CULTURAL STUDIES

Humanization of Technology: Understanding Andrew Feenberg's 'Technical Code'

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Abstract

This article examines Andrew Feenberg's concept of "technical code" as a foundational concept for understanding the humanization of technology. A prominent contemporary philosopher of technology, Feenberg is known for his work within the Critical Theory of Technology. Feenberg states that technologies are not neutral instruments but rather embed social values and interests during their design and development. This technical code, far from being exclusively technical, reflects power dynamics, cultural norms, and the choices of specific social groups. The values integrated within technology determine its application and consequences, reinforcing prevailing social structures. The article explores Feenberg's critical theory of technology, emphasizing that democratic intervention offers a path to humanize technology. The article investigates the connection between technical code and social change to elucidate approaches for developing technologies that truly address human needs and support more equitable and sustainable societal development.

Keywords: Technological Determinism, Technical Code, Instrumentalization, Deworlding/Reworlding, Boundary of Technique, Bias in Coding, Hegemonic Technological Rationality.

Introduction

During the pre-modern age, technical development was rooted in the practical experience inherent to craft traditions. These traditions were characterized by their holistic nature, integrating components such as religious tenets, applied knowledge, aesthetic values, and defined social functions. Technical evolution proceeded in alignment with local beliefs and customs, which served to preserve experiential forms of learning. Craft practices typically combined an understanding of the natural world with an awareness of technology's potential for societal disruption. This approach generally supported stable, self-sustaining societies across long durations, despite intermittent environmental challenges. Conversely, contemporary technological advancement tends to estrange individuals from their lived, everyday experiences. This estrangement is largely because capitalist production centralizes authority over technology design in the hands of a restricted dominant class and their associated technical workforce. Such centralization not only allows for exploitation but also curtails the judicious utilization of technology. By frequently disregarding historical antecedents, modern technological progress accelerates the pace of change, thus fostering ongoing social instability (Feenberg, 2010).

The ethical controversies surrounding technology often revolve around a supposed conflict between technical efficiency and societal values. However, Feenberg affirms that this opposition is often artificial. Many of today's technical methodologies and standards originated in informally articulated values that were later integrated into established technical codes. Because values have always been part of how technology is built, it is necessary to recognize this when addressing practical arguments against ethical proposals. The introduction of new technologies often leads to societal conflicts regarding their safety, design, and regulation.

Andrew Feenberg's notion of the 'Technical Code' is central to his critique of technological determinism and instrumentalism, which are two dominant perspectives in the philosophy of technology. Technological determinism suggests that technology autonomously drives social structure and cultural values in a unidirectional manner(2010). Feenberg argues against this view, asserting that while technology undoubtedly influences society, it is also profoundly shaped by social forces and human agency. Instrumentalism sees technology as a neutral tool whose impact depends entirely on how users intend and apply it (Feenberg, 1999, p. 1). For Feenberg technology is not impartial, rather, its fundamental design includes values and biases. It is socially constructed and embodies the values, culture, and ideologies of its creators and the society in which it is developed. He challenges

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the idea that technology is merely a neutral set of tools. Instead, he contends that technology inherently embodies significant cultural and ideological influences. (Feenberg, 1999).

Feenberg cites the historical example of "bursting boilers" in early 19th-century steamboats. This demonstrates that disputes over the social control of technology are not a new issue. The steamboat era, much like automobiles or airlines today, saw significant debate over how to manage inherent risks. Despite early awareness of the dangers and a high death toll, effective regulation for steamboat boilers took a long time to implement. He argues that the "proper" design of a boiler was not purely a technical decision but a social judgment about safety. While market forces played a role, political pressure ultimately led to mandates for features like thicker walls and safety valves. This implies that what a technology "is" becomes defined through social and political struggle, not just technical necessity (Feenberg, 2010). He states: "What I call the "technical code" of the object mediates the process. That code responds to the cultural horizon of the society at the level of technical design. Quite down-to-earth technical parameters such as the choice and processing of materials are socially specified by the code" (Feenberg, 2010, p.22). Technology is not purely technical, its design is shaped by society's values, forming a "technical code." This code, once set, makes socially-driven choices look like unavoidable technical necessities, creating an illusion of technical necessity. Technological development and design are not purely deterministic or solely driven by technical considerations. Instead, they are deeply intertwined with social values, political processes, and cultural norms, which ultimately shape what a technology "is" and how it functions.

Deworlding and Reworlding

The 'Technical Code' operates at different levels and in various aspects. Feenberg's instrumentalization theory, with its primary and secondary distinctions, provides a framework to understand this. Primary Instrumentalization is the first level which describes the fundamental way we engage with the material world through technology. Drawing on Heidegger's terminology, Feenberg describes it as a process of "de-worlding," where we abstract objects from their natural context, reduce them to their useful functions, and subject them to technical control. Think about how the internet takes information, images, sounds, and social interactions and transforms them into digital data that can be manipulated and transmitted (Feenberg, Brey, & Misa, 2004).

The second level of instrumentalization, referred to as secondary instrumentalization or realization, involves a complementary process of "re-worlding" or "disclosure". Here, the simplified objects and subjects from the primary level are reintegrated into a new natural and social environment. This stage is where design and implementation come into play, heavily influenced by prevailing social and cultural values. This is where society actively shapes and gives meaning to the technologies that have been initially formed through primary instrumentalization.

The technical choices made during this phase are not merely about efficiency but reflect broader societal priorities and power dynamics (Feenberg, Brey, & Misa, 2004). At this secondary level, the 'Technical Code' gains influence. This influence reflects the interests and ideologies of the social groups involved in designing and developing the technology. This is where social goals are "coded" into the technical specifications, guiding the selection of one technical design over another based on ethical, aesthetic, and broader social considerations. This means that technological advancements and designs often reinforce the power and control of those who possess technical knowledge and control its deployment.

The boundary of technique

The concept of the "boundary of technique" is strongly linked to Feenberg's idea of the technical code. This code refers to the rules, norms, and assumptions built into a technology during its design and development. This code is not neutral. It reflects the dominant social interests and values of the society in which it has created. The Technical Code significantly shapes technological design. This is because social values and assumptions are embedded within the technology itself. Therefore, design features are not just technical solutions; they also embody underlying cultural values, priorities, and norms. Feenberg states: "Technology rests not only on scientific rationality but also on design that mediates between scientific knowledge and its technical applications by forming a "technical code"—the latter can therefore incorporate life-affirming values to replace the current "formal bias" of technology that favours domination and control" (Arnold & Michel, 2017, p. 52). For Feenberg, the boundary of technique is not just about understanding where technology applies. Instead, it is a way to see that even when technology is used correctly, its design and how it works are filled with social and political biases from powerful groups.

Social desirability

Feenberg developed the concept of technical code to explain how social and technical requirements are linked. A technical code represents how an interest or

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ideology is built into a practical solution to a problem. While technologists may explicitly create some codes, Feenberg's concept is a broader analytical tool, applicable even when not formally stated. More precisely, a technical code serves as a criterion that selects among feasible technical designs based on a social goal, integrating that goal directly into the final design (Feenberg, 2010). In this context, "feasible" denotes technical viability. Goals are "coded" through a process of categorization that ethically evaluates items as permissible or prohibited, assesses them aesthetically as superior or inferior, or ranks them according to prevailing social preferences. "Socially desirable" is defined not by a universal standard but by goods widely valued within a given society, such as health or economic gain. In Feenberg's view, "Technical codes are formulated by the social theorist in ideal-typical terms, that is, as a simple rule or criterion. A prime example in the history of industrialization is the imperative requirement to deskill labour through mechanization rather than preserving or enhancing skills" (Feenberg, 2010, p. 68). Where such codes are reinforced by individuals' perceived self-interestand law, their political import usually passes unnoticed. This is what it means to call a certain way of life culturally secured and a corresponding power hegemonic.

Hegemonic technology

According to Feenberg, all societies contain "technical elements,"distinct technological components that are combined in specific arrangements to create recognizable and usable artifacts. This process, consistent across a society's technical practices, reflects its prevailing understanding of what technology is and how it should be implemented. He states: "Performing technology in this way is a scripted activity in which people and objects come together to produce both individual technology designs and, at the same time, to reproduce the prevailing idea of what technology is. The technical code is the script" (Feenberg, 2010, p. 117). The technical rules governing design are not objective; they embody the influence of specific social groups, and the designs produced then strengthen that influence. Even though design discussions use common language, certain interpretations of these rules gain significance and are perceived as more valid. This leads to the selection of designs that fit within the framework defined by these dominant interpretations, a process Feenberg identifies as "hegemonic technological rationality" in modern capitalism.

Feenberg argues that the technical code – the underlying principles, rules, and assumptions that guide technological design is not a neutral, objective set of guidelines. Instead, it is deeply shaped by the social context in which it emerges.

This technical code reflects the interests of dominant social groups that is when technology is designed, it incorporates the values, priorities, and power structures of those who hold power in society. The resulting technological designs, then serve to reinforce the dominance of these particular social interests:"Much of the terminology of political discourse tends to be shared among the parties to a debate, but some articulations of them appear more coherent and truthful than others, so some designs will be favoured within the framework set by the dominant articulations of the technical code. These designs are selected by what Feenberg calls 'hegemonic technological rationality', which is manifest in articulations of the code specific to modern capitalist societies" (Feenberg, 2010, p. 117-118). This refers to the idea that a particular form of rationality – one that prioritizes efficiency, control, and quantifiable outcomes – becomes dominant in modern capitalist societies. The technical code is the mechanism through which these power dynamics are embedded into the very fabric of the technological world, making it appear rational and natural when it is, in fact, a reflection of unequal social interests. Technology is infused with values from its very creation through its technical code. Changing technology therefore requires a deep dive into its political foundations, understanding that real reform means fundamental shifts in design that are not merely technical but are profound "events" of societal re-valuation.

Bias in Coding

Technical systems often carry biases derived from the values of those who create them. The critical theory of technology aims to reveal these hidden biases. However, pinpointing technical bias is challenging because the unfair social results of technical choices often appear to be natural outcomes of 'progress'. When technical rules are supported by individuals' perceived self-interest and by laws, their political importance is usually overlooked. This situation illustrates how a way of life becomes culturally secured and its accompanying power becomes hegemonic (Feenberg, 1999).

The notion of democratic capitalism as a neutral system, allowing individuals to define their own good, strengthens existing dominant powers. Revealing the inherent biases within this system requires a specific type of argument, primarily advanced by certain philosophers of technology. These scholars dispute the separation between technical logic and societal biases, contending that social factors are intrinsically woven into technological choices. Illustrative examples highlight this perspective. Marcuse, for instance, argued that technology's claimed neutrality allows it to be used by dominant social groups. Similarly, Borgmann criticized the

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close connection between liberalism and the "device paradigm" in societies that prioritize private consumption (Arnold & Michel, 2017).

Formal bias is a concept from the critical theory of technology. It helps us see how a technical system, even if it is designed well and works perfectly, can still cause unfairness or discrimination in a real-world social situation. This idea also helps explain things like institutional racism. Its main goal is to help us analyze activities that appear fair in theory but cause discriminatory outcomes in practice (Feenberg, 2010).

Beyond Fixity

The technical code is not a fixed entity but rather exists within a space of potential contestation and revision. Just like in democracy, where different groups fight to shape the rules, the technical code is also influenced by various competing players trying to control how it is made. Consequently, any specific configuration of technical elements inherently integrates both technical requirements and underlying societal values, with the resulting output serving to strengthen prevailing social interests.

Constructivism primarily identifies the seemingly neutral act of labelling by socially significant groups as the mechanism through which technologies are shaped by the attribution of meanings aligned with specific user practices. Feenberg on the other hand adopts a broader and more politically oriented perspective. Feenberg argues that debates about how specific technologies are made can lead to questioning what technology itself means or to fundamental changes in how our society is structured. Traditional critical social theory, particularly the Frankfurt School viewed technology as inherently tied to the problems of modernity, embodying a dangerous focus on efficiency or instrumentalism that undermined genuine meaning and empowered technocratic experts. They believed technology was fundamentally unreformable, leading them to prioritize defending non-technological sources of meaning as essential for human existence. Feenberg's idea of technology enabling profound social change was therefore a significant departure from this established perspective. Feenberg's concept of the technical code focuses on two main points: how values are built into technologies during their design, and how the overall meaning of technology comes to serve the interests of powerful social groups (Arnold & Michel, 2017).

The technical code can be understood as a technically sound solution that incorporates specific social interests. This code is evident in all technological

designs influenced by societal concerns. Consequently, these designs not only reflect the technical code but also serve to strengthen existing social power structures (Feenberg, 2002). Technical rules aim for good solutions, but since social interests shape these rules, the resulting technology ends up supporting the current powerful groups.

The Code of Control

The idea of "code" combines three key concepts. First, it primarily refers to the rules guiding technical decisions to maintain a system's independence. This highlights how design practices become routine, leading to technologies that uphold and strengthen current power structures(Arnold & Michel, 2017). Second, artifacts are shaped toa certain end, but they also communicate their function to other actors and enroll them in relevant activities. Feenberg writes that "organizations must encode their technical environment, not merely associating technology with certain signifiers, but installing these signifiers in its very structure. Finally, the technical code also functions as a discourse in the way Foucault described. This means the technical code acts as a "regime of truth," shaping how technical systems are built and understood to align with a system of control. In this sense, the technical code goes beyond just local design settings. It becomes embedded in how people perceive and interact with technology, influencing broad areas of society(Arnold & Michel, 2017).

Feenberg claims modern societies have large, connected networks of many different parts. The technical code works within these networks in key ways: it controls how technologies are described and made, how people see and understand technology, and how technology fits into society's culture. Feenberg points out that at each of these stages, the technical code faces resistance from forces that can change how it works. A technical code bridges a social demand and a technical solution. It appears in both discussions and actual products. For instance, the desire for car safety leads to safety features like seat belts and airbags, which are how safety is functionally achieved. Feenberg (2010) remarks: "Thus, technology and society are not alien realms as are facts and values in the treatises of philosophers. Rather they communicate constantly through the realization of values in design and the impact of design on values"(p. 68).

The concept has also drawn scholarly criticism from various perspectives. Critics raise questions regarding its conceptual boundaries, its practical efficacy in achieving radical change, and its potential to separate technology from the lived

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human experience. One major line of critique deriving from postphenomenology and other traditions that emphasize the lived experience of technology, questions whether Feenberg's concept maintains too sharp a distinction between technology and the lifeworld. Verbeek, Dutch philosopher of Technology argues that by emphasizing primary and secondary instrumentalization, Feenberg risks reinforcing a modernist split between humanity and technology, potentially overlooking how technologies actively shape our perceptions, actions, and even our very being in the world. The criticism here is that the technical code might absolutely treat technology as an external object upon which values are inscribed, rather than recognizing it as an integral part of human experience and world-making. Some scholars suggest that his concept of "technical code" could benefit from a more empirically based approach. Critics argue that while Feenberg's ideas are good at showing how technology is shaped by society, they might make the process of how technical rules are created and changed seem too simple. They argue that the real-world process is much more complicated.

Conclusion

To summarize, the 'Technical Code,' as articulated by Andrew Feenberg, forms a foundational concept for comprehending the relation between technology and society. Andrew Feenberg contends the notion of technology as a neutral tool. Technology is not just a set of objective instruments. It is not value-neutral, rather, its inherent design incorporates societal values and power dynamics through what he terms the technical code. This code, which guides design and development, reflects the priorities of dominant social groups, often leading to technological designs that reinforce existing power structures.

Feenberg illustrates how technology first abstracts elements from their context and then reintegrates them into new social environments, where values are "coded" into their very structure. This process reveals that what is considered socially desirable is, in fact, a result of social and political choices, as seen in historical examples like the steamboat boiler controversies. This code, he suggests, determines which technological designs are pursued, underscoring that the path of technology is one of choice, not predetermination. The 'Technical Code' is operative throughout the life-cycle of technology, representing a key arena where power is exercised and where democratic challenges to that power can emerge. Feenberg's scholarship sheds light on the social and political dimensions of technology, urging a critical examination of how it can be guided by democratic principles. Analyzing

technical code is a political act important for identifying hidden biases and power structures, which in turn empowers citizens to engage democratically in shaping the technologies impacting their lives.

Feenberg's work ultimately pushes us to recognize technology as a field of choice and responsibility, rather than an uncontrollable force. In an age characterized by rapid technological evolution and its significant societal impacts, his concept of the technical code equips us to strive for a technological future that is more just, humane, and sustainable. This entails a deliberate effort to create technologies that are sensitive to human values, promote fairness, and respect ecological limits, paving the way for more enriching ways of living with technology. Ultimately, Feenberg asserts that understanding the nature of the technical code is essential. Since technology is a product of social construction, its design and function can be transformed through democratic engagement and a re-evaluation of societal values. This perspective suggests that authentic technological reform transcends mere technical adjustments, necessitating a societal re-evaluation aimed at developing technologies that serve human and social interests, rather than solely reinforcing existing control mechanisms.

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