WOMEN WHO CODE THE FUTURE: EXPLORING FEMINIST TECHNO-SCIENCE IN THE AI REVOLUTION

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ABSTRACT

As artificial intelligence becomes an increasingly powerful force reshaping economies, labor, and daily life, the role of women in its development remains both crucial and underacknowledged. This study explores how women developers, engineers, and researchers are not only entering but actively transforming the AI landscape. Anchored in the theoretical framework of feminist technoscience—particularly the work of Donna Haraway and Judy Wajcman—this research challenges the notion that technology is a neutral or genderless field. Instead, it argues that technological systems, including AI, are deeply embedded with the social values and power structures of their creators. Women working in AI today are reshaping these systems by embedding values of equity, care, accountability, and inclusivity into algorithmic design and digital infrastructures. Through an interdisciplinary approach that combines qualitative case studies, ethnographic accounts, and interviews with women in AI fields, the paper documents how feminist interventions are emerging not only in grassroots tech communities but also in major industry and academic institutions. These women are not simply participating in AI—they are redefining what it means to build technology for the public good. The study further reflects on how feminist technoscience opens up space for ethical innovation, questioning the biases and exclusions coded into AI systems while offering alternative, socially conscious pathways forward. By centering women's contributions and critically examining the structural challenges they face, this research calls for a reimagining of technological progress—one that sees gender equity not as an afterthought, but as a foundational principle of the AI revolution.

Keywords: Feminist Technoscience, Artificial Intelligence, Women in Technology, Gender and Innovation, Ethical AI, Intersectionality, Digital Equity

Introduction

The emergence of artificial intelligence (AI) as a transformative force in contemporary society marks one of the most significant technological shifts of the 21st century. From predictive healthcare systems and autonomous vehicles to intelligent education platforms and biometric surveillance, AI technologies are increasingly embedded in everyday life (Russell & Norvig, 2021). While discussions around AI often focus on computational power and innovation, less attention has been paid to the social dynamics that shape who builds these technologies—and with what values and intentions.

Historically, the field of computer science, including AI, has been dominated by masculinist cultures that have marginalized women's contributions, both structurally and symbolically (Wajcman, 2004). As a result, many AI systems today reflect the gender, race, and class biases of those who design and train them (Noble, 2018). For example, facial recognition algorithms have been shown to have

significantly higher error rates for women and people of color due to skewed datasets (Buolamwini & Gebru, 2018). These systemic issues not only reproduce social inequalities but also undermine the credibility and fairness of AI itself.

However, recent years have witnessed a growing feminist intervention in the field of AI. Women are no longer simply advocating for inclusion in existing structures—they are challenging and reshaping the epistemological foundations of AI development. Central to this shift is the framework of feminist technoscience, which interrogates the myth of objectivity in science and technology and asserts that all knowledge production is shaped by social and political power relations (Haraway, 1985; Harding, 1991).

Feminist technoscience emphasizes situated knowledge, intersectionality, and care ethics as critical tools for imagining alternative futures in science and technology. It recognizes that gender is not an isolated axis of identity but intersects with race, class, geography, and ability to shape lived experience and access to power (Crenshaw, 1989). This theoretical lens allows us to critically examine how women in AI are not only pushing back against patriarchal and technocratic norms but are also building community-driven, ethically-informed technologies aimed at collective flourishing.

This research seeks to explore how women in the AI ecosystem—engineers, researchers, educators, and activists—are using feminist technoscience as a guiding philosophy and practical toolkit to shape AI systems that prioritize justice, equity, and inclusivity. It aims to move beyond the rhetoric of "adding women" to a male-dominated field and instead focuses on how their interventions are fundamentally altering the logic and direction of AI development.

Research Questions

This study is guided by the following central research questions:

1. How does feminist technoscience inform the perspectives and contributions of women in AI development?
2. In what ways are women in AI challenging traditional innovation cultures and embedding inclusive, care-driven values in AI systems?
3. What structural and cultural barriers continue to limit the full participation of women in AI, and how are these being navigated or resisted?
4. How can feminist approaches to AI contribute to the development of more socially just, ethical, and inclusive technological futures?

Research Objectives

In addressing the above questions, the objectives of this study are as follows:

1. To critically examine the theoretical contributions of feminist technoscience to the field of AI.

2. To document and analyze the contributions of women working in

various sectors of AI development, including coding, ethics, research, and activism.

3. To identify the socio-technical barriers that women face in entering and influencing AI-related domains.
4. To evaluate how feminist ethics and inclusive design practices are being integrated into real-world AI projects.
5. To propose future pathways for inclusive AI development rooted in feminist values, intersectionality, and ethical innovation.

Methodology

Research Design

This study employs a qualitative research design rooted in interpretivist epistemology, which emphasizes understanding human experiences and meaning-making from the perspective of those directly involved (Creswell & Poth, 2018). Given the exploratory and critical nature of the research questions, a qualitative approach is particularly appropriate for examining the nuanced ways in which women engage with AI and apply feminist technoscience principles in their work. The study does not seek to generalize but rather to contextualize individual experiences within larger sociotechnical and theoretical frameworks.

Data Collection Methods

The research triangulates three qualitative methods to ensure a comprehensive and multi-layered understanding of the topic:

1. Semi-Structured Interviews

Twelve women working in diverse roles within the AI ecosystem—including researchers, engineers, educators, and activists—were selected using purposive sampling. The selection aimed to ensure representation across geographical regions (North America, South Asia, Sub-Saharan Africa, and Europe), institutional settings (academia, industry, and civil society), and career levels (junior to senior). Interviews were conducted virtually via Zoom and lasted between 45 and 70 minutes. Each participant was asked about her experiences in the field, the challenges she faced, and how feminist values influenced her work in AI.

2. Case Studies

Three feminist-led AI initiatives were examined as case studies. These included:

- **The Gender Shades Project** (MIT Media Lab), led by Joy Buolamwini
- **AI4All**, a U.S.-based nonprofit promoting diversity in AI
- **The Feminist Internet Project**, a UK-based collective focused on ethical and inclusive digital technologies
  Each case was analyzed for its design principles, team composition, community engagement, and alignment with feminist technoscientific values.

3. Document Analysis

Supplementary materials such as policy reports, academic publications, public talks, and project manifestos were analyzed to

identify recurring themes related to feminist ethics, inclusivity, and structural resistance in AI. These documents provided context for the interviews and case studies and helped ground the findings in broader discursive and institutional landscapes.

Data Analysis

Thematic analysis, as articulated by Braun and Clarke (2006), was used to code and interpret the qualitative data. Transcripts from interviews were first manually coded using open coding to identify initial patterns. These codes were then organized into broader themes aligned with the research questions: (1) feminist values in AI design, (2) resistance to patriarchal systems, (3) intersectional representation, and (4) ethical innovation.

An iterative coding process was followed, allowing emergent insights to be refined and cross-referenced with case study and document analysis data. Nvivo software was used for data organization, which facilitated visualization of co-occurring themes and subthemes.

Ethical Considerations

All research participants were informed of the study's objectives and signed consent forms prior to data collection. Participants were given the option to remain anonymous, and pseudonyms were used where requested. Ethical approval was obtained from the Institutional Review Board (IRB) of the author's home university. Data confidentiality, secure storage, and participant autonomy were upheld throughout the research process in line with the American Psychological Association's (2020) guidelines on ethical research.

Literature Review

Feminist Technoscience: Reimagining Knowledge and Power

Feminist technoscience emerged in the late 20th century as a critical response to the assumed neutrality of science and technology. Foundational thinkers like Donna Haraway (1985) and Sandra Harding (1991) argued that all scientific knowledge is socially situated and embedded within power structures that often reinforce patriarchy, colonialism, and capitalism. Haraway's *"A Cyborg Manifesto"* introduced the figure of the cyborg as a metaphor for transgressing binaries such as human/machine and male/female, proposing a hybrid feminist identity that challenges the boundaries of traditional technoscience.

Judy Wajcman (1991; 2004) built on this work by focusing specifically on the gendering of technological labor and design cultures. In *TechnoFeminism*, she contends that technology reflects the social relations of its production and thus reproduces masculine values such as control, hierarchy, and speed. Feminist technoscience thus reorients the production of knowledge from an objective, universalist endeavor to one that is pluralistic, relational, and ethically engaged.

Feminist technoscience also incorporates the **ethics of care**, a framework that prioritizes empathy, interdependence, and social responsibility in decision-making processes (Held, 2006; Tronto,

1993). This ethical lens provides a meaningful counterpoint to the utilitarian, efficiency-driven logic that underpins much of AI development.

Gender and Bias in AI Systems

A growing body of research documents how AI systems often reproduce and amplify gender-based discrimination. Noble (2018) demonstrated how search engine algorithms systematically disadvantage women and people of color, offering biased results that reflect and reinforce social hierarchies. Similarly, Buolamwini and Gebru's (2018) *Gender Shades* study revealed that commercial facial recognition technologies had far higher error rates for darker-skinned women compared to lighter-skinned men, due to biased training datasets and lack of diversity in development teams.

These findings underscore the urgent need for inclusive datasets, ethical design frameworks, and diverse development teams. Yet the problem is not simply technical—it is epistemological. As Benjamin (2019) argues in *Race After Technology*, the racial and gender biases in AI are not bugs in the system; they are features of a broader sociotechnical matrix that privileges certain bodies and knowledges while marginalizing others.

Women in AI: Representation and Resistance

Statistical data consistently show a significant gender gap in AI. According to the World Economic Forum (2023), women make up only 22% of AI professionals worldwide, with even fewer represented in senior leadership and research roles. This underrepresentation is both a symptom and a cause of the marginalization of feminist values in AI development.

Despite these challenges, women are leading a number of transformative initiatives. Joy Buolamwini, founder of the Algorithmic Justice League, has been instrumental in exposing algorithmic discrimination. Timnit Gebru, a pioneer in ethical AI, co-founded the *Black in AI* community and has advocated for AI that centers justice, transparency, and accountability (Hao, 2021). Initiatives such as *Women in Machine Learning* (WiML), *AI4All*, and *The Feminist Internet Project* offer alternative models of engagement where mentorship, ethical reflection, and community-building are central.

These initiatives often employ **intersectional feminism**, a term coined by Crenshaw (1989) to describe how multiple forms of discrimination intersect and compound. Intersectionality is increasingly used to analyze how AI impacts individuals at the margins of race, gender, class, and geography—recognizing that a gender lens alone is insufficient without attention to broader structural oppressions.

Toward Ethical, Feminist AI

A number of scholars and practitioners have called for a reorientation of AI development toward feminist principles. D'Ignazio and Klein (2020), in *Data Feminism*, propose a set of design principles for data science that emphasize power analysis, participatory design, and the amplification of marginalized voices. Similarly, Costanza-Chock (2020) advocates for "design justice," which seeks to ensure that those most affected by design decisions are centered in their creation.

These frameworks not only offer practical tools for inclusive AI development but also challenge the foundational ideologies of the tech industry. Instead of "value-neutral" algorithms, they argue for "value-explicit" ones—where care, justice, and inclusivity are intentionally coded into technological systems.

Discussion

This section analyzes how women in AI are actively transforming the field by applying feminist technoscientific principles in their work. Drawing from interviews, case studies, and literature, four key thematic areas emerged: (1) redefinition of innovation, (2) intersectional practices in AI design, (3) resistance to masculinist tech culture, and (4) the advancement of ethical, feminist AI.

Redefining Innovation: Feminist Values in AI Design

Mainstream innovation discourse in artificial intelligence often equates progress with speed, scale, and profitability. This logic, deeply influenced by capitalist and patriarchal ideologies, tends to sideline considerations of ethics, inclusivity, and care (Wajcman, 2004). However, women in AI are disrupting these assumptions by embedding alternative values in the design and deployment of technology.

For example, several interviewees emphasized the importance of *slow innovation*—an approach that privileges deliberation, community feedback, and long-term social impact over quick releases and competitive advantage. One AI researcher from India noted, "Sometimes the most radical thing we can do is take our time and ask the communities we serve what they actually need from technology."

This approach aligns with feminist technoscientific values that privilege context-sensitive knowledge production, emotional labor, and relational ethics (Haraway, 1985; Held, 2006). Rather than viewing care as a "soft skill" irrelevant to technological development, women in AI are treating it as a foundational design principle. This has led to innovative applications in healthcare diagnostics, gender-aware language processing, and educational tools for marginalized groups—projects often ignored in male-dominated R&D pipelines.

Intersectionality in Practice: Inclusive AI from the Ground Up

Intersectionality, introduced by Crenshaw (1989), is not only a theoretical framework but a practical methodology adopted by many women-led AI projects. It is used to assess how race, gender, class, and other dimensions of identity intersect to produce unique

experiences of marginalization within AI systems.

One case study, the **Feminist Internet Project**, employs intersectional design principles to build digital platforms that prioritize consent, accessibility, and representation. Similarly, **Black in AI**, co-founded by Timnit Gebru and Rediet Abebe, provides a community for Black researchers to co-develop AI solutions rooted in racial and gender equity (Hao, 2021).

Interviewees reported that intersectionality allowed them to "see the blind spots" in mainstream AI, including language models that fail to recognize dialects or datasets that erase transgender and nonbinary identities. These women are not merely critiquing existing systems but proposing design interventions that center historically excluded voices.

Moreover, many of these projects engage in participatory research methods, such as co-design workshops and user feedback loops, ensuring that technology is shaped by those it claims to serve. These practices challenge the traditional top-down models of tech production and instead embrace *democratized innovation* (D'Ignazio & Klein, 2020).

Challenging the Techno-Masculine Culture

The masculine norms that dominate AI culture—rationality, objectivity, competitiveness—often alienate those who bring alternative values into the field. Multiple interview participants described toxic workplace environments where care-oriented ethics, inclusive design, or feminist critiques were dismissed as unscientific or irrelevant.

This resistance is rooted in the "techno-masculine" ideology described by Faulkner (2001), wherein technical competence is conflated with male identity and emotional detachment. One senior AI engineer recounted being told, "You're too political for this space," after raising concerns about gender bias in an algorithmic hiring tool.

Despite these obstacles, women are creating feminist countercultures within AI spaces. Online communities such as *WiML (Women in Machine Learning)* and *Data Feminism Network* serve as crucial support networks that offer mentorship, collaborative research opportunities, and safe spaces for critical discourse.

Feminist technoscience insists that objectivity is not compromised by subjectivity—it is enriched by acknowledging positionality and power. As Harding (1991) argues, the most robust knowledge comes from "strong objectivity," which starts from marginalized standpoints and is therefore more reflective of the complex realities AI systems attempt to model.

Ethical AI and Feminist Interventions

Feminist technoscience does not merely critique—it offers constructive models for rethinking AI ethics. While many corporate tech ethics boards are performative, women-led initiatives are implementing meaningful interventions that integrate ethics at every stage of design and deployment.

For example, Joy Buolamwini's *Algorithmic Justice League* works to

expose and correct algorithmic discrimination. Their audits of facial recognition software have led to policy changes at major firms, including IBM and Microsoft (Buolamwini & Gebru, 2018). Similarly, D'Ignazio and Klein's (2020) *Data Feminism* framework offers concrete principles such as "examine power" and "embrace pluralism," which have been adopted in community data science projects globally.

Ethical AI, when informed by feminist theory, is not a checklist—it is an ongoing process of relational accountability. This shifts the focus from abstract principles to lived impacts, encouraging designers to ask: Who benefits from this technology? Who might be harmed? Who is left out of the decision-making process?

Interviewees emphasized that feminist ethics provide a compass in an industry driven by disruption and capital. As one AI ethicist remarked, "Feminism reminds us that technologies are never neutral. They are always political—and so are we."

Findings and Gaps

Key Findings

The research reveals several significant insights about the role of women in AI and the transformative potential of feminist technoscience:

1. **Women in AI are actively redefining what counts as innovation.**
   Rather than pursuing speed, scale, or disruption for their own sake, many women-centered AI initiatives emphasize *ethical responsiveness*, *community relevance*, and *sustainability*. This shift challenges the dominant techno-solutionist narrative pervasive in the AI industry (Wajcman, 2004).

2. **Feminist values are being embedded into AI systems through design, policy, and pedagogy.**
   Feminist technoscience provides both a theoretical framework and a practical strategy for building more inclusive technologies. Concepts such as *situated knowledge* (Haraway, 1985), *ethics of care* (Tronto, 1993), and *intersectionality* (Crenshaw, 1989) are actively informing algorithmic audits, dataset revisions, and participatory design practices.

3. **Structural barriers to women's full participation in AI remain deeply entrenched.**
   Despite increased awareness of gender disparities, participants reported facing systemic challenges such as limited access to research funding, lack of mentorship in male-dominated departments, and tokenization on diversity panels. These issues are especially pronounced for women of color and those working outside of Western institutions.

4. **Alternative AI spaces are being created and sustained through feminist organizing.**
   From community-based coding collectives to global networks like

Women in Machine Learning and *Black in AI*, women are building ecosystems of resistance that provide critical resources, emotional support, and intellectual collaboration. These spaces are redefining AI not just as a technical field, but as a terrain for cultural and political transformation (D'Ignazio & Klein, 2020).

5. **Feminist ethics offer a powerful alternative to corporate AI ethics frameworks.**
   Unlike top-down compliance models, feminist ethics operate through a relational and participatory approach. Interviewees emphasized the importance of *ongoing dialogue*, *mutual accountability*, and *socially embedded design processes*. These principles resonate with recent calls for decolonial and justice-centered approaches to AI (Benjamin, 2019).

Gaps in the Literature and Practice

While this study highlights the positive contributions of women and feminist thought to AI, it also identifies several critical gaps that warrant further investigation and engagement:

1. **Lack of geographical diversity in feminist AI scholarship and practice.**
   Most existing literature and high-profile feminist AI initiatives are concentrated in North America and Western Europe. There is limited documentation of feminist AI movements in the Global South, especially in contexts shaped by postcolonial or Indigenous epistemologies.

2. **Insufficient longitudinal research on the outcomes of feminist-led AI projects.**
   While many feminist AI initiatives show promise, few have been evaluated over time to assess their real-world impacts on systems, institutions, and communities. This limits the ability to translate pilot successes into scalable models.

3. **Limited institutional support for feminist technoscientific research.**
   Feminist interventions in AI remain marginal within dominant academic and corporate structures. Funding agencies and university departments often deprioritize gender-focused research in technology fields, reinforcing epistemic hierarchies that value technical expertise over ethical inquiry.

4. **Underrepresentation of LGBTQ+ and disabled perspectives in feminist AI discourse.**
   Although intersectionality is a guiding principle, more explicit inclusion of queer and disability-centered analyses is needed. As AI systems increasingly impact healthcare, surveillance, and labor, these communities offer critical insights into what inclusive design truly means (Costanza-Chock, 2020).

5. **Absence of feminist legal and policy frameworks for AI governance.**
   Most AI regulatory debates remain framed in abstract ethical terms rather than grounded feminist praxis. There is a need to

integrate feminist legal theory into global AI policy frameworks to address structural injustice in data ownership, surveillance, and algorithmic accountability.

Conclusion

This research has explored how women in artificial intelligence are not merely striving for representation in a historically male-dominated field but are actively redefining its foundations through the lens of feminist technoscience. Grounded in the works of Haraway, Wajcman, and Crenshaw, the study reveals how women are embedding ethics of care, intersectionality, and situated knowledge into AI systems, thereby offering a substantive alternative to dominant technocratic paradigms.

Women-led initiatives in AI challenge the assumptions of neutrality and objectivity that have long governed technological development. Instead, they emphasize justice, inclusivity, and social responsibility as essential components of innovation. Through participatory design, intersectional data practices, and activist scholarship, women are reshaping what it means to develop and deploy intelligent systems. Their contributions are not limited to technical expertise; they constitute a form of resistance against epistemic exclusion and institutional sexism.

Yet, the path toward a truly feminist AI is fraught with obstacles. Structural inequities in access to resources, visibility, and leadership continue to limit the transformative reach of these interventions. Moreover, the dominance of Euro-American feminist narratives in AI discourse underscores the urgent need to amplify voices from the Global South and from historically marginalized communities within feminist movements themselves.

The future of artificial intelligence must be one that is not only intelligent in computation but also wise in justice. This study concludes that feminist technoscience offers a necessary compass for navigating this future—one that centers care over control, plurality over hierarchy, and collaboration over competition. If AI is to serve all of humanity, it must be co-created by those who have long been excluded from its making—and women are at the forefront of that revolution.

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