University of Art and Industrial Design Linz

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Davulita

Adapting Davul for Live, Experimental Dance Music

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Abstract

This master's thesis explores how to adapt the davul, a traditional Turkish drum for live, experimental dance music. Inspired by the cultural history of the davul, techno, and post-club practices, the project aims to offer a tangible, organic alternative to a setting often perceived as mechanical.

The project's practical outcome is Davulita, a hybrid instrument that enables players to process the organic sound of the davul and record loops using the custom controller attached to the mallet. This process involved finding solutions to capture the sound, using ESP32 microcontrollers and various sensors for the interfaces. The digital sound-processing methodologies were adapted from self-artistic practices.

Tested in various public and private performances, the Davulita has shown it can be effective outside the genre that inspired it. User feedback confirmed the instrument's energy and offered suggestions to make it more practical for future variations.

In conclusion, Davulita comes from the intersection of davul tradition and ritualistic club experiences and it inspired artist to move freely beyond both.

Contents

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Introduction

People have been dancing for over 10,000 years. Many things make them move. For this Master's thesis, I chose two as a starting point: davul and techno.

Growing up in Turkey, collective dance often involved the traditional drum, davul. It was one of the primary rhythm instruments in weddings, feasts, and on the streets. Later, I discovered electronic dance music, clubs, and finally techno, where the beats were heavier.

Starting as a listener, my desire led me to document electronic dance music in various magazines, produce my own tracks, and perform as a DJ. Later, during my studies at the Tangible Music Lab, I had the opportunity to learn and research about rhythm.

Driven by the need to have my own percussive instrument, I found myself adapting the davul, one of the earliest rhythm instruments, into my artistic practices, at the blurry edges of live, experimental electronic dance music heavily inspired by techno and post-techno genres. At the end of the process the davul became Davulita, a hybrid instrument. During this development, I decided to preserve the instrument's organic sound while enhancing it with digital processing. I also added a mechanism that lets players create loops and sequences.

To achieve this, I combined microcontrollers, programming, and basic electronics. In digital sound processing, I adopted techniques from my practice in techno/dance music production. In the process, I had a chance to collaborate with other artists to test Davulita as well.

In the following chapters, in addition to the process of building the instrument, I aimed to incorporate information about my inspirations. Chapter 1 focuses on the davul, its features, cultural context, and contemporary use. Chapter 2 covers the brief history of techno and its production. The last chapter before Davulita, Chapter 3, is about techno's context, with a brief history of DJing and clubs, and concludes with post-techno practices.

Chapter 1

Davul

1.1 Instrument Overview

Figure 1.1: Profesyonel davul YSD-303, Dinleal Webstore

The davul shown in Figure 1.1[1] (also known in various regions as tapan, tupan, or dhol) is organologically classified as a membranophone, more specifically as a double-headed cylindrical drum (Hornbostel–Sachs 211.21)[1], meaning it has a tubular body with two usable membranes. The instrument is commonly hung from the shoulder and played with two different types of mallets or hands. [2]

It is possible to trace the davul back to ancient times. It has been a part of different cultures and geographies, including Central Asia, the Middle East, and the Balkans. The name of the instrument varies in these regions as well. In Bulgarian, the instrument is called 'dabdani', 'dhol' in Armenian, in Kurdish it is 'dahol', and in Greece the instrument is named 'baul'. [2]

As an artist raised in Turkey, I acknowledge the limitations of fully accessing the cultural connotations associated with the instrument in other linguistic and regional contexts, where the instrument possibly has its own historical timeline. Therefore, I decided to conduct the research by using the term davul or asma davul (hanging drum) for terminological clarity and consistency.

[1] Photo: *Profesyonel davul YSD-303*, Dinleal Webstore, `https://dinleal.com/products/profesyonel-davul-ysd-303`.

1.2 Organographic Features of the Davul

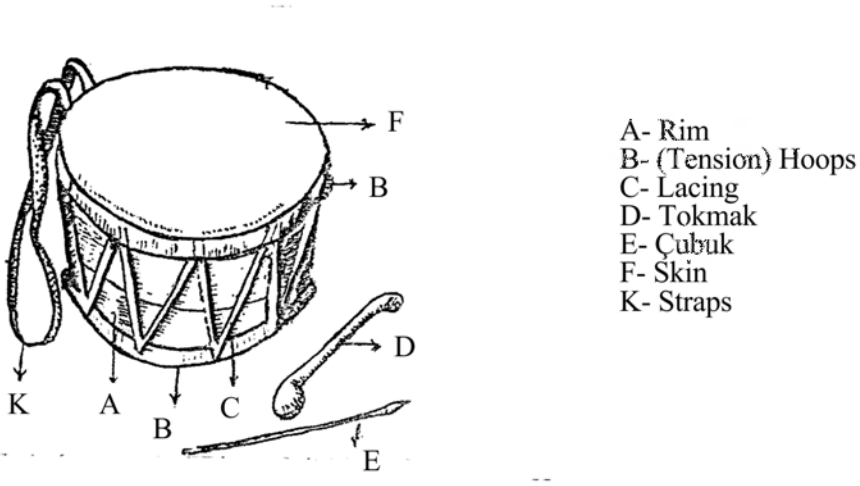

Figure 1.2: Adapted from Oldac (2020), showing the parts of the davul (translated)[3].

The instrument is composed of a cylindrical wooden shell with one drumhead on each open end. In most cases, the instrument is played with two mallets. 'Tokmak' is a thick mallet generally used to get low-frequency sounds. A thin stick named 'çubuk' (also named 'çibik') is used for higher-pitched strokes (often referred to as rhythmic accents or embellishments). [2]

Most of the davuls range between 50 and 60 cm in diameter. However, smaller and larger sizes also exist in different regions of Turkey [3]. The size is usually adapted to the music style that will be performed. For example, in the regions where traditional compositions are faster (such as the Black Sea region), players prefer to perform with a smaller size of davul. [4]

The choice of wood for the body is also affected by the region [4]. Walnut, pine, and beech are mostly used for the drum shell in the eastern part of Turkey. In the west and the north of the country, the use of walnut is documented more.[3]

For the drumheads, goat skin is traditionally used; examples of sheepskin are rare yet still noted. [3]. In contemporary practice, instead of animal skin, X-ray films and synthetic skins are also used. [2].

To attach drumheads to the shell, tension hoops are used. Just like the body, the material of the hoops varies[4] Instrument builders use a long rope to connect hoops to the davul. They pass the rope through the holes drilled into the hoops, which are placed at both ends of the davul.

By tightening the rope, they combine the pieces and also prepare them for tuning and playing. The patterns formed during lacing are often named after the shapes they resemble: Y, inverted Y, W, M, or N. Later, two opposing holders are screwed into the shell to attach the strap used to hang the davul for playing.[2][3]

1.3 Performance and Acoustic Features

Figure 1.3: Hanging davul (screenshot from YouTube video by neseliayaklar8733, 2022

As shown in Figure 2.3, if the player is using their right hand to provide the primary pulses, the instrument is hung on the left shoulder.[2] Due to its size, the davul can be supported with the legs. [3]

As mentioned earlier, 'tokmak', a thick mallet, is designed to produce deep bass tones. 'Çubuk' (also known as 'çıbık') is thinner compared to tokmak and usually used for treble-side articulation. Instrument builders usually prefer light wood materials such as pine, chestnut, and apricot so as not to damage the drumheads [3]. The style of using mallets (sometimes not using one of them or playing with hands) differs depending on the region, music style, and the instrument the drum is accompanied with [4].

The right side of the davul is used mainly for the bass pulses. It produces a loud, deep, booming tone that is rich in the low-frequency range. In traditional davul notation, a hit on the right-hand side is referred to as 'düm'. The left side allows for sharp percussive tones. The term 'tek' refers to a stroke played on the left side of the drum. The combination of the left and right sides is referred to as 'yek'. [3]

'Cızlatma' is produced by holding the çubuk on the 'tek' side and hitting the 'düm' side with the tokmak.Striking the drum's shell (kasnak) with the tokmak is named directly after the shell itself: 'kasnak', and hitting the hoop (çember) with the tokmak is called 'çember'.[3] The combination of these completes rhythmic patterns.

In the thesis of Mustafa Şahin (2009), the author provides davul notations from Traditional Turkish Folk Dances for the instrument. It is clear that, in addition to regular 4/4 rhythm, the instrument is widely used in diverse meters. Şahin (2009) shows that in Halay dances, there are examples of 2/4, 4/4, 6/4, 6/8, 10/8, and 12/8.[2]

[2]Video title: *Davul Çalma Teknikleri Ders-4*, YouTube Shorts, by neseliayaklar8733, `https://www.youtube.com/shorts/eDEcEhZ7MA8`.

In the category of "Bar", there are different motives where davul accompanies in 4/4, 5/8, 6/8, 9/8, 12/8, and for "Horon" 5/8, 7/8, and 7/16. Associated with "Zeybek," the use of 9/2, 9/4 is noted.[2]

1.4 Historical Background

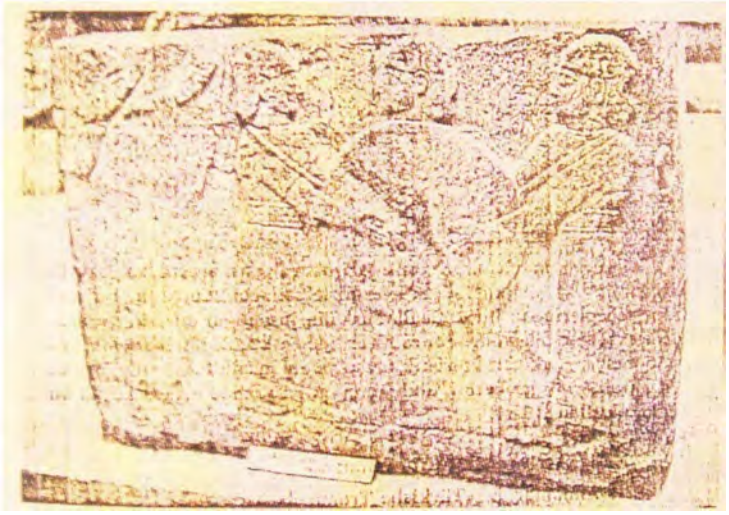

Figure 1.4: Hittite Relief in the Anatolian Civilizations Museum [2]

As mentioned at the beginning, the tradition of playing the davul has an ancient origin that reaches the Middle East, Central Asia, and the Balkan regions [2]. It is speculated that the simplest versions of the wooden drums were made in the Upper Paleolithic era (40,000–10,000 BC) [5]. And the early visual depictions of drums are from the Neolithic era. In one of the examples, a figure is shown playing a drum-like instrument in the Hittite (1900–1200 BC) and Sumerian reliefs [2]. In history, early drum-like instruments were mainly used in religious and martial contexts. Later, the instrument was integrated within the culture itself [3].

In the rituals of Ancient Mesopotamia and Anatolian societies, music held a strong position. Alongside writing and poetry, music classes also had their place in the school curriculum [6] .

Drums were part of the orchestras among the Sumerians, used for religious ceremonies. Depictions of the drums have similarities to the modern asma davul in their size, the way they were hung to be played, and how they were played [6] .

One of the prominent examples of ritualistic use of the davul can be observed in Shamanism. The instrument was used during religious rituals to cast away evil spirits [7]. In the same culture, it has also been stated that "There is no ritual without a drum, no shaman without a drum." [8] Besides its ritualistic context, the instrument was also a symbol of expression. It depicted the shamans' cosmological view of the universe. [9]

The martial context of the drum is found in the Xiongnu Empire and lasted until the Ottoman Empire. By their nature, the davul and other drums didn't need any additional amplification. Therefore, they found a place for themselves in various functions in Mehter platoons, such as communication, motivation, and celebration. The sonic similarity between drums and weapons was also used as an advantage to create illusions on the battlefield. [4]

The davul was used in a more speculative context as well, such as relieving pain. A practice known as Davul Yakısı [2] involved repeatedly playing the davul next to a person with complaints.

Today, these roles of communication and symbolism have evolved into traditions within cultural life. There are still davul players during Ramadan to wake people up in the sahur time. Weddings, public celebrations, wrestling contests, and football shows still make place for the instrument.

1.5 Social and Cultural Roles

Every davul needs its player. Just like the instrument itself, players were referred to by various names: tablzen, davulzen, and davulcu [10]. In many communities, tradition was inherited through generations and often passed down from father to son [2]. In Abdal communities, where musical performance (especially davul and zurna) holds a primary means of livelihood, it is said that children are "born with their instruments." [11]

Nowadays, players don't necessarily need to be born with it. As I also referenced them in this research, there are academic sources and courses available at Public Education Centers. There are YouTube tutorials and method books that support self-learning.

Going back to the phrase 'father to son', I aimed to find a historically recorded female davul player. Unfortunately, I couldn't reach a source about this. Naturally, there are more accessible sources about contemporary practices where female davul players are visible.

Ayşe Ezer, a contemporary davul player in the Nigde Mehter Platoon, says, "Playing davul is not difficult for me at all. I want women to be courageous about this." (Source: Ahmet Demircan, Anadolu Ajansı, September 22, 2025) [12] Again this year, it was recorded that a group of female davul players continues the tradition of waking up people in Sahur times during Ramadan. [13]

In current times, the davul is still taking part in celebrations. When conducted in a traditional way, davul plays a central role in those events. In those settings, the instrument can be seen with the zurna, a double-reed woodwind instrument. The festive duo got into the proverbs as well: "Davul zurnasız düğün olmaz" ("A wedding isn't a wedding without the davul and zurna"). However, with new trends, those traditions no longer continue as loudly as before.

Davul players in the Abdal community discussed the changes from their experiences. Until the mid-90s, davul and zurna players were booked several months in advance for the three-night-long wedding performances. They held a significant position in the whole ritual. [11]

Even though the research I am citing was done almost 15 years ago, it is mentioned that the celebrations were turning into a one-night event, and davul players are starting to be replaced by DJs. The same study by Kilic also talks about the new adjustments in law that restrict and regulate the davul playing activity in intercity bus stations during the army farewell. [11] Here it might be useful to mention: without explicitly mentioning the davul, playing the instrument in public spaces can result in a fine under noise limitation laws. But it is not the first time that davul is suppressed.

During the modernization and Westernization process in the late Ottoman and early Republican periods of Turkey, the davul (and zurna) became a controversial topic. In the mid-1940s, there were arguments about the visibility of Eastern folk music on public radio. In this context, an article (attributed to Şevket Bado) was written: "Zira ciddi ciddi radyoda davul zurna teklif edecek bir münevver tasavvur edemiyoruz. Radyo keyif verici değil, zevk terbiye edici bir yerdir"(Akşam, 1945, as cited in Cantek, 2005) ("One could hardly imagine a so-called intellectual seriously proposing davul–zurna on the radio. The radio is not a place for giving pleasure, but for cultivating taste"). [14]

This statement also received opposing responses. Refik Halid Karay, for instance, focused that interest in these instruments and music style was not bound to the rural population. As his text develops into a broader East/West polemic, only the opening sentence is cited here in order to illustrate the contrast and to indicate where the davul was thought to belong: "Davul zurnayı isteyenler yalnızca köylü değildir. Biz şehirliler ve az çok musikiden anlayanlar da istiyoruz"(Akşam, 1945, as cited in Cantek, 2005) ("It is not only the peasants who want davul–zurna. We city dwellers, and those of us who understand music to some extent, want it too"). [14]

Raised with a blend of rural and city norms, I want it too. Looking back at my own memories, it almost feels like it was always there: in public celebrations, weddings, and family gatherings.

1.6 Contemporary Use

My earliest contemporary davul reference is the Turkish multidisciplinary artist, Cevdet Erek. At first, I came across his band Nekropsi where he plays drums and contributes to the vocals. It would be fair to say the band is well-known in the creative music scene in Turkey with their experimental attitude towards (hard to describe) rock. I always admired the way they mix polyrhythm with noisy textures.

Figure 1.5: Cevdet Erek playing Davul in Nekropsi concert

In a Nekropsi performance I found on YouTube,[3] the video starts with the camera focused on Erek playing the davul. Another band member seems to be simultaneously busy with the pedals, assuming he is processing the sound. During the performance, he combines the rhythmical function of the instrument with an experimental approach. Holding the davul near the microphone and speakers at the same time, he generates feedback and drone-like sounds.

The comment section of the video reflects curiosity as well. User @evrenkaragebet2180 asks if the long resonance of the drum was coming from "Cevdet keeping the davul on top of the monitor," noting that he has been thinking about it for the last 6 years.

Feeling the curiosity of the user evrenkaragebet2180, here I'd like to make a personal note. I am familiar with the concepts of feedback, drones, and noise through experimental electronic music; however, this was the first time that I associated those concepts with the traditional davul practice. Referring to the video, it is clear that the instrument has the potential to create heavy subtones and to fill the space

While I was working on building Davulita, I tried different techniques to amplify the sound. I used contact microphones, piezos, and dynamic microphones; however, I ended up getting some sort of feedback. At first, I treated them as an unwanted byproduct. One of the artists who shifted my perspective was naturally Erek, and second, a percussionist and a student in TAMLAB, Sam Bereliani.

As a part of our seminar project, I handed my davul project to Sam. In his improvisation, there were parts where he was using the feedback (issue) to build an atmosphere and fill the room with sound. I realized that the so-called problem can be a nice feature in good hands.

Let's go back to Erek.

[3]Video title: *Nekropsi - Davul @Salon İKSV 22.03.2019*, by sezyum, `https://www.youtube.com/watch?v=xnZFla9DUsk&t=119s`.

Figure 1.6: Album cover of Davul, Cevdet Erek

Erek's experiments with davul actually have a longer history. In the album 'Davul' (2017), he presents his live recordings with the instrument. [4] With a series of untraditional choices (different mallets, different tuning), the album consists of seven improvised pieces. Listening to 'Davul', I sensed sudden changes in speed, complex rhythms, textures, or atonal melodies which were not mentioned in davul methodology books I found so far. The final piece, 'Dicycles', reminded me of the sound of bird wings recorded in a very small room, and I had to remind myself that I am still listening to a davul performance.

To have an expanded view of what is happening today, I found it critical to look beyond the formal context. One interesting example is Erkan Karagöz, known in Uşak as 'Çılgın Davulcu' (Crazy Drummer). In his performances, he begins playing with two davuls and gradually increases up to seven. He claims to be the only musician in Turkey and the world who can play seven at once, and his goal is to reach eight in order to apply for a Guinness World Record.[15]

[4] Cevdet Erek, *Davul* (Subtext/Multiverse LTD, 2017), `https://cevdeterek.bandcamp.com/album/davul` .

Figure 1.7: Screenshot from TRT Haber video of Erkan Karagöz, known as "Çılgın Davulcu," performing with multiple davuls. TRT Haber (2019).

Playing seven davuls (fingers crossed for eight) might be interpreted as absurd at first, but imagining tuning each of them differently would make it possible to have a greatly wider sound palette.

Coming from a computer music background, I am used to changing sound and timbre as a consistent feature. With a simple gesture, it is easy to control the filters, timbres, or swap instruments. This real-life example guided me to reflect on whether there would be a need for changing the sound of the davul during performances. If yes, would it be possible to make it without carrying several of them?

Building my project, I aimed to carry the main controls that I use to process sound on a DAW onto davul. I do not change the sound of the davul into another instrument; however, by saturation, adding reverb, or adjusting the 'boost' of bass levels, I suggested an idea. And for me, Karagöz was the initial inspiration behind this.

As briefly mentioned through the Abdal community, the traditions of wedding celebrations are changing rapidly. In the more modern settings, davul is not playing a central role in those ceremonies as it used to. With this shift, davul playing started to appear more as a staged show, and they have a decorative presence. Therefore, wedding organizers are finding new ways of placing this tradition in new settings. One attractive example is from the user Enes Şahin Sahne Sanat[5], where the wedding entrance includes visually modified drums.

[5]Video title: *MUHTEŞEM ZAFFE DAVUL ŞOV - Amazing Turkish Zaffe Show - TURKISH ZAFFE BRİDE AND GROOM*, by Enes Şahin Sahne Sanat, `https://www.youtube.com/watch?v=hivGptOUZO0`.

Figure 1.8: Screenshot from YouTube video: Amazing Turkish Zaffe Show (2023).

Taken from a wedding entrance performance, the screenshot shows how the davul tradition can be interpreted as a show. I would love to describe the modifications to the instrument. First, the shell of the body is changed with a metallic surface, and inside the shell, the LED strips are installed. The stylistic choice of the davul also matches the performer's outfit, metallic jackets, and again, LED-inserted sunglasses. Small fireworks are also placed in front of the instrument.

The video functions as a trailer rather than a documentation of the whole performance. In the provided time frame, davul and performers come to the stage with a digital backing track that includes darbuka and zurna. It is hard to decide if the sound of the davul is coming from the live performance or the backing track. At some point, a voice (assuming the DJ) shouts 'Put your hands up' in English. I think this saying explains the in-between, hybrid position of the show very well. As a result, the performance gives a very clear image of how an instrument can be transformed with the aesthetics of digital culture.

To examine the transformation, I would like to focus on the LED placement inside the davul. This intervention would require opening up the instrument and configuring the placement of the electronics, and creating an example of how davul can be combined or can be imagined with contemporary technology.

Figure 1.9: Screenshot from YouTube video: ANIL PİYANCI, GROGİ VE SANSAR SALVO (DAVULCU PART 5).

Discussing the adaptation of the davul to contemporary settings, I'd like to go back to reference the use of the instrument in other musical genres. A good example to start with is 'Davulcu', a Turkish rap series by Anıl Piyancı, together with artists such as Grogi, Sansar Salvo, Avaz, UZ4Y.

The series consists of six parts, and a davul player accompanies the hip-hop artist. Videos are mainly shot in urban settings. In Davulcu Part 5[6], the performance takes place in a skate park, where the player is located at the top of a ramp and plays the instrument. Other artists rap over the played beat.

In this project, I observed davul as a practical choice, particularly in the context of live street performances. The davul doesn't require additional amplification, electricity, or a long setup, which can make it one of the ideal instruments for filming in outdoor and improvised domains.

[6]Video title: *ANIL PİYANCI, GROGİ VE SANSAR SALVO (DAVULCU PART 5)*, by İbrahim Elessar, `https://www.youtube.com/watch?v=gNWmkbagLkQ`.

Figure 1.10: Screenshot from YouTube video: İpek İpekçioğlu and Hakan Vreskala

Another example of the davul is from a collaborative project by İpek İpekçioğlu, a well-known DJ who works at the intersection of electronic dance music and Anatolian musical practices. In 2018, with vocalist and percussionist Hakan Vreskala, they worked on the arrangement of the anonymous Turkish folk song 'Bir Çift Turna'. Later that year, the duo played in İzmir with their hybrid setup.[7] In some parts of the recap video Vreskala played the davul, while İpek controlled the audio with DJ equipment and other controllers. For the performance, Deniz Mahir Kartal joined them on wind instruments, and Bulgarian artist YvesO created an audiovisual layer.

The performance sets a good reference point for how a davul can be imagined in a contemporary electronic dance music setting and in a hybrid environment. Another interesting part for me is to see an audiovisual artist and the davul together. I believe the concert of Nekropsi that I have cited earlier had a specific person for the lights, or in the wedding entrance, there was a strong visual aesthetic with LEDs. Still, none of those examples mention the audiovisual integration.

Here, I am going against what I stated at the beginning of the chapter about strictly using 'davul'. During my research, I aimed to find contemporary electronic dance music examples that sample the instrument; however, I came across the British-Armenian producer Hagop Tchaparian with the keyword 'dhol'.

In a Pitchfork review, Younger (2022) describes the track 'Right to Riot' as "anchored by clanging dhol drums and caterwauling zurna". I agree with the description, but would like to add how powerful the dhol combination with zurna sounds when looped. The track also stands out for me because the use of the instrument is not ornamental but highly blended with the electronic kicks.

[7]Video title: *GLOBLOKAL Konser: "İpek İpekçioğlu Hakan Vreskala" (22 Eylül 2018, İzmir)*, by LOKALL İzmir Kent Rehberi, `https://www.youtube.com/watch?v=LN8kGOLPbug&t=4s`.

Figure 1.11: Cover of the Sample Pack: Turkish Percussion Essentials

Today, the internet offers accessible sources for producers who want to use the davul in their digital productions. For example, I came across Turkish Percussion Essentials curated by Gio Israel on Splice. The pack includes one-shots, loops, and textures from the instrument. [8] The online visibility of the instrument makes it possible for it to be adapted into global music production.

[8] Gio Israel, *Turkish Percussion Essentials* (Splice, 2025), `https://splice.com/sounds/packs/gio-israel/turkish-percussion-essentials/`.

Chapter 2

Techno: History Overview & Production

2.1 Historical Overview

"Boom boom boom boom." There is also "Boom tcha, boom tcha, boom tcha, boom tcha." It is actually easier to mimic music rather than attempting to define it. I want to start with the essentials to make the process easier.

Techno is an electronic music genre highly associated with dance and club culture. It is mostly driven by a four-on-the-floor rhythm, generally between 120 to 150 beats per minute.[16]

After this oversimplified definition, it is worth mentioning that the history of the genre has been a topic for many books, articles, and interviews, and they all point to one city in the USA.

Figure 2.1: The Belleville Three. Image via DJ Mag (djmag.com).

“But techno? Well, of course we know it really comes from Detroit and that its pioneers were Derrick May, Juan Atkins, and Kevin Saunderson” (Brewster, as cited in Sicko 2010, p. vii). After acknowledging techno’s birthplace, Brewster lists the first names behind the genre. Later, they were credited by their location and the number of people they were: "Belleville Three." [17]

The authors and the pioneers of the genre argue that Detroit’s (or Belleville’s) industrial landscape had a direct impact on the music they made [18] [19]. Until the middle of the 20th century, the city was the center of Ford Motor Company’s production, and this was provided a livelihood for many people. I found it interesting to see parallels between techno and the company’s manufacturing model, which required workers to remain steady

and perform the same activity. [20] After the Second World War, Ford, Chrysler, and General Motors, faded away from the city, Detroit transformed into a post-industrial area [21]. It was within this context that the Belleville Three crafted their sound. Reflecting on the environment, Atkins saw techno as a way to get away and said: "With Detroit being such a desolate place, it's depressing and there's a lot of crime and decay, you really want something to take you away. I always saw techno like as dreaming."(Atkins, 1993 as cited in Poschardt, 1998 p. 317) [22]

Figure 2.2: Mike Rinaldi, then-President of UAW Local 600, stands at the sign in front of his headquarters on Dix and points to the Ford Rouge Plant in 1983. (Credit: Ira Rosenberg, Detroit Free Press (freep.com).)

However, the inspiration of the trio was not solely from the industrial atmosphere of the city. Reynolds explains that the pioneers were also influenced by the German electronic band Kraftwerk (also the Kraftwerk was inspired from the city as well). [18]Atkins describes Kraftwerk's music as "It sounded like somebody making music with hammers and nails" (Atkins as cited in Reynolds, 1999, p.13). With these words, he draws parallels between Detroit and the iconic band. Later, he uses the city as an adjective to describe a mechanical approach towards sound design and composition. "Kraftwerk was always very culty, but it was very Detroit too." [18]

Another referenced influence is a Detroit-based radio host, Charles Johnson, also known as The Electrifying Mojo. He is usually credited for giving space to futuristic selection of music in his show.[19]

Besides music, literature was another layer of stimulation. Juan Atkins notes Alvin Toffler's Future Shock and Afrofuturist ideas for their Cybotron project with Richard Davis [23] .

Figure 2.3: The dance floor of The Warehouse. Image courtesy of the Frankie Knuckles Foundation, via Block Club Chicago (blockclubchicago.org).

Techno was not alone in its timeline. Alongside the genre, a few hundred km away in Chicago, house music was evolving with the contributions of artists like Frankie Knuckles and Ron Hardy. The Belleville Three often visited the city to sell their production and attend Ron Hardy's DJ sets. It is also argued that they drew lots of inspiration from the scene. [19] In the West of Europe, there was Electronic Body Music (EBM) inspired by various factors such as industrial and punk movements [22]. It would be possible to speculate that all of them were meeting points for new musical technologies and a bit of dance.

Here, it would be a good moment to share the reflections of the pioneers about techno. With the genre, Atkins aimed to create a soundscape where computers are having a conversation. (Atkins as cited in Brewster and Broughton 1999 p.335) He also highlighted the sense of coldness in the music similar to Derrick May descriptions.[19] Even though Brewster argues that the philosophy and ideology of the genre appeared after the initial releases, and the genre was actually made for the dance floor, Atkins' quotes add another layer to the function of the music. He says, "I make my records in the hope that people will go and buy them to listen to as well as dance to." (Atkins cited in Brewster and Broughton 1999, p.335)[19]

In the first examples of techno, it was still perceived as a sound from Chicago. After more releases and DJ appearances, genre caught the attention of the UK press and record labels. When it was shipped across the Atlantic under the title "Techno! The New Dance Sound Of Detroit" in 1988, genre reached a wider audience. After its recognition, it blended with the pre-existing electronic scene and started to grow first in Europe, later worldwide. [19]

While techno was growing in Europe, a second wave of Detroit Techno was being developed by artists such as Jeff Mills and Robert Hood. It is also a must to mention Underground Resistance (UR), a musical collective co-founded by Mills and "Mad" Mike Banks. The collective also gained recognition for its political views. [22] [19]

Later, with a series of different artistic takes, the genre was continuously developed. It reached the pop charts, influenced fashion, inspired movies, and naturally club culture worldwide.

Becker and Woebs suggest that techno should not be understood only as a musical genre but as a ritualized form of listening. They argue that the machinery rhythms produce a metaphorical connection between human and machine, allowing listeners to enter trance-like states. [24]

As a former partygoer, I always enjoyed listening to techno in the dark dancefloors. I had the privilege to listen to the artists that I adored in the safe club environments. Here, I fully agree with Becker and Woebs and want to focus on what makes listening to techno possible, the production of the genre. In the following sections, I concentrated on the influential instruments, technological developments, and contemporary setups of selected artists.

2.2 Production of Techno

The production of techno music was closely connected to the growing popularity and increasing accessibility of electronic instruments such as drum machines, synthesizers, sequencers, and samplers. In their early stages, these devices (in the 1980s) were the primary tools for creating techno.

With the development of technology and the introduction of Digital Audio Workstations and MIDI protocols, music making (including techno) started to shift towards computers and digital tools. Virtual Studio Technologies and Virtual Instruments first helped to mimic the classic needs of the studio in computers. Later, they allowed any sort of creative implementation.

Each generation of technology affected and influenced the sound of different variations of techno. In contemporary practice, it is possible to observe different approaches. The range goes from only using a DAW to full hybrid setups.

2.2.1 Drum Machines

When discussing techno, a genre based on repetitive pulse and rhythm, drum machines are among the most prominent devices. In the 1980s, the Roland Corporation developed a series of programmable rhythm machines that defined the early stages of techno. The Roland TR-808 and TR-909 are among the most influential examples of this type of instrument.

Figure 2.4: Roland TR-808 drum machine. Image by Bryan Pocius (New York, USA), via Wikimedia Commons (CC BY 2.0, commons.wikimedia.org).

The Roland TR-808 (1980) could simulate eleven percussion sounds at once, including kick, snare, clap, and hi-hats. It offered controlling parameters such as the volume, tuning, attack, and decay for each selected sound. On the interface, there were 16 keys that allowed users to interact in real time and sequence rhythms. The device also had the capacity to save drum patterns. [25] Even though 808 is mostly associated with hip-hop, it was also influential for the early days of Detroit Techno [26].

Figure 2.5: Roland TR-909 drum machine. Image by Brandon Daniel, derivative work by Clusternote, via Wikimedia Commons (CC BY-SA 2.0, commons.wikimedia.org).

The iconic drum machine TR-909, again by Roland, came out in 1983. Dave Jenkins, an author in DJ Mag described the device as "faithfully captures the true spirit and essence of electronic music" (Jenkins, DJ Mag, 2019) [27]. Designed by Japanese Tadao Kikumoto, the device blended digital sampling features with analog synthesis. The 909 is also referred to as the first drum machine that integrated MIDI. [28] It is possible to hear the machine in many popular techno tracks. Some examples include Jeff Mills' "The Bells", Plastikman's "Spastik", and Derrick May's "String of Life" [29]

The legacy of the instrument is also takes place in popular streaming platforms. For instance, in the playlist "50 Shades of 909," users Antonio De Spirt and Alex combined more than 100 songs that used the instrument. The list includes works from Madonna, Kendrick Lamar, Björk, Daft Punk, and many more.[1]

It would be possible to say that the 808 and 909 models of Roland influenced instrument makers as much as musicians. There are many large and small-scale brands that created products by being inspired or directly aiming to emulate those models.

An example could be the German company Behringer. Inspired by those models, they created more affordable options. Here, it is worth mentioning that the original instruments were produced in limited numbers, and naturally, their prices increased in parallel with demand. Instruments like the RD-8 and RD-9 drum machines by Behringer can be referred to as examples that fit this concept. For their model RD-8 MKII, the model has been described as "the most authentic analogue recreation of the Roland TR-808 ever." [30]

[1] "50 Shades of 909," Spotify, `https://open.spotify.com/playlist/1I6fWaNwlr2fAvnhJcwqJz?go=1&sp_cid=69c29d18ddcf888cbeebf39afbf80c56&utm_source=embed_player_p&utm_medium=desktop&nd=1&dlsi=c909e63a251d490f`.

Figure 2.6: Analog Rytm by Elektron

There are also other companies that add new features and reinterpret the drum machines. During my research, I came across Elektron from Sweden. Their Analog Rytm (2014) stood out by allowing users to combine samples with synthesized sounds. [2]

To illustrate contemporary artistic takes and other designers' perspectives, I would like to provide examples of electronic, digital, and post-digital drum machines, regardless of their direct connection to techno.

Figure 2.7: Kastle Drum by Bastl Instruments

Based in the Czech Republic, Bastl Instruments created the electronic Kastle Drum that has no buttons for programming rhythmic sequences. Instead, the company used the patching method. [3] This choice of interface illustrates how an electronic drum machine can be interpreted and redesigned without a pattern-based structure, allowing fluid experimentation.

[2] "Legacy Products," Elektron, `https://www.elektron.se/legacy`.
[3] "Kastle," Bastl Instruments, `https://bastl-instruments.com/instruments/kastle`.

Figure 2.8: Photo of the Intelligent Drum Machine by Vogl and Knees [31]

From the digital category, I would like to mention the Intelligent Drum Machine by Vogl and Knees (2017). In their research, they created a drum machine that uses artificial intelligence to create different variations of the user's sequences. The interaction takes place on a screen-based interface, with step-base design. The project was specifically tailored for electronic dance music, with the data trained by commercial rhythm sequences. [31]

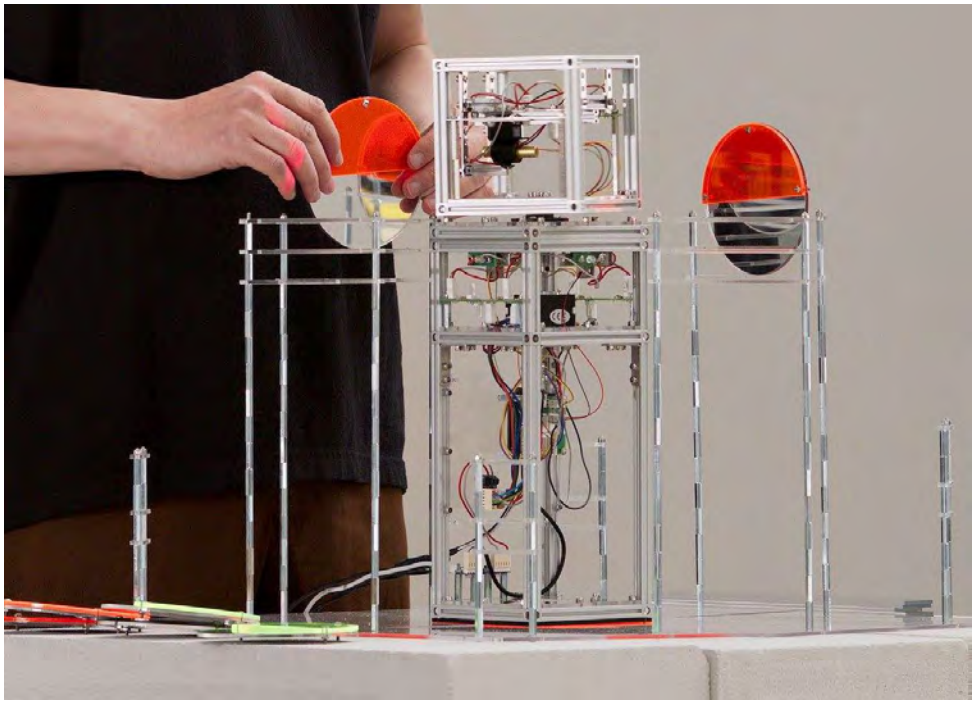

Figure 2.9: Photo of the UVTOWER by Guidi and Giacomo [32]

When it comes to the category of post-digital, I would like to mention UVTOWER by Andrea Guidi and Giacomo Lepri [32]. Inspired by post-rave culture, the artists created a generative installation—a sequencer. Even though it would be an oversimplification to directly call it a drum machine due to its other functionalities, I found it inspiring to mention under this category. Here, when compared with the traditional drum machines, the representation of time is not done by the blinking LED lights but by a rotating laser. Performers can create the patterns by placing mirrors that reflect the laser beam and shape the composition. The pattern becomes denser when there is more reflection which leads to a drop and then goes silent.

2.2.2 Influential Synthesizers

“When I first heard synthesizers dropped on records it was great... like UFOs landing on records, so I got one."(Atkins, as cited in Amsterdam Dance Event Website, n.d). In his own words, one of the techno pioneers, Atkins, describes the sci-fi, literally out-of-this-world associations that led him to be interested in synthesizers. [33]

Figure 2.10: Korg MS-10 synthesizer. Image by Kevin, via Wikimedia Commons (CC BY-SA 2.0, commons.wikimedia.org).

Atkins’ first synth was the MS-10 made by the Japanese company Korg. The instrument came out in 1978 as a one oscillator, monophonic synthesizer [34]. Alongside Atkins, it was also used in the productions of the Chemical Brothers, Underworld, and The Orb [35].

Figure 2.11: Yamaha DX7 synthesizer. Image by Leo-setä et al., via Wikimedia Commons (CC BY 4.0, commons.wikimedia.org).

A more popular choice, the Yamaha DX7 was released in 1983. The instrument is known for its commercial success as one of the first digital synthesizers. It also stood out for the implementation of frequency modulation synthesis, which was created by John Chowning. [36] The DX7 was known for its bell and electric piano presets, and it was used in various musical genres [37]. It is possible to hear the instrument in the works of Kraftwerk, Brian Eno, Depeche Mode, and many more [38].

Figure 2.12: Roland TB-303 synthesizer. Image by Steve Sims, via Wikimedia Commons (CC0, commons.wikimedia.org).

Talking about synthesizers, mentioning the Roland TB-303 is a must. It had one oscillator that could generate a sawtooth or a square waveform. Players could achieve the characteristic "squelchy" tones by using the low-pass

filter and the envelope. [26]

The instrument behind the acid basslines was actually designed to mimic bass guitars. Although it did not fulfill the original purpose, it was repurposed in another direction. The original TB-303 and later productions of the device influenced acid house, Chicago house, and techno. Some examples of the 303's use include Josh Wink's A Higher State of Consciousness, Aphex Twin's Windowlicker (Acid Edit), and many works released on TRAX Records. [39] [40] [41]

Figure 2.13: ARP Odyssey Mark I synthesizer. Image by Slugworth, via Wikimedia Commons (commons.wikimedia.org).

Another well-known synth of the era is the ARP Odyssey, which was used in tracks like Yellow Magic Orchestra's Thousand Knives and Kraftwerk's iconic work Autobahn [42]. The instrument came out in the early 70s and was referred to as Moog's Minimoog contestant [43].

Figure 2.14: Minimoog synthesizer. Image by Krash, via Wikimedia Commons (Public Domain, commons.wikimedia.org).

And of course, the Moog. The Moog synthesizer was developed by Robert Moog in the mid-1960s. It is referred to as the first commercially available analog synthesizer [44]. Each model of the Moog influenced music differently and was used widely in music production, including funk, hip-hop, and, naturally, techno.

The Minimoog was a portable synthesizer and reached a wide range of audience from the day it was released in 1970 [45]. According to Synthtrax, the Minimoog has been used in more than one thousand songs by many

artists including Giorgio Moroder, Brian Eno, and Tangerine Dream. [46]

In the contemporary synth market, alongside the big brands, there are also boutique synth designers such as Erica Synths [4] , Make Noise [5], and Dreadbox [6].

To provide an overview of how artists and designers approach synthesizers, I would like to follow the same three-category structure in the drum machines section: electronic, digital, and post-digital.

Figure 2.15: FEEDBACK MACHINE (2023) by Kae Tea (fka Kuntay Seferoglu)

Giving an example of contemporary electronic synth reinterpretations gives me a chance to talk about an artist who inspired me in my own practice. Istanbul-based instrument maker and sound designer Kae Tea with their project FEEDBACK MACHINE (2023) created a noise synth with 2399 analog delay chips. The synth plays the player's motifs briefly before destroying them, allowing the player to embrace chaos through harsh textures. With a simple interface, the instrument allows a playful approach to sound making. [47]

[4] "Erica Synths," *Erica Synths*, `https://www.ericasynths.lv/`.
[5] "Make Noise Music," *Make Noise*, `https://www.makenoisemusic.com/`.
[6] "Dreadbox / Analog Synthesizers," *Dreadbox FX*, `https://dreadbox-fx.com/`.

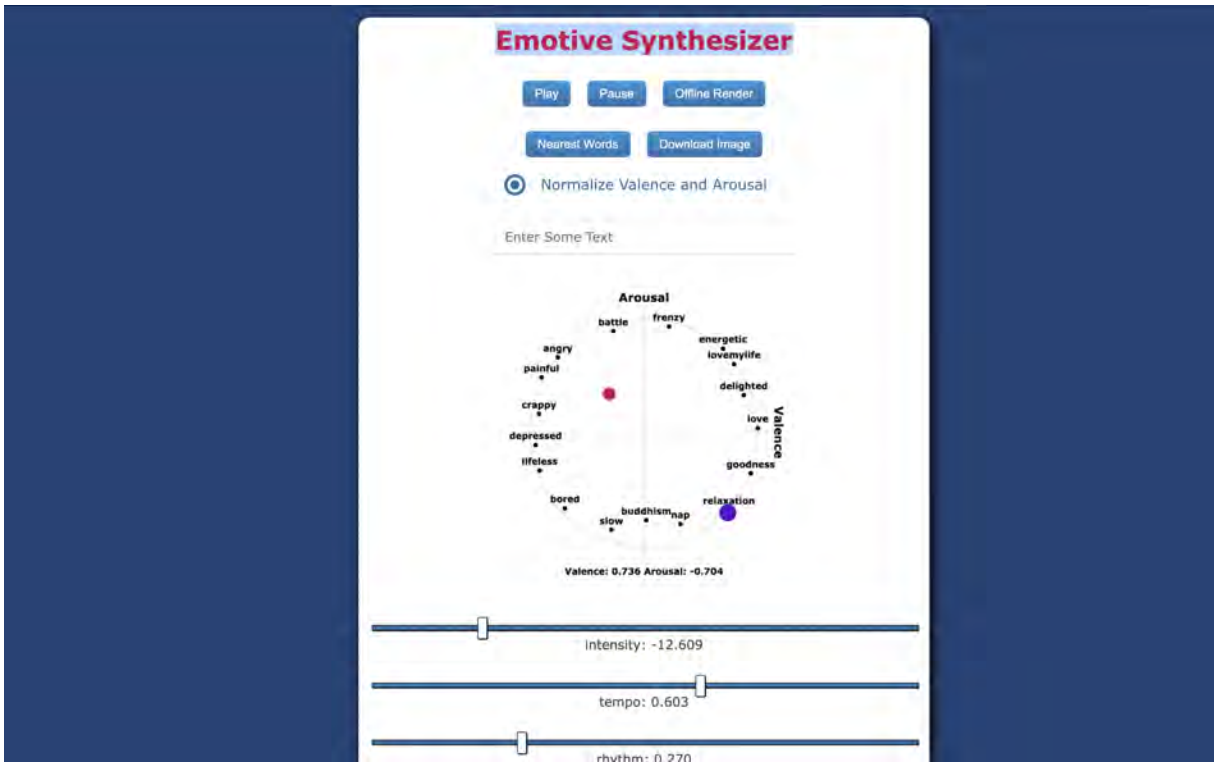

Figure 2.16: Screenshot from Emotive Synthesizer by Krzyzaniak (2020) [48]

When it comes to digital synthesizers, there are many, many great examples, including plugins, websites, and hardware that uses digital technology. The difficulty of choosing among the examples led me to a project I came across at the beginning of my study. The work inspired me with its different approach to music-making.

In his 2020 piece, "Words to Music Synthesis", Michael Krzyzaniak investigates the relationship between words and music to create sound compositions using text-prompts. This digital synthesizer uses words which in turn makes the process of composing more accessible. Krzyzaniak used an analyzing system, which had emotional valance and arousal values dimensions, to link words to music. The prompted-text automatically creates a melody additionally Krzyzaniak gives artistic freedom to change the parameters that affect the synthesis. [48]

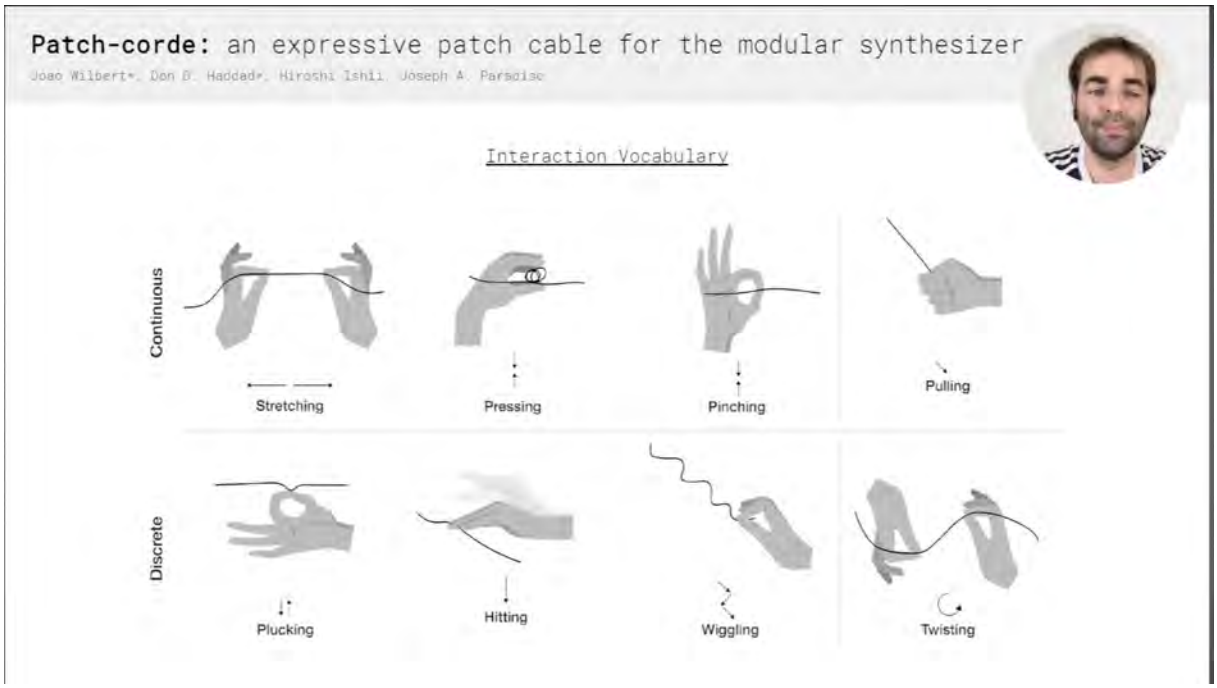

Figure 2.17: Patch-corde: an expressive patch-cable for the modular synthesizer. Screenshot from NIME2020 on YouTube (youtube.com). [49]

For the post digital category, I chose an example that again emphasizes artistic gestures. Wilbert, Haddad, Ishii and Paradiso in their project titled Patch-cord(2020) modified the patching cables that is used with modular synthesizers to allow musical expression. By combining 3.5mm audio cables with sensors, players were granted to let their movements on the cable affect the sound. Some of the documented movements were plucking, pressing, wiggling, streching and hitting. [49] I found the project inspiring in terms of reinterpreting a purely functional object for artistic expression and transforming it for a different purpose. In that sense, this kind of repurposing almost feels like sampling, taking an existing element and giving it a new context.

2.2.3 Samplers

> "So Frankie Knuckles started using the 909 at his shows at the Powerplant. Boss had just brought out their little sampling footpedal, and somebody took one along there. Somebody was on the mic, and they sampled that and played it over the drumtrack pattern." – Juan Atkins (Music Technology, December 1988, interview by Simon Trask).

One of the prominent instruments of electronic music production, samplers allowed users to record, manipulate, and play back the audio. They can be found in a standalone hardware format or as digital software. [50]

The history of sampling started before techno developed. Here, it would be worth mentioning the electro-mechanical instrument, the Mellotron, built in 1963. Compared to today's samplers, it functioned similarly. However, instead of playing audio digitally, each key was connected to a dedicated tape piece, and it played the pre-recorded material on it [51]. Digital samplers started to appear in the late 70s with technological developments.

Figure 2.18: Fairlight CMI Series II, early digital sampler and music workstation, photographed at NAMM Show 2011 in Anaheim, California. Image via Wikimedia Commons (commons.wikimedia.org).

Fairlight Computer Musical Instrument stood out as one of the first examples of an audio workstation that also integrated a digital sampler. It was introduced in 1979 and adopted by various influential artists and producers such as Hans Zimmer, Stevie Wonder, and Kate Bush. [52]

In 1981, LMD-649 was developed by Kenji Murata for the Japanese electronic music band Yellow Magic Orchestra, a band that also inspired to Belleville Three. [50]. It was designed to synchronize short audio clips with multi-track recordings. It is possible to hear it used on the album recording of Technodelic [53].

Even though the early examples of samplers were used in different parts of the world, it was still an expensive technology, and it became more prominent in the 1980s. Instruments like the Ensoniq Mirage (1985, America), E-mu Emax (1986, America), and various models designed by Korg and Roland made digital sampling even more accessible. [54, 55]

Figure 2.19: The original SP-1200 in grey housing. Image by 2xUeL, via Wikimedia Commons (Public Domain, commons.wikimedia.org).

The SP-12, also considered a drum machine, allowed users to load samples. The SP-1200 model from E-mu extended the features of its predecessor SP-12 and it was widely adopted in music production. The sampler was used by iconic names in the scene such as Daft Punk, The Prodigy, Theo Parrish, and many more. It also took part in hip-hop production and was often mentioned alongside the AKAI MPC60. [56, 57]

Figure 2.20: AKAI S900 sampler, clipped from Shawn Rudiman's studio rack in Pittsburgh, PA. Image by Angie Schwendemann, derivative work by Shoulder-synth, via Wikimedia Commons (CC BY 2.0, commons.wikimedia.org).

It would be possible to say that the growing sampling technology in the 90s influenced techno production as well. Samplers such as Akai's S-Series became prominent devices in the production. For example, the S900 and S1000 were used by electronic musicians such as The Chemical Brothers, 808 State and Juan Atkins. [58, 59]

In the 90s, techno production artists often combined drum machines, synths, and samplers. They pitched chord stabs up and down. Some artists later included the famous Fairlight orchestral hits. [7]

[7] "Orchestra Hit Presets Fairlight CMI," YouTube, `https://www.youtube.com/watch?v=TEohvxCyp68`.

Figure 2.21: Elektron Octatrack step-sequencer. Image by Limpertus007, derivative work by Clusternote, via Wikimedia Commons (CC BY-SA 3.0, commons.wikimedia.org).

In the 2000s, with the rise in the accessibility of DAWs, sampling technology began to move into computers. They were more affordable (in some cases, free) than hardware samplers. Naturally, this doesn't mean that contemporary examples of hardware samplers don't exist. For instance, Octatrack (2010) by Elektron[8] is considered both a performance instrument and a sampler. In its device, designers combined sequencing and real-time sound processing.

For the samplers, just like in the drum machine and synth sections, I would like to give electronic, digital, and post-digital samples from makers and researchers. While thinking about examples of electronic samplers, the inseparability of samplers from digital technology made me pause for a moment. Then, following the historical example of Mellotron, I began researching artists who work with cassettes today. I came across Rich Bernett, also known as The Sound of Machines," who stands out with his DIY projects.

Figure 2.22: Make Your Own Cassettone Mk1— A DIY Modified Cassette Player Synth. Screenshot from The Sound of Machines on YouTube (youtube.com)

[8]"Legacy Products," *Elektron*, `https://www.elektron.se/legacy`.

Bernett's Cassettone Mk1 project enables the user to adjust the pitch by manipulating the cassette's playback speed using the keys. As noted by Spurgeon(2022), this setup, created by hacking a cassette player with DIY equipment, presents a structure that resembles the Mellotron. [60] I would agree that it can be considered as a sampler due to its ability to play back a recorded sound and provide control over the pitch.

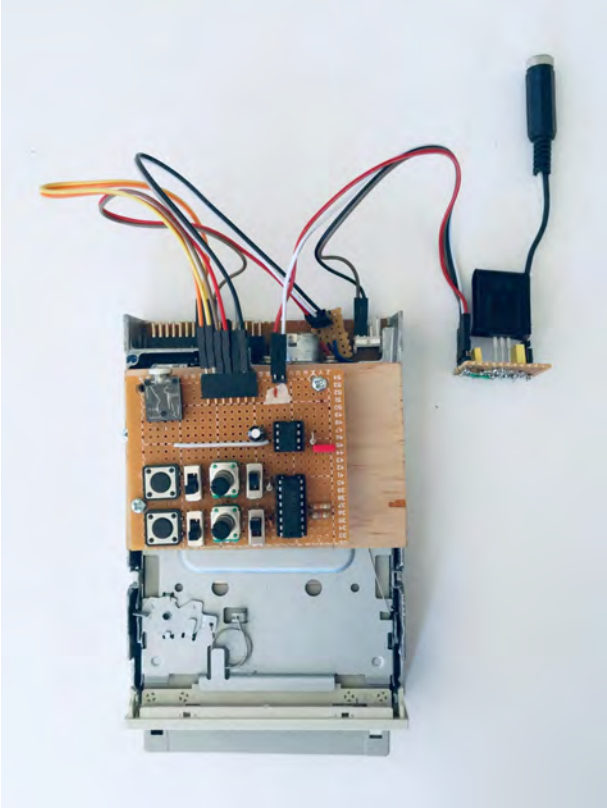

Figure 2.23: Concentric Sampler by Timothy Tate (2022) [61]

Speaking of cassettes, for the digital (non-digital) example of a sampler, I find it interesting to bring up another storage medium. Concentric Sampler(2022) by Timothy Tate, combined a floppy disk with circuitry to be able to record and play sound, process the sound, and create simple sequences in real time. Even though the circuitry itself is not digital, I believe the project has an interesting take, bringing digital concepts like 'granular synthesis' back into electronic circuitry. [61]

(a) Photo of a raw unpainted Tample (b) Photos of 10 painted Tamples

Figure 2.24: Photos of raw and painted Tamples by Thomas Geissl (2025) [62]

In his project, Geissl has designed a series of objects for sampling and sequencing on turntable mechanics. Tample, which I see as one of the cornerstones of the project, is a color-coded, cylindrical, small physical object that functions as a token. If the player wants to record the sound to a token that is playing on the turntable, they place the "tample" in its box 'Tamplifier', which behaves like a recorder. The recorder device recognizes the color of the token and links the sound that is going to be recorded to the color of the token, therefore to the token. Even though the tokens don't store the sample itself, this method creates a representation for the recorded sound. Later tokens can be put onto the other designed devices to be played back, filtered, or sequenced. [62] Making the sampled sound tangible is, in my opinion, one of the most inspiring parts of the project. Having the sound in your hands to work on, use in a composition, or filter, making it accessible as an object, somehow makes it feel more valuable.

2.2.4 DAWs

A digital audio workstation (DAW) is hardware or software used for recording, editing, and producing audio. The structure of a DAW may differ; however, there are parallels in the solutions they offer, such as having an interface to arrange several tracks and combine them into one as a result. [63] This technology, and of course VSTs that grew alongside DAWs, heavily influenced techno production and live performances.

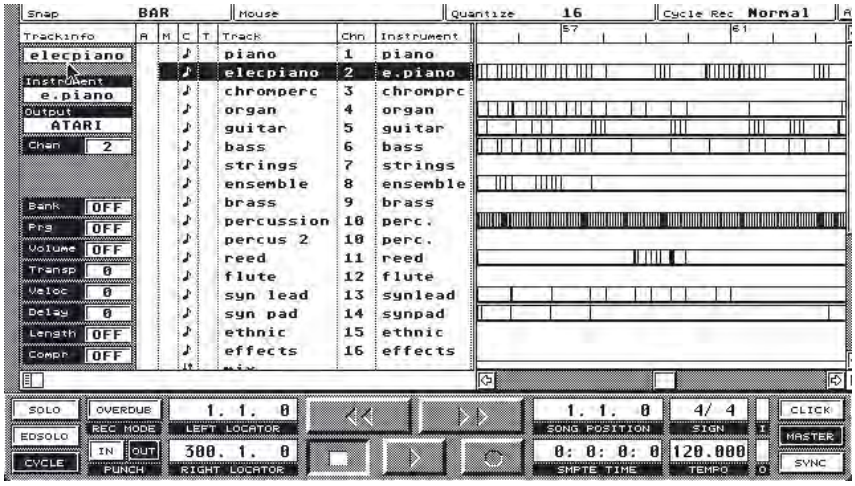

Figure 2.25: Steinberg, Early DAWs: the software that changed music production forever. via MusicRadar (musicradar.com).

The history of DAWs goes back to the early 70s; however, due to the high cost and slow technology, its accessibility was limited. Modern DAWs share a parallel history with the technology of Musical Instrument Digital Interface (MIDI).

In the early 80s, musician Manfred Rürup, Nicole Rürup, and engineer/musician Karl Steinberg collaborated on a software based on a MIDI sequencer. With this project they started Steinberg Research [64].[9] Even though the sales of their project was not a huge success, it led to further projects such as Pro-16, Pro-24, Cubit, and the Cubase that we know today. Along the way, the software was adapted for different computers of its time, from Commodore 64 to Windows and Mac. [65]

Logic Pro that we know today can also be traced back to the 1980s. One of the first releases of the programmers behind the contemporary DAW was a MIDI sequencer software. One of their later releases was Notator (1988), which included a musical notation. Later, they formed the company Emagic and published Notator Logic. After a few iterations, the software was published again as Logic. Later, Emagic was owned by Apple in 2002. Since then, the software could only be used on Apple computers. [66]

Today, there are many DAWs that have been used for digital music production. The examples of commercially available contemporary DAWs can be Ableton Live, FL Studio, Avid Pro Tools, Reaper, and previously mentioned Apple Logic Pro, and Cubase. Free and open-source options include Ardour and LMMS (Linux Multimedia Studio).

As a practitioner, I use Ableton Live. It was first released in 2001, created with the involvement of techno producers Robert Henke and Gerhard Behles. [10]

Figure 2.26: Ableton Live screenshot of Session View. Image via Levels Music Production (levelsmusicproduction.com).

To me, Live stands out with its non-linear, loop-oriented approach to music making. In the "Session View", music makers can launch audio clips and loops. This method is especially useful when the music does not necessarily need to be composed in a linear timeline. By launching independent loops, it is possible to have a more playful approach to music making, which might result in unexpected combinations. I have also observed that many electronic music and techno artists use Ableton Live in their productions; however, it is not the only choice.

Richie Hawtin (aka Plastikman), a British-Canadian producer and DJ, was one of the early adopters of hybrid and digital workflows. In his interview with Bitwig Studio, he talks about how he integrated the DAW into his production. [67] I also found it interesting that the DAW was created by a team that includes a former Ableton member.[11]

[9] "Steinberg," *Steinberg Official Website*, `https://www.steinberg.net/`.
[10] Robert Henke, "Ableton Live," `https://roberthenke.com/technology/ableton_live.html`.
[11] "Bitwig Studio," *Wikipedia*, `https://en.wikipedia.org/wiki/Bitwig_Studio`.

2.2.5 VST(i)s

The name behind Cubase, Steinberg, introduced the Virtual Studio Technology in 1996. It allowed music makers to simulate effects and generate sound on computers instead of using big, expensive machines to do the job. [68].

First examples of VSTs were sound effects. Later, with an update to VST in 1999, it was also possible to use MIDI data. This update led to another technology called Virtual Studio Technology Instrument (VSTi) [68]. It is possible to imagine VSTis as instruments on the computer screen.

Figure 2.27: Steinberg Neon VSTi interface (screenshot). Image via KVR Audio (kvraudio.com).

Neon can be considered as one of the first accessible VSTi synthesizer [68]. In 2001, a user named *x_bruce* commented on the instrument "Good for meat and potato synth timbres" and rated it 8 out of 10. [12] [68].

Besides making the MIDI data transfer possible, the 1999 VST 2.0 update allowed other companies to create plugins as well. With VST 3.0 in 2008, it was observed that technology became more stable, and faster.[69]

Also, many of the instruments that had been discussed in the previous sections were mimicked with the VSTi technology. It can be speculated that this approach reduced the cost of music production and made it more accessible.

Figure 2.28: MeowSynth by Knobster (screenshot). Image via Plugins4Free (plugins4free.com).

Along with VSTs that simulate classic acoustic and electronic instruments, there are also many creative implications. During my research, I came across a Reddit post that collects 100+ plugins. [13] One of the

[12] "KVR Audio: The History of VST," archived, `https://web.archive.org/web/20070503203324/http://www.kvraudio.com/get/74.html`.

[13] "Behold My Collection of Weird and Rare VST Plugins," r/FL_Studio (Reddit), `https://www.reddit.com/r/FL_Studio/comments/13l0kpn/behold_my_collection_of_weird_an_rare_vst_plugins/`.

examples is MeowSynth by KNOBSTER. It is a VSTi that allows users to generate sounds based on samples of a real cat named Baksik. [14] Another example is Thunder by Xoxos, which mimics the sound of thunder. [15] Last but not least, Amusing Sounds of the Body by SyncerSoft is designed to generate bodily noises. [16]

As mentioned briefly, VSTs often exist on the computer. This digital environment offers limited ways of interaction. Here, I see it as a good opportunity to discuss MIDI and MIDI-based controllers, which offer a more intuitive way of control.

2.2.6 MIDI

Until the late 70s, there was no standard communication protocol between electronic music instruments. This issue was causing problems on the user end, resulting in not being able to connect instruments from different brands together. MIDI protocol was developed with the aim of resolving this problem and offering a universal way to communicate. [70]

One of the first proposals for a universal communication protocol was presented in 1981. It was initiated after the discussions of Roland's Ikutaro Kakehashi and Sequential Circuits' Dave Smith. [70]

After the proposal, other influential companies such as Yamaha, Korg, and Kawai joined Roland and Sequential Circuits to contribute. Renamed as Musical Instrument Digital Interface (MIDI), the new technology was shown in 1983 and demonstrated by connecting a Prophet-600 to a Roland JP-6. [71]

Figure 2.29: Roland Jupiter-6 synthesizer. Image by Vuntutheysari, via Wikimedia Commons (CC BY-SA 3.0, commons.wikimedia.org).

MIDI 1.0 was officially published in 1983, and decided to keep it accessible to the public. After a while, MIDI was recognized as one of the standard protocols. Some examples of commercially available instruments with the MIDI protocol could be the Prophet-600 (1982-83), and the Yamaha DX7 (1983).[71] [72]

[14] "MeowSynth by KNOBSTER," Plugins4Free, `https://plugins4free.com/plugin/633/`.
[15] "Thunder by Xoxos," *Plugins 4 Free*, `https://plugins4free.com/plugin/320/`.
[16] "Amusing Sounds of the Body by SyncerSoft," *Plugins 4 Free*, `https://plugins4free.com/plugin/1148/`.

Figure 2.30: AKAI MPC60 sampler. Image by Kimi95 (original uploader at Italian Wikipedia), via Wikimedia Commons (CC BY 3.0, commons.wikimedia.org).

The developments in MIDI were reflected in the interfaces as well. Alongside keyboard-based controllers, products like the Akai MPC60 (1988) included pads in their design. [73] Roland's Octapad (1985) was developed for drummers and percussionists, [74] and Electric Wind Instrument (EWI) was commercially available around the 1980s, allowed players to send MIDI data using breath pressure [75].

As mentioned in the previous section, music production shifted towards computers with technological developments. MIDI controllers adapted to this change as much as they helped shape it. Companies such as Native Instruments [17] , Arturia [18] , and Novation [19] developed systems where the controller and the software worked together, with automatic mapping of the controls and program-specific features. The design of the DAWs was also reflected in the MIDI controllers. For instance, the grid-based Session View of Ableton Live can be controlled with the grid-based Novation Launchpad.

[17] "Native Instruments," *Native Instruments*, `https://www.native-instruments.com`.
[18] "Arturia," *Arturia*, `https://www.arturia.com/`.
[19] "Novation," *Novation*, `https://novationmusic.com/`.

Figure 2.31: MiMu Gloves. Image via Equipboard (equipboard.com).

There are also more experimental approaches to MIDI controllers. For instance, the LinnStrument enabled MIDI Polyphonic Expression (MPE). [20] Imogen Heap's Mimu gloves, a wearable and gestural instrument, pushed the idea of controllers and gave performers more physical ways to interact with sound. [21]

In current times, alongside the classical cable, it is possible to send and receive MIDI information with Bluetooth and Wi-Fi. With microcontrollers like Arduino, ESP32, and the Bela platform, the technology has become even more accessible for independent builders to create custom MIDI devices.

[20] "LinnStrument," *Roger Linn Design*, `https://www.rogerlinndesign.com/linnstrument`.
[21] "MiMU Gloves," *MiMU*, `https://mimugloves.com/`.

2.2.7 Contemporary Setups

Bjarki

Figure 2.32: Bjarki – Waveshaper TV Ep. 2. Screenshot from Waveshaper Media on YouTube (youtube.com).

"Absolutely interested in terrifying things," [76] Bjarki was also described as one of the most unpredictable figures in the techno scene.[77] Even though he has been associated with techno, it is difficult to define the artist's genre, especially when considering his latest releases. Therefore, I thought it would be a good idea to start this section with Icelandic producer, DJ, and the founder of bbbbbb Records, Bjarki.

In the video Waveshaper TV Ep. 2 (Waveshaper Media)[22], Bjarki R. Sigurdarson is interviewed about the production process for his 2019 release Happy Earth Day on !K7 Music. Together with a friend, he mentions how he is inspired by the sound of nature. In the first part of the video, he does field recordings inside a cave and uses intuitive techniques to hunt sound. He talks about how he repurposes the sound of rocks as kick drums. He hits them together and throws them to the sand. He also uses other found materials like wooden sticks and sand to create sound. Later, the video returns to the studio. He works with a hybrid setup that combines analog hardware, sound effect pedals, and Ableton Live. Although no specific devices are named in the official description of the video, viewer comments suggest that the pedals include models such as the Boss RV-3 or RV-5, Boss PS-3 or PS-5, Electro-Harmonix Pog2, and possibly an Electro-Harmonix Big Muff. According to the Equipboard website, Bjarki has also used instruments such as the "Make Noise René" and the "Make Noise Pressure Points" modular synths, and the Dave Smith Instruments "Tempest" drum machine.

[22] "Waveshaper TV Ep.2 — Bjarki R. Sigurdarson," Waveshaper Media, `https://www.youtube.com/watch?v=QYRxid1iss0`.

Nene H

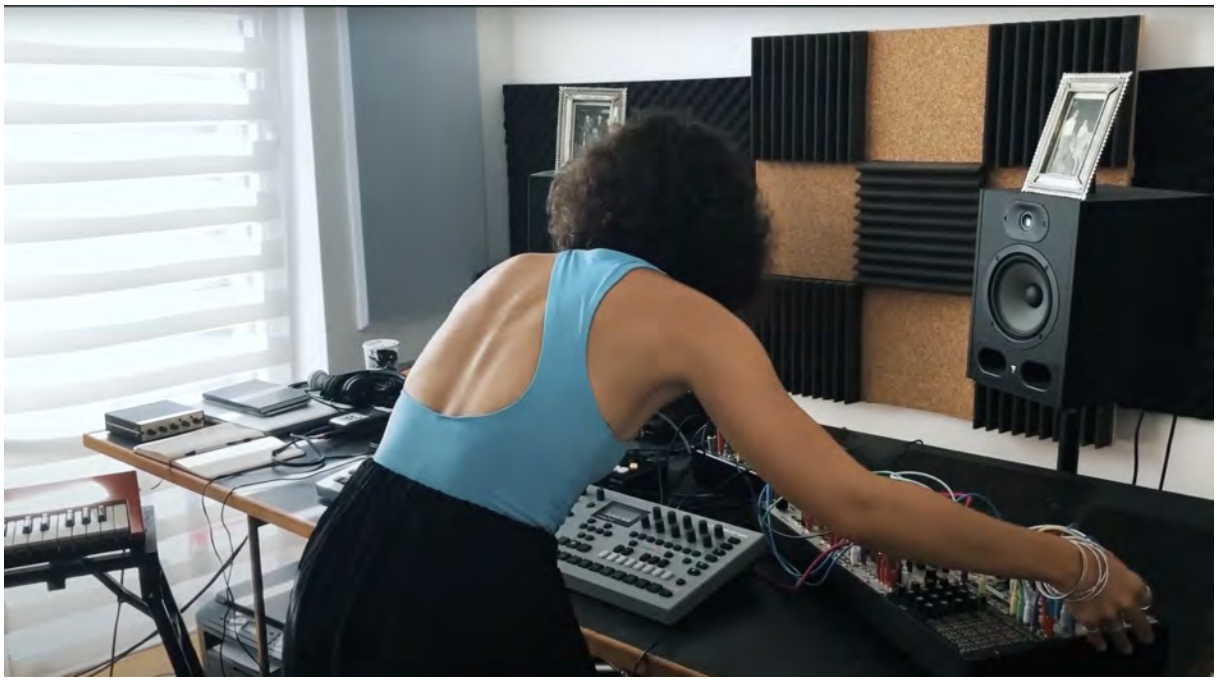

Figure 2.33: Patch Notes: Nene H. Screenshot from 180 Fact on YouTube (youtube.com).

Turkish-born, Copenhagen and Berlin-based artist Nene H is also located on the blurry intersection of techno and experimental electronic music. A classically trained pianist, Nene H is the co-founder of Siræn collective to support artistic practices, and the founder of UMAY label dedicated to emerging artists from underrepresented areas and the QTBIPOC communities.

In their production, Nene H combines organic and electronic sounds. In the video Patch Notes: Nene H[23] composition, the official video description states that they performed a 12-minute with a hardware-based setup including Elektron's Analog Four, Analog Rytm, Eurorack modular system, and an OTO Biscuit effects unit. On their debut album Ali (2021, released on Incienso), they combined electronic production with Turkish instruments.[78] In an interview held with The Erica Synths, they mentioned the use of Korg microKorg and Akai MPC alongside Ableton Live when their work was closer to the classical traditions. [79]

[23]"Patch Notes: Nene H," YouTube, `https://www.youtube.com/watch?v=JAj1c0V-8pY&t=399s`.

Lady Starlight

Figure 2.34: Lady Starlight – Against The Clock. Screenshot from 180 Fact on YouTube (youtube.com).

American producer and DJ Lady Starlight has worked in diverse fields of art. She is also known for her collaboration with pop icon Lady Gaga [80]. She has released works on labels like Figure, Stroboscopic Artefacts, A-TON (a sublabel of Ostgut Ton), and Tresor. [24]

In an interview with Eventide, Lady Starlight explained that her live setup consists of three instruments: a Eurorack case, an Elektron Machinedrum, and an MFB Tanzbär drum machine, plus two effects pedals. In the same interview, she argues that limiting the amount of gear is fundamental for live techno performances. Starlight also adds that working with a smaller setup is more efficient and it allows one to be more familiar with the gear. [81]

[24] "Lady Starlight," *Discogs*, `https://www.discogs.com/artist/5661183-Lady-Starlight`.

Tzusing

Figure 2.35: In the Studio: Tzusing. Photos by Sean Marc Lee, via XLR8R (xlr8r.com).

Tzusing is described as "a stylistic shapeshifter with an impeccable ear for detail." (O'Connor, DJ Mag, 2023) Born in Malaysia and based between Shanghai and Taipei, he first appeared in Shanghai's underground club scene. He is the founder of the Sea Cucumber label and has released his works on cult labels such as L.I.E.S. and PAN. [25] Even though his early releases are linked to genres like EBM and industrial techno, he has also been referred to as "genre-hopping". His projects engage with themes of masculinity, power, and traditional gender roles drawing references from Chinese culture. [82]

In an interview with XLR8R, he provides in-depth insights into his production. He mentions that the first gear he used was the Roland MC-505 and Sonic Foundry's Acid software. He later added Korg MS-20, Metasonix S1000, and Doepfer Dark Time to his toolbox. His current studio setup centers on Ableton Live with Ableton Push and various hardware and software tools, such as TL Audio Ivory 5013, Culture Rooster/Vulture, and Korg MS-20. He also notes that he enjoys single-purpose machines over highly versatile ones.[83]

[25] "Tzusing," *Discogs*, `https://www.discogs.com/artist/4032685-Tzusing`.

Slikback

Figure 2.36: Slikback by João Octávio Peixoto.

British electronic music magazine Mixmag referred to Slikback as "one of the most exhilarating artists in electronic music" (Michael Lawson, Mixmag, 2022). Uganda-based artists experienced electronic music first listening to the radio. Later, his started to experiment with software such as Virtual DJ and Fruity Loops. He mentions that after moving to Uganda, he encountered the Nyege Nyege collective, which became central to his artistic development. [84]

He notes in a different interview with Tiny Mix Tapes that his production setup consists solely of a laptop, without the use of external hardware. [26] Slikback has performed at festivals and venues such as CTM Festival, Berlin's Tresor, and Unsound Festival in Poland. He has also published works on Planet Mu, PAN, and Hakuna Kulala, alongside self-published albums.

[26]"Slikback," *Tiny Mix Tapes*, `https://www.tinymixtapes.com/features/slikback`.

Chapter 3

Techno in Context

3.1 Overview

Techno has a significant influence on arts and culture. The genre gathered communities together, influenced DJs, clubs, and festivals. It inspired fashion, movies, memes, and this master's project. The culture and its function as dance music became almost indivisible from the genre itself. However, I thought "what's been done with the music is not necessarily music's problem," and decided to dedicate a branch to its context only.

I started this chapter with a brief history of DJing and clubs. Later, I discussed the development and current state of the genre within this culture. I included the opinions of artists and academics who criticized techno's dance-oriented and function-driven approach.

To conclude the section with my inspiration, I described the post-club style, which deconstructs club music to create something new.

3.2 The DJ and the Club

Brewster and Broughton define the term DJing as "the act of presenting a series of records for an audience's enjoyment" (Brewster and Broughton, 1999, p. 8).

Radio DJs were the first to be recognized in this role [22]. While playing the tracks, they announced the songs, told stories, and sometimes even promoted products. Club DJing, however, is quite different from the first examples of radio DJing. One focuses on broadcasting, the other is about controlling the music in real time to create a holistic experience. [19]

To achieve a complete experience, instead of playing tracks one by one, club DJs create continuous sequences by mixing them. According to Brewster, from this perspective the DJ transforms from someone who announces tracks into a performer. Their music selection, mixing techniques, and timing influence the dancefloor and guide this ritual. When Brewster compares the experience to other ritual practices throughout history, he naturally states that knowledge and technique are required to achieve this. [19]

The author argues that it is important for a DJ to be familiar with the structure of the songs they play and have an intuition for rhythm. They should be aware of the textures, keys, and tones of the tracks. Technical knowledge is as crucial as musical knowledge, and the best DJs approach the sound system as an instrument. [19]

The argument is pushed to the extent that if two DJs, one novice and one experienced, play the same song, there can be a big difference due to the way they EQ the record. Last but not least, he mentions the importance of having an extensive music archive, being able to remember these songs, and recontextualizing them. [19]

The origins of the collective dances, which are generally guided by DJs today, actually go back ten thousand years. Prehistoric rock art depictions portray people wearing masks and costumes, dancing in lines and circles.

[85] I enjoy thinking about the parallels between Berlin clubs and these visual descriptions.

With the advancement of recording and playback technologies, people began dancing to pre-recorded material as well as live music. From the early 20th century onwards, jukeboxes and public gramophones enabled people to select, listen to, and dance to the music they wanted. [19]

However, dancing to 'curated' pre-recorded material live and dancing collectively appeared after a series of technological developments, through the initiatives of artists and the participation of the community.

3.2.1 From Radio to the Dance Floor

As radio became more dominant in everyday life, the first DJs started to appear. Although radio DJing has been done in different styles over time, in the early days, they would announce the songs and play them. The history of DJing usually went hand in hand with technological developments in the sector.

In 1906, engineer Reginald A. Fessenden, who also worked with Edison, made one of the first radio broadcasts from Massachusetts, USA [22]. In his broadcast, he included conversations, Bible readings, a violin solo, and a phonograph record. This moment is often cited as the birth of the disc jockey [19].

When radio spread widely, airplay of the recordings caused new controversy and created tension [22]. Musicians were afraid that they would lose their jobs. Record labels worried that sales would decrease [19]. These concerns did not stop radio hosts. They continued to create their own broadcasts based on recordings.

In 1914, one of the first female DJs, Sybil M. True, gave a glimpse of how a radio program could influence the market by boosting local record sales [22]. BBC's Christopher Stone, on the other hand, stood out by breaking the regular format of the radio. His casual tone gained a lot of popularity and made him an influential person. With different contributions, radio started to influence the market, affecting tastes. [19]

A few years later, Alan Freed defined rhythm and blues as rock'n'roll, increasing the visibility of black musicians with his program. [22]

As radio grew, so did the reactions. The American Federation of Musicians tried to restrict record playback and went on strike until the union raised royalties. The American Society of Composers, Authors and Publishers (ASCAP) also put pressure on radio stations. These reactions in large organizations led to the birth of other institutions. One example is Broadcast Music, Inc. (BMI), which helped young and black artists gain visibility. In short, radio and DJing caused many changes in the music industry. [19]

There are few different takes on who used the term 'disc jokey'. Brester mentions that the first recorded use of the term was on 1941, in Variety. [19]. However, there are online sources that speculates the term was first used in 1935, by Walter Winchell for Martin Block, a popular radio host. [86]

The roots of modern club DJs go back to 1943, to Yorkshire, UK. In his book, Brewster describes the story in an engaging way and points to Jimmy Savile as the great-grandfather of today's DJs. Back in the day, he hosted a party using an amplification system that one of his friends built by repurposing radio parts and a gramophone. Although jukeboxes were already used in public spaces for shared music listening, this event can be seen as one of the earliest examples of the modern club as we know it today. [19]

Even though the DIY, hand-soldered sound system failed early in the night, Savile continued his experiments as a DJ, helping to launch what became known as discotheques. He also claimed that he introduced the idea of using two turntables for continuous playback. [19] However, it was later shown that double-turntable models had already been advertised in Gramophone magazine in 1931 [87].

Before I mention more about clubs, I would like to acknowledge the sound system traditions from Jamaica, which are very important in how we experience music today. In the aftermath of the Second World War, Jamaica's nightlife gave way to large, mobile setups of loudspeakers and turntables. Instead of live performances, local selectors played R'n'B music, hyped up the crowd, and added improvised narratives over the tracks. These open-air parties also led to other new music genres. [22]

The sound system culture that was influential in Jamaica spread to other countries. In the early 1950s, Jamaican-born Duke Vin, a music pioneer, operated the first Jamaican style sound system in the UK [88]. Again, Count Suckle from Jamaica played an influential role in the reggae and sound system culture [19]. In the 1970s, DJ Kool Herc brought the same tradition to the Bronx, New York. With his creativity and techniques, he also

became a cornerstone of Hip-Hop [22].

What I observe is that club DJing and clubs didn't begin in the form we know today. It accumulated from different artists, experiments and genres that gradually shaped the practice.

In 1950s America, live DJ events were known as 'sock hops' and 'platter hops'. Bob Casey, in 1958, showed up with a custom double-turntable at one of the 'record hops'. The equipment allowed him to do a continuous transition between songs. [89]

While names like Ian Samwell, Guy Stevens, and Jeff Dexter were among the first influential DJs, Terry Noel, who worked at the Arthur Club and Salvation in New York, is one of the first names mentioned for mixing the records together. Noel reorganized the sound and lighting system in the club with engineer Chip Monk. With three turntables and a volume control, he brought the different parts of the tracks together in his live practice. With this mixing technique, he gave his audience a more holistic experience. [19]

While the club culture was rising and DJs were experimenting, Disco fever appeared in the late 60s. It brought people together in clubs and in discotheques. People celebrated freedom and diversity on the dance floor. The scene was important for African-American, Latin-American, and gay communities. [19] [90]

Soon, disco reached the mainstream. It gave birth to cultural icons, influenced fashion, and fused with popular music. In time, oversaturation of the genre came with backlash. Although 1979's 'Disco Demolution Derby' showed rejection of the genre [18].

Another important venue for the Black, Latino, and gay communities in the 70s was Paradise Garage, where Larry Levan also DJed. From my understanding, the powerful sound system and the inclusive nature of the venue left a strong impression on the audience. [19] As the story moves towards techno, I think it's worth mentioning Chicago's The Warehouse and Frankie Knuckles too.

Knuckles, one of the pioneers of house music, used to include drum machines in his DJ performances at the Warehouse, looping the rhythmic parts of the tracks to create hypnotic experiences. The venue, which is also an important place for minority communities, is one of the cornerstones in the history of electronic music. [19]

3.2.2 From Detroit to the Digital Age

Techno, as discussed in the previous chapter, emerged not so far away from Chicago, in Detroit. Growing next to the house music genre (Chicago), the genre first appeared in a small scene of the industrial city, mostly at exclusive parties. Collier, an influential DJ of the era, was one of the first DJs to play techno tracks like "No UFOs" by Juan Atkins's or "Strings of Life" by Derrick May. [19]

Atkins and May began performing with their DJ collective Deep Space [17] in 1981. Kevin Saunderson joined them later in 1984. The genre originated in Detroit; however, the city itself had limited influence on making techno and techno parties widely popular. The productions of the Belleville Three gained more recognition. [19]

At first, Detroit's new sound was often seen as similar to Chicago house. Early works of Juan Atkins, Derrick May, and Kevin Saunderson were treated as part of the same movement. This changed with May's "Nude Photo" and "Strings of Life," which sounded more futuristic compared to house music. [19]

Music writer Dan Sicko described "Nude Photo" as "Okay, this isn't house music anymore."(Sicko, as cited in Brewster and Broughton, 1999, p. 329) pointing to the moment Detroit developed its own identity. In 1988, British promoter Neil Rushton released the compilation 'Techno! The New Dance Sound of Detroit' on Virgin Records. The name "techno," which the Detroit artists already used informally, gave the music its own identity and linked it to the city's industrial and technological image. [19]

The genre has reached a wider audience in Europe compared to Detroit. Artists in the UK, Belgium, and Germany have blended the genre with their existing electronic music practices to create their own scenes. Labels like R&S and Warp Records defined its direction. With experiments and different artistic takes, new subgenres came out. Eventually, Europe became one of the main centers of techno. As the music evolved, a new club culture emerged to support it. [19]

US

Techno progressed in Detroit, New York, and Chicago in different ways. For example, The Music Institute (1988) in Detroit was an important place. The club was a hub for the DJs and producers who are now known as the second wave of Detroit techno. [19]

Many of the techno DJs and producers that we see on the festival line-ups today also come from the second wave era. While they were working on the development of the sound, they had a political stance as well. For example, Jeff Mills and "Mad" Mike Banks formed the famous Underground Resistance, a musical collective that is known for its militant political stance and anti-corporate perspective. [1]

UK

In the 90s, the UK was one of the major hotspots for electronic music. The Haçienda in Manchester (1982) and The Ministry of Sound in London (1991) are among the most famous clubs of the period. [91] [92] In addition to clubs, many large-scale parties were organized in open spaces and warehouses in and around London. The growth of these parties was suppressed by the state. In 1994, the Criminal Justice and Public Order Act aimed to block the gatherings featuring music characterized by repetitive electronic beats.[93]

During my research on the producers and DJs, I noticed an interesting take from UK based Warp Records. They published the compilation album Artificial Intelligence,1992 as 'electronic listening music from Warp'. The album featured artists as Aphex Twin (as Dice Man), Autechre, and The Black Dog, whose sound would later to be known as "intelligent dance music." [19] Alongside this work,I have also came accross The Prodigy, 808 State, Orbital, Sasha, and Carl Cox.

Germany

After the Berlin Wall came down, clubs like Tresor (1991) and E-Werk (1993) became important places for the underground music scene. Berghain's roots reach to the same period, starting from the hardcore techno and fetish parties at the Bunker. Later the organizers Michael Teufele and Norbert Thormann founded the Ostgut in 1998. When Ostgut closed in 2003, the founders managed to start Berghain in 2004.[94] Around the same time, the KitKatClub was opened in 1994 by Austrian pornographic filmmaker Simon Thaur and Kirsten Krüger. [95]

Across Germany, there are many other DJs and promoters building up the scene. Sven Väth, who founded the Frankfurt club Omen, helped establish the country's early electronic music scene [94]. In Berlin, Matthias Roeingh, known as Dr. Motte, launched the Love Parade. [96], Wolle XDP, the name behind Tekknozid (a mix of "techno" and "acid"), organized the first series of large-scale raves in East Berlin in 1990.[94] Artists such as WestBam, Marusha, and DJ Gudrun Gut are noted from the era as well.

3.3 Post-Techno: if that's a term

It would be fair to say techno has continuously evolved. It inspired many other reinterpretations and blended with many other genres. Over time, it has sped up and slowed down, grown harder or softer, blended with other forms of club music, and, at times, been completely deconstructed.

In Ishkur's Guide to Electronic Music, "a guide that favors authenticity over accuracy, and aims to entertain before it informs," [2] techno is divided into many different subgenres, including dub techno, minimal techno, hard techno, bleep techno, and even the self-explanatory banging techno. On EveryNoise.com, a music discovery website created by former Spotify employee, Glenn McDonald using data from the streaming platform, the split is even more detailed, featuring tags like German dark minimal techno, raw techno, and somatik techno. [3]

Naturally, these reinterpretations took shape as techno became more popular. It opened new creative paths and reflected different perspectives on the music. A strong early example of this recontextualization, discussed earlier, is Warp Records' compilation Artificial Intelligence. The label's co-founder Steve Beckett explained:

[1] *Underground Resistance*, Discogs, `https://www.discogs.com/artist/1160-Underground-Resistance`.
[2] "Ishkur's Guide to Electronic Music," *music.ishkur.com*, `https://music.ishkur.com/`.
[3] "Every Noise at Once," *EveryNoise.com*, `https://everynoise.com/`.

"...You could sit down and listen to it like you would a Kraftwerk or Pink Floyd album. That's why we put those sleeves on the cover of Artificial Intelligence - to get it into people's heads that you weren't supposed to dance to it!" (Beckett as cited in Reynolds, 1999, p. 183) [18]

Encountering Mark Guzman's article Beyond Functionality: 'Club Music as a Sound Art Practice' helped me understand why Beckett frames their argument through the function. 'Club music' is often classified as popular music by scholars due to its rhythmic, repetitive structure. The genre has a recognized commercial success, unlike more experimental computer music. [97]

Despite its innovative elements, it has a strong association with dance and, therefore, with its function. This is why the genre has been viewed as less intellectually serious than high-art computer music. [97] From this perspective, by pointing where it's desired to be heard, Beckett might be suggesting that the Artificial Intelligence release is different from function-driven techno.

I believe no artist should be held accountable for how their music is perceived by external factors. This is why I disagree that music played in clubs is less valuable or inferior. However, when the genre is standardized and solely driven by its function, it might just lead to the reproduction of existing material. It has a risk of becoming a self-consuming system, detached from compositional freedom. As a practitioner, I find this sort of production causes fatigue in the aesthetic and limits artistic engagement.

With Berlin's club scene valued at about €1.5 billion annually (Club Commission, 2019)[98], it is possible to speculate that club culture can be considered as a profitable service. Not only in Berlin, but also in other cities, big brands are sponsoring the events. Within this context, the tension between artistic freedom and systemic commodification is discussed in Raddatz's critique of cultural private partnerships and commodification in the context of club cultures. It is also argued that commercial expectations are challenging the authentic expression of the artists. [99] Fortunately, this does not mean that new sonic experiments are not being created, and music is always the same.

Before addressing terms like conceptronica and deconstructed club music, I would like to return to Guzman's article because he asks the question of how to separate club music from more intellectual music types like computer music.

Guzman refers to Neill's assertion and states "the question can be answered in one word—rhythm" (Neill, 2002, as cited in Guzman, n.d.). With this quote, he argues that the academic division is based on the perspective of rhythmic complexity. He recognizes this as a generalization that overlooks certain artistic practices but notes it offers insights into how rhythm has been historically shaped.

As a practitioner, I don't agree that artists should be limited. However, I found this quote helpful when reflecting on my own experience. It led me to reflect on rhythm as a key concept.

In most of my experiences with techno, I witnessed the clear dominance of the four-on-the-floor structure. Also, on the grid, the calculated "drops" at first felt powerful and exciting; over time, their effect has faded. In that sense, I find myself partially agreeing, not as a dividing line in theory, but from a perspective of attractiveness.

I believe it would be a completely oversimplified and a wrong statement to look at 4/4, on-grid electronic music production as unoriginal. I acknowledge the artistry to its full extent. The fatigue I mention is caused by formulaic, standardized production.

Here, as an author, I entirely accept the biases that I have. Those biases are highly driven by my personal taste and the DJs I have listened to before. In full honesty, it is almost impossible to explain how I decide if there is an artistic expression in dance music. Most of the time, it is just 'magic', which is something personal. At other times, the feeling of uniqueness is in the composition, texture, sound, and song of the title. Again, quite personal, and there are times when something is new for me that is not new for other people, or vice versa.

In order to continue, I simply decided to bring examples from various artists in the blurry edges of club music who don't necessarily stick to the 4/4 structures.

The first name that comes to mind when talking about different rhythmic compositions is Berlin-based producer and DJ Nicolas Bougaïeff, who holds a doctorate in minimal techno. His 2017 album Principles of Newspeak is described on Bandcamp as one that "disrupts the 4/4 pulse with alternative beats and blinding sheets of rhythmical distortion." The record creates the feeling of multiple timelines intersecting, occasionally merging into moments of unity. It holds the energy of the dance floor while challenging the dominance of 4/4.

His album The Upward Spiral is another example which The Quietus described as: “Layers fight for rhythmic dominance, pushing each other in and out of focus in the most surprising ways.” (Burke, The Quietus, 2020) [100] More recently, Bougaïeff discussed on his Instagram a technique he calls Pivot Mixing. It is an electronic music DJing technique that uses a common audio loop to smoothly transition between tracks of different tempos (BPMs).

Polygonia is a Munich-based artist and owner of the label QEONE. [4] Their release on Dekmantel, Dream Horizons (2025), is an example of how dance music and techno elements can be reinterpreted through diverse influences. In their review, DJ Mag described the album as “Lindsey Wang stretches techno’s seams to surreal effect. Flute motifs, tangled beat grids, and haunted strings coalesce, blurring the lines between machine and breath.” (Pillay, DJ Mag, 2025) [101]

I especially enjoyed the phrase “blurring the lines between machine and breath.” It reminds me of a saying from Juan Atkins. “I want my music to sound like computers talking to each other.” (Brewster and Broughton , 1999, p. 335). When I think about this sentence from an ’80s perspective, it feels quite cold and mechanical. Maybe a sense of stiffness. However, reflecting on the same sentence from today’s perspective, the feeling changes. The way machines “talk” nowadays evokes more elastic images. The imaginary conversation feels warmer, maybe even more human. That’s why I find DJ Mag’s phrase so powerful. It suggests that an electronic sound can now live in the space between the so-called natural and artificial.

3.3.1 Post-Club

Critiques of the standardization of club music are not new. For more than a decade, deconstructed club music has challenged musical conventions by moving away from steady four-on-the-floor rhythms and stable tempos. It also tends towards broken beats, irregular structures, and experimental sound design. The style has also been referred to as post-club.

As Bandcamp contributor Andra Nikolayi says, “If you think of house and techno as modernism, then deconstructed music and post-club are essentially the equivalent of post-modernism.” (Andra Nikolayi, Bandcamp Daily, 2019) [102]

Deconstructed club music, or “post-club,” is often mentioned as starting in 2009 at NYC’s GHE20G0TH1K parties. The parties were organized by a collective initiated by DJ Venus X and Shayne Oliver. The movement started as a response to the “predominantly white, hetero, and highly formulaic nightlife.” (Andra Nikolayi, Bandcamp Daily, 2019) It blends Jersey club, punk, footwork, techno and moves away from steady 4/4 rhythms and clean production. The deconstructed club music is also known for chaotic mixes, gritty textures, and its strong political message. [102]

The sound recognized worldwide through collectives such as NAAFI, Staycore, and No Shade, with artists like Arca, Chino Amobi, and SOPHIE, expanding its emotional and sonic possibilities. Even though it’s often labeled as techno or experimental, post-club music has a rebellious form, driven by diverse voices. [102]

In her DJ Mag article, Chal Ravens highlights how technological advancements and accessibility of the DJing equipment played a role in shaping deconstructed club music. As Berlin-based Planet Mu artist Ziúr says, “I like that it’s accessible and people can just get into the field easily. You don’t have to buy fancy equipment. You can rip the software, buy a controller for 20 bucks, illegally download some music, and you’re a DJ.” (Chal Ravens, DJ Mag, 2020) Even though, as an author, I don’t support the idea of illegal ownership, quote from the Ziúr nicely explains the change in accessibility. The author also suggests that this phenomenon led to more experimentation among people who have more eclectic tastes. [103]

Referring back to the discussion on the function of techno, I would like to conclude this section with Simon Reynolds’s Pitchfork article. He begins by asking: “Why so much electronic music this decade felt like it belonged in a museum instead of a club?” (Reynolds, Pitchfork, 2019). Exploring this question, he discusses conceptronica, a fraction of electronic music that is crafted conceptually and uses academic frameworks.

“Conceptronica, likewise, often has a warped-mirror relationship with contemporary dance styles: hence the rise of the term deconstructed club.” (Reynolds, Pitchfork, 2019) With these words, and after checking the list of artists, I come to the conclusion that there are some deconstructed club music pieces that fall into the category of conceptronica. [104]

[4] “Polygonia,” *Bandcamp*, `https://polygonia.bandcamp.com`.

In the end, it is possible to identify a shared aim among all the concepts discussed. A departure from the 4/4 hegemony and a shift towards non-standard dance music...

Chapter 4

Building “Davulita”

This chapter focuses on my master’s project Davulita and some of the experiments I have done during my studies. The idea of adapting a traditional drum for a live electronic dance music setting didn’t exist at first. It is a result of what I gathered from collaborations, lectures, and experiments.

At first, I didn’t aim to explore rhythm and ideas around it. However, it became the core of my experiments and gave me a platform to test what I had learned. It makes sense when I think about my background in club music.

TAMLAB and my studies there reshaped my artistic practice. Learning about new technologies and alternative ways of interaction changed my perception. I began working more closely with microcontrollers and tested different ways of interacting with rhythm.

Overall, I was attracted to machines and objects that could produce or help me create rhythms. Additionally, with my background in visual communication, I was interested in audiovisual crafts and transformations.

Besides the experiments on rhythms, our band, OGDL, was another source of inspiration. It provided a platform to test our compositions and instruments in a live context and pushed my music production beyond the DAW.

After all these new experiences, I had two primary motivations behind the davul project. The first was connecting an instrument associated with a communal dance experience to another (contemporary club culture), and the second was a belief in the advantages of having a tangible instrument for this setting.

In the following section, I describe the early experiments that led up to Davulita and the process of developing the instrument. These experiences shaped my everyday life and activities, therefore my understanding of interaction and sound. I would like to thank our instructor, Enrique Tomás, again. His support was essential throughout the whole process.

4.1 Practices during TAMLAB

4.1.1 Pick-up + Washing Machine

Figure 4.1: Screenshot from Pick-up + Washing Machine

My experiments started after a workshop by an experimental guitar maker Yuri Landman. During the workshop, we assembled our own electric guitars from ready-made materials. Our artistic choices influenced the placement of the strings and the shape of our DIY guitar. It was my first time working with pickups, and I was amazed by how they could capture sound from other electronic devices.

We later experimented with how the pickup reacts to random objects such as an electric razor or a Canon Speedlight flashlight. I placed those devices near the DIY guitar's pickup and processed the sound in Ableton by applying filters and resonators. While writing about it, I remembered that I used the flashlight technique at the beginning of our OGDL sets as well.

Around the same time, I saw DJ sets from Cercle, mostly held in natural, picturesque spaces. Tongue in cheek, I had the idea to carry a washing machine to nature. There were several reasons. First, my favorite washing program lasted about 45 minutes, which fit to the usual length of the Cercle sets. Second, I was not the only one thinking of a washing machine as a techno performer.

Speculating but not following the initial idea, I put the DIY guitar onto the washing machine, added a looper, and jammed with it using the electromagnetic sound. In my ideal world, the washing machine would shake the guitar, and the continuous vibration of the strings would create a humming drone sound. Even though I was only able to capture the sound of the machine, there was enough material to repurpose and use in some of my DJ sets later.

I leaned towards making conventional sounds with conventional rhythm machines. In my practice, allowing off-grid, surprising rhythmic textures still requires a conscious effort to welcome them. So, starting with the objects and machines that have an internal chaotic rhythm was an amazing way for me to get out of my comfort zone. It is funny to see that I still approach music from a photographer's perspective.

4.1.2 Helmet+Piezo

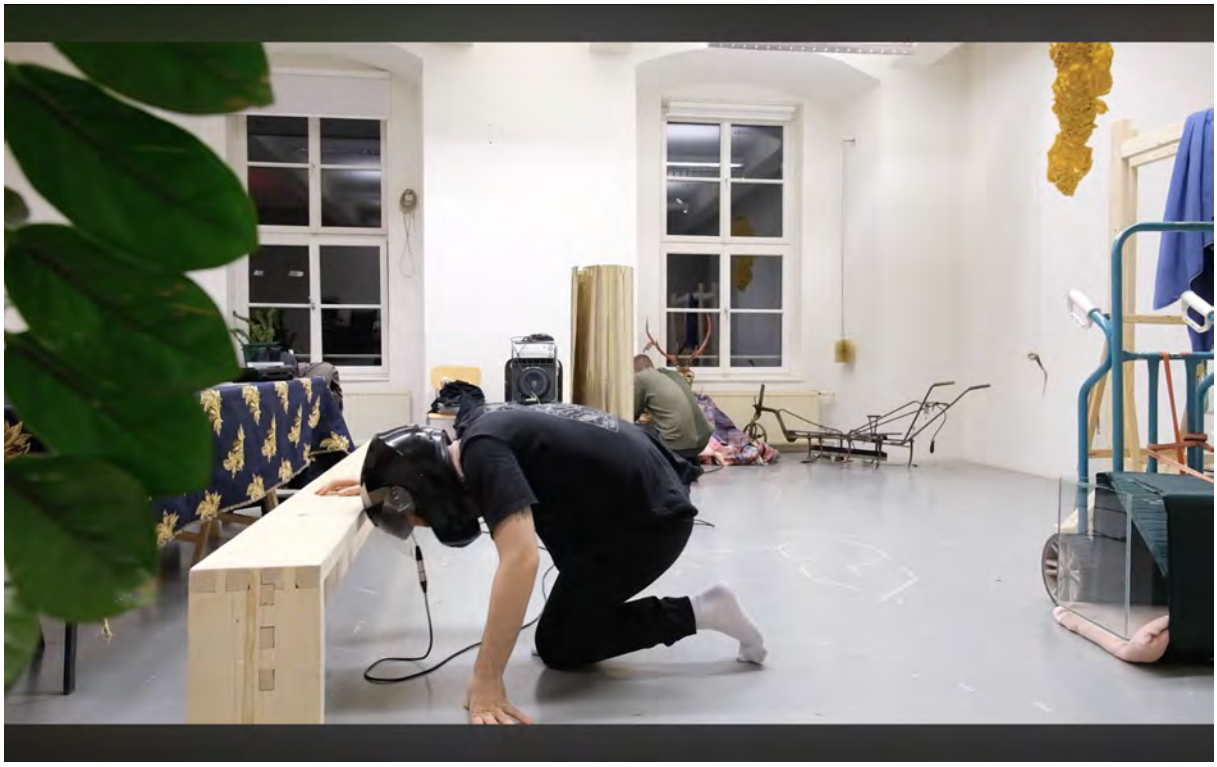

Figure 4.2: Screenshot from Helmet+Piezo video

On our way to Tina Frank's class, we came across a pile of motorcycle helmets lying around. Driven by a childish curiosity, I just picked up one. I thought one day I could use it in one of my projects.

I imagined scenarios what would I need to do to protect my head or where I would need a head protection.

Somewhere in this process, I also remembered my mother's saying, "Don't hit your head, you would become stupid," and a comment about techno's idiotic and repetitive structure. After this salad of ideas, I taped a piezo microphone inside the helmet and met with Botond Kelemen in the Sculpture Department. We tried creating steady four-on-the-floor rhythms by hitting our heads, striking the helmet with sticks, and rolling around.

Starting from finding a random motorcycle helmet I found myself exploring what seems absurd when we assign the duty of a machine, a repetitive action, to a person. This led to the questions, "What kind of labor is associated with the machines?", "Why does the actor of repetition create different feelings?" Working later on the davul project, I also learned people with different backgrounds have other intuitions about the same topic.

My family spent a good amount of time with davul. Even though they don't play the instrument, it is tightly connected to their background and their entertainment culture. So I found it fruitful to talk to them about what I add to the instrument. When I explained the integration of the looper system, their first reaction was "Then, what would the player do on stage?" They had a different perspective on a repetitive movement, which could be assigned to a machine.

4.1.3 Testing Pulse Sensor

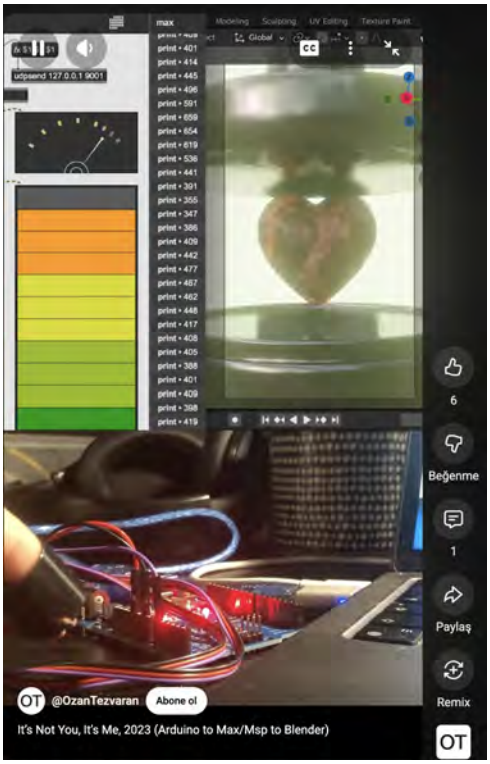

Figure 4.3: Screenshot from It's not you, it's me, 2023

I met the pulse sensor at the exhibition "Living System" by Christa Sommerer and Laurent Mignonneau at OK Platz. In one of their works, you could control the growth of a digital plant-like structure with your heartbeat. The idea of using my own pulse as an input spoke to me loudly for two main reasons. First, it was romantic. Second, I really enjoyed the idea of repurposing an existing rhythmic force to create something else.

Speaking of romance, my first project with the sensor was "It's not you, it's me". The main idea of the artwork was to test if I could control a 3D model in real time with the sensor. To capture the data, I connected the sensor to an Arduino and later used MAX/MSP to read the information. In the software, I sent data via OSC to Blender.

In the animation there was a model of a hydraulic press inspired by "oddly satisfying videos" on social media. I placed a ready-made model of a heart between the plates. Whenever there was a signal from the pulse sensor, the hydraulic press went down to smash the heart model. The animation of the smashing didn't behave as I expected, so I wanted to try the sensor on another project.

"Are you alive?" is a music player activated with the pulse signal. I used an ESP32 Wroom 32 to connect the sensor. Processed the input data on Touchdesigner. The music player only had one song and the logic was quite straightforward. Whenever there is a continuous pulse input, What Doesn't Kill You by Kelly Clarkson played.

These experiments gave me insight into how to process rhythmical data and how to map it in a meaningful way. Also, it showed me that where the rhythm comes from is important, since it directly affects the concept and the feeling of the artwork.

This reminds me of the conversations in the lab about using a laptop on stage. I am one of the people who consider their computers as friends. So hearing the 'watching someone play a computer might not be that interactive' was slightly hurtful. But here, I admit the fact that I would have different associations if I saw a person on stage with a pulse sensor, a laptop, or a washing machine.

4.1.4 It sounds a bit like a washing machine

Figure 4.4: Screenshot from Imagine this in a big room, 2024

As an artist with a background in visual communication design, I have been curious about audiovisual transformations. Thus, during my studies, I collaborated with Tina Frank and the BETA NOW. They were mostly focused on the performative side of the image. With those projects I gained experience in audiovisual interaction, feedback systems and video synthesizers.

In one of the BETA NOW projects, we collaborated with students from the University of Music and Performing Arts Vienna. In our group, I worked with Dominik Förtsch (mdw) and Christian Azzouni. While working with the video synthesizer and exploring the inputs and outputs, Dominik shared a technique. To create sound, he connected the outputs of individual color channels to the sound mixer. This gave a sense of a very direct translation. Later, I continued to discover what sort of sounds I could achieve with this approach.

One example I can mention here is a video recording from a live experiment. "Imagine this in a big room" is an audiovisual work which sound is created by the green and blue channel outputs. Directly generating audio by the colors appearing on the screen. What I saw was really close to what I heard. However, it was challenging to compose with this technique.

Around that time I came across Boris Shershenkov's phonoptic transducers. I had an intuition that I could achieve a more controllable audiovisual system with them. Considering the changes in the medium, I started to build the TouchDesigner patch to control the visuals that were projected onto them. I made the patch thinking of the controls of the video synthesizer, specialized for the transducers.

Figure 4.5: Boris Shershenkov's phonoptic transducers

The visuals were set as two blinking rectangles on the left and right (like the device's outputs), and a larger white flashing rectangle in the center that I imagined would function as a mono kick. I could control the main tempo of the blinking with the MIDI controller. According to the main tempo, I was able to adjust time signature cycles for the left and right elements. These parameters allowed me to change different sequences for each channel, and allowed me to perform stereo, polyrhythmic patterns and textures. With the position parameter, I was able to control how close or far away the color blocks were going to be from the device, which meant volume control.

In the first tests of the experiment, I was directly projecting the visuals onto the transducers. The project took a new direction after having a few discussions with Enrique Tomás. He suggested that including bodily interaction to the performance would add another layer. Based on this, I decided to project the visuals onto myself and positioned the device between me and the projector. I used my hands to control the amount of light reaching the transducers.

When I listened to the sound created, I noticed the device is highly sensitive. Small changes in the light and in the gestures created audible differences. Therefore, I wore white gloves to be able to redirect the light with minimum loss. It felt like an abstract mixing desk controlled with light.

Figure 4.6: It sounds a bit like a washing machine, Corfu, 2025. Photograph by Bereliani

I performed the project live as a 10-minute piece at the Summer Academy of Ionian University in Corfu. During the performance, Enrique Tomás controlled the sound levels and helped me to handle the multichannel sound system.

By that time, my experiments with davul had already started. Drawing parallels between this project and playing the davul was inevitable.

While interacting with the davul, I use both sides of the instrument simultaneously to create rhythms. Here, the two sides of the davul were symbolically represented by the device, and the physical effort that had been put in while playing the instrument was translated by the projected light.

4.1.5 OGDL

Figure 4.7: OGDL, Tresor Linz, 2024. Photograph by Verena Mayrhofer

OGDL first started at the Semester Opening Party as a music collective. We were four people, Gundega Graudiņa, Ludwig Klöckner, Darko Vukić, and I. Later, it 'gradually crystallized as a duo of' Gundega and me.

I am mainly responsible for the digital production of the tracks; Gundega handles vocals, plays bass guitar and various cassettes, creates feedback, reads crystal cards, and performs many other tasks with instruments or pedals that I cannot fully name. In our performances, we mix and blend our works to create a noisy, dramatic world with kicks.

We have previously played at Skaņu mežs, Ars Electronica Festival's Sound Campus, Stream Festival here in Linz, and several exhibitions. During performances, I usually use my Traktor DJ Controller, although in our last mini concert at TAMLAB's Out of Control, I had a chance to test the davul I was working on.

I use Ableton Live to produce tracks that I later perform using DJing techniques. During production, we usually think about what we want to play on stage, what we are trying out, and what is happening in our daily lives. Sample selection and the main structure of the pieces are developed during this period.Previously, we collected sounds from lullabies, pop songs, washing machines, and a passage with a tram passing above it (to get proper, deep kicks).

For the rhythmic parts, I draw inspiration from techno and post-club movements, alongside traditional Turkish dances. In our track "Wedding Delulu", we use 9/8 rhythms that are often played in traditional wedding songs in Turkey. The track later develops into a chaotic, four-on-the-floor acid techno structure. In our latest concert, we aimed to create an atmosphere that grows into a ritualistic texture, inspired by religious rhythms.

What I noticed in the last two years of OGDL was how difficult it actually is to jam with computers when you don't have pre-existing material. Usually, in our rehearsals, we had to sit down in front of the computer to get the material first, but later, Gundega was able to play on top of them. Of course, the DJ equipment helped

me loop sounds, re-adjust the EQ, and add new samples. However, I couldn't create the sounds I wanted in real time without interrupting our workflow. After these experiences, making my own rhythm instrument proved to be a very efficient solution.

4.2 Before Building Davulita

This section is dedicated to my master's project Davulita and the process of adapting davul for live, experimental electronic dance music. I started the process by deciding on the requirements.

4.2.1 Ideation Process

As I briefly mentioned in the previous section, this project was born out of the need for my own percussive instrument. In my head, I had a list of requirements.

Requirements

1. It should produce kick sounds.

In my musical practice, there is not a single piece I have published without a kick. I am not mentioning it because it is the best thing to do; I am just stubbornly drawn into it.

In our OGDL project, my main responsibility (one I took on) was to create the rhythmic parts, mostly composed of kick drums. In my personal electronic dance music project, "1=1," I produce beat-driven music. Also, under my DJ Döner persona, I play hyperactive electronic dance tracks that rely heavily on kick sounds. Therefore, I had no choice but to rank this requirement first.

2. It should be jam-friendly.

I started collaborating with instrument players in TAMLAB. In all honesty, my production methods were neither jam-friendly nor intuitive. I was used to producing on my own, in front of computers.

For me to develop a sound, it took a lot of trial and error. I paused the continuous flow of sound to listen to what I had done again and again. So, the jamming sessions with OGDL meant that we would first sit at the computer.

What I observed among the instrument players was that they were able to make music intuitively (in most of the places) and with fewer interruptions. With my instrument, I desired a similar scenario.

3. It should be able to process the sound and generate sequences.

In my musical practice, I rely heavily on effects and enjoy processing the sound to achieve dirty textures and later loop them in sequences. In Ableton Live, I usually use various amp simulations, saturators, long reverbs, and delays with high feedback.

In one of my earlier works, "Stop Sitting On My Face Or," published on the Berlin-based record label Banana Creampie, I aimed to saturate the kick sound and loop it to repurpose it as a distorted guitar. In short, the effects give me the possibility to use the existing sound for different purposes. In my instrument, I wanted to use the same techniques.

4. It should look like an instrument.

I don't enjoy mentioning this, but I have to say I noticed a negative bias towards DJ controllers on stage. In some of our concerts with OGDL, I found myself explaining, "No, this is not a DJ set," as if doing a DJ set would be a negative thing. Therefore, I wanted my instrument to look less like a controller and more like an instrument.

5. It should be familiar.

This requirement is maybe the most personal one, and it's based solely on feelings. During my studies, I experienced that what was experimental to me was actually a part of popular culture here. As I explained in the techno chapter, Europe is one of the main hubs of electronic dance music, and it has a long history of electronic music practices.

Even though I was aware of the history, my approach had a different timeline, which doesn't necessarily match here. Therefore, for my instrument, I wanted a requirement that would give me great familiarity. I wanted this connection to be as natural as possible. It should be something that I experienced the nuances and the associations of the instrument.

Decision

Reflecting on all my requirements, I decided to adapt the traditional percussive instrument "davul," for my practice. There were several reasons leading me to this.

1. It can create a kick-like sound.

Using the "düm" side and the thick mallet 'tokmak', it is possible to generate a sound rich in low frequencies. Besides the traditional practices that use this function, it has already been repurposed as a kick drum in examples such as the "Davulcu" hip-hop series, the performance of Ipek Ipekcioglu and Hakan Vreskala, and a song by Hagop Tchaparian.

2. It already exists in the context of dance.

As previously mentioned the davul is highly connected to traditional dance music. On a personal note, most of my childhood collective dance memories include the davul.

With my family and friends, we were also discussing how music styles like 'Halay', often played with davul, feel close to techno. To extend the joke, I played the 'Hizli Halay' song by Ahmed Hasan in a few DJ sets while performing as DJ Döner.

During my research, I also came across the ritualistic use of similar drum instruments from shamanic times, with which I drew parallels to perspectives that perceive the current club environment as a ritual. [8] [24] [19]. This added another layer to my project and conceptually made the bond stronger.

3. Other reasons

It is also worth mentioning that this decision covered the familiarity and appearance-related requirements. It was also promising in terms of allowing me to jam with other people.

However, in its original form, the davul is a pre-digital instrument and doesn't have the features to process the sound or loop sequences. Finding ways to add those parameters is at the core of this project, and I will discuss the implementation process later in this chapter.

4.2.2 Finding The Instrument + First Sketches

After deciding on the instrument, the first challenge was to find one. After phone calls with my family members, I noticed that it would be costly to ship one from Eastern Turkey, where my family had migrated, and where I learned about the culture.

Later, I came across a second-hand davul on Willhaben listed by Linz-based artist/musician Daniel Bierdümpfl. I want to thank him again for helping me find the instrument and making it economically accessible.

After receiving the instrument, I started using it in the lecture "Postdigital Ensemble" led by Bernhard Breuer. The classes gave me the opportunity to practice with it and created a general impression of how it functions and sounds with other electronic, digital, and pre-digital instruments. I also had a chance to discuss my process with Breuer, since he plays as a drummer in the acoustic techno band Electro Guzzi.

Besides the Postdigital Ensemble classes, I started having jamming sessions using Ableton Live and a piezo microphone. I tested the instrument with various intuitive sound-processing techniques, used the built-in looper

Figure 4.8: Screenshot from the first recorded jam

to create sequences, and explored what kinds of sounds I could create from the different parts of the instrument. Later, I created a chart about how I would like to handle the signal flow.

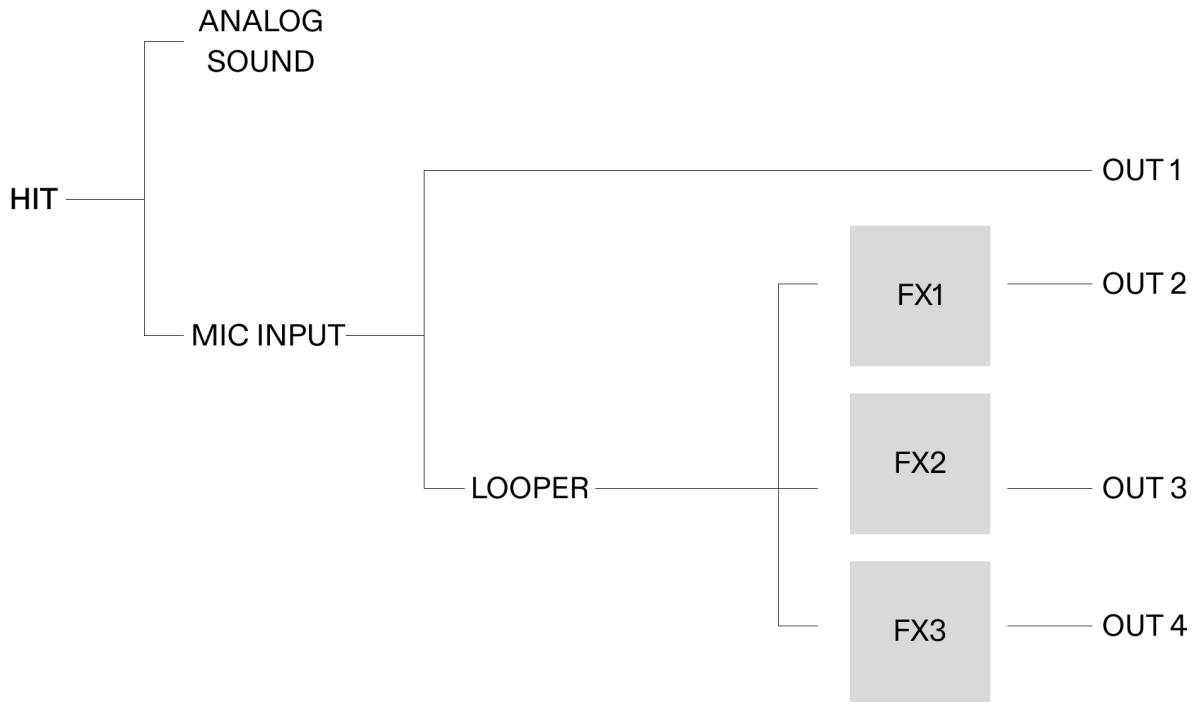

Figure 4.9: A sketch for the signal flow

As shown in the chart, I split the input into two separate signals. I kept the first one as is to preserve the instrument's textures. To the second channel, I added a looper and routed three sends to process the sound later. The first effect chain functioned as a bass booster, the second as a saturator, and the third had a series of reverb

effects. After creating the chart, my direction was clearer. I needed to find a way to capture the sound, a solution to process it, and an implementation for a looper system. Before explaining the implementation process, I found it fruitful to discuss how other artists and researchers augmented the davul and other percussive instruments.

4.2.3 Examples of Augmented Percussion

After all decisions, I realize that Turchet's (2018) definition of augmented musical instruments fits what I aim to do with the Davulita project: expanding the features of a pre-existing instrument by combining it with technology. [105] Therefore, in this section, I focus on the projects that blend percussive instruments with digital and electronic technologies. I started my research with the keyword davul and came across the work of Sinan Bökesoy and Patrick Adler with the title '1city1001vibrations' (2011).

Figure 4.10: Photo of 1city1001vibrations, adapted from [106].

In their sound installation, a group of percussive instruments, including the davul, is played by robotic arms. The robots were triggered by the live sound analysis captured from a microphone placed in the Bosphorus, Istanbul. As a result, it would be possible to speculate that the environment became the initiator. [106]

It surely is an interesting take on traditional davul playing practices and illustrates how the instrument can be blended with contemporary technology. By playing the davul with robotic arms, the artist replaces the player with machines. In my project, I aimed to integrate a machine, not to play the instrument but to allow me to repeat my actions, in short, a looper.

After this work, I needed to change the keyword davul to dhol in order to find relevant examples. This change led me to find a project by Ajay Phadke and Eashwar Rangarajan from Cornell University. In their final project An Electronic Dhol (2012), even though the project is about the Indian percussion instrument dhol, I found similarities between my approach and the adaptation of the davul.

Figure 4.11: Photo of The Electronic Dhol, adapted from [107].

Phadke and Rangarajan transformed a traditional Indian instrument to play specific sounds when struck by using microcontrollers and programming. They also added a feature that allows the player to record and play back the player's actions. [107]

Even though the researchers use the player's input to trigger sampled sounds, it showcases a mindset similar to the Davulita: the need to amplify the sound and loop the player's motifs. The control mechanism for the sequence recorder is located on top of the instrument, accessible to the player. There is also a YouTube video of the researchers showcasing the project. In the comment section, I came across several criticisms of triggering only one sample per dedicated side of the instrument. Reflecting on the comments, it would be possible to say that in this project, the instrument's body starts to function more like a controller.[107]

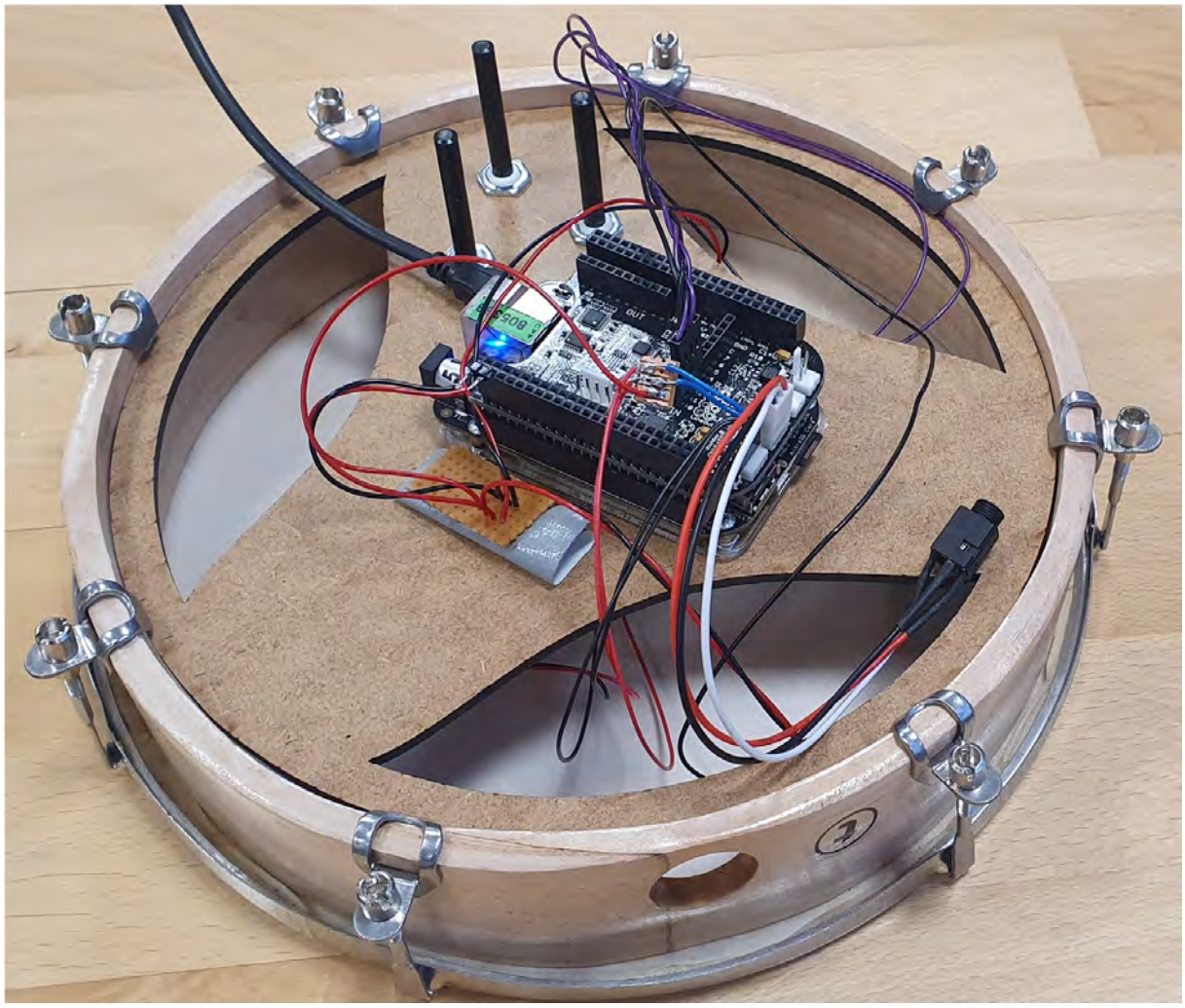

Figure 4.12: Photo of Hybrid Hand Drum, adapted from [108].

In the project "Hybrid Hand Drum" (Casper Preisler and Dan Overholt, 2025), researchers aim to create a hybrid percussive instrument. They argue that, in addition to using samples, enhancing the instrument's organic sound features with digital sound processing can enhance authenticity. [108]

Preisler and Overholt used piezosensors to capture the sound, an FSR sensor for analyzing pressure and BELA to process the sound. They also included three potentiometers to control the effect parameters. [108]

It is possible to draw many parallels between "Hybrid Hand Drum" and the 'Davulita' project. As an artist, I also find protecting the organic sound of the instrument highly important. Not using samples allows many different textures and sounds, and keeps the instrument somewhat alive. Implementing the controllers into the instrument and designing it to function as a standalone unit seems very practical, as the researchers note in their paper.

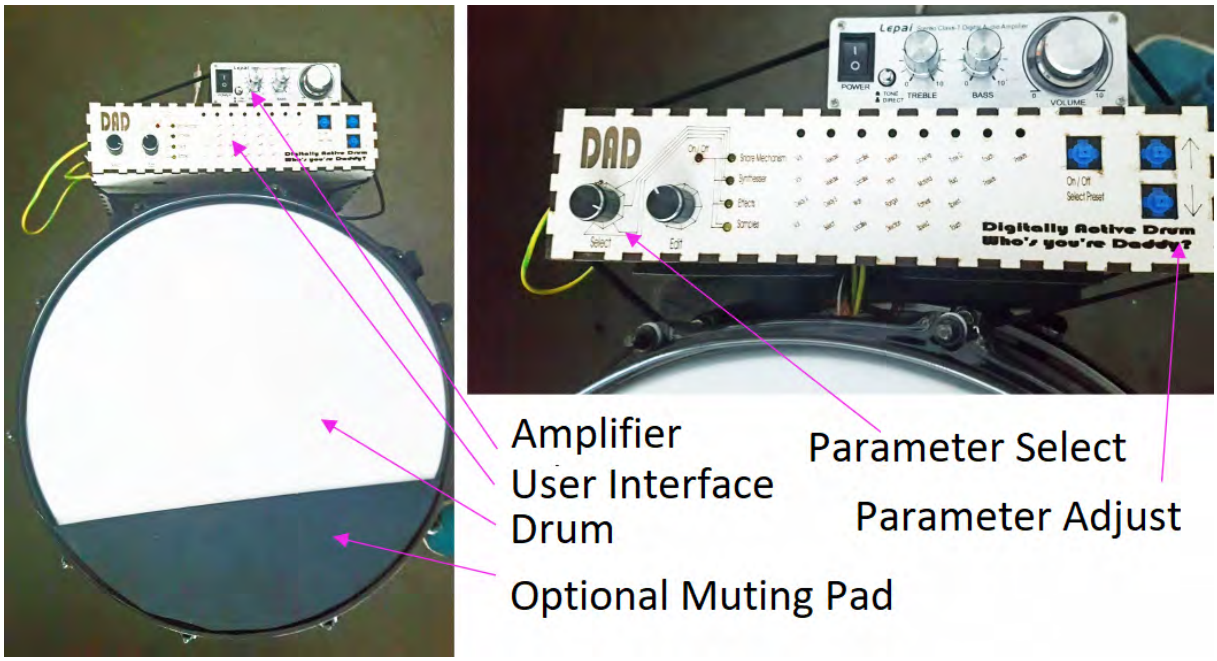

Figure 4.13: Photo of Digitally Active Drum, adapted from [109].

I came across another notable hybrid drum example on the Bela platform's blog. "Digitally Active Drum" by Peter Williams both processes the organic sound of a snare and uses inputs to trigger samples. The scope of the project combines Electronic Dhol (2012) and the Hybrid Hand Drum (2025), keeping the organic sound for processing later and for triggering samples. Even though I saw the possibility in my project, I decided not to use my instrument's sound to trigger samples. This limitation allowed me to focus more on the instrument. [109]

4.3 Davulita

After exploring how other artists and researchers adapt the davul and other percussive instruments, I would like to discuss my process for adapting Davul into a live, experimental electronic dance music context.

4.3.1 Amplifying & Sound Processing

My first challenge was to understand how to capture the sound from the davul. In my first jams, I mainly used a piezo microphone and listened to the output with my headphones. However, the result was surprising when I wanted to share what I was working on with my roommate through speakers. When I routed the signal out, the davul created loud feedback, and I wasn't able to play it. It was completely different from what I was hearing from the headphones.

Figure 4.14: Microphone check with Breuer at Bruckner University, 2024

Later, I came across similar issues related to feedback in the post-digital ensemble classes. When I mentioned the problem to my professors, I learned that it's common when amplifying drums. After that, we set up a meeting with Breuer at Bruckner University to test different microphones. Bernhard suggested I look into kick drum microphones, and after discussing a few models, I chose the Behringer BA 19A, a condenser boundary microphone, owing to its relative affordability.

Figure 4.15: The Kelly SHU Pro™ shock-mount holder for drum microphones. Source: Kelly SHU

However, the kick microphones were mostly built into the drums, so it was clear that I needed to disassemble the drum and put the microphone inside. I checked for DIY design approaches and brands that offer professional solutions to that problem. One project was on drumforum.com, from the username "K.O". He used the same model of the microphone and built a DIY structure that allowed the microphone to be suspended inside the kick drum [110]. The simplest way to continue was to blend the idea of DFO Star and the "Kelly SHU® Microphone Shock-Mount System" [1]. I aimed to design my own 3D printable, DIY version with the dimensions of the Behringer model.

[1] "The Kelly SHU Microphone Shock-Mount System," Kelly Shu, `https://www.kellyshu.com/`.

Figure 4.16: Studio of Mehmet Muderris: Format Printing, Northern Cyprus, 2025

By the time I was working on this part of the project, I was visiting Northern Cyprus, where my family is now based. With the help of my relative Mehmet Muderris, who works in the 3D printing field, I was able to create the model to stabilize the microphone inside the instrument. It took a few sessions to design the components, and later, we printed slightly different sizes to match with the microphone dimensions.

Figure 4.17: Separately printed materials

All of the structures were printed separately. Therefore, when I returned to Linz, I visited the Bauhaus to obtain the necessary materials. I gathered elastic ropes, plastic clips, different sizes of screws and super glue to assembly the parts. Later, I disassembled the drum, and began building the structure inside the instrument.

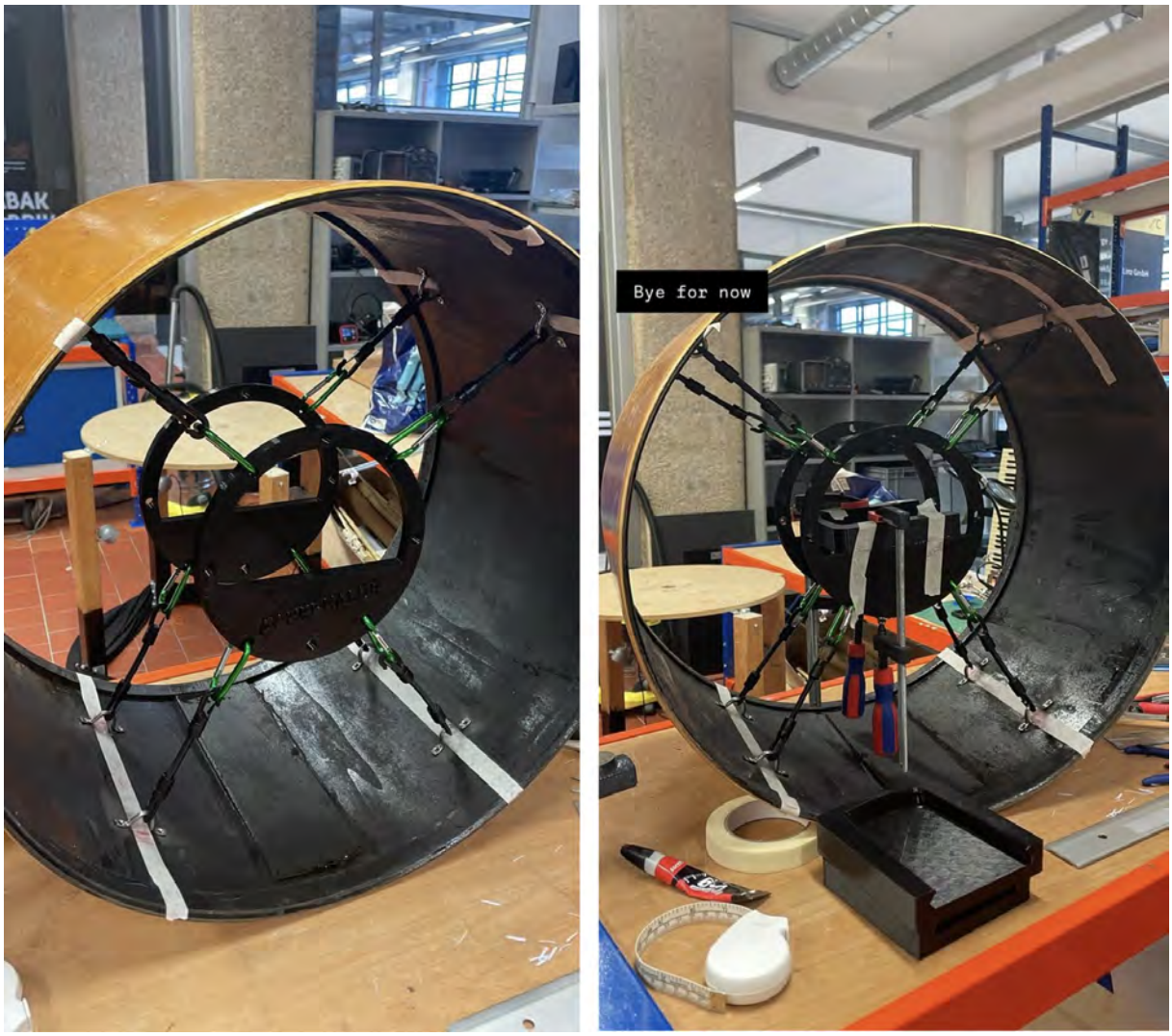

Figure 4.18: Process of implementing the microphone mount

I wanted the structure to be as stable as possible, so I drilled holes and used screws to reinforce it inside the instrument. To extend the microphone connection outside the instrument, I used a ready-made male-to-female "XLR Pass Through Cable".

Figure 4.19: Screenshot from the first jam

I connected the XLR to Ableton by using a sound card. When I switched on Ableton Live, I started working more on sound processing and checked whether the template from the first jamming sessions worked with this microphone setup as well. (Yes, there was still feedback.)

In this process, I had a chance to talk with Görkem Gökkaya and Barış Ergün, who both work in the field of sound. Gökkaya is an Istanbul-based electronic dance music producer, also 1/3 of Triart. Barış Ergün is a sound engineer and producer. I came across him first through his noise and experimental electronic music. I want to thank them both for sharing their ideas.

In our mini-interview with Barış Ergün, he suggested protecting the transient sound of the davul. He also mentioned the importance of compressors and gates. What he said was parallel to the ideas of Gökkaya and TAMLAB lecturer Ulla Rauter.

Gökkaya's help was powerful. After I sent him my initial sketches in Ableton Live, he built another version by interpreting what I aimed to do. I sent him recordings, both dry and processed. Later, he sent me his version of the project file. I checked the chain of effects with input from the davul in the TAMLAB studio. I tweaked the parameters intuitively until it felt right. Even though the main project file went through many iterations, owe him a huge thanks.

4.3.2 Interface

I started to develop the project further in the Postdigital Lutherie class of the Master's program. After deciding on the sound that I wanted to achieve with the instrument, I had a clear image of what sort of controls would be necessary. Later, I added them to an existing chart for sound signals and created another table to analyze them.

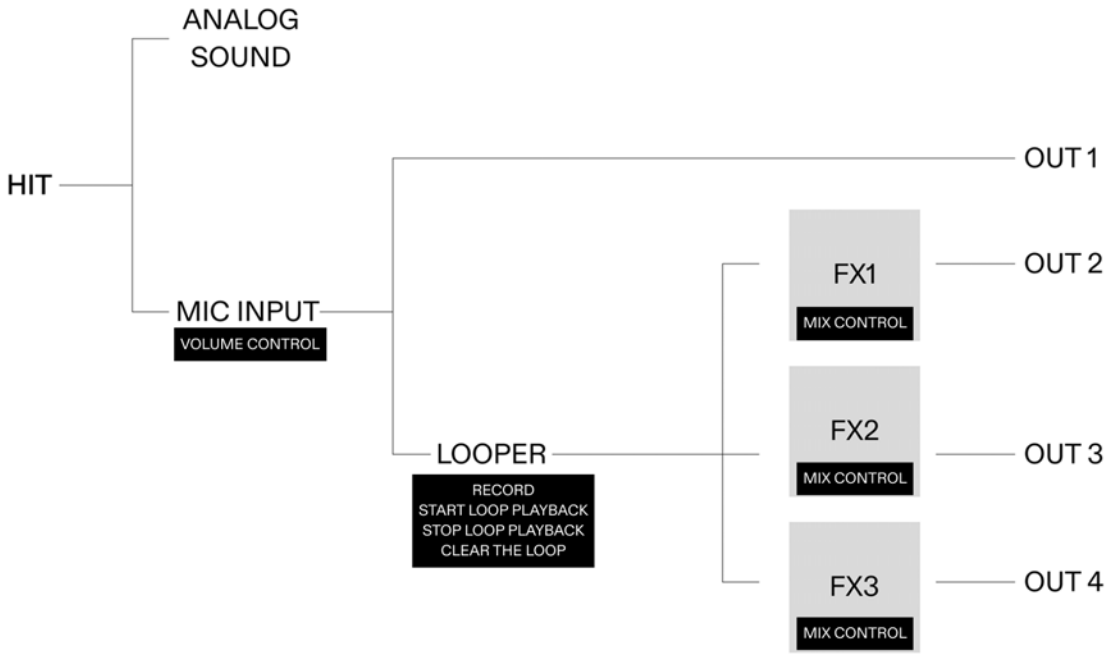

Figure 4.20: Locating controls

Section	Function	Signal Type	Possible Input Device
Instrument Input	Volume Control	Analog control	Potentiometer
FX1	Mix Control	Analog control	Potentiometer
FX2	Mix Control	Analog control	Potentiometer
FX3	Mix Control	Analog control	Potentiometer
Looper	Record	Binary Control	Push button
	Start Loop Playback	Binary Control	Push button
	Stop Loop Playback	Binary Control	Push button
	Clear the Loop	Binary Control	Push button

Figure 4.21: Overview of control types

My initial aim was to create the project on the Bela Platform and handle the sound processing with PureData. I built the patch mainly by watching the QCGInteractiveMusic YouTube videos, with the help of Enrique Tomás and Ulla Rauter. The patches include three FX and a looper, and can be found on the GitHub page under the name Stoic Riot. Even though I later chose not to continue with Bela, it pushed me to prototype.

While building my first prototypes with potentiometers and buttons, I imagined where can I implement the controllers onto the instrument. The sketches and the implementation process led to AI-generated images as well.

Figure 4.22: Implementation sketches

While building my first prototypes with potentiometers and buttons, I imagined where I could implement the controllers on the instrument. The sketches and the implementation process led to AI-generated images as well.

As a result, I decided to implement the looper controls on the mallet. I thought it would be practical and would allow players to handle the loop on the fly. The volume and FX controls are planned to be implemented on the top surface of the instrument.

Figure 4.23: AI-generated image created during the implementations

Mallet

In the first prototype of the mallet, I was still using Bela. To have a feeling of the control, I hot glued two digital push buttons on the 'tokmak' and with very long, non-practical wires I connected it to the breadboard which controlled the start/stop function of the loop on PureData. Later, I wanted to get rid of the cables.

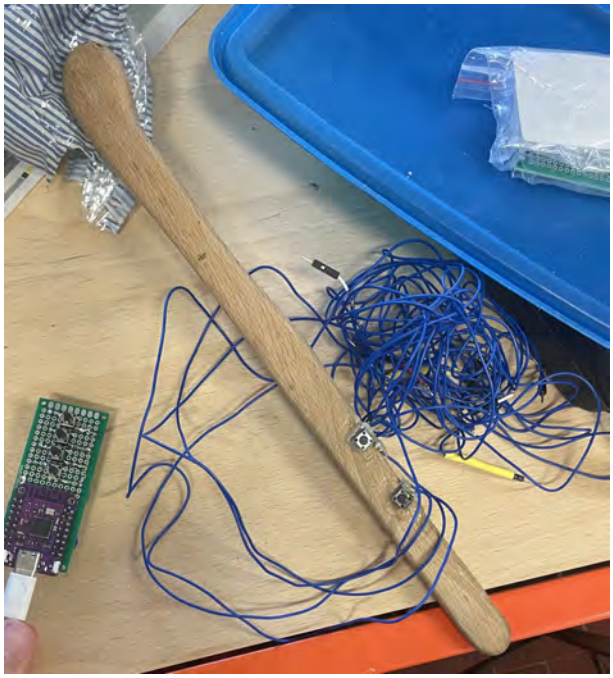

Figure 4.24: First prototype of the mallet

Later, I switched to using ESP32. It allowed me to send wireless MIDI signals by using the ESP-NOW module. On a found perfboard, I soldered four push buttons and connected them to the microcontroller. When triggered, it sends the note on/off data to the receiver, which is recognized as a MIDI device on the computer.

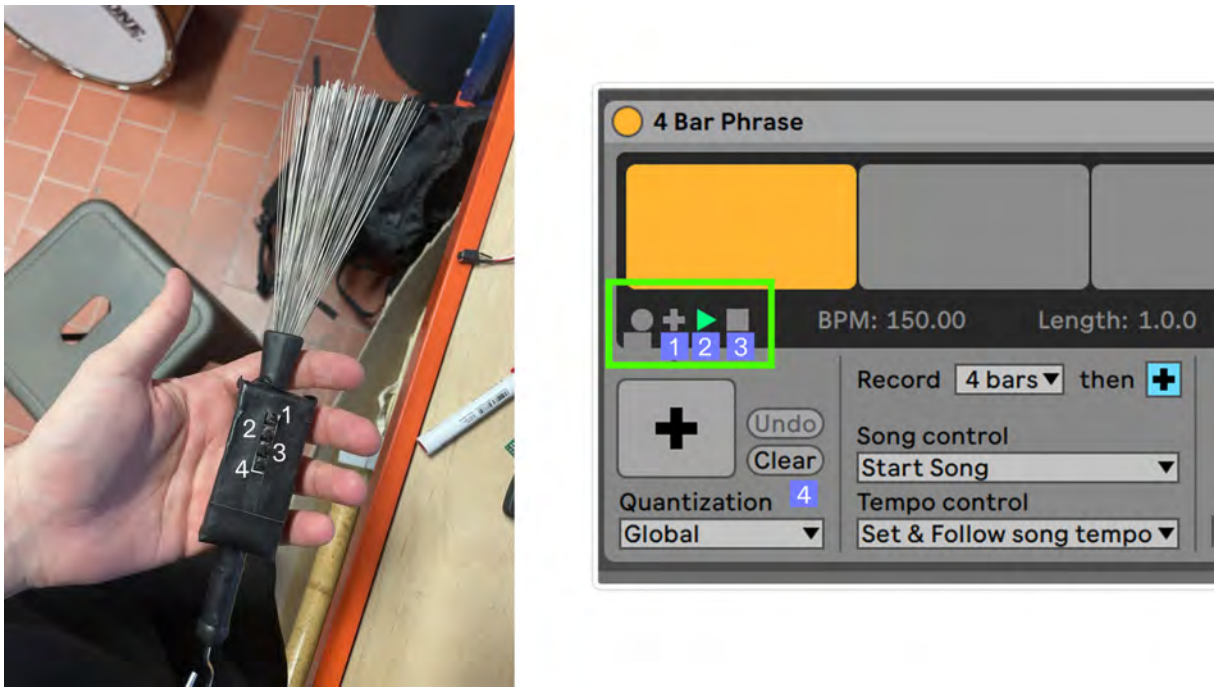

Figure 4.25: Second Prototype of the mallet

After designing an enclosure, I taped the sender circuit to a brush rather than 'tokmak'. This type of mallet allowed me to achieve a grainier texture when the instrument is amplified. For the controller, I mapped the four buttons' MIDI signal to Ableton Live's built-in looper. I mapped the more often used, less dangerous controls closer to the fingers. Compared to adding a layer while playing, it is more difficult to press 'clear' and 'stop' while playing the instrument.

FX Controllers

For the FX controllers on the top of the instrument, I used potentiometers connected to another ESP32 microcontroller. The MIDI CC messages were sent to the same receiver as the looper module to be mapped in Ableton. To improve control, I decided to increase the potentiometer's size. To achieve this, I designed circular 3D-printable pieces that fit the controllers' heads.

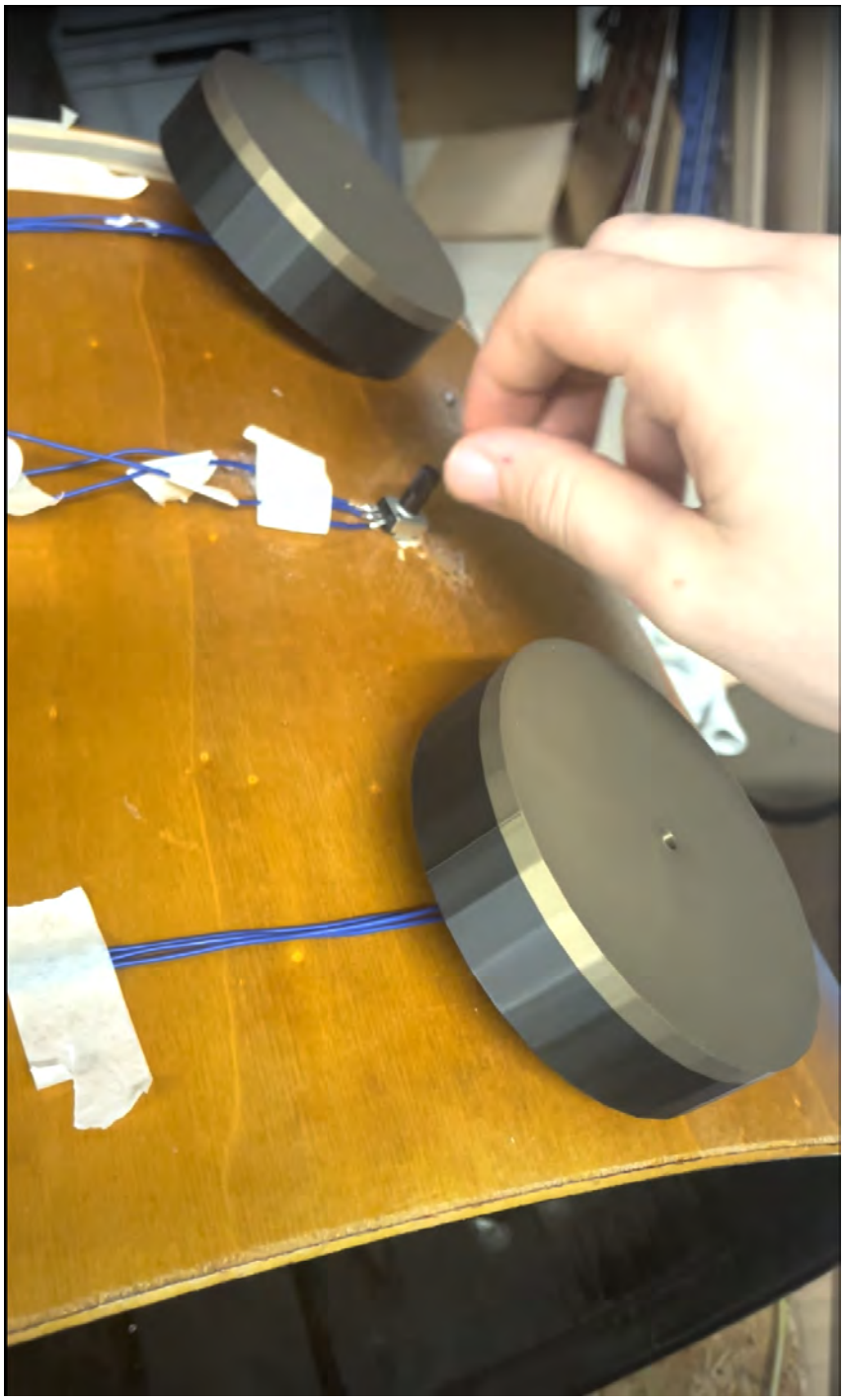

Figure 4.26: First prototype of the FX controllers

After making sure that the signal flow is working, I wanted to stabilize the potentiometers on the instrument. I calculated the dimensions for the holes and drilled holes to insert the controllers. This process helped me to clear up the cables.

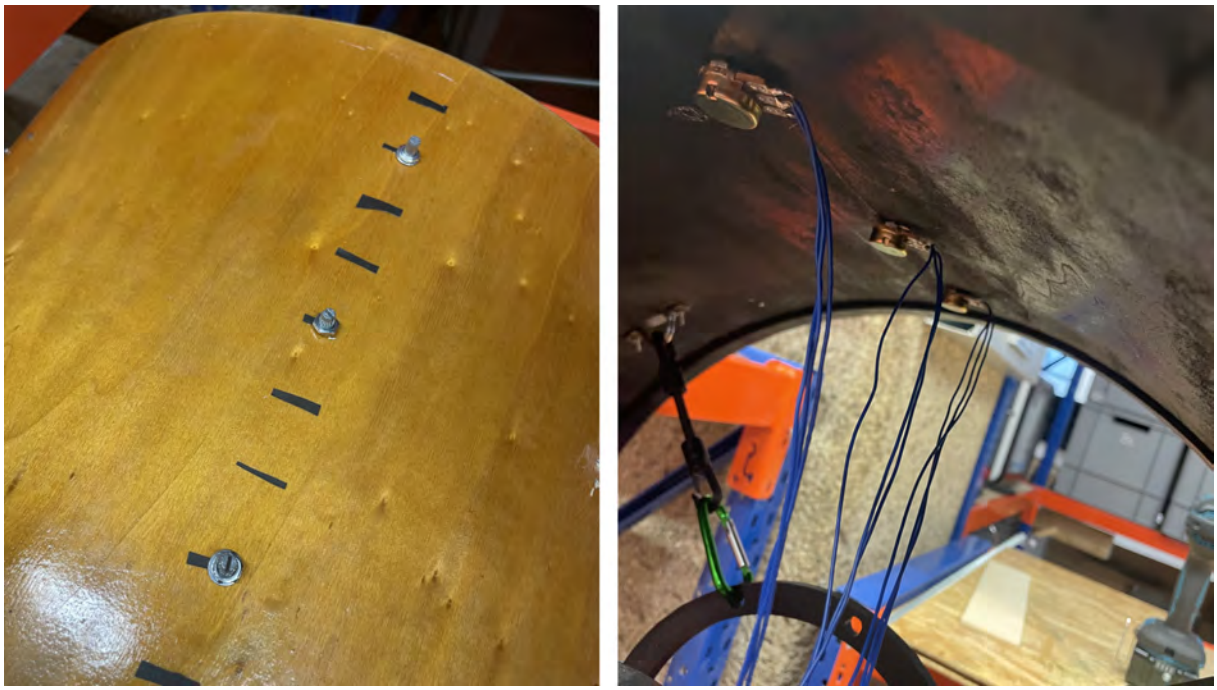

Figure 4.27: Stabilizing potentiometers

In the first 3D-printed knobs, there were no visual indicators that communicated the amount of effect applied. Therefore, in the second prototype, an arrow indicating the level was added. I wanted it to be part of the 3D design because, by making it volumetric, it would also be helpful in the absence of light. Later, I also added which effect it was. BASS for bass booster, SAT for saturator, and REV for reverb.

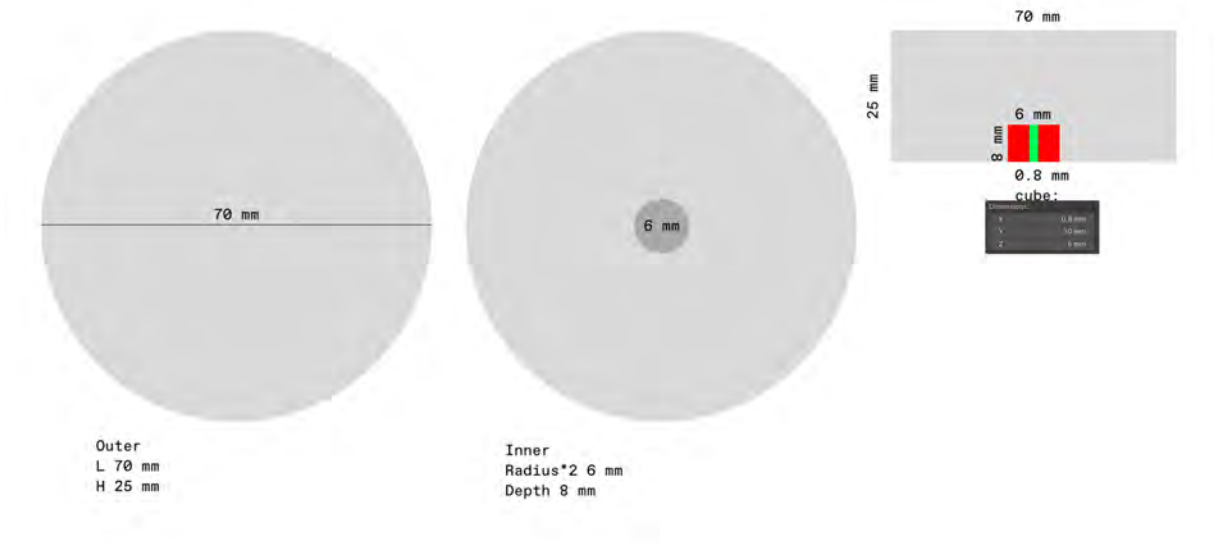

Figure 4.28: Dimensions of the knob

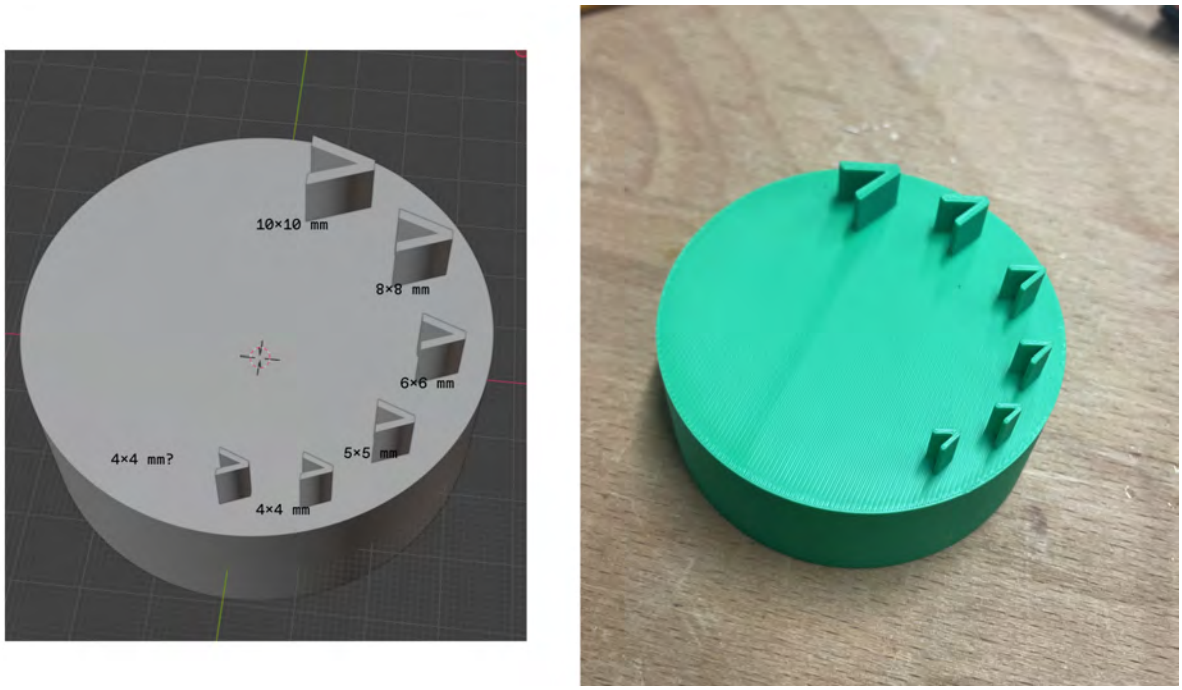

Figure 4.29: Visual indicator sketches

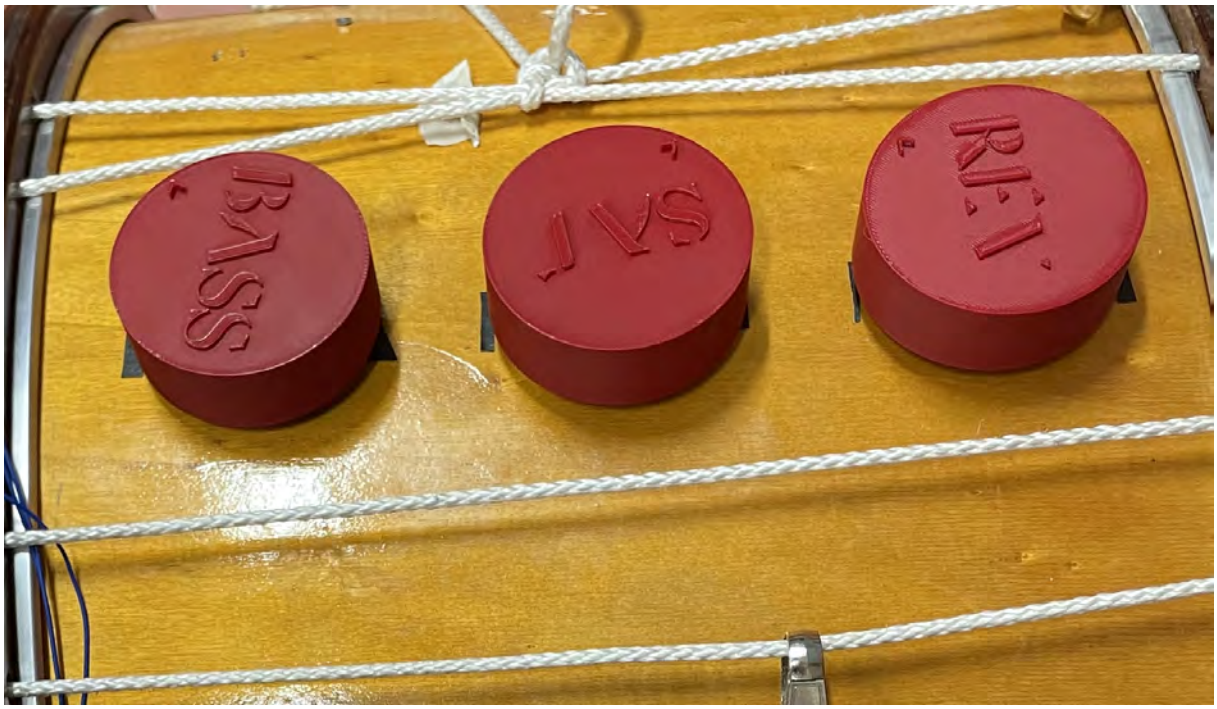

Figure 4.30: Final implementation of the knobs

Volume Control

During the sketches, I always imagined having the volume control on the left rim. As the main pulse provider on the instrument with my right hand, I assumed a lever-like structure on the left side would give me greater accessibility.

Reflecting on this idea, I looked for solutions to implement a lever/handle-like system. As suggested by Enrique Tomás, I started with a soft linear potentiometer. The initial plan was to wrap the softpot around the

rim, taking advantage of its flexibility. I successfully fitted the sensor, connected it to the ESP32, and sent the MIDI CC message for volume control. However, I couldn't design a lever-like system that would transform the softpot into a lever.

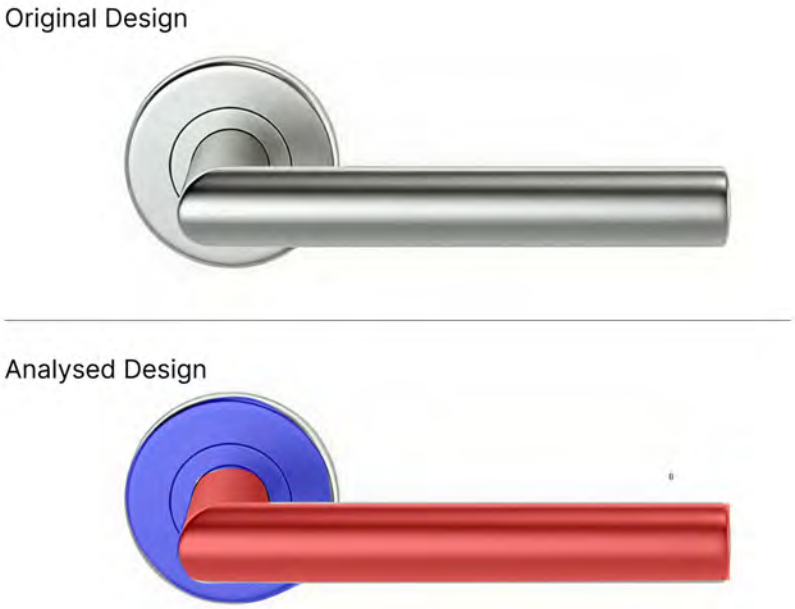

Figure 4.31: "Erkul Kapı Kolu Oda Paslanmaz (Model 0472), image from Starwoodyapimarket, cropped"

With a slight frustration, I began to examine daily life lever/handle-like objects. The design of the door handles gave me an idea. While designing the knobs for the FX controllers, I already made the circular design, which I refer to as the blue area in the figure above. To make the interaction more like a lever, I needed to design the red area to integrate with the previous design. Later, since the knobs were designed for potentiometers, I switched from using a softpot strip to using them.

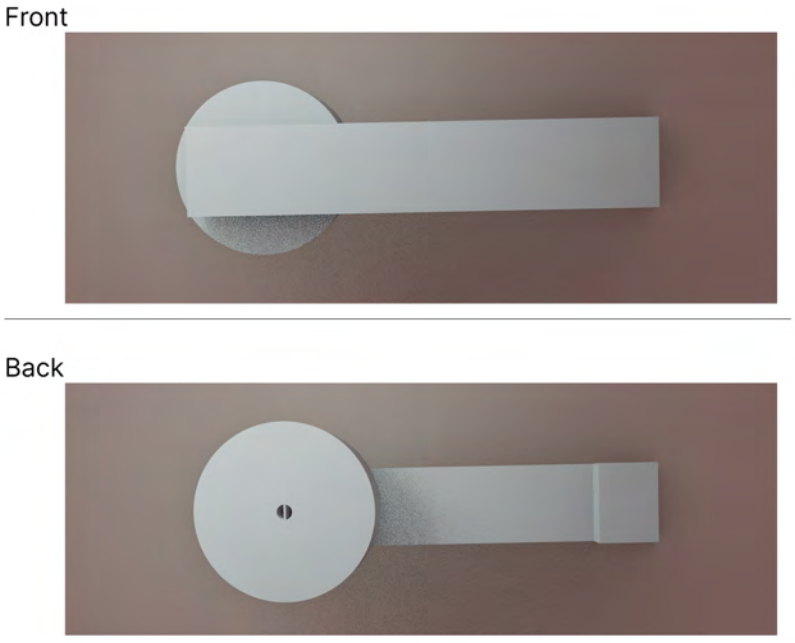

Figure 4.32: Lever design for a potentiometer

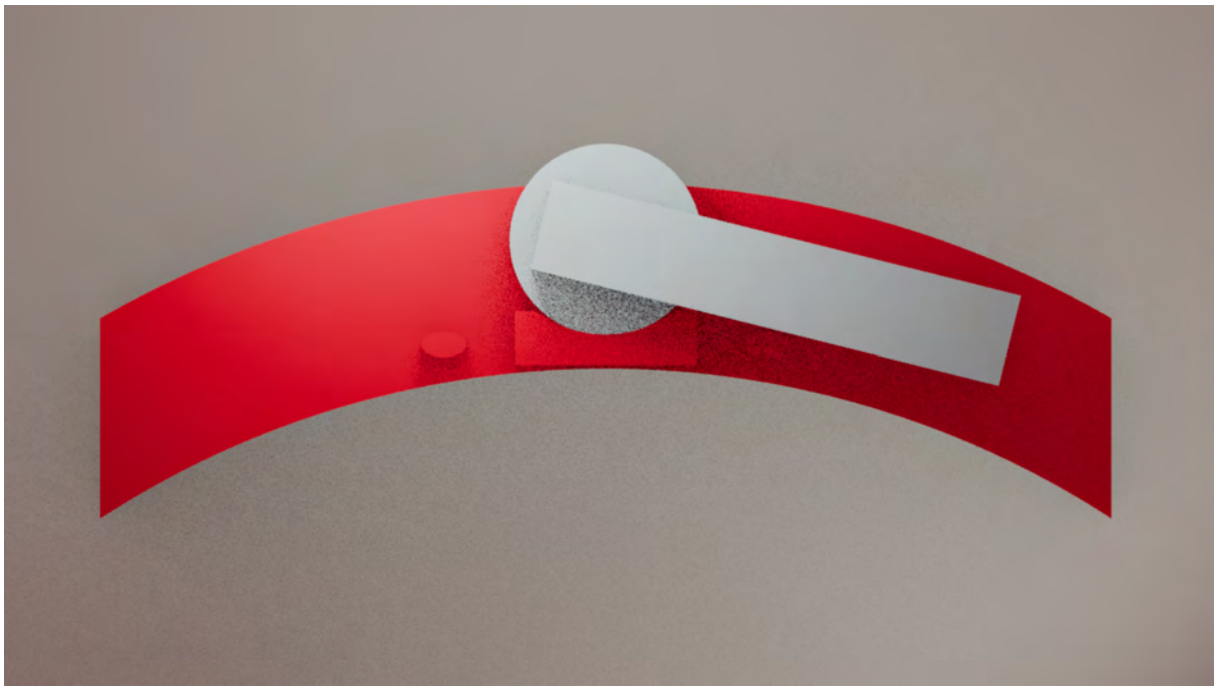

Figure 4.33: Lever design with its holder platform

After 3D-printing the lever and the platform that helps stabilize it, I integrated it onto the left rim of the davul.

Figure 4.34: Integrated Lever

ESP BOX

As mentioned before, the four potentiometers (one volume control and three FX controls) on the instrument were connected to an ESP32. I also wanted to stabilize the microcontroller on the instrument.

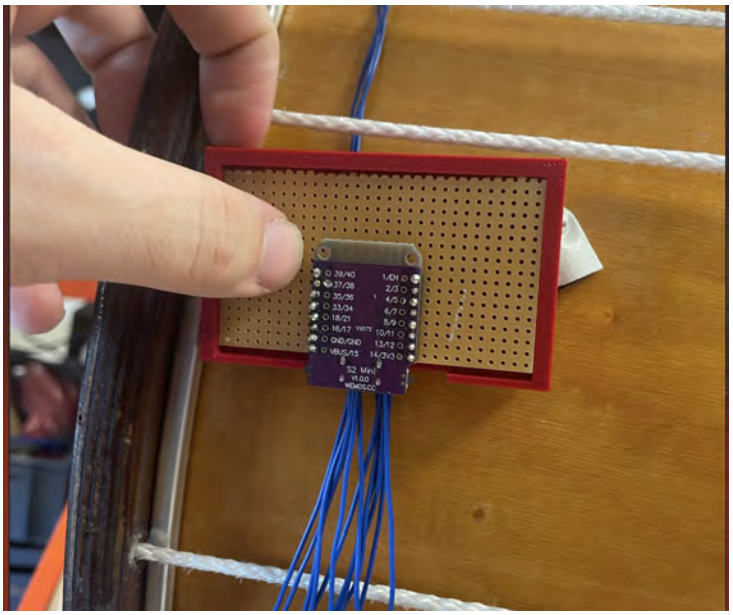

Figure 4.35: Design Process

I chose a spot on the back of the instrument, somewhere I could easily look while playing. The FX control cables were inside the instrument. To take them out, I drilled a hole where the ESP32 would be located. Later, on a perf board, I combined all of the cables and the microcontroller. I designed and 3D printed an enclosure for the circuit to protect it.

Figure 4.36: Integrated Design

4.3.3 Setup

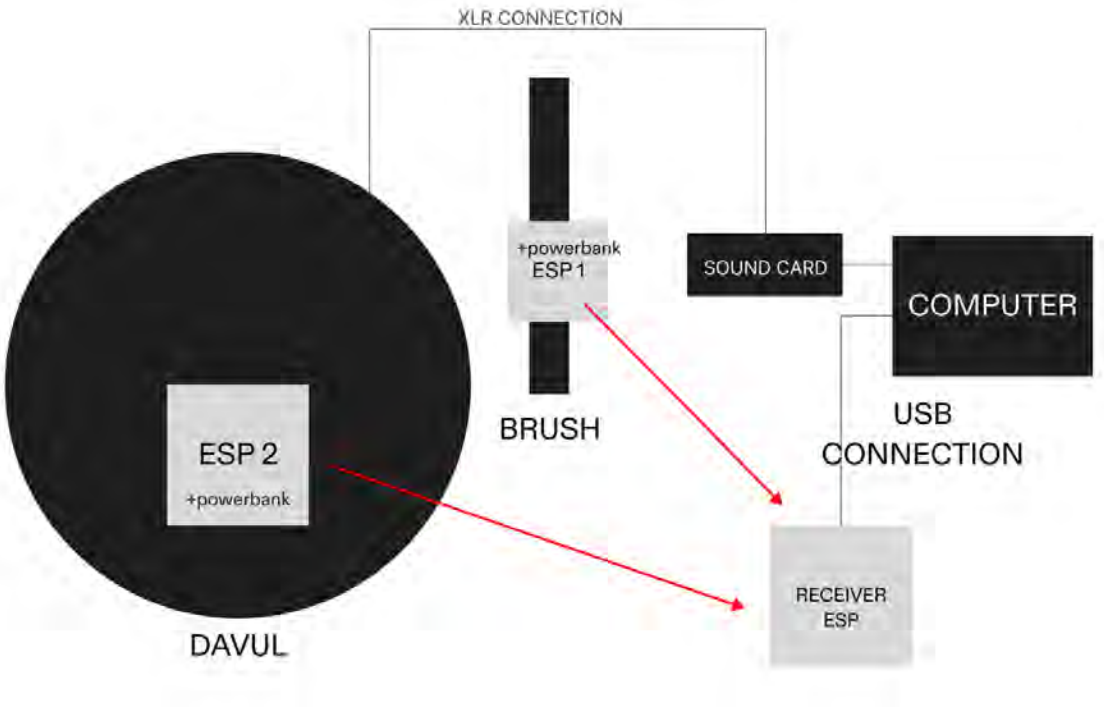

Figure 4.37: Workflow Diagram

The setup and the workflow are pretty straightforward. The steps to use the instrument can be listed as:

1. Connect the soundcard to the computer.
2. Connect the instrument to the soundcard with an XLR cable, and turn on the phantom power.
3. Turn on the Ableton Live project file, and check the sound input.
4. Connect the receiver ESP to the computer.
5. Connect the power bank to the ESP1 on the mallet and check the MIDI signal on the looper.
6. Connect the power bank to the ESP2 and check the MIDI signal on the FX sends.

As previously mentioned, the knobs on the instrument control the effects, and the lever on the left side controls the volume. The buttons on the mallet are mapped to the looper.

4.4 Performances and User Feedbacks

4.4.1 LEICHT ÜBER LINZ

On March 12, 2025, as part of the "LEICHT ÜBER LINZ" event of Anton Bruckner Privatuniversität, we performed with the class of the Postdigital Ensemble. This concert was one of the first public events I performed in with the davul.

Figure 4.38: Postdigital Ensemble, Anton Bruckner Privatuniversität, 2025

During the concert, the instrument was still in progress and only had the microphone in it. However, it still provided me with valuable insights. For instance, before amplification, it was not possible to hear the small textures created by the brushes or the sound of the ropes that held the instrument together. Besides the traditional ways of playing it, the instrument's alternative sounds allowed me to integrate it into different sections of the concert.

COM/POST festival

Organized by TAMLAB students, the COM/POST festival took place from 29 to 31 May 2025 at Tabakfabrik in Linz. Davulita took part in the performance, OBI BLANCHE AND THE B.O.B with Sam Bereliani - Postdigital Punk. It was the first time that the finished instrument was given to another player: Sam Bereliani.

Figure 4.39: Postdigital Punk, COM/POST festival, 2025

Sam and the rest of the band members had a rehearsal before the show. Therefore, it would be possible to say they set up the instrument several times on their own and reported that they were able to use it as it was designed to be used.

In the concert, I wasn't able to hear the instrument. Later, I learnt that there was a technical error in the sound mixer, and the problem was not related to the instrument itself. However, there was enough experience to talk with the band members and Sam about their experiences with the instrument.

At first, I wanted to hear Sam's feedback, since he spent more time with the instrument. I aimed to ask questions about the ease of setup, the instrument's intuitiveness, and the sound problem during the concert.

You built the setup on your own without me. Was it easy to follow the instructions?
Sam: (After thinking for a while) Yes, it was.

What do you think about the instrument? Was it fun to play?
Sam: Overall, yes. But there were some problems with the cable control. The connection points were in different places, so I had to check several spots to make sure the device was working. Also, the power bank cable for the mallet was a bit short.

And I think switching from tokmak to a brush has some issues. If you're using a brush, it would be better to have a less smooth or more textured surface, so you can get more detailed, textured sounds.

The gig was nice, but I noticed a sound issue when you switched to the davul. Was that related to the setup?
Sam: No, it was because of a mistake with the mixer and the soundcheck.

After his feedback, I also wanted to hear from OBI, who experienced the instrument from the outside and accompanied it with his guitar and vocals.

OBI mentioned that he found the instrument creative and fun to improvise with. From his perspective, the augmented looper was working easily and without any delay. However, he also pointed out the feedback problem of the instrument. In his experience, it was easy to create feedback and therefore he suggested looking more into

anti-feedback solutions.

4.4.2 Seminar IV

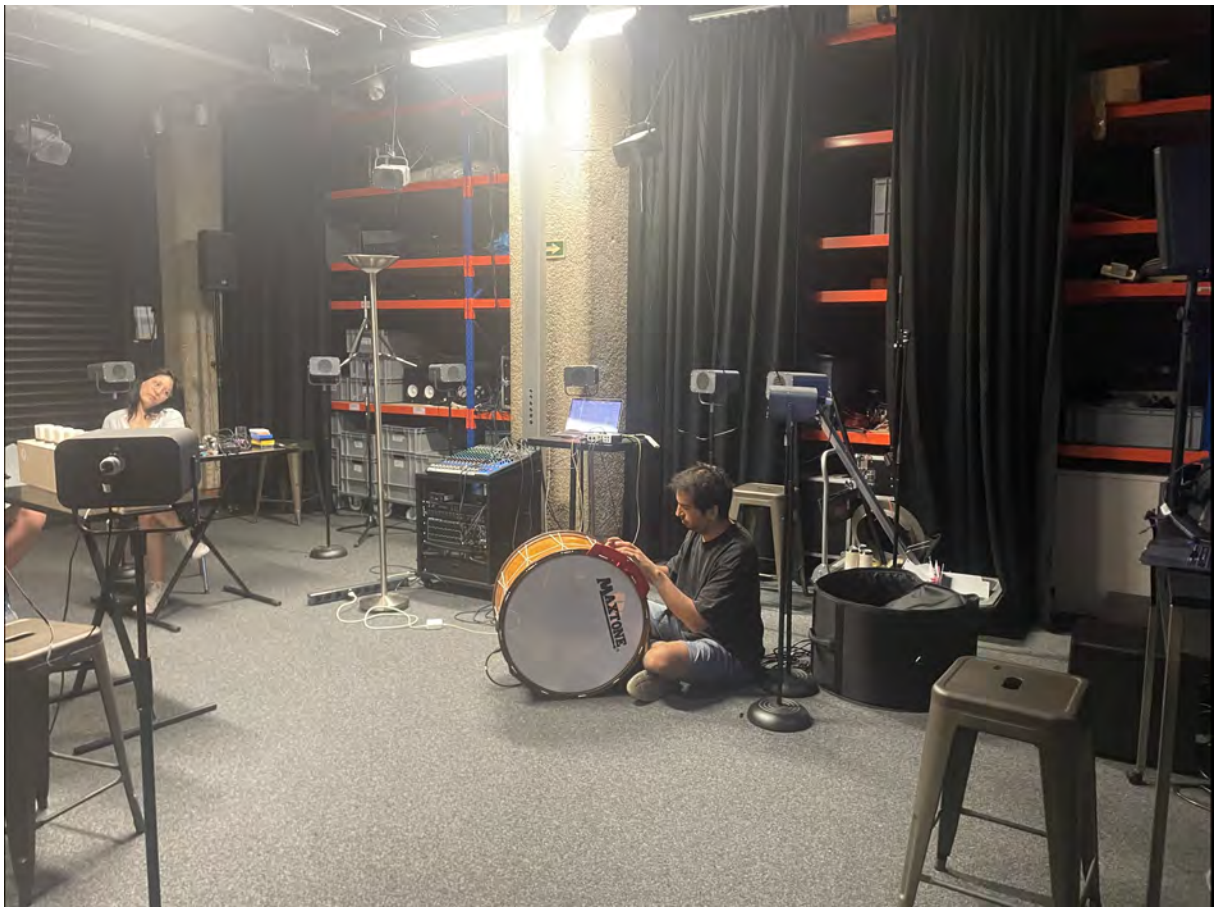

Figure 4.40: Sam Bereliani, Seminar IV, 24 June 2025

Our collaboration with Sam extended to the Seminar IV lecture in our Master's program, where other students tested instruments and created compositions.

After several conversations, Sam decided to improvise a 5-minute performance with the instrument. The session took place in the TAMLAB studio during the final class of Seminar IV. This time, I was more focused on how Sam was using the instrument musically, rather than on whether he could easily set it up.

There were several interesting points in his performance. One of them was the way he physically approached the instrument. Traditionally, I am used to seeing the instrument played while standing and hung over the shoulder. However, he sat on the floor and played it in this way.

Another interesting point was the use of the feedback. As OBI mentioned it as a difficulty, Sam treated it as part of his composition and generated drone-like textures.

4.4.3 Out of Control

Figure 4.41: OGDL, Out of Control, 26 June 2025

As OGDL, we performed a 15-minute live set with Gundega at the Out of Control event of TAMLAB. Unlike our other sets, I didn't use any DJ equipment and accompanied Gundega solely with Davulita.

In the first track(s), I used the instrument with the augmented features. I looped short and long sections, layered beats and textures, and used the effects. For the last track, I wanted to use only the instrument's analog sound.

It was an emotional experience to play only with my new instrument, since OGDL was one of the primary motivators behind it. Also, it was fruitful to hear my bandmate Gundega's, feedback and experience working with our new instrument. When I asked her about it, she said the following:

> "Playing with davul (I mean - playing with you playing davul) feels like a more full-bodied experience. The sound feels closer, more tangible (compared to the digitally created tracks we've used before). Witnessing stronger energy (seeing the gestures of you playing, hearing the davul in the room, next to me, not just through speakers), allowed us to create some ritualistic magic together. I like how you can move from a dry drum sound to more space with the reverb, and blow it all up with saturation and feedback."

4.4.4 Studio Session

Figure 4.42: Sam Bereliani, Studio Session, 2 November 2025

As the research and thesis were coming to an end, I contacted Sam to see if he would like to have a final session with the instrument. The reason for the session was to reproduce rhythms and textures directly connected to techno. Even though OGDL can be considered as conceptronica and therefore associated with club music and techno, it was suggested to have a setting where the instrument was used to create techno music directly.

In the improvised session, Sam worked on five different one-minute sketches that he felt connected to techno music. He used the looper to create long and short sequences, and used the built-in FXs to shape the sound.

After the session, his prominent suggestion was to implement the looper as a mechanism that allows changing the type of the mallet. He argued that creating a kick-like sound with the brush was difficult, and it would have been easier with a thicker mallet. However, achieving a hat-like sound with the brush was easier.

4.5 Evaluation & Future Implementations

There were many great insights from different artists and musicians in the process. In general, I am happy about the feedback. I perceive them as leads to follow, problems to be solved in the future. One of the most prominent ones is about the choice of a mallet. To be more correct, it concerns stabilizing the looper module to one mallet. By working with other artists, I noticed that players require different mallets, so redesigning the looper module to be detachable would allow many different possibilities. Maybe this can solve the problem.

The other key point is to actually find an alternative power source, and not to use power banks with cables. During my performances or when I see other people using the instrument, the cable management gets messy. Plus, charging numerous power banks to play an instrument is impractical. I would be interested in researching this matter.

When it comes to the comments about feedback, I started to perceive it as a very powerful feature of the instrument when it's used correctly. Naturally, it would be ideal to keep it within a safe boundary. However, it keeps me on my toes while I am playing, and I enjoy it.

Even though it is not mentioned by other artists, it would be also an important step to get rid of the computer in the future.

Conclusion

Adapting davul for live, experimental electronic dance music was one of the most informative projects I have done. It provided me a space to learn more about sound, electronics, interaction, interface design, and programming. But, most importantly, I learned how to bond with an instrument.

It would be fair to say I have successfully fulfilled the requirements that I defined for the project. With the final version of the project, it is possible to achieve different variations of kick sounds. Having both organic and digital features allowed me to jam freely and collaborate with other artists. It has also been tested in various genres, including dance music, experimental dance music, punk, and other improvisation-based practices. It was not challenging to adapt the instrument sonically in any of the genres mentioned.

I was able to integrate a low-latency looping system, which helped me and other artists to build sequences during performances. And finally, as I expected, throughout the process, the sense of familiarity remained. I didn't find myself dissociating with the davul.

Naturally, there are many things to improve as well. As I briefly mentioned in the previous chapter, my next steps would be to make changes to the mallet system and to fix features to make the instrument more practical. I learned that giving the instrument to other people and hearing about their experiences is a game-changer.

Writing about the next part feels partially ironic. At some point during this one-year project, I found myself losing interest in techno and dance music. The genre has been highly influential on me over the last 10 years, and it inspired this project. Still, after spending time with organic rhythms and distancing myself from club culture, I found myself genuinely uninterested in performing techno or dance music with what I built. I also believe the instrument's pre-existing design played a role in this.

Nevertheless, spending time with the instrument and reflecting on the genre led me to compare different ways of making techno and dance music. As an artist accustomed to DAWs, I noticed how specific interfaces shape music-making and personal taste. I am positively surprised by how transferring the same methods to another medium creates new, unexpected results.

In my experience, even though it technically worked, techno methods plus davul did not mean a davul to make techno. It was less binary and more freeing.

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