The Period Instrument

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ABSTRACT

This paper presents the Period Instrument, an interface for musical expression that requires the input of menstrual blood in order to be played. Drawing from both experimental musical instrument design and feminist design, the resulting object exists both as a sound-making device as well as a vector for challenging normative principles of musical instrument design. Moreover, the Period Instrument represents a particular representation and physical embodiment of time. We will discuss the design and technological development of the instrument, focusing primarily on how designing with and for time constraints can result in new interfaces for musical expression.

Author Notes

[1]Both authors contributed equally to this paper.

Author Keywords

NIME, time, temporality, constraints, menstruation

CCS Concepts

•**Applied computing** → **Media arts;** *Performing arts;* Sound and music computing;

1. INTRODUCTION

The menstrual cycle is a series of hormonal changes occurring in the female reproductive system which cause a variety of psychosomatic processes as well as creating the possibility of pregnancy. Menstrual cycles are often described as cyclical: each cycle lasts about 28 days on average, starting from the first day of bleeding (the period), and ending when the next bleeding occurs. However, this temporality is not exact, and there is no normative way that the body behaves — in fact, most people have cycles that vary from 21 to 35 days, and many people have irregular menstrual cycles or vary from cycle to cycle [8]. This cyclical and varying tem-
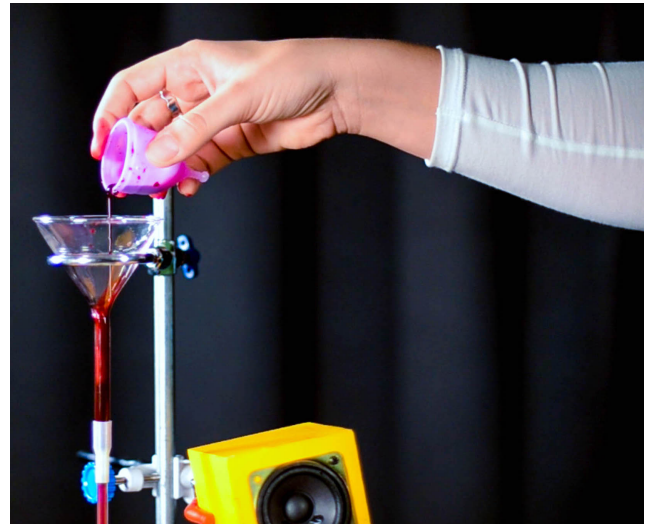
Figure 1: Using The Period Instrument

porality is what has provided the context for the Period Instrument[1].

The Period Instrument is a menstrual musical object — it is designed to create sound exclusively in response to menstrual blood. As we will discuss in this paper, menstrual blood is a bodily material that is associated with a wide variety of cultural and social norms, expectations, and taboos, as well as functioning as a particular representation and embodiment of time. The instrument generates a personal sound experience from the blood, responding to patterns of dripping and flowing of this fluid.

We describe the design and development of the Period Instrument, situating it as a musical interface designed *with* and *for* time constraints. In this case, applying the concept of "menstrual time" to the design of a sound-making device creates a new space for musical intervention. Exploring this space reveals a complex network of ideas around intimacy, sustainability, feminism, and bodily materialism. We offer to the NIME community the Period Instrument as a case study for how different forms of time could be integrated into musical instrument design.

2. BACKGROUND AND RELATED WORK

2.1 Menstruation in art and design

[1]We align with intersectional feminist studies that point out that people of all genders menstruate, for example, women, non-binary people, or trans men. In addition, not all women menstruate, for example, due to hormonal contraception, menopause, or illness.

Although it is associated generally with fertility and reproduction, in most Western societies menstrual blood is often framed as a loss and a waste; a failed attempt at reproduction, a burden, a gendered fluid that should be concealed and suppressed [34, 8]. Like many bodily materials, menstrual blood is *abject* — part of a person, yet also not part of them once it leaves the body [27]. This abjection causes feelings of disgust and discomfort, often even for the menstruating person. When witnessing menstrual blood separate from a body, it appears 'out of place', dirty, and potentially toxic [13].

'Menstrual art', which has become more of its own genre in the past decades, explores these tensions, probing our associations with this fluid, as well as raising questions of patriarchal control and surveillance of women's bodies. The genre took off in the 1970s with artists like Judy Chicago and her work "Red Flag" [6], which marks one of the first depictions of menstruation in Western contemporary art. Since then, menstrual art has proliferated and extended to social media and digital spheres, where artists have pushed back against censorship and dealt with trolls and harassment. Notably, "Casting Off My Womb" by Casey Jenkins was a 28-day performance where the artist inserted yarn into her vagina and knit a long piece of textile stained by her fluids [25]. The project went viral, and Casey faced numerous threats and online harassment, further exposing the stigma and misogyny attached to society's views of menstruation and women's bodies. Recently, feminist bioartists have used menstrual blood as a medium in their work, where menstrual blood cells are isolated and speculated as possible sources for lab-grown meat and 3D bioprinting [24], or where the smells of menstrual blood are synthesized and collected in an installation for the audience to experience [28].

In HCI (Human-Computer Interaction) and Design, a growing body of work engages in design projects that aim to increase curiosity and understanding of intimate menstrual fluids [4, 3]. Speculative approaches include PeriodShare, where a menstruating person would share menstrual blood data on social media in a similar way as other fitness data (going for a run, workout data) [44], or Biomenstrual, a project which focused on making biodegradable menstrual pads, reframing menstrual blood as something nutritious for soil [43, 2]. Further HCI research has speculated on the capitalist and normative intentions and issues around menstrual fluid tracking [17] and pointed out many current risks in the surveillance of intimate data [29].

2.2 From Time Constraints to Sonic Cyberfeminism

One of the primary characteristics of menstruation and menstrual blood is a particular relationship to time. As opposed to linear standard understandings of time, "menstrual time" [16], can be seen as a framework that accounts for the plurality of menstrual experiences, and how these ebb and flow in a non-linear fashion. Menstrual time is cyclical, yet often not predictable, since there are many variations of cycle length from person to person, and even within the cycle of one individual.

The concept of menstrual time can be seen as clashing with the so-called "cornucopian paradigm" of design [36], where interfaces and digital infrastructures are designed to be instant, eternal, and pervasive (among other characteristics), leading to unsustainable approaches to technology. Indeed, new musical tools are most often marketed on their ability to offer *more* (tracks, effects, storage, etc). As Tara

Rodgers and others have pointed out [38], the language used for music technology is not accidental, and reflects how it is embedded within socio-technological hegemonic norms; the ideal "reproducing" medium is generally considered to be silent, passive, and invisible - qualities that are clearly coded as traditionally feminine. Meanwhile, the audio source is meant to be "punchy", "clear", or "strong" - and discussions of fidelity are generally positioned as the struggle for these masculine traits to be heard despite the perceived weakness of the reproductive surface. These terms point towards a political ecology of music technologies [11], perhaps starting with the use of disembodied human ears gathered from nameless cadavers to build the first sound recording devices [14], continuing through to gendered approaches to design and manufacturing [46] and recently with the application of deep-sea oil drilling technologies to auto-tuning [42].

The normalisation of cornucopian design has been heavily critiqued from a sustainability perspective [5], with a number of designers and researchers within the Sustainable HCI (SHCI) [26, 33, 22] community advocating for a "limits" or constraints-based approach [31] to move towards a more socially and technologically sustainable future.

The broader fields of Human-Computer Interaction and media arts have recently seen a number of projects that take time constraints as a starting point. Tega Brain's work *Being Radiotropic*[2], for example, demonstrates a set of different approaches to powering internet routers, making their signal strength dependent on moon phases and candle flames, among other things. Other research has looked at the potential for designing for "slow time" [32] and embracing the inherent irreversibility of time [39].

Similarly, the fundamental principle that underpins the design of the Period Instrument is the concept of designing *for* a time constraint. Essentially: what if the design of an instrument explicitly limits when (and thus, how) it can be played? This could be seen as running counter to the design paradigm that guides the development of most new technologies (musical or otherwise), which generally prioritize accessibility, ease of use, and endless options.

From a musical perspective, the Period Instrument can be seen within the context of a variety of projects that respond to time in non-standard ways. Ellen Fullman's Long String Instrument, John Cage's *As Slow As Possible*, and Jem Finer's Longplayer all expand the time dimension of musical experience significantly. This project is also related to previous work that uses the human body or specific anatomical parts and movements as an interface for generating or manipulating sound. A number of instruments or systems have been designed that respond to brain or muscle signals [45, 12] , effectively sonifying or amplifying measurements of real-time bodily activity. Other projects have looked at the relationship between the human body and the sound-making interface, through gesture [30] or biosensing [9]. Artists such as Johannes Bergmark have also used the body as an instrument by amplifying the sounds of eating, drinking, and moving through the use of internalized microphones[3]. Many feminist artists and musicians have been particularly drawn to work involving the female body and the intimate experience as a source for sound. Althea Rao's 'Vagina Chorus' is a project that uses the movements of the pelvic floor and the vagina to create a collective sonic performance[4] and Maya Livio's "Music for Eggs" is a musical score to be played via an intravaginal speaker designed for

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[2] https://tegabrain.com/Being-Radiotropic
[3] https://www.bergmark.org/gall
[4] https://altheamrao.myportfolio.com/vagina-chorus

gestating fetuses [5]. In these projects, the *materiality* of the body is central, entangling bodies and identities with technologies like sensors, actuators, data, networks and more. Cyberfeminist scholarship highlights and delves into these entanglements [41]. Within the NIME community, several projects have explored 'sonic cyberfeminism' [23, 40] and feminist approaches to embodied knowledge [23], as well as attempts to address some of the shortcomings of NIME in terms of inclusiveness and diversity [19]. In particular, Hayes and Marquez-Borbon's 2020 NIME paper discusses a lack of critical engagement with gender, the privileging of traditional temporalities, and a bias towards quantitative analysis (among many other things). We feel that the Period Instrument works with these concepts by integrating gender, Research Through Design, and time constraints as fundamental starting points of the project.
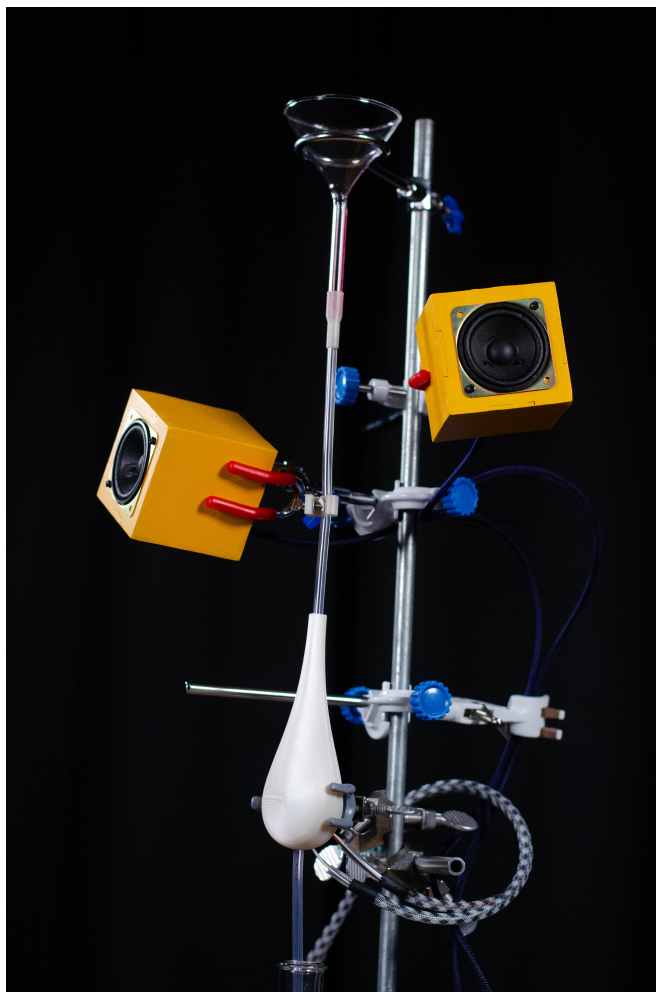
3. DESIGN

Figure 2: The main structure of the instrument, showing the retort stand, clamps, speakers, 3D-printed housing of the RGB sensor, and glass funnel

3.1 Method

This project took a Research Through Design (RtD) [48, 18, 37] approach to creating a prototype in response to the concepts described above. As such, the focus was on develop-

ing a functional musical instrument that responded to menstrual blood, with the instrument functioning as an artifact that is then analyzed for what it reveals. We will therefore provide a detailed description of the design process, materials, and the resulting build, followed by a discussion of what it is like to "play" the instrument and what concepts the final design reveals. Within this framework, the instrument itself, and potentially the experience of playing the instrument, is the resulting knowledge that is generated by the process.

Due to the nature of menstrual blood as the main material, the process naturally took a first-person experimentation approach, with strong elements of autobiographical exploration. The project work took place in Sweden in late 2023. The two authors, one with experiences of menstruating, collaborated on the instrument from the beginning, as it overlapped with both of their research areas.

3.2 Designing with menstrual blood

In order to design and build The Period Instrument, the menstruating author conducted an exploration of her own menstrual blood. She experimented with flushing the blood through a syringe and a transparent tube, watching the bubbles of air trapped between the blood, the clumps of tissue darkening the mix. She experimented with different dilutions of water, capturing a repertoire of shades of red and pink. From these explorations, the authors investigated how to 'translate' or 'map' the properties of the blood into sound. At this point, the decision was made to use an RGB sensor to control the system, since, as artists and designers, it was very difficult to identify a sensor system for rapidly testing whether a liquid is, in fact, blood. Even more complicated would be to test whether a blood-like liquid is specifically menstrual blood: while there are some chemical and material qualities specific to menstrual blood, such as viscosity or lack of coagulative cells, there are no off-the-shelf biosensors that could provide us with that information. Therefore, the technical trade-off is that the instrument is not in fact dependent on blood: any colored liquid would trigger some sound, and any red liquid would suffice to generate a similar sonic palette to the menstrual blood.

As we discuss later in the ethical considerations in this paper, there are several constraints when working with biological material in a research setting, and particularly within our institution. Thus, the decision was made to use synthetic blood and handcraft a mixture resembling menstrual blood as much as possible. Therefore, the menstruating author's first-person experiences and close observation and testing were essential to the project. For the final synthetic blood mixture, we used water, food coloring, and a mucus-like substance made from soaking flaxseeds.

The aesthetic qualities of lab-like glassware, transparent tubes, syringes, and exposed cables have been intentionally chosen to address and probe the concerns of toxicity of menstrual blood and the way that it is commonly treated as a biohazard within academic environments. We explicitly challenge this by juxtaposing playful and colorful aesthetics with the serious and medical forms of the lab equipment.

3.3 Sound design

Granular synthesis was chosen primarily due to the way that it deals with time, which reflected the themes of the project as a whole. Granular synthesis is a sound generation and manipulation technique in which an existing sound recording is broken down into small individual "grains" of

Figure 3: Testing synthetic blood for consistency and color

sound, which are then played back in rapid succession. This enables a set of manipulations to the sound which would otherwise be impossible - a sound can be "frozen" in place, or played at a different speed without changing the pitch (or vice versa). The time element of sound thus becomes something malleable, so the sound of a single drop of blood can be stretched to reflect the time it will take to fall.

We chose three sound samples to overlay using this technique - two vocal samples (breathing and speaking) and a musical sample to create melodic and harmonic shifts. On each change in blood color the granular settings are adjusted, creating an ever-shifting texture combining human and musical sounds. The two vocal samples that were selected were of a female performer using a close-mic recording technique, capturing the texture of breath and the vocal chords. The musical sample is a musician improvising jazz on a Fender Rhodes in their home studio with the windows open, with birds audibly singing outside.

The selection of these samples (and the mapping of the color to various granular parameters) can be seen as primarily stemming from artistic choice, with the aim of generating a satisfying sonic palette that reflects the themes of the work. Thus, the final result included a balance of sounds that clearly come from a physical human body together with musical elements that provide melodic activity.

Three granular parameters are changed each time a shift in the blood color is detected by the sensor. These are grain size, grain density (number of times per second a grain is triggered), and grain offset within the sample. The other parameters in the granular synthesis system (pitch, offset randomization, etc) are all fixed at values we determined to work well for the source material. The entire granular system is activated only when a color is detected, and the primary volume control is linked to the red value.

This approach to the sound design provides a balance between randomness and consistency, in the sense that the overall sonic texture remains similar and recognizable, whilst each individual moment will have different characteristics. This system also results in satisfying moments of texture and ambiance when the blood is flowing through the tube, as well as rapid pseudo-melodic changes when the flow is interrupted by bubbles or variable shades of red. These

Figure 4: Synthetic blood flowing through the RGB sensor

moments were explored in our early tests when we discovered that variations in the shade of red (which naturally occur in menstrual blood), as well as bubbles (which occur as a result of using relatively thin tubing), provided the opportunity for particularly satisfying musical feedback (see Figure 4).

3.4 Technical build

The Period Instrument is built on a retort (or "clamp") stand originally designed for lab work. A set of arms are attached to the center support, supporting the main interface elements. Menstrual blood is poured into a glass funnel at the top, which is connected to a tube with a fluid regulator. This tube runs through a 3D-printed container containing an LED and an RGB sensor. The blood flows past the sensor and into a receptacle below. The sensor and light are attached to a Teensy microcontroller which converts the color data into MIDI control change messages. The Teensy is connected via USB to a Bela board. A Pure Data (Pd) patch is running on the Bela board, responding to the MIDI messages sent from the Teensy. The audio from the Bela is connected to speakers mounted on the retort stand. The entire instrument is thus self-contained. A menstruating person who uses a menstrual cup can *play* the instrument by pouring the contents of their cup into the funnel at the top.

The 3D-printed enclosure for the RGB sensor was made primarily to enable consistent readings. By surrounding the tube with a fairly opaque material and building a light source inside, the sensor was able to provide data independent of the ambient light in the room, lessening the need
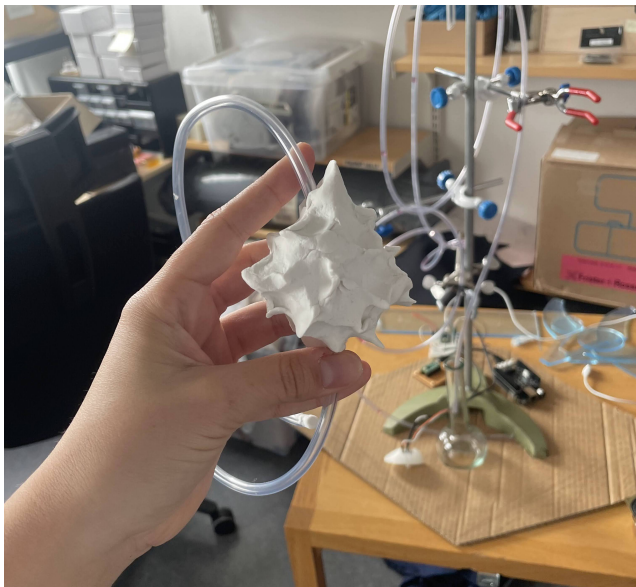
Figure 5: Early version of the RGB sensor housing prototyped in clay.

for recalibration. The priority was for the instrument to be silent when not in use, but to react immediately to blood. Various shapes were tested (see fig.5) before settling on the droplet shape, which provided a balance of aesthetic appeal and functionality.

The data from the RGB sensor was scaled to MIDI, with the three color values and one transparency value converted to control change messages ranging from 0-127 and sent out from the Teensy over USB MIDI. This was determined to be the best option to allow for prototyping flexibility, so that the Teensy could be connected to any computer for rapid testing, and eventually connected also to the Bela for standalone use. The main downside to this approach was a relatively low data resolution, but this did not prove to be an issue due to the specific nature of the design requirements - the main priority was to detect different shades of red, while other colors could be effectively ignored.

The data processing and sound generation is accomplished in Pure Data, using a granular synthesis system developed by the first author. The patch attempts to judge whether the current color being detected by the RGB sensor is a shade of red. If so, a number of settings for three granular sound generators are randomized within a set range as described above. With the settings lightly randomized, the master volume of the sound output is then raised, with the volume of each individual sound controlled by the relative ratio of red, green, and blue. The code is all available on GitHub[6], and a video can be viewed on YouTube[7].

4. PLAYING THE INSTRUMENT

The Period Instrument is thus designed to be played by a menstruating person who uses a menstrual cup. The blood in the cup is poured into the glass funnel at the top of the instrument. Watching the instrument, the "player" naturally follows the blood dripping down the tube, and anticipates the sound as the liquid approaches the sensor. The blood trickles down in an unpredictable pattern, some gaps, some bubbles, some rapid jumps, some quiet and gentle drops. The sound reflects this: uneven, skittish, but occasionally

[6]https://github.com/yannseznec/periodInstrument
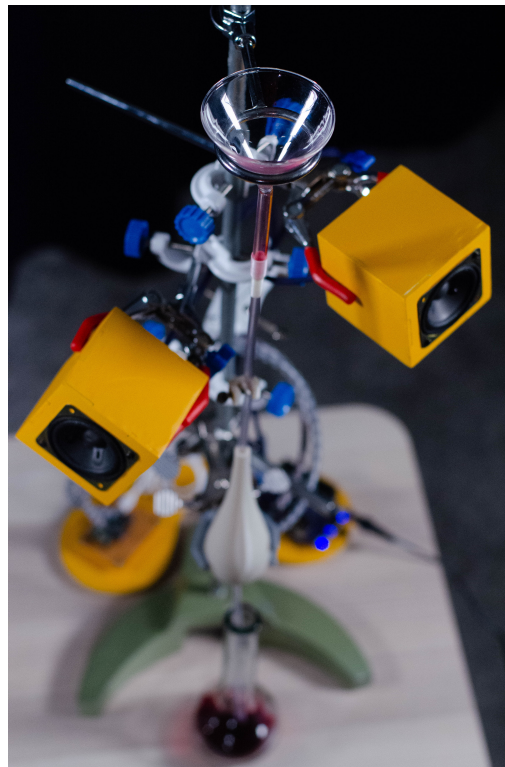[7]https://youtu.be/vOGdXnA11Is

Figure 6: The Period Instrument

calm. Each bubble, clump, or color change is represented in the resulting music through a shift in the parameters of the granular synthesis voices. The most noticeable, perhaps, is the musical sample, which changes pitch and generates unique melodies each time it is used. The vocal samples provide timbre and bring a human texture to the sound, which is projected at roughly ear-height from the built in speakers on the instrument. Any uninterrupted flow of blood generates a static musical texture, the sound frozen in time until the sensor detects a change. The last dregs of blood often take some time to drip down the tube, the color value slowly dropping along with the resulting volume of sound, until the instrument returns to silence. The player finishes by pouring water into the funnel to clean the system, resulting in one last moment of sound. The blood and water in the receptacle can now be taken away for cleaning.

5. DISCUSSION

5.1 Temporality and Constraints

We deliberately chose to use musical sound as a method for exploring and reinforcing the concept of menstrual time, because sound is perhaps the form of media most linked to time. The act of listening is dependent on surrendering our time to a sound - we cannot simply listen quickly to a sound in the same way that we can glance at a photograph. This leads to Chion's ideas of sound as the prime conveyor of time in the audio-visual experience, effectively arguing that not only does sound rely on time to convey information, but also vice versa [7].

Time is therefore something of a design material with this project, both in terms of the menstrual time aspect as well as the use of sound. In particular, time is the main design *constraint*. The instrument can only be used, after all, by someone who is menstruating, at the time of menstruation, and even then only practically during heavier bleeding days.

The instrument is silent for the rest of the time, and if you miss your opportunity, you cannot use it until the next cycle.

By working *with* the constraints of menstrual time, rather than against them, this artwork suggests that the periods of time when the instrument is silent are equally important. This instrument performs, through silence punctuated by occasional moments of music, the sound of menstrual time. We align with Max Picard's philosophical notion of silence as more than merely the opposite of sound, but rather "a complete world in itself" [35]. Picard's definition is extended into how silence's apparent "uselessness" also presents a challenge to a society (or indeed, a music technology sector) that desires profit and utility. The use of silence in the Period Instrument eschews the cornucopian approach to technological design in favor of an embrace of limits and the resulting silence.

Playing the instrument can be seen as a sonic manifestation of a human cycle, one which operates on its own (often frustrating) time. This is, of course, a constraint - however, arguably, the resulting instrument may not necessarily be played significantly less than an average musical instrument, which spends the vast majority of its life *not* being played. The default position of any musical instrument is, after all, silence. Thus, the constraint of operating on menstrual time is perhaps not as extreme as it may seem, but rather, the Period Instrument could potentially occupy a similar conceptual place as a piano, which in many households takes up space but is rarely played.

One of the motivations for a constraints-based design approach to this project was how it could align with contemporary thinking on Sustainable HCI (SHCI), particularly by employing an anti-cornucopian design stance. The Period Instrument shows, perhaps, the potential that new musical interfaces have to explore the SHCI design space. Whilst admittedly the majority of commercial music technology designs fall squarely within the cornucopian mindset, experimental interfaces such as the Period Instrument can reject some core assumptions of many musical technologies - that they should be endless and instantly available. What if we limited our ability to hear a sound or create a musical interaction? If a musical experience is no longer accessible at any given moment, perhaps it goes some way towards challenging the norms of listening and experiencing sound. This therefore positions our use of time as a constraint within sustainability-led design.

5.2 Menstrual blood, materiality, and political ecologies

Whilst this paper has focused on the time-constraints aspect of the design of the instrument, the very act of menstruating is also quite clearly a major design factor - who can 'play' the musical instrument (and how) is also a constraint. In order to play, the user/menstruating person must collect their blood via a menstrual cup, which is one method of menstrual care, but not the most common. The menstrual blood might be directly poured into the top funnel of the instrument, or via a portable container or vial, since removing and changing a menstrual cup is often done in the bathroom. This opens questions on the context and location of the instrument, which we imagine creates different uses and social implications. For instance, if the instrument exists in a public space, it might be shared, raising issues of cleanliness, hygiene, and taboos. In terms of presentation, questions arise on who can perform and play the instrument, and a performance would presumably have to be 'scheduled'

according to one's menstrual cycle. As an RtD project, we intentionally leave these questions open, and use the artifact as a way to discuss and provoke conversations around temporality, stigmas, and ethical tensions associated with menstrual blood.

These ethical tensions have been pointed out by previous design projects using bodily fluids, such as breast milk, urine or other vaginal fluids, which become especially problematic when doing autobiographical work, or using your own biological material throughout the design process [3, 20, 21, 47]. Designing with bodily fluids is a challenging space, where ethical constraints are imposed by institutional limitations, as well as social norms and the 'acceptability' of using bodily materials in the research lab. Menstrual blood is, in a way, a mundane and everyday part of many people's lives, yet when it enters the research environment, it becomes a potentially 'toxic' research material, subject to procedural ethics including processes such as getting permission from an ethical review board and figuring out biosafety regulations. Although essential for reducing and preventing harm within research projects, these regulations do not take into account the use of first-person methods, especially when the interest might not be in studying the chemical and biological properties of the bodily fluid, but in the first-person experiences and accounts of designing with these materials [21].

Furthermore, when designing with bodily fluids, traditional methods of rapid prototyping are challenging, since you cannot just "get blood", test a design, and quickly iterate. There is a very direct constraint not only when playing the instrument, but also when designing: menstrual blood was only available (through the experiences of the menstruating author) once every 30 days or so. And even then, it is not simple to 'collect' it anywhere, nor can it be easily stored, especially within the research lab. The menstruating author performed all her observations and experiments with her blood at home, and the decision was made to sidestep this complex web of ethics and to use synthetic blood as a symbolic replacement for menstrual blood. In making this decision, we ask *what might be lost* when replacing menstrual blood for synthetic blood, and does it matter? Is the instrument still challenging the stigma of menstrual blood when using synthetic blood? Perhaps the use of real blood is not as important as the symbolism of the instrument itself. We also see the Period Instrument as a way to reframe menstrual blood, as a 'fuel' for the machine, as something useful and valuable, rather than a waste, thus using the artifact as a catalyst for critical discussions on bodies and taboos in general.

We openly acknowledge that our design allows for the instrument to be used in ways we do not desire or expect: any fluid could be poured into the funnel to generate sound, and any red liquid would closely mimic the effect of menstrual blood. From a political ecology standpoint, the lack of sensing technologies for measuring menstrual blood could be seen as illustrative of the general lack of female-centric technological development. More abstractly, a parallel can be made to the development of historically-informed period instruments, which will necessarily contain compromises in terms of materials, processes, and final implementation. A historical lute maker can not guarantee that a performer will not play the instrument in front of a microphone for an audience in an air-conditioned concert hall with modern lighting. An instrument designer must accept that the framework and principles that guided the design may not be respected by the end user.

This historical example is not accidental. When first discussing the concept of a menstrual blood-responsive in-
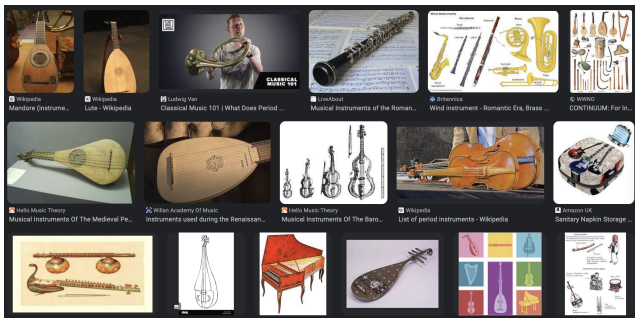
Figure 7: Google Image result from a search for "menstrual musical instrument"

strument, we googled the phrase "menstrual musical instrument". We were somewhat surprised to see results primarily showing lutes and harpsichords - clearly the search engine had internally converted the term "menstrual" to "period", resulting in a set of search results reflecting so-called 'period instruments' (see fig. 7). We were struck by the underlying assumptions in the language processing of the search technology, which reflects decades of embedded male dominance (or at least female invisibility) in the development of those tools. Thus, the title of our instrument is a play on words with the concept of *period instruments*, in which musical instruments are designed, built, and played with the intention of recreating every aspect of a musical performance from a chosen era in the past. It is also simultaneously a reference to the biased assumptions made by technologies on our behalf.

6. CONCLUSION

The Period Instrument as a musical device shows how an alternative conception of time can be applied to the creation of sonic interfaces. Using a constraints-led approach, time can become a method for finding new places for musical interventions. In our particular case, selecting menstrual time as a constraint meant exploring the potential for designing an instrument for a hitherto musically unexplored and ultra-personal moment. This approach opened a number of questions about how a musical instrument can represent concepts of sustainability, the stigma and materiality of menstrual blood, and feminist design in general.

While we concentrated our efforts on menstrual time, we invite other musical instrument designers to take a similar approach to any number of other conceptions of time - some composers have already explored non-human approaches to time [10], for example, and design theory has begun to engage with notions of crip time [15] and even questioning how clocks orient our particular worldview and represent a generally incomplete picture of the realities of time [1]. The Period Instrument, as a tangible prototype, argues that by engaging with time and designing *for* constraints, new areas of musical expression can be unlocked.

ACKNOWLEDGEMENTS

Ethics Statement

This research paper describes the design and fabrication of a musical instrument that uses menstrual blood to generate sound. The artifact thus opens up for discussions on intimacy, bodies, temporalities, and gender. The first ethical concern, discussed in the paper itself, is the use of menstrual blood in the design of the instrument. Menstrual blood is a biological material that can contain blood-borne diseases such as sexually-transmitted diseases, thus in medical/clinical research it is treated as a biohazard and often subject to storage regulations in order to avoid the risk of infecting other researchers if diseases were present. Additionally, menstrual blood is highly stigmatized, perceived as disgusting, which adds to this association of toxicity. Our design intentionally wants to challenge these associations, bringing menstrual blood to the center of a musical artifact. However, given the restrictions of our institution (a technical university) and the ethical guidelines of our country (Sweden), we did not bring collected menstrual blood into the lab or makerspace. Instead, the menstruating author used her own first-person experiences throughout the process by experimenting in the privacy of her home. In her home, she observed her own menstrual blood, gathering aesthetic inspiration and also noticing the qualities of the texture and composition of the blood in order to replicate it by making a synthetic mixture. The synthetic mixture was used to test and iterate on the instrument's design and to film the documentation. When writing "no menstrual blood was brought into the lab space", we also want to point out the blurriness of this, as of course, menstruating bodies are often in the lab, and might they always carry a potential to 'intoxicate' if say, they leak? With this we also reflect in the paper how there are no clear guidelines on how to work with bodily fluids like menstrual blood in design research—we are not doing clinical studies on the menstrual blood, but rather using it for it's aesthetic and stigmatized meanings. Finally, we would like to point out how this research was led by two PhD students, and we are therefore influenced and affected by the advice given by our advisors. For this project, the advisors were not involved in the design process, which is especially important for the menstruating author to be able to state that she was not coerced nor forced to do research with her own body and her own menstrual experiences, but rather this came from her own will and curiosity.

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