Meaningful Engagement with Appropriate Technology (MEAT): A Study on Unravelling the Dynamics of Human-Technology Relations

Doctoral Thesis

by

Rasleen Kour

(2018HSZ0009)

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

INDIAN INSTITUTE OF TECHNOLOGY ROPAR

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Meaningful Engagement with Appropriate Technology (MEAT): A Study on Unravelling the Dynamics of Human-Technology Relations

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In Partial Fulfillment of the Requirements

For the Degree of

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DEDICATED

TO

MY PARENTS

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I hereby declare that the work which is being presented in the thesis entitled **"Meaningful Engagement with Appropriate Technology (MEAT): A Study on Unravelling the Dynamics of Human-Technology Relations"** has been solely authored by me. It presents the result of my own independent investigation/research conducted during the time period January 2019 to August 2024 under the supervision of Dr. Sreekumar Jayadevan, Assistant Professor, Department of Humanities and Social Sciences, IIT Ropar and Dr. Swathi Krishna S., Assistant Professor, School of Humanities, Social Sciences and Management, IIT Bhubaneswar. To the best of my knowledge, it is an original work, both in terms of research content and narrative, and has not been submitted or accepted elsewhere, in part of in full, for the award of any degree, diploma, fellowship, associateship, or similar title of any university or institution. Further, due credit has been attributed to the relevant state-of-the-art and collaborations (if any) with appropriate citations and acknowledgements, in line with established ethical norms and practices. I also declare that any idea/data/fact/source stated in my thesis has not been fabricated/falsified/misrepresented. All the principles of academic honesty and integrity has been followed. I fully understand that if the thesis is found to be unoriginal, fabricated, or plagiarized, the Institute reserves the right to withdraw the thesis from its archive and revoke the associated Degree conferred. Additionally, the Institute also reserves the right to appraise all concerned sections of society of the matter for their information and necessary action (if any). If accepted, I hereby consent for my thesis to be available online in the Institute's Open Access repository, inter-library loan, and the title & abstract to be made available to outside organizations.

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Certificate

This is to certify that the thesis entitled **"Meaningful Engagement with Appropriate Technology (MEAT): A Study on Unravelling the Dynamics of Human-Technology Relations"** submitted by Rasleen Kour (2018hsz0009) for the award of the degree of Doctor of Philosophy of Indian Institute of Technology Ropar, is a record of bonafide research work carried out under our guidance and supervision. To the best of my knowledge and belief, the work presented in this thesis is original and has not been submitted, either in part or full, for the award of any other degree, diploma, fellowship, associateship, or similar title of any university or institution.

In our opinion, the thesis has reached the standard of fulfilling the requirements of the regulations relating to the Degree.

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Lay Summary

The famous dictum by Socrates, “an unexamined life is not worth living” reflects this thesis’ fundamental idea of the importance of critical reflection in discovering life’s true meaning in today’s technological world. If we observe modern life, marked by abundance and consumption, we have ceased to critically and meaningfully examine our existence. The technologies that surround us are designed to free us from the burdens of labor, yet they also increase our dependence on these artifacts. Rather than reflecting on this dependency, we tend to simply accept what is fed into our plates without question. The thesis begins with a crucial question: are we truly living a life that can be considered worth living, a life that aligns with the idea of a “good life”? The aim is to explore this question in the context of our relationship with technological artifacts. It proposes a vision of the good life with technology, one in which we cultivate authentic and genuine relationships not only with other humans but with the environment. Since humans are not “unencumbered selves,” we must strike a balance with our surroundings and critically consider how our use of technology affects our social, cultural, and community ties. This critical reflection on how technology shapes our lives is central to creating a more fulfilling and examined life, which I present through the idea of MEAT (Meaningful Engagement with Appropriate Technology). The study begins by exploring the importance of engagement, emphasizing that not all engagements with technology should be accepted without scrutiny. As the thesis progresses, it examines how only certain artifacts can truly support human growth, flourishing, and thriving. These are the technologies that allow individuals greater freedom to act authentically and become better versions of themselves. The thesis concludes by identifying a way ahead for MEAT, where humans can rely on technology without diminishing their worth. MEAT advocates for technologies that help individuals cultivate skills, develop virtues, and foster a closer connection to nature.

Abstract

The proposed study seeks to revisit the significance of meaningful engagement with artifacts by critiquing postphenomenology in the philosophy of technology. Postphenomenological thinkers like Don Ihde and Peter-Paul Verbeek argue that there is no universal way of interacting with artifacts, as each human has a unique relationship with specific technologies. However, I contend that this view makes it difficult to identify which interactions can be considered meaningful, as not all technologies foster such engagement. In response, the study seeks to generalize humans (capital H) to understand which types of technologies promote meaningful engagement. Building on this premise, it demonstrates that low-tech artifacts, in contrast to high-tech ones, facilitate deeper engagement due to their increased transparency, ease of repair, and maintenance. In the context of low-tech, the study takes up the phenomenon of Jugaad, defined as a non-standard form of engagement in contrast to the standard engagement typically designed by experts. Further, it explores how humans can have meaningful engagement with technologies that creates a stronger sense of attachment, warmth, and long-term relationships with the product, drawing on the philosophies of Albert Borgmann and Gandhi. By examining the conceptual parallels between these thinkers, the study develops the concept of MEAT (Meaningful Engagement with Appropriate Technology). MEAT is illustrated through the example of the Charkha, an artifact that promotes meaningful engagement while addressing socio-economic, ecological, and intrinsic values. The thesis concludes by asserting that artifacts designed with these concerns in mind can sustain meaningful and authentic user engagement.

Keywords: *MEAT, Postphenomenology, Borgmann, Gandhi, Charkha*

List of Publications from Thesis

Papers in Refereed Journal

1. Kour, Rasleen. 2024. "Focal thing, Appropriate technology, and Wheel of Self-reliance." *Techne: Research in Philosophy and Technology* 28(3): 310-337. https://doi.org/10.5840/techne2024122206.
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Book Chapters

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Abbreviations

BDT	Building, Dwelling, Thinking
BT	Being and Time
HTPP	Heidegger's Technology: Postphenomenological Perspectives
MEAT	Meaningful Engagement with Appropriate Technology
MT	Moralizing Technology: Understanding and Designing the Morality of Things
PTPL	Postphenomenology and Technoscience: The Perking Lectures
TCCL	Technology and the Character of Contemporary Life
TLGE	Technology and the Lifeworld: From Garden to Earth
TMA	The Memorial Address
TOWA	The Origin of the Work of Art
TQCT	The Question Concerning Technology
TT	The Things
WTD	What Things Do: Philosophical Reflections on Technology

Chapter 1
The Background

1.1 Introduction

Looking back on my life, I can see how easily I have adapted to technology I did not have access to when I was younger. I vividly recall how happy I was to get my father's first phone purchase, and I eagerly awaited getting home after school to use it. It was more of a leisure tool I could use once my schoolwork was done. My mobile phone is now my primary source of all work-related things, not just something I do for fun. The phone's alarm clock wakes me up every morning, and then I check for emails and updates, as it is the first thing I engage with when I open my eyes. I no longer distinguish between using my phone during working hours and leisure time. All my life activities, from digital wallets to fitness trackers to weather reports and calendars to work-related apps, have dominated my existence. Some artifacts, such as a fan, table lamp, clock, and so forth, continue to function for me even after I go to sleep. I cannot picture my life without technology. Moreover, engaging with technology helps me to be more accurate than before. I no longer need to worry about remembering my friends' birthday dates, bank details, health records, and work schedules; I can rely on my phone. These apps were designed to liberate humans from the constraints of daily work hours, allowing them to dedicate more time to personal pursuits and activities they truly enjoy. That is, the purpose of technology, in a certain sense, was to emancipate human beings from their monotonous toil. The question is- is technology liberating us from our activities or making us more tied up and unaware of important information that we no longer remember, such as the birthday dates of our dear ones? Here, further questions arise: is all engagement with technology inherently positive? Are there instances where our interaction with certain artifacts be detrimental? Are there artifacts whose engagement adds meaningful values to our lives?

Some philosophers have talked about the negative aspects of technology use; some have defined it positively, while others have adopted a neutral stance. In my thesis, I focus on the stages of technological evolution where immense changes have occurred and also, I look at how those changes have affected philosophers' perspectives on technology. The first is the late 19th and early 20th centuries, the era following World War II, and its effects were felt worldwide. Technological advancement has resulted in long-term destruction, as evidenced by the Hiroshima and Nagasaki incident. In this phase, the philosophers generalize that all modern

technologies (T) have the capacity to harm people (H). The relation between humans and technology can be defined as H-T. Consider gun culture as an example. For these thinkers, all guns (weapons) are harmful to people. The problem with this phase is too excessive generalization, as a single artifact may have various applications within distinct cultures. While some see guns as symbols of violence and power, others see them as symbols of freedom and protection. Therefore, different cultures have different views on them. For example, while it is prohibited in China and Russia, it is permitted in Germany and India under some restrictions and is entirely legal in the USA. A second example would be sex determination, which is prohibited in India but lawful in Canada and the United States. This demonstrates how an artifact can have multistable relations with people across different cultures. This viewpoint is supported by the philosophers of the 21st century, that is, the second phase, known as the empirical turn and postphenomenology. They contend that since there are differences in the relationships between specific humans (h) and specific technologies (t). The human-technology relation, in this case, will be (h-t). The problem with this phase is its relativistic approach. Too many viewpoints will make formulating a theory and reaching a consensus challenging.

I focus on the middle way between first and second. I use capital H to generalize all humans because I believe that there are certain essential universal qualities to human beings. I use (t) to refer to various technologies interacting with the essential human (H-t). Though I am aware that people can interact differently with different technologies, the thesis develops a position, following the works of Martin Heidegger, Albert Borgmann, and M.K. Gandhi, that 'what it is to be a human' plays a part in engaging with technologies. Consider the example of care robots in the healthcare industry. While they are more accurate and error-free than people, care robots lack warmth and empathy. For that general essence, I am using capital (H) for all humans. On the other hand, I am using (t) to indicate the multistable character of various technologies. While some technologies harm people, some are beneficial and promote human flourishing. I explain it using the notion of "appropriate technology" in Borgmann and Gandhi, which focuses on creating more genuine and meaningful relationships with people through technology. Appropriate technology underscores the importance of technology, which empowers human growth and flourishing amidst the abundance available. Hence, through appropriate technology, the thesis delves into the intricate relationship between humans and technology, emphasizing the necessity for:

i) authentic and meaningful engagement
ii) promotion of human flourishing when interacting with technological innovations.

The thesis draws upon the philosophies of Heidegger, Borgmann, and Gandhi, juxtaposed against the perspectives of postphenomenological thinkers. The core of the critique lies in contrasting engagement within low-tech contexts (supported by Heidegger, Borgmann, and Gandhi) versus high-tech (endorsed by postphenomenology). Through the lenses of Heidegger, Borgmann, and Gandhi, the thesis underscores the importance of utilizing technology (low-tech) to encourage deep involvement and contribute to the development of human character. Conversely, postphenomenological thinkers advocate for embracing modern technologies (high-tech), arguing that these advancements can also foster engagement. Central to the conflict between high-tech and low-tech lies the principle of transparency. In high-tech devices, such as automatic systems, user involvement in the design process is limited, reducing transparency and engagement. The thesis also familiarizes the novel way of engagement, wherein the user undertakes complete control over the artifact's design, leading to heightened transparency and engagement. Here, the thesis examines the notion of jugaad, representing creative fixes born from ingenuity and resourcefulness. Lastly, the thesis highlights that low-tech artifacts like the charkha (spinning wheel) allow greater functionality and transparency, facilitating deeper user engagement. This kind of engagement fosters cohesion among individuals and promotes internal harmony in an individual's life.

The following are the three main objectives of the thesis:

1. Critically examine the human-technology relationship within the framework of Postphenomenology [dealt with in Chapter 2].

2. Explore jugaad as a distinct form of human-technology engagement and understand its implications within this relationship. [dealt with in Chapter 3].

3. Investigate the concept of engagement within low-tech contexts and its role in fostering deeper, more meaningful interactions [dealt with in Chapter 4].

Below, I briefly sketch the agenda and descriptions I lay out in each chapter:

The first chapter introduces the status quo of the Philosophy of Technology, focusing on engagement within low-tech and high-tech contexts. The thesis emphasizes the recent approach in the philosophy of technology, the postphenomenological approach, wherein philosophers like Don Ihde and Peter-Paul Verbeek employ empirical research to develop new frameworks and concepts. To explore engagement more thoroughly, I delineate it into standard

and non-standard categories. Standard engagement is where users typically follow predetermined guidelines set by designers. Non-standard engagement in low-tech involves interacting with artifacts without adhering to established standards or protocols, often disregarding socio-ecological or ethical-legal considerations. Standard engagement applies to both high-tech and low-tech scenarios, while non-standard engagement occurs mainly in low-tech contexts. When elucidating standard engagement in high-tech settings, I draw upon the philosophies of postphenomenological thinkers. Conversely, when discussing standard engagement in low-tech contexts, I delve into the ideas of Heidegger, Borgmann, and Gandhi. Non-standard engagement is exemplified in the process of jugaad. The chapter also elaborates on how jugaad bleeds from modern technology and is relevant to re-engages in human-technology relations in developing countries.

In Chapter 2, I offer a critical analysis of the concept of engagement in contemporary approaches in the philosophy of technology, namely, from postphenomenological thinkers. The chapter explores the difference in the concept of engagement in terms of bodily-sensorial engagement, defined by postphenomenology, and in terms of essence and the authentic way of living defined by Heidegger. The chapter concludes that low-tech artifacts provide users with greater room to interact, are transparent, and are easy to repair and maintain. A crucial critique revolves around the postphenomenological concept of engagement within the realm of high-tech. The view is- the more automated an artifact is, the less room it allows for user interaction. For instance, Verbeek (2005) compares the Sven Adolph-designed electric space heater to a campfire, noting how the latter fosters more engagement. However, repairing the electric space heater would require professional assistance in the event of a malfunction, whereas engaging with a campfire is relatively simple, requiring only basic knowledge of starting and maintaining a fire. High-tech artifacts engage users, but not in an authentic manner as in the cases of low-tech. Several philosophers have critiqued the postphenomenological approach from various angles, highlighting its shortcomings in addressing misinterpretation of Heidegger's concepts, missing historical materialism, socio-political perspectives, and lack of positionality. However, I intend to take a different approach to criticism regarding their heavy reliance on high technology in human-technology engagement. Their analysis often prioritizes examining the relationship between humans and technology while neglecting the broader implications of technology usage or the vision of the future we should associate with technology. I ask the question: did we ever have the option to say "no" and stick to certain technologies? In the subsequent chapters, I explicate that the process of jugaad and the philosophies of Borgmann

and Gandhi provide us with certain insights into engagement and meaningful ways of interactions with the artifact.

> When something is replaced rather than repaired, a piece of history that bespeaks and sustains the continuity of life is surrendered to just garbage heap and that point marks and affirms that the stages of life of that particular artifact is lost (Borgmann 1984, 104).

The concept of jugaad intervenes to prevent this fate, saving the artifact from becoming part of the refuse and granting it a new lease on life imbued with fresh significance (discussed in chapter 3). I am not dealing with the notion of jugaad as an invention practice in some labs for designing low-cost products. First, I take key concrete examples of jugaad to show that human users do not have much choice due to a lack of resources. In other words, the user reinvents a different engagement with the artifact precisely because he/she could not afford an option provided by modern global technology. Second, a postphenomenological analysis of the same is presented in this chapter, which analyzes the various nuances of engagement in the context of jugaad. I draw certain inferences from my study on jugaad, i.e., 1) we are already in a space with modern global technologies and a culture of repair and maintenance that lacks transparency and engagement. 2) Jugaad, in a strict sense, is an indication of the user's necessity to rebuild engagement and regain the relationship with the technology. For example, take the case of a mitticool fridge (made up of clay); the very act of bringing in an ingenious yet engaging artifact reveals the user unchoice as he/she is devoid of electricity, against the need to preserve food. 3) Jugaad is a symptom of a larger malady where modern technologies are blindly placed in meaningless engagements. More discussion on what is considered "meaningful" in the context of engagement is unearthed in the following chapters; the only way for me to define meaningful engagements is by looking at Gandhi and Borgmann. Note that I am not claiming that jugaad is a meaningful engagement. On the other hand, the claim is that the jugaad reveals the need for meaningful engagement as we are already trapped in the clutches of non-transparent modern global technologies. Therefore, rather than considering humans as particular humans, we need to generalize human beings again and see which appropriate technologies are meaningful in our existence.

In Chapter 4, I retreat to philosophy of technology's rendezvous with low-tech via Gandhi and Borgmann. Here, I find the reason why we should consider technology as a vehicle that can enhance meaning in our existence. I elaborate on the idea that technology need not be

tied down only as relations such as embodiment, alterity, background, etc., but as a friend ("amicus meus," more specifically, a friend of mine) which provides totality to our existence. Usually, technology is understood in folk understanding either as an instrument, or in academic discourse of the early twentieth century as something strongly substantive (as in Heidegger) that controls us. Alternatively, in postphenomenology, technology forms bodily-perceptual relationships in different modes. I argue that it is possible to consider technology as a friend. The vision is similar to an engagement someone can have with his/her tool, say a soldier with his/her weapon, a doctor with his scalpel, or a cabbie with his/her car. This is not a mere anthropomorphizing of technology! In contrast, I argue that it is possible to retain this mode of engagement with technology via Gandhi and Borgmann. I elaborate two main aspects here using Gandhi's model artifact- the charkha (the spinning wheel): 1) not all technology can be amicus meus (a friend of mine). There are appropriate technologies that Gandhi and Borgmann point to. 2) Meaningful engagement is a key aspect where technology takes the place of enhancing our autonomy, enhancements of virtues or skills, and elevation of more corporeal human-to-human (h-h) relationships. I elaborate on Borgmann and Gandhi's perspectives on engagement with low technology and its role in fostering a good life. While Borgmann predominantly draws examples from the pre-technological, Gandhi's focus leans toward pre-modern examples, illustrating how low-tech artifacts can deeply engage people in meaningful ways. The chapter discusses the similarity in Borgmann and Gandhi's concept of harmonious relation between humans and technology; and additionally, explores charkha as a focal thing that provides people with an authentic and meaningful way of living where it tends to unify means and ends, individual and community, labor, and leisure. The chapter emphasizes the questions that postphenomenologists have overlooked but pondered over by pre-empirical turn philosophers. Ihde (1990) and Verbeek (2005) criticized Heidegger for his over-emphasis on 'T,' the essence of technology, and his critique of high-end technologies. I believe postphenomenology has undermined other crucial issues, such as what it is to be an authentic human (capital 'H') and what is necessary for people to lead sensible lives in the wake of an overwhelming barrage of global technologies. This is especially significant because we, as human beings, are at a point in our history where it is even possible to change our essential nature through technology. We are no longer asking ourselves the questions we must ask: what kind of humans do we aspire to become in the future? What does human flourishing precisely mean? I am not critiquing the empirical and post-empirical turns but rather re-addressing the pre-empirical turn's issues in today's world where the need is most pressing. Gandhi and Borgmann were clear about what sort of humans we must be.

In the concluding chapter, I extend the proposal for a relook at the general condition of human existence based on meaningful engagement with technology. Meaningful engagement relies on three things. First, it retains human autonomy by avoiding the manipulative influence of technology. Engaging with appropriate technology can contribute to a balanced lifestyle and foster harmony with artifacts, fellow humans, and the environment. The second is focusing on upskilling. However, discerning whether it enhances (upskills) or diminishes (deskills) our skills (upskilling/deskilling) can be challenging in a world overwhelmed with technology. It is crucial to navigate the relationship with technology that helps one upskill rather than revert to a pre-technological era (as a complete rejection of technology), which is not a viable solution. Technology that empowers individuals to reflect and exercise autonomy holds intrinsic value, contrasting with superficial consumerism. This necessitates judiciously harnessing technology and discerning its positive and negative impacts. Taking a neutral stance, sometimes as advocated by postphenomenological theorists, is inadequate because ethical considerations always underpin our interactions with technology. The manner in which we engage with technology implicitly reflects our ethical values. We are now shifting from "How can I improve myself by embracing virtues?" to "How can I cultivate virtues by engaging with technology?" It is not wrong to cultivate virtues through using technology, but prioritizing cultivating virtues in humans remains paramount. Even if a particular technology is helpful to humans, we must contemplate its necessity and potential to shape one's character. Third point is using technology to free humans from monotonous works and rebuilding more human-to-human corporeal spaces, i.e., technology may have an emancipatory role in suggesting human essence. This idea can be understood by Borgmann's distinction between good and bad burdens. Bad burdens are those for which the cost of relieving the burden outweighs the benefit it offers. According to Borgmann, while many burdens may have lessened, they erode the inherent values and care and values embedded within them. However, good burdens, like cooking or writing a message to a friend, are those people which would gladly embrace because they bring delight and satisfaction. Therefore, a good relationship with technology is like a friendship- one in which your reliance on it allows you to be more yourself rather than lose yourself. Indeed, an as-friend bond lacks manipulation or control and fosters genuine interaction with the artifact. Rather than becoming increasingly technological and losing humanity, individuals should pause, reflect, and utilize artifacts to enhance humankind rather than diminish it. In what follows, I portray the landscape of the debate required for developing my philosophical convictions.

1.2 History of Philosophy of Technology

Philosophy of technology emerged as a distinct subfield in the latter half of the 19th century, yet this does not imply that earlier philosophers neglected questions regarding technology. The terms "technique" and "technology" find their roots in the Greek word *techne*, denoting art or craft knowledge, particularly in the making of objects (Parry, 2008). Applied initially to crafts like *techne* of carpentry (use of carpenter's craft-knowledge to make objects from wood), it extended to various disciplines such as music, medicine, and so on. Ancient Greeks took technology as more than the idea of making and manipulating things. Therefore, it is a way of bringing forth something or letting something be known. For instance, crafting a statue was seen as a way to unveil the essence of the human body. The concept of *techne* evolved over time. Classical Greek philosophers like Plato expanded it to encompass human action and metaphysical speculation. In Plato's "Timaeus," he compared the Creator (*Demiurge*) fashioning the universe to a craftsman following a design plan. This analogy highlights how both natural and man-made entities come into existence through agents with predetermined plans. Aristotle, however, distinguished the natural realm (*physis*) from the realm of fabrication (*poiesis*). *Physis* pertained to entities with inherent principles of existence and motion. At the same time, *poiesis* involved objects reliant on external agents for their existence and operation, such as a wooden bed crafted by a carpenter and maintained by its owner. Until the Middle Ages, the distinction between natural and man-made objects and the idea of craftsmanship imitating nature remained prevalent. Craftsmanship was not solely associated with crafts but also extended to the arts. Francis Bacon, in his work *New Atlantis*, emphasized the significance of both natural philosophy and technology in societal development. This era witnessed the introduction of mechanical arts like weaving, instrument making, armament crafting, marine navigation, commerce, hunting, agriculture, therapeutic, and dramatic arts by Christian theologians and philosophers, leading to a Renaissance of technology (17^{th} century) marked by various advancements. Bacon viewed technology not as separate from natural philosophy but as an integral part, highlighting the importance of technical endeavors. Functionalism became a hallmark of modernism during this period, focusing on the functioning of artifacts and machines. Then came the 19th-century, where philosophers critiqued this functional aspect of machines, arguing that individuals have lost their authenticity in this mechanized world. These philosophers are termed classical philosophers of technology.

1.2.1 Classical Philosophers of Technology

The major traditions of the classical philosophy of technology era, which spanned from 2.1theology, and related areas" (Brey 2010, 36). Martin Heidegger, Herbert Marcuse, Jacques Ellul, Ivan Illich, Arnold Gehlen, Hans Jonas, Lewis Mumford, and other notable individuals are considered classical philosophers of technology (Brey 2010; Achterhuis 2001). At that time, it also gave rise to a new movement known as critical theory, most of whose proponents are also affiliated with the Frankfurt School, which emphasizes social criticism. Marcuse, Jürgen Habermas, Theodor Adorno, and Max Horkheimer are a few of its members (Achterhuis 2001). In my thesis, I focus primarily on classical philosophers of technology, especially Heidegger, who are rooted in the traditions of phenomenology, existentialism, and hermeneutics.

Hans Achterhuis (2001) refers to classical thinkers as first-generation philosophers or classical philosophers of technology. He continues, "The most important discovery of classical philosophy of technology is undoubtedly the absolute novelty, within the history of humanity, of the technological approach to reality" (2001, 3). Their critique of the purely technological approach to reality and their perception of modern technology as "the other" made a vital contribution and furthered the work of philosophers of technology. These thinkers took a critical position against Enlightenment optimism over technology. Francis Bacon, Descartes, Hobbes, and Leibnitz are among the optimistic thinkers who "…envisioned that technology would bring humanity control over nature, individual freedom, well-being and affluence" (Brey 2010, 37). These thinkers fail to highlight the profound implications of technology, with a particular focus on its cultural and social impacts, which are central concerns for classical philosophers. Heidegger, in *The Question Concerning Technology (TQCT)* (1977), views modern technology not merely as a tool to ease human effort but as something transforming nature into a standing-reserve. His vision is further taken by neo-Heideggerians like Albert Borgmann and Hubert Dreyfus. In *The Technological Society* (1954 [1964]), Ellul critically examines how society's embrace of technique could lead to a totalitarian system. Marcuse, in *One-Dimensional Man* (1964), argues that new technology serves as an ideological vehicle for capitalism. In *Technics and Civilization* (1934), Mumford explores how megamachines—comprising not just technologies but also social groups—have influenced people to place their hopes in technology. Hans Jonas, in his 1973 work, emphasizes responsibility as the core imperative of ethics in the context of technological power. The key contribution of these

classical philosophers lies in their exploration of the relationship between technology, human existence, and the world and their examination of how technology shapes our ways of being. Recent generations of philosophers have adopted this critical stance and have offered new solutions in innovative ways.

The distinction between classical and recent approaches in the philosophy of technology lies in their perspectives on technology and the historical context in which these technologies emerge. During the era of classical thinkers, technological advancements led to the expansion of mass manufacturing, the rise of consumer society, and the growth of the industrial sector, which began to permeate every aspect of society. More significant application of technology in the Second World Wars and their detrimental effects on the environment and humanity were seen. However, this consumerist society also brings about several other changes, including materialism, a decline in spiritual values, and the breakdown of communities. For these reasons, classical philosophers of technology criticized the optimistic perspective of technology and the enlightenment philosophy of human control. Brey claims that "they also declared that humanity had lost control of technology…that rather than being improved, the quality of life was often worsened by processes of rationalization, uniformity, alienation and shallow consumption" (2010, 37-38). Therefore, classical philosophers of technology are sharp critics of modern technology, pointing out its negative aspects.

1.2.2 Empirical Turn

Various criticisms were leveled at classical philosophers in the 1980s by newly emerging approaches in the philosophy of technology, such as the field of science and technology studies (STS) and the views by postphenomenological thinkers (Brey 2010; Achterhuis 2001). These approaches raised several issues against the classical philosophers: (1) they were accused of taking a one-sided negative view of technology; (2) they presented a deterministic picture of modern technology as unstoppable and autonomous. Brey (2010) argues, "in the wake of STS, philosophers of technology started developing conceptions of technology that likewise portray its development and consequences as contingent, socially shaped and contextually dependent" (39); (3) The third critique is that all technology was categorized under the 'capital T,' and specific technological activities were overlooked in favor of a more generalized approach. There is not much that classical philosophers of technology have to say about particular technologies or particular technologically connected challenges. Don Ihde criticizes Heidegger in his book *Heidegger's Technologies: Postphenomenological*

Perspectives (HTPP) (2010)**,** for viewing technology in terms of the essence of technology, favoring traditional over modern technology and emphasizing a metaphysical perspective of technology (which is covered in more detail in the following chapter). Ihde uses the example of musical instruments to show how it does not fit into the criteria of standing-reserve. Verbeek (2005) accuses classical thinkers of drawing an "excessively gloomy picture of the role of technology in contemporary culture," making "too abstract and sweeping judgments," and failing "to connect with concrete technological practice" (2005, 14). Verbeek criticizes them for defining technology based on its conditions of possibility, and in doing so, "it thought backwards...from the actual presence of concrete technological objects in our society to what made them possible" (2005, 7).

Unlike classical thinkers, the new philosophers of technology recognize that technological development is shaped by and contributes to societal transformation while also being influenced by sociocultural factors. They believe technologies are introduced into society, but their use is often transformed by cultural influences. According to David Noble, quoted by Achterhuis, "Technological development, in short, is not an independent force impinging upon society from the outside, according to its own internal logic; rather, it is a social activity in itself, which cannot but reflect the particulars of its setting: the time, the place, the dreams and purposes, the relations between people" (Noble 1978, 248). This highlights the interdependence between technology and society, often described through metaphors like "technosociety" or "technoculture." Achterhuis remarks how technology significantly influences various domains, including economic, scientific, political, and social spheres (Hughes 1983), as well as areas such as gender and technology (Cockburn and Ormrod 1993) and technology as a social process (Schwarz and Thompson 1990). According to Achterhuis, classical philosophers have failed to recognize these unanticipated ways technology influences social processes. They were blind to the other side of technology, which is how it influences society and creates a culture of technology. According to Achterhuis (2001), the classical approach often assumes that technology has positively contributed to nature. He contends that humans have shaped various cultural norms and myths around landscapes in countries like the US, Germany, France, and England. This challenges Heidegger's idea that the modern world views nature merely as a resource for human use, thereby questioning his concept of 'standing-reserve.' Achterhuis (2001) points out that the long-standing contrast between culture and nature, originating with thinkers like Bacon and Descartes and followed by classical philosophers of technology, is now giving way to a renewed intertwining of the two. He

suggests not to nostalgically reject this new cultural constellation in favor of some idealized past harmony between nature and culture but to understand and engage with it.

The approaches that surfaced in response to these criticisms are referred to as the "empirical turn" in the philosophy of technology (Kroes and Meijers 2000, Achterhuis 2001). This shift signifies a departure from traditional philosophical analysis towards a more empirical approach. In this phase, philosophers integrate philosophical inquiry with empirical investigation, using actual technologies and developments as the foundation for their analyzes. Rather than imposing pre-existing philosophical theories onto technology, thinkers in this phase allow technology to challenge established frameworks. They use empirical research as a basis for developing new concepts and frameworks that are grounded in real-world technological contexts. Achterhuis (2001) refers to this phase as the "empirical-philosophical turn," which has been instrumental in shaping the philosophy of technology over the past 15 years. In this perspective, technological development is not seen as an impersonal force impacting social practices but rather as a social practice in itself. Ihde in his book *Technology and the Lifeworld: From Garden to Earth* (TLGE) (1990), discusses that in Europe, the tradition of *technophilosophy* took root long ago. He highlights that Ernst Kapp, a neo-Hegelian thinker, published the first book titled *Technikphilosophie* in 1877, marking a significant milestone in Germany and Texas. Ihde further mentions that in 1981, Friedrich Rapp contributed to this discourse with his book 'Philosophy of Technology.' He also points out that Rapp, alongside Paul Durbin, often referred to as the 'father' of the *Society for Philosophy and Technology* (SPT), orchestrated the inaugural gathering of German and American philosophers in Bad Homburg, Germany in 1981. According to Ihde, SPT has since evolved into an international forum, biennially convening philosophers from across the globe to foster dialogue, interaction, and the exchange of ideas. Ihde (1990) embarked on a journey across various countries to explore diverse perspectives on the philosophy of technology.

During the 19th and 20th centuries, the field of empirical philosophy of technology experienced a shift, leading to the emergence of two distinct approaches: one adopting a radical stance and the other retaining the same concerns as classical philosophers but offering new solutions (Brey 2010). Brey describes both approaches as *society-oriented* in the philosophy of technology, as they establish a connection between technology and society. He points out that the first turn marks the beginning of a new tradition in the fields of poststructuralism, pragmatism, and STS-oriented philosophy. According to Brey, notable figures in this

movement include Donna Haraway, Bruno Latour, Andrew Light, and Lary Hickman. These technology philosophers are associated with fields like STS, media, cultural, and communication studies, encouraging a more descriptive, neutral, and empirical approach to technology. The second turn Brey refers to as Neo-critical theorists, neo-Heideggerians, and postphenomenologists. Brey explains that these thinkers take their theoretical framework from STS, concentrate on concrete technologies, have less deterministic ideas, are more pragmatic, and have a balanced view of modern technology. He also highlights that the neo-critical theory method, which Andrew Feenberg (2005) adopts, produced a theory of technology that "emphasises the contextual nature of technology and the possibility for it to be developed and used differently" (2010, 39). Brey further mentions neo-Heideggerian thinkers such as Hubert Dreyfus and Albert Borgmann, where Borgmann explores the idea of having a genuine, meaningful relationship with technology, and Dreyfus engages with AI through hands-on research projects. Brey concludes by acknowledging Ihde's descriptive phenomenology, which examines how technology mediates between the person and the world and provides a practical assessment of technology.

Apart from the *society-oriented* approach, there are two more turns in the philosophy of technology, known as an *engineering-oriented* approach and *applied ethics* (Brey 2010). According to Brey, *Engineering-oriented* theories and *applied ethics* are part of the empirical turn because they react to classical approaches and concentrate on more concrete practices and technological artifacts. He acknowledges that the pioneers of this approach are Peter Kroes and Anthonie Meijers (*The Empirical Turn in the Philosophy of Technology* 2000) and Joseph Pitt (*New Directions in the Philosophy of Technology* 1995). They draw attention to the fact that, in the wake of the classical philosophers of technology, philosophers now focus more on the social effects of technology than on the technology itself. They believe that there is a need for the philosophy of technology to carefully describe and analyze engineering practices to arrive at empirical theories of technology in the philosophy of technology. It is referred to as a "turn to engineering approach," pioneered by American philosopher Carl Mitcham (*Thinking Through Technology 2022*), who emphasizes the internal functions of technology over its external effects.

Applied ethics research differs from professional ethics, also known as technology-oriented ethics, which is geared towards engineers and focuses on moral guidelines to address ethical dilemmas (Brey 2010). Brey emphasizes that applied ethics addresses social-ethical

issues related to the use of technology and its broader implications, such as, the morality of cloning is a topic of discussion. He points out that the problem here is that applied ethics primarily assesses moral normativity as a singular value rather than providing a reflective approach to such technologies. However, Brey (2010) argues that the role of philosophy is to examine how technology impacts various values and standards of goodness and badness. He uses the example of online shopping, where the convenience of purchasing products online results in fewer people traveling to cities—raising the question of whether this is a positive or negative development. Brey believes that applied ethics alone cannot adequately address this issue. Therefore, he advocates for incorporating additional normative values, such as integration and social cohesiveness, into philosophy of technology. He emphasizes that, beyond moral values, we must also consider social, cultural, political, economic, ecological, and personal values. Brey contends that we need a philosophy of technology that evaluates all aspects of value and explains why things are good or harmful. Such a philosophy helps recognize multiple values and understand how each can contribute to solving social issues.

Additionally, Brey (2010) emphasizes the importance of values which will protect cultural like traditional knowledge endangered by the internet, weigh the social benefits of in-person friendships against those mediated by computers, and strike a balance between economic and ecological values. He insists that there is a need for development of specific technologies for culture that can check the replacement of sophisticated ideas of intimacy, trust, and friendship with those of computer-mediated relationships and how they influence them. Brey (2010) introduces the emergence of a new field within the empirical turn, known as value theory, necessitates the examination of various values, including intrinsic, instrumental, ethical, aesthetic, cultural, social, prudential, and economic values. He emphasizes that the incorporation of these values is crucial for enhancing societal well-being and welfare. Brey notes that substantial research has already been conducted in this area, particularly concerning the relationship between technology and a good society, as well as technology and the good life (Borgmann, 1984; Higgs, Light, and Strong, 2000). He also underscores the significance of theories on human-technology relations, such as Bruno Latour's actor-network theory, Don Ihde's postphenomenological theory, Langdon Winner's politics of artifacts, and Andrew Feenberg's technological rationalization theory.

In my thesis, I focus on two key aspects from the empirical turn: first, the concept of human-technology relations, and second, the application of value philosophy. Among the

various approaches in the empirical turn, my thesis concentrates on postphenomenology, which offers a detailed analysis of human-technology relations. This approach explores how humans can engage more effectively with technology by understanding the dynamics of these relationships, drawing on the ideas of Ihde and Verbeek. I align with Achterhuis's view of Don Ihde's postphenomenology, "…[that] allows us at this point to see how technology, as anew and richer way of grasping nature, can give us a more expanded access to it" (2001, 8). Additionally, I incorporate insights from Borgmann on the concept of the good life to further develop my own ideas regarding human-technology engagement.

1.3 Postphenomenology: Don Ihde as a Pioneer

Postphenomenology is coined after the concept of phenomenology to overcome the radical dichotomy of idealism and realism (Ihde 1990). It gives a new interpretation of the phenomenological idea of intertwining subject and object and discusses how subject and object constitute and coshape each other. The first book from which Ihde got inspiration is Paul Ricoeur's dissertation on *hermeneutic phenomenology*. He shifts from Ricoeur's hermeneutic phenomenology to practicing a *phenomenology of technics* based on praxis-oriented engagement. Postphenomenology represents a fusion of phenomenology and pragmatism. By integrating these views, Ihde addresses and eliminates essentialism, foundationalism, and skepticism often associated with traditional phenomenology. As a result, postphenomenology is also referred to as non-foundational phenomenology. In his book *Postphenomenology and Technoscience: The Perking Lectures* (PTPL) (2009), Ihde calls postphenomenology the "modified, hybrid phenomenology" (2009, 23).

Phenomenology originated in Europe, while pragmatism became popular in America almost simultaneously. Both philosophical schools strongly emphasize 'experience,' using it as the cornerstone of their own conceptions. Edmund Husserl introduced phenomenology, while William James popularized pragmatism (giving Charles Sanders Peirce credit for this). The primary figurehead of pragmatism is John Dewey, whose philosophy is contemporaneous with Husserl's phenomenology. This is why they share certain commonalities yet diverge on various points. Their shared principle is 'experience;' nevertheless, their interpretations of that experience diverge. Husserl's philosophy pays homage to the philosophies of Descartes and Kant, and the terminologies he used exhibit his bent towards them. Husserl's philosophy is entrenched in the epistemological ideas employed by Descartes and Kant, such as subject/object, body/mind, internal/external, ego, and consciousness, though with slightly

different interpretations. Therefore, his philosophy rests more on epistemological than practical grounds, which Ihde (2016) finds problematic in his book *Husserl's Missing Technologies*. Ihde relies on Dewey's philosophical position for pragmatic considerations. Dewey replaced Husserl's subject/object model with the organism/experimental model to make experience the ultimate arbiter of validity for humans. Thus, pragmatism makes phenomenology more practical by challenging its subjective viewpoint. Ihde believes that, on the one hand, pragmatism makes phenomenology practical, whereas, on the other hand, it derives theories from phenomenology to embolden its claims.

Ihde's several concepts, such as variational theory, embodiment theory, and the notion of the lifeworld, are rooted in phenomenology and hermeneutics. The foundation of variation theory is the mathematical analysis of objects' structures and essences, which, in turn, led Ihde to adopt an anti-essentialist stance and develop the theory of multistability. This theory has become a crucial tool in the phenomenological investigation of technologically mediated images. Ihde drew on Merleau-Ponty's embodiment theory, particularly the example of the blind man's cane as an extension of the body. He expanded upon the concept of the *lifeworld*, initially introduced by Husserl, with insights from Heidegger. This expansion allowed Ihde to recognize artifacts' significance in shaping our world experience. Husserl initially introduced *lifeworld* in his work *Crisis in European Science and Transcendental Phenomenology* (1936 [1970]). Husserl focuses on interpreting human experience, particularly perception and bodily activity. Further, Heidegger developed phenomenologically oriented hermeneutics. Taking insights from Husserl and Heidegger, Ihde further delves into the 'phenomenology of human-technology relations' and the 'hermeneutics of technology-culture embeddedness.' Ihde explores this concept in his book *PTPL* (2009) by integrating two philosophical traditions: phenomenology and hermeneutics. Within these traditions, he examines three notable examples: Heidegger's hammer, Husserl's Galileo, and Merleau-Ponty's feather.

Heidegger's understanding of objects emphasizes that our closest engagement with them is not purely perceptual but practical and utilitarian. According to Heidegger (1927), all objects exist within a use-object context and lack inherent existence as standalone entities. He explains it using the example of hammer; it is useful if it does the hammering; otherwise, no relation will exist. Therefore, artifacts are embedded in a web of cross-relations characterized by instrumental "intentionality" or reference to specific purposes. Moreover, Heidegger highlights the significance of the user's relationship with the equipment, which becomes a

means rather than an object of experience. This phenomenon, termed embodiment relation by Ihde, involves the object's withdrawal into the background of direct experience—however, disruptions in its normal functioning prompt circumspect dealings. These ideas further enable Ihde to expand his concept of the *Relations of Mediation*, which examines how different technologies interact and influence each other (discussed in detail in the next chapter).

Husserl's concept of the *lifeworld* underscores the importance of praxis and perception, which Ihde discussed. He views the lifeworld as the most fundamental layer of human experience, characterized by intuitive, bodily, and perceptual engagement with objects. Husserl distinguishes between pre-scientific immersion in perceived material bodies and the geometric abstraction of scientific inquiry, which moves away from materiality towards the process of perfecting. Husserl critiqued modern science by citing Galileo as an example. He contends that Galileo's mathematization removed people from 'lived experience' by creating abstract concepts like geometric shapes and mathematical laws. The disconnection with reality, he believes, leads to a loss of significance and meaning for human existence. Husserl's concern is valid, Ihde contends, but Galileo's invention of the telescope also creates a new avenue for engaging with the artifact because it has the capacity to both magnify and diminish the experience (amplification/reduction theory). Ihde is grateful for "Galileo's selective macrovision and his new microperception. The domain of shapes, measurements, and angles gave Galileo the means to see the mountains of the moon as distantly similar to those of earth" (1990, 54). He further argues that the Galileo revolution helps us understand how "cultural acquisition" contributes to achieving "praxically attained perspectives" (1990, 37). For a theory to be effective, it must be embraced by culture. Ihde extracts the following from Husserl's example of Galileo: "By making the material-sensory world both prescientific and foundational on the one hand and emptying the scientific world of perception and praxis as a "derived," although special, "world" on the other, Husserl misses the interrelation between what I am calling micro- and macroperception" (1990, 38). Ihde explains whereas macro perception—also referred to as cultural or hermeneutic perception—contextualizes our existential lives, micro perception deals with instantaneous sensory experiences. Both types of perception are crucial in the real world, with macro perception influencing micro perception in different contexts. Therefore, for Ihde, a comprehensive understanding of human-technology relations necessitates a two-pronged approach that includes a 'bodily-sensorial experience' as well as a study of 'cultural hermeneutics' within the lifeworld.

Ihde is greatly influenced by Maurice Merleau-Ponty's (1945) ideas regarding perception and embodiment. According to Merleau-Ponty, our bodies play an active role in shaping our perception of the external world, making all our perceptions fundamentally embodied. Tools link our bodies with technologies, leading to an embodied experience of reality. He uses the example of a cane-wielding blind person. When a person uses a cane, it becomes an extension of his/her body and alters his/her perception of the world from what it would be without the cane. Ihde uses this concept to investigate how technology might enhance a person's experience by interacting with their body. He asserts, "what Merleau-Ponty adds to this procession of prototypical analyses is a strict phenomenological correlation between a "lived" body and the perceived world" (1990, 37). Ihde also uses various examples, such as eyeglasses and telescopes, to explain how technology mediates one's experience. Therefore, technology, according to Ihde, provides the perceptual and bodily schema needed to engage with the world.

Ihde argues that imagining a lifeworld devoid of technology is nearly impossible from a human perspective. In his book *TLGE* (1990), Ihde envisions the possibility of a "New Eden" with a modern adaptation of the Adam and Eve narrative. However, he argues that a purely non-technological garden is unrealistic, as humans have long departed from such a state. Examples such as the Tasaday, a stone-age culture with basic technology, and observations of proto-technologies in animals challenge the concept of a purely non-technological existence. Ihde questions whether humans have truly left the Garden or if remnants of primal experiences persist, such as intimate encounters with nature. The horizon, where all technologically mediated human experiences occur in everyday life and are filled with meanings, practices, and interactions, is termed a *lifeworld* by Ihde.

Ihde discusses how, by the late 20th century, our lives became intricately woven with technology, not solely in critical issues like nuclear war or global pollution but also the mundane aspects of daily existence. From the moment we awaken, our engagement with artifacts shapes our experiences-technologically enhanced bedding, such as electric blankets; engagements with various artifacts in the bathroom, appliances like toasters, coffee makers, ovens, and dishwashers in kitchens, relying on transportation services, or enjoying recreational activities such as watching television. We have become so deeply immersed in technology that we sometimes overlook how much it permeates our lives. Ihde refers to this immersive environment as a *technosystem* (1990, 3). However, contemporary engagement with

technology differs significantly from the past due to the prevalence of industrialized, high-technology societies. Ihde claims this has sparked various questions about the nature of technology. Are technologies neutral entities? How do technologies shape people's lives? Ihde focuses on analyzing the role of technology in the interrelation of human beings and the world and investigates how these interrelations are formed due to the involvement of artifacts. He calls it Relations of Mediation. This is discussed in detail in the next chapter. This shift leads to a consideration of 'technologically mediated human beings,' emphasizing the intricate relationship between humans and technology: two of the crucial concepts Ihde has given in the field of philosophy of technology are as follows;

1.3.1 Technological Intentionality

Intentionality, in general, means the intentions, but in a philosophical sense, it means the directedness of humans towards reality. The foundational idea of Postphenomenology is to overcome the radical dichotomy of humans and non-humans, as humans can never exist with-in-itself but rather exist with-in-world. For instance, "if I see…, I see something, If I feel…, I feel something." This connectedness of human being with the world can be understood in terms of intentionality. In the technological world, technologies are directing humans toward worldly reality; Ihde coined the term technological intentionality. This means that technology is not neutral but possesses a certain robustness. Ihde says, "Technologies, by providing a framework for action, do form intentionalities and inclinations within which use-patterns take dominant shape" (1990, 141). He means technologies influence human actions, and they possess intentionalities. Ihde mentions that writing style differences arise when one writes with a fountain pen, typewriter, or word processor. One writes slowly with a fountain pen, which allows one to think over the sentence several times while composing it. The compositional speed is much faster with a typewriter, which tends to promote a style much closer to spoken language. A word processor vastly expands the ability to compose text. So, they have an intentionality, a trajectory that promotes a specific kind of use. Another example is Langdon Winner's example of a low-hanging bridge. In the essay "Do Artifacts Have Politics?" (1980) Winner uses the example of low-hanging overpasses on Long Island in New York. Regional planner Robert Moses designed those overpasses. He deliberately built low overpasses to prevent buses from using the roads under the bridge and thus prevent the marginalized communities and people experiencing poverty from reaching the beaches. This demonstrates how technology provides humans with specific trajectories that shape their use of technology.

1.3.2 Multistability

The idea that an artifact's capacity to co-shape human-world relations is not an intrinsic property. As discussed by Heidegger, this idea helps Ihde frame his theory of multistability. Ihde's *Experimental Phenomenology* (2012) provides a methodical explanation for multistability. Using the example of visual illusions, he explained how a phenomenological explanation of variation might lead to a deeper study of illusions that cannot be achieved with empirical or psychological methods. He claims, "[m]ultistable phenomena as well have opened the way for finding variations and possibilities within perception" (2012, 111). Ihde illustrates the idea of multistability with the Necker cube. The Necker cube is a two-dimensional cube represented by a single wireframe without any visual cues indicating its orientation. This optical illusion typically appears in two different ways. Looking at the cube, one would see a three-dimensional cube with two sides facing us and the bottom surface facing away. The cube can alternatively be interpreted in two dimensions, in which case it represents a six-legged bug perched in a six-sided web cell. As a result, the figure is interpreted in various ways. In other words, it changes the perception between two stable states. Ihde uses it as a model case study to demonstrate perceptual multistability, which he subsequently extends to other domains. It illustrates how, depending on the focus and context, the mind can accept several stable interpretations of the same artifact.

Ihde applies this concept in the realm of culture and proposes the idea of *Pluriculture.* "Pluriculture is the mediation of multiple cultures via the virtual space-time of contemporary communications" (Ihde 2012, 151). He says that, similar to technology, culture cannot be comprehended in a vacuum but rather in a context. He illustrates it by contrasting traditional and Western navigational methods. While traditional navigation relies heavily on birdwatching, wave patterns, and cloud cover, Western navigation relies on instruments. Both interpretations accurately depict the readings and show many ways to use technology in different cultural settings. He coined *pluricultural/multiculturalism* to describe the coexistence of many independently existing cultures. He believes that "[p]luriculturalism goes farther than the facts that we eat Chinese, Italian, and French foods, and that we decorate our living rooms with African carvings and Indonesian batiks" (Verbeek 2001, 137).

Robert Rosenberger's example of the public bench in *Callous Objects: Design Against the Homeless* (2017) illustrates the concept of multistability. Public bench is designed for sitting in parks, bus stops, and other common platforms. What if people, especially the

homeless people, use it for sleeping? Here, the same artifact allows the user to look at the bench in different ways, such as *bench-as-seat* and *bench-as-bed*. Apart from this, there is another kind of public bench intentionally built to prohibit sleeping, which can be interpreted as *sleep-prevention bench.* Thus, here, the bench is an example of multistable revelation.

1.4 Peter-Paul Verbeek

After the empirical or material turn, Verbeek (2005) introduces what he calls the "thingly turn." Verbeek, as a second prominent postphenomenological thinker, offers insights into the relationship between humans and technology. I focus on two key works by Verbeek in my thesis: *What Things Do: Philosophical Reflections on Technology* (WTD) (2005), which introduces his ideas on postphenomenology. Here, Verbeek explores how the focus has shifted from solely human understandings of technology to encompass the materiality of technologies. The second is *Moralizing Technology: Understanding and Designing the Morality of Things* (2011a) (MT), which explores how technology influences human actions and decisions and its role in shaping ethical and social values.

In his book WTD, he introduces the "philosophy of technological artifacts" and discusses its application in industrial design (2005, 9). There are three main sections to the book. In the book's first section, "Turn to artefacts," Verbeek criticized the classical philosophers of technology, such as Jaspers and Heidegger for their overgeneralization and for defining technology in terms of conditions of possibility. He also draws on the ideas of Jaspers and Heidegger to develop two key concepts: hermeneutical phenomenology and existential phenomenology. He says:

> The work of Jaspers and Heidegger represents the two poles of the phenomenological tradition within the philosophy of technology: existential phenomenology, in which the central question is how human beings realize their existence and thus are present in their world, and hermeneutical phenomenology, which examines the ways in which reality is interpreted and thus is present for human beings (2005, 10).

Ihde provides a new interpretation of the existential and hermeneutic definitions of technology within their frameworks. In the second section of the book, "Philosophy from Things," he delves into his theories on the postphenomenological philosophy of technology. He builds his theory using insights from contemporary thinkers such as Don Ihde, Bruno

Latour, and Albert Borgmann. The central concept he presented here is "technological mediation," which examines how technology shapes and influences human decision-making and actions. In the third and final section of the book, "Philosophy of artefact," he introduces the concept of industrial design and demonstrates the applicability of these ideas in creating a better industrial design.

1.4.1 Hermeneutical-Phenomenology

Verbeek (2005) criticizes early Jaspers (1957) for providing the demonic view of technology and later (1961) for defining technology in terms of neutral means. He claims that Jaspers in *Man in the Modern Age* (1957) presents a very skewed picture of technology and describes it in terms of functionality. He offers a broader viewpoint, arguing that technology should not be reduced to transcendentalism, which isolates technology from people. Instead, he emphasizes the interconnected and mutually supportive relationship between humans and technology, where each co-shapes the other. While Verbeek criticizes Jaspers for his limited view, he acknowledges Jaspers' valuable inquiry into how technology influences human existence. Verbeek borrows from Heidegger the idea of technology's potential to reveal reality. He offers a critique of Heidegger's way of defining modern technology. He says human-technology relation "…requires, rather, an attitude of "releasement" vis-à-vis technological artifacts, in which humans use them without letting them fully determine their relation to the world" (2005, 95). He explains that the emergence of a new way of being is not independent of technology nor in giving up themselves; instead, it is the space where humans and technology interact and evolve. Verbeek believes that by focusing on actual technological artifacts, one can effectively address concerns about technology, leading him to develop his concept of the "philosophy of technological artefacts" (2005, 9).

In discussing the "philosophy of technological artifacts," Verbeek focuses on the core ideas of material hermeneutics and postphenomenology taken from Ihde's work. He explores how technology shapes and influences the way people perceive and interact with the external world. He draws attention to several questions: "In what way do telescopes and electron microscopes, automobiles and airplanes shape our access to the world? In what way are others present to us when we contact them via telephone or email?" (2005, 119). From Ihde, he discovers the more complex image of the hermeneutic role of technologies, which deals with the idea of multistability, technological intentionality, micro- and macro-perception, praxes,

and concrete artifacts. He draws on Ihde's work to outline the various ways in which humans can relate to technological artifacts and states that:

> Ihde brings to light the many possible ways in which human beings can relate to technological artifacts: technologies can mediate perception, they can be perceived themselves, and they can be present in the background of human perception while helping to shape it. (Verbeek 2005, 144).

Building on Ihde's concept of the Relation of Mediation, Verbeek develops his own expanded version of this theory, emphasizing that every interaction with technology is fundamentally bodily and perceptual. This idea forms the basis of the next chapter.

1.4.2 Existential Phenomenology

In the existential part, Verbeek discusses how things mediate human existence. The question he deals with are; "How does the television [artifact] set affect the way we divide up our day? What implications do automobiles and airplanes have for the way in which we organize our social relations?" (2005, 119). He uses an existential-phenomenological approach to address these concerns. He builds his theory of "technological mediation" by discussing the significance of "existence" using Borgmann and "action" using Latour.

According to Latour, human behavior is technologically mediated, which means technology can mediate human behavior. He criticizes the dichotomy of humans and non-humans, as the two cannot be held separately but are always bound up with each other in a network of relations. He builds a theory known as the *Actor-Network theory*. An actor is someone who possesses agency, and Latour believes that agency is not exclusive to humans. Actants freely are nothing; they emerge within the networks. Verbeek draws on Latour's concept of *Technical Mediation* to explain this entwining relationship. Verbeek cites Latour's example of a gun from the book *Pandora's Hope* (1999) to demonstrate. "If someone shoots another with a gun, who shoots the person or the gun?" (Verbeek 2005, 154). Verbeek highlights that proponents of Gun Control argue, "Weapons kill people," while opponents say, "People kill people." However, Latour asserts that humans and guns are not distinct but entwined. Here, the gun serves as a mediator rather than just a neutral intermediary between the gunman and the target. It actively influences how the goal is accomplished. In this case, both human and non-human are actants. Latour explains that four steps comprise technical mediation:

a) Translation: When technology mediates, it involves the translation or programming of an action. For example, imagine an angry person (Actant 1) who wants revenge but lacks the physical strength to harm someone. If this person acquires a gun (Actant 2), the gun mediates the action, enabling the killing of the intended victim.

b) Composition: Composition refers to the involvement of multiple actants working together to perform an action. In the previous example, both the person and the gun are actants that collaborate in carrying out the act of revenge.

c) Reversible Black-boxing: Black-boxing is a process that renders the creation of actors and artifacts completely opaque. For instance, consider an overhead projector; when it malfunctions, all the components and individuals involved—such as repairmen, light bulbs, lenses, screws, and more—become visible.

d) Delegation and Scripts: The program of actions is inscribed in concrete forms. Take speed bumps, for example; they direct our behavior by signaling to "Slow down so as not to endanger students" (Verbeek 2005, 159). People reduce their speed not because of police presence or traffic regulations but because the program or script is embedded in the physical structure of the speed bumps.

Therefore, Latour nods with Sartre to explain that existence precedes essence, but unlike Sartre, he does not limit existentialism to humans. He extends it to include non-humans also. He says, "A book presents itself to human beings by virtue of the relations it has with a bookstore, publisher, printer, the tastes of book buyers, and so forth, rather than having some predetermined "essence" (Verbeek 2005, 150). Therefore, he calls these entities hybrids.

Verbeek extends Latour's idea of equal agency granted to humans and non-humans by extending it beyond 'technical' to 'technological mediation.' According to him, in Latour, there is only one way that action is mediated, but in postphenomenology, artifacts reflect both the making process and the relationships that develop between people and the outside world. Latour reduces non-human entities to what humans do to them. It involves delegations from humans to non-human entities. It is clear from the following instances:

> House owners give to door springs the task of ensuring that the door gets shut; hotel managers give to bulky key rings the task of making sure that guests return

> their keys; and engineers and university officials give to speed bumps the task of getting drivers to slow down (2005, 169).

In Verbeek's (2011a) example of obstetric ultrasound, the technology grants artifacts an equal role in shaping human actions and decisions. The ultrasound brings into play concepts like the "fetus as a person," the "fetus as a patient," and the evolving "relationship between the unborn child and the parents" (23-27). Without ultrasound, the fetus would remain unseen, but now, the sonogram is often regarded as the first picture of the child, strengthening the bond between parents and the unborn. Additionally, by revealing potential defects that were previously undetectable, the fetus is viewed as a patient, influencing parents' decisions on whether to continue or terminate the pregnancy. Therefore, he believes that humans and non-humans actively participate in shaping and influencing human decisions.

Verbeek further argues that humans should actively engage with their world to fully realize their existence. He draws on Albert Borgmann's work to support this view. He derives insights from Borgmann on how technology mediates and transforms the way people interact with their environment, thus highlighting the depth and richness of human engagement with the world. Borgmann has extensively explored how technology shapes human existence and what constitutes a good life. His primary focus is on how technology influences human engagement with the world. Deeply influenced by Heidegger, Borgmann's philosophy is often seen as an extension of Heidegger's works, particularly *TQCT* and *TT*. However, Borgmann reinterprets many of Heidegger's ideas in new ways, emphasizing the importance of considering specific technologies rather than viewing technology as a monolithic entity. He introduces his key ideas, *focal things/practices*, and *device paradigm* in his book *Technology and the Character of Contemporary Life* (TCCL) (1984). He contrasts focal things and practices, which deeply involve individuals and help them develop new skills, with the device paradigm of modern technology, which has transformed the world into a realm of commodities, thereby reducing users' meaningful engagement to the bare minimum.

'Focal' means 'hearth' or fireplace that occupies a central place in the family and connects them in a good way. Borgmann argues that nowadays, the fireplace's location has shifted over time, changing with many other things, such as the kitchen. Borgmann draws on the concept from Jeremiah Eck, an architect who is redesigning homes to incorporate a hearth, described as "…a place of warmth and activity…," where individuals can prepare food, dine, and live (Borgmann 1984, 197). Heidegger also discusses the relevance of focusing on artifacts

that have lost their fundamental meanings and values with the advent of modernity, an idea Borgmann draws upon in his reflections on technology. Borgmann uses Heidegger's example of an earthen wine-pouring vessel as a metaphor for fourfold causality to demonstrate his claim (Heidegger 1971). For Borgmann, as in Heidegger's view, the vessel, made of clay, embodies the earth and gathers the sky, with the rain and sun are present in wine, reviving us from our mortality and aiding in emancipation as it appeals to the Gods. Borgmann cites Heidegger's insights that earthenware has inherent values as "it teaches us to hold, to offer, to pour and to give" (Borgmann 1984, 198). Such things are what Borgmann refers to as focus things since they call for deeper intimacy and active participation. Heidegger's later work, in which he analyzes the notions of *techne* and *technologie*- the simultaneously revealing nature of pre-technological things and the threatening aspect of modern technology, is the inspiration for Borgmann's philosophy. He prefers *focal thing*s over the *device paradigm* as it connects people more meaningfully. *Focal thing*s and practices bring out the better side of humans, which is creative, genuine, and social. It includes activities such as reading, painting, sporting, running, cooking, fishing, gardening, and so on. Borgmann cites work from several authors, including *The Supper of the Lamb* (2002) by Robert Farrar Capon, *Running and Being* (2013) by George Sheehan, and *Earthly Pleasures* (1981) by Roger B. Swain, to elucidate how such activities are quintessential of how achievement/competence and enjoyment/consumption can co-exist in harmony. In contrast, the modern devices (device paradigm) have commodified everything, making it constantly available on demand and ready for consumption. For example, processed food in the market versus cooking a meal—where cooking involves skills and fosters closer connections with others. Verbeek has critiqued Borgmann for focusing predominantly on the negative aspects of modern technologies. He argues that contemporary technology introduces new and diverse opportunities for engagement. Verbeek expands Borgmann's notion of engagement by highlighting that while technology may reduce certain forms of engagement, it also significantly enhances others.

Therefore, with insights from Latour and Borgmann, Verbeek develops his theory of 'technological mediation,' which emphasizes how technology shapes human actions and influences the way humans interact with their world. Though postphenomenological thinkers like Ihde and Verbeek offer a deeper understanding of human-technology relations, their theories also face criticism. It involves misinterpretations of Heidegger's concepts (Reijers 2019; Zwiers et al. 2016), missing historical materialism (Kaplan 2009), neglect of socio-political perspectives (Feenberg 2015; Gertz 2020), and a lack of positionality (Kinkaid 2021).

I also examine postphenomenology from a critical standpoint and address another criticism: its failure to maintain authentic and meaningful engagement with technology, which I discuss in the upcoming section.

1.5 MEAT (Meaningful Engagement with Appropriate Technology)

I am introducing the idea of MEAT, which stands for *Meaningful Engagement with Appropriate Technology*. Here, I use the term "engagement" rather than "relation" as traditionally used in postphenomenology. I do not adopt a neutral stance toward technology (like Ihde and Verbeek) but emphasize critical and meaningful engagement with technology. Rather than viewing technology solely as beneficial, as Bacon and Descartes believe, or as a threat, as classical thinkers like Heidegger and Jaspers describe, I aim to critically evaluate technological artifacts to assess their meaningful engagement with humans. This involves selectively examining artifacts to identify those that foster a more profound sense of engagement while balancing relationships between humans, artifacts, and the environment. Such engagement can promote social, cultural, economic, and intrinsic values. The MEAT theory focuses on identifying artifacts that support these values and enhance human-to-human relationships through technology.

I am not alone in advocating for a revival of these values in today's technological world. Many philosophers, such as Brey (2010) and Vallor (2016), argue that there is a pressing need to revisit value philosophy in our advanced technological era. A revised value theory is essential as the distinction between the real and virtual worlds becomes increasingly blurred. In the book *Technology and the Value: A Philosophical Guide to Future Worth Wanting*, Shannon Vallor tries resurrecting the virtue ethics tradition by considering contemporary technology and its effects on human life. She coined the term "technomoral virtue ethics," which refers to the moral principles guiding the development of emerging technologies, such as social media, biotechnology, combat robots, and care robots (Vallor 2016, 27). Here, I believe that simply reviving technological virtues will not suffice, as Borgmann suggests, because we are already entrenched in the device paradigm[1] shaped by modern technologies. The change we need is not just external; it requires a shift in the entire paradigm. We must

[1] The device paradigm refers to the way technology is perceived in the modern world, often viewed as a ready-to-use commodity for consumption. Borgmann contrasts this device paradigm with focal things and practices from pre-technological times, which encouraged authentic engagement with artifacts.

consider the necessary values to foster more human-to-human interaction to achieve this. This means we have two options: either we abandon the technological realm and return to a time without modern gadgets, or we learn to identify the artifacts that promote deeper engagement with the world. The first option is not feasible, so the thesis focuses on the second one, which calls for a critical stance. However, to identify those artifacts that ensure value philosophy and provide meaningful engagement, we need to understand how the human-technology relationship functions in a world saturated with artifacts and one with fewer technological options. MEAT helps to grasp this idea.

In MEAT, two key concepts are 'meaningful engagement' and 'appropriate technology.' MEAT emphasizes engaging with technology to build positive relationships, preserve human connections, support environmental stewardship, and uphold moral, social, cultural, and intrinsic values. The term 'appropriate technology,' is borrowed from Borgmann and Gandhi, refers to technologies that promote individual well-being, using local resources without harming the natural environment. Borgmann and Gandhi primarily focused on low-tech solutions when defining appropriate technology, and the thesis follow the same approach. The thesis explores how these concepts can guide meaningful engagement with technology and how such engagement can enhance the meaning of one's life.

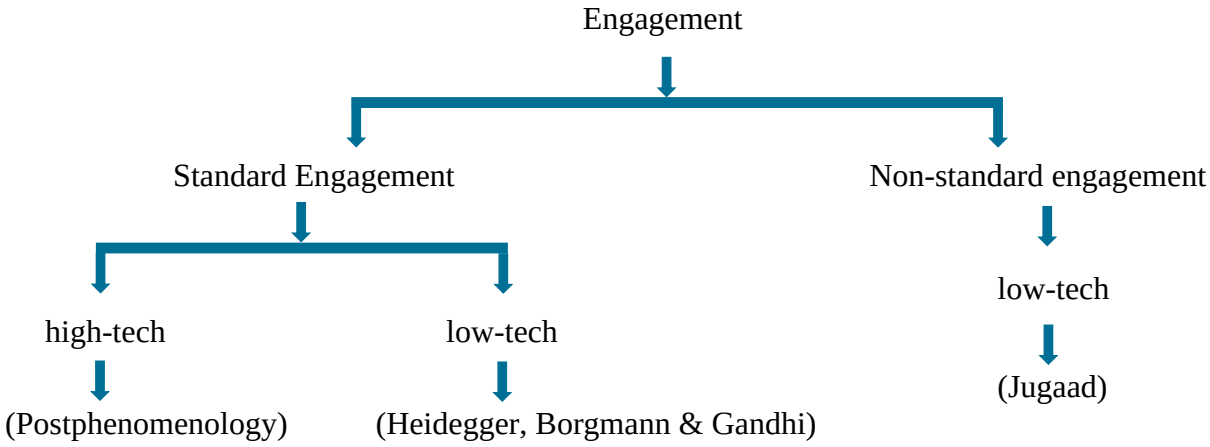
To define MEAT, the thesis adheres to two standards:

1. When defining human-technology engagement in high-tech versus low-tech contexts, low-tech offers a more transparent way of interacting with artifacts.
2. Exploring how low-tech promotes more meaningful engagement.

To address (1), a thorough understanding of human-technology engagement is essential. This involves categorizing engagement into standard and non-standard types and examining insights from postphenomenological thinkers, Heidegger and looking at the cases of jugaad. Postphenomenology provides a detailed analysis of human-technology relations, with Ihde exploring how technology mediates our interactions with the world and Verbeek applying these theories to design, which is crucial for high-tech engagement. Heidegger's distinctions between high-tech and low-tech will also enhance our understanding of low-tech engagement. Jugaad, a prime example of low-tech innovation, is often overlooked in philosophical discourse. However, the thesis argues for a unique perspective on engaging with low-tech solutions. To address (2), I use Borgmann's and Gandhi's theories. Borgmann's exploration of pre-technological times highlights how technology can foster more authentic

engagement. Gandhi's ideas are used to draw parallels with Borgmann and underscore the potential for meaningful engagement with appropriate technology.

The categorical representation of the above description can be summarized as follows:



1.5.1 Standard and Non-Standard Engagement: Defining human-technology engagement in high-tech versus low-tech contexts

1.5.1.1 Standard Engagement

Standard engagement means engaging with artifacts pre-determinedly, while non-standard has no such guidelines or requirements. In Standard engagement, the user must go in the direction that the designer specifies. An artifact created by a designer must follow specific protocol guidelines in order to be used; otherwise, it will not function. This is increasingly typical; regardless of size, every artifact we buy from the market comes with an instruction manual. Moreover, there is no longer any prospect of repair if someone misses a single detail while handling it. I am not referring to this engagement in terms of good or bad. The idea is that standard engagement gives the user fewer moments of freedom. The thesis argues that standard engagement is possible in both high-tech and low-tech technologies. Since there is no clear distinction between high-tech and low-tech, the criteria focus on the level of user involvement, with a preference for artifacts that encourage greater user engagement over highly automated ones.

In exploring standard high-tech engagement, I examine the perspectives of postphenomenological thinkers due to their comprehensive analysis of human-technology relationships. While Ihde provides foundational insights, Verbeek is deeply immersed in the high-tech domain, focusing on how technologies shape human experiences and the world.

Verbeek addresses mediated engagement and offers ethical analyzes on fostering better relationships with various technologies. He also discusses the importance of user participation in the design process through concepts such as transparency, and repair and maintenance, an idea has its own limitations that is examined in the next chapter. The thesis argues that as artifacts become more advanced, opportunities for genuine user participation decrease. In high-tech, I say there is less product interaction, resulting in less engagement. I contend that compared to high-tech, low-tech ensures deeper engagement with more scope of transparency and repair and maintenance.

To understand standard low-tech engagement, I begin with Heidegger for two reasons: first, he was among the first philosophers to critically examine technology, differentiating between low-tech (*techne*) and high-tech (*technologie*). Second, his theories on the harmony between people, artifacts, and nature provide valuable insights for developing the MEAT theory in low-tech contexts. Heidegger recognized that not all technologies promote genuine relationships, making his perspective particularly relevant for understanding meaningful engagement with artifacts. While I diverge from Heidegger by not viewing modern technology as a threat to humanity, I believe his questions about technology remain pertinent, especially those that postphenomenological thinkers tend to overlook. We need to replace (particular human) 'h' with an uppercase 'H' to recognize that not all technologies are meaningful for all humans. It is essential to explore which technologies are truly beneficial and to shift the relationship from (h-t) to (H-t). I aim to revisit these concerns, but I rely more on Borgmann and Gandhi for answers. My preference for Heidegger over postphenomenology stems from his concept of engagement, which I argue in Chapter 2, showing that low-tech solutions foster better engagement. I aim to revisit these questions, but I rely more on Borgmann and Gandhi for answers. My preference for Heidegger over postphenomenology stems from his concept of engagement, which I argue in Chapter 2, showing that low-tech solutions foster better engagement.

1.5.1.2 Jugaad as Non-Standard Engagement

Non-standard engagements are those in which the designer has not specified any predetermined rules. Only in low-tech situations would this kind of engagement take place. This is because all high-tech devices require specific protocols to function; otherwise, the user cannot operate the artifact. When it comes to non-standard cases, users have total control. Under non-standard engagement, I introduce jugaad, which means "frugal" in Hindi, is a term

that refers to inventive problem-solving with a creative attitude. The thesis also highlights that jugaad and frugal are not the same thing; frugal can still be discussed in relation to standard low-tech engagement, whereas jugaad is only appropriate for non-standard engagement. The freedom available to users in jugaad is absent in standard engagement. Jugaad is often underestimated due to its negative connotations, which I cannot entirely dismiss. In Chapter 3, I argue that it arises as a byproduct of modern technology—it is not something to be celebrated but rather a response to scarcity. This scarcity-driven innovation makes jugaad valuable for studying artifacts that emerge under constrained conditions, a topic primarily overlooked in the philosophy of technology. I also present jugaad as a form of unchoice and forced creativity.

A closely related concept in the literature that resembles non-standard engagement is non-intentionality, as described by Breth Preston, and the designer fallacy, discussed by Ihde. Preston explores how an artifact's creation can occur accidentally or as a byproduct of something else rather than through deliberate design. Similarly, Ihde introduces the idea of the "designer and technological fallacy," which highlights how an artifact's use can sometimes extend beyond the designer's original intentions, resulting in a different product or outcome. I want to clarify that jugaad can sometimes align with non-intentionality, this is not always the case. Although it often involves accidental invention or repurposing a product for uses other than its original intent, my focus is on inventions that are purposefully made to lessen the pressing necessity. Its primary goal is to address immediate needs and offer prompt solutions.

The concept of jugaad aids in understanding low-tech engagement more fully and how it facilitates better engagement with artifacts. Observing how people around me experiment with artifacts, repurposing them for different purposes to mitigate their instant need, supports the idea that engagement increases as artifact complexity decreases. Modern gadgets often require specialized instructions and extensive maintenance, which is impractical for most people. To explore non-standard engagement, I propose three criteria's for achieving deeper engagement, which is discussed in Chapter 3.

a) user participation

b) transparency

c) repair and maintenance

Jugaad, arising from scarcity, offers a non-standard approach that can help re-establish engagement with artifacts when standard relations (Relations of Mediation), as discussed by Ihde and Verbeek, break down. It can restore a sense of normalcy for users. I explain it using two jugaad examples: the mitticool fridge by Mansukh Prajapati and the retrofitted bicycle by Kanak Das. Some may argue that jugaad does not constitute meaningful engagement due to potential safety concerns with its low-cost solutions. I concur, but it provides a lens to see the nuances of low-tech; low-tech generally offers greater user participation. This approach leads to two conclusions:

a) In high-tech contexts, the lack of transparency and complex repair and maintenance requirements voluntarily reduces user participation. This allows global companies to maintain control over their products, making users dependent on them for updates and repairs, thereby promoting continual product sales.

b) In contrast, low-tech solutions foster greater engagement by giving users more freedom to interact with artifacts. They offer transparency and facilitate repair and maintenance, which enhances user involvement.

1.5.2 Meaningful Engagement with Appropriate Technology: Exploring how low-tech promotes more meaningful engagement.

Meaningful engagement meets the criteria of user participation, transparency, repair, and maintenance while imparting social, cultural, intrinsic, and economic values. In Chapter 4, I introduce the views of Borgmann and Gandhi to explore further and understand MEAT. Both talk about the concept of appropriate technology, where they discuss the technologies that provide meaning to one's life. Even though they originate from different historical periods, I discover that both share a conceptual similarity in providing the idea of meaningful engagement. Borgmann defines it using pre-technological examples, while Gandhi relies on pre-modern examples. Borgmann's idea of focal things and practices helps us understand the relevance of virtues and skills when engaging with artifacts. In Gandhi's idea of appropriate technology, I am taking his example of charkha (artifact used to spin thread), which is taken as a model in the chapter that instantiates the focal thing.

In the case of Borgmann, there is extensive literature on his views about technology, where he tends to favor pre-technological examples over modern technology. However, barring attentive one-dimensional works on Gandhi's views on modernity, religion, or

industrialization, a comprehensive theory of technology in Gandhi's works is not available or perhaps impossible. This is because he made many claims about machines and artifacts in varied contexts. Even though he was firm on the role of the charkha in self-reliance, freedom, engagement and community life, he was often choosy about the role of modern artifacts. Many prominent Gandhian scholars believe that one needs to take into account "Gandhi-the political persona" who was politically present in the historical context of freedom struggle, and he was aware that a certain level of pliability is required when it comes to pacing one's policies on technology. Gandhi wrote extensively on many topics spanning thousands of pages, and his comments on technology are often not internally consistent. This is possibly a sign of resignation to the apparent emergence of industrialization, and in many other writings, he vehemently falls back to pre-technological artifacts. In this chapter, I have addressed the possible secondary sources and tried to see why he falls back to the pre-technological. It is clear that, given a chance, he will go back to the pre-technological stage, similar to Borgmann.

The central theme of chapter 4 is the concept of appropriate technology, which shows the relationship between high and low technology (Borgmann 1984; Gandhi 1910). Borgmann's idea of technology is not to reject it entirely but to use it judiciously to ensure that focal things and practices flourish. Gandhi uses the concept of appropriate technology for indigenous technology that is best for people, uses locally available resources, and causes minimum cultural and ecological disruption. For Gandhi, the charkha exemplifies such an appropriate technology, as it can free people from a mechanized world, foster meaningful engagement, and promote a joyful and prosperous life. Thus, Gandhi envisioned the relationship between humans and machines not as a master-slave dynamic but as one with family and friends. In this chapter, I explore the parallels between Gandhi and Borgmann, examining Gandhi's ideas through the lens of Borgmann's framework. I also discuss how Gandhi's concepts can address some of the shortcomings in Borgmann's approach. The thesis concludes by asserting that for an artifact to be considered MEAT, it must foster an authentic relationship with humans. This includes providing space for human autonomy, ensures upskilling, and maintaining a balanced relationship with both people and their surroundings.

Chapter 2
Engaging with Technology

Engagement traces its roots back to the French term "engager," initially signifying a commitment or pledge, particularly in moral and legal contexts during the 17th century (Koprivitsa 2020). Koprivitsa notes that over time, its usage broadened to encompass participation and involvement, representing both the 'act of engaging' and the 'state of being engaged.' It indicates a material manifestation of being. In contrast to Plato's era, where ontological reality was prioritized over sensory perception, modern reality is shaped by continual engagement, both anthropologically and socially. Koprivitsa asserts that we now exist in an 'epoch of practicalism,' bridging the gap between theory and practice. Koprivitsa (2020) posits that engagement emerges as an *epochally typical paradigm of existence* when individuals perceive a lack of cosmic order. This prompts them to autonomously reconstruct social reality, transcending reliance on established religious frameworks. In this context, engagement becomes synonymous with a practical mindset that seeks answers through human experience and action rather than adhering strictly to dogma. In times where certainties are scarce, engagement is not solely a means to an end but an immersive involvement in the process itself. Koprivitsa (2020) describes engagement as an urgent response to uncertainty, where actions are taken without full knowledge of their outcomes. Koprivitsa references Makowiak ideas of the concept of engagement as a daring commitment towards life's practical decisions. According to Makowiak (2005) as highlighted by Koprivitsa:

> To engage in some direction, for some subject, mean to commence acting, not necessarily knowing where one is going to, not even knowing whether that which is to be done good or not, whether its goals will be achieved or not. That is why we can often engage, as the saying goes, as if "head through the wall" (2020, 178).

Therefore, engagement involves committing one's person, embodying Sartre's notion that the real world is revealed only through action. Engaging is not just about the ability to act but also the capacity to perceive reality accurately. Therefore, an engaged individual is inseparable from thought and action, desire, and responsibility, embodying intentional engagement within their environment. In recent years, the proliferation of new technologies,

including virtual spaces, has led to a diversification of engagement forms (Koprivitsa 2020). Now, virtually all interactions, whether in virtual or non-virtual realms, are mediated by technology, giving rise to various types of relationships, as discussed by postphenomenological thinkers such as Ihde and Verbeek. When individuals engage with technology, they become part of a relational dynamic. For instance, Koprivitsa cites Ihde's example of the shift in responsibility before and after the advent of vehicles. Previously, individuals traveling were not categorized within any institutionally recognized group, but now they are labeled as "traffic participants," whether they are drivers or pedestrians. This technologically imposed responsibility cannot be ignored, as it carries legal implications. Consider for example, the activity of stopping at a traffic signal for pedestrians to cross or the act of insuring the vehicle. In both, the human agent is engaging in a nexus of interrelated actions necessitated by technological use. Consequently, individuals today are more inclined towards intentionally divergent engagements, seeking new experiences rather than conforming to traditional existentialist notions of self-realization. Therefore, human activities have been inherently intertwined with technology, from minimal to highly automated technologies, shaping meaningful existence or mere meaningless superfluous existence worldwide.

With more advancements, philosophers find the need to look at the concreteness of technology and study it independently, apart from humans. This is the main intellectual agenda in the empirical turn. However, there is a distinction in how many philosophers perceive engagement with technology; this chapter focusses on pre-empirical time philosophers and post-empirical turn philosophers, thereby highlighting their contrast in the idea of engagement. In pre-empirical turn, Heidegger is the first philosopher to provide a thorough analysis of the phenomenological study of artifacts in relation to human experience. Heidegger defines engagement with technology in terms of its essence and the authentic way of living. His views are further reinterpreted by Borgmann with modifications in the light of modern reality (discussed in chapter 4). Secondly, in post-empirical turn, I elaborate on postphenomenological thinkers (Don Ihde and Peter-Paul Verbeek) who aimed to study how technology affects humans and focuses more on bodily-sensorial engagement. According to Ihde, human-technology relations are "direct bodily and perceptual experiences of others and the immediate environment" (1990, 15). Verbeek, in defending his position against Borgmann, says, "by this I do not mean the focal, meaning-giving engagement of which Borgmann speaks, but rather bodily-sensorial involvement with objects" (2005, 228). This chapter highlights the difference

between bodily-sensorial engagement by postphenomemological (post-empirical) thinkers and meaning-giving engagement by Heidegger (pre-empirical thinker).

The distinction between meaning-giving and bodily-sensorial engagement does not imply that meaning-giving engagement is unimportant or vice-versa. The bodily-sensorial approach differs in that it relies more on perceptual experiences, whereas the meaning-giving approach looks for underlying meanings when interacting with artifacts. In the latter, the engagement is for a genuine or relationship between people and technology that fosters the development of experiences that are meaningful for the human beings. The thesis argues that this kind of involvement helps people refocus on their lives and create environments where we can aim for greatness and cultivate skillful living.

2.1 Heidegger as a thinker who identifies the importance of meaning-giving engagement with technology

Though Heidegger never directly spoke about 'meaning-giving engagement,' he discusses how one might engage with technology more profoundly with a balance between nature and other humans. Heidegger's *BT* and *TQCT* are two well-known works that shaped phenomenological discourse on existence and technology. BT delves into the ways in which Dasein stands in relation to a constantly revealing world with examples of tools and artifacts. Understanding Heidegger's 'phenomenology of technological praxis' requires understanding his early work. His primary concern is *Dasein*, being-in-the-world, or humans' relationship with their environment. He underlined how crucial it is to comprehend these relationships using everyday experiences of using tools. He places more emphasis on manipulating things and making them useful, which makes him more concerned with the practical connections with the world. Heidegger illustrates it with the example of hammering, explaining how the hammer's purpose becomes clear while it is in use. He states that the purpose of the hammer is "dealings cut to its own measure," illustrating the equipment's "in-order-to" character rather than the hammer-as a thing (1927[1962], 98). He calls this characteristic of the artifact "readiness-to-hand" (*zuhandenheit*), and refers to it as "circumspection," which deals with handling artifact (1927[1962], 99). It implies that every piece of equipment manufactured has a certain purpose; for instance, a clock's function is to indicate the time, shoes are meant to be worn, etc. As a result, the work generated will possess the same kind of Being as equipment. He also introduced the concept of 'present-at-hand (*vorhandenheit)*,' illustrating how our perception of tools shifts from transparent and integrated into our activities to opaque and noticeable only

when they malfunction. Therefore, Heidegger believes that when someone uses a tool, it involves referential structure- the material used for the product, future use, and the purpose it will be used.

My attention in this thesis is mostly directed towards his book, *TQCT* in which he discusses the need to have a genuine relationship with technology. The nature of technology, its effects on people and the environment, and its significance to human life are all explored in this essay. The essay aims to create a free relationship between people and technology, which can be achieved by comprehending technology's essence. I view Heidegger as a philosopher of meaning-giving engagement for two reasons. First of all, for his critical perspective on technology. We must critically assess the significance of the artifact at our disposal rather than unquestioningly accepting it as applicable. People are too distracted by technology in today's high-tech culture to think about what a genuine relationship with an artifact, another person, or nature looks like. There seems to be an incessant supply of technology, often the ones we use become obsolete by the time we foster a meaningful engagement. The last three decades have been a graveyard of newer technologies such as floppy discs, DVDs, video recorders, VHS tapes, different types of gaming devices, various medicines, and so on and so forth in all sectors. We must respond to his inquiry concerning technology once more from the perspective of the present day. My second motivation for studying Heidegger is to investigate the idea of authentic engagement, which I mostly do in chapter 4 using the views of Borgmann and Gandhi as my primary sources. Heidegger serves as an inspiration for Borgmann, who bases his arguments on current developments. I look into Heidegger's viewpoint to better comprehend Borgmann's position on human-technology engagement and how Borgmann's ideas differ from his.

2.1.1. Heidegger's notion of Technology

According to Heidegger, the term "technology" originates from the Greek word *Technikon*, which means belonging to *techne*. *Techne* was not merely associated with the skills of craftsmen but was also linked to *episteme* by philosophers like Plato, signifying a connection to revelation. Aristotle distinguishes between *techne* and *episteme* based on what and how they reveal. *Techne* is a mode of *aletheuein* that implies bringing forth something that cannot reveal itself. For instance, those who build houses, ships, or forge sacrificial chalices reveal their creations through four modes of occasioning (given first by Aristotle).

> (1) the *causa materialis*, the material, the matter out of which, for example, a silver chalice is made; (2) the *causa formulis*, the form, the shape into which the material enters; (3) the *causa finalis*, the end, for example, the sacrificial rite in relation to which the chalice required is determined as to its form and matter; (4) the *causa efficiens*, which brings about the effect that is the finished, actual chalice, in this instance, the silversmith. What technology is, when represented as a means, discloses itself when we trace instrumentality back to fourfold causality (Heidegger 1977, 6).

All these causes are intertwined, and their culmination is referred to as "telos" in Greek, a term Heidegger emphasizes is often misunderstood as simply meaning 'aim' or 'purpose.' Heidegger citing Aristotle explains that telos is responsible for bringing together both matter and form, jointly contributing to the creation of the sacrificial vessel. Heidegger claims that these four causes are distinct from one another, they are inherently interconnected. These four causes serve to reveal what would otherwise remain concealed. According to Heidegger's interpretation of Plato, "every occasion that transitions from the non-present to the present constitutes poiesis, a bringing-forth (1977, 10)." Heidegger elaborates that poiesis involves bringing something forth from within itself, such as the blossoming of a flower, which is inherently a form of poiesis. Bringing-forth occurs when something reveals what was previously concealed. According to Heidegger (1977), the Greeks referred to this act as *aletheia*, while the Romans used *veritas*. Heidegger posits that revealing has a profound connection with the essence of technology. He further argues that if the potential for all productive manufacturing lies in revealing, then technology transcends mere utility. In this scenario, Heidegger posits that technology becomes a means of revealing truth; its essence lies in this act of revelation. In other words, according to Heidegger, technology can reveal a new reality and its experience to the human which otherwise would be impossible without technological use.

According to Heidegger, technology is distinct from the essence of technology. He argues that when discussing the essence of a tree, for instance, it refers to something that permeates in every tree as a tree but is not identical to the tree itself. For Heidegger, the word "technology" connotes also to contrivance, Latin *instrumentum*, meaning it signifies a means and human activity, pointing to technology's instrumental and anthropological definition. He contrasts the instrumental definition with older handicraft technology, stating that modern

technology serves to fulfill needs, such as a hydroelectric power plant on the Rhine River, contrasting with a sawmill nestled in a secluded valley of the Black Forest. In modern technology, everything is manipulated to achieve the desired needs. The problem, he believes, is when "we will, as we say, "get" technology "spiritually in hand." We will master it. The will to mastery becomes all the more urgent the more technology threatens to slip from human control" (1977, 5). In this pursuit of mastery, Heidegger believes that humans overlook the fourfold causality, which reveals the interconnectedness of the four causes responsible for the existence of everything, as outlined by Aristotle. Contrast the older technology with the modern ones where we immediately set it up with a user-manual to kickstart the device and yield results. The medium and the skill to master the various levels of working are simply non-existent. In terms of experience too, to take a simple example, consider the difference between an actual physical classroom and a virtual one. In the former, there is something quite personal, a level of corporeality that seems missing in the latter. For me, both classrooms reveal different experiences of teaching and learning in addition to differing degrees of meaningful engagement.

Therefore, according to Heidegger, technology is not merely about creating and manipulating but serves as a means of revelation. Modern technology diverges from the sense of poiesis, and instead impose unreasonable demands on nature. Heidegger cites examples such as windmills, which rely solely on the wind's energy without storing it, unlike hydroelectric plants. Similarly, he contrasts the act of sowing grain with the mechanized food industry, highlighting how the latter imposes upon nature. Heidegger contends that contemporary technology orders everything to stand by, immediately available for further manipulation, resulting in what he terms the "standing-reserve" or *Bestand.*

2.1.2 Technology as *standing reserve (Bestand)*

The term "standing-reserve" transcends mere stockpiling and signifies a profound transformation in how things reveal themselves (Heidegger 1977). It implies that everything is poised in standby mode, ready to be immediately called upon or manipulated. Consequently, modern technology according to Heidegger, has rendered everything a standing-reserve characterized by a dry, monotonous, and oppressive nature. He claims that human beings, driven by the *will to master technology*, have embraced ordering as the primary mode of revealing. Heidegger argues that this mode of unconcealment is beyond human control and transforms human beings into a standing-reserve themselves. He introduced the concepts of

Techne and *Technologie*, distinguishing between older mechanical crafts and contemporary high-tech advancements such as biotechnology and nanotechnology. Heidegger argued that modern technology deviates from the harmonious relationship with nature in older technologies. While traditional methods conform to natural standards, contemporary technology establishes its standards and manipulates nature for human ends.

Heidegger cautions against viewing modern technology from a singular perspective (exploitation and manipulation). According to him, we considered keeping everything at standing reserve to get them used later. It is challenging to exploit everything as a resource and subject nature to unreasonable demands. Heidegger says:

> when man, investigating, observing, ensnares nature as an area of his own conceiving, he has already been claimed by a way of revealing that challenges him to approach nature as an object of research, until even the object disappears into the objectlessness of standing-reserve (1977, 19).

He admits that abandoning technology is impossible but warns about the danger of reducing everything, including human and nature, to useable resources, which strips them of their intrinsic value. The key idea here is to acknowledge his point that we are becoming standing reserves ourselves in the act of making nature a standing reserve. The means-ends structure of affairs is seen in professional life far too often, where in attending a standing reserve such as a stock market, the agents are also mere pawns meaninglessly wandering about the pursuit of a systemic goal. Heidegger is not just unthinkingly attacking technology; instead focuses on the meaningful and authentic engagement we can have with technology. Viewing technology as merely an instrument perpetuates the desire to master it, akin to Nietzsche's concept of the overman who seeks to dominate everything. According to Heidegger, those under the sway of technology are subjected to the same rule, leading to purely technological relationships.

2.1.3 *Gestell* as an issue

Gestell finds its roots in the German word "stellen," meaning "to put" or "to place," combined with the prefix "Ge-," signifying "gathering" or "collection" (Heidegger 1977). In common usage, it denotes some form of apparatus. It is also used to refer to a skeleton, akin to Plato's use of "eidos" to signify the essence that transcends direct perception, encompassing the audible, tastable, tactile, and everything accessible. Similarly, Heidegger's *Gestell*

represents the essence of modern technology. According to Heidegger, the term "stellen" implies "setting upon," and "Ge-stell" denotes 'enframing.' He explains that in enframing, modern technology reveals the real as a standing-reserve, a process that is neither solely a human activity nor merely a means within such activity**.** For Heidegger, enframing constitutes the essence of modern technology. He believes enframing refers to the gathering together of the setting-upon that challenges humanity to reveal the actual through the form of ordering, manifested as standing reserve. It denotes the mode of revealing that dominates in the essence of modern technology, that is, mere technological manifestations. Heidegger uses the example that every component of an automobile, including the chassis, pistons, and rods, falls in the scope of technology.

Heidegger posits that our response to the challenges posed by enframing is neither wholly predetermined nor entirely free. His primary concern is how Dasein, or human existence, can establish a genuine and free relationship with technology. He emphasizes:

> We shall be questioning concerning technology, and in so doing we should like to prepare free relationship to it. The relationship will be free if it opens our human existence to the essence of technology. When we can respond to this essence, we shall be able to experience the technological within its own bounds (1977, 3).

According to Heidegger, an authentic or free relationship with technology entails openness to the essence of technology, which he calls *Gelassenheit* or releasement. Heidegger suggests that in *Gelassenheit*, one fosters a relationship with technology devoid of domination and mastery. When Heidegger refers to an authentic relationship, he implies one that transcends human control. Heidegger also provides the way out and believes that within the power of enframing lie both danger and salvation. Heidegger quotes Holderlin: "But where danger is, grows the saving power also" (1977, 28). Heidegger delineates a double moment of concealment within enframing: the first concealment is inherent in the nature of being, necessary for something to come to presence; the second concealment arises when things are taken for granted, obscuring their essence, and viewed solely as moments of presence:

> The coming to presence of Enframing is the danger. As the danger, being turns about into the oblivion of its coming to presence, turns away from this coming to presence,

> and in that way simultaneously turn counter to the truth of its coming to presence. In the danger there holds sway this turn about not yet thought on (1977, 41).

Heidegger describes the process of concealing concealment epitomizes the experience of viewing things as standing reserve, an experience that cannot be overlooked. He argues that the danger arises when humanity becomes dominated by or fixated on the technological. Heidegger, however, maintains that within this danger lies the potential for salvation. The second form of concealment, according to Heidegger, is a pathway to transcend the second concealment and access the first. Releasement facilitates an openness to perceive Being amidst technicity. Heidegger observes that through modern technology, humans seek to control and dominate nature, leading to concealment rather than revelation. He argues against viewing technology merely as an instrument controlled by humans, emphasizing its ontological essence. He warns of the danger that enframing may obscure the authentic structure of autonomy, replacing it with an inauthentic conception.

Heidegger asserts that contemporary society has lost sight of the primary notion of truth, *Aletheia*. He points out that while modern usage equates *Aletheia* with the correction of object representation, its Greek origins imply un-concealment, stemming from the term *Lethe,* meaning concealment or forgetfulness. For Heidegger, technology operates as a unique mode of concealment, distinct from the self-revealing nature of physis or Nature. He notes that unlike physis, modern technology does not bring forth unconcealment but rather challenges beings, treating them as raw materials. Heidegger critiques the quantifiable nature of modern technology, warning that it threatens the non-quantifiable qualities of beings, and extends its influence over all things, including nature. He challenges the common perception of technology as simply a human creation, viewing it instead as a mode of revealing, albeit with a particular mode exclusive to modern technology. Heidegger cautions against human arrogance in the face of this threat, emphasizing the need to understand the challenges it brings. Within *Gestell*, he suggests that the notion of un-orderable, uncontrollable, and isolated being appears unattainable.

The following section addresses the conceptual resonance and dissonance that Ihde and Verbeek find with Heidegger and how their approach to bodily-sensorial engagement varies from Heidegger's meaning-giving engagement.

2.2 Heidegger's philosophy of Technology as the foundation of Postphenomenology

Ihde is the first philosopher to critically examine and reinterpret phenomenological concepts to develop the theory of postphenomenology, a more in-depth investigation of the relationship between humans and technology. In his work titled *HTPP* (2010), he responded to Heidegger's philosophy of technology and extracts numerous insights. Ihde calls Heidegger's approach to ontological problems "the most penetrating to date" and commends him for taking them seriously. He sees Heidegger as the pioneering philosopher who makes technology a part of philosophical inquiry by freeing it from an instrumentalist perspective. Ihde claims that Heidegger asserts that all contemporary technologies "fall under the sign of the same" (2010, 21). The entire corpus of works in empirical turn and in postphenomenology emerged in reaction to this. Heidegger's theory is challenged by STS and in the empirical turn for being metaphysical and transcendental, which emphasizes particular, concrete technologies within unique cultural contexts. Ihde and Verbeek also criticize Heidegger for emphasizing ontological over *ontical* or essentializing technology under the general 'capital T' and ignoring different kinds of technologies.

2.2.1 Ihde's critical understanding of Heidegger

Ihde notes the disparity in tone between Heidegger's early work *BT* and his later work *TQCT* about his philosophy of technology. Ihde borrowed Heidegger's (1927) phenomenological analysis of everyday equipmental activity to develop his theory of artifacts. Since his early works, Ihde has been interested in the hermeneutic understanding of artifacts (concept of readiness-to-hand and present-at-hand). Heidegger is more critical of contemporary technology in his latter work, where Ihde finds dissonance. Ihde disagrees with three of Heidegger's assertions: that technology is not neutral or anthropocentric, there is a distinction between contemporary and traditional technology, and that technology can be viewed from a metaphysical standpoint. The first idea is applicable and widely acknowledged in the philosophy of technology, but it is applied in specific technological analyzes rather than being limited to general conjectures (such as defined under the general term 'capital T'). Regarding the second, Ihde is more interested in explaining how humans interact with technology than in advocating for such traditional and modern differentiation. Ihde also renounces his third claim regarding the revealing character of technology. He does not consider technology a threat or a standing reserve nature. With this metaphysical perspective of defining Heidegger's philosophy of technology, Ihde claims that "it is also the means by which all technologies

become, ultimately, subject to the *same high-altitude analysis"* (2010, 19). Ihde draws attention to Heidegger's fallacious contrast between handcrafted and contemporary technologies. He claims that Heidegger's romanticization of handicraft instruments, which eventually leads to the appreciation of aesthetics in poetic production in works of art, is one-sided. Ihde says:

> [This] aestheticist move, which, here using more contemporary terms, perceived through Heidegger's use of techne (a poetic production process which he claims from the Greeks), applies both to technologies and to works of art. However, "modern" technologies come out looking "bad," while carefully wrought works of art look "good." But both are products of material culture (2010, 20-21).

Yet both technologies and art works are material artifacts that phenomenologically belong to their respective contexts. Ihde argues that Heidegger uses a "hugely selective" approach to the artifacts (mainly handcrafted) for his tool analysis. Ihde argues:

> Heidegger chooses as examples equipment that is used "in hand," technologies that are directly employed in work projects, technologies that extend human capacities often in terms of *handiwork*. This selectivity colors the entire analysis and is one element of a certain Heideggerian inadequacy of interpretation regarding technics (Ihde 2010, 51).

Though Ihde criticized Heidegger for ignoring the historicity of technological advancement and being unduly sentimental for traditional technology, he also included many of Heidegger's concepts into his postphenomenological definition of artifacts. Ihde's works takes inspiration from the idea of being-in-the-world (Dasein), non-neutral and non-Anthropocene view of technology, practical engagement over theoretical one, and priority of technology over science that leads to the idea of 'technoscience.' I regard Heidegger's differentiation of modern and traditional technology as a crucial demarcation. Similar to Ihde, one may of course level the criticism that the differentiation is modeled on the difference between art and technology; yet Heidegger has a deeper point here. That is, modern technology sets out a unique attitude towards nature. Heidegger found this probably due to the devastating impact of technology in the first half of twentieth century he was witness to. For him, in general there are two kinds of technology: a good one and a bad one. Good and bad here hinges on the flourishing of humans. Borgmann too raises similar concerns when he discusses focal things

and device paradigm. Both philosophers make sense when we look at philosophy of technology from the point of view of human existential purpose in engaging with technology, and not in the mere analysis of interactions between commercially oriented humans and technology in a practical manner. Therefore, I argue that there must be a relook into the differentiation Heidegger made.

2.2.2 Verbeek's on Heidegger

After Ihde, Peter-Paul Verbeek is the next in line for the postphenomenological understanding of technology. Ihde provides the technoscientific reading of Heidegger, while Verbeek explores the "philosophy of technological artifact" (Verbeek 2005, 9). Verbeek criticized classical philosophers like Heidegger and Jaspers for highlighting technology's negative aspects and leaving "no room for different kinds of descriptions of different kinds of technologies" (2005, 4). Verbeek does not entirely reject the ideas of the classical philosophers; rather, he maintains that their concerns still need to be addressed. He criticizes them for reducing technologies to their conditions of possibility for doing the same thing that Kant did about knowledge. Verbeek insists on going 'back to things themselves.' This entails discussing the function of concrete technological artifacts and how they mediate human existence and their world. Verbeek offers an artifactual reading of Heidegger. For Verbeek, it requires a "critical analysis...in order to make Heidegger's hermeneutic philosophy of technology relevant to a 'turn toward the artifact' in the philosophy of technology" (2005, 48). He opposed Heidegger's transcendentalism, which removes the phenomenology of everyday existential interaction and replaces it with a transcendental manner of thinking. Verbeek is grateful to Heidegger for raising pertinent concerns regarding technology: "What is the significance of technology for the way human beings encounter reality; and how does it affect the manner in which they interpret the world?" (2005, 49).

In between early and later Heidegger, Verbeek, (like Ihde) considers the works of early Heidegger as a detailed analysis of technological artifacts and regards them as forward-looking. According to Verbeek:

> [Heidegger's early works offer] an extensive analysis of the role of equipment in the relation between human beings and their world, which contrasts sharply with his later analysis...the earlier Heidegger, instead of reducing the relation

> between human and world, technological artifacts generate specific forms of access to the world for human beings (2005, 76).

Verbeek's main point of criticism in Heidegger's philosophy is *kehre*, or "the turn," He summarizes Heidegger's writing as "a transcendental manner of thinking gradually crept into his philosophy, culminating during the period of its so-called turn or *Kehre"* (2005, 49). The pre-*kehre* approach focused more on the phenomenological interpretation of Dasein's existence. In contrast, the post-*kehre* approach treated the question of being from the perspective of the history of being itself. Verbeek contends that Heidegger has contradictory views on both traditional and contemporary technology. He questions how Heidegger "selectively navigates between two different approaches. One historical and one ahistorical" (2005, 60). Verbeek believes that Heidegger analyzes modern technologies from a historical perspective and traditional artifacts from an ahistorical one. Verbeek claims this perspective dualism is not a problem for Heidegger because for Heidegger, being is "intrinsically, and therefore ahistorically, [being] is an "event," but the way in which this event shows itself is historical. That reality comes into being is unchangeable, but how this event shows itself is contingent" (2005, 73). The result, for Verbeek is that Heidegger measures traditional and modern with two different standards.

Verbeek blames *kehre* for elevating transcendentalism and diminishing the significance of specific technologies. Heidegger discusses individual technologies in his later writings, such as nuclear energy and hydroelectric plants, although he does so primarily to explain them within a specific historical epoch and not to view them as technological artifacts that influence how humans interact with the outside world. According to Verbeek, Heidegger defined technology post-*Kehre* as ontological, reducing everything to its conditions of possibility, whereas pre-*Kehre* provided a more phenomenological account of our daily interactions with tools in day-to-day life.

Verbeek uses Heidegger's six texts—BT (1927), "The Origin of the Work of Art" (TOWA) (1950[1971]), *The Thing* (TT) (1971), *Building, Dwelling, Thinking* (BDT) (1954[1971]), TQCT (1953), and *The Memorial Address* (TMA) (1959[1966])—to chart the chronological development of his conception of technology. His work BT demonstrates tool analysis and makes a more significant contribution to the philosophy of technology. Verbeek thinks that Heidegger's TOWA, in which he distinguishes between equipment, artworks, and mere things, is essential in understanding his ideas about artifacts. While humans create

artworks, mere things are self-sufficient and do not require human intervention, and equipment is a useful artifact built for a specific function. In *BDT*, he combines artifacts and artworks together into one category called "the thing." Verbeek, therefore, thinks that Heidegger's attempt to combine everything under one heading represents his rejection of the phenomenological view of an artifact in favor of an abstract, monolithic one. He claims that even *TT*, Heidegger's work, loses its sense of what it is. Verbeek suggests that things are reduced "to the way of unconcealment that prevails in a particular historical epoch" (2005, 92). It indicates that Heidegger has classified modern technology under the standing reserve and earlier technology under the specific period of being. Then comes *TQCT*, where Heidegger has defined everything through a metaphysical approach—in which he understands everything with the mystical notion of "fourfold." It can be seen that Heidegger uses the examples of a bridge and a jug to show how

> the fourfold is the world as it is gathered by "earth and sky, divinities and mortals" (Heidegger 1954[1971], 153). These four components form the dimensions that open up the realm in which human beings experience their world. They are made visible by things, which refer to the earth from which they are made, the sky under which they rest, the mortals who concern themselves with them, and the gods who can be thanked for them (Verbeek 2005, 70).

Lastly, *TMA* explains how technology is understood as a historical period of existence rather than as only technological. Verbeek believes that Heidegger's later philosophy, which views technology as a standing reserve and whose point of view is the history of being, is insufficient.

We see that Heidegger faced criticism from Ihde and Verbeek, who argued that his approach could be enhanced by integrating pragmatic and empirical perspectives. They charge Heidegger for being essentialist and transcendentalist by failing to advocate a more nuanced understanding of technology. Building on the fundamentals of Heidegger's works, Ihde incorporated post-empirical perspectives and the concept of multistability, thus paving the way for a purely pragmatic yet phenomenological approach. While Verbeek contends that Heidegger views reality as solely accessible and manipulable by humans, Ihde sees Heidegger's analysis as overly essentialist, reducing everything to enframing. Ihde argues that Heidegger overlooks the diversity of contexts and dimensions inherent in technology. To

address this, Ihde suggests considering the multiple contexts and dimensions of technology. Verbeek criticizes Heidegger for focusing too much on the conditions of possibility and looking backward. Verbeek proposes transcending enframing to understand how technologies function in people's lives. For instance, he uses the example of a car, which cannot be reduced to mere materials but must be understood in terms of its impact on identity formation (one's status) and beyond. Verbeek argues that Heidegger's transcendentalist approach falls short in explaining modern technological artifacts. So, instead of reducing all technologies to the same essence or conditions of possibility, postphenomenological thinkers aim for more appropriate role of technologies.

2.3 Postphenomenological idea of Human-Technology Relation: Bodily-sensorial Engagement with Technology

Ihde (1990) characterizes the human-technology relationship through the framework of experience, which he terms as relativistic. Each individual will have different relations with the same technology or with different technologies. Ihde defines postphenomenology as:

> A phenomenological account…always takes as its primitive the relationality of the human experience to the field of experience. In this sense, it is rigorously relativistic. The relationality of human-world relationships is claimed by phenomenologists to be an ontological feature of all knowledge, all experience (1990, 25).

Experience, according to Ihde, is pivotal in maintaining the connection between humans and their environment. In the act of experiencing, individuals become deeply intertwined with the world, where humans and the world cannot be disentangled. Ihde delineates two forms of perception: sensory or bodily perception, termed microperception, and an interpretative dimension that unveils meaning, termed macroperception. For instance, microperception might entail "I see a tree," while macroperception could involve a profound shift in perception (Example; since that talk, I see things completely differently (Verbeek 2001, 124). In both microperception and macroperception, technologies play a crucial role in mediating the relationship between humans and their environment. A pivotal starting point in comprehending technological mediation is found in Heidegger's analysis of the role of tools in everyday existence. Ihde agrees with Heidegger that tools (in the state of readiness-to-hand) establish connections between humans and reality. In this state, the artifact recedes from direct attention,

and the user's focus is directed towards its function as seen in Heidegger's hammer example. When someone wields a hammer, their attention is fixated on driving the nail rather than the hammer itself. Heidegger suggests that people's engagement with reality is made possible through readiness-to-hand, and if a tool becomes dysfunctional, it disrupts the relationship between the user and their world. Therefore, when tools are actively in use, they serve as mediators in human-world relations. In these interactions, technological artifacts are not passive agents but actively influence human perceptions, actions, experiences, and existence within the world. Ihde provides numerous examples from our daily lives such as using a thermometer to measure temperature, conversing over the phone, or watching television for entertainment, where technology plays a crucial role as a medium. In each instance, individuals engage in bodily-sensory experiences through technological artifacts. This bodily-sensory engagement mediated by technology is termed technological mediation by Ihde, highlighting how technology serves as a mediator in these relationships. In postphenomenology, understanding the structural aspects of these ambiguous relations between humans and technology is key. The starting point of this relation is the interaction of the "I-as-body" with the environment through technologies. Ihde elucidates four types of Relations of Mediation: embodiment relation, hermeneutic relation, alterity relation, and background relation.

2.3.1 Types of Relations of Mediation

a) Embodiment Relation: Ihde contends that the process of embodiment dates back to early modern science, coinciding with the introduction of innovations such as optical technologies. In the case of optical technologies, vision undergoes technological transformation through optics, a phenomenon Ihde terms as visual technics, evident in the intentionality of seeing. In direct viewing of the world, the relationship is expressed by Ihde as

I-see-the world

while with the use of optical artifacts, it becomes

I-see through the optical artifact-the world

In this relation, technology mediates between the observer and the observed, positioned in a mediating role. Ihde explains that the initial sense of positioning in this relation is ambiguous. Firstly, the technology must be technically capable of allowing sight through it, meaning it must be transparent. Transparency here refers to the physical characteristics of

the technology. If the glass is not transparent enough, seeing-through will not be feasible. However, if it meets the condition for embodiment by being sufficiently transparent, then pure transparency is possible. According to Ihde, the first time someone wears glasses, they see the corrected world. Adjustments needed are minor, such as slight changes in spatial perception. He believes that once learned, the technology becomes maximally transparent, seamlessly integrating into one's perceptual-bodily self-experience. He argues that these embodiment relations are not confined to visual experiences but can occur in sensorial dimensions. Ihde gives examples such as hearing aids for the deaf and canes for the blind, which exhibit similar structural features of embodiment relations. Thus, for all such artifacts, the relations are defined as

(I-artifact)-world

According to Ihde, these embodiment relations extend beyond simple technologies to encompass larger and more complex artifacts, necessitating a more intricate learning process involving bodily tacit knowledge. He argues that the body image in such experiences is not fixed; it can be reducible or extendable in terms of embodied technologies. Ihde categorizes the reducible form as microperception and the extended form as macroperception. For Ihde, what remains constant is the bodily focus, the reflexive reference back to one's bodily capacities. He explains that both the microscopic and macroscopic dimensions appear within the same proximity, analogous to observing the size of an amoeba and a galaxy through an instrument.

b) Hermeneutic Relation: Hermeneutics, typically referring to interpretation, is recontextualized by Ihde within a technological framework. For Ihde, writing represents a technologically embedded form of language, fundamentally transforming our perception and understanding of language. He explains unlike perceptual isomorphism observed in optical examples, textual isomorphism allows for the representation of concepts like a chart when one reads it. He argues that in the hermeneutic relation, transparency is textual rather than perceptual. This transition from embodiment to hermeneutic occurs gradually along the human-technology continuum, Ihde claims is evident in the slow historical development of writing technologies. Ihde illustrates this transition with the example of readable technologies. Imagine being inside a warm house on a cold day, looking out the window at blowing snow (Ihde 1990). While one perceives the cold visually, they do not physically feel it. If a thermometer is placed outside, one can know the temperature but still cannot

physically feel the cold. The thermometer does not convey the sensation of cold like a conductor placed through the wall might. Instead, one reads the thermometer and hermeneutically understands that it is cold. He asserts that in this scenario, both embodiment and hermeneutic relations are at play: embodiment in perceiving the cold visually and hermeneutic in interpreting the thermometer's reading. Ihde extends this notion to reading temperature as a metaphor for reading knowledge, emphasizing how technology mediates our understanding of the world. He further elucidates this with the example of the Three Mile Island incident, where misreading instruments led to a nuclear meltdown (1990, 85). Here, the instrumental panel becomes the object of microperception, mediating the observer's reading of the nuclear pile. Ihde identifies two potential sources of confusion regarding the difference between embodiment and hermeneutic transparency. Firstly, there is an intertwined sense in which perception and interpretation overlap, as perception itself is an interpretive act. Secondly, both relations are employed to experience something, whether through the use of lenses to observe the world or thermometers to gauge temperature. The relation is schematized as:

I-(technology-world)

c) Alterity Relation: Ihde introduces the alterity relation within human-technology dynamics. In the embodiment relation, technology's objectiveness is perceived negatively, while in the hermeneutic relation, it is viewed positively. Ihde believes that Heidegger views technology's otherness as negative, as it becomes unusable when it breaks down, transforming into mere junk. Ihde, however, emphasizes the positive aspect of human-technology relationships, termed technology-as-other or alterity relation, borrowing from Levinas's concept of infinite difference between one human and the other (and by ultimately other, that is God). In analyzing human interactions with technology, Ihde discusses the allure of video games, which encompass both embodiment and hermeneutic relations. For example, the use of joysticks embodies hand-eye coordination, extending the player into the game's virtual realm, illustrating embodiment relations. Additionally, the application of sports analogies within games demonstrates hermeneutic relations. Ihde introduces another dimension where individuals interact with entities beyond themselves, such as technological competitors, leading to dialogue and occasional challenges. This quasi-otherness or quasi-autonomy of technology highlights its dynamic nature. He believes that historically, automata have captivated Western thinkers, evolving from simple constructs to more

complex systems. Presently, AI research aims to create robots with human-like intelligence, showcasing the advancements in technology. Ihde coins the term "technological intentionality" to describe how technology shapes human behavior, playing a pivotal role in the human-technology continuum as a medium of transformation. Ihde explains in alterity relation, humans maintain positive interactions with technology, which emerges as a focal entity demanding attention and acting as the "other." Formally expressed as:

I-technology-(-world)

This relation positions technology at the forefront, influencing human interactions with the world. Within this framework, technology remains artifactual yet significantly impacts people's relationships with the world.

d) Background Relation: Technologies that are discarded or no longer in use often remain in the background of human experience. These items may sometimes be repurposed into forms of junk art or preserved in museums. However, Ihde's definition of background relation pertains to a specific group of technologies designed to operate in the background, such as automatic or semi-automatic devices. In everyday life, Ihde point out that numerous home appliances like lighting, heating, and cooling systems serve as examples of semi-automatic systems. He further explains while they may require some intervention, fully automatic appliances operate independently, like high-tech devices. He provides the example of automatic heaters, where the presence of technology is evident through background noise and the heat they emit.

The relation is defined by Ihde as:

I (-technology/world)

Ihde discusses two important aspects of the human-technology relation in the background: first, there is a lack of opacity and transparency because the artifact withdraws from immediate awareness. According to him, its phenomenological function in this context is withdrawal, remaining absent from immediate environmental perception. Ihde notes that the use of technologies as background is not exclusive to the contemporary world, as ancient traditions also utilized devices in this manner. For example, scarecrows mimic human figures to scare birds away from crops (Ihde 1990). Furthermore, Ihde points out how technologies are sometimes used to insulate humans from the external environment, such as clothing that

protects against temperature, wind, and extreme weather conditions. Although clothing can provide embodiment by allowing one to feel the external environment, it is not as transparent as other instruments. Another example Ihde discusses is shelter technology, which ranges from minimal resource usage to more complex structures designed to shield against external weather conditions. The most automated forms of shelter technology are referred to as technological cocoons. Heidegger says, however, a challenge with incorporating high-technologies into the background is the significant disruption caused when these technologies fail. Ihde (1990) cites the example of Hurricane Gloria in Long Island in 1985, which resulted in massive destruction of power lines, leading to power outages. During such times, people had to revert to older technologies like lanterns and candles for lighting, or adjust their eating habits due to refrigeration failures during blackouts in New York. Therefore, different technologies have various ways of intertwining with human life, and their failure can directly impact human experiences.

In defining human-technology relations, Ihde's aim is not to explain it negatively or positively but to see how different technologies maintain different relationships with different groups of human users. In the exploration of human-technology relations, Ihde discusses how technology mediates human experiences and perception towards looking at the world. Verbeek aligns with this perspective, asserting that technology mediates how people interact with the world and shapes human actions within their social context.

2.3.2 Verbeek's extension of human-technology relations

Verbeek expands on the concept of mediation by introducing additional relations beyond those described by Ihde. Verbeek introduces new categories of mediation: Cyborg relation and composite relation-immersive relation and augmented relation.

1. Cyborg Relation: In the cyborg relation, the human body integrates with technology, resulting in a novel hybrid entity. An example of this for Verbeek is a brain implant utilized for deep brain stimulation to treat conditions such as Parkinson's disease or psychiatric disorders, embodying the realm of transhumanism. This relationship is articulated as:

   (Human/technology)-world.

2. Composite intentionality involves the combination of human intentionality with technological intentionality. In the immersive relation, technology merges not with an

individual but their environment, imbuing it with ambient intelligence. Here, technologies act interactively rather than passively, shaping the context of interaction. An instance of this, according to Verbeek, is smart beds in hospitals that detect people's movements and provide feedback on their behavior The configuration of immersion is depicted as:

Human <->technology/world

3. Augmentation Relation: The augmentation relation bifurcates the human-world relation, exemplified by technologies like Google Glass, which simultaneously employ the embodiment relation and provide a representation of a parallel screen (Verbeek 2011a). This combination reflects both embodiment and hermeneutic relations. The configured structure for this relationship is:

(human-technology)->world+human->(technology-world).

Therefore, Verbeek conceptualizes engagement as a bodily-sensorial experience, where the human body, acting as an active subject, interacts with technology as an active object. For him, active interaction occurs when humans interact with the artifact, resulting from the co-interaction of the designer, the user and the artifact. Moreover, with these technological advancements, Verbeek asserts that since technology significantly shapes human experiences and practices, the design of technology should be approached with great responsibility. He argues that designing technology is essentially designing humanity, with profound ethical implications for individuals and society as a whole. To illustrate this point, Verbeek (2011a) cites medical imaging technologies like MRI and ultrasound, which enable the visualization of the fetus, an otherwise invisible entity. In cases where the fetus is found to have a disease, these technologies empower parents to make decisions regarding the life of their unborn child. Verbeek utilizes mediation theory to elucidate the ethical dimensions of technology design. He advocates for a more inclusive and democratic approach to technological mediation, emphasizing that the responsibility for this process should not rest solely on designers. Verbeek (2011a) outlines three stages for achieving this: anticipating mediations, assessing mediations, and methods of moralization.

A) Moral imagination: It is also known as anticipating mediation. This involves the designer's imagination regarding how the artifact will alter the relationship with the user. Designers strive to envision how the technology under design could shape human practices. It includes various elements, point of relation, types of influences and domain of mediation. These

elements will explain, "which 'point of application' does the technology have, which form do its impacts have, and which aspect of human existence does it affect?" (Verbeek 2013, 7).

a) Point of Relation:

Verbeek, drawing on Steven Dorrestijn's work *Design of Our Own Lives* (2012), discusses four loci of mediation in the human body where technology exerts its influence, also referred to as the four points of application: "to the hand", "before the eye", "behind the back", and "above the hand."

1. To the hand: It means physical relation. He uses examples like speed bumps and turnstiles to illustrate his point. Speed bumps make it physically impossible to drive fast, while turnstiles influence metro users to purchase a ticket (Verbeek 2013).

2. Mediation before eye: It has cognitive nature. This includes technologies that provide cues or signals to influence behavior. For example, he mentions a navigation meter designed to beep when someone is driving too fast (Verbeek 2013).

3. Behind the back: It influences the contextual or infrastructural role of technologies. It influences people's decisions indirectly. For instance, he explains how the ease of using public transport can lead people to choose the train over driving a car (Verbeek 2013).

4. Above the head: It refers to the influence technologies have on our thinking. This is more of an abstract concept, such as holding utopian or dystopian expectations about the social impact of technology.

Using the Point of Relation, Verbeek discusses the physical connection that technologies maintain with humans and the world. By providing information, these technologies influence decision-making.

b) Types of Influences:

It is another element in Verbeek's mediation analysis. To explain this, the designer Tromp et al. (2011), categorizes influences of technology on humans into two factors; one is force of influence (weak versus strong) and the other is visibility (hidden versus explicit). The result of this will be four quadrants, which they named as below:

1. Coercive (strong and explicit): This approach involves using force to influence human behavior through technology. Since people are aware of this influence, it is considered a strong force. Verbeek uses the example of a speed camera, which compels people to avoid driving too fast (Tromp et al. 2011).

2. Persuasive (weak and explicit): This approach involves influencing people's decision-making through persuasion. It operates by convincing individuals rather than imposing force, and is therefore considered a weaker force. An example Verbeek uses is campaigns designed to promote healthy eating (Tromp et al. 2011).

3. Seductive method (weak and implicit): This approach involves enticing users to behave in a certain way, with the motivation coming from within themselves. Verbeek uses the example of the microwave to illustrate this. The microwave has enabled people to store and reheat cooked meals, thereby transforming the traditional concept of family dinners into individual meals (Tromp et al. 2011).

4. Decisive method (strong and implicit): This approach has intrinsic design value and significantly impacts user behavior. For instance, constructing a staircase instead of an elevator encourages people to walk more and stay healthy. Users are often unaware that their choice is being intentionally influenced by the designer (Tromp et al. 2011).

The final domain is the Domain of Mediation, which highlights the differences between individual and social contexts. It encompasses how technology shapes both individual and social practices and experiences. For example, Verbeek uses the whiteboard in schools to illustrate how it impacts not only the individual experiences of teachers and students but also the overall learning process.

B) Method of Informed prediction: This approach involves assessing mediations and entails informed prediction along with enhanced constructive technology assessment, which links the context of use to the context of design. By involving all relevant stakeholders—such as designers, users, companies, and interest groups—in the technology design process, Verbeek believes that it enables more accurate predictions of potential future issues and guides more effective decision-making.

C) Scenario and Simulation method: It aims to design products from the viewpoint of their use rather than solely in terms of intended functionality. This approach develops multiple

meaningful scenarios through virtual-reality technologies, allowing for a more comprehensive understanding of the potential impacts of technology on human experiences and practices (Verbeek 2011a). According to Verbeek, the focus is on the product's usability across different cultures rather than solely on functionality. Verbeek (2011a) cited Martijn Tideman's example of designing a lane change support system in cars. In Tideman's approach, potential users were given the opportunity to design their own lane change support systems by adjusting various relevant variables in a virtual representation.

Thus, Verbeek advocates for transparent design, aiming to involve users in the design process. While he emphasizes the equal contribution of both humans and users in design to mitigate technocracy, the designer often determines the degree of user engagement. Verbeek goes into great detail about how designers and users interact with artifacts, defining it in terms of mediating engagement.

To sum up, even though Verbeek draws the nuances of human experience in the bidirectional relations of humans and technologies, the entirety of his imagined technological space is high-tech and futuristic, containing modern gadgets and devices of the developed world. His philosophy contains little room for traditional technologies. One may clearly see that he is a philosopher of our times. However, he misses the bird's eye view -the warning of Heidegger about the perils of modern technologies- that there is something "quintessentially human" we miss when we engage with modern technology. This general essential aspect of modern technology is rather conveniently avoided by Verbeek in order to merely look at the various relations hi-technologies provide us. Verbeek definitely lists lessons at length about ethics and responsibility about individual technologies in specific design contexts. Here, one may be tempted to ask, for example-what is the point of careful design of a hi-tech device when the purpose of its use, from a totalitarian view is, say, surveillance? Verbeek misses the larger politico-economic agenda of big corporations in coming up with newer technologies of control every day. Mere listing of nuanced effects of these technologies on particular users is a fine-grained approach that is politically vacuous. What I suggest, instead, is to take a step back, learn the lesson from classical philosophers, and to acknowledge the fact that there are certain negative effects evidently available in modern technologies. To cement my position, let us consider Verbeek's own example of the microwave. One of the key observations he makes is the outcome, the possibility of the individual meal. He does not make any value judgment about this. This is because opting for an individual meal could be a good thing at one time when one

is extremely busy, and bad at another time when there is a possibility of a family dinner yet the device has after all habituated us to eat individually. Verbeek is silent on the possibility of a general value judgment here. His philosophy does not allow him to call a spade a spade for the simple reason that his theory merely provides the relation between particular humans and particular technologies. A general stance is clearly missing! What he cannot afford to do is draw a line like Heidegger and claim that- if we compare an individual meal with a traditional family dinner, the latter tends to provide more human-to-human meaningful experiences. In other words, microwave definitely has its use on a busy day, but it treats hot meals as a standing reserve where the possibility of family time in enhancing human social experience is clearly undercut. The microwave should be called out for its subversive traits. This cannot happen with postphenomenology!

2.4 Verbeek on Engagement: how is this different from *engaging with technology*

This section explores Verbeek's concept of engagement in designing an artifact and how it is different from meaning-giving engagement with technology. Because Verbeek and Heidegger lived in different eras, comparing their examples is perhaps meaningless. Given the greater technology (high-tech) examples in Verbeek, it is also necessary to comprehend the historical background of these developments. Although I acknowledge that we do not need to return to a time when technology was very limited, Heidegger's concerns remain mine. Heidegger's main concern—which I am addressing in the thesis—was the loss of contact with the environment, other people, and a meaningful human existence through careful use of artifacts. Even though Verbeek offers a thorough theory outlining how these relationships might be improved, it appears that authentic engagement with the artifact is left out in the case of high-techs. This section aims to provide insights into Verbeek's concept of engagement and highlights the shortcomings in his approach to fostering a stronger relationship with artifacts. I also throw light on what I mean by engaging with technology in an authentic way in the cases of low-tech.

Verbeek introduces the concept of mediating engagement in industrial design to broaden the human-technology relation perspective, emphasizing the importance of functionality, sensory experience, materiality, and practical usage of objects. He draws from Heidegger's notion that useful objects occupy a significant position between pure objects and artworks, as they are created not just for display but for practical purposes. Verbeek asserts that aesthetics in product design should focus on the practical interaction with artifacts rather than

solely on visual appearance or symbolic significance. He cites Müller (2001) as saying that two forms of utility are associated with artifacts: material utility and socio-cultural utility (Verbeek 2005, 204). Material utility refers to the practical usefulness of a product, while socio-cultural utility pertains to the social and cultural significance of the product. For instance, a yacht serves not only as a means of sailing but also as a symbol of its owner's status. Engineers typically focus on material utility, whereas designers address socio-cultural utility. Verbeek emphasizes the importance of practical engagement with technology, particularly in the light of recent developments.

Verbeek advocates for an approach that expands the ways in which people interact with artifacts rather than relying on a single revealing nature of an artifact (discussed by Heidegger). Verbeek illustrates this concept with the example of Personal Digital Assistant (PDA), which exemplifies a thorough investigation of specific technologies (2005, 197). The PDA, a compact version of a personal computer that fits into one's pocket, offers various functions such as word processing, clocks, calendars, address books and internet access. It plays a significant role in a person's life beyond mere functionality. For instance, it alleviates pressure during travel by enabling individuals to complete work tasks while engaging in other activities like reading or conversing with others. Verbeek argues that while the PDA may limit certain forms of engagement, such as chatting with others or enjoying the scenery, it also opens up new avenues for interaction. Users can read emails and respond to them, shaping both the users' experiences and interactions with the world. Therefore, he believes that mediation is not the product's function but rather a byproduct of its functionality.

Further, Verbeek argues that things play a moral role in guiding human behavior and influencing decisions about how to live. So, he wants to share the moral responsibility between the designer, the user, and the artifact. He believes this perspective aligns with Gerard De Vries's (1999) idea that the landscape and technological systems also instruct individuals on living in contemporary societies. Achterhuis (2001) introduces the concept of the "morality of artifacts," a notion Verbeek builds upon by emphasizing the need for designers to anticipate how their creations will impact people's lives. Verbeek further supports Achterhuis's idea that devices should share some responsibility for decision-making, as seen in the example of automobiles automatically slowing down in dense fog to prevent accidents. Achterhuis cites the example of a 1991 automobile collision in dense fog in the Netherlands, where if vehicles had been programmed to automatically slow down, fatalities could have been avoided. Critics

of "material ethics" raise concerns about the potential establishment of technocracy and the lack of intentionality and accountability in artifacts. Verbeek acknowledges that while things may not hold responsibility, they influence moral considerations, both explicitly and implicitly. For example, speed bumps explicitly control speed, while parental screenings during childbirth implicitly raise questions about abortion. Verbeek underscores the ethical implications of design decisions, citing the case of Robert Moses's bridge design, which disproportionately affected access to Long Island beaches based on socioeconomic status (Winner 1986). He argues that designers should treat artifacts as members of the community and take responsibility for shaping human relations with the world through thoughtful design. In anticipating the role of artifacts, designers must navigate complexities such as multistability, where artifacts may have multiple interpretations or uses. To deal with this problem of multistability, he explains how designers can involve users to make a strong relation between humans and artifacts.

Verbeek (2005) introduces the concept of "material aesthetics" as an alternative approach that considers environmental factors alongside design considerations (204). He discusses how to design ecologically friendly industrial products by placing the relationship between humans and products at the center stage. He highlights the work of the industrial design organization Eternally Yours, which focuses on developing durable products with minimal environmental footprint. Their approach differs from traditional eco-design by prioritizing product use over emissions and energy consumption. Verbeek believes that his postphenomenological and material aesthetics approach to ecological design allows designers to influence human habits and encourages products to play an active and changeable role in mediating human relations with the world. Eternally Yours aims to reduce the quantity of disposable products by focusing on lifecycle analyzes, expanded repair options, recycling, and extending the service life of products. They recognize that products often end up in landfills prematurely due to difficulties in repair and the allure of newer models.

Verbeek believes that designers can strengthen the bond between humans and artifacts, suggesting the "cultural durability" concept inspired by Italian designer Ezio Manzini (2005, 220). This approach emphasizes creating products that age gracefully and become cherished partners in life, much like plants in a garden. He cites furniture designer Sigrid Smits as an example, whose furniture coverings develop beautiful patterns over time, renewing the design and enhancing its aesthetic appeal. To ensure a lasting bond with the product, it must return to

being "ready-to-hand" after being "present-at-hand." Verbeek highlights the issue with many products that fail to achieve this transition due to their lack of transparency, particularly in electronic devices that are sealed shut, preventing repair. He argues that transparency not only enables repairability but also extends the psychological connection with the product beyond disruptions. Verbeek advocates for "functional clarity" (idea borrowed from Van Hinte), where the internal components of a product are visible, and their roles explained, as demonstrated by the "Ithaca" color printer designed by Donald Carr (Verbeek 2005, 227). Transparent products encourage users to engage with their machinery, fostering bodily-sensorial involvement and attachment. Verbeek notes that human involvement with artifacts is easier to discern in their use rather than in repair or upgrading. He contrasts products designed to withdraw from human involvement, leading to detachment and replacement, with those that require user participation in their functioning or repair, promoting dependency on humans rather than quasi-autonomous functionality. As already mentioned in his example of Sven Adolph-designed electric space heater, it is a product that encourages user engagement by positioning it in the center of the room, akin to a campfire, fostering a sense of community and interaction (2005, 231). Verbeek also mentions the wind-up radio by BayGen, which is specifically designed for use in developing countries lacking electricity infrastructure. Powered by wind-up spring mechanisms, it eliminates the need for batteries. These products encourage active involvement in daily routines. Verbeek suggests that "products toward which people have only an indifferent use relation could be redesigned so that people can make them their own" (2005, 231).

From the above passages, it is clear that Verbeek's conception of engagement in his elaborative human-technology-relation overlooks the essential human. That is, for Verbeek, human beings constantly evolve with the use of technology, and technologies constantly evolve at the hands of humans. The growth is bidirectional, yet Verbeek is unclear who the "human" in his "human-technology relation" is. For him, it is a particular user. On the other hand, Heidegger is clear about this. The human is in search of authentic existence. Heidegger cannot afford to lose the "human" at the hands of modern technology. In the section below, I take a critical stance towards postphenomenology in moving towards a general critique of modern technology by proceeding to analyze the phenomenon of jugaad in chapter 3.

2.5 The vacuous nature of postphenomenology

This section discusses the intellectual lapses in postphenomenology and how it has already been critiqued by various philosophers from different angles, such as its shortcomings in

addressing misinterpretation of Heidegger's concepts (Reijers 2019; Zwiers et al. 2016), lack of historical materialism (Kaplan 2009), lack of socio-political perspectives (Feenberg 2015; Gertz 2020), and lack of positionality (Kinkaid 2021). The vital thing to note about these criticisms is that, as Ihde and Verbeek pointed out, defining the human-technology relationship solely in terms of a neutral stance in this highly technologically evolved world will leave out important socio-political aspects. Heidegger offers a far more comprehensive explanation of living life critically to better understand oneself and one's environment.

Reijers (2019), for instance, takes issue with postphenomenology's interpretation of Heidegger's ideas on technology, emphasizing the inseparability of technology from human conditions. While Heidegger's work significantly influences postphenomenology and the philosophy of technology, Reijers argues that there are misinterpretations, such as the concept of "totality of relevance[2]," which is rephrased by Ihde as the "use-context." In the use-context, Ihde restricts the concept of readiness-to-hand in terms of "in-order-to," which means 'assignment of something to something else.' Ihde cites examples such as hammering done in order to build the house. Reijers argues that Heidegger's idea of "in-order-to" works along with "for-the-sake-of-which." He further explains by quoting Sinclair that, "Heidegger's tool analysis does not have one structural element (the in-order-to), but three, which additionally include the where-from (the materials from which tools are produced) and the for-the-sake-of-which" (Reijers 2019, 606). These all-structural elements represent Heidegger's notion of "worldiness." Heidegger states that there is manifoldness of reality, and their relation to one-another is questionable:

> The thing at hand which we call a hammer has to do with hammering, the hammering has to do with fastening something, fastening something has to do with protection against bad weather. This protection "is" for the sake of

[2] According to Heidegger (1927), the world is structured meaningfully by 'relations of relevance and significance' as perceived by Dasein. Heidegger defines these relations in terms of "reference," specifically as "in-order-to" connections, where one thing refers to another for a particular purpose. For instance, a hammer is used "in order to" hammer nails. The interconnectedness of tools like hammers, nails, boards, etc., when building a shed, demonstrates their mutual reference to one another, forming a totality of useful elements for construction. He terms these referential relations as *circumspection*, structured by relevance, wherein beings are discovered in relation to something else, existing together with it. This totality of relevance, Heidegger argues, shapes the usefulness and functionality of objects. Dasein, through its "for-the-sake-of-which" orientation, assigns value to this totality, organizing it in a manner intelligible to itself.

> providing shelter for Dasein, that is, for the sake of a possibility of its being (1996, 78).

While Ihde overlooks the "for-the-sake-of-which" and the totality of relevance, Heidegger emphasizes the importance of understanding the artifact's purpose and its role in human existence. Heidegger suggests that by focusing solely on "in-order-to," modern technology neglects the broader "for-the-sake-of-which," leading to the reduction of everything, including humans, to standing reserve. Thus, there's a perceived deficiency in addressing the telos or ultimate human good within postphenomenological frameworks, according to Reijers.

Zwier et al. (2016) argue that postphenomenology, grounded in content-pragmatism, overlaps with phenomenology. Zwier et al. (2016) clarify that phenomenology focuses not on the content of philosophical research but on the methodology employed. They illustrate this distinction using the example of genome studies, where scientists examine the structure and functions of the genome without delving into how the genome appears as an object of experience or in the associated scientific theory. Thus, the phenomenon of phenomenology is not the content of a theory but rather the relationship between being and thinking that facilitates the enactment of such content. According to Zwier et al. (2016), phenomenology is not a theoretical science but a specific domain that enables objectivity. In contrast, postphenomenology adopts a theoretical stance by aiming to provide a comprehensive theory regarding human-technology relations and their mediated aspects, defined pragmatically. While acknowledging postphenomenology's attention to the ontic level of human-technology relations, Zwier et al. (2016) criticize its oversight of technical mediation at the ontological level. They argue that "… aspects of reality cannot be limited to (ontic) human-technology relations accessed by mediation theory, but must further involve the (ontological) relation between being and thinking that is involved in encountering these relations" (2016, 328).

Regarding Heidegger's concept of enframing, Zwier et al. (2016) diverge from interpretations by Ihde and Verbeek. They argue that enframing should not be reduced to essentialism or transcendentalism but rather understood in relation to technical mediation. Enframing, for Heidegger, is not the essence of technology but rather the relation that actualizes technological phenomena, bridging the ontic (artifacts) and the ontological (ways of revealing). Thus, they pose questions regarding how technological artifacts mediate at the ontological level, suggesting that postphenomenology's scope is limited to ontic human-technology relations and criticized for neglecting broader contextual conditions, such as politics. They

emphasize that the phenomenology of technology is concerned not with what but with how the world appears and how this perception undergoes transformation due to technological advancements.

Ritter (2021) critiques both the Heideggerian and postphenomenological approaches, highlighting deficiencies in each. He suggests that Heidegger's approach is lacking not due to essentialism or transcendentalism but because it overlooks immaterialism, specifically neglecting technological materialities and intentionalities. For Ritter, while Heidegger acknowledges technology as influencing "how things appear to us," he fails to elucidate how this mode of appearance is intertwined with or influenced by technological materialities. Ritter contends that Heidegger's concept of enframing suffers from detachment from actual technologies. Similarly, Ritter argues that postphenomenology falls short in claiming something as technologically mediated if it does not sufficiently consider the concept of technology (T) itself.

David Kaplan (2009) critiques Verbeek's *What Things Do?*, raising questions about what things still do not accomplish. Kaplan criticizes Verbeek for failing to consider the material conditions of production and for overlooking the socio-political contexts surrounding artifact usage. He argues that not all retrospective approaches to technology are transcendental and futile. Kaplan emphasizes the significance of 'historical materialism,' which aims to explain the relationships among individuals, events, and objects within their historical development. He suggests that the internal relationship between things and their historical conditions shapes, enables, and frames them. Given that nature, history, and society are constantly evolving, it's essential to understand their internal laws and connections. Kaplan asserts that technology is dialectically linked to society, implying a circular relationship between historical and technological development. He posits that things are enabled, influenced, and materially understood solely in relation to history. He further elaborates on Verbeek's mediation theory, arguing that mediation involves more than merely occupying a middle position; it is about establishing relationships, forming connections, and reconciling differences. Kaplan critiques Verbeek's interpretation of mediation as undialectical, arguing that it should encompass the historical development of entire environments. He references Hans-Georg Gadamer's concept of "historically effected consciousness," which suggests that understanding is always relational and inseparable from the historical context (2009, 235).

Kaplan (2009) contends that historical analysis is inherent in postphenomenology through the concept of hermeneutical relation, as hermeneutics inherently involves historical orientation. Thus, to interpret the relationship with an object, Kaplan asserts the importance of focusing on its materialist past rather than solely on practical engagements. In this materialist past, one can uncover the socio-political context in which technology mediates human experience, a crucial aspect overlooked in postphenomenology. Kaplan argues for analyzing how societies and objects are co-shaped rather than solely focusing on how subjects and objects are co-shaped. He critiques Verbeek's theory of engagement for divorcing itself from political economies, which are central to deal with waste and further detachment from artifacts. While Verbeek's example of the "Eternally Yours" device illustrates enhanced relationships, Kaplan contends that it overlooks broader societal impacts on rights, freedoms, and consequences for humans and non-humans. He asserts that such thinking suggests technology has little relevance to human lives.

Feenberg (2015) and Gertz (2020) criticized postphenomenology for its failure to integrate a political perspective into their analyzes of "human-technology relations." Gertz contends that Ihde's reluctance to incorporate a political dimension into postphenomenology stems from his reliance on Heideggerian concepts to elucidate these relations while simultaneously sidestepping Heidegger's differentiation between ancient and modern technologies. According to Gertz, the postphenomenological approach is inherently limited because it revolves around an individualistic viewpoint, emphasizing how technologies interact and influence the relationship between the "I" and the "world," showcasing the specific interactions of particular technologies with specific artifacts. However, Gertz (2020) argues that the significance of anything, including technology, cannot be fully understood solely from the perspective of individual experiences. Gertz (2020) insists that postphenomenology must incorporate political discourse into its understanding of technological mediation. He finds Ihde's emphasis on defining human-technology relations in terms of practical life and Verbeek's focus on moral life insufficient, as political life transcends the sum of individual experiences. Drawing on Hannah Arendt's ideas, Gertz emphasizes the necessity for postphenomenology to be critical and recognize the political importance of understanding individualistic orientations. Citing Arendt (2005), he illustrates how psychology tends to focus on the experiences of individual sufferers rather than the political systems within which they exist. Arendt argues that in our contemporary "desert-world," individuals lose the capacity for judgment, suffering, and condemnation, leading them to internalize blame for societal

shortcomings. According to Arendt, Nietzsche was among the first to grasp this phenomenon, highlighting the importance of considering political frameworks in understanding human suffering. Therefore, Gertz posits that postphenomenological theory would benefit from acknowledging Arendt's theory of 'political mediation,' emphasizing the role of politics in comprehending human-technology relations.

In bringing postphenomenology to absolute scrutiny, Kinkaid (2021) delves into the concept of positionality and its significant role in defining the relationship between humans and technology. Kinkaid criticizes postphenomenology for its apparent neglect of the concept of positionality. Kinkaid raises questions about identity, positionality, and the politics surrounding the act of "doing theory." The notion of positionality originated from feminist theory debates in the 1980s, particularly in discussions about feminist epistemology. Several related concepts emerged during these debates, such as standpoint theory (Collins, 1986; Harding, 2004), situated knowledge (Haraway 1988), theories of the flesh (Moraga and Anzaldua 2015), and the politics of location (Rich 2003). These debates all revolved around the idea that *who we are* significantly influences our experiences and how we acquire knowledge. In the late 1980s, Donna Haraway vehemently critiqued scientific epistemology, advocating for a conception of knowledge as always situated within specific bodies, historical moments, and practices. She rejected the notion of "the God trick," which represents the attempt to view everything from a detached, transcendental perspective. Harding aligns with this perspective, emphasizing that acknowledging the researcher's positionality makes them a visible, accountable individual rather than an anonymous authority. These feminist epistemological debates underscore the interconnectedness of knowledge, location, experience, and embodiment. In the ontological framework of postphenomenology, recognizing positionality becomes essential (Kinkaid, 2021). Postphenomenology primarily concerns itself with ontology, exploring what the world is. However, Kinkaid argues that we should not abandon critical epistemological concepts as they shape the ontologies we construct and engage with. Neglecting positionality could lead to detached and "objective" accounts of the world, which are both impossible and irresponsible. Kinkaid contends that even when postphenomenologists construct the world through theoretical frameworks, they cannot escape the perils and responsibilities of positionality. In other words, acknowledging one's identity and standpoint is vital because our identities are inherent to our existence in the world. Kinkaid claims, using the work of Ash and Simpson (2016), that for experience to be "about" something, there must be an author of this aboutness and a point of directedness.

Postphenomenologists have deconstructed the idea of a perceptual or existential subject, rendering notions of directedness obsolete, challenging our understanding of experiences, memory, self-consciousness, and even physiological functions. While feminist theorists are deeply concerned with identity, difference, and epistemology, postphenomenologists appear to distance themselves from these issues in favor of ontological and relational thinking. They do not treat social categories of difference (such as race, gender, and sexuality) as predetermined concepts but rather as relational and emergent phenomena (Rossetto 2019). Therefore, postphenomenology's reluctance to engage with issues of identity, social difference, and positionality raises concerns about the responsibility and accountability of knowledge claims. Ignoring these aspects could lead to irresponsible knowledge production, as these factors fundamentally shape how we perceive and engage with the world.

The preceding set of critiques highlights deficiencies in the philosophical frameworks of Ihde and Verbeek and hints on reasons why I root for the transparencies available in older technologies which are situated in the need for being human. However, I intend to take a different approach by learning from these criticisms, focusing primarily on Verbeek's ideas due to his reliance on contemporary advancements (high-tech). I focus on the question- how and why the concept of engagement is interpreted too narrowly in Verbeek's philosophy. His focus on engagement primarily revolves around the designer's role, wholly or partially. He does not delve into scenarios where the artifact is entirely left to the user's discretion from inception to completion. Verbeek misses' cases where artifact creation does not adhere to a predefined path for engagement (discussed in detail in the next chapter). Engaging freely with artifacts in this manner fosters a deeper sense of connection. What I mean is that using technology should have a balanced relationship with artifacts and nature itself, as in the Heidegger's example of the jug; this artifact allows one to get familiar with both the artifact's purpose and its knowledge. Human involvement from the beginning of the artifact to the end will result in a more profound sense of engagement, which Verbeek's example fails to provide. In Verbeek's PDA example, one will undoubtedly use the artifact to engage in various activities but will lose out on the first-hand understanding of how things are available to individuals. Take the example of working in industries producing food and farming. A farmer will have knowledge about the ideal seasons for each crop, the amount of water needed, and the properties of both crops and the environment; this is not the case in the food industry. Alienation of labor and the produce happens at large in modern technologies which Verbeek underplays. Undoubtedly, knowledge is required to produce food in the food sector, but the

harmony between humans and materials, the natural world, and other humans is missing. Moreover, they view all crops equally, which is very similar to what Heidegger says, treating coal and rivers equally as sources of electricity. Our perception of and handling of artifacts is also becoming shallower as the context in which they grow or exist has lost significance.

2.6 Why do various thinkers differentiate between High tech and low tech?

There is no clear-cut distinction between low tech and high tech. To be more specific, I am using Heidegger's (*techne* and *technologie*) Borgmann's (*focal things/practices* and *device paradigm*) views to differentiate between low-tech and high-tech. Using their philosophies as a source of inspiration, I am using two criteria: the first is user active participation in the creation of the artifact, and the second is the principle of transparency, which puts repair and maintenance in the hands of the people. I classify those technologies that meet these two requirements as low tech. Though Heidegger does not explicitly define *techne* and *technologie* in terms of the above conditions, one can infer this distinction from his examples. My point of differentiation is not to advocate for low-tech over high-tech solely due to the threat they pose but rather for other reasons. I aim to explore how low-tech solutions foster closer relationships between people and artifacts. While Verbeek criticizes Heidegger and Borgmann for favoring low-tech over high-tech, he also seeks to enhance the sense of engagement between humans and artifacts. He illustrates various points, such as transparency, engagement, and the aging process, to demonstrate how high-tech devices can facilitate engagement (explained above). However, I disagree with Verbeek. Initially, he delegates the task of fostering long-lasting user engagement with the artifacts to the designer. This decision stems from the intricate nature of high technologies' functionalities, which can be challenging for users to grasp and engage with independently.

Although Verbeek does not explicitly discuss the concepts of high-tech or low-tech, these distinctions can be inferred from his examples. The more automated an artifact is, the less room it has for user interaction. High-tech artifacts engage users, but not in an authentic manner, as defined by Heidegger. Unlike Heidegger, I do not see modern technology as a threat; instead, I argue that it reduces opportunities for individual interaction and engagement. Take the example of making pottery by hand (Heidegger's example) versus buying it from the market. In the first case, one is genuinely involved in the creation of things and learns about the intimate knowledge of things, environment, character building, social harmony, sense of worth, and long-term emotional attachment with the product, while all those things are absent

in the second situation. Moreover, low technologies, which do not require reliance on the designer for repair and maintenance, offer a deeper potential for user engagement and are more transparent.

2.6.1 Modern global technology (High-tech) as a phenomenon of least engagement

Modern technology offers enhanced comfort but often at the expense of meaningful engagement. This lack of engagement extends beyond mere usage to the functional aspects of technology. The more fixed and standardized a product's function, the less room there is for genuine engagement. Charlie Chaplin's renowned film "Modern Times" (1936) is a poignant commentary on the criticisms of capitalism and industrialization. Chaplin portrays the iconic character of the Tramp, who struggles to survive in a rapidly industrializing society. Due to his monotonous and repetitive work, the factory owner treats him as a disposable resource. As Jaspers (1951) suggests, technologically produced artifacts tend to conform to "ideal types" of functions for mass production, neglecting the authentic human experience and engagement with oneself and others. Jaspers emphasizes that humans must engage with their environment to understand their individuality fully. This engagement goes beyond meeting basic needs; it involves self-realization through personal involvement and commitment. Unfortunately, such personal involvement is often lacking with automatic appliances, as they do not necessitate the full utilization of one's body and mind.

Verbeek (2005) contests with the view that technology does not dictate how people should live but rather offers choices. For instance, automobiles provide more opportunities for social interaction, telephones facilitate frequent conversations, and television exposes individuals to new information. He sees technology as offering opportunities for human enrichment by expanding availability and promoting social and political stability. With technological growth, economic growth also increases, providing access to more goods. Verbeek points out that this leads to people in the lower and middle classes desiring what the wealthy enjoy. Verbeek assumes that the average human being carefully chooses. What Verbeek misses here is the idea that in most cases technology chooses humans rather than the other way around. The various technologies at our disposal were not of our choice but a historical phenomenon beyond the control of an average human user. One cannot live without certain technologies even if he or she wishes to do so. Consider for example the case of a smartphone. The overwhelming integration of almost all aspects of life in the smartphone has made it an indispensable gadget. However, from the perspective of Heidegger and Borgmann,

engagement is not merely physical contact but involves experiencing the world through the manifold sensibilities of the body, which strengthens one's skills and character. Automated technology strips humans of the skills and grace required for engagement. With fully automatic systems, humans no longer need to perform tasks themselves. In such cases, individuals are not truly engaged with the artifact but rather use it as a means to multitask or pursue other activities. For example, sitting in a self-driving car without actively driving can lead to disengagement and distraction from the task at hand. There is a difference when parents introduce a child to a stereo instead of a flute, highlights how reliance on automated technology can hinder embodied and disciplined engagement with activities such as music (Borgmann 1984).

Indeed, engagement with high-tech lacks the genuine depth found in interactions with low-tech. This is because technology is not merely a neutral tool but is often shaped and controlled by specific societal agendas. Building on Nietzsche's ideas, Gertz argues that contemporary society is still influenced by these priestly tactics, now through technology rather than religious values (Christian morality)[3]. Today's engagement with technology is often superficial and fails to impart a true understanding of individuality. Gertz applies this concept to modern technology, highlighting the prevalence of screens in our daily lives, such as televisions and smartphones, which lead to disengagement through automation. For instance, streaming platforms like Netflix enable binge-watching, granting uninterrupted access to entertainment. Augmented Reality (AR) and Virtual Reality (VR) further blur the lines between fantasy and reality, allowing individuals to immerse themselves in virtual experiences. Therefore, Gertz claims that technologies are not making us stronger but rather making us more fragile and feebler and is a step towards self-destruction. Vallor describes our contemporary societal condition as being "technosocially blinded," indicating that rapid technological

[3] To illustrate this in today's context, Gertz (2019) redefines Nietzsche's terms: self-hypnosis becomes Techno-Hypnosis, mechanical activity is rephrased as Data-driven activity, petty pleasures are transformed into Pleasure Economics, herd instinct is reframed as Herd Networking, and orgies of feeling are depicted as Orgies of Clicking. Techno-Hypnosis, as understood by Nietzsche, involves seeking to avoid feelings of regret, fear, or pain by attempting to disconnect from oneself. Data-driven activity involves engaging in repetitive tasks to maintain normalcy and evade accountability. In today's technological landscape, this has evolved into algorithms dictating various aspects of our lives, from entertainment recommendations to potential romantic partners. Fitness trackers monitor and regulate physical activity, relieving individuals of self-discipline. Pleasure Economics refers to technological platforms enabling grander forms of assistance, such as crowdfunding or shared economy services. Herd Networking manifests in social media platforms connecting individuals globally, providing a sense of community identity at the expense of individuality. Lastly, Orgies of Clicking entail being swayed by overwhelming emotions, leading to irrational decision-making, as seen in phenomena like flash mobs and online shaming campaigns.

advancements have outpaced our ability to discern which ethical principles to uphold (2016, 6). She terms this dilemma as "Acute technosocial opacity" (2016, 6). Due to this lack of understanding about the innovations emerging today and their potential impacts tomorrow such as robotics and artificial intelligence, we face a profound challenge in navigating their ethical implications.

My argument revolves around the idea that while high-tech may seem to provide a better standard of living, it does not necessarily align with the concept of genuine engagement. High-tech undoubtedly help people do more things at one time and make people's lives comfortable, but it often comes at the expense of individual character, skills and virtues, which can be fostered through involvement in low-tech. In low-tech scenarios, where individuals simultaneously serve as designers and users, their role is not monotonous and replaceable, unlike in high-tech settings. Moreover, the more complex the functionality, the less the product is repairable by the user. In that case, replacing the product with a new one is viable. Borgmann argues that replacing rather than repairing an artifact means losing its historical continuity and reducing it to mere waste. However, jugaad offers a way to rescue the artifact from this fortune, giving it new meaning and extending its life.

Regarding low tech, I believe jugaad gives users complete control over how they interact with the technology and allows them to completely engage with the artifact. When standard engagement[4] fails, it helps users to re-engage with artifacts and operates on the principles of transparency, repair, and maintenance. Because of its unique and unconventional structure, I am discussing jugaad as a non-standard engagement.

[4] The concept of engagement I emphasize in my thesis is when the user actively participates before the thing is produced. In that case, engagement with technology deviates from the set standard way of engaging, which I define under standard engagement. Standard engagement primarily occurs in high-tech scenarios where objects are fully functional and ready for usage. Standard engagement may also exist in low-tech devices like windmills, where the creator has already predetermined how the artifact will be used. I am more interested in non-standard engagement, which is feasible in low-tech situations with no boundaries or predetermined routes. I am keeping postphenomenological theorists under standard engagement because they concentrate on characterizing the relationship between humans and technology in standard scenarios; they do not discuss situations in which the relationship breaks down because of socio-political factors.

2.7 Concluding Remarks:

The chapter delved into the conceptual understanding of engagement in the philosophy of technology in pre-empirical turn (through Heidegger) and post-empirical turn (through postphenomenological thinkers). I showed the importance of distinguishing between high-tech and low-tech through a series of sections. Additionally, Ihde and Verbeek contributed to the understanding of human engagement with technology. We also saw a series of critiques of postphenomenology in order to highlight the key points raised by thinkers such as Borgmann and Heidegger, where the human in the human-technology relation is looked upon as a socio-politically situated individual. Postphenomenology misses Heidegger's main contention that technologies can treat the humans as mere means. Therefore, a march back into low tech is not a distant option. Low-tech, in my opinion, gives better opportunities for engagement with artifacts. Furthermore, I think that the idea of engagement exists even before the ultimate product is made. This type of engagement has a beginning and an end, enhancing a more profound sense of fulfillment. Therefore, the next chapter of the thesis take up the concept of jugaad, representing a more open and liberating approach to interacting with artifacts.

Chapter 3

Non-Standard Engagement: Jugaad as a Necessary Outbreak of Modern Technology

Non-standard engagement is when the use of the product deviates from the intended ways set by the designer. It frequently happens that a designer with specific goals creates an artifact, but users define its use completely differently, which might lead to the production of entirely new artifacts. To explain non-standard engagement, I am taking cues from the concept of non-intentionality and the multistable/pluralist conceptions held by Ihde and Preston. I employ Preston's views solely to grasp how unintentional relationships apply to artifacts; the chapter focuses on the relationship between humans and artifacts in Ihde and thereby, demonstrate the structures underlying the phenomenon of jugaad. Jugaad is an ingenious solution to a problem that exists as a result of one-dimensional structure of modern technology. I regard jugaad as a classic example of non-standard engagement because, due to the availability of a problem, it compels the user to change the way an artifact functions. Section 3.1 explicates jugaad and the various cases of it to develop my theoretical repertoire. I go over how the cases discussed by Ihde and the cases of jugaad varies in terms of multistable relations. Understanding non-standard engagement in the context of jugaad requires understanding how it differs from non-intentional engagement. For that, I am taking two broad criteria for evaluation:

a) Non-intentional and Pluralist/Multistable engagement
b) Cultural Context and Practices

3.1 Jugaad as Non-Standard Engagement

3.1.1 Non-intentional and Pluralist/Multistable engagement:

Ihde connects "intentional fallacy"—a context in language or literature—to the idea of "designer fallacy" to emphasize that we cannot describe artifacts solely through the perspectives of designers (2008, 51). The intentional fallacy challenges the notion that the authors' intentions determine a text's meaning by ruling out the chance that the text contains a concealed meaning. It can rely on how individuals use technology and read texts, including how creatively and well they comprehend the literature. Ihde refers to this concept as the

"designer fallacy" and applies it to technology. Although a designer can design technology with its intended use and purpose in mind, the outcome may still differ. He contrasts this perspective to the idea of the designer-God from the eighteenth century, which holds that the designer creates the product and the user uses it as intended. Ihde illustrates how sometimes artifact use can reverse designer intent by drawing on Andrew Pickering's concepts of "turning" and the "dance of agency" (2008, 54-55). Pickering (1995) uses a metaphor known as the "dance of agency" to describe how human and non-human agents interact and demonstrate their dependence on one another. This illustrates that agency is not fixed but develops and changes via practice. As an illustration, he cites how scientists and their tools react to one another's actions, leading to the creation of new practices and knowledge. Therefore, according to Pickering, the crucial aspect of agency is its temporal emergence, in which scientific findings develop gradually due to interactions and modifications between human and non-human actors. Ihde illustrates it further by using Latour's (1987) example of "post-it" products with temporary adhesives readily available in the market as an example, which came up as a result of testing out different glues (2008, 55). As a result, this new product is both unexpected and unforeseen. He termed it as the artifactual-use interface. In this context, the user or users have more significant influence and control over the design. In this case, Ihde believes that the indeterminacy is multistable concerning the range of imagined or realized probable applications.

Breth Preston discusses similar ideas about various artifacts having distinct roles depending on the situation and calls it "material culture (2013, 134)" She connects it to historical changes in biological organs. She opposes the notion of a 'centralized control' because it implies that the designer is in charge of a concept that makes improvisation seem unimaginable (2013, 134). In her opinion, 'centralized control' is not feasible in real-world situations. She holds that plans and intentions originate from material culture's context. Therefore, contrary to the monistic viewpoint, which supports an artifact's one unified function (intentional function[5]), Preston promotes the "non-intentional function" or "pluralist function"

[5] Intentionalist philosophers like Karen Neander (1991) challenge non-intentionalist perspectives by drawing a distinction between biological and artifact functions. She argues that selection is intentional in the case of an artifact, but not in the case of a biological function. Other writers who concur with this intentionalist interpretation of artifact include Simone Evnine (2016), Randall Dipert (1993), Lynne Rudder Baker (2007), and Peter McLaughlin (2001). Some, like Wybo Houkes and Pieter Vermaas (2003), maintain a stance that lies halfway between intentionalist and non-intentionalist accounts. They contend that the theory of artifacts works from use plan, which is from designer to user and user to designer.

of artifacts (232). According to her, human intentions and actions do not arise in a vacuum; instead, they are reproduced through interaction with material culture, which creates the opportunity for a wide variety of functional artifacts. She says that the functions of artifacts are comparable to those of biological organisms and that the processes by which they acquire these functions are also similar. She contends that all human behavior is inherently social and says working together "…is the most concrete manifestation of human sociality" (36). Let me illustrate this point by employing a simple example. The design of automatic elevator doors was the invention of Alexander Miles, an ingenious American inventor in the latter half of the Nineteenth Century (Lemelson 2022). Miles made elevators safe. The motion of retracting doors is originally designed to safely withdraw in the event of an interfering movement between the doors. The designer intentionally designed the doors where it is expected to ensure safety. Surprisingly, a culture has now emerged. Nowadays, users take advantage of the automatic doors' safety feature in such a way that they purposefully stop the elevator doors to allow a hurrying fellow user in. The retracting doors open the possibility of generosity towards other human beings where we take a chance by holding our hands against the doors. This is a common site across buildings. New ways of interactions arrive by transcending the designer's original intention. The designer was merely aiming at safety, thus releasing the potential for the broader values of the protection of life, but the users found a way to get around and integrate it with the values of compassion and generosity.

Understanding the meaning of non-intentional and multistable artifacts helps us comprehend jugaad's process. Jugaad's fundamental principle is the decentralization of power, which transfers authority from the designer to the user. It opens up the multistable or pluralistic manner of dealing with artifacts comparable to what is articulated by Ihde and Preston because it gives the user entire autonomy. In Ihde and Preston's case, non-intentionality highlights minimal control by the designer and more room for the user to intervene. Similarly, jugaad gives the user total flexibility, frequently leading to unintentional developments. Because of its inventive and creative nature, its outcomes are invariably multifaceted. There is no predetermined route in jugaad because it evolves as it goes along. Though there is a similarity, there is also a difference in how a user-artifact unit functions in the above-mentioned unintentional engagement and in the case of jugaad. The two crucial distinctions are as follows: a) Ihde talks about the relevance of both 'designer-materiality relations' and 'artifact-user relations' interplay, while in the case of jugaad, it is more of 'user/designer-artifact' interplay. With jugaad, the user is given the chance to become the designer themselves. In this case, the

changes are not non-intentional but somewhat intentional—they produce a completely new artifact. b) In the cases of Ihde, Latour, and Pickering, the agency (human) is unfixed as it evolves during the process. However, in the instance of jugaad, agency—a human position—is set, allowing one to determine the kind of artifact that best suits their purposes.

3.1.2 Cultural Context and Practices

According to Ihde (2008), the design process is a complicated web of interactions between the user, technology, and the designer. Ihde explains how different cultural contexts affect how entrenched technologies are. He uses the example of a windmill to illustrate his point. A windmill is a powered device that rotates with the wind and generates electricity. He demonstrates how its significance varies depending on the cultural context. It was employed as a "wind-driven prayer wheel" or "automated praying device" in ancient India, used as a milling power in Mesopotamia in the ninth century, as a lowland pump in Europe, and currently as a global wind energy source (2008, 54). The example demonstrates how windmills are historically uniquely ingrained in various cultural contexts. It is context-specific and illustrates how the same technology may work in multiple situations. Ihde believes technology can serve many purposes or follow different developmental paths (multistable). Every new invention, which was initially fascinating, was later developed into new applications. It is evident that the use of new technology results in changes to practices, and these changes do not follow a straightforward, deterministic pattern. He interprets a 'human-technology-uses paradigm' that is interrelated and dynamic, wherein humans, materials, and practices are all subject to change. With this, Ihde demonstrates how contingent and fallibilistic the design process can be, highlighting the need for a more cooperative and mutually co-critical approach.

Preston (1998) explains that artifacts have both proper function and system function. She relies on Millikan's (1984) account of 'direct proper function' for proper function (1988, 222). She draws upon on Robert Cummins's (1975) theory of biological function (established by a component's causal role in a system) for 'system function (1988, 219)' Proper function is the first function of the artifact set by the designer. It is the proper name given to artifacts like hangers and bookmarks, similar to how biological organisms get their traits through natural selection (1988, 243). The biological process begins with the emergence of a new trait through mutation or as a byproduct of another trait; in other words, the preexisting qualities are essentially adapted to new functions. Similar to this, the creation of a prototype by an inventor or designer or the modification of an already-existing artifact are the initial steps in the process

of creating an artifact. However, with an artifact, the designer may quickly fix whatever faults they made, unlike in a biological trait. Preston goes on to discuss system functions as the second category of functions. It happens as a result of a widespread cultural custom. For example, people stand on chairs to handle objects at a height; tomatoes are occasionally tied to supports with old shoestrings; and after discovering that cats liked to play with twist ties, people began to hear tales of other cats whose owners had also encountered the same thing. Preston goes on to draw how Schiffer (1992) distinguishes between technofunction (technical nature) and sociofunction (social, communicative nature) (1988, 246). He illustrates the example of clothing worn to keep the body warm and covered up and has a technological function. In contrast, a wedding gown, which is unique and plays a distinctive role in a person's life, is thought to have a sociofunction since it represents someone's social role and status. Occasionally, multiple individuals independently come out with the same exaptation. Standardized exaptation needs to begin in this manner. This is how an artifact's nonfunctional or non-intentional feature may occasionally be forced into service. This exemplifies how cultural assimilation plays a crucial role in the unintentional function. Culture is essential; although functions may differ between cultures, there are also similarities within cultures due to mutual understanding. There are instances in jugaad where cultural consensus leads to creating a specific artifact. However, the majority of artifacts are the outcome of lone efforts when emergent solutions are required. Ihde and Preston discuss changes that occur throughout the evolutionary stage since it takes time for an artifact's functioning to alter with use. In some situations, a designer is inspired to produce a unique prototype by changes in use. Unplanned design of artifacts is another possibility that Ihde addresses as being discovered accidentally through experimentation. He cites the example of a cannon, that has no documented origin story (1988, 56). It was the outcome of some cultural activity rather than the work of a single designer. However, in the instance of jugaad, this is not the case; instead, it is the outcome of conscious individual action. There might be situations when unintentional results exist, but I am ignoring them for the reason that they may digress from the current scope of my research. I concentrate on situations where people are compelled to choose jugaad as a solution because of sociopolitical circumstances, which Ihde does not discuss. I am neither considering jugaad as an evolutionary stage, such as biological qualities (slow and gradual change), nor a "post-it" product where something was discovered through experimentation. In jugaad, a multistable relationship is defined differently when someone is compelled to make something to meet an immediate need. The user's goal is crucial to understand this case; it is something that is needed rather than something that is done for fun or creative expression.

Consequently, the intentional transfer of power from designer to user forces it to be classified under a new category, which I address in the chapter as non-standard engagement. Since jugaad innovation is in the hands of the user, low technical skills lead to low-tech products; there are exceptions where it reaches a broader scale and is used in industry, which I address as frugal innovations. However, this chapter concentrates on low-tech innovation where jugaad fits well, a fundamental innovation where modifications are easily made. Non-standard engagement in low-tech occurs when individuals interact with an artifact without adhering to established standards or protocols, disregarding socio-ecological or legal considerations. In contrast, standard engagement in high-tech involves obeying predetermined guidelines set by designers (as discussed by Ihde). In low-tech non-standard engagement exemplified by jugaad, there is absence of boundaries and predetermined paths, resulting in more pronounced effects. Jugaad, in essence, defies norms by repurposing objects in unconventional ways to make them functional for personal needs. In standard high-tech engagement, a refrigerator is typically understood as an electric appliance requiring electricity, a washing machine is meant for washing clothes run by electricity, and water storage tanks are used for storing water. In jugaad, objects are used in unexpected ways, such as using a refrigerator without electricity, repurposing a washing machine to make lassi (buttermilk), or cutting a plastic water tank in half to park a scooter. Jugaad solutions are often rough, improvised, and rely on readily available or discarded materials, such as repairing a leaking car radiator with a chewing gum. In verb form, jugaad denotes finding solutions through any means necessary, ranging from inspired innovation to corrupt practices. While jugaad innovations can be inspiring and amusing, they can also involve unethical behavior, circumvention of rules, and subversion of systems**.** However, in its pursuit of immediate solutions, jugaad often overlooks safety considerations, prioritizing necessity over sustainability. These characteristics collectively classify jugaad as a form of non-standard engagement. I believe that jugaad, despite its departure from modern technological standards, has the ability to foster deeper engagement. I also delve into the reasons for its deviation and highlight. Jugaad disrupts the conventional relationship between humans and technology, offering a novel approach to engaging with technology.

While my focus is not to promote jugaad, I still believe studying and understanding its function and position in society is valuable. I identify two significant reasons for practicing jugaad: the inherent human instinct and socio-political pressures, which are unaddressed in Ihdean postphenomenology. Jugaad reflects the basic instinct of human nature to comprehend

how things work and how to rectify defects. This can be better understood through Thorndike's (1898) theory of trial and error, where individuals resort to this method when ready-made solutions are unavailable. In the process of trial and error, one attempts various solutions until finding the desired outcome, discarding those that prove ineffective. Similarly, jugaad arises when existing solutions fail to adequately address a problem, compelling individuals to seek alternative methods through trial and error. The inability to secure basic amenities available in the global market and the desire to attain them underpin the socio-political dimension of jugaad. Consequently, jugaad can be perceived as a symptom of the shortcomings of modern technology. However, my aim is not solely to highlight the socio-political reasons for practicing jugaad but to emphasize that the concept of engagement in jugaad surpasses that of standard high-tech engagement. Also, in the cases of failure of standard high-tech engagement, it helps to re-engage with artifacts. It provides people with a more liberal and democratic approach to interacting with artifacts.

3.2 Jugaad: Exploring through Case Studies

Jugaad, a term originating from Indo-Aryan languages, embodies a non-conventional approach to innovation, often synonymous with "hack." It encompasses the use of simple yet creative and out-of-the-box tactics, utilizing local resources and bending rules to devise innovative solutions. Pronounced as "Jugaad" or "Jugaadh" in Hindi, "Jugaar" in Punjabi or Urdu, and "Yukti" in Sanskrit, it derives from the word "jorna," meaning to join together, reflecting the process of amalgamating disparate elements into a functional whole. Literally translated as "making things work," jugaad is defined as "the use of skill and imagination to find an easy solution to a problem or to fix or make something using cheap, basic items" (Oxford Learner's Dictionary). This concept is not a phenomenon restricted only to India; it is recognized and practiced universally in various countries under different names. For example, in Brazil, it is known as "Gambiarra," emphasizing improvisation with limited resources and boundless imagination to ensure functionality. In China, "Zizhu" refers to self-governance or self-determination, while "Chuangxin" denotes improvisation or indigenous innovation. In Kenya, individuals engaged in self-employment and creating and repairing things for short-term benefits are referred to as "Jua Kali." In France, the process of quick hacks is known as "System D." This global occurrence of jugaad underscores its universality, particularly prevalent in developing nations where resourcefulness and adaptability are crucial. The prime motto of jugaad innovation is to endorse cost-effective industrious ideas and thus, shift focus

from the functionality principle to essentiality (Weyrauch and Herstatt 2016). Rather than focusing on improving the features of an artifact to launch newer and newer products, the jugaad mindset is to design the artifact so that it mitigates the user's essential needs. It also brings a pyramidal shift in design from *Top to Bottom* to *Bottom to Top* in developing countries (Koerich 2020; Singh *et al.* 2012). This means that the lower social strata can reap the dividend of growth by virtue of being the producer, the designer and the consumer at the same time, which hitherto was an exclusive domain of the designer and the upper-end consumers. Jugaad is the gutsy art of seeking opportunities in adverse conditions with limited resources and capital. The idea is to do more with less. It is an initiative to break down the hegemony of the elite class (topmost engineers and scientists) in the design process and promote equal participation of designers and users. Jugaad innovation is a boon for emerging countries. It has carved out a more active role to the lower-order consumer strata. Jugaad innovation paves the way for the replacement of black-boxed market innovations. It encourages common users to come up with creative ideas and promotes deliberation before their execution. There is a plethora of examples of jugaad or jugaad designs. These symbolize the act where people having a creative mindset find the best solution at the time of a resource crunch. It is affordable, cost-effective, time-saving and it provides easy, quick fixes and simple solutions to problems in daily life (Belchandan 2020). Given its creative content, it soon garnered the attention of multiple organizations that have incorporated and made it part of the mainstream industry. An example is Renault, a producer of both electric cars and low-cost vehicles. In 2007, the company launched the Logan car with a modern design that is less costly, reliable, affordable, and easy to repair. Logan became the cash cow for the company and was one of the mega-hits in Western European countries during the recession period. Jugaad is often lauded for its thrift, allowing individuals to achieve more with fewer resources, and its flexibility, enabling continuous experimentation until desired results are attained. The success of India's Mars Orbiter Mission (MOM) has been attributed to its reliance on bypassing fixed rules and leveraging jugaad like principles. This approach has been evident in various high-profile endeavors, such as the development of the car Tata Nano, which aimed to be affordable to the poor with a price tag of just 1 lakh Indian rupees (approximately 1000 USD). Jugaad extends beyond mere innovations; it represents a way of thinking and problem-solving. For example, the invention of the "missed call" language demonstrates how individuals adapt and find creative solutions to communication challenges. Despite criticisms, jugaad continues to play a significant role in addressing societal needs and empowering communities worldwide.

The word jugaad is sometimes used interchangeably with frugal but frugal design is much more advanced than jugaad (Gupta 2017). The word 'Frugal' is derived from the French word *Frugal* meaning 'economical in use,' which further originated from the Latin 'frugalis' meaning worthy, valuable and that is originally the dative of *frux*, denoting to fruit, reward, and success (Merriam Webster, n.d.). It describes cost-effective techniques while focusing on safety and quality standards (Belchandan 2020).

The following table 3.1 clarifies the differences between jugaad and frugal with respect to developing countries.

Table 3.1 shows the difference between frugal and jugaad

Frugal	Jugaad
Cost reduction, robustness, improves the life of marginal communities, focus on the problem of resource scarcity, aesthetically enrich (Singh et al 2020), affordable (Basu et al 2013)	Cost reduction, robustness, individualistic approach, may or may not help in resolving community problems (Giaretta et al 2017; Krishnan 2010)
Emphasis on safety norms, ethical norms, large-scale production, reliability, quality assurance, sustainability (Belchandan 2020) environment-friendly, preserves natural resources and energy (Aulbur 2018)	No safety norms, no ethical concerns, unreliable, no concerns in terms of quality and quantity, do not pay heed to issues like environmental pollution and resources conservation (Belchandan 2020; Birtchnell 2011)
User-related approach with long term solutions (Basu et al 2013)	User-related approach with short term solutions (Barodawala et al 2015)
Paves a path for national and international collaboration, improves functionality through a business perspective (Sjafrizal 2015)	Non-business-oriented approach (Giaretta et al 2017)
Structured and planned, high tech, permanent solutions, with emphasis on market profit (Gupta 2017), Target their customers and re-design accordingly in low prices, with mature strategy (Giaretta et al 2017)	Clever and improvised fix, low tech, quick fix, temporary solutions, with negligible concerns related to market profit (Gupta 2017), Less matured survival strategy, requires improvement (Giretta et al 2017)
Example: Mitticool Fridge (Sharda 2017)	Example: Kanak Das' bicycle (Bahadur and Doczi 2016)

However, it may be noted that in the beginning, these frugal innovations in the mainstream are conceptually and temporally posterior to the process of jugaad. For a jugaad innovation to be considered in the purview of frugal, the following conditions are proposed:

1) The jugaad design must be replicable, at least at a small industrial scale, resulting in the propagation of the design across the needy in the society.

2) The jugaad design must be sustainable (in cost and durability) in the long run.

Frugal innovation is more socially prominent than others and is followed by emerging market developmental strategists. It is based partially on the principles of jugaad but unlike jugaad, its solutions are not quick fix and temporary. It gives long-term solutions by using high-tech services. This is the reason I believe jugaad is different from frugal. Frugal practices adhere to low-tech standard engagement, governed by specific rules and often employed for commercial purposes. In contrast, jugaad represents a low-tech non-standard engagement entirely driven by users and their methods of artifact creation. This autonomy sometimes renders jugaad as chaotic engagement and contributes to its limited study within mainstream academia. Additionally, the repercussions associated with jugaad tend to be more significant compared to those of frugal practices. However, there are instances where successful examples of jugaad demonstrate functionality and transition into frugal practices. These examples state how the marginalized groups in order to catch up with the modern global tech struggles, resort to jugaad.

3.2.1 Case Studies

3.2.1.1 Mitticool

Mansukh Prajapati, a resident of Gujarat, India, manufactured what is termed a “mitticool-village fridge” (Figure 4.1). In 2001, just after the Gujarat earthquake, a newspaper photo caption appeared: “Poor man’s fridge broken!” The photo referred to the earthen pot generally used by villagers to store drinking water (Anand, 2014). The cooling effect of the earthen pot inspired Prajapati. ‘Cooling by evaporation’ is the principle behind how the mitticool works. The refrigerator has several compartments or sections to store various products; its outer enclosure is made of clay. There is also a water storage chamber at the top. The heat from the outside causes the water to evaporate as it slowly permeates the clay walls, cooling the interior of the refrigerator. As the water evaporates, it absorbs heat from

the refrigerator's internal spaces. This causes a cooling effect within the refrigerator, keeping the food fresh. Mitticool maintains a temperature several degrees lower than the outside air temperature. To maintain constant cooling, users must occasionally refill the water chamber at the top of the refrigerator. The humidity and temperature of the surrounding area affect how often the water needs to be refilled. This fridge is eco-friendly, affordable, and needs low maintenance. It does not require electricity but serves the same purpose as a regular fridge (Sharda, 2017). The designer created the fridge to respond to the earthquake that left people without electricity for months. In India, more than five hundred million people live without a permanent source of electricity, including a massive number from Prajapati's village. He was a potter by profession and used his intuition. After several months of experiments, he came up with the idea of a Mitticool fridge ("mitti" in Hindi means clay). He drew the traditional method of pottery into the mainstream industry to mitigate the needs of modern consumers, driving financial, environmental, and socio-cultural sustainability. He brought a "mini" industrial pottery revolution to rural areas of India.

Figure 3.1 Mitticool Fridge ("The Logical India" 2015)

3.2.1.2 Modified Bicycle

Kanak Das from North-Eastern India designed a bicycle that can convert oscillation motion drawn from shocks caused by uneven roads to kinetic energy that propels it forward. In India, bicycles are the major means of travel in rural areas. However, rough roads pose serious difficulty to users. The roads in Das's village were unfit for driving vehicles. He was not satisfied with the functioning of the typical bicycle with a shock absorber available in the market (Bahadur & Doczi 2016). He had the bright idea of utilizing the energy lost in the shock absorbers to propel the back wheel in addition to the pedal. A battery of six springs

located under the pedal converts the force created when a cycle bumps over an uneven road or terrain. His initial version had the problem of reverse pedaling. He solved the problem by creating a new model. The bicycle of Kanak Das would not slow down after a bump the way other bicycles would. Due to its capacity to transform vertical movement caused by shocks into horizontal propulsion, it would accelerate after every bump. This is especially useful when someone is riding a bicycle uphill on an uneven road. In sum, instead of complaining, he retrofitted the bicycle with a makeshift device (as shown in Figure 4.2) that converts the shocks into acceleration and energy, allowing the bicycle to transform hindrance into use. Eventually, he reframed the problem posed by the existing bicycle, which has a universal structure (Bahadur & Doczi 2016).

Figure 3.2 Modified bicycle ("National Innovation Foundation" 2002)

3.2.1.3 Plasma separation whirligig toy

This was created by Stanford bioengineers, who drew inspiration from the childhood whirligig toy, where a loop of string is threaded through two holes in a button. One can take hold of the loop's ends and pull rhythmically. The twine coils and uncoils as the button rotates rapidly. A centrifuge is the mainstay of any medical diagnostics facility. Extracting plasma from whole blood requires checking the concentration of pathogens and parasites in blood, urine, and stool. Standard care diagnostics is impossible in Africa because of the lack of electricity, medical facilities and equipment. So, the bioengineers at Stanford University developed an inexpensive, human-powered blood centrifuge that helps diagnose and treat diseases like malaria, HIV, Tuberculosis, African sleeping sickness, and many more in off-the-grid areas (Newby, 2017). The low-cost whirligig toy helps the centrifugation to separate plasma from blood and other parasites. The market-available centrifuge is expensive, bulky, and requires electricity. In contrast, this ultra-low design centrifuge (in Figure 4.3) is

lightweight (2 g), low costs (< 20 cents), human-powered, does not require electricity, and is made of paper. Bhamla et al. (2016) believe that the paperfuge achieves speeds of 125 000 rpm (30, 000 g) using only human power. This type of frugal and sustainable product helps to cater to the various needs of poor people without compromising the quality of the product.

Figure 3.3 Plasma separation whirligig toy (Strickland 2017)

3.2.1.4 Sparky Dryer

In Uganda, an East African nation, most food gets wasted after harvest, and almost 50% of the food spoils before it is sold in the market (British Council, 2018). Kampala, the capital of Uganda, is the most significant source of solid waste generation, with an exponential increase from 407,890 tons in 2011 to 785,214 tons in 2017. It is the primary source of solid organic and biodegradable garbage and landfills, making it the second largest contributor to greenhouse gas emissions. The major problem is not the lack of food but storage facilities. People produce more food than they consume, but it gets spoiled quickly because of the weather, lack of electricity, and other resources. According to the United Nations' world food Program, one in three Ugandan school-age children does not have enough food to consume. Lawrence Okettayot, a graduate student in engineering, created a low-tech thermos dehydrator dubbed the Sparky Dryer as a very effective means of solving the problem. The Sparky Dryer uses biofuel from the garden, such as leaves, sticks, and other inert organic materials. It does not need electricity, has a dehydrating capacity five times greater than solar dryers, ten times greater than open sun drier, and retains the nutrients in the food. With just 2 kg of biofuel, 50 kilograms of food may be dried in 5 hours, extending its shelf life from days to months (Kamau, 2020). The primary goal of Sparky Dryer (Figure 3.4) is to alleviate poverty, hunger, and provide economical, clean energy that is environmentally friendly, simple to use, and easy to clean.

Figure 3.4 Sparky Dryer (Apio 2021)

3.2.1.5 Repurposing of war debris in Laos

Laos has the least-known and unexplored past of being heavily bombed during the American Vietnamese war. About 270 cluster bombs fell on Laos, with around a third not exploding (Pienaar 2019). It is estimated that 30% of the cluster bombs deployed there are yet to detonate, implying that there are over 78 million unexploded cluster bombs on the ground, including giant rockets, shells, heavy bombs, mines, and a variety of other life-threatening weapons. The government is taking many initiatives, including forming an Article 22 team and a Mines Advisory Group to clean up the area and make it a safer place to live. Since then, still, only 1% of the land has been clear from these unexploded bombs. As a result, people's lives here are different from those of other countries in this region. Laotians built boats and practical accessories from bombs that were dropped years earlier (Baxter 2009; Apollo 2021). Their culture influences how they use technology, and technology also assists them in sustaining their livelihood. These bombs are more than just instruments; they have socio-cultural and historical significance. The inhabitants of Thabak in Laos have turned the drop-fuel tanks into functional and shiny boats. Since metals are sturdy, they used missile-like boats for transportation. The cultural shift paved the way for increased tourism, showcasing the change in culture from seeing missiles-as-disastrous to missiles-as saviors. People in Ban Napia have also started initiatives to make spoons and other utensils out of bomb metal. Approximately 13 households in this community produce over 150,000 spoons, recycling the bombs into spoons every year. Xieng Khouang province uses these bombshells to decorate its restaurants and bars. They have repurposed many things, including the bullet shot glass with an actual bullet embedded in one side of the glass, electric lamps, oil lamps, conference tables, chopsticks, and many other valuable things (Levith 2007). Thus, in

making these things, humans are engaged with the artefacts to bring new meaning and definition to the material world that did not exist previously.

(a) (b)

(c)

Figure 3.5 The upcycled products made from the bomb scraps; (a) Shiny boats made from the Missile Scrap (Cortesi 2017); (b) Spoons made from recycled materials from scrap piles of explosives (Dennehy 2016); c) Jewellery (Peacebomb) cast from the explosives (Khng "n.d.")

3.3 Re-thinking Jugaad through Postphenomenological Principles

This section explores how jugaad can be understood through postphenomenological principles and how applying these principles can introduce jugaad into the mainstream philosophy of technology. However, in applying these principles, there is a divergence in how they function in the context of jugaad.

3.3.1 Transparency Principle in Jugaad

According to Verbeek (2005), transparency maintains the actual connection of the user with the artifacts. Because the product's mechanism is necessary for the user to become

attached to it, if the machinery's operation is transparent, the user can maintain a long-lasting relationship with the product even after it stops working. Verbeek cites Van Hinte's (1996) ideas of "functional clarity" as one of the characteristics of transparency as it strengthens people's attachment to an object and "make possible their return from objective presence to handiness" (2005, 227). Hinte discusses the territorial segregation in industrial design, where the 'skin' or outer covering is accessible to the user for touch and appearance, while the interior workings are reserved for trained technicians, consequently discourages engagement. He argues that by enhancing "functional clarity," the relationship between the user and the product can be made more transparent (the example of the "Ithaca" color printer, discussed in chapter 2). Instead of black-boxing the interior, the printer clearly identifies each part's function. As a result, it enables users to continue their relationship with the product even after it malfunctions. Therefore, a transparent product serves the user's needs functionally and shows them how it works (Verbeek 2005, 225).

Verbeek also agrees with Van den Eede, *"*users and designers need a 'double vision' to simultaneously see the transparency of both use and design context" (Verbeek 2011b, 391). Van den Eede (2011) discusses that mediation does not mean the simple use of technology. It also has social implications, thus demanding careful handling by the user and the designer. The functionality of the technology is its use, and the social and political dimensions are the context of design. He states, "from a use (or designer's or engineer's) viewpoint awareness of the technological mediation must be as low as possible. From a 'context' (or individual's, or reformer's or victim's) viewpoint, the consciousness of it should be as great as can possibly be accomplished. From a theorists' viewpoint, however, some form of double vision should be developed, where both sorts of transparency come in view-otherwise, we risk to overlook either one or the other" (Verbeek 2011b, 393-394). Therefore, Verbeek argues that involving users in the design process is essential for creating transparency in products, which in turn enhances users' attachment to them. He notes that transparency allows users to maintain a connection with products even when they break down, and it provides opportunities for users to engage more deeply with the products, understanding their functions and perceiving them as material entities.

Similarly, the principle of transparency can be observed in the functioning of jugaad. Due to its low-tech nature, jugaad provides users with the opportunity to participate actively and perform repairs and maintenance themselves when malfunctions occur. For instance, the

Mitticool fridge requires users to regularly fill the top tank with water, which involves active user participation. Users can construct the fridge using local expertise and resources and can easily address issues if they arise. As a result, it infuses a sense of belongings for the artifact *vis a` vis* users. I believe, in contrast to standard artifacts discussed by postphenomenological thinkers, the transparency principle is more effectively realized in low-tech solutions like jugaad.

3.3.2 Notion of Repair and Maintenance

Verbeek discusses the significance of repair and maintenance in fostering a stronger relationship between people and artifacts. He emphasizes the importance of designing products that allow users to participate in their repair and maintenance. Verbeek refers to Van Hinte's example of the Apple Macintosh computer, which provides users with the ability to upgrade and repair it in case of malfunctions. Verbeek believes that involving people with material things is crucial, arguing that artifacts should be designed to be more dependent on users for their functioning. He states, "Products that allow human participation in their functioning, with their repair when they break down, forge a bond between users and themselves as material things rather than simply as suppliers of commodities" (2005, 230-231). He asserts that the more transparent a product is, the greater the opportunity for users to personalize and adapt it, thereby making it their own.

The concept of repair and maintenance is also present in jugaad but with a deeper level of user involvement. In postphenomenological examples, designers are tasked with providing space and instructions for users to perform repairs and upgrades. Due to the complexity of high-tech artifacts, users often need manuals or guidance to carry out these tasks. However, in the case of jugaad, the low-tech nature of the artifacts gives users more autonomy in repairing and maintaining them. For instance, with products like the Mitticool fridge or the modified bicycle, users can easily fix issues on their own when malfunctions occur.

3.3.3 Out of the box, de-*gestell*

Unlike modern technology, which Heidegger characterizes as exploiting and enframing everything to impose order, regulation, and control through *Gestell*, jugaad defies categorization. While postphenomenological thinkers critique Heidegger's notion of modern technology as enframing, I am not advocating for Heidegger's negative perspective on technology. Rather, my point is that modern technological artifacts often exhibit fixed rigidity

and opacity, which jugaad disrupts. In this sense, jugaad offers an alternative approach to dealing with artifacts, breaking away from the constraints of *Gestell*. This is evident in the innovative, out-of-the-box solutions achieved through jugaad, as illustrated in the examples provided. Therefore, it could be considered as a process of *De-Gestell*, or unframing, as it provides unforeseen solutions without seeking to redefine or preserve things for the future. Jugaad aims to accomplish tasks with temporary fixes rather than securely storing items for prolonged periods, thus diverging from the essence of *Gestell*. While modern technology may conceal the essence of truth within its complexity, jugaad's straightforward solutions do not challenge the inherent vitality of the artifact. Although jugaad may impact the environment, it lacks the exploitative nature often associated with modern industries or high-tech solutions. Jugaad does not pose a threat to humanity as its objective is not to replace or replicate human capabilities but simply to make things functional, fostering deeper engagement from individuals. Furthermore, in the context of Borgmann's philosophy, jugaad transcends the *device paradigm* by lacking the repetitive patterns inherent in interactions with modern devices. Each interaction with jugaad presents a novel approach, offering a fresh perspective on engaging with artifacts.

Let us consider this example,

> On the side of a busy street, a man sits on a stationary motor-bike. Next to his handles is attached a sharpening wheel to the bike pedals, and he is busy sharpening knives for customers. At the end of the day, he starts the motor-bike and rides home, The vehicle, shop, desk, seat all are in one form for him. It is one of the examples of 'things that work'- creative ideas that require the ability to think laterally, sometimes out of necessity and sometimes out of a desire for innovation (Vaswani 2018, 1).

Figure 3.6 Multipurpose Bike (Vaswani 2018)

This scenario illustrates how a man ingeniously repurposes his stationary bike to fulfill various roles, efficiently addressing his needs. By transforming his bike into a sharpening station for knives, he demonstrates the essence of jugaad: creative problem-solving with minimal resources. This approach, characterized by simplicity and adaptability, aims to provide immediate solutions in unstructured and uncalculated ways, unlike the high-tech solutions. Jugaad operates outside the confines of predefined frameworks (enframed or patterns), offering flexibility and spontaneity in addressing problems. People resort to jugaad to address their needs that may otherwise be unattainable for them.

3.3.4 Multistability in Jugaad

Multistability is when technology presents us with multiple possibilities. As already discussed, Ihde believes that the same technology has different uses in different cultures, and even the same goal can be realized in different ways. Ihde (1990) gives the example of oval sardine cans that Australian visitors to New Guinea left behind. The inhabitants of New Guinea valued cans as precious items and used them to create the focal point of their headgear, which they wore on essential occasions. Sardine cans have taken the place of the enormous shells that were previously utilized as the forehead's centerpiece. Here, the outdated cans are transformed into new "fashion" praxis and new artifacts (*sardine-can-become-headwear*). In such a praxis, the status and the identity of the wearer fit into its framework of significance. The interwovenness of technology in different cultures in different ways makes it 'multistable' (Ihde 1990).

In the context of jugaad, multistability is a fundamental characteristic, where the same artifact is utilized in various ways. For example, in Laos, remnants of missiles and bomb shells are repurposed into useful products, demonstrating how multistability operates within jugaad. However, there is a distinction between how multistability functions in postphenomenological examples and in the cases of jugaad. In postphenomenology, using artifacts in different ways involves creativity, whether it is an individual or collective effort, driven by the desire to repurpose the artifact for a specific purpose. For instance, converting sardine cans into headgear represents a collective will but lacks a motivational impetus behind its use. In contrast, in jugaad, the notion of multistability often arises out of necessity rather than choice. In Laos, the repurposing of unexploded bombs is driven by socio-political conditions; these remnants are dangerous and still pose risks, as they may explode when stepped on. With the government unable to address the issue effectively, locals are compelled to find alternative solutions. Thus,

in jugaad, multistability is not merely a creative choice but an emergent response to challenges imposed by modern global technologies, a concept explored further in the next section.

3.4 Jugaad is an exposition of the problems of modern global technologies

This section contemplates on the reasons for the shift in relations when global technologies fail in the developing world due to a lack of resources. It is not the mere 'breakdown' that forces newer technologies but a culture that actively hosts ideas for novel relations.

3.4.1 *Unchoice,* and lack of resources

What happens when one buys a bicycle to go to work every day, but the roads in the area are in terrible shape? When there is no electricity for refrigeration, how does one preserve food? These questions lead us to the unconventional world of artifact-induced innovations. In a metaphorical way, here, artifacts long to be heard so that they are put back on track. In this process, users invariably come up with ways of creation of artifacts. One can be frugal in two ways: (i) when one has access to resources and (ii) when one has a scarcity of resources. In (i), frugality is a choice, and in (ii), it is a need. Both ways call for a shift in user-technology interaction. The Western intellectual sensibilities have primarily focused on (i), where frugality is a virtue and a 'retreat' from the surplus. Interestingly, (ii) reflects life in developing nations where there is lack of resources which pushes people to choose the frugal way of creating artifacts. On the other hand, (i) has a rich history that takes us to the origins of frugal ways of life. The concept of 'practice as temperance' was discussed by philosophers and theologians such as Aristotle, Thomas Aquinas, and others (Nash, 1995). In these contexts, we can trace the meaning of frugal, which is mainly regarded as one of the virtues. Frugality is a thrifty way of living life. Frugality has been used as a concept and tool since ancient times.

The philosophy of Aristotle and Aquinas refers to the self-disciplined mastery of the senses. According to Aristotle, a virtuous life should aim at frugality by employing *phronesis*[6]. For him, 'evil belongs to the class of unlimited and good to that of the limited' (NE II.6). It

[6] Phronesis is wisdom or intelligence that is applicable to real-world action. It entails sound judgment as well as excellence of personality and conduct, and it was a prominent topic in ancient Greek philosophy. According to Aristotle, it is the connection between general theory and practical knowledge. He called it "practical wisdom," which is the foundation of all knowledge.

may be argued that the *Golden Mean*, as defined by Aristotle, forbids all forms of excess and is based on the frugal way of life. Frugality was debated in the Christian times by Thomas Aquinas under the themes of contentment, sufficiency, power of responsible control, against the habit of unjust production and consumption, and in opposition to greed and gluttony (Nash 1995). As a frugal artifact, one can find several examples from ancient Greece. One such example is the staff, or "skeptron," a simple wooden stick that Diogenes of Sinope, a Cynic philosopher, commonly used as a walking aid and a symbol of his philosophical beliefs. He used the staff to serve multiple practical purposes; as walking aid that offered assistance on protracted foot treks, a tool for digging and searching for food such as roots of plants, supported his aging body, used to defend himself against aggressive animals or attackers, and last, served as a symbol of his commitment to a simple, frugal way of life (Buckingham 2021). So (i) reflects cases where we could live otherwise without excess but opt to be frugal by choosing.

In (ii), we do not have an option other than being frugal. The artifacts are either unavailable, or available but the context prohibits its normal function. My examples pertain to both these scenarios. In our phenomenological experience with artifacts, when they cannot naturally gel into a relationship with the user, the artifact generates a visible problem as it is unusable and exists as something other than its original use. Here, the metaphor of "speaking for themselves" is clearly visible. Artifacts garner attention because they are devoid of conventional user-technology intentional relations. In a more aesthetic sense, the idea that artifacts speak for themselves have historical, cultural, or artistic importance inherent to them. For example, museums, exhibits, or archaeological sites are presented so visitors may comprehend their value and context without reading written descriptions (Kukla 2022). It indicates that artifacts have inherent properties that cause them to reveal their significance and worth to anyone who looks at them. This goes beyond what the curators, as well as the creators, want it to represent. Well-curated exhibitions always aim to allow the artifacts to speak for themselves and provide viewers with a more immersive and exciting experience. Artifacts often have numerous levels of meaning that can only be understood with more background information. As a result, there will always be an attentive and involved relationship between the person (observer) and the artifact when it speaks for itself. The viewer will, therefore, receive knowledge directly from the artifact. However, there are situations when an artifact has multiple meanings, and its intended meaning may differ from its use (Ihde, 1990). The artifact can be repurposed and given an alternative use even though it was created to serve an original prescribed function. Due to the varied socio-economic and political factors, the rationale for

"reused" differs. There may be instances where it is altered to bring novelty, but there may also be instances where creativity is forced or is simply an unchoice. The conventional or standard artifact may not fit properly with the challenging setting in a frugal context; it requires attention and calls for re-use or modified use, which is accomplished through frugal methods. In the case of developing nations, the artifacts speak for themselves due to the failure of global standards of user contexts; however, with repurposed meaning through jugaad, it satisfies user needs.

Using the two examples in this chapter, where a technological artifact is retrofitted to regain its user context (bicycle), and another is created from the ground up due to a natural disaster (mitticool fridge), I elaborate the structure of jugaad. When frugal is a need, one engages in repurposed meaning and unchoice creativity. I refer to unchoice creativity or forced creativity as situations where we lack or have no choice or when our creativity is compelled rather than freely inspired. This helps in knowing the interruption in human-technology relations and how jugaad is a solution to either repurpose it back to its original relation, or change the relation altogether to a new one. Unchoice is when one's circumstances deny choices. Unchoice creativity means there is no choice other than to be creative because of the urge to be back to normalcy. According to various sources of literature, creativity is a choice-conscious effort and intrinsically motivated act that is not based on external rewards (extrinsic) (Chua and Iyengar 2008). The question is- if creativity is conscious and intrinsically motivated; can it be an unchoice? I contend that when no other options are available, creativity can also result from extrinsic factors. In such a case, creativity is unchoice. Jugaad is an instantiation of such unchoice that is the result of consciously and extrinsically motivated creativity. Extrinsic motivation in jugaad comes from the desire to alleviate the suffering that the impoverished are unable to meet for a variety of sociopolitical reasons. The underprivileged people are forced to create substitute solutions that are not high-tech. Jugaad provides a low-tech solution that to a certain extent gets the job done. In Rosenberger's view, we can see a similar idea of producing creative solutions when the stable relation fails to function. Rosenberger (2017) talks about using alternative stability when the dominant stability fails to serve the function and calls it an "expansionary" design modification. He suggests:

> [The] spray cap is neither a restrictionary nor an unrestrictionary modification but an exemplar of a third category. Where the hydrant locks close off a stability, and the hacks reopen that stability, the spray cap "opens up" the alternative

> stability, securing multiple usages. Let's refer to this kind of modification as an "expansionary" design modification] (2017, 68).

When an artifact is Restrictionary, it means that its stability has been set by legal and design strategists; when it is unrestrictionary, it means that it has been utilized without authorization outside of those stabilities. Therefore, there are consequences to both of these approaches: the first one is reliant on authorized entities, and the second includes additional side effects. Rosenberger (2017) introduces three types of stability which illustrate by using the example of a hydrant locking system in New York and the stability change by adding a spray cap to the existing hydrant. Hydrants serve multiple functions, such as spraying torrents of water into streets where kids can play during the hot monsoon. These can be utilized for building purposes or by the police to fill water cannons used to suppress riots. The existing open hydrant blasted over a thousand gallons of water into the street every minute and is inefficient, expensive, and possibly harmful to young children. With the insertion of a spray cap, the hydrant becomes a communal sprinkler, and the amount of water it sprays lowers to that of an uncapped hydrant. It shows that the fire hydrant has multiple stabilities. Therefore, the spray cap hack opens the alternate stability that the dominating hydrant lock closes off the dominant one.

Typically, technologies in the developing world result from "technology push." That is, in the current globalized world, technologies are designed and produced in a global context for the average user and subsequently imported or pushed to various cultures. The origin of technology-push begins from the early colonial-industrial phase, starting from railroads all the way up to the internet and mobile phones of the globalized economies. Ihde (1990) notably shows how different cultures adapt to technology in diverse ways. As we have seen in some examples, the anticipated human-technology relation is sometimes altered due to the involvement of cultures. Jugaad conveys the idea of a change in an expected relationship between technology and its users. The leading cause for such a change is the social, political, and economic differences between users in different cultures. I do not propose an STS route to prove this point. Postphenomenological principles are efficacious in discussing the character of jugaad. In Ihde's work, one can find traces of creative remedies or discussions about using alternative methods, but not a clear definition of frugal. He mentions the 1973 gasoline shortage incident as the first significant global lack of fossil fuels, and it became clear and scary as automobiles are involved in a vast and intricate web of economic activity. Even more serious

consideration of the need for alternative energy sources was sparked, and it helped to some extent to drive conservation efforts (Ihde 1990, 32). Developed nations have resources, so they can think of using them wisely. In developing countries, they must go for alternatives because there are fewer resources. So far, postphenomenological theorists, in their case studies, have not addressed the idea of unchoice and forced creativity and the shift in human-technology relations which resulted from scarcity. With this conceptual difference between postphenomenology and jugaad, there is also a difference in how each approach shapes the relationship with the individual.

3.4.2 Jugaad as a re-engagement with technology

There is difference in the 'relation of mediation' between artifacts in the global context and locally repurposed jugaad context. The intended function of the bicycle is to help one cover distance. Similarly, the purpose of the modern refrigerator is to store food through mechanical refrigeration, which necessitates the presence of electricity. According to postphenomenology, the 'relation of mediation' we have with the bicycle is the embodiment relation, whereas the relation with the regular electrical refrigerator is the background relation. In embodiment relation, artifacts interact with users in two ways (Ihde 1990). Firstly, it broadens the user's area of experience between their body and the rest of the environment, expanding the individual's perspective. It also enables us to transcend the physical body's limitations, which is only possible by using an artifact. The second is the transparency it creates between the body and the outside environment. This means that when we use an artifact, we are more concerned with the relationship it establishes with the world than with the artifact itself. Ihde gives the example of spectacles; we scarcely notice the glasses since our attention is drawn to the vision that can be achieved with them (Ihde 1990, 73). Similarly, our attention is drawn to the road or surroundings rather than the bicycle itself when riding a bicycle. In the case of the refrigerator, its relation of mediation is a background relation because it fulfills our needs without drawing attention to itself. Its absence or presence is usually felt when it stops functioning and becomes *present-at-hand*.

In embodiment relation, the artifact mediates the particular way of using or perceiving technology. It also transforms the individual's perceptual and bodily relation with the external world. Bicycle, for example, broadens the individual's perspective and experience by allowing them to travel to faraway locations securely, and thus, it empowers them to transcend the physical body's limitations. Another element of embodiment is that in the human-artifact

relationship, the artifact becomes "maximally transparent" (Ihde 1990, 73). Transparency does not imply "being in its purest form," as in the instance of a glass through which we clearly see (Ihde 1990). Transparency is understood in an embodiment sense where the artifact becomes barely noticeable or withdraws itself at the time of use. When we use an artifact, we are more concerned with the relationship it establishes with the human and the world than with the artifact itself. Here, the bicycle is invisible, transparent, and aids in bodily extension, hence meeting all the conditions of embodiment relation. So, the relation of mediation {(I-technology)-world} becomes {(I-bicycle)-world} (Ihde 1990, 73). Contrary to this in the case of the bicycle on bad roads, it is "minimally transparent." Transparency is affected by the environment. People must be cautious while riding on bumpy roads, making the bicycle opaque instead of transparent. The innovativeness of the jugaad bicycle is not because of the user's choice to bring frugality as a virtue; instead, the broken roads or gutters make the standard bicycle unfit to drive, and therefore, he/she is forced to modify the bicycle. In this model, the energy absorbed from each fall in the gutters is efficiently converted to kinetic energy that further propels the bicycle up the hill. The lack of resources is cleverly translated into preferred outcomes. For developing countries, these innovations are natural outcomes of the interaction between the original artifact and the user in a particular environment. The artifacts there need to have their repurposed meaning (speaking for themselves), or they will be meaningless. There will be two options: either utilize the object in its original context, which renders it useless for the user or use it in a different context, which makes it valuable. Given the fact that the second option is preferable, I believe anyone would select it. Making the object suitable for use by re-engaging it takes a creative attitude. However, I must again admit that this creativity was motivated more by necessity than curiosity. This un-choice or forced creativity are a result of minimal transparency.

If we observe closely, Ihde's *Technics and Praxis* (1979) can be employed here in elaborating jugaad bicycle's narrative. Technics refers to the technology or the material artifacts and tools shaped and used by humans. According to Ihde, technics is not a neutral means but an integral aspect of human existence and society. Due to the constant influence of technology on how we see reality, it can expand and restrict human engagement with the outside world. Praxis describes human activity, practice, or practical involvement. It is about the lived experience and how people interact with their environment and other living things more meaningfully. Ihde demonstrates how technics and praxis are intertwined since humans shape technology, and technology influences our experiences, perceptions, and meanings of

the world. Similarly, in the case of the bicycle, it represents the concept of technics and praxis. The bicycle was initially a technological tool for an individual to explore the world (Technics), forming part of the action. It has expanded human engagement with the existing surroundings by making it easy for them to cover more distance in less time. Presented with the challenges of uneven roads, the inventor used innovativeness to come up with a modified bicycle conducive to the current situation, thus forming a new perceptible world favoring him (Praxis). By addressing the people's needs in a crippled context of roads, the modified bicycle has a more meaningful and involved relationship with them.

To take up the second case of the Mitticool Fridge, many people do not have access to basic amenities in developing countries, making it difficult to buy an electric fridge. So, without electricity, the artifact loses its background relation. A regular electrical refrigerator creates the relation of mediation that Ihde characterizes as the background relation because it fulfills our needs without drawing attention to itself. According to Ihde, a background relationship refers to how technologies integrate into our everyday experiences and practices so seamlessly that we hardly notice their presence. When technology effectively disappears from our conscious awareness, it operates in the background, shaping our perceptions and interactions with the world without us actively reflecting on it. Here, technology (refrigerators and other automatic appliances) merges with our environment and occupies the background (Ihde 1990). The technology also withdraws from our attention, but unlike the embodiment relation, the withdrawal is not transparent or opaque. Thus, withdrawal is a kind of absence where the artifact makes the relation with the individual subtly and indirectly. The equation represents the relation of mediation in the background {I (-technology/world)} or {I (-refrigerator/world)} (1990, 109). Its absence or presence is usually felt when it stops functioning and becomes *present-at-hand*. Heidegger refers to the object as "present-at-hand" when we study the object in isolation in the sense of the mere facts in a theoretical manner. In this way of encountering things, the observer stands apart from the object, observing it as if it were independent of any human context or purpose. For example, imagine looking at a hammer solely as a physical object with a certain weight, shape, and material properties without considering its purpose or how it fits into human activities. In the present-at-hand mode, the hammer is seen as a mere thing, stripped of any practical context.

Similar to Heidegger, Ihde also believes that when the artifact stops functioning, it becomes present-at-hand. The artifact should have an active working relationship with the

individual for meaningful engagement. But in the case of mitticool, it does not have the same background relation due to the unavailability of electricity. Prajapati created a refrigerator, allowing individuals to get fresh and chilled foods by interacting with the artifact. Unlike the electric refrigerator, which doesn't demand attention for its functioning, Mitticool requires constant attention and participation. Human intervention is needed to fill its upper tank with water instantiating the engagement principle. As we have already seen, according to the engagement principle, humans or technologies are not independent agencies but rather mutually responsible for shaping themselves, the artifacts, and the surroundings. In this case, the mitticool fridge and the individual efforts are equally required for the normal functioning of the relation of mediation. The mitticool will not maintain the identical background relation as in the electric fridge, where it becomes unnoticeable. It stays in the background for a few moments when human intervention is not required. When the intervention is needed, it will come in the foreground, and the shift in relation to mediation is visible. The positive outcome is that jugaad rebuilds an individual's relationship with the artifact in a new and adapted way in developing countries.

Therefore, after jugaad repurposing, the bicycle's embodiment relation is restored, but the refrigerator's background relation with the human and its world is altered, albeit in a different way. The manner in which the artifact shapes the human-world relation is not the same for everyone since it depends on the use-context or how the individual uses it under different circumstances. Many issues render the original "relation of mediation" unworkable in the cases of many artifacts. Jugaad offers a new solution for developing countries to complete this mediation relation in a way that is appropriate for their use and environment. It also reflects the ideas about the dynamicity of humans and technology in every human-technology relation. By the word 'dynamicity,' I mean the continuous growth and evolution of humans and technology. Postphenomenology highlights the mutual co-constitutive relation of humans and technology in which both co-shape each other. Interestingly, one may note that postphenomenology criticizes Heidegger for focusing on the essence of technology and to generalize everything under 'T.' Ihde and Verbeek talk about the role of concrete artifacts in shaping the lives of people. It is correct that we cannot generalize technology as it is multistable and robust in nature. However, it is also true for postphenomenology that human beings do not have a general nature with an 'H' in each human-technology relation. jugaad exemplifies the differences in human situations concerning class, gender, region, and culture. It is not the choice that determines the use of technologies in multistable ways; instead, there are other

factors, such as lack of resources and capital, demographics, and other environmental factors. I must not say that jugaad will usher a new turn, like a societal turn and a thingly turn, but it portrays the underlying shift in human-technology relations.

3.5 The Politics of Jugaad

Jugaad is often hyped in the existing literature and celebrated as a lesson for the developed nations to become frugal. Though jugaad is popular in developing countries due to its problem-solving capacity, we must not overlook its drawbacks. Jugaad is democratic, flexible, and unstructured on the one hand, but it is also illegal, dangerous, unsustainable, short-sighted, and subject to temporal context on the other hand (Prakash et al. 2019). While jugaad offers unconventional solutions by breaking away from established norms, it is essential to acknowledge that romanticizing it can be problematic. Although jugaad may provide innovative solutions, many individuals take pride in its compromises, leading to detrimental consequences. One notable example is in the medical sector, where the production of cheap generic medicines in India has resulted in fatal outcomes. In 2013, expert Dinesh Thakur protested in Srinagar, Jammu and Kashmir, after thousands of children were administered doses of two antibiotics found to be unfit for consumption by the state's drugs control department (Nelson 2018). Thakur attributed this scandal not to a lack of technical knowledge, but to a jugaad mindset focused on cutting corners, adulteration, and disregarding regulations for monetary gain. The absence of accountability has fostered a culture of impunity. Jugaad's makeshift solutions lack safety testing, standardization, and certification, violate legal provisions, scalability, and sensorial appeal. One such example of legal violations is breaking rules outlined in the Motor Vehicles Act. One notable instance is the creation of a Ferris Wheel-Cum-Bike, where an individual attached a swing to their bike for family transportation. While these innovations may fulfill immediate needs, they often neglect environmental concerns and may inadvertently create problems for others. While jugaad solutions offer immediate and cost-effective fixes, they typically lack long-term efficiency compared to original products. Although jugaad can be effective in specific situations, it often fails to provide scalable or enduring solutions. Repurposing objects for multiple uses may address several problems, but the resulting product usually falls short of the efficiency of its intended purpose. Consequently, jugaad solutions are inherently limited in their scalability to meet widespread needs. Many jugaad products fulfill niche requirements in terms of location, utility, or cost, but they are often unsuitable for mass production to address broader societal needs. Furthermore, jugaad

products typically do not meet aesthetic standards, prioritizing functional design over visual appeal. These makeshift solutions consist of disparate parts hastily assembled, resulting in products that lack aesthetic coherence.

The initial impetus behind the widespread adoption of jugaad stems from the scarcity of resources, a challenge that spurred ingenuity and adaptability for survival. The underlying issue is often the pressure, which compels individuals to find innovative solutions, to put things back on track. These pressures, whether visible or invisible, can drive the adoption of jugaad practices. In visible cases of jugaad, the causes and effects are evident such as political pressure. In recent years, there has been a push to reintroduce Kulhad (clay) cups in India, driven by political pressure to preserve tradition and support local industries (Basu 2019). In many cases, the motivation for jugaad may stem from the allure of modern technology. While developed nations enjoy the comforts of advanced technology, many developing and underdeveloped countries still face resource constraints. Those unable to afford modern conveniences often resort to innovative solutions. Additionally, the historical injustices stemming from colonization may contribute to this invisible push towards jugaad. While colonization introduced new technologies and machinery, it also left communities without the necessary maintenance, skills, or infrastructure to fully utilize them. As a result, people may resort to jugaad methods to adapt and address their needs in the absence of formal training or resources. Despite the negative impacts of colonization, such as exploitation and destruction, it also facilitated the introduction of innovative techniques and machines to certain regions. However, once colonial powers withdrew, communities were often left without the means to sustain these advancements, compelling them to employ jugaad methods to compensate for their lack of expertise or resources.

In India's early post-independence era, Jawaharlal Nehru's government imposed restrictions on imports, leading to economic shortages and necessitating frugality (Nelson 2018). The shortage of spare parts for imported goods, compounded by the influx of refugees following partition, further fueled a surge in creativity and invention across India. Individuals resorted to jugaad to address the challenges posed by the unavailability of essential items such as bicycles, motor dynamos, and kitchen mixers. For them, jugaad became a means of making necessities functional and creating opportunities for themselves. In response to these circumstances, many individuals established mechanical workshops to address the pressing need for repair and fabrication services. These workshops served as vital sources of support

and employment, contributing to the proliferation of jugaad as a practical approach to problem-solving in India's post-independence landscape.

Jugaad innovators are primarily driven by social rather than financial incentives. Unlike high-tech innovators who may be motivated by the promise of monetary gain and fame, low-tech innovators focus on addressing societal challenges such as poverty and resource constraints. For instance, when Prime Minister Indira Gandhi distributed inexpensive pumps to impoverished farmers for agricultural purposes, these pumps were repurposed by communities on holidays to power makeshift vehicles for transporting worshippers to temples and families to ceremonies (Nelson 2018). Low-tech items, particularly bicycles, are often the target of jugaad innovation due to their transparency in functioning and ease of repair.

While jugaad examples often arise from socio-political challenges, they also demonstrate how low-tech solutions can create more opportunities for engaging with artifacts. Not all technologies are harmful; certain low-tech, accessible technologies can significantly enhance quality of life in various ways. One notable example is Amrutbhai Agrawat, who received a lifetime achievement award for his invention of the "tilting bullock cart" (Nelson 2018). This innovation attaches to the bullock, allowing it to empty its load efficiently, thereby reducing the burden on women laborers and animal used who previously struggled under the scorching sun. Despite perceptions of bullock carts as symbols of backwardness, they remain essential to the lives of millions of farm laborers, easing their workload despite causing traffic congestion and accidents. Therefore, jugaad, in the context of low-tech solutions, serves as a means of providing immediate relief in emergency situations, offering quick and improvised fixes to pressing problems.

3.6 Concluding Remarks

The chapter highlights the significance of acknowledging non-standard engagement in the philosophy of technology, which has received the least attention. It discusses how users re-engage with the artifact when the standard engagement fails. The chapter highlights the fact that low-tech devices have considerably more engagement potential than high-tech ones and that maintenance and repair are more straightforward due to their lower complexity. There is an essential link that connects this chapter with the next. If we zoom out and take a bird's eye point of view by trying to understand the broader purpose to investigate the idea of engagement and highlight how low tech promotes much deeper engagement, we can see that there is an

essential link. In low-tech, there is minimal or no interference from the designer and jugaad is a subversive phenomenon necessitated by none other than modern technology. In contrast to the traditional designer-user paradigm, this approach focuses on how shifts occur and the user becomes the designer (user/designer). Due to minimal centralized control, there is more scope for its maintenance and repair. It should be noted that, as I have already stated in the chapter, I am not celebrating jugaad; I aim to understand how low-tech functions from a philosophical standpoint by bringing forth the many cases I discussed. We also saw that jugaad redefines the "relation" in human-technology relation. The thesis seeks to show that not all low-tech devices can promote meaningful engagement. We should exercise caution in identifying those genuinely aiding human growth and development. The upcoming chapter illuminates the concept of meaningful engagement through the concepts of Borgmann and Gandhi. Jugaad is perhaps a stark reminder that the incessant push for non-transparent technology can compel the deprived users to re-engage with artifacts in their own way. This is what could be called a user's-mutiny against the established human-technology relations. In the next chapter, I do a deeper analysis of not mere engagement, but engagement that appeals to "the human" in the human-technology relation.

Chapter 4
Meaningful Engagement with Appropriate Technology (MEAT): Engaging with Low-Tech

The chapter highlights the idea of meaningful engagement with appropriate technology (MEAT) through the ideas of Borgmann and Gandhi. Both philosophers define what constitutes a good existence using low-tech artifacts. To discuss MEAT, the chapter looks for common ground between Borgmann and Gandhi through the harmonious link between humans, technology, and the environment. Although I debated how low-tech encourages greater participation in the last chapter, this chapter concentrates on low-tech that fosters meaningful engagement. Both Borgmann and Gandhi appreciated the use of technology but in an "appropriate" way. We will see that both thinkers maintain the term "appropriate" to restrict the use of technology. They have dealt with crucial issues, such as what it is to be an authentic human (capital 'H') and what is necessary for people to lead sensible lives. This is especially significant because we, as human beings, are at a point in our history where it is even possible to change our essential nature through technology. We are no longer asking ourselves the questions we must ask: what kind of humans do we aspire to become in the future? What does human flourishing precisely mean?

Borgmann uses pre-technological examples, while Gandhi relies on pre-modern examples such as the charkha, which is a model artifact. In this chapter, I present it as the quintessential example of MEAT. The charkha, or the spinning wheel, a symbol of self-sufficiency and freedom, implicitly promoted the idea of togetherness, making people sit and spin yarn together and share joy and agony. This chapter highlights charkha as the epicenter, where it assimilates all the attributes and values of the *focal thing* (pre-technological life), a concept developed by Borgmann, which he contrasts with the device paradigm (modern technology). Studies already provide evidence of the cross-cultural relevance of focal things. Heikkerö's (2005) use of the Japanese practices of *chado* (the method of tea) and *kendo* (the art of sword practice) as focal things/practices illustrates these practices' philosophical and cultural relevance. *Kendo* is a form of sword practice that helps one to develop character while learning the application of the *katana* (sword). The purpose of the tea ceremony (Chado) is to prepare, distribute, and consume tea meticulously. The fundamental tenet of all cultural practices is that by engaging in the appropriate artistic endeavor, one can better understand

oneself, others, and reality. The chapter supports a similar idea by presenting a case study from the Indian context.

Figure 4.1 Original photograph of Gandhi spinning charkha during the late 1920s (Times Now News 2020)

In the subsequent sections, the chapter addresses these questions from Borgmann's and Gandhi's views. If one looks at the focal thing via the model artifact charkha, it is seen as more than just a communal activity because the charkha brings (i) economic stability where the yield is sold as goods, (ii) gender equality where men and women are equally supposed to operate the artifact, and (iii) leaves the environment from harm by avoiding big industries; thereby fostering self-reliance without alienation. These additional points contribute to Borgmann's three crucial views in the paradigm reform process- the centrality of social justice, environmental welfare, and the quality of life. The fundamental tenet of the charkha is its adherence to Gandhi's *Sarvodaya* paradigm of equality (benefit of all), human flourishing, and economic independence. Gandhi uses these guidelines to ensure that a single artifact satisfies all requirements and employs it as a suitable tool to highlight the shift from a consumptive approach to one that enhances autonomy, cultivates virtues or skills, and elevates more corporeal (h-h) relationships, which helps to understand MEAT. I use the model artifact charkha as a wheel of self-reliance regarding economic and social freedom since it made many everyone, especially women, self-sufficient during India's struggle for independence. While exploring the idea of charkha as an example of a focal thing, the chapter also examines its associated values. It undertakes a three-fold analysis of the charkha: as an appropriate technology, a symbol of economic regeneration, and a tool for women's emancipation. As a cynosure of everyone's life, its significance extends to familial-cultural gatherings and national unity. The chapter concludes that every pre-technological or technological device that liberates people and gives them a purpose in life embodies the spirit of focal things. In the next section,

I provide an expository description of Borgmann's idea of focal things as opposed to the device paradigm with certain critical remarks.

4.1 Albert Borgmann

Borgmann has extensively explored the impact of technology on leading a meaningful life. His work draws on ideas before the empirical turn, inspired by Heidegger, where the focus was not just on concrete technologies but on broader questions such as the essence of technology, the nature it reveals, and authentic living. Ihde (1990) and Verbeek (2005) criticized Heidegger for overemphasizing the essence of technology ('T') and his critique of high-end technologies. However, they have overlooked the essential nature of the human ('H') which I am re-addressing in this chapter. My intention is not to critique the empirical and post-empirical turns but to revisit the pre-empirical turn's issues in today's context, where addressing them is more urgent.

Borgmann draws inspiration from Heidegger's ideas, yet diverges in his analysis of modern technology. While Heidegger views technology through the lens of *Gestell*, focusing on how it frames and manipulates nature, Borgmann introduces the concept of the *device paradigm* (discussed in section 4.1.1). The paradigm illustrates how modern technology shapes individuals' lives through dominant patterns or frameworks. Unlike Heidegger and Jaspers, Borgmann shifts away from defining technology solely in terms of conditions of possibilities, instead emphasizing its manifestation in concrete artifacts (Verbeek 2005). Borgmann contends, "Technology becomes most concrete and evident in (technological) devices, in objects such as television sets, central heating plants, automobiles, and the like. Devices therefore represent clear and accessible cases of the pattern or paradigm of modern technology" (1984, 3). When Borgmann distinguishes between *focal things* and the *device paradigm*, his focus is not on effort or exertion, but rather meaningfulness and the orientation of one's life.

4.1.1 Borgmann's notion of Focal Things/Practices

The word "focal" derives from the Latin word *focus*, which means "hearth" or "fireplace." In the pre-technological time, the fireplace served as a focus for everyday chores, providing light and warmth (Borgmann 1984). In many cultures, fireplaces symbolize social gathering, sharing food, joy, and sorrow. This is seen in the prominent function of the hearth in America (Borgmann 1984), the nostalgic Kamado in Japan (Thompson 2011), and the Indian

notion of Sanjha Chulha (Bhasker 2012). Borgmann contemplates the hearth (fireplace) as the best illustration of focal things that call for deeper intimacy and active participation. He describes focal things as what inspires individuals to participate in them fully, such as running, gardening, crafting, fishing, cooking, etc. For Borgmann (1984), we might enjoy the specific activities of washing utensils, cutting bread, eating homemade bread, and being kindly offered an excellent wine while the meal is being prepared. Preparing the food is part of the focal practice, opposite to the ready-made fast food available with disposable utensils.

The focal activities aim to enjoy family gatherings and culinary traditions, and they have a beginning and an end. Therefore, according to Borgmann, engaging in these activities helps one to improve talent, persistence, stamina, patience, commitment, and observation. One may be tempted to dismiss Borgmann's ideas as overly romantic, a case that is only possible in leisure. Borgmann's concept of the focal thing has drawn criticism for being antiquated and sentimental, with no application to meet day-to-day requirements. For instance, he used gardening and running as examples of relevant hobbies that, despite their apparent enjoyment, did not contribute to social or economic security. For example, one may criticize Borgmann for being overly nostalgic about devices that are pre-technological. On the one hand, we can see the need for being more practical, and see the world as it is today where technology overwhelms us. On the other hand, we can advance the proposal that Borgmann could have looked at modern technology's role in supporting a good life where a much more selective strategy is possible. One may take the example of the postphenomenologist strategy and see that we need not reject all technology as bad, but be selective in looking at the ways they affect us, and then decide whether to go for it or not. However, Borgmann maintains that the device paradigm's lens is what makes us myopic towards focal things. The device paradigm revolves around attributes of instantaneous, ready-for-consumption, clean, time efficient, accessible, ease of use, and convenience. In other words, Borgmann believes that the default mentality for us is that of the device paradigm, and it takes a significant amount of unlearning to see how focal things work. He considers that the commodious nature of modern technology has little relevance over focal things in terms of meaningful engagement:

> Commodities, in comparison with focal things, are highly reduced entities and abstract in the sense that within the overall framework of technology they are free of local and historical ties. Thus, they are sharply defined and easily

> measured. Focal things, on the other hand, engage us in so many and subtle ways that no quantification can capture them (Borgmann 1984, 81).

Borgmann (1984) characterizes this consumptive and commodified approach to technology as the "foreground" of technology. The foreground in question generally precedes in domains such as recreation, consumption, or the standard of life, which were completely under the influence of focal things before consumerism. For Borgmann, one may think about the unattainable warmth in Montana a century ago, but it is readily available today. During that time, individuals were required to partake in the laborious and potentially hazardous undertaking of constructing a fire within the stove and procuring and dividing logs to generate heat (1984, 41). In the case of the hearth, there is the allocation of distinct responsibilities to various family members and the establishment of their respective roles within the household; "The mother built the fire, the children kept the firebox filled, and the father cut the firewood" (Borgmann 1984, 42). In the example of a central heating system, though it provides heat, care associated with a traditional fireplace is missing. Care is understood in the sense of careful engagement, making it impossible to maintain and repair highly sophisticated products.

Borgmann prefers focal things over the device paradigm as it connects people more meaningfully. Contemporary artifacts have evolved into disposable, carefree objects like plastic plates that need little handling. A focal thing is inherently intertwined with its surrounding context and environment through active involvement by the user. He calls focal practices as *deictic discourse* (opposite to the *paradeitic*/paradigmatic approach) that derives its potency from its ability to engage with focused issues, directing our attention and guiding us toward matters of significance. As a deictic discourse source, he delves into how the wilderness is a significant juxtaposition to technology. In contrast to museum artifacts that may lack authenticity, the wilderness embodies qualities such as strength, durability, and timelessness comparable to a temple or sacred space. Borgmann says, "[the] traditional focal things and events of religion, art, and daily practice have lost their commanding places in our world, the firmness of their contours, and their orienting force" (72).

Again, many philosophers have disagreed with Borgmann's ideas regarding the relevance of focal things over the device paradigm. Mitcham (2000) argues that focal things are ahistorical and do not belong to the technological realm. Strong (2000) maintains that not all contemporary devices fit within the parameters of the device paradigm. Furthermore,

Feenberg (2000) contends that the traits of technology that Borgmann (2000) identifies—such as the reduction of things to raw materials, the application of predetermined plans, and the supervision of some persons by others—have existed historically in a consistent manner. Borgmann objects, arguing that we cannot say that the device paradigm was applied consistently throughout history because it can both enable and disengage even within devices. According to Borgmann, technology does not constantly improve one's experience; for example, it can cause one to become less engaged when using a telephone and eliminate opportunities such as in-person encounters and letter writing. Following up on the criticisms, Kellner (2000) makes the additional point that we cannot assume that devices always disconnect as they can be similar to real-world experiences like gardening, hiking, and pet care. He is grateful for the advancements in information technology, particularly cyberspace, which he believes presents a fresh opportunity for human interaction that will likely go undiscovered. It facilitates the emergence of a new reality and offers a fresh avenue for interpersonal communication. He advises against dismantling or limiting new technology habits. Borgmann (2000) disagrees with this and draws attention to the uncertainty inherent in virtual space—a concept he calls *virtual ambiguity*. Campbell's (2000) concept of *cyborg ambiguity*, which illustrates the unpredictable and inconsistent nature of cyborg space, is adopted by Borgmann.

According to Borgmann (2000), mediating a person in the virtual world always carries ambiguity because it is a place where people are released from the constraints that define their lives. He claims that in the consumer world, people go in a circle, from one cyber-encounter to the next, full of hope and expectation. However, what they ultimately experience is dawning disillusionment. He argues that disorientation in the digital age affects not just individuals but also our culture as a whole, posing significant challenges to well-being. In contemporary society, digital spaces have supplanted physical cultural spaces, lacking the sensory and physical richness of face-to-face interactions, leading to "cyber disorientation." This state is characterized by an overload of information and the necessity to multitask, which scatters focus and hinders meaningful engagement. It brings superficiality and restlessness to one's life. He was concerned that we would lose connection with nature, culture, and our embodied social lives due to information technology's rising cultural domination. According to Borgmann, if technology information surpasses tangible reality, there will be an imbalance. Borgmann (2010) emphasizes the importance of orientation for human flourishing in the technological world, where cultural space—the reflection of our physical space—is essential for

understanding and addressing cultural disorientation and reorientation. According to Borgmann, commodifying an object is still acceptable (that users also do, as suggested by Feenberg), but the critical issue is that people themselves have become commodities in cyberspace, reduced to nothing more than the "object of commodification." To restore depth and richness to human life and, as a result, give direction and foundation in a bewildering digital environment, he discusses striking a balance between focal activities and digital places. For Borgmann, if we recover orientation, we can remove the hyperinformation or distracting information; what will remain is the light of information.

Borgmann (2010) questions how we can regain our grounding, suggesting that meaningful order is contingent and discovered through experience rather than imposed a priori. Orientation should be anchored in actual homes, which he signifies as the place where we are involved in active engagement, and such engagements he defines in focal things. Borgmann contends that we should consider the broader picture before deciding where to take a stand. Like Michelfelder's (2000) primary thesis, he asserts that the relational component—which Borgmann defines as the universe of focal things—determines the quality of care. In addition to defending his viewpoint, he values Larry Hickman's concept of "flexible functionalism." Hickman (2000) believed that everything ought to be put to use after passing certain standards of testing. The benchmark for this test is the focal thing, according to Borgmann.

Borgmann (1984) highlights the necessity of a technological reform that achieves a harmonious equilibrium between a deep reverence for the intrinsic value of pristine nature and a mature acknowledgment of the progress and innovations brought about by technology. He proposes a practical method wherein individuals, or at most horses and mules, carry essential objects into the wilderness without causing harm or leaving discernible marks, minimizing the potential for detachment or estrangement. He says the concerns that motivate us to initiate a reform of the paradigm also result in reforms within the paradigm. He contends that although this reform may seem radical to certain philosophers, people must adopt a different way of living to understand the negative impacts of this consumerist society. The reform Borgmann discusses differs from the material world and focuses on focal things, rituals, and group celebrations. Borgmann (1984) emphasizes the need to differentiate between the quality of life and the standard of living. He adopts a favorable perspective towards technology, wherein he calls specific entities and behaviors metatechnological, hence establishing a sustained counterforce against technology. Metatechnological means that engaging with focal things

opens a new way of looking into life in the technological world. For him, the ultimate catastrophe would entail the total eradication of technological advancements, resulting in the forfeiture of all possibilities for further development. The focal concerns acquire relevance inside the technological framework and restore the framework to its esteemed original potential. Borgmann claims,

> If our lives are centered in a focal concern, technology uniquely opens up the depth and extent of the world and allows us to be genuine world citizens. It frees us from the accidental limits of shortness of time, lack of equipment, or weakness of health so that we can turn to the great things of the world in their own right. It frees us for the genuine limits of our endurance, fortitude, and fidelity; and if we fail, we fail where we ought to fail and where we can hope to grow (1984, 248).

Therefore, the only way he sees technology being preserved and improved is through the practice of focal things, and he views this as a remarkable achievement where the authentic human meets appropriate technology.

4.2 Gandhi's views on technology

Though Gandhi has written a great deal, his writings on modernity, technology, human, and social flourishing are not definitive; his views on human nature, his criticism of modernity, and his conception of a good society all contribute to understanding his varied sets of beliefs. Gandhi believed that humans are not separate entities but an essential component of the cosmos, existing with other sentient, material, and natural entities (Parekh 1997). He promotes that there should be interdependency in each entity so that the governing principles of a good society prevent one from dominating the other. To put these concepts into practice, he advocates for Satyagraha (holding onto truth), swaraj (self-governance), sarvodaya (welfare of all), swadeshi (self-sufficiency), ahimsa (non-violence), indigenous development, and inculcation of moral, ethical, and spiritual values. Gandhi's percepts hold true in all spheres of life, such as social, political, economic, or technological.

To define human nature, Gandhi places a high value on truth, which he describes as the quality that unites all things in the universe and keeps people constant even in the face of adversity (Guha 2014). He advocates treating other humans and non-human entities with

reverence and *maitri* (compassion). Gandhi (1910) argues that the integrated evolution of the individual in all domains—social (local empowerment), economic (decentralized), and individual (ethical living)—is necessary to achieve a truly ideal human-technology relation. It is important to remember that Gandhi wanted to move humanity's liberation quest from the "realm of necessity" to the "realm of freedom" (Ghosh 2007). Gandhi did not appreciate the correlation between the increasing desires of individuals and the subsequent increase in happiness. In his perspective, a person with limited desires can experience happiness with solid aesthetic and cultural inclinations. For this reason, he was against modernity and the craze for modern machines.

According to Gandhi, modern technology reflects industrialization and technological supremacy over humans and nature. He perceives the notion of capitalist industrialization as a fallacy, asserting that it will solely result in the exploitation of the villages, either via passive or active means (Gandhi 1936, 226). He often emphasized that a contemporary machine should never replace a human being and should function as a man's tool, helping him to finish the task. However, Gandhi (1910) was aware that machines would serve as a substitute for humans and would lead to the emergence of a civilization powered by machines rather than humans. This is why Gandhi stated in *Hind Swaraj* (1910) that purchasing clothes from Manchester merely causes monetary agony; however, installing the machine in our soul will require us to pay with our blood. Nandy explains Gandhi's recognition of the potential issues that arise from modern machinery and his reasons for supporting local brands (such as Campa-Cola) over foreign (such as Coca-Cola). Vinay Lal (2008) cited Nandy's illustration of Coca-Cola and asserted that Gandhi's decision to renounce it was not a useless act against any specific market but instead a warning against the totalitarian characteristics of contemporary technologies.

Gandhi's viewpoint will face criticism here because, while his views were relevant in the production era, we now live in a time of consumerism. We can recognize the ideas' applicability in the modern era if we understand the ideology that guided their implementation. According to Parekh (1997), we shall understand "the very reason for which there is a need to go back to reading Gandhi and perhaps re-read him" if we carefully examine Gandhi's ideas. Gandhi was right when he observed that contemporary technologies organize people, objects, energy, and information at a never-before-seen speed and scale. Sahasrabudhey (2006) defends Gandhi's position on how, nowadays, a country's ability to wield strategic weapons determines how powerful it is, and the technology it has developed—such as computers, telephones,

electricity, and chemical fertilizers—measures how far it has progressed. He believes that modernization has resulted in significant devastation of human communities worldwide. The value of happiness has shifted from satisfaction to increased consumption.

Gandhi's metaphors, which highlight the distinction between "living in the face of danger" and "living dangerously," help to clarify the relationship between humans and technology. This definition captures a lot of what is going on. Gandhi argues that the primary distinction is that one style of living is purposeful while the other is not. In this contemporary world, technology deprives humans of meaningful engagement and purpose, while genuine human activity is devoid of violence even if the violence is technology induced. Gandhi (1931) warns that if the obsession with machinery continues like this, a time will come when people become so weak and debilitated that they will regret having forgotten the use of beautiful, living machines gifted by God.

Gandhi's solution is not limited to the individual or a single organization but encompasses all entities' collective growth, fostering harmonious relationships between humans and machines. He found the equilibrium of this relationship in the charkha. He believes spinning charkha will break down boundaries between manual and mental labor, help people become more self-reliant, especially individually, and ultimately lead to the resurgence of indigenous skills and practices (Parekh 1997). During India's independence struggle, a single artifact accomplished several goals, including social reform, individual advancement, economic independence, and the resurgence of indigenous industry. Irfan Habib (1992) emphasized the significance of Gandhi's charkha, not just as a symbol but also as a means to resist industrialization. Gandhi thus emphasizes that the nature of the relationship between humans and machines should not be in a master-slave structure but somewhat akin to one with family and friends. This idea of a human-machine friendship is a significant thesis that takes Gandhi into the Borgmannian territory in philosophy of technology.

4.2.1 Neither *technophilia* nor *technophobia*: Gandhi's conception of technology (Charkha) as a friend

Gandhi is often misunderstood as being anti-science or anti-technology. However, Gandhi never explicitly defined himself as a techno-optimist or techno-pessimist; these labels have been applied to him through later interpretations. Many philosophers argue that Gandhi's ideas are often unfairly viewed as limited. Uberoi (1982) recognized the value in Gandhi's

theory of equality between humanity and nature as a framework for understanding various scientific phenomena. Nandy clarifies that Gandhi's opposition was not against technology itself but against "technologism," which created hierarchical divisions between those who possess technology and those who do not, as well as between humans and nature. According to Visvanathan, "In Gandhi's altered organization of science, science would need money the least, and instead of big laboratories, there would be ashrams and gurukuls of science" (1997: 212-44). This vision is embodied in the concept of the "science of Khadi," reflecting Gandhi's efforts to alter the productivity of machines while infusing them with a creative spirit. Gandhi's focus on improving hand tools and his implementation of constructive programs in villages further highlight his commitment to integrating science into daily life. His critique of modern science was not rooted in a disdain for machinery itself but in the injustices and moral failings often associated with its advancement.

Therefore, Gandhi was not opposed to machines but supported those that contributed to human flourishing and growth. His critique of modern science and technology was not aimed at the technologies themselves but at the obsessive pursuit and glorification surrounding them. Gandhi's perspective on technology was characterized by a balanced approach that neither feared nor idealized it, avoiding both technophobia and technophilia. He envisioned a society where both machines and humans had an equal place. He says, machinery has its place; it has come to stay. But it must not be allowed to displace the necessary human labour" (Gandhi, 1925a, 377). Gandhi (1925a) made this remark, highlighting the significance of humans and machines in contributing towards ameliorating human life. He suggests that excessively powered devices are unnecessary since they waste manpower (Gandhi 1925a). Good existence for him is an amalgamation of an equal quantity of human and machine power. He considered the charkha[7] (spinning wheel) as an artifact that causes a harmonious human-machine existence. While spinning cloth on a charkha (as shown in Figure 1), the machine takes human

[7] Charkha is a Persian derivation of the word *Charkh*, which means "circle" or "wheel." Its function is to weave the threads and spin the wheel to make clothing. Historical evidence suggests that it was initially used in Baghdad before arriving in India and China. It also holds the most noticeable icon in Buddhist relics. Before the Industrial Revolution, it was the ubiquitous household item for spinning yarn and weaving cloth. According to Gandhi (1954), it reinforced the idea of work ethics and traditional handloom practices and served as a tool for political liberation by thwarting the import of foreign goods. In the 20th century, it was a widely used instrument in many handloom factories and cotton textile industries. According to Gandhi, everyone should do spinning as they eat, drink, and clothe themselves. For him, it is an industry that enables the people of India not to live as a nation but as a nation producing authentic and equitably distributed wealth.

muscle to function and thus involves technology and human effort in equal proportion. Charkha for Gandhi reflects his essential view about what kind of life he desires. He concentrates on employing technology that enhances the well-being of Humans (capital 'H')[8]. For Gandhi, charkha is both a technical as well as a representational or symbolic artifact having a social function. It performs its technical function of producing yarn and still represents the freedom movement of India from the British. The charkha was not merely an artifact; it was deeply intertwined with people's identities, becoming an integral part of their lives. More than just an occupation, it served as a companion, providing personal space for growth and self-expression while respecting individual autonomy. In that sense, I am using charkha as amicus meus. "Amicus" in Latin means "friend" and "meus" means my, therefore, it means a friend of mine. charkha considers more than physical significance in people's lives as it filled with empty space by providing them a meaning to grow, thrive and flourish. A friend-relationship is more of providing you a friendly space to interact, which charkha was during independence by giving jobs to many and was unforgotten friend in the life of widows. I am using the charkha as "amicus meus", which in Latin means "a friend of mine." The charkha holds more than just physical significance in people's lives, as it fills an empty space by offering meaning, growth, and flourishing. Like a friend, it offers a space for interaction, acting as an 'unforgotten friend' in the lives of widows and enabling individuals to express more of their true selves.

4.3 Reading Gandhi through Borgmann

Both Borgmann and Gandhi believe that the question of a good life cannot be left undefined and cannot be answered by excluding technology. Despite the fact that they come from various historical periods and have distinct cultural backgrounds, I aim to highlight the conceptual proximity of their vision about human flourishing in this section. Their image of a good life is to have a good relationship with technology, where technology does not sideline humanity but aids humans to become better beings inside and out. They held the belief that high-tech innovations are inherently dominating and controlling. Borgmann and Gandhi claimed that the initial promise of technology and the appeal of modern democratic ideologies

[8] When discussing humans, the capital letter 'H' is used to refer to their essential nature as an inseparable participant constantly engaged in genuine connections with the world and its environment. In the contemporary philosophy of technology, the human is an 'h' that participates in particular relations with technologies. In sum, in the current literature, the essential nature of the human being is not a focus.

were fraught with ambiguity. Modern technology offered promises of freedom and liberation, and it was propagated that rejecting them meant opting for confinement, suffering, and impoverishment. Both contend that we are always searching for genuine choices, and technology helps us.

Borgmann (1984) claims that our choices of technology are made in the realm of leisure and consumption, and the difference is too close and hardly visible. For Borgmann, in some cases, people do not have choices, such as between horses and motorcars, shoemakers, and shoe stores. But it is still possible to delimit occasions in peoples' lives where there are no legal or economic pressures, and they can still differentiate between engagement versus distraction (Borgmann 1984). Similarly, Gandhi (1910) talks about the relevance of genuine choices that focus on the value of using technology that provides earnings and helps humans flourish. In line with Gandhi's philosophy, Toynbee (1962) draws attention to the issue of how technology could allow humans to destroy the natural world. Gandhi urges people to look for purpose in life and think beyond the limited goals of material success and economic growth to live in harmony with nature.

Dreyfus (1997), demonstrating Borgman's philosophy as an extension of Heidegger's, elaborates that skills are crucial for achieving a fulfilling life. For Borgmann, the pre-technological dwelling comprises a movement closer to "earth, where meaning is derived through engaging in practices that reveal the world and other humans to us**.** Dreyfus carefully shows why Borgmann was fascinated with the family dinner or a simple community baseball game. Both have the capacity to bring meaningful engagement. These require effort, concentration, and a connection to the physical world. For Gandhi, the same is extremely important. Gandhi (1925b) claims: "The message of the spinning wheel is much wider than its circumference. Its message is one of simplicity, service to mankind, living so as not to hurt others, creating an indissoluble bond between the rich and the poor, capital and labor, the prince and the peasant" (321).

Similarly, elaborating on the ideas of Borgmann, in Higgs (2000), a closeness between Borgmann and Gandhi can be drawn on two different parameters. 1) Focal practices create a symbiotic engagement between the community and its environment with reference to a technological artifact. These practices endorse certain connections between the community and the world through the use of skill and attention. 2) The focal practices create a sustainable

relationship with the environment through local and sustainable living, as evidenced in the example of the charkha. The device paradigm, according to Higgs, causes unsustainable practices that lead to environmental degradation, ultimately forcing human beings to be alienated from nature.

Borgmann (1984) focuses on opting for social fixes rather than taking shortcut methods of technological fixes[9]. He sought a middle ground between high and low technology, sometimes called "appropriate technology." His vision of reforming technology involves not abandoning it entirely but using it sparingly, allowing ample space for focal things to thrive. Similarly, Gandhi (1910, 1945) spoke against using technological fixes to cut corners and favored pursuing social improvements despite their difficulties. He felt that social solutions, however more challenging, provide a thorough and long-lasting solution compared to technological ones, which only provide temporary repairs. Gandhi emphasized what was best for each individual and promoted indigenous technology, which he called "appropriate technology." Charkha, for Gandhi, is the quintessence of such appropriate technology. The broader implications of charkha are discussed in the subsequent section, including the possibility of liberating people from a mechanized world, encouraging meaningful interaction, and cultivating a joyful and prosperous existence.

Despite the similarities, Gandhi would have made certain comments about Borgmann. As Feenberg rightly pointed out, Borgmann neglects to discuss the socio-political factors influencing each particular artifact's making and subsequent utilization. Gandhi's attitude towards technology (and charkha) mirrored his beliefs regarding technology's ethical, political, social, historical, and economic significance in day-to-day living. Charkha has a long history of making its products and disproving foreign ones; thus, it serves a specific practical function other than fostering nostalgia or bringing people together. On the contrary, a hearth won't make someone financially independent. It will not comport with Gandhi's fundamental tenet of swaraj (self-rule). Borgmann's concept of the focal thing is entirely devoid of political and

[9] As demonstrated by instances such as acid rain and lung cancer, reformers often try to address issues by implementing a "technological fix," a term coined by Weinberg (1967). Weinberg explains that these problems have both social and technological solutions. But, the difficulties with the social fix—arduous, unpredictable, and frustrating—have led to a preference for a technological fix.

economic independence; it may not satisfy Gandhi's requirement that the artifact must help realize Swaraj. Gandhi will stand for those low-tech artifacts that help people become self-reliant and recognize their value in contributing to the greater good of society.

Certainly, charkha will not help one to survive in the modern world if that is the question. However, understanding the rationale behind using charkha would aid in understanding the fundamental principle of utilizing artifacts that help humans grow and flourish. Therefore, a Gandhian critique of Borgmann would emphasize on the role of an artifact in providing financial self-reliance. In this regard, the charkha perhaps is a step closer to the reality of the modern world where economic sufficiency of the individual is a foundational aspect for his/her freedom.

4.4 Charkha as a Focal Thing/Practice

The characteristics of the charkha, such as its non-consumptive nature and non-availability (like hearth), suggest that it is more closely associated with focal things rather than the device paradigm. For spinning cloth, individuals must allocate substantial amounts of time to acquire cotton fibers and subsequently exert more effort in converting these fibers into threads. In contrast to easily accessible modern devices like central heating systems, the charkha necessitates a combination of physical strength, endurance, stamina, mental attention, precision, and continuous exertion.

During spinning, the individual can actively partake in dialogues and continue in the collective act of rotating. Similar to cooking, one must be mindful of how much a specific ingredient can come in for flavor while still enjoying a conversation with the person standing next to them. Moreover, as an artifact, it embodies intrinsic goodness and provides people with an "actual home," a place of engagement as discussed by Borgmann, that orients their lives and prevents them from becoming lost in a chaotic world. Through the charkha, individuals can actively engage with artifacts and people, thereby preserving culture and maintaining cultural orientation. It fosters a natural, cultural, and technological balance, aligning with Borgmann's discussions.

Charkha has no means-ends distinction since this is not a pointless mass production where another may substitute one person's part. It is an artistic expression where continuous practice and repetition enhance mastery and precision in executing the skill. Following

Borgmann, charkha has a beginning, a middle, and an end, like the temples' (hierarchical order of reality, which culminated in heavenly majesty), traditional cooking (from making to serving food), and other focal examples. It serves as a means to explore tranquility inside the realm of technology, providing an opportunity for contemplation and establishing a link between historical and future contexts. This is evident when Borgmann discusses Pirsig's contribution. Pirsig (1974) suggested that paying close attention to a technological object, like a motorcycle, might help one find peace of mind amid technology. He believes we must start caring for the artifacts around us to live harmoniously with them. However, Pirsig's idea is critiqued by Borgmann, who believes that technological advancements have made the device carefree, maintenance-free, or unfathomably complex. In the case of charkha, people can interact and create enduring relationships because its parts are simple to maintain and fix. Charkha allows one to attain peace amid daily activities and demands attention.

Another feature of the charkha is the absence of a distinction between leisure and labor wherein individuals derive gratification from their work. However, this may sound like a bigger demand from the user. Borgmann brings in Ferguson (1979), who contends that retrieving water from a well, for example, in the present day, has become a laborious and burdensome undertaking. Even now, we can argue that producing cloth through charkha is a painstaking activity, and one has to sit for a few hours to make a small quantity of yarn. Borgmann believes that the fundamental problem is when we perceive pre-technological things through the lens of current technology, where we are already privileged with less engagement. Here, we miss the benefits of focal points. He points out Boorstin's (1975) illustration of Rebecca's visit to the well, demonstrating that her sole purpose is to fetch water and seek friendship, gather information about the village, and meet her betrothed.

In a manner akin to Gandhi's ashram, individuals of all genders were publicly encouraged to practice spinning charkha. This community activity provided a platform for women and men to converse, socialize, and engage in productive work simultaneously. In Gandhi's ashram, individuals with pre-technological abilities, such as farm workers and homemakers, are not considered unskilled (like in the mechanized world). It would not be an overstatement to claim that the charkha exemplifies our defragmented and integrated existence within the technological world. When it comes to charkha's relevance in today's consumeristic world, it can offer people the necessities rather than excess. Gandhi's advocacy of charkha addresses consumerism and its associated issues, including surplus production, waste, and

disparities in social and economic status. Moreover, this problem of excess is disorienting individuals in the world of consumption, where one has lost the meaning of one's life and existence. So, charkha is relevant today when discussing sustainable production and thoughtful consumption.

4.4.1 Charkha: An appropriate technology, a symbol of economic regeneration, and a tool for women's emancipation

Being a focal thing, the charkha (artifact) maintains an active relationship with people and has additional significance in their daily lives. As described in the section title, there are three crucial aspects of charkha. Borgmann describes the idea of appropriate technology when discussing the "Reform of the paradigm" (Borgmann 1984). However, the other two ideas—economic stability and women's liberation—are the political dimensions associated with the charkha. Gandhi (1910) popularized it to achieve the national and individual aim of swaraj (self-rule).

Household women needed a simple, usable, and portable artifact from which to engage and make money. For Gandhi, the charkha had the emancipatory potential and was easily accessible by women. Women in the early part of the twentieth century in India could not venture out to the industrialized modern factories in towns, and in general, men dominated the scene of factory work. Gandhi believed that getting women to work need not necessarily involve them engaging with modernized machinery, but they could simply start operating the charkha and be self-reliant. The charkha was slow but effective in bringing together the family and communities. The advantage of the charkha is not in its efficiency to produce thread but in its potential to be a medium to help people engage in meaningful ways by being self-reliant, something the modern factories could not. Therefore, Gandhi's employment of the charkha could be seen as an ideal resistance to the alienating forces of industrialization, which favored only the men and women of urban settlements.

Gandhi (1910) advocated using the notion of "appropriate technology" to address the pressing national and global development issues. Appropriate technology is any tool, process, or method that utilizes locally accessible resources in line with regional, cultural, and economic settings. The well-known economist Schumacher (1973) wrote on appropriate-practical technology with a more limited reach in his book *Small is Beautiful* (also see Borgmann 1984). His (and Borgmann's) interpretation of intermediate technology indicates that it is far more

advanced than the primitive forms of technology but also far more straightforward, less expensive, and liberated than the super-technologies of the wealthy. The appropriate technology movement stems from the belief that modern technology should be tailored to local conditions and capabilities rather than being wastefully and disruptively transferred to developing nations.

Gandhi (1910, 1945) chose the charkha as an appropriate technology that emphasizes traditional technological knowledge and complements traditional ecological systems, values, and ethics worldwide. It helps one learn local practices, environmental stewardship, social responsibility, community-based sharing, cultural traditions, sources and meaning, etc. It is a concept closely related to development, in which the focus is on the development of people rather than objects, even though the production of goods and services is considered an essential byproduct. Gandhi's (1925a) use of appropriate technology does not replace human labor with unnecessary and meaningless labor. He believes that any strategy focused solely on utilizing raw materials without considering human labor is doomed to be asymmetrical or would lead to social inequality. He considers replacing human labor with power-driven machines as unethical. He says, "I hold that the machinery method is harmful when the same thing can be done easily by millions of hands not otherwise occupied" (Gandhi 1931, 161). He encouraged small-scale family businesses that outperformed larger industrial models utilized by other nations in terms of output and employment. Gandhi proposed, "large scale technique should give way to small-scale technique" (1954, 174). This principle is central to his theory of decentralization, which emphasizes empowering local economies and governance to foster economic self-sufficiency among people. Therefore, charkha symbolizes the indigenous and appropriate technology that endorses self-reliance and self-sufficiency.

According to Andrews (2005), hand spinning is not intended to displace any existing industry, nor does it solely rely on a single able-bodied individual who monopolizes employment opportunities for others. It makes no entitlements to fulfill one's ambition to get wealthy. Its sole claim is to offer a quick, workable, and long-term remedy to the forced idleness brought on by unemployment. Numerous issues, including hunger and poverty, are brought about by the progressive extinction of India's primary indigenous technologies without the emergence of any new ones. Gandhi was aware that machines would produce an embedded economy—for a select few—but he wanted the economics of justice or true economics (Gandhi

1954). True economics, for him, means *Sarvodaya* is progress and the betterment of all, not just a few.

Charkha provided jobs to thousands of unemployed weavers during the British colonial period in India. It assisted in making khadi cloth from cotton yarn, restarting the cotton textile cottage economy, and ultimately becoming the tool of indigenous industrial regeneration. Gandhi supported the idea that every village should function as a republic, or "panchayat," with complete authority and that every person is an entire unit (Gandhi 1910). Such a society must be highly cultured, where each man and woman are aware of their desires and understand that no one should pursue goals that others cannot achieve through equal effort—this is the true meaning of an authentic and fulfilling existence. However, though charkha does not offer the living standards that one would hope for in the current world, it does enable each villager to be self-sufficient and capable of running their affairs, including protecting themselves against the interests of the outside world.

Spinning has played a significant role in ending the many degenerative practices against women in India, including the purdah (culture of veiling) and other socially restrictive attitudes of men towards women (Jha 2004). Charkha became a means for rural women to come out of their houses and participate in political campaigns. Gandhi (1940) consistently supported women's liberation, their participation in the fight for the country's independence, and their equal standing in society. Women could create clothing, earn money, and fight for India's freedom. It was considered as the "friend and solace of widows" (Gandhi 1940, 85). He claimed that the spinning wheel represented women's purity. Charkha helps women to venture beyond the boundaries of domesticity and dedicates their ethical and intellectual pursuits to the betterment of their existence. It catalyzes women's liberation and empowerment. It was a remarkable approach to connect with women and bridge the divide between their personal, political, and economic lives. It is crucial to remember that khadi could not compete with foreign mill cloth in terms of durability and luxury. That was the people's choice and the price they paid for their freedom. Therefore, charkha dissolved various bonds between the rich and the poor, the capital and the labor, the prince and the peasant, the public and the private, the home and the nation.

To sum up this section, let us ask the question- if Borgmann were to explain the notion of focal thing using the model artifact charkha, how would he have done it? The charkha has

three essential aspects of focal point: (i) engagement, (ii) meaning, and (iii) community, and all three center on developing special skills over time. The two key additional aspects of the charkha that can rationally persuade Borgmann to use it as a specific example lies in its simplicity and environmental friendliness. Borgmann's own model artifacts, such as the hearth, happen to create a sense of togetherness, however, with a price. The hearth is a human activity that does not generate any yield. The charkha has an economic potential which the hearth misses. When one is living in the modern world, this is of utmost importance. In addition, the hearth requires wood, and it contributes to the damage to the environment even if it's on a minuscule scale. The charkha, as a focal point, offers a richer, engaged relationship to the world where the reductionist tendencies of the device paradigm are undercut. By spinning their own yarn, communities take responsibility for consumption, as what is made by them is worn; similar to the effort one takes in producing fire in the hearth, where the heat they experience is their own, and it's their responsibility; unlike a central heating system that they pay for which is externally run with electricity. The charkha is entirely made up and used with local materials, adding to the characteristic of self-reliance of the region. Altogether, had the charkha been noticed by Borgmann, it would be at the top of his list as an example of focal thing.

4.4.2 Addressing possible objections

In this section, I aim to firstly address the potential objections that revolve around Gandhi's endorsement of the use of charkha as an artifact for self-reliance and freedom, and secondly, the chapter's main concern of equating charkha with focal thing. For the former objection, Rabindranath Tagore's and Ambedkar's views are brought in. For the latter, as no prior literature identifies charkha as a focal thing, two possible criticisms are leveled and subsequently clarified.

The first objection is from the well-known Indian poet and writer Rabindranath Tagore, who disparaged Gandhi's idea of spinning charkha. Tagore's (1925) three significant criticisms are: non-intellectual activity, lack of distinction between leisure and labor, and considering artifacts (charkha) as epicenters. Tagore believes that spinning charkha is a non-intellectual occupation whose sole function is to calm people's minds so they can deal with the tension brought on by colonialism. He claims, "[by] doing the same thing day after day, a mechanical skill may be acquired; but the mind like a mill-turning bullock will be kept going round and round a narrow range of habit. That is why, in every country, man has looked down on work

which involves this kind of mechanical repetition" (1925, 4). He argues that man's survival instinct will stifle his intellectual desires, which will have a detrimental effect on him as he spins charkha for several hours. Note that Tagore is questioning Gandhi's idea that the charkha has a socioeconomical role even if it is a monotonous activity, that of self-reliance and autonomy.

Gandhi (1925a) responded to this criticism by saying that the poet addresses the issue within his unique creative universe, delivering concepts in novel and alluring ways. However, charkha reveals the hidden and actual potential of discarded and worn-out items. Even though it is a repetitive task, like building a fireplace, and nothing new comes out, there is still delight in the process of finishing the work and taking pleasure in other people's company. The charkha symbolizes more than just the physical relationship between humans and objects; instead, it unlocks the multifaceted sensitivity of the body, enabling individuals to acquire spinning talents and develop their character. For Gandhi, charkha is not a mindless and unintellectual pastime, requiring focus and discipline to create superior quality yarn. The second critique is that Tagore finds it undesirable that charkha uses leisure time to produce positive and productive work, thereby blurring the distinction between leisure and labor. Gandhi responded that he was not asking people to give up their jobs and engage in spinning activities. He requests thirty minutes to be added to the daily activity, which offers substantial participation. Gandhi is of the opinion that leisure time should involve mental and physical labor rather than engaging in works restricted to the mind alone. While spinning charkha, labor becomes leisure when done for enjoyment, and labor becomes leisure when it helps to fulfill one's necessities. The third critique of Tagore pertains to Gandhi's notion that a machine should be the center of a man's existence. Gandhi retorted that machines are here to stay and have a distinct place in people's lives. Even though he opposed modern machinery, he acknowledged that it was necessary for human existence. He aimed to establish a balanced partnership between humans and machines, ensuring that neither dominates the other.

The second objection is from B. R. Ambedkar (Indian reformer, political figure, and head of the country's constitution drafting committee), who challenges Gandhi's notion of employing charkha as a leisure tool (Moon, 2013). According to Ambedkar, leisure is everything that reduces human effort and provides people with more physical fulfillment. That is only possible when a machine replaces a human. He believes the person who criticizes modern machinery and civilization will suffer. He asserts, "Gandhism, with its call of back to

nature, means back to nakedness, back to squalor, back to poverty and back to ignorance for the vast mass of the people" (Moon 2013, 284). When Gandhi talks about the modern machine, he is not talking about abandoning all machines but appreciates the ones that flourish with humans. He would view the extinction of all machines as a catastrophe and would not want it to happen. If we are using machine power only, it means, "we are destroying the matchless living machines viz., our own bodies by leaving them to rust and trying to substitute lifeless machinery for them" (Gandhi 1933[1971], 69)

To defend the Gandhian position, I must say that the focal activities, such as spinning cloth using charkha and building fires, provide a more significant and profound level of engagement than their more sophisticated counterparts. If I apply Ambedkar's concept to comparing charkha and modern mills in the apparel industry, the mills will produce garments more efficiently. Still, charkha holds significance in terms of its meaningful engagement, encompassing skills, safety for environment, and the preservation and evolution of tradition. Borgmann's example of capon and junkie are both associated with food, but capon possesses a more profound level of involvement. Consider the comparison between conventional hearths and contemporary room heaters. In a traditional hearth, it is possible to manage the hearth, and its repair and maintenance are in the hands of users. However, this capability is absent in room heaters once they cease working. One must go to the store for its replacements. Indeed, it is accurate to say that the lower the level of advancement of an artifact, the higher the level of user involvement.

I believe participating in these focal activities can build a sincere link between humans and the world and save the heritage in its genuine state. For example, Balinese palung salt, produced by ancient salt-making techniques faces the threat of extinction due to contemporary and more efficient methods of extracting salt from saltwater (Rochwulaningsih et al. 2019). Owing to modern salt production techniques and the proliferation of commercial activities in coastal areas, such as the expansion of the tourist sector and the establishment of hotels and resorts, salt farmers have been compelled to transition from salt production to occupations oriented towards tourism. Therefore, it poses a threat to the maintenance of conventional palung practices.

Unlike Gandhi, I am not suggesting that we abandon modern industries, such as the mill sector's use, and revert to using the charkha. Even when Borgmann (1984) explains

Sheehan's running example as a focal practice, he is not entirely abandoning technology but limits its use. Runners favor footwear with lightweight and shock absorption capabilities but would not appreciate physical activity from a treadmill. Comparably, in the instance of Balinese palung salt, workers can keep their jobs and preserve the traditional method of extracting salt if they are given some engaging technological assistance and a sense of worth for their work in terms of income. Through these focal things, Gandhi and Borgmann want to revive meaningful engagement using technology, where humans can flourish along with nature.

Let us move to two possible objections about the crux of the chapter. Firstly, one may claim that identifying charkha as a focal thing may involve compromising and limiting Borgmann's own idea. There is a characteristic feature that Borgmann describes when a focal thing is at work: enhancement of skills through deeper engagement with the artifact. One may, therefore, object that the charkha is a simple artifact that does not require any deeper engagement or skills that usually takes time to build. Any person can learn its operation if willing to spend little time sitting in the same place for a few hours. Borgmann's own examples such as the hearth and musical instruments are slightly complex. In response, we need to be aware that the deeper engagement is a matter of degree and perception. For a novice onlooker, the movement of the charkha might look like a simple act of rotating a wheel with one hand and using the other hand to make the thread. Easy as it may seem, the activity has its own deeper levels of skilling that involve serious engagement. Much of this knowledge falls in the category of learning through imitation and tacit understanding through a skilled master. The handloom weavers and the subsidiary charkha operation rely on the fine skills of the artisan in getting quality threads from cotton. Therefore, this possible criticism of lack of deeper engagement in the case of charkha is not very compelling.

The second possible objection could be about the cultural contexts in which the charkha functioned. Borgmann's focal things are employable as alternatives to the device paradigm in order to neutralize the disengaging tendencies of modern technology. We can see that the charkha is situated as a symbolic artifact in the specific cultural context of India's freedom struggle. Therefore, one may level a criticism that falling back to the charkha currently may not be the same as falling back to the hearth as the latter is still perhaps a meaningful solution, whereas the former is not practical. The charkha cannot be, therefore, an alternative to other forms of producing threads in the modern context. However, we can again see that underestimating the anachronistic character of the charkha is again the result of thinking from

the point of view of the device paradigm. What is needed and not, and what is possible and not, depends on the socio-economic milieu in which we are situated, namely, consumerism and the neo-liberal market.

In contrast, in many parts of India, cottage industries still rely on the use of the charkha. The government subsidizes these initiatives to promote sustainable practices and preserve traditional skills. Therefore, the need of the people and the question about what is possible can point back towards the charkha if we think about the situation from a non-consumerist approach, a claim that this chapter already discussed in section 4.4.2 in dealing with criticisms against Borgmann.

4.5 MEAT (Meaningful Engagement with Appropriate Technology)

While the idea of appropriate technology, as discussed earlier, was explored by Borgmann and Gandhi, the primary contribution of this thesis is to expand focal theory to encompass a broader range of values that fosters meaningful human-technology engagement. Such meaningful engagement with artifacts provides people with a sense of purpose, making these technologies central to their lives. The key feature of MEAT drawn from Borgmann and Gandhi include a focus on the essential nature of humans (H), the idea of self-sufficiency, and the emphasis on collective welfare and equilibrium between human, nature and technology.

Gandhi's and Borgmann's retraction towards pre-technological artifacts as a critique of modern technology is explicated in this chapter for gaining the idea of meaningful existence through appropriate technology within the same socio-historical epoche. The important concern for bringing meaningful engagement with technology is not a "how," that is, how we use something or how something works, but "why." That is, why should we go for some technology? This shift from how to why is rather important. Both thinkers ask "why" the constant urge to maximize efficiency. When Gandhi questioned the replacement of trains with planes, asking why people needed to travel so quickly, he wasn't opposing the artifact itself. Instead, he addressed modern society's restlessness, where individuals are engrossed in consumptive activities. The pursuit of perfection often leaves 'little space' to consider if it is indispensable. Modern devices may offer relaxation and comfort and provide people 'sufficient time' with so many other options. However, it fails to provide 'sufficient space' for individuals to develop their skills and become better beings. Both thinkers seek answers to dissatisfactions stemming from our rapid progress to an alienating, attritious modern life. The answer to these

issues lies in revolving our life around focal practices and things, such as the charkha. If the previous chapter highlighted the phenomenon of jugaad as an outbreak of modern global technology, this chapter brings forth the remedy, an engagement with technologies that tend to the essential aspects of humans (H).

I am not restricting the concept of a focal thing to a specific set of pre-technological artifacts; instead, I add the criterion of self-reliance from Gandhi that allows for the inclusion of more items that brings in meaningful engagement, and sustainability. The chapter identifies charkha as an artifact of self-reliance focused on minimizing consumption and fulfilling the necessary needs of humans. The only difference between Borgmann and Gandhi lies in Gandhi's view about the reality of technological life where he understands that modern technology is here to stay. Even though Gandhi was not a fervent supporter of contemporary technologies like the mill industry, he knew that using machinery was 'inevitable.' He asserts that the utilization of machinery is deemed permissible when it helps the collective welfare of all those involved. Therefore, he emphasized maintaining an equilibrium between nature, technology, and human (human-artifact-world). His idea of a fundamental education encompasses manual labor, a constructive attitude toward work, and reverence for skills. This is a direction which Gandhi took that shows an intellectual affinity to Borgmann's views.

MEAT not only promotes meaningful relationships but also makes it practically feasible to engage with it through the concepts of repair and maintenance, thanks to its low-tech nature. This idea stems from the discussion in the previous chapter, where we observed that low-tech approaches tend to offer greater transparency, along with more opportunities for repair and maintenance, thereby fostering deeper engagement. I am incorporating these ideas into MEAT because they represent a crucial step toward achieving deeper and more meaningful engagement. This requires technology to play a more significant role than merely being a functional artifact in one's life.

4.5.1 Engaging with technology as repair and maintenance

Borgmann advocates for technology that is simple to handle, maintain and repair; characteristics typically found in low-tech solutions. Borgmann illustrates this with examples from pre-technological eras, where interaction with objects and their repair were straightforward. He argues that modern devices erode the cohesive and engaging nature of pre-technological objects by concealing their machinery and turning them into commodities. This

shift, exacerbated by a lack of scientific, economic, and technical literacy among people, has led to a diminished genuine engagement with technology. Borgmann discusses how this contributes to people's inability to maintain and repair modern technological devices. He explains that commodities are designed to be disposable, such as napkins and cans, making maintenance and repair impossible in many cases. Furthermore, he says that sophisticated products like tableware and plastic dishes are designed to be carefree, leading to neglect in care and maintenance. For instance, microcomputers, while marketed as user-friendly and easy to operate, actually highlight the significant gap between their user-facing functions and the complex machinery behind them, making them challenging for users to repair. Those commodities he believes not also exclude care and repair, but also the exercise of skill, the bodily-engagement, and the context behind them:

> The machinery of a device does not of itself disclose the skill and character of the inventor and producer; it does not reveal a region and its particular orientation within nature and culture. In sum, the machinery of devices, unlike the context of things, is either entirely occluded or only cerebrally and anonymously present (1984, 48).

So, this unfamiliarity with the machines of the devices discourages engagement and makes the ends independent of means.

Although Gandhi didn't explicitly discuss repair and maintenance in pre-modern technologies, one can infer insights by contrasting the simplicity of tools like the charkha with modern sewing machines. Individuals can easily disassemble a charkha to identify the issue in the event of a malfunction. Even my grandmother, who lacked formal education, possessed the knowledge to troubleshoot and fix the charkha if needed. In contrast, understanding modern machinery can be challenging for educated individuals. Low-tech like the charkha are inherently easier to repair and maintain, so they remained integral to people's lives for extended periods. Their simplicity fosters accessibility and empowers users to address issues independently, contributing to their longevity in everyday use.

In previous chapter, I discussed how Verbeek (2005) acknowledges that repair and maintenance are feasible for high technologies. However, the distinction lies in the accessibility and ease of repair. In low technologies, individuals can readily open the artifact and address issues, which tend to be cost-effective and straightforward to fix. Conversely, with high

technologies, there may be delays in obtaining replacement parts or services, sometimes exceeding the product's value. Importantly, this reliance on technicians for repairs severs the direct engagement between users and their technology. Consequently, individuals may opt to discard rather than repair intricate technologies. However, with low-tech, there is greater transparency and more opportunities for repair and maintenance, which in turn fosters increased engagement. By actively involving oneself in the artifact and its functional aspects, one can develop a long-lasting relationship with it, making the artifact more relevant and meaningful in one's life. Therefore, Authentic engagement occurs when an individual interacts with an artifact in a way that adds value and meaning to their life, drawing them closer to others, the environment, and the artifact itself.

4.6 Concluding Remarks

The chapter tried to cross-culturally identify the notion of a focal thing in the artifact charkha. Gandhi's return to the pre-technological charkha was a mode of resisting rampant industrialization and modernization. However, we saw in this chapter that the charkha not only occupies a mere symbolic role but also captures the various tenets of the focal thing Borgmann pointed out. The chapter also opens up certain academic directions. There are a few criticisms of Borgmann's philosophy, to which I think the charkha provides the compelling answers. The first criticism of Borgmann's philosophy pertains to his reliance on pre-technological examples. In this context, charkha is an archetypal instance encompassing mechanical and human resources. The charkha, therefore, falls into Heidegger's (1977) notion of *techne*, as it integrates traditional mechanical craftsmanship with contemporary engineering methodologies reminiscent of the mechanisms employed in antiquated windmills. However, claiming that only pre-technological artifacts can uphold the focal relation reflects a narrow perspective. Any machine that requires substantial human engagement, irrespective of the level of technological evolution, can establish and foster focal relations. This is where Borgmann differs from Gandhi as Gandhi was much more realistic about the emergence of modern technology compared to Borgmann.

The second academic direction is about the selective approach that Gandhian philosophy adds to Borgmannian literature. Gandhi does not ignore the disadvantages of choosing low tech over high tech. He believes that every good work contains some element of evil. We ought to work on endeavors that result in the greatest amount of good and the least

amount of evil. We are aware of the inimical impact we have inflicted upon our environment in our pursuit of growth and advancement. For instance, if we read from Borgmann, upon returning from the woods, individuals savor the moment until their next expedition. This is why Borgmann highlights that we are talking about 'voluntary simplicity,' 'back to basics,' 'self-care in health,' 'neoconservatism,' 'arts and crafts,' and others. Like Borgmann, I hope replacing the device paradigm with focal things will lead to better engagement in using devices that act as focal things. Thus, this kind of reform entails adopting a discerning approach towards technology in private and public realms to preserve traditional values of excellence and promote familial cohesion.

Chapter 5
Conclusion

We have seen the famous existential quote "everything has been figured out except how to live."[10] I believe that the quote may be modified as "everything has been figured out except how to live with technology." This thesis takes a pluralistic and selective position in the debate over engagement with technology. It is pluralistic because it draws from ideas of both classical and contemporary philosophy of technology, namely, the works of Heidegger, Borgmann, Gandhi, and the postphenomenologists. The thesis works through the question: how can we re-imagine engagement by emphasizing the essential human H that engages with appropriate technology? The thesis is selective because it does not consider all technology as appropriate. The classical philosophers of technology warned technology for its harms and romanticized low-tech that enhances human flourishing. The postphenomenologists, on the other hand, celebrate technology for its infinite possibilities and multitude of experiences. The motive for this thesis originated from a counterfactual question: if Heidegger sees the postphenomenological studies on technology, what would be a possible reaction? We know that Heidegger ridiculed modern technology for its complete lack of attention on the essential human nature, whereas the postphenomenologists distanced their intellectual radar away from any general authentic "human" and other negative effects of technology. Borgmann and Gandhi focused on the questions of what it means to be an authentic human and what is essential for leading a meaningful life. This study, therefore, seeks to reinvigorate the importance of cultivating the idea of being human in the light of overwhelming technological experiences. Not all technologies are beneficial to humanity, and I aimed to identify those technologies that foster authentic and meaningful human-technology relationships. Ultimately, the goal is to restore a 'general condition of human existence' that has been overlooked by contemporary postphenomenology in defining human-technology relations.

It may be noted that the thesis provides only an outline for good human-technology engagement through Borgmann and Gandhi. In the world of consumerism, technologies as well as humans are expendables. The intrinsic worth for technology and humans is brought back through the proposal of MEAT. MEAT integrates two core concepts: meaningful engagement

[10] This is an allegedly Sartrean quote, "tout a étéprévu, sauf comment vivre" attributed to Sartre. Neither the French nor the English sources conclusively relate the authorship to Sartre.

and appropriate technology. This fosters a deeper connection between humans and technology, emphasizing the cultivation of virtues, skill development, and character building as seen in chapter 4. As technological artifacts become more advanced, the opportunities for genuine engagement tend to decrease—an observation explored throughout the thesis. Chapter 2 sketches the theoretical background for the thesis with critical attention to postphenomenology. Chapter 3 builds on the findings from earlier sections by examining how low-tech solutions foster more engagement compared to high-tech ones, using the case study of jugaad. I categorize jugaad under non-standard engagement due to its lack of designer-imposed obligations and standards. The conclusions drawn from this chapter illuminate the pitfalls of high-tech and the benefits of low-tech, setting the stage for the next chapter. It is obvious that jugaad is an outcome of modern technology. Metaphorically jugaad 'bleeds' from modern technology because of the universal attitude of contemporary designs towards user environments. We often fail to appreciate the notion of engagement that is pivotal in the working of a technology. In the developing world, users are left with technology but without means for maintenance and repair, or infrastructure. I use postphenomenology to capture the ways in which jugaad changes existing human-technology relations. I consider this as a symptom of a larger issue. That is, modern technologies are opaque and complex. They act more as magic rather than as transparent devices, for example, when one turns a switch, there is heat; losing the engaging process of creating heat as in the low-tech contexts. In the discussion on jugaad, it must be reiterated that the phenomenon is a result of stifle amongst the common users, stifle for resource. When a user does not get the expected engagement out of a technology, he or she is in a constant struggle to realign the technology to its original function. The chapter highlighted that when going frugal is not a choice, users resort to ingenious ways to get the technology back on track. Jugaad is, therefore, a startling reminder that modern technology is one-dimensional. That is, modern technology works well when all its supporting arms such as repair and maintenance, infrastructure to run the technology etc., perform well. Without its supporting arms, modern technology is ineffective. Modern technology conceals its nature, both literally and metaphorically. The function of modern technology is like the beautifully chopped pieces of meat one gets in a supermarket where one is ignorant of the workings of the butchery in the backstage that brings it forth. Jugaad is, therefore, a peep into the backstage, an attempt to reconfigure the backstage with whatever available at hand.

Gandhi and Borgmann believed that technologies can indeed play an active role in creating a sense of meaningful living where the human user has a role to play. Chapter 4

explains the main aim of the thesis by exploring meaningful engagement with appropriate technology, particularly through low-tech solutions. Using the charkha as an appropriate technology model, I discuss how it makes people self-reliant, brings back indigenous skills and practices, gives people economic and social security, and takes into consideration ecological concerns. Meaningful engagements promote the welfare of all by considering social, economic, and environmental factors. In this chapter, I intend to expand on MEAT slightly and then provide possible limitations. I do not confine my definition of MEAT to any specific artifact or any artifact from a particular era, such as pre-technological or pre-modern. Instead, any artifact that adheres to three key factors will foster authentic engagement: ensuring human autonomy by resisting the manipulative influence of technology, emphasizing upskilling, and fostering human-to-human corporeal interactions. These three are continuous with the philosophies of Heidegger, Borgmann, and Gandhi discussed in previous chapters. Therefore, below I provide the road ahead. These are potential way points that can be addressed as we go along the pluralistic yet selective approach to technology in MEAT.

5.1 Ensuring human autonomy by avoiding the manipulative influence of technology:

Autonomy typically means self-governance and the capacity to make decisions independently. Postphenomenology asserts that most actions and decisions are technologically mediated. Agency is seen as shared between humans and technology. According to this view, humans are not the sole originators of moral agency; instead, technology mediates intentions. Autonomy is viewed as a shared process between humans and artifacts rather than an individual domain. As we have seen previously, postphenomenological thinkers argue that machines, like humans, are not neutral in human-technology interactions; they possess a form of technological intentionality that influences human behavior and task execution. This perspective challenges the traditional notion of independent subjects and objects, highlighting their interdependence. However, I believe that this influence of values from technology should not be at the expense of what humans really need and care for. In this thesis, I aimed to emphasize the independent existence of the subject, as having an independent perspective is crucial for understanding what is right or wrong. This need not be interpreted as a march back to instrumentalism, because in instrumentalism the role of technology is belittled. In Borgmann and Gandhi, technology has its role in shaping human experience, albeit in a positive manner. Gandhi is a proponent of non-violence. He believed that there is always a tripartite choice available for human beings ranging between violent action, inaction, and non-violent action. According to him, we must never

choose inaction. For Gandhi, the human subject is responsible for the choices he/she makes, and if there is a choice available, one has to tread the road very carefully so as to choose minimum violence as possible; but not inaction. So, for Gandhi, a passive existence among the influence of technology is denied in favor of a much more enhancing experience with a technology that is the lesser of the evil. Given a choice between 'no action' to improve social inequality and a harmful technological solution, Gandhi would go for the latter. Clearly, he prefers some action (be it good or bad) over inaction. However, if we have a choice to go for a harmless technology (non-violence), we must always favor it. Without this individual perspective, we risk falling into the trap of a subject-object loop, making it challenging to identify and address major shortcomings. In MEAT, the human subject is not someone who falls prey to the manipulative influence of technology but retains a subjectivity to assess the dangers of modern technology. Of course we change with technology, however, this should not mean that we accept whatever technology that comes our way.

Take the complex issue of virtual rape. Virtual rape's nature is considerably more convoluted, lacking the simple mediation relations in our interactions with everyday technology. This complexity arises from the unpredictable and unforeseen consequences of virtual worlds, making it challenging to gauge the full impact of virtual reality technologies. Engineers may develop technology responsibly with the best intentions, but the ultimate repercussions remain uncertain. However, Verbeek talks about anticipatory ethics and responsible innovation. The challenge lies in the intricate, multistable nature of the technology and its potential consequences, which are challenging to predict during the design phase—an issue often referred to as the Collingridge dilemma (Genus & Stirling, 2018), or control dilemma. Therefore, the focus should not be to side-step the issue of autonomy by distributing it between humans and artifacts but on preserving autonomy within humans. Technological advancements that diminish human autonomy cannot be considered as fostering an authentic relationship with humans. The key point is that when humans interact with artifacts, they should retain the ability to use their intellectual capacities to determine what is morally right or wrong.

5.2 Emphasizing Upskilling:

Technology has profoundly changed us, with technological advancements both enhancing and diminishing our skills. Vallor (2016) illustrates how, as we increasingly delegate human tasks to technology, simultaneously generate/degenerate our abilities, both upskilling

and deskilling ourselves. For instance, while smartphones have opened up countless ways to interact with the external world, they've also led to us forgetting our friends' phone numbers. In the future, driving may become obsolete as autonomous vehicles take over, no longer requiring us to control the wheel. The idea of offloading work to machines was originally intended to divide leisure and liberation—the prospect that by allowing machines to handle mundane and tedious tasks, we would gain more time for personal growth and self-enhancement. However, rather than leading to liberation, we often find ourselves caught in dependency, distractions, and mind-wandering—particularly with artificial intelligence and big data (Vallor 2016). In a world flooded with technological advancements, it can be difficult to discern whether technology enhances (upskills) or diminishes (deskills) our abilities. I contend that only those technological artifacts, such as the charkha or the hearth, tend to skills and impart value. Automation, therefore, comes with a larger threat of diminishing our ability to meaningfully engage. Multitasking on a computer can lead to unnecessary stress and a sense of fragmentation. These interactions with technology do not foster meaningful engagement. Take, for instance, GPS technology, which assists people in finding directions and traveling with ease, eliminating the need to ask others for help. However, heavy reliance on GPS has led to a reduction in spatial awareness and skills compared to the art of navigating with the position of stars. In the modern context, within their technological life, people often become hesitant to interact with others, resulting in a disconnection from the physical world, diminishing engagement with their surroundings and other human beings. Let's take a slightly scaled up example of Borgmann's: climbing mountains. If one were to look at the amount of technologically assisted mountaineering, it would soon become a reality that literally anyone can conquer any mountain, Consider the case of Mount Everest. The base camp of Mount Everest is flooded with many aspirants who just want to get the result irrespective of the technological means. Contrast this with how old school mountaineering works which is more involved as well as demanding. Even if technology benefits people, we must assess its necessity and potential impact on shaping character. Rather than focusing on making artifacts more ethical, we should concentrate on cultivating values in individuals, as this will enable them to use technology in a more responsible and ethical manner.

5.3 Human-to-human Corporeal Relations:

The third aspect involves using technology to liberate humans from monotonous tasks and to create more human-centered, physical spaces for interaction. In this context, technology

can play an emancipatory role in shaping the human essence. We should shift our ethical focus from asking, "How can I plant virtues in technology?" to "How can I improve myself by cultivating virtues within me?" Some might argue that we can instill virtues in artifacts, allowing them to evoke behavior similar to those generated by human interactions to act in a morally appropriate manner. One could claim that relying on an artifact frees others from the responsibility of human care, as Verbeek notes, many people prefer care robots over human help when sick, feeling less burdensome to others. However, I argue that while care robots may be more precise, they lack the warmth and care that comes from human interaction. I am not critiquing all technological use or advocating for a return to a world without technology, but rather emphasizing the importance of artifacts that foster more corporeal, human-centered relationships. It would be even fitting to leave such jobs to a human when technology cannot replace humans in that particular context, such as in the case of care robots. After all, the human being is a social being. It requires social spaces where technology can play the role of a facilitator at best. One can better understand it with Borgmann's distinction between good and bad burdens. Bad burdens are those where the effort to relieve them exceeds the benefits they provide. Borgmann argues that while technology may reduce certain burdens, it often undermines the inherent values and care associated with them. These burdens are frequently viewed as unnecessary and harmful to individual and societal well-being. The source of these burdens lies in technology's promises of ease and comfort, which, in reality, can lead to alienation and disconnection from genuine experiences. Good burdens are those that enrich experiences and add meaning to life. They require continuous effort, reflection, persistence, and engagement, leading to valuable outcomes. Borgmann highlights good burdens, like cooking or writing a letter to a friend, as activities people willingly embrace because they bring joy and satisfaction. This is similar to Gandhi's example of the charkha, which demands constant participation and involvement. Good burdens carry the responsibility of achieving a sense of accomplishment and engagement, helping people develop skills, fostering physical relationships with others, and connecting with the world in meaningful ways. In this sense, a good relationship with technology resembles a friendship where reliance on it enhances rather than diminishes one's sense of self. Such a relationship is free from manipulation or control, allowing one to exercise autonomy in a positive direction and build skills. Therefore, engaging with technology in this way adds depth and richness to life.

MEAT is open to several criticisms. One key issue lies in our existential shift from a production-based era to one dominated by consumption, where an overwhelming array of

options makes it difficult to identify authentic choices. In today's consumption-driven society, the sheer abundance of options introduces a layer of complexity to personal fulfillment. This abundance can lead to a paradox of choice. While MEAT focuses on the simplicity of decision-making, it may be challenging to fully understand the modern world through MEAT's current framework. I addressed the need to critically evaluate our choices and lock onto appropriate technology, but did not adequately consider how consumer culture shapes personal and social experiences. In its present form, MEAT falls short in several areas, including the notion of subjectivity, ethical complexities, and the need for case-by-case approach in policy-making.

The concept of meaningful engagement may look inherently subjective, as it varies from person to person in their engagement with a technology. Some individuals may find fulfillment in certain technology-driven experiences, such as online chatting or gaming, where the virtual world feels more real and meaningful than physical forms of engagement. For many, the virtual world offers a richer sense of connection and satisfaction than traditional physical engagement. However, these virtual engagements reflect vanity. They are available at the cost of actual corporeal engagements. As I mentioned in the introduction about the difference between online classrooms and real classrooms, the difference is that in the former, we miss out on something quintessentially human; of asking, critiquing, doubting, clarifying ideas from a real human with flesh and blood. Therefore, a deeper exploration of how MEAT addresses both physical and virtual engagement is necessary to understand its relevance to different individuals. Excluding or undermining those who derive significant value from virtual-social engagement would result in a one-sided perspective. There is an opportunity to expand the framework by incorporating the plurality of meaning in engagement, recognizing that not all, but some technological artifacts can significantly enhance people's sense of purpose and meaning in life.

Moreover, the MEAT does not adequately address the ethical complexities introduced by new technologies such as AI and Big data, nor does it provide concrete ethical guidelines to tackle these concerns. While the thesis emphasizes the need to engage in discussions about these issues, it falls short in offering solutions on how to address them. Technology can no longer be neatly classified as purely good or bad, as the same innovations that benefit humanity also create significant challenges. For example, apps used during the COVID-19 pandemic helped track infections and ensure safety, but they also led to data breaches. In such cases, abandoning the technology altogether is not a feasible option. Therefore, there is room for

improvement within MEAT, particularly in the ethical domain, to explore how it can help navigate and resolve such dilemmas.

Lastly, although MEAT shows theoretical promises via Heidegger, Borgmann, and Gandhi, there is ambiguity in its practical application. A key challenge is the potential incompatibility between the principles of MEAT and the reality of modern life, where survival is largely dependent on technology. The current version risks overgeneralizing modern technology's impact, failing to account for high-tech innovations that enhance human well-being and foster meaningful connections rather than alienation. The road ahead for MEAT is to see that in hi-tech fruitful engagement is perhaps possible. There are cases where starting from the design all the way up to recycling, the user can play an active role. Therefore, the lessons from Heidegger, Gandhi and Borgmann can be translated to hi-tech by making them shift their manipulative structure. This, however, is a much more ambitious project!

References

Achterhuis, H. (2001). *American philosophy of technology: The empirical turn*. Indiana University Press.

Anand R (2014) When an earthquake hit Gujarat, he "Mitticool," a clay fridge that runs without electricity.https://www.thebetterindia.com/14711/mitticool-rural-innovation-nif-mansukhbhai/

Andrews, C. F. (2005). *Mahatma Gandhi: His life and ideas*. Jaico Publishing House.

Apio, M. (2021). Eco-friendly food dryer reduces food waste, improves farmers' incomes in Uganda.https://realiti6.wordpress.com/2021/02/01/sparky-food-dryer-utilizing-agricultural-waste-to-enhance-food-security-and-conserve-the-environment/

Apollo. (2021). Article 22. https://article22.com/pages/about

Aristotle (350 BCE). *The nichomachean ethics*. (W. D. Ross, trans & eds.), Oxford University Press. (Originally published in 1954).

Ash, J., & Simpson, P. (2016). Geography and Post-phenomenology. *Progress in Human Geography*, *40* (1):48–66. https://10.1177/0309132514544806.

Aulbur, W. (2018). Frugal innovation is more than just jugaad. https://www.thehindubusinessline.com/specials/auto-focus/frugal-innovation-is-more-than-just-jugaad/article6837864.ece

Awasthi, R. K. (1999). Technological transformation and relevance of Gandhi in modern India. *Indian Journal of Social Work, 60*(4): 508–524.

Bahadur, A., & Doczi, J. (2016). Unlocking resilience through autonomous innovation. Overseas Development Institute, London. ISSN (online): 1759–2917.

Baker, L. R. (2007). *The Metaphysics of Everyday Life: An Essay in Practical Realism*, Cambridge: Cambridge University Press. 10.1017/CBO9780511487545

Barodawala, B., Banerjee R., Roy, S., & Kapur, V. (2015). "Jugaad"- The perennial short-term solution. *World Journal of Social Sciences, 5*(2): 163–176.

Basu. (2019). Kulhads aren't exactly the eco-friendly alternative to plastic cups you thing they are. *The Print*. https://theprint.in/environment/kulhads-may-not-be-the-eco-friendly-alternative-to-plastic-cups-you-think-it-is/290532/

Basu., Ramaswami, R., Banerjee, P. M. & Sweeny, E. G. (2013). Frugal Innovation: core competencies to address global sustainability. *International Journal of Global Sustainability, 2*:63−82. 10.13185/JM2013.01204.

Baxter, D. (2019). Thabak bomb boats: repurposing war remnants in Laos. https://www.awaygowe.com/laos-bomb-boats/. Accessed 10 August 2021.

Belchandan, P. (2020). Jugaad to Frugal Innovation and beyond. https://uxdesign.cc/jugaad-to-frugal-innovation-and-beyond-67ab2cd10509

Bhamla, M. S., Benson, B., Chai, C., Katsikis, G., Johri, A., & Prakash, M. (2016). Paperfuge: An ultra-low cost, hand-powered centrifuge inspired by the mechanics of a whirligig toy. *Nature Biomedical Engineering*. https://doi.org/10.1101/072207

Bhasker, G S. (2012). Sanjha Chulha: Flame of Shared Cooking Re-ignited. *Hindustan Times*. https://navdeepasija.blogspot.com/2012/04/sanjha-chulha-flame-of-shared-cooking.html

Birtchnell, T. (2011). Jugaad as systemic risk and disruptive innovation in India. *Contemporary South Asia, 19*(4): 357–372.

Boorstin, D. J. (1975). Democracy and Its Discontents: Reflections on Everyday America. Vintage Books.

Borgmann, A. (1984). *Technology and the character of contemporary life: A philosophical inquiry*. University of Chicago Press.

Borgmann, A. (1999). Holding on to reality: The nature of information at the turn of the millennium. Chicago and London: The University of Chicago press.

Borgmann, A. (2000). Reply to my critics. In E. Higgs, A. Light., & D. Strong (Eds.), *Technology and the Good Life?* (339−370). Chicago: University of Chicago Press.

Borgmann, A. (2010). Orientation in technological space. *First Monday* 15:6−7.https://firstmonday.org/ojs/index.php/fm/article/download/3037/2568

Brey, P. (2010). Philosophy of technology after the empirical turn. *Techne: Research in Philosophy & Technology, 14*(1). 36−48. https://doi.org/10.5840/techne20101416

British Council. (2018). Refrigeration- 'Sparky Dryer' and 'Cold Hubs' means cold food in Hot Sun. https://www.britishcouncil.com.sn/sites/default/files/18_refrigeration_-_sparky_dryer_a2_v3.pdf

Buckingham, W. (2021). Living the Life of a dog with Diogenes the Cynic. https://www.lookingforwisdom.com/diogenes/

Campbell, M. (2000). Technology and temporal ambiguity. In E. Higgs, A. Light., & D. Strong (eds.), *Technology and the Good Life* (294−315). Chicago: University of Chicago Press.

Capon, R. F. (2002). The supper of the lamb: A culinary reflection. Modern Library.

Chua, R., & Iyengar, S. (2008). Creativity as a matter of choice: Prior experience and task instruction as boundary conditions for the positive effect of choice on creativity. *The Journal of Creative Behavior, 42* (3): 164-180. https://doi.org/10.1002/j.2162-6057.2008.tb01293.x

Cockburn, C., & Ormrod, S. (1993). *Gender and technology in the making*. London: Sage Publications Ltd.

Collins, P. H. (1986). Learning from the outsider within: The sociological significance of black feminist thought. *Social Problems, 33* (6): S14-S32. 10.2307/800672.

Cortesi, M. (2017). Tha bak bomb boats. https://www.atlasobscura.com/places/tha-bak-bomb-boats

Cummins, R. E. (1975). Functional analysis. *Journal of Philosophy, 72*(20): 741-765.

Dennehy, J. (2016). The village that turns bombs into spoons. *Narratively*. https://www.narratively.com/p/the-village-that-turns-bombs-into-spoons

Dennehy, J. (2016). Turning bombs into spoons-relics of the secret US war in Laos. The Guardian. https://www.theguardian.com/global-development/2016/mar/31/turning-bombs-into-spoons-after-the-us-war-on-laos

Dipert, R. R. (1993). *Artifacts, Art Works, and Agency*. Philadelphia: Temple University Press.

Dorrestijn, S. (2012). The design of our own lives: Technical mediation and subjectivation after Foucault. University of Twente. (Dissertation).

Dreyfus, H. L., & Spinosa, C. (1997). Highway bridges and feasts: Heidegger and Borgmann on how to affirm technology. *Continental Philosophy Review*, *30*:159–178 https://doi.org/10.1023/A:1004299524653

Ellul, J. (1964). *The Technological Society*. (J. Wilkinson, trans,). United States: Vintage Books. (Originally published in 1954).

Eternally Yours. (1997). Lectures given during the eternally yours congress. The Hague: Eternally Yours.

Evnine, S. J. (2016). Making Objects and Events: A Hylomorphic Theory of Artifacts, Actions, and Organisms. Oxford: Oxford University Press.

Feenberg, A. (2000). From essentialism to constructivism: Philosophy of technology at the crossroads. In E. Higgs, A. Light., & D. Strong (Eds.), *Technology and the Good Life*? (294−315). Chicago: University of Chicago Press.

Feenberg, A. (2005). Critical Theory of Technology. *Tailoring Biotechnologies*, *1*(1): 47−64.

Feenberg, A. (2015). Lukács's theory of reification and contemporary social movements. *Rethinking Marxism*, *27*(4), 490-507.

Ferguson, E. S. (1979). The American-ness of American technology." *Technology and Culture, 20*(1): 3−24. https://doi.org/10.2307/3103109

Gandhi, M. K. (1910). *Hind Swaraj*. Natal: The International Printing Press Phenix. (Originally published in 1909).

Gandhi, M. K. (1925a). Young India 7(45): 373−380.

Gandhi, M. K. (1925b). Young India 7(38): 317−324.

Gandhi, M. K. (1927). *The story of my experiments with truth.* (M. Desai, Trans.). Navajivan Publishing House.

Gandhi, M. K. (1931). Young India 9(27): 160−167.

Gandhi, M. K. (1936). Harijan, 4(29): 225−232.

Gandhi, M. K. (1940). Harijan, 8 (9): 81−92

Gandhi, M. K. (1945). Constructive programme: Its meaning and place. Navajivan Trust.

Gandhi, M. K. (1954). Sarvodaya: The welfare of all. (B. Kumarappa, Eds.). Ahmedabad: Navajivan Publishing House. (Originally published 1908).

Gandhi, M. K. (1971). Pathway to God. (M.S. Deshpande, comp.). Ahmedabad: Navajivan Trust. (Originally published in 1933).

Genus, A., & Stirling, A. (2018). Collingridge and the dilemma of control: Towards responsible and accountable innovation. *Research policy*, *47*(1), 61−69.

Gertz, N. (2020). Democratic potentialities and toxic actualities: Feenberg, Ihde, Arendt, and the internet. *Techné: Research in Philosophy and Technology*, *24*(1-2), 178−194.

Ghosh, B. N. (2007). Gandhian political economy: Principles, practice, and policy. Ashgate Publishing Limited.

Guha, R. (2014). *Gandhi before India*. India: Penguin India.

Gupta, P. (2017). Jugaad is not frugal innovation. https://www.linkedin.com/pulse/*jugaad*-frugal-innovation-dr-praveen-gupta

Habib, I. (1992). Pursuing the history of Indian technology: Pre-modern modes of transmission of power. *Social Scientist, 20* (3/4):1−22. https://www.jstor.org/stable/3517685

Hans J. (1976). Responsibility Today: The Ethics of an Endangered Future. *Social Research: An International Quarterly, 43(*1): 77-97.

Harding, S. (2004). *The Feminist standpoint theory reader: Intellectual and political controversies (eds.)*. London: Routledge.

Heidegger, M. (1950). The origin of the work of art. In A. Hofstadter, (Trans. & Intro,). *Poetry, Language and Thought*. New York: Harper & Row Publishers, Inc. (Originally Published in 1971).

Heidegger, M. (1954). Building, dwelling, thinking. In A. Hofstadter, (*Trans*. & intro,). *Poetry, Language and Thought*. New York: Harper & Row Publishers, Inc. (Originally Published in 1971).

Heidegger, M. (1966). The memorial address. In J.M. Anderson & E. H. Freund, (Trans,). *Discourse on Thinking*. New York: Harbor & Row Publications, Inc. (Originally published in 1959).

Heidegger, M. (1975). The thing. In A. Hofstadter, (Trans. & intro,). *Poetry, Language and Thought*. New York: Harper & Row Publishers, Inc. (Originally Published in 1971).

Heidegger, M. (1977). *The Question Concerning Technology*. (W. Lovitt, Trans,). New York & London: Harper and Row Publishers, Inc.

Heidegger, M. (1996). Being and time (J. Stambaugh, Eds,). New York: State University of New York Press. (Originally published in 1927).

Heikkerö, T. (2005). The good life in a technological world: Focal things and practices in the West and in Japan." *Technology in Society, 27* (2): 251−259. https://doi.org/10.1016/j.techsoc.2005.01.009

Hickman, L. (2000). Focaltechnics, pragmatechnics, and the reform of technology. In E. Higgs, A. Light., & D. Strong (Eds.), *Technology and the Good Life?* (89-105). Chicago: University of Chicago Press.

Higgs, E. (2000). Nature by design: Remaking and restoring landscapes. In E. Higgs, A. Light., & D. Strong (Eds.), *Technology and the Good Life?* (195−212). Chicago: University of Chicago Press.

Higgs, E., Light, A., & Strong, D. (2010). *Technology and the good life?* (Eds,). University of Chicago Press.

Hughes, T. P. (1993). *Networks of power: electrification in western society*. Baltimore: Johns Hopkins University press.

Husserl, E. (1970). The crisis of European sciences and transcendental phenomenology: An introduction to phenomenological philosophy (D. Carr, Eds,). Northwestern University Press. (Originally published in1936).

Ihde, D. (1971). Hermeneutic phenomenology: The philosopher of Paul Ricoeur. Northwestern University Press.

Ihde, D. (1979). *Technics and praxis: A philosophy of technology*. Boston: D. Reidel Publishing Co

Ihde, D. (1990). *Technology and the lifeworld: From garden to earth*. Bloomington: Indiana University Press

Ihde, D. (1993). *Philosophy of technology: An introduction.* Paragon House

Ihde, D. (2008). The Designer Fallacy and Technological Imagination. In P. E. Vermaas., P. Kroes., A. Light., & S. A. Moore (Eds,). *Philosophy and Design: From Engineering to Architecture* (51−59). Springer Netherlands.

Ihde, D. (2009). Postphenomenology and technoscience: The Peking university lectures. Suny Press.

Ihde, D. (2010). Heidegger's technologies: Postphenomenological perspectives. New York: Fordham University Press.

Ihde, D. (2012). *Experimental phenomenology: multistabilities* (2nd Ed,). Alban: State University of New York Press.

Ihde, D. (2016). *Husserl's missing technologies*. Fordham Univ Press.

Jacques, E. (1963). The technological order: Proceedings of the encyclopedia britannica conference, C. E. Stores (Eds.). Detroit: Wayne State University Press.

Jaspers, K. (1957). *Man in the modern age*. New York: DoubledayAnchor Books.

Jaspers, K. (1961). *The atom bomb and the future of man*. United Kingdom: University of Chicago Press.

Jha, S. (2004). Charkha, 'dear forgotten friend' of widows: Reading the erasures of a symbol. *Economic and Political Weekly, 39*(28): 3113−3120. 10.2307/4415256.

Kamau, T. (2020). Sparky dryer. *Engineering for Change*. https://www.engineeringforchange.org/solutions/product/sparky-dryer/

Kaplan, D. M. (2009). What things still don't do. *Human Studies, 32(2)*: 229−240.

Kellner, D. (2000). Crossing the Postmodern Divide with Borgmann, or Adventures in Cyberspace. In E. Higgs, A. Light., & D. Strong (Eds.), *Technology and the Character of Good Life?* (234−255). Chicago: University of Chicago Press.

Khang, D. (n.d.). Laos' war souvenirs: Jewellery, cutlery from unexploded bombs. https://www.weeworks.wkwsci.ntu.edu.sg/WeeVolunteer/stories/2018/war-souvenirs.html

Kinkaid, E. (2021). Positionality, post-phenomenology, and the politics of theory. *Gender, Place & Culture, 29*(7): 923−945.

Koerich, G.V. (2020). Frugal Innovation: origins, evolution and future perspectives. *Cadernos EBAPE.BR 17*(4): 1079–1093. http://dx.doi.org/10.1590/1679-395174424x

Koprivitsa, C. D. (2020). The concept of engagement. *Filozofija i društvo 31*(2): 177−193.

Krishnan, R. T. (2010). From jugaad to systematic innovation: the challenge for India. India: Utpreraka Foundation

Kroes, P., & A. Meijers. (2000). *The Empirical Turn in the Philosophy of Technology* (Eds,). Amsterdam: JAI.

Kukla, Q. R. (2022). Public artifacts and the epistemology of collective material testimony. *Philosophical issues 32*: 233−252. https://doi.org/10.1111/phis.12224

Lal, V. (2008). The Gandhi Everyone Loves to Hate. *Economic and Political Weekly 43*(40): 55−64. https://www.jstor.org/stable/40278027

Latour, B. (1987). *Science in Action*. Cambridge: Harvard University Press.

Latour, B. (1999). Pandora's hope: Essays on the reality of science studies. Harvard university press.

Lemelson. (2022). Alexander Miles Automatic Elevator doors. Massachusetts Institute of Technology: Cambridge. https://lemelson.mit.edu/resources/alexander-miles

Levith, W. (2017). Six Surprising Products Made from recycled bombs, bombers, and bullets. *InsideHook*.https://www.insidehook.com/article/home-goods/products-made-deactivated-bombs-bullets

Manzini, E. (1995). Prometheus of the Everyday: The Ecology of the Artificial and the Designer's Responsibility. In R. Buchanan & V. Margolin (Eds,). *Discovering Design: Explorations in Design Studies*. Chicago: University of Chicago Press.

Marcuse, H. (1964). *One-Dimensional Man*. United States: Beacon Press.

McLaughlin, P. E. (2001). What Functions Explain: Functional Explanation and Self-Reproducing Systems. Cambridge: Cambridge University Press.

Merleau-Ponty, M. (1962). *Phenomenology of perception*. C. Smith (Trans,). (Originally published in 1945).

Michelfelder, D. P. (2000). Technological ethics in a different voice. In In E. Higgs, A. Light., & D. Strong (Eds.), *Technology and the Good Life?* (219−233). Chicago: University of Chicago Press.

Millikan, R. (1984). Language, thought and other biological categories: New Foundations for Realism. Cambridge: MIT.

Mitcham, C. (1994). Thinking through technology: The path between engineering and philosophy. Chicago: University of Chicago Press.

Mitcham, Carl. (2000). On character and technology. In E. Higgs, A. Light., & D. Strong (Eds.), *Technology and the Good Life?* (126−148). Chicago: University of Chicago Press.

Moon, V. (2013). *Dr. Babasaheb Ambedkar writings and speeches Vol.9*. Haryana: Tan Prints Pvt. Ltd. 10-1-2013/YS-13-11-2013

Moraga, C., & Anzaldua, G. (2015). *This bridge called my back: Writings by radical women of color*. New York: Sunny Press.

Müller. W. (2001). *Order and meaning in design*. Utrecht: Lemma.

Mumford, L. (1934). *Technics and Civilization*. Harcourt, United States: Brace and Company.

Nandy, A. (2000). Gandhi After Gandhi After Gandhi. *The Little Magazine 1*(1): 38–41. http://www.littlemag.com/nandy.htm

Nash, J. A. (1995). Toward the revival and reform of the subversive virtue: Frugality. *The Annual of the Society of Christian Ethics 15*:137–160. http://hdl.handle.net/10822/880211

National Grassroot Innovation. (2002). Bicycle with rider and terrain induced forces for transmission system. *National Innovation Foundation*. https://nif.org.in/innovation/Bicycle_-with_-rider_-and_-terrain_-induced_-forces_-for_-transmission_-system/197

Neander, K. (1991). The Teleological Notion of 'Function. Australasian Journal of Philosophy 69(4): 454–468. 10.1080/00048409112344881

Nelson, D. (2018). *Jugaad yatra: Exploring the Indian art of problem solving*. Aleph Book Company.

Newby, K. (2017). Inspired by a whirligig toy Stanford bioengineers develop a 20-cent, hand-powered blood centrifuge https://news.stanford.edu/2017/01/10/whirligig-toy-bioengineers-develop-20-cent-hand-powered-blood-centrifuge/

Noble, D. F. (1978). Social Choice in Machine Design: The Case of Automatically Controlled Machine Tools, and a Challenge for Labor. *Politics & Society, 8*(3-4): 313–347. https://doi.org/10.1177/003232927800800302

P.P. Verbeek (2013). Technology Design as Experimental Ethics. In: S. V. D. Burg & T. Swierstra, *Ethics on the Laboratory Floor* (83−100). Basingstoke: Palgrave Macmillan.

Parekh, B. (1977). *Gandhi: A very short introduction*. United States: Oxford University Press.

Parry, R. (2008). Episteme *and* techne. In E. Zalta (Eds,). *Stanford Encyclopedia of Philosophy.*

Pickering, A. (1995). *The mangle of practice: Time, agency, and ccience*. University of Chicago Press, Chicago.

Pienaar, J. (2019). Upcycling Laos: urning bombs into boats & spoons. https://zafigo.com/stories/zafigo-stories/upcycling-laos-bombs-into-spoons/. Accessed 12 November 2021.

Pitt, J. (1995). New Directions in The Philosophy of Technology (Eds,). Dordrecht: Kluwer.

Prabhu, J., & Jain, S. (2015). Innovation and entrepreneurship in India: Understanding Jugaad. *Asia Pacific Journal of Management 32*(4): 843–868. https://doi.org/10.1007/s10490-015-9445-9

Prakash, J., Chatterjee, K., Srivastava, K., & Chauhan, V. S. (2019). *Jugaad*: An indi-genius problem-solving approach. *Industrial Psychiatry Journal 28*(2): 312–314. https://doi.org/10.4103/ipj.ipj_87_20

Preston, B. (1998). Why is a wing like a spoon? A pluralist theory of function. *The Journal of philosophy, 95*(5): 215–254.

Preston, B. (2013). A philosophy of material culture: Action, function, and mind. Routledge.

Raghuramaraju, A. (2006). *Debating Gandhi: A Reader*. New Delhi: Oxford University Press.

Reijers, W. (2019). Beyond postphenomenolgy: Ihde's Heidegger and the problem of authenticity. *Human Studies 42*(4): 601–619.

Rich, A. (2003). Notes towards a Politics of Location. In R. Lewis, & S. Mills (Eds,). *Feminist Postcolonial Theory: A Reader*: 29–42. New York: Routledge.

Ricoeur, P. (1975). Phenomenology and hermeneutics. *Noûs*: 85–102.

Ritter, M. (2021). Postphenomenological method and technological things themselves. *Human studies 44*(4): 581-593. https://doi.org/10.1007/s10746-021-09603-5

Robert M. P. (1974). Zen and the Art of Motorcycle Maintenance: An Inquiry into Values. Bantam: William Morrow and Company.

Rochwulaningsih, Y., Singihh T. S., Mahendra P. U., Noor, N., Siti, R., MakhfudEfendy & Misri, G. (2019). Traditional knowledge system in *palung* salt-making in Bali Island. *Journal of Ethnic Foods 6*(10). https://doi.org/10.1186/s42779-019-0018-2

Rosenberger, R. (2017). *Callous objects: Designs against the homeless*. University of Minnesota Press.

Rossetto, T. (2019). Repeat photography, post-phenomenology and 'being-with' through the image. *Transactions of the institute of British Geographers 44* (1):125-140. https://10.1111/tran.12261.

Sahasrabudhey, S. (2006). The Machine. In A. Raghuramraju. *Debating Gandhi. A Reader*. (175−194). New Delhi: Oxford University Press.

Schiffer, M. B. (1992). *Technological perspectives on behavioral change*. University of Arizona Press.

Schumacher, E. F. (1973). Small is beautiful: Economics as if people mattered. Blond and Briggs.

Schumacher, E. F. (1979). *Good work*. New York: Harper & Row publishers.

Schwarz, M., & Thompson, M. (1990). *Divided we stand: Redefining politics, technology, and social choice*. United States: University of Pennsylvania Press.

Scully, V. (1962). *The Earth, The Temple, and The Gods*. New Haven and London: Yale University Press.

Sharda, P. (2017). Technology frugal innovation – a meta study of Jugaad mindset in India. *International Journal of Engineering Sciences & Research*. https://doi.org/10.5281/zenodo.827864

Sharda, P. Technology frugal innovation – a meta study of jugaad mindset in India. *International Journal of Engineering Sciences & Research* 6(7): 2277-9655. 10.5281/zenodo.827864

Sheehan, G. (2013). Running & being: The total experience. Rodale.

Singh, R., Seniaray, S., & Saxena, P. (2020) A Framework for the Improvement of Frugal Design Practices. *Designs 4*(3): 37. https://doi.org/10.3390/designs4030037

Sjafrizal, T. (2015). Frugal Innovation characteristics: market, product and business perspective. *8th International seminar on industrial engineering and management*. Indonesia.

Strickland, A. (2017). 20-cent, whirligig-inspired paperfuge could help diagnose diseases. *CNN Health*. https://edition.cnn.com/2017/01/16/health/paperfuge-whirligig-disease-study/index.html

Strong, D. (2000). "Philosophy in the Service of Things." In E. Higgs, A. Light., & D. Strong (Eds.), *Technology and the Good Life?* (316−338). Chicago: University of Chicago Press.

Swain, R. B. (1981). Earthly pleasures: Tales from a biologist's garden. Charles Scribner's.

Tagore, R. (1925). Cult of the Charkha. *The Modern Review*. Calcutta.

The Bhamla Lab. (2021). Low-Cost Centrifuge. https://bhamla.gatech.edu/project-blog/paperfuge-3dfuge

The Logical Indian. (2015). High school dropout designed a refrigerator that runs without electricity. https://thelogicalindian.com/story-feed/get-inspired/high-school-dropout-designed-a-refrigerator-that-runs-without-electricity/

Thompson, C. S. (2011). Japan's Showa Retro Boom: Nostalgia, Local Identity, and The Resurgence of Kamadogami Masks in the Nation's Northeast. *The Journal of Popular Culture 44* (6): 1307−1332.

Times Now News. (2020). Gandhi Jayanti 2020. *The unseen photos of Mahatma Gandhi will take you to the pre- & post- British era*. https://www.timesnownews.com/india/photo-

gallery/mahatma-gandhi-birth-anniversary-17-unseen-photos-of-the-father-of-nation-that-will-give-you-goosebumps/292620

Toynbee, A. J. (1962). *Study of History: V11-X*. Abridgement by S. C. Somervell. Oxford University Press.

Tromp, N., Hekkert, P., & Verbeek, P. P. (2011). Design for socially responsible behavior: a classification of influence based on intended user experience. *Design issues 27*(3), 3-19. http://www.jstor.org/stable/41261940

Uberoi, J. P. S. (1982). Right, Left and Centre in the Sciences of Nature. *Gandhi Marg 4*(2-3): 148-50

Vallor, S. (2015). Moral deskilling and upskilling in a new machine age: Reflections on the ambiguous future of character. *Philosophy & Technology 28*: 107-124.

Vallor, S. (2016). Technology and the virtues: A philosophical guide to a future worth wanting. Oxford University Press.

Van Den Eede, Y. (2011). In between us: On the transparency and opacity of technological mediation. *Foundations of Science 16*: 139–159. https://doi.org/10.1007/s10699-010-9190-y

Vaswani, (2018). Thinking out of the box: 'Jugaad' thinking and the power of simple ideas. *Mindspace.* https://mindspacearchitects.wordpress.com/2018/05/08/thinking-out-of-the-box-jugaad-thinking-and-the-power-of-simple-ideas/

Verbeek, P. P, & Slob, A. (2006). *User behavior and technology development: Shaping Sustainable Relations Between Consumers and Technologies*. Springer, The Netherland.

Verbeek, P. P. (2001). Don Ihde: The technological lifeworld. In H. Achterhuis & R. P. Crease (Eds,). *American philosophy of technology: The empirical turn* (119–146). Bloomington and Indianapolis: Indiana University Press.

Verbeek, P. P. (2005). *What things do: Philosophical reflections on technology, agency, and design*. USA: Pennsylvania State Press.

Verbeek, P. P. (2011a). *Moralizing technology: Understanding and designing the morality of things. Chicago*. USA: University of Chicago Press.

Verbeek, P. P. (2011b) Expanding mediation theory. *Foundations of Science 17*(4):391–395. https://doi.org/10.1007/s10699-011-9253-8

Verbeek, P. P. (2013). Technology Design as Experimental Ethics. In S. V. D. Burg & T. Swierstra, *Ethics on the Laboratory Floor* (83−100). Basingstoke: Palgrave Macmillan.

Vermaas, P. E. and Wybo, H. (2003). Ascribing Functions to Technical Artefacts: A Challenge to Etiological Accounts of Functions. *British Journal for the Philosophy of Science 54*(2): 261–289. 10.1093/bjps/54.2.261

Vishvanathan, S. (1997). A Carnival of Science. Essays on Science, Technology and Development. Oxford University Press.

Weinberg, A. M. (1967). Can Technology Replace Social Engineering? *American Behavioral Scientist 10*(9): 7−10. https://doi.org/10.1177/0002764201000903

Weyrauch, T. & Herstatt, C. (2016). What is frugal innovation? Three defining criteria. *Journal of frugal innovation 2*(1). https://doi.org/10.1186/s40669-016-0005-y.

Winner, L. (1980). Do Artifacts Have Politics? *Daedalus. 109*(1):121−136. https://www.jstor.org/stable/20024652

Zwier, J., Blok, V., & Lemmens, P. (2016). Phenomenology and the empirical turn: A phenomenological analysis of postphenomenology. *Philosophy & Technology 29*: 313−333.