ARTIFICIAL INTELLIGENCE: OPPORTUNITIES, CHALLENGES, AND THE ROAD AHEAD

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Abstract

Artificial Intelligence (AI) is a transformative force reshaping societal structures and individual lives across the globe. Among its most promising frontiers is its role in promoting gender equality and empowering women. This paper explores AI's potential to support women across key domains, including education, economic participation, political engagement, healthcare, safety, and legal protection. It critically examines how AI can drive digital and social empowerment while also identifying systemic risks such as algorithmic bias, underrepresentation, and data privacy violations that may hinder equitable outcomes. The study further evaluates India's national strategies—like the Digital India Initiative, AI Careers for Women, and Yashoda AI—that aim to close the gender digital divide. Drawing on real-world applications and challenges, it illustrates how AI can amplify women's voices, foster inclusion in governance, and promote access to services. However, the paper also underscores that AI is not inherently neutral and can reinforce existing disparities if not governed responsibly. It emphasizes the urgent need for ethical AI governance, inclusive STEM education, and gender-sensitive infrastructure. Ultimately, the paper asserts that AI must be developed and deployed within a feminist, rights-based framework to ensure it acts as a tool for liberation rather than exclusion. The paper concludes with suggestions for creating a gender-responsive AI ecosystem capable of catalysing meaningful and lasting change.

Keywords - Artificial Intelligence, Women Empowerment, Gender Equality, Algorithmic Bias, Digital Divide

1. Introduction

The Fourth Industrial Revolution, led by Artificial Intelligence, has ushered in unprecedented technological advancement. For women, especially those in historically marginalized communities, AI offers both a pathway to empowerment and a new frontier of risks. When thoughtfully designed and equitably implemented, AI can open doors to quality education, enhance access to healthcare, expand economic participation, and improve legal and social protections for women. However, the benefits of AI are not automatically inclusive. The field remains overwhelmingly male-dominated, with gender biases often encoded into algorithms, datasets, and decision-making processes. Women are not only underrepresented as developers and leaders in AI but are also disproportionately impacted by its unintended harms, including algorithmic discrimination, privacy violations, and job displacement.

This paper explores the multifaceted relationship between AI and women's empowerment, highlighting both its transformative opportunities and its structural challenges. It examines key areas where AI can support gender equity—such as education, employment, healthcare, safety, political participation, and legal access—while critically analyzing the systemic barriers that hinder inclusive development. Finally, it proposes a roadmap for building a more just and gender-sensitive AI ecosystem that truly empowers women in the digital age.

2. Women Empowerment and Artificial Intelligence

Women's empowerment refers to enhancing women's ability to make strategic life choices in a context where this ability was previously denied. According to renowned scholar Naila Kabeer, empowerment is fundamentally about the expansion of people's ability to make strategic life choices in a context where this ability was previously denied to them. This definition

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captures the essence of what we're really talking about when we discuss women empowerment.[1] Women's empowerment enables women to make life-determining decisions through the different societal problems.[2]. Women's empowerment encompasses various dimensions, which includes social, economic, and political empowerment. In recent years, a new and increasingly significant facet has emerged—digital empowerment—which plays a crucial role in enabling women to participate fully in the digital age. Digital empowerment of women refers to the process by which women gain the knowledge, skills, access, and confidence to use digital technologies to improve their personal, economic, educational, social, and political lives. It enables women to leverage digital tools—such as mobile devices, the internet, and AI-based applications—for informed decision-making, participation in the digital economy, accessing services, expressing opinions, and exercising rights. AI is defined as machine-based systems that, given a set of human-defined objectives, can make predictions, recommendations, or decisions influencing real or virtual environments.[3] Artificial Intelligence (AI) includes machine learning, natural language processing, computer vision, and robotics—technologies capable of performing tasks that typically require human intelligence. Artificial Intelligence is a prominent tool for women empowerment as it has become an indispensable part of the world we live in. It permeates nearly every sphere of human life .

3. AI and Political Empowerment

Women possess the capacity to govern effectively across various levels of government. They are good leaders and can impact the people in a meaningful manner. The constitution of India lays down many provisions for political empowerment of women which includes reservation of seats for women in local self-governing bodies like Panchayats and Municipalities. The role of women in grassroot governance can pave way for future success in national politics. The Constitution (One Hundred and Twenty-Eighth Amendment) Bill, 2023 was introduced in Lok Sabha on September 19, 2023.[4]The legislation aims to allocate one-third of all seats in the Lok Sabha and state legislative assemblies exclusively for women, ensuring greater representation in India's political system. AI, when responsibly designed and inclusively implemented, has the potential to enhance women's participation in political life by addressing systemic barriers and amplifying marginalized voices. AI-powered platforms can facilitate wider political participation by providing women with accessible tools for civic engagement. Chatbots, natural language processing (NLP), and voice-to-text technologies can bridge literacy gaps and offer multilingual access to political information, legal rights, and public policy debates—especially important in rural and underserved areas. By amplifying women's voices, increasing access to information, and ensuring safer public discourse, AI can contribute meaningfully to the realization of inclusive and participatory governance.

4. AI and Economic Empowerment

Artificial Intelligence (AI) holds transformative potential for advancing the economic empowerment of women, especially in contexts where traditional barriers—such as limited access to education, capital, or mobility—have historically marginalized them. When applied equitably, AI technologies can open new economic opportunities, bridge gender gaps, and foster inclusive growth.AI-based tools help women-led MSMEs optimize marketing, inventory, and customer service.AI-driven credit scoring enables microloans for women without formal financial histories. To boost economic empowerment, the India AI Mission is fosters an inclusive AI ecosystem, particularly supporting women entrepreneurs, digital start-ups, and job creation in fields like cybersecurity and fintech. The mission's emphasis on digital entrepreneurship ensures that women have access to the opportunities emerging in AI-driven industries. AI-based platforms are helping

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[2] E. Bayeh, *The Role of Empowering Women and Achieving Gender Equality to the Sustainable Development of Ethiopia*, 2 Pac. Sci. Rev. B: Human. & Soc. Sci. 38 (2016), https://doi.org/10.1016/j.psrb.2016.09.013.
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women upskill. For example, SkillLab provides personalized learning maps using AI to enhance employability[5]. AI chatbots like AskMyUncleSam in Africa assist women in understanding small business taxes and financial inclusion.

However, historical bias in financial data affects credit scoring systems. Studies reveal that algorithms trained on biased data sets often score women as higher risk borrowers, perpetuating unequal access to financial opportunities. The World Bank reports that automation disproportionately affects low-income women in sectors like textiles and domestic labor[6].

5. AI in Education and Digital Empowerment

Recognising the transformative potential of AI in education, the government has deployed AI-powered learning platforms such as SWAYAM and DIKSHA, which provide high-quality educational content and skill development opportunities. These platforms not only bridge the digital divide for women in rural and urban areas but also enable individuals from diverse backgrounds to gain digital literacy and technical expertise. [7] The 67th meeting of the United Nations Commission for the Status of Women highlighted the critical role of AI, technology and education in achieving gender equality and the empowerment of all women and girls. While technology has the potential to be good for all society, it is vital to ensure that decision-makers, designers, and the data they draw from are representative of all groups to avoid perpetuating gender stereotypes and existing biases.[8] Yet, the GSMA Mobile Gender Gap Report finds that women are 23% less likely to use mobile internet in South Asia, mainly due to affordability, digital illiteracy, and cultural norms.[9]AI platforms such as BYJU'S and Khan Academy personalize content based on individual pace and learning needs.[10] AI-powered language translation and speech-to-text applications bridge linguistic and literacy barriers for women.

6. AI in Health and Reproductive Rights

Artificial Intelligence (AI) is increasingly influencing the healthcare landscape, with transformative implications for women's health and reproductive rights. From improving access to services and personalizing care to addressing systemic inequalities, AI has the potential to empower women by promoting autonomy, informed decision-making, and equitable healthcare access. However, ethical concerns and data biases must be addressed to ensure that this potential is realized responsibly.[11] AI applications like Ada Health or Niramai aid in early diagnosis of conditions like breast cancer, often overlooked in women.[12] Still, lack of disaggregated health data and underrepresentation of women in clinical trials reduces the effectiveness of AI-based diagnosis for women.[13]

[5] SkillLab, *About Us*, https://www.skilllab.io (2023).
[6] World Bank, *Gender Dimensions of Automation and the Future of Work* (2020).
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7. AI for Safety and Legal Protection

AI-based solutions can help women feel safer by tackling issues such as harassment, violence, and security. Preventing crimes against women can be aided by smart surveillance systems, face recognition technology, and predictive analytics. AI-powered smartphone applications can give real-time emergency assistance, allowing women to seek aid and report instances as soon as possible.[14]AI-enabled apps like Raksha and Safetipin map unsafe areas and allow women to alert authorities.[15] Facial recognition tools used in surveillance, however, raise privacy concerns, and have been shown to misidentify women and minorities at higher rates.[16] AI chatbots like DoNotPay and Indian startups like NyayaBandhu democratize legal assistance for domestic abuse and workplace harassment victims.

8. Policy Landscape

The Indian government, along with industry leaders and research organizations, has formulated inclusive policies ensuring women have equitable access to AI-powered education, skill development, financial services, and entrepreneurship opportunities.

1. Digital India Initiative: The Digital India Initiative includes various components such as digital literacy programs, e-governance services, and digital infrastructure development, which can empower women by enhancing their access to information, education, and economic opportunities through AI-powered platforms and services.[17]

2. Yashoda AI—Your AI SAKHI - To advance women's AI literacy and digital awareness across India, the launch of Yashoda AI—Your AI SAKHI for Shaping Horizons with Digital Awareness took place at Mahatma Jyotiba Phule Rohilkhand University, Bareilly, on May 22, 2025. Yashoda AI is a sole initiative of the National Commission for Women (NCW) in collaboration with Future Shift Labs (FSL).[18] It is a key step toward empowering women to contribute meaningfully to a Viksit Bharat driven by technology and inclusion. Yashoda AI embodies this vision by empowering women to lead in the digital age. In Viksit Bharat, technology must be a tool for inclusion, not exclusion.[19]

3. AI Careers for Women -The Ministry of Skill Development and Entrepreneurship (MSDE) and Microsoft have signed a Memorandum of Understanding (MoU) to launch AI Careers for Women—a pioneering skilling initiative aimed at empowering women in higher education institutions to pursue careers in Artificial Intelligence (AI). This strategic collaboration seeks to bridge the gender gap in emerging tech by equipping women with industry-aligned AI skills, enabling them to participate meaningfully in the digital economy and become active contributors to India's innovation-led growth. The program is designed to expand digital career pathways for women and contribute to a more inclusive technology workforce.[20]

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[16] Joy Buolamwini & Timnit Gebru, *Gender Shades: Intersectional Accuracy Disparities in Commercial Gender Classification*, in *Proceedings of the Conf. on Fairness, Accountability & Transparency* (2018).
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4. AI for All Initiative – NITI Aayog introduced the National Strategy for Artificial Intelligence in 2018, under the initiative #AI4ALL.[21]It is a broader effort to democratize AI education, making AI accessible to women and underrepresented communities through training programs and skill development. It aims at bridging the gender gap in AI, ensuring women have access to AI-driven opportunities in education, employment, and innovation.

This policy landscape is instrumental in fostering a technology-driven inclusion model, ensuring AI serves as an enabler, not a barrier for women's participation in economic and technological advancements. As AI continues to shape industries, India's focus remains on creating a future where women can lead, innovate, and thrive in the digital era.

9. Challenges to Equitable AI Access for Women

Along with the growing impact of AI comes many challenges that obstruct women from accessing AI and reduce their ability to contribute to any relevant progress.

1. **Persistent Gender Bias and Stereotypes** - One of the challenges faced by women is the persistent gender bias and stereotypes. Gender biases embedded in AI systems can significantly hinder equal access and representation, particularly in crucial domains such as hiring processes, financial services like loan approvals, legal decision-making, and broader leadership or governance roles. These limitations reduce both opportunity and diversity where inclusion is most critical.AI systems can amplify gender inequalities when trained on biased data.[22]
2. **Limited Digital Access and Infrastructure** - A large digital divide persists, especially in rural areas. Only 25% of internet users in rural India are women. Indian women are 15 percent less likely to own a mobile phone, and 33 percent less likely to use mobile internet services than men. In 2020, 25 percent of the total adult female population owned a smartphone versus 41 percent of adult men. [23]
3. **Technical Know-how and Skilling Gaps -** The lack of technical knowhow is another major hurdle which is faced by women in the use of AI. A lack of awareness, training, and mentorship programs in STEM and AI fields keeps many women from developing the skills needed to participate in or benefit from AI advancements. Inadequate access to programmes and courses on AI or lack of female mentorship results in neglecting AI as a career. In AI training programs, women represent just 28% of enrollments worldwide. Studies show women are 16 percentage points less likely than men to use AI tools in the same job. A survey conducted by SWIFT, Supporting Women in Information Technology, based in Vancouver, Canada, asked 7,411 participants questions about their career choices. The survey found that females are less interested in computer science than males.[24] This reluctance creates a dangerous cycle: as women hesitate to adopt these technologies, they fall further behind in both the workplace and a society increasingly shaped by AI.[25]
4. **Lack of role models –** There are few women who have made it big in the AI field. Aspiring women do not find many such icons in this field to whom they can look up for inspiration and mentorship. A study by Girls Who Code found only 11% of AI role models are women.[26]This is very discouraging as women find it a burdensome task to make a mark in this sector.

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5. **Data Privacy Violations -** Another critical yet often overlooked challenge in empowering women through AI is the violation of data privacy. Many AI applications used by women—particularly those related to healthcare, safety, and legal assistance—require the input of sensitive personal data. Without robust privacy protections, such data can be exposed, misused, or weaponized, leading to social stigma, harassment, or even physical threats, especially in conservative or vulnerable settings. In India, the absence of a comprehensive and strictly enforced data protection framework exacerbates this risk. This not only erodes trust in digital platforms but also deters many from fully utilizing AI-driven services that could otherwise empower them.
6. **Time constraints -** Another significant challenge to women's participation in AI-driven opportunities is the constraint of time. It hampers the development of skills. Many women, particularly those in leadership roles, struggle to find time for AI learning due to work-life balance challenges.[27] Many women, especially in low- and middle-income contexts, face a disproportionate burden of unpaid care and domestic responsibilities. This limits the time they can dedicate to upskilling or engaging with digital tools and AI-related training programs.
7. **Algorithm Bias -** AI technologies can inadvertently reinforce, or even exacerbate, existing gender-based disparities. This occurs primarily through algorithmic bias—a phenomenon wherein AI systems produce systematically skewed or unfair outcomes due to biases embedded in data, design processes, or institutional contexts.[28] AI models are trained on data that often reflect existing societal biases. For instance, Amazon had to scrap a hiring AI tool that downgraded female applicants because it was trained on male-dominated resumes.[29] Men continue to dominate the technology space, and the disparity serves to perpetuate gender inequalities, as unrecognized bias is replicated and built into algorithms and artificial intelligence.[30].

8. Underrepresentation in Tech Fields - Women remain significantly underrepresented in AI-related domains. Globally, less than 22% of AI professionals are women.[31] This reflects a substantial gender disparity in one of the most influential and fast-growing fields.

10. Transformative Measures for Women Empowerment through AI

To ensure that Artificial Intelligence becomes a powerful enabler rather than a barrier, targeted efforts must be made to remove systemic obstacles and promote equitable access and participation. The suggestions outlined below aim to foster a gender-responsive AI ecosystem through ethical design, inclusive education, supportive infrastructure, and fair governance mechanisms.

1.Mitigating Gender Bias in AI

It is essential to mitigate gender bias so that women can be equipped in a better way to work in various sectors employing AI. AI development can progress in a way that not only prevents the reinforcement of existing biases but also actively champions gender equality, ensuring fair and equitable outcomes for all users. This comprehensive approach moves beyond simply addressing bias, aiming instead to create AI systems that proactively foster inclusivity and fairness at their core. While some organizations, notably Google and Apple, have implemented commendable measures to mitigate bias through enhanced algorithms, equitable treatment protocols, and increased transparency, others such as Amazon and Microsoft have faced setbacks, necessitating the discontinuation of problematic systems

[27] *The AI Skills Gap: Women's Interest in Generative AI Outpaces Available Training*, AWS Training & Certification Blog, https://aws.amazon.com/blogs/training-and-certification/the-ai-skills-gap-womens-interest-in-generative-ai-outpaces-available-training/ (last visited June 26, 2025).
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due to intractable bias issues. [32] Therefore, addressing gender bias is not just a technical necessity but a foundational requirement for ensuring that AI systems serve all individuals justly and do not replicate or intensify social inequalities. A noteworthy initiative in addressing gender representation in AI is the recent launch by the Collective Artists Network of Radhika Subramaniam, India's first AI-powered bilingual travel influencer. Designed to engage Gen Z audiences with culturally rich and diverse content, this innovation marks a progressive step toward mitigating gender bias in digital and media spaces. By creating a female AI persona that reflects both linguistic inclusivity and cultural depth, the project challenges the stereotypical portrayal of AI avatars and promotes a more representative digital ecosystem.

India is not alone in this endeavour. In 2023, the German National Tourist Board introduced Emma, an AI-generated travel ambassador developed to promote tourism in Germany. These global examples reflect a growing awareness of the importance of gender-sensitive AI representation and highlight how AI can be harnessed not just for automation or efficiency, but also for inclusive cultural storytelling and engagement.[33]

2. **Inclusive AI Education**: Initiatives should be taken to make AI more inclusive for women. Young girls and women should be encouraged to participate in science, technology, engineering, and mathematics (STEM) through mentorship programs, workshops, and educational content. This will help to build a pipeline of women ready to lead and innovate in AI-driven educational technologies.[34]
3. **Support Women- led Startups -** One of the most impactful strategies to empower women in the AI ecosystem is to actively support and promote women-led startups, particularly those leveraging artificial intelligence for social innovation and problem-solving. These ventures not only disrupt traditional gender norms in technology but also offer inclusive solutions tailored to diverse user groups, especially underserved. Some of these have already made significant strides by using AI.[35] For instance, Moonhub,[36]founded by former Meta engineer Nancy Xu, develops AI-powered tools to enhance efficiency and reduce bias in hiring processes. Similarly, Audioshake,[37] founded by Jessica Powell, is an AI-driven audio research company that deconstructs audio tracks for reuse in new formats such as subtitles, dubbing, and remixes. These examples highlight how women entrepreneurs are not only driving AI innovation but also creating real-world impact across industries.
4. **AI Ethics Boards**: As the AI technology expands and advances it becomes even more crucial to have strong ethical principles ensuring transparency and fairness. [38] A strong framework with a gender lens should be adopted by the AI Ethics Board. It should be ensured that the board includes members of all genders, especially women. Inclusive hiring within AI development teams should be encouraged and gender experts should be involved in AI governance structures which will help in foster a culture of equity and respect.

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5. **Improving Digital Infrastructure**: Access to reliable digital infrastructure is a prerequisite for women's participation in the AI-driven world. Investing in digital infrastructure particularly for women in rural areas is key to bridging the digital divide and fostering economic empowerment. Several initiatives, including Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA)[39] aim to increase digital literacy among women, enabling them to access online education, financial services, and job opportunities. Expanding the digital infrastructure by targeted investment in broadband expansion, affordable device distribution, and localized digital literacy programs tailored to women's needs will ensure that they are empowered to participate fully in the opportunities AI offers.

11. Conclusion

As we stand at the frontier of AI-led transformation, the need to embed gender justice in every layer of technological development is not just desirable—it is imperative. Without inclusive governance, AI may replicate or deepen existing divides rather than close them.

Artificial Intelligence is not inherently neutral. Its potential to empower or disempower depends on how it is designed, deployed, and governed. To ensure that AI becomes a tool for transformative gender justice, a conscious commitment to equity, ethics, and inclusivity is essential. This paper asserts that AI can indeed be an engine for women's empowerment—if guided by a feminist and rights-based framework. Furthermore, a collaborative approach involving policymakers, technologists, civil society, and women themselves is crucial to shape AI tools that are transparent, accountable, and equitable.

Contemporary female tech leaders such as Sheryl Sandberg, former COO of Facebook, and Ginni Rometty, former CEO of IBM, have emerged as influential figures and champions for gender equity in the tech sector. Their accomplishments underscore the capacity of women to lead and drive innovation in the ICT field, even as significant obstacles persist.[40]With continuous effort to address gender disparity women can be empowered to pursue careers in technology. Only by embedding gender perspectives into every stage of AI development can we harness its full potential to bridge existing disparities and build a future where women are not just users, but leaders and creators of technology.

[39] Ministry of Elecs. & Info. Tech., *Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA)* (2025), https://www.myscheme.gov.in/schemes/pmgdisha.
[40] M. Potes Barbas et al., *Women in ICT* (Editura Pro Universitaria 2024), https://ace-eu.ipsantarem.pt/wp-content/uploads/2024/07/WomenInICT_handbook.