# *Methodology*

## *Building Circuits as an Artistic Practice*

This research draws upon feminist hacking methodologies (Reis & Wuschitz, 2021) and diffractive methods (Barad, 2007, p. 28) within artistic practice. Specifically, it employs diffractive analysis, which integrates diverse methodologies from various disciplines, to position the research within multiple perspectives (Tsing, 2015). Through this approach, the project aims to examine the material effects of difference within these entanglements. This implies embracing technological challenges from a demystification and hacking perspective based on open hardware and DIY[1] techniques, and also looking into the materials used from the perspective of their matter and agency (Bennet, 2010), using non-toxic and recycled hardware where possible.

By questioning the techno-capitalist system, reverse engineering, advocating for access and openism, repairing and de-growing, we employ a top-down approach, using deconstruction as a method to create art. We question what drives the tech industries and the impact of technology in the current neoliberal market.

1 The DIY (do-it-yourself) ethic is rooted in craft and artisanal traditions and is seen as a dimension of punk culture, allowing mainstream culture to become more accessible (George, 2002). The riot grrrl feminist movement, which draws on the experiences of marginalised women, used music, art and writing to create a sense of solidarity and protest against various social issues (Higgs, 2013; Klein, 2019). The DIY principle encourages individuals to create and consume within their own communities by building, changing or repairing objects without the help of experts (Ferguson, 2016). This has been described as using raw or semi-raw materials to produce, transform or reconstruct objects.

Instead of consuming commodities off the shelf, we recycle materials; instead of accepting the toxic afterlife of dysfunctional devices, we analyse the genesis to demystify the actors that benefit from their blackboxing, application and licensing — those who profit from opacity and designed obsolescence. As artists and researchers, we believe in the power of art as a critical impetus for social and political change (Nijhuis, 2019, p.128). We embrace hacking strategies, both as research methodologies and potential instruments for self-articulation (Laczko, 2021). We work in collaboration with allies who are grounded in intersectional and eco-feminist values and who operate within the realms of science, art and technology — an approach that we refer to as feminist hacking.

Feminist Hardware: Making Printed Circuit Boards with Natural Clay by Patrícia J. Reis and Stefanie Wuschitz, Hangar-Visual Arts Research and Production Centre, Barcelona, Spain, 18 and 19 October 2023

# *Feminist hacking*

Feminist hacking is a movement that challenges traditional gender norms and encourages greater participation of under-represented groups, including women*, in the technology field. It often pursues a trans-species approach, finding kinship with other sentient beings (Haraway, 2016; Albrechtsen & Helms, 2019; Gillespie, 2020). It involves the deconstruction and reassembly of electronic devices to create something new, with the goal of learning and understanding how these devices work and their impact on sentient beings on a global scale. Feminist hacking values are making use of existing, recycled and/or self-made DIY hardware; the process is driven by a desire to create technology from unique and nomadic perspectives (Braidotti, 2002, 2019). By breaking with feminine gender scripts and embracing technological challenges, feminist hacking pushes the boundaries of what is considered 'technology' in the first place (Criado Perez, 2019).

Many feminist hackers work with the situated experience of their own body, skin, hormones or body fluids to generate embodied technological assemblages.[2] This experimental approach to technology is informed by critical making, human–computer interaction, media art and feminist theory, but it remains anti-disciplinary. Other than critical making, the main intention is not critical pedagogy but the deconstruction of non-legitimate authorities. We should point out the importance of open hardware for our endeavour. We understand open hardware as main We see it as a basic requirement to hold developers accountable

2 See Part 2 Acupuncture sonification, My Fair Acupuncture Songs as an example of how we developed an interface that works with the body as 'matter'.

and to grant wider access to knowledge and means of production and self-expression.[3] taining commons that provide the public with transparent data sheets or tutorials on how a particular technology works and can be used or modified.

***Note: The use of 'women*' in this context refers to cisgender and transgender women, as well as non-binary individuals who are marginalised in the technology field.**

## *Agential cuts*

How should scientific or artistic inquiry approach ever-transforming entangled worlds? Feminist physicist Karen Barad proposes enacting *agential cuts* (Barad, 2020), through which we produce boundaries and properties of *entities* where there are none. We enact agential cuts by intervening in the world, by defining a beginning and an end of an observation, for example through an apparatus and experimental setting, but also an art piece. The entity that we create through our agential cuts is shaped dynamically by the properties of our intervention (e.g. the temperature measure changes the temperature of the measured water). The reciprocal quality of the intervention makes us transform while we investigate an entity, which is itself transformed. To Barad, science is a practice of making boundaries and cuts that help us to look at this transformation. Phenomena come to matter through the dynamics of this mutual transformation that Barad calls *intra-activity*.

3 Open hardware refers to hardware designed so that the schematics are openly available for everyone to see, modify and distribute. This means the hardware design is not proprietary and people can use it for their own purposes, commercial or non-commercial. Open hardware projects are often built and developed feminist hardware through collaborative efforts and can range from single boards to complete systems. Open hardware is important for the development of ethical hardware because it increases transparency and visibility within the design and manufacturing process of hardware products, which can help to identify and address ethical concerns such as


Mz* Baltazar's Lab, outdoor view during the performative event Riot im Riot. On Reclaiming Space, curated by Olivia Jaques and Anna Watzinger, July 2023
Photo © Patrícia J. Reis

For this project, the feminist hacklab Mz* Baltazar's Laboratory in Vienna, Austria, provided the experimental framework and apparatus. Its properties and boundaries were enacted through a theoretical agential cut, mediated the research process and became the site of extensive intra-active mutual transformation. Donna Haraway calls the future epoch – following the Anthropocene – the Chthulucene. It signifies a future world in which humans and non-humans co-exist and understand the extent to which they co-create one another as kin in intra-activity. How can we develop tech for the Chthulucene?

the use of conflict minerals, environmentally damaging production methods or privacy-infringing data collection (Free Software Foundation, 2019), encouraging collaboration and community involvement, which can lead to faster innovation and a wider range of perspectives and solutions to ethical and technical issues (OpenSource.com, 2018). This can help to promote digital rights and freedom of expression (Free Software Foundation, 2019). Allowing for the reuse and repurposing of hardware components reduces the need for new products to be manufactured (OpenSource.com, 2018).

*Chthulucene is a simple word. It is a compound of two Greek roots (khthôn and kainos) that together name a kind of [sic] timeplace for learning to stay with the trouble of living and dying in response-ability on a damaged earth.*

(Haraway, 2016, p. 2)

Haraway, a trained biologist, also coined the term 'natureculture', which refers to the idea that the natural world and culture influence each other (Haraway, 2003). This idea draws attention to the body as a biological being shaped by cultural beliefs and practices. New materialist theories argue that the traditional separation of nature and culture into separate academic disciplines is artificial and that they are two sides of the same coin.

## *Feminist new materialisms: (re)turns to matter*

The term 'new materialism' was first introduced by feminist scholar Rosi Braidotti in the 1990s in the field of gender studies (Braidotti, 1996). This cultural theory has emerged in response to the cultural turn, a focus in the social sciences on cultural and textual approaches to understanding society. New materialism aims to create a more holistic understanding of the world by breaking down dualisms.[4] It makes affirmative connections between seemingly opposing theoretical traditions. The new materialist approach involves re-reading classic and marginal texts from various disciplines and paradigms to find shared characteristics and unexpected theorisations (Coole & Frost, 2010).

4 New materialism is transversal rather than dialectic and seeks to create 'transversal cartographies'.

Karen Barad unexpectedly brings together perspectives from physics, including recent research in quantum mechanics, and cultural and social theories (Barad, 2003, 2020). The result is a post-humanist, performative account that highlights the inter-dependence and mutual constitution of matter, meaning and agency. Materiality, or the physical things of the world, is seen as a complex and self-organising process that is active and has agency. This means that things, including non-human agents, are able to shape and interact with the social environment.

This approach differs dramatically from traditional cultural theories that view the matter as passive and lacking agency (Bennett, 2010; Alaimo & Hekman, 2008). Additionally, new materialists focus on what they call 'material realism', meaning they aim to understand theories about life's non-discursive aspects through an examination of lived experience, physical practice and biological substance (Coole & Frost, 2010). The new materialist perspective is political and ethical, taking a stand on issues such as climate change and biotechnological engineering (van der Tuin & Dolphijn, 2012). To do so, they embrace an interdisciplinary approach that includes the non-human universe, which has historically been the domain of natural sciences.

Finally, new materialists reject the idea that science should only consider falsifiable hypotheses and instead seek to understand the impact of technological advancements on the natural world. They believe that modern science, with its focus on calculability and measurability, has led to the degradation of the environment (Barad, 2007). A perspective that really resonated with our practice.

With the rise of artificial intelligence and its potential to replace human values, technoscience is becoming more powerful (Sinders 2019; Crawford, 2021). According to philosopher Bruno

Latour, we must choose between modernisation and ecologising. And we should be aware that any change in our understanding of science could impact modernisation as a whole (Latour, 2013).

To address this challenge, we need to create a new system that incorporates a more diverse range of values and a deeper relationship with the natural world. The main driving forces behind new materialism are technoscience and climate change.[5] The theory seeks to find a balance between progress and ecology, and it encourages the creation of new organisations and networks that prioritise global wellbeing (Coole & Frost, 2010).

Indigenous philosophers have written about similar worldviews before new materialism or eco-Marxism (Kohei Saito, 2022). They have more eloquently revealed how violent dispossession of land and the ongoing praxis of displacement could be normalised through enforcing racial and material categories (Lorde, 2021; Yusoff, 2019, p. 3). Yet, we believe that new materialist theory has the potential to bring together a community of like-minded individuals who seek to create a more conscious and organised world (Tuck & Yang, 2012).

5 They also believe that certain things 'matter' because they are a matter of shared concern and emphasise the movement's political agenda (Latour, 2008).

# *Considering human and non-human persons*

These theories resonate with scholars who integrate Indigenous knowledges into post-colonial critique. 'Human beings' existence is contingent on the lives of others, other non-human persons.' These non-human persons can form relationships, and their relationships can generate cultures – *naturecultures* – as stated by Puig de la Bellacasa (Haraway, 2003; Bellacasa, 2017). These naturecultures need to become the focus of our attention if we want to survive on a damaged planet (Tsing et al., 2017). This is what Indigenous resistance stands for: caretaking and creating just relations between human and other-than-human worlds on a planet that is thoroughly devoted to capitalism (Demos, 2016). Animistic syncretism grants personhood to plants, animals and stones. This leads to a critique of settler-colonialism, opposition to extracting natural resources and their capitalist commercialisation as commodities (Kimmerer, 2015). In that sense, new feminist materialism aligns with these values. Anna Tsing, one of the most important authors for our research, explains that this personhood of natural resources is not a belief or metaphor – even our own bodies contain more bacterial cells than human ones (see interview with Saad Chinoy in Part 3). Tsing shows how cross-species entanglement is real and requires our attention for collaborative survival (Tsing et al., 2017, p. M5, M75).

In the following chapters, we will provide an overview of the umbrella concepts that have inspired our research, and we will discuss their influence in our practical outcome.