Oscillations: Composing a Performance Ecosystem through a Sonic Cyberfeminist Lens

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ABSTRACT

The audiovisual installation Oscillations, turns irons and ironing boards into electronic instruments, in an attempt to deconstruct stereotypical ideas of gender and its assigned roles. The project aims to investigate the relationships we have with domestic objects, and ponder their structures and significance through the design and performance of an interactive ecosystem. The project uses a sonic cyberfeminisms lens to critically explore aesthetic and relational hierarchies at the intersection of sound, gender and technology. Three irons and ironing boards have been hacked and retrofitted with embedded electronic instruments that together create a complex feedback network. While the audience is invited to physically interact with the iron instruments and manipulate samples, the sonic state of the installation also changes based on the audio information detected in the environment.

Author Keywords

Critical NIME practices, sonic cyberfeminisms, performance ecosystem, playful interactions.

CCS Concepts

•Applied computing → Performing arts; •Human-centered computing → *Collaborative and social computing theory, concepts and paradigms;* Systems and tools for interaction design;

1. INTRODUCTION

Artists and technologists active within the domains of musical interactions and instrument design are increasingly engaged with the socio-political implications of technology ideation and development. Practitioners are expanding New Interfaces for Musical Expression (NIME) disciplinary frontiers by incorporating critical perspectives coming from music sociology [21], environmental sciences [13] and political sciences [34]. NIME researchers are then proposing both critical reflections and direct actions to deal with specific socio-political issues. See, for instance, Tomás [47], on the

prevailing tendencies for musical creation with digital interfaces and their significance to contemporary consumerism, and Morreale et al. [35], which discuss a set of directions to engage with socio-economical and ethical questions concerning instrument design within and beyond academic contexts.

Alongside these accounts, it is possible to identify a thread of contributions tackling diversity, inclusion and gender underrepresentation in NIME, and more broadly within the Music Technology communities. Amongst the others, Born and Devine's account of gender and class imbalance, in music technology undergraduate degrees in Britain [5], and Xambó [51] study on the presence and evolution over time (until 2017) of women authors in NIME. In conversation with these investigations, this article aims to contribute to the discourse on gender and technology with a practice-based approach [18, 24].

More specifically, our project strongly resonates with the work of Schedel et al. on Women's Labor [43]: a NIME project in which domestic appliances of women's chores are reimagined and redesigned to create new interfaces for musical expression. While adopting the same approach of the Women's Labor project, i.e. hacking old iron devices, we aim to further expand this research route, broadening its theoretical framework and performance ecosystem.

This paper provides an account at the intersection of feminist theory and NIME research by presenting "Oscillations": an audiovisual installation featuring different digital instruments made with vintage irons and ironing boards. The piece is concerned with the deconstruction of stereotypical ideas of gender and shared assumptions and its assigned technologies. By reflecting on the execution of this particular project, we aim to share relevant considerations for the NIME community in respect to pressing issues on technology design. Our focus is on the modalities through which NIME practices might help to critically explore tacit assumptions on gender, technology and the domestic sphere.

Our approach for the reinterpretation of everyday objects in an artistic setting borrows strategies from the arts, design research and Human Computer Interaction (HCI). We exploit the processes of 'making strange' and 'defamiliarization' [3], as devices that force us to (re)consider how we perceive the familiar and the tacit [11]. By augmenting irons and presenting them in a novel and unfamiliar context, we intend to expose the cultural forms and pre-existing representations linked to the artefact [22]. We then adopt a reflexive [40] and autobiographical [37] outlook to gather and share insights on our artistic experience.

In the following sections, we introduce the framework of our work, also covering relevant literature; we then introduce the artwork describing its main conceptual, technical and aesthetic features. Finally, we reflect on the assembled installation and its exhibition to the public.

2. BACKGROUND

In recent years there has been myriad discoveries of female electronic artists and inventors who contributed to the creation of the field of electronic music. Our previous work has joined this movement and highlighted the work of some of the female pioneers of electronic music, particularly Daphne Oram; and the forgotten 'herstory' of music technology in an attempt to redress imbalances, change the 'face of sound' and challenge dominant historical narratives about electronic music's history [23, 33]. Analogue recordings have been digitised and re-released; and forgotten works, such as Oram's Still Point, have been re-imagined and brought to life by modern day artists [10].

There is a risk here however of creating a new narrative that is shaped by neoliberalism. Neoliberalism favours individualism over collectivism and empowers the individual with the belief that they are in control of their own destiny [28]. In the case of the female pioneer of electronic music, neoliberal values of individualism and entrepreneurialism push a social agenda of commercialising gender inequality [9]. Further to this, works by these formerly unrecognised female pioneers now have a market value and may be re-released, re-packaged and sold as new.

2.1 Visibility in Sonic Culture

The visibility of female-identifying producers, composers and inventors is explored by Rodgers in her seminal text, Pink Noises [41]. Here Rodgers deconstructs hegemonic ideas of gender in the electronic music industry in terms of language, relationships to technology, visibility, and the historiography of electronic music; and proposes that sonic arts can contribute to feminist discourses [41].

The research of Born and Devine focuses on gender participation rates in music technology higher education in the UK [5, 6]. Their findings indicate again a lack of participation of women, noting only a 10 percent female-identifying participation rate in higher education studies in the UK. They argue that the thematic and contextual elements of their work, which often aim to subvert the dominant paradigms, are lost by the under representation of female sound artists. These participation rates in higher education may lead to under representation in curation, festival programming and development of the genre [6].

The problematic nature of gender assumptions being built into music technology is underscored in research conducted by Oudshoorn et al [38], who investigated the new information technology, I-methodology, which claimed to be creating technologies that had universal appeal. What they found was in fact the opposite: the population of users mirrored the demographic of the technological designers. Herein lies a failure to analyse and critique the gendered construction of technology itself [14]. Schedel et al's work, Women's Labour [43], directly addresses gender and dominant narratives of participation and representation. In this project, an antique iron and ironing board are repurposed with technologies to become an embedded acoustic instrument (EAI). The instrument forms part of a larger project where a series of bygone domestic tools associated with women's work are repurposed to become new musical instruments. The instruments are used to perform works of historically forgotten female composers. This work aims to address the gender disparity in the music industry and asks people to look at the gendered narrative attached to domestic tools in their own households [43]. These same factors are also relevant to the field of NIME where Hayes and Marquez-Borbon suggest that, "there is a danger that the musics and musical activities associated with NIME might fall into the same anti-inventive trappings that Born has identified within other musical institutions, erecting a mobile stasis, a capacity to prolong the governing aesthetic by resisting or repressing significant musical change" [21, p.3].

Why then, despite affirmative actions such as research, government and industry initiatives, is there still gender disparity in the participation rates of women in the sonic arts? Faulkner suggests that the failure of these programs is largely due to a lack of critical analysis of how gender is constructed and assigned to technology [15]. Goh suggests that there is a tension between the work of industry to increase rates of female participation within the current structures and that of the academy, which criticises and analyses these structures of power [16]. An argument therefore exists that attempting to change the nature of representation and participation rates of women in music technology and sound art fails to critique the structures at play and risks reproducing these issues. How is gender shaped and reproduced through technology on a domestic and global scale? What role does the sound practitioner play in their dismantling? While this style of affirmative action remains absolutely essential in the push for gender equity, Oscillations is framed through a Sonic Cyberfeminisms lens that attempts to question the very categories of men and women, and the structures in which they exist.

2.2 Sonic Cyberfeminisms

Our project provides an opportunity to go beyond amplifying women's work in the sound arts. It explores the socio-political context and structural influences in which digital instruments are created and performed through a Sonic Cyberfeminisms lens. Sonic Cyberfeminisms is an ongoing project created by Annie Goh and Marie Thompson in 2014 that asks, "in the struggle for gender equity in tech orientated music cultures, what changes and what is reproduced?" [46, 30.01]. It is informed by cyberfeminisms, and is largely concerned with the intersection of sound, technology, networks and feminist praxis. Sonic Cyberfeminisms attempts to create a critical space to reflect upon sound, gender and activism.

Australian arts collective VNS Matrix and Sadie Plant were among the first to define the term cyberfeminism in the early 1990s as a means of describing the work of feminists who were working at the intersection of gender and technology [31, 39]. It is largely informed by the seminal work of Donna Haraway in her essay, A manifesto for cyborgs [19]. Here Haraway ironically manifests a new reality that challenges patriarchal power structures that serve to dominate. While there is no one definition for cyberfeminism, initial theories did not necessarily include sound and sound art. Goh, however, suggests that "the decentralized, non-linear and non-hierarchical nature of cybernetic culture, and characterisations of sound as an ephemeral, emanating force, gives occasion to link the two as sonic cyberfeminism" [16, p.58]. Sonic Cyberfeminisms as a theoretical framework may provide an alternative non-hierarchical structure for the critical analysis and development of new sound works in music technology. For instance, Goh explores the notion of a Sonic Cyberfeminisms in GenDyTrouble: Cyber*Feminist Computer Music: a series of generative sound works that mixes Iannis Xenakis ideas of generative composition with Judith Butler's queer theory [17]. Using Sonic Cyberfeminisms as a theoretical framework, Oscillations attempts to critically explore non-hierarchical sonic networks, non-commercial sonic outputs, processes and labour.

2.3 Re-Making Strange

In her article The De-Scription of Technical Objects [1] Madeleine Akrich proposes the notion of the *script* to illustrate how artefacts *de-scribe* potential scenarios of uses which were previously in-scribed into technical objects. The scenarios inscribed into an artefact then reflect a body of pre-existing norms associated to the uses and contexts of a given technology. According to this perspective, technical objects have political strength as they mobilise values and assumptions coming from the community and culture in which the technology is created.

Born and Devine [6] suggests that "by reflexively reconfiguring the practice of design and its scripting of the ensuing technologies" we can work to create modes of practice that are more responsive to and in conversation with sites of oppression. The artwork presented in this article questions tacit norms of gender and domestic objects by *making strange* of a familiar artefact, which suddenly become exceptional and enigmatic. The intention is to re-purpose in an unusual context and re-interpret the iron, hijacking its material features, functions and significations [8]. This strategy draws on previous NIME works that question the implicit norms codified into existing artefacts through their remediation and reformulation [25, 27]. More broadly, our practice resonates with a set of experimentations and approaches for the design of music technology that Born calls materialist *détournements* [4].

Oscillations aims to *détourne* technological expectations by altering everyday objects and introducing rich interactions, which can be explored in a playful and open-ended fashion. We then provide a strange, unexpected and to a certain extent absurd technological ecosystem to the audience that is free to play with the piece and explore its audiovisual components and references. We borrow the idea of employing play and humour as means for the emergence of critical reflections from research across art and HCI. These include absurd music hackathons [26] and instrument design workshop [2], and questionable strategies for the generation of design knowledge, such as the *questionable design concepts* by Vines et al. [49] and the HCI-Amusements by Devendorf et al. [11].

3. THE ARTWORK

Oscillations[1] aims to separate objects of domestic labour from their historical narrative and playfully create a new meaning and purpose for them. The domestic steam iron and ironing board has been deconstructed and re-framed as a tool of musical and political expression for an installation setting. Three vintage irons and ironing boards have been hacked and retrofitted with embedded sensors and microcontrollers that together create a sonic network. Projection is used to connect the audience with the conceptual underpinnings of the work and to create changes to the ambient lighting conditions for the photocell sensor in each iron instrument. Figure 1 provides an overview of installation.

3.1 Implementation and Setup

Three vintage irons from the late 1980s were chosen due to their aesthetic design, durability and hackability. Each iron has been augmented with a range of sensors that allow the player to interact intuitively with the instruments. The controls that originally existed in the iron for temperature and surge of steam, have been retrofitted with potentiometers.

Figure 1: Oscillations Installation in a Contemporary Gallery Setting

The water pump has been replaced with a toggle switch. An electret condenser microphone has been embedded in the back of the iron and a photocell installed in the base of the rear of the iron. The choice of components has been made to maintain the original integrity and form of the iron and to allow the audience to connect with a potentially familiar artefact from their domestic life.

Vintage wooden ironing boards have been restored and retrofitted with timber drawers from vintage singer sewing machines. The drawers house the Bela microcontroller [32] and the sensor's circuit. The ironing boards each feature additional sensors on the board as well as in the clothing that lay draped over them. A white collared button up shirt lays over the ironing board, half ironed representing the draped flag of the patriarchy. A long force sensing resistor and softpot membrane potentiometer have been sewn into the buttoned placket of each shirt. The ironing board also functions as a switch controller through a circuit made with conductive paint and the iron's aluminium soleplate. See Figure 2 for a close view of a single iron and board.

3.2 Audio Synthesis and Mappings

The iron instruments in Oscillations allow for real time manipulation of three sets of audio samples. The audio sample sets in each iron create a soundscape that represents three different stages in the iron's journey, from its creation in a factory, to its placement in the consumer market to become part of the domestic sphere. 1. Factory sample set; 2. Capitalist / Advertising sample set; 3. Domestic sample set. Each sample set has five different sounds that can be loaded in real time via the toggle switch on the iron instrument. Samples used in the installation have been sourced from a combination of field recordings and satirical advertising material recorded by the authors. Additional sounds were sourced via creative common online archives.

A Bela board is installed in each ironing station. The data coming from the sensors are used to control a granular synthesis algorithm created in Pure Data. The patch used in the instruments is an adaptation of Yann Seznec's Granular Sampler [44].

The choice of sensors and interactions has been made to maintain the original integrity and form of the iron to enable the audience to connect with a potentially familiar artefact from their domestic life, retrieving action and gestures associated with it. The granulator settings and mappings are mostly repeated on each iron so that the audience can develop some familiarity when changing between instruments. Table 1 provides an overview of sensor-audio parameters mappings.

The audio output of each ironing station is continuous unless interrupted by the iron being placed on the conductive paint switch on the ironing board. The soundscape can range from low filtered drones to chaotic, and sometimes rhythmic textures. The original samples are largely unrecognisable, apart from the voice samples used in the advertising sample set - which are mostly audible and work to create a capitalist narrative that accompanies the soundscape.

Figure 2: Oscillations Installation in a Contemporary Gallery Setting

When the iron is played in an ironing motion, moving back and forth across the board with some pressure applied, there is a resultant change in the texture and pitch of the iron's sonic output. Once the movement stops, the parameters return to their default position. Further changes to the sample playback position and grain density can be enacted through manipulation of the potentiometers embedded in the iron itself. Once these parameters are changed, they maintain their settings and can be used to create a more nuanced and stable sonic output. For example, a player may sweep through the sample using the sample offset potentiometer to find a desired portion of the sample.

In order to create a balance between player control and system autonomy, the output of each ironing station is also being continuously changed by feedback from the environment through the microphone and photocell. The parameters mapped to the microphone sensor create random changes in the samples i.e pitch, playback position and amplitude. This input creates a complex and chaotic ecosystem where the soundscape can shift without direct intervention from a player. Over time, we also discovered soundscapes that, when designing the instrument, we didn't think were possible. These ranged from rhythmic patterns in the voice samples to bleeping melodies in the washing machine samples.

Parameter	Sensor	Location
Grain Density	Potentiometer	Top of iron
Grain Size	Long Soft Pot Membrane	Shirt buttonholes
Sample Offset	Potentiometer	Iron temperature dial
Pitch	Force Sensing Resistor	Shirt buttonholes
Volume	Light Dependant Resistor	Soleplate of Iron
Patch on/off	Conductive Paint	Ironing Board
Random pitch	Microphone	Rear of iron
Random panning	Long Pot Membrane	Shirt buttonholes
Random sample offset	Microphone	Rear of iron
Sample selection	Button	Iron steam button

Table 1: Sensor Mappings for Iron Instruments

3.3 Performing in an Ecosystem

In Oscillations, ideas of hierarchy, agency and power are questioned by using methods informed by cybernetics such as ecosystemic design. Ecosystemic sonic systems are generative in nature and use feedback from the environment as a sonic input, as an alternative to the model of master player/creator [12]. The ecosystem allows for exploration of improvised performance that is interrelated with the context in which it is being created. Light, movement, noise, silence and musical metaphor are all playfully embodied [7, 50].

Each ironing station presents a range of options for collaboration within a collective performance. The musical content may shift in response to a range of interventions or disruptions. Changes in ambient lighting conditions for example can be disrupted by simply standing at the ironing station and casting a shadow into the projection. This change in ambient light is detected by the photocell on the base of the iron and can create a change in the amplitude of the sonic output of the iron at that station, thus setting in motion a cascade of interrelated sound events. Changes in light, pitch and dynamic in the room all create nuanced changes to the granulator algorithm in each iron. Further changes to the sonic output of each iron may be enacted through the performance of crisp white shirt ironing. All elements within this collective music making exercise are interdependent, thus challenging notions of power dynamics and hierarchy in traditional musical settings of the master player. Each assemblage within the system holds equal power to enact change within the system.

Oscillations has been presented to the public in a contemporary gallery setting for three weeks. During this time the installation was activated by an improvised performance for three ironing boards, four projectors, three iron instruments, a room and an audience. After a brief demonstration period the audience were invited to *play* the iron instruments. During this performance, we observed that ironing experience is not essential but highly preferred when playing the instruments. The relationship between elements within this performance created a vibrant, playful atmosphere. The ironing stations were a wash of chatter and motion as the human participants sought to understand their contribution to the soundscape.

Figure 3: Oscillations Installation in a Contemporary Gallery Setting

4. DISCUSSION

Oscillations have been developed in Australia by white identifying artists (two Australians and one European). In this section we will discuss the work and its greater implica-

tions in the socio-political context of which it has emerged. Before doing that, we must acknowledge the First Nations peoples of Australia and the land upon which this work has been made. We must also acknowledge that our position of privilege as artists and designers in this Nation has come from a violent colonial history and built with indentured labour. Our discussion presents a series of reflections on the labour involved in the production of this work and speaks more broadly to notions of labour and exploitation both internationally and in an Australian context.

4.1 Labour

According to Rodgers [42, p.81], "artists have an expansive mandate in the arenas of aesthetics and politics to depict and bear witness to the social, cultural, political and economic systems and times in which they are enmeshed." Oscillations attempts to bring focus to the issues of transnational feminised and racialised labour practices that exist within a neocolonial framework. Labour is a key principle of neoliberalism and capitalistism. In Oscillations, we bring attention to the work of the nimble fingers that both create the irons and the instruments.

According to Vágnerová "how sounding takes place – how it can take place – involves particular relational constellations of technological nodes, inputs and interactions, and transmissions through spaces, media and bodies" [48, p.254]. Following this perspective, our approach also aims to establish conceptual connections between domestic technology and audio technologies to bring attention to the network of labour exploitation existent in the domestic and audio industries.

While we elevate the women who produce electronic music, we must also acknowledge the women who have laboured to create the component parts that allow this music to be produced. These component parts are often constructed by automated plant machinery before being assembled by a team of robots and humans. This technical work is largely conducted by women of colour in Chinese, Taiwanese and Thai factories. Stereotypes of women workers have been constructed, casting them as being obedient and having 'nimble fingers' [45, 48].

In Oscillations, we use loud and noisy source sounds from the factory floor in one of the iron instruments in an attempt to connect the audience with the experience of the factory worker. Simultaneously, the 'nimble fingers' of the instrument builder creating the iron instrument are shown through video projection. In showing this labour we aim to bring attention to issues of transnational labour practices and the audio industries role in their creation and perpetuation.

Australia, was largely built on the unpaid indentured labour of First Nations Australians [20]. In Oscillations, we use source audio samples from a satirical advertisement entitled *White Wash*. White Wash was created through a collaboration with First Nations comedian Jay Wymurra and Tegan Koster and featured in a gig theatre piece created for the Adelaide Fringe Festival in 2020. This advertisement presents to the public a product called White Wash, that is guaranteed to "keep your whites safe and separated". It uses satire to explore themes of colonisation, genocide, labour exploitation and the White Australia Policy.

In Oscillations, the words "White wash" can be often heard, they are repeated and moulded with factory sounds and advertisement jingles, to be sometimes obscured by a granular soundscape of domestic appliances. The audio generated by the piece then aims to provoke the audience, inviting them to reflect upon the white washing of our national

history and how this plays out on repeat, to this day.

4.2 Repair and Reuse

The debate around the longevity and obsolescence of new musical tools is gaining attention also in those academic and research contexts concerned with music technology innovation [36]. Researchers are increasingly discussing the sustainability of their practices, and the NIME community recently started various actions to build awareness and contrast the general lack of reflection on the environmental impact of the research undertaken [30].

Sustainable design practices are an important aspect of our artwork. Our instruments were built in a home studio that uses self generated solar power during daylight hours. Where possible, we sourced from local suppliers second hand materials for the implementation of the piece. Most notably, discarded irons and ironing boards have been restored. We then understand the importance of reusing of objects in the home, not only as an act of restoration, but also as an act of creation where the repurposing and resourcing of objects are crucial driving factors of the artistic process [29].

Further, our design choices were often guided by the intention of using open source components and software that are freely accessible[2]. While challenging the capitalist neoliberal model of the competitive free market, we aim to support open source and hacking cultures, as they provide a more sustainable model for NIME practices, as participants can more easily recreate, reinterpret and repair a give piece of technology.

5. CONCLUSIONS

Oscillations was created through a practice-based study that used instrument design and musical performance to investigate questions and theories of gender in the domestic sphere. This project aims to separate the objects of domestic labour from their historical narrative and playfully create a new meaning and purpose for them. It has been informed by Sonic Cyberfeminisms as a theoretical framework and attempts to critically explore sonic networks, non-commercial sonic processes and labour.

Cybernetic culture historically held hope, for a new non-hierarchical system where open access contribution to networked systems could change the distribution of knowledge and power [46]. In Oscillations we have used the principles of Eco-Systemic design to explore relational hierarchies at the intersection of sound, gender and technology. Our piece poses questions on a broad set of challenges, linking the local to the global, with the intention to stimulate disparate and yet interconnected reflections.

This paper touches upon the socio-political contexts of the artwork, gazing at the historic exploitation of labour allowing us (as artists) and our artwork to exist. Then asking who has laboured to create the technological components of our *musical expressions* and at what cost. Oscillations provides the opportunity to explore these themes in an accessible, playful and critical fashion. By *making strange* of familiar artefacts it helps us to reframe and recontextualise technological practices through a different lens, such as with Sonic Cyberfeminisms, and permissively speculate on possible future alternatives.

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[2]Link to GitHub project:https://github.com/GLepri/Oscillations

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7. ETHICAL STANDARDS

8. REFERENCES

[1] M. Akrich. The de-scription of technical objects. In W. E. Bijker and J. Law, editors, *Shaping technology - Building Society: Studies in Sociotechnical Change*, pages 205–224. MIT Press, Cambridge, 1992.

[2] K. Andersen and R. Wakkary. The magic machine workshops: Making personal design knowledge. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*, page 1–13, 2019.

[3] G. Bell, M. Blythe, and P. Sengers. Making by making strange: Defamiliarization and the design of domestic technologies. *Transactions on Computer-Human Interaction*, 12(2):149–173, 2005.

[4] G. Born. The dynamics of pluralism in contemporary digital art music. pages 305–377, 2022.

[5] G. Born and K. Devine. Music technology, gender, and class: Digitization, educational and social change in britain. *Twentieth-Century Music*, 12(2):135–172, 2015.

[6] G. Born and K. Devine. Gender, creativity and education in digital musics and sound art, 2016.

[7] J. Bowers. Improvising machines: Ethnographically informed design for improvised electro-acoustic music. *ARiADATexts (4)*, 2002.

[8] J. Bowers and O. Green. All the noises: Hijacking listening machines for performative research. In *Proceedings of the International Conference on New Interfaces for Musical Expression*, pages 114–119, 2018.

[9] R. Braidotti. Introduction: Learning from the future. *Australian Feminist Studies*, 24(59):3–9, 2009.

[10] J. Bulley. Bbc proms profile: Still point. *Pioneers of Sound*, 2018(13), 2018.

[11] L. Devendorf, K. Andersen, D. K. Rosner, R. Wakkary, and J. Pierce. From HCI to HCI-amusement: Strategies for engaging what new technology makes old. In *Proceedings of the CHI Conference on Human Factors in Computing Systems*, page 1–12, 2019.

[12] A. Di Scipio. 'sound is the interface': from interactive to ecosystemic signal processing. *Organised Sound*, 8(3):269–277, 2003.

[13] E. Dorigatti and R. Masu. Circuit bending and environmental sustainability: Current situation and steps forward. In *Proceedings of the International Conference on New Interfaces for Musical Expression*, 2022.

[14] W. Faulkner. Dualisms, hierarchies and gender in engineering. *Social studies of science*, 30(5):759–792, 2000.

[15] W. Faulkner. The technology question in feminism: A view from feminist technology studies. In *Women's studies international forum*, volume 24, pages 79–95. Elsevier, 2001.

[16] A. Goh. Sonic cyberfeminism and its discontents. *CTM Festival Magazine-Dis Continuity*, pages 56–58, 2014.

[17] A. Goh et al. Gendytrouble: Cyber* feminist computer music. *n. paradoxa international feminist art journal*, 37:78–82, 2016.

[18] O. Green. The situation of practice-led research around nime, and two methodological suggestions for improved communication. *Leonardo*, 49(1):78–79, 2016.

[19] D. J. Haraway. A cyborg manifesto: An ironic dream of a common language for women in the integrated circuit. In *The Transgender Studies Reader Remix*, pages 429–443. Routledge, 1991.

[20] N. Harkin. Whitewash-brainwash: An archival-poetic labour story. *Australian Feminist Law Journal*, 45(2):267–281, 2019.

[21] L. Hayes and A. Marquez-Borbon. Nuanced and interrelated mediations and exigencies (NIME): Addressing the prevailing political and epistemological crises. In *Proceedings of the International Conference on New Interfaces for Musical Expression*, pages 428–433, 2020.

[22] M. S. Horn. The role of cultural forms in tangible interaction design. In *Proceedings of the Conference on Tangible, Embedded and Embodied Interaction*, pages 117–124. ACM, 2013.

[23] M. Jack. What does daphne oram have to do with housework? https://www.ironingmaidens.com.au/thesoapboxblog/2020/6/21/whatwoulddaphnedo, Oct 2020.

[24] A. Johnston. Some opportunities for practice-based research for NIME. In *Proceedings of the Practice-Based Research Workshop at the International Conference on New Interfaces for Musical Expression*, 2014.

[25] G. Lepri, J. Bowers, S. Topley, P. Stapleton, P. Bennett, K. Andersen, and A. McPherson. The 10,000 instruments workshop - (im)practical research for critical speculation. In *Proceedings of the International Conference on New Interfaces for Musical Expression*, 2022.

[26] G. Lepri, A. McPherson, and J. Bowers. Useless, not worthless: Absurd making as critical practice. In *Proceedings of the Designing Interactive Systems Conference*, 2020.

[27] G. Lepri and A. P. McPherson. Mirroring the past, from typewriting to interactive art: an approach to the re-design of a vintage technology. In *Proceedings of the International Conference on New Interfaces for Musical Expression*, pages 328–333, 2018.

[28] S. Macarthur. The woman composer, new music and neoliberalism. *Musicology Australia*, 36(1):36–52, 2014.

[29] L. Maestri and R. Wakkary. Understanding repair as a creative process of everyday design. In *Proceedings of the 8th ACM Conference on Creativity and Cognition*, pages 81–90, 2011.

[30] R. Masu, A. P. Melbye, J. Sullivan, and A. R. Jensenius. NIME and the Environment: Toward a

More Sustainable NIME Practice. In *NIME 2021*, Shanghai, China, 2021.

[31] V. Matrix. Bitch mutant manifesto. *Accedido o*, 10(09):2013, 1996.

[32] A. McPherson and V. Zappi. An environment for submillisecond-latency audio and sensor processing on beaglebone black. In *Audio Engineering Society Convention 138*. Audio Engineering Society, 2015.

[33] F. Morgan. Pioneer spirits: New media representations of women in electronic music history. *Organised Sound*, 22(2):238–249, 2017.

[34] F. Morreale. Where does the buck stop? ethical and political issues with ai in music creation. *Transactions of the International Society for Music Information Retrieval*, 4(1), 2021.

[35] F. Morreale, S. M. A. Bin, A. McPherson, P. Stapleton, and M. Wanderley. A NIME of the times: Developing an outward-looking political agenda for this community. In *Proceedings of the International Conference on New Interfaces for Musical Expression*, pages 160–165, 2020.

[36] F. Morreale and A. McPherson. Design for longevity: Ongoing use of instruments from NIME 2010-14. In *Proceedings of the International Conference on New Interfaces for Musical Expression*, pages 192–197, 2017.

[37] C. Neustaedter and P. Sengers. Autobiographical design in HCI research: designing and learning through use-it-yourself. In *Proceedings of the Designing Interactive Systems Conference*, pages 514–523, 2012.

[38] N. Oudshoorn, E. Rommes, and M. Stienstra. Configuring the user as everybody: Gender and design cultures in information and communication technologies. *Science, Technology, & Human Values*, 29(1):30–63, 2004.

[39] S. Plant. On the matrix: Cyberfeminist simulations. *The gendered cyborg: A reader*, pages 265–275, 2000.

[40] J. A. Rode. Reflexivity in digital anthropology. In *Proceedings of the CHI Conference on Human Factors in Computing Systems*, page 123–132, 2011.

[41] T. Rodgers. Pink noises. In *Pink Noises*. Duke University Press, 2010.

[42] T. Rodgers. Cultivating activist lives in sound. *Leonardo Music Journal*, 25:79–83, 2015.

[43] M. Schedel, J. Ho, and M. Blessing. Women's labor: Creating NIMEs from domestic tools. In *Proceedings of the International Conference on New Interfaces for Musical Expression*, pages 377–380, 2019.

[44] Y. Seznec. Granular sampler mica. `https://github.com/yannseznec/Granular-Sampler-MICA`, Mar 2022.

[45] A. Tamirisa. Sonic activism in the integrated circuit. *Feminist Review*, 127(1):13–19, 2021.

[46] M. Thompson et al. Sonic (cyber) feminisms: Questions, strategies and contestations. 2018.

[47] E. Tomás. Politics of musical interfaces: Ideologies and digital disenchantment. In *Proceedings of the First International Conference on Interface Politics*, 2016.

[48] L. Vágnerová. 'nimble fingers' in electronic music: Rethinking sound through neo-colonial labour. *Organised Sound*, 22(2):250–258, 2017.

[49] J. Vines, M. Blythe, S. Lindsay, P. Dunphy, A. Monk, and P. Olivier. Questionable concepts: Critique as resource for designing with eighty somethings. In *Proceedings of the CHI Conference on Human Factors in Computing Systems*, pages 1169–1178, 2012.

[50] S. Waters. Performance ecosystems: Ecological approaches to musical interaction. *EMS: Electroacoustic Music Studies Network*, pages 1–20, 2007.

[51] A. Xambó. Who are the women authors in nime?–improving gender balance in nime research. In T. M. Luke Dahl, Douglas Bowman, editor, *Proceedings of the International Conference on New Interfaces for Musical Expression*, pages 174–177, 2018.