# listening to the unhearable

listening to the unhearable

A thesis presented in partial fulfillment of the requirements for the degree Master of Fine Arts in Digital + Media of the Rhode Island School of Design, Providence, RI

by

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all images are the artist's own work

# abstract

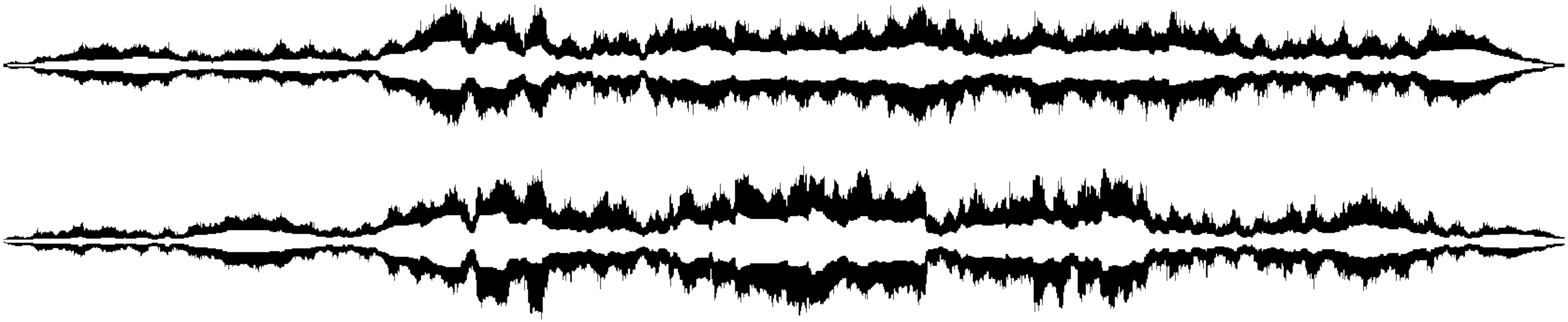
My work lives in the world of trees, lakes, oceans, sunrises, starlight, hurricanes, and mountains, the world centered on the rumbling sounds of the earth and water, the quiet roars of silence in the air, in space, in the depths beneath, and all that lives in between. In approaching this world, I have found myself unable to hear everything it shares. The hard to perceive, often soundless parts of environments — those facets of climate, the ground we stand on, the subtle changes in noise - are often unobserved, or under-observed, and underappreciated. I have cultivated a practice of seeking out the under-observed, and holding a conversation with them. Through building electronic instruments, I've developed and refined a practice of listening to the unhearable.

Within my thesis book, I seek to create a dynamic representation of the world I've explored. The intangible, often conflicting feelings of wonder, loss, contemplation, and frustration are embedded in short vignettes. I'm interrogating, within the writing, the conversation with the world of the rumbling sounds and silence. The space where I fit in this world. I oscillate between these exercises of care ( for myself, for those who came before me, and for the Earth) and technical minutiae. It is through technical processes that I am able to create meaning in these spaces, so the exploration and explanation of the technical is a central component of my practice. Technology in itself is an idea, one I find best approached through the lens of democratizing and open sourcing. Everyone should be able to create the tools they dream of for understanding their world.

My instruments are tools that represent the unhearable and under-observed. They take data and transform it into something else, a recombination of the individual components into something unrecognizable yet familiar. Relationships and conversations are formed between the ground and my hands, weather data and the ethereal, weather data and movement, and sound samples and collapsed time. I have made either three and a half or four instruments while at RISD, depending on how you count them. They allow me to listen to that which cannot otherwise be heard. I continue to refine them, to improve the conversations. I ask the unhearable parts of environments how to listen to them, and, through the music of the instruments, they answer. Then I ask again, and continue to refine the process of creating a sonic world.

This book is an embodiment of a sonic world for the unheard.

# vignette one



*oceanography*

VCV Rack virtual synthesizer emulation

2020, 3:14, Philadelphia, PA

The first time I visited the lake, I could not comprehend it. I ventured out to meet it every morning, climbing the rocks that overlook it. Armed with a sketchbook and a watercolor pad, I would do nothing. I watched the water move, listening to the ripples on the agate and gravel visible under the crystal-clear lake surface. Years later, I would try to paint one of the iron-stained stones[1] that traveled with me, but the volcanoes and glaciers of millennia past would evade capture.

Water is within all of us; it sustains and nourishes us. One lake led to another, where I again could not paint, could not read, could not do anything but exist with the water.

*This is a place for celebration.*

1. Lake Superior agate began to form over a billion years ago, as North America was split by the heat of the Earth beneath the crust, and lava erupted. Pockets of carbon dioxide in the hardened lava met iron and quartz, which became crystallized. An unfathomable amount of time later, the Ice Age set the gems free with a massive ice sheet called a lobe, that cleaned and perfected them as it passed. (Scott F. Wolter, "Minnesota Gem: The Lake Superior Agate," *The Minnesota Volunteer*, January-February 1988, 37-42)
2. Espresso with honey, left to cool slightly, poured over ice with milk.



I did celebrate every day I was there. I would wake up, make coffee[2] and breakfast, go to the lake. Everyone has their own way of celebrating the lake. Most people wake up early to see the morning sun. I'd sleep until 10 because I stayed awake to lie on the dock and see the stars.

My mother said that before I was born, she dreamed of me in a vast space, filled with stars and shapes and music. She called this a premonition.

Water asks me to listen. It has its own music, its own shapes. The loudest water I met was by the ocean. I visited whenever I could make the trek, hoping the tide wouldn't stop me from walking from one end to the other, paying my respects to the land[3] before returning home on a bus.

3. Land, rather than existing in opposition to the water, acts as an all-encompassing term for the places of inhabitance on Earth.

# chapter one

*signals sound noise music*

In the insides of my instruments, there are tiny computers, listening to data, creating audio. To listen to environments, to nature and earth, I felt that I needed to use varied approaches to bring nature's intertwined systems into sound systems. Connections are formed between signals, data coalescing into instrumental form, a union of physical and digital creation which sound is at the core of.

Audio signals are representations of sound we hear in the world. There are both analog and digital versions of audio signals, differentiated by how they store information. The analog signal is continuous: it doesn't have pauses — little gaps in time — and it outputs amplitudes without breaks.[4] The computer can't understand the analog signal, and it cannot listen without pauses, but it can sample the analog signal into a digital one. Digital signals, which are discontinuous — discrete time, the opposite of continuous time — have pauses that, while imperceptible to us, make the signal comprehensible to the computer. The analog-to-digital converter, or ADC, and digital-to-analog converter, DAC, are the beautiful inventions that have made computer music possible.[5]

Musical signals can be seen and heard. Sine waves, square waves, triangle waves, and sawtooth waves all have their own shapes. They're like building blocks in synthesized sound. The sine wave has curved, smooth rises and falls. The square wave jumps between 1 and -1, or on and off, but never with exactness. The sawtooth, which sounds like a saw, swoops down in a diagonal line. The triangle wave sounds something in between a saw and a sine, and has two diagonal lines meeting at the peak in each cycle. These signals contain varying levels of harmonic complexity, or the layering of different quantities of various partials above the fundamental. The most harmonic content is found in white noise, "a wideband 'hiss' in which all frequencies are equally likely."[6] Pink noise, a favorite for audio synthesis, is "exponentially biased toward lower frequencies,"[7] as between any two octaves there are the same number of frequencies present, and octaves increase by a factor of 2 rather than linearly.

[4] Victor Lazzarini, "Introduction to Digital Audio Signals," in *The Audio Programming Book*, ed. Richard Boulanger and Victor Lazzarini (Cambridge, MA: The MIT Press, 2011), 431.

[5] ADCs sample the analog signal at fixed time intervals. The speeds this is done at are unfathomable,with standard CD quality demanding 44100 samples per second. This is then quantized according to the bitrate of the digital signal, creating a discontinuous function from a continuous wave. DACs do almost the opposite. (Lazzarini, 430-434; Fernando Lopez-Lecano, "Digital Sound, Additive and Wavetable Synthesis Lecture Slides," CCRMA, 1997.)

[6] Julius O Smith III, "White Noise," *Spectral Audio Signal Processing*, CCRMA.

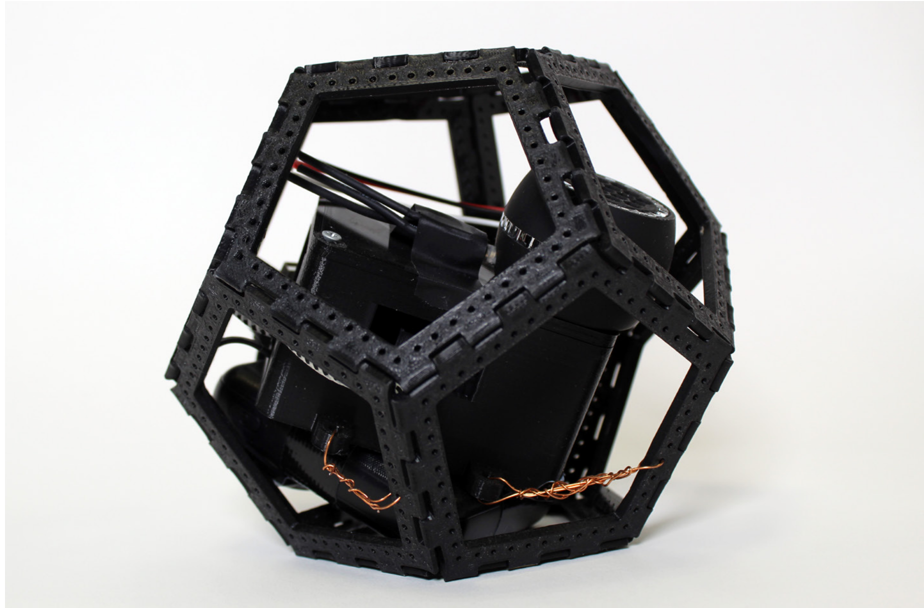
[7] David Michael Cottle, *Computer Music with examples in SuperCollider 3*, 2005, 135.

Waveforms and noise are pure sound sources in sound synthesis. They are used together through filtering, adding, subtracting, modulating, amplifying, and more. Modular synthesizers enact these processes in modules, which can often be handpicked by the owners of each system. I got to work with the synthesizers at Brown from January 22 to March 17, 2020. In the Music and Multimedia Composition studio, I fell in love with the Eurorack's sheer wealth of possibilities embedded in its 13 modules. When the studio closed, I learned of the mediated reality of VCV Rack[8]: unbounded dimensions on which to place hundreds of digital manifestations of synth modules, limited only by my computer's processing speed and my determination to only use free modules.

[8] A digital emulation of a Eurorack synthesizer, complete with loads of emulated modules for selecting and arranging.

Through explorations with modular synths, I learned the value of utilizing discrete parts that seamlessly interact with one another. Systems that create and maintain clear signal flow enable complexity of sound to rapidly build. Within these systems, simple tones can interact with one another in many different ways, creating waves of volume, shifting pitches, bringing meaning forth from a single sustained beep. Much like the way patch cords route signals through the synthesizer, features like wind and cold direct sounds in the world. Listen to the heaviness of each breath on a humid day, to the crisp details of footsteps on winter frost, to the way the sound carries more smoothly on certain days. My instruments listen to the temperature, humidity, altitude, soil moisture,

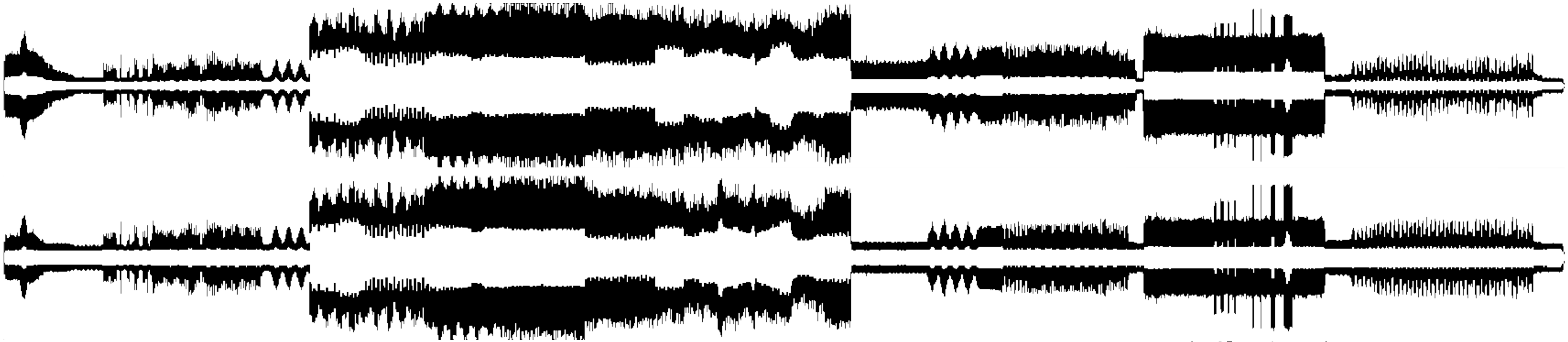




audio level, barometric pressure, human touch, non-human touch, and even the sounds outside of them. Much like the modular synths I loved so much, the parts of their listening are interwoven, sending digital data across parameters, creating layers of signal flow that enhance unpredictability. The internal system of surrounding sound creates sounds from temperature, altitude, and barometric pressure blended into timbre, an attempt to turn the sonic feelings of the everyday into replicable motifs. Rotation and acceleration of the instrument, from the motion of playing it, create note sequences, letting me talk to the weather in a translation of its own language.[9]

[9] The translation starts with the collection of data points, abstracting environmental features into numbers. The numbers are translated into something a computer understands, then back into the numbers that humans understand, albeit only because we are taught to understand them. Numbers interweave with lines of code, attempting to re-entangle the features as they are translated into sound.

# vignette two



*croton and flaming katy*

earth and touch

2020, 6:22, Providence, RI

An unsalvageable potted bouquet was once given to me by my mother. Knowing my disdain for cut flowers,[10] she opted for ones that were still alive, a gorgeous spectacle orchestrated by a florist unconcerned with the conflicting needs of the different plants. By the time I had realized these plants weren't meant to live together, some of them had already started to deteriorate.

Rescuing the plants was a given.[11] You make a home real when you fill it with life. I wanted this home to be real. I wanted to feel safe in this home.

On walks to parks near my parents' house, I found pockets in the pavement where flowers we call weeds had sprung from concrete tessellations. The infinite tiling of the city interrupted by the singing of a rogue dandelion, of untethered ivy in search of a surface to climb, always fleeting, waiting out their life before concerns about the conjoined foundations of rowhouse upon rowhouse will lead a neighbor to yank them from the ground.

10. Cut flowers are dead, and if they are not going to be used for something then I do not see why they should die.

11. I couldn't save the cut flower, which was already dead, or the English ivy, which had struggled the most in the pot. The flaming katy's flowers all wilted, and nearly half of the leaves needed to be pruned. Mold kept growing on the soil around the palm for a month before it was in balance again. One of the croton's main branches didn't survive the replanting. The five rescued plants are all thriving now, in their separate pots, receiving the correct amounts of water and sunlight.



The planned gardens aren't nearly as interesting as the unintentional. I imagine I could've spent summers looking for bugs in the wildflowers when I see a younger cousin do the same by the lake. Lately I've wondered where all the late summer song-bugs have gone.[12] Who is going to sing for the plants when the crickets, cicadas, and grasshoppers have left?

12. I heard some in Providence last summer, closer to fall than expected, but I can't remember the last time I heard them in Philly.

# chapter two

*programs and notes*

Over the course of the past two years, I've had to reframe everything I'd learned about computers and sound. My formal training was steeped in a paradigm that necessitated computational power: RAM, CPU, GPU stats at the center of whether an idea was feasible. My peers and I combined audio generation, video generation, and motion tracking,[13] focused on creating immersive performances. These performances were fleeting and untethered, beautifully situated in a blip in time, impossible to truly document and replicate. They taught me to love collaboration, to tell stories with both sound and gesture, to paint light onto the walls of the concert hall with precarious assemblages of projectors, utility carts, and duct tape. Max/MSP enabled simple realization of ideas, letting four composers sit together and talk about their piece while creating it on separate machines. It lent an ease to interaction. While one machine captured a dancer's motion, others received that motion as lists of body parts and numbers and turned the movement of a limited set of joints into an everchanging soundscape. Two performers joined hands at the end of a performance to bring their spotlights together. Blood cells projected onto a dancer had their collisions grow in intensity alongside the audio and her motion. Drumming lit up a particle system, sliced the video frame and rearranged it, changes sparked by every strike onto silicone.

I started making instruments because of this wonderful performance space I was in. I could create narratives that unfolded on stage, but I could not take them out of the concert hall. I helped create a piece where a character listened to the sounds around her, moving through forests in search of something she couldn't quite hear. I wondered what it really means to listen to the environment. Eventually the question evolved. How do you have a conversation with sound, with land, with air, with something unknowable? Knowing that I am not an objective observer, because there is no such thing as an objective observer, I didn't seek to create instruments that observed. I cannot hear the minutiae of natural features abstracted into discrete parts. I do not know what barometric pressure or altitude or the earth's magnetic field sound like, and I cannot know. My instruments bring the sound creation to the unhearable, to let the air sing something in a new language.

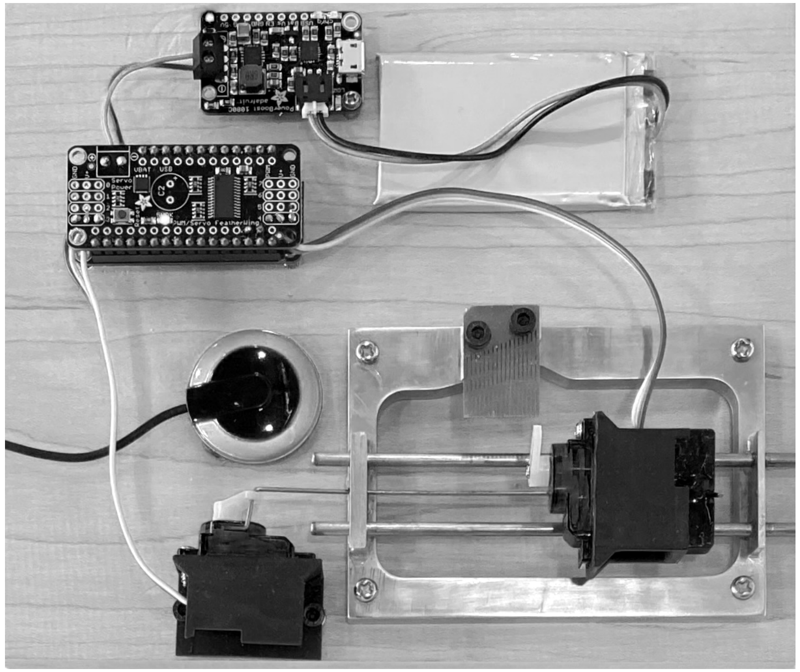
Making instruments portable upended my reliance on computational power. I could have taken my laptop into a forest and plug an instrument in to let Max/MSP generate the sound, but the gesture of playing from the laptop forces the environment to communicate in my language. So I started programming in Arduino, making small sketches to collect data from sensors. I found a familiarity in the syntax of the language. Dependencies and definitions are neatly delineated at the beginning, and the functions that follow — setup and loop — split the program into two parts: what happens at the start, and what repeats perpetually.[14] In perpetuity, I asked a temperature sensor to tell

[14] Motion tracking here was done using Microsoft's Kinect, with a custom interface created by the engineers in the Music Technology program. The engineers' work made sense of the strange skeletons on the screen, but couldn't erase the problems with Microsoft's technology. The Kinect often seemed to think that there were bodies dancing in the ceiling, interrupting rehearsals to create chaos. While programming in Max/MSP was easy, navigating the Kinect's ghost-filled infrared land was not.

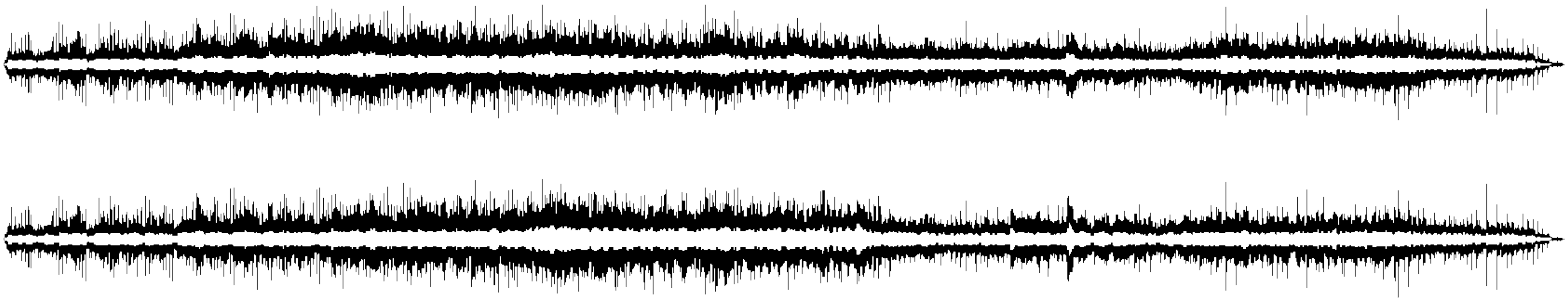
me the changes it found. I checked if my breath could create a striking change. The slight increase in its temperature lingered for a few moments. I felt that the Arduino language and I could grow to understand each other, so I pushed forward, and entered the realm of sound in Arduino.

Sound is only made possible in Arduino through external libraries, sets of definitions and instructions to allow a specific tiny computer to understand sound. The learning curve here was steep. I did not initially realize that there were computer processors that couldn't create sound. Having been steeped in creating sound from computers for so long, it didn't even occur to me to take into consideration the insides of the computers themselves. My understanding of programming sound would have to shift numerous times to accommodate the variety of computational machineries embedded in the instruments.

[14] Until "Batteries, Die." That is one of Perry Cook's original rules for designing computer music controllers that is "not so true anymore" thanks to "smaller batteries with higher energy densities, capable of powering our systems for hours." But the batteries do still die, eventually, and the program will not run forever. Perry R. Cook, "Re-Designing Principles for Computer Music Controllers: a Case Study of SqueezeVox Maggie," (paper, International Conference on New Interfaces for Musical Expression, Pittsburgh, PA, June 2009).



# vignette three



*metal in the hand*

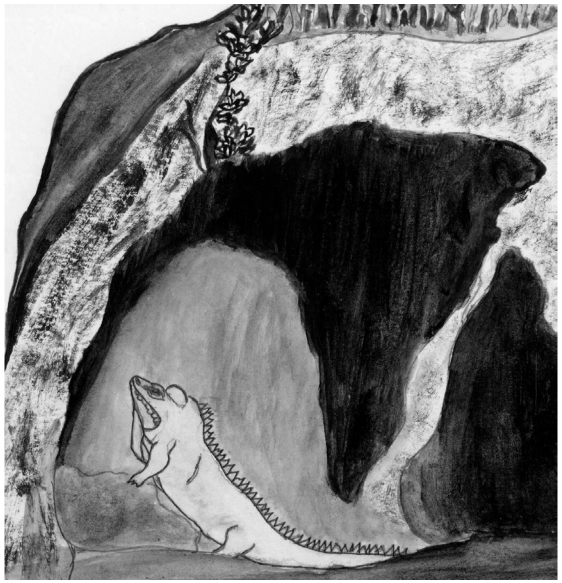
surrounding sound and found sounds

2021, 4:10, Providence, RI, and everywhere I found sounds

In a waterfall, at a river near that lake I had met eleven years earlier, I found a secret. There is a trail where the fearlessness of youth convinces people to cannonball from a cliff to the swimming hole beneath it. The water is the color of root beer, and the waterfall creates a foam on top of it. Iron deposits are in the water here, not just the rocks.

I am young, but not fearless. In the swimming hole, I pushed against the current, into the onslaught of the waterfall, and swam through its heavy sheet. Behind it, I found a series of caves. They are just big enough to sit inside, and they have a shared ledge that lets you travel from one cave to the next. Inside the cave, the waterfall sounded different, and the splash of my cousin jumping from the cliff echoed.

How do you find a sound you've lost? If you can return to it, how do you prepare to capture it?





I keep my instruments safe in a drybag, alongside a borrowed recorder that stores their songs. What will they sing in the cave? It will be different from the songs just outside the cave, in the swimming hole, and different still from the songs on the trail. The echo of the cave will create a resonance of some kind.[15]

I have a recording of a sound I heard in passing four years ago, walking through my home city. A metal plate of uncertain function[16] on the side of a building had become partially dislodged. The wind around it created an irregular clang with a varying pitch. I only had my cell phone with me, so I captured the sound in a voice memo, labeled "funny sound near 11th st." When I returned there, the loose plate had been repaired.

Sometimes the only trace of a sound is a recording of dubious quality, nearly a memory.

15. Maybe to learn about this space, I have to perform Alvin Lucier's I am sitting in a room. A cave is a room inside the home of the waterfall.

16. It may have been a strangely shaped vent, or some kind of plaque commemorating the longevity of the building. Historic plaques are common around there, but generally not so flimsy

# interlude

*technological ethics*

In maintaining a practice of building instruments, I have become aware that I cannot make them solely on my own. From the very outset, I was faced with a steep learning curve to climb. Thanks to the many makers that value the free exchange of knowledge through open sourcing, teaching one another, and (usually) welcoming newcomers, I found a plethora of resources from which to learn. In later stages of instrument development, I learned that I would need to send patterns for printed circuit boards to manufacturers, and that if I didn't have access to the fabrication resources at RISD, I would be sending designs for instrument casings across the internet to be manifested into the physical world.

Lisa Nakamura, reflecting on a passage[17] from Donna Haraway's "A Cyborg Manifesto," writes "Haraway draws our attention to the irony that some must labor invisibly for others of us to feel, if not actually be, free and empowered through technology use."[18] The invisible labor that creates technology now is a continuation of a decades-long lineage of labor, often by women of color,[19] that brought the electronics industry to an often contradictory landscape. The democratization of technology has formed pockets of accessibility and openness, but there is still obfuscation around the origins of these machines, and the current manufacturing process. It doesn't play nicely with the narrative of open tech for all, so it remains unspoken. What does it mean to be Latinx and working with devices that grew from those that were once manufactured by Latinas described as having "nimble fingers," supposedly ideal for electronics manufacture? It is hard to argue that it is a reclamation in any way when it often remains unclear who is creating the devices and tools I use. I remain grateful to those whose labor has allowed me to approach my questions about the world in this way, and continue to seek ethical answers to the development of devices.



[17] "The nimble fingers of 'Oriental' women, the old fascination of little Anglo-Saxon Victorian girls with doll's houses, women's enforced attention to the small take on quite new dimensions in this world. There might be a cyborg Alice taking account of these new dimensions. Ironically, it might be the unnatural cyborg women making chips in Asia and spiral dancing in Santa Rita jail whose constructed unities will guide effective oppositional strategies." (Donna Haraway, "A Cyborg Manifesto," in *Simians, Cyborgs and Women: The Reinvention of Nature* (London: Routledge, 1991) quoted in Lisa Nakamura, "Indigenous Circuits: Navajo Women and the Racialization of Early Electronic Manufacture," *American Quarterly* 66, no. 4 (2014): 919.)

[18] Lisa Nakamura, "Indigenous Circuits: Navajo Women and the Racialization of Early Electronic Manufacture," *American Quarterly* 66, no. 4 (2014): 919.

[19] See Lisa Nakamura's "Indigenous Circuits" for a history of electronics production racializing the manufacturing of semiconductors, with a detailed explanation of Fairchild's presence on Navajo land. Fairchild was motivated through a combination of various financial incentives (including lower minimum wage) to employ Navajo women. Their promotional materials appropriated traditional Navajo art and presented racist rhetoric suggesting Navajo women, and indigenous women as a whole, had innate differences from white women and men that improved their ability to manufacture the chips.

# chapter three

*the arduino fairy*

Arduino is becoming an ubiquitous term, synonymous with the idea of makers: creators of DIY projects, experimenters who aren't afraid to fail, a group of people embracing the fabled intersection of art and technology. Arduino, as a platform, has provided a way for people to much more easily learn about physical computing.[20] The combination of the Arduino hardware, which is plug and play, robust documentation of introductory tutorials, and a programming language[21] made for the boards provides a path to surmount the learning curve. The Arduino hardware is a single-board microcontroller, i.e., a small device you can configure to run a program over and over again. Arduinos aren't the only microcontrollers out there — I haven't actually used one in two years — but they are likely the most well-known. When I explain that my instruments are built on microcontrollers, I often add in a "you know, like Arduino," to clarify. The Arduino fairy is the magic that makes building these instruments possible: she is the amalgamation of years of open-sourcing, pushing for STEAM in classrooms, creating specialized and fascinating microcontrollers,[22] and building frameworks for non-engineers to make their wildest ideas real. Without the Arduino fairy, I probably wouldn't have dreamed of creating my instruments.

To build instruments, I have to consider what components I may need. It is often the components themselves that inspire ideas, rather than the other way around. Combing through the "shop" and "learn" pages of Adafruit and SparkFun,

[20] David Cuartielles, one of the founders of Arduino, says, "The philosophy behind Arduino is that if you want to learn electronics, you should be able to learn as you go from day one, instead of starting by learning algebra." (qtd. in David Kushner, "The Making of Arduino," *IEEE Spectrum*, October 26, 2011).

[21] Technically, the Arduino programming language is built on C++ and C, and isn't technically its own language, but that's just semantics.

[22] There are increasingly accessible, low-cost development boards optimized for a range of functions from sound production to machine learning.



[23] PJRC stands for Paul J Stoffregen and Robin C Coon, who maintain the PJRC shop, website, and forum. The Audio System Design Tool can be used with PJRC's microcontroller Teensy, as well as any microcontrollers that run on an SAMD51 chip. (Paul Stroffregen and Robin C. Coon, "About Paul and Robin," PJRC, November 2019.; Adafruit based on Paul Stroffregen, "adafruit/Audio/AudioStream.h," June 5, 2019.)

[24] Atau Tanaka, "Sensor-Based Musical Instruments and Interactive Music," in *The Oxford Handbook of Computer Music*, ed. Roger T. Dean (Oxford: Oxford University Press, 2011), 238.

[25] That is, in short, that a computer of some sort must collect data, turn it into sound, embed musical structure in some way, and actualize that sound through the magic of the DAC.

I find threads of ideas and grab onto them. Perhaps this means finding a sensor and wondering how it could be used, and what other sensors could be combined with it. It may mean seeing a project for a MIDI synthesizer, reading about it, learning about the PJRC Audio System Design Tool,[23] and deciding to buy a compatible microcontroller to use it. Vague, fleeting ideas can either be ignored or acted on, and I tend to find myself acting on them. A project graveyard, for the ideas that could not be brought into reality, used to sit on my desk. Now its contents are in a box, holding bits and pieces that may be revisited alongside ones that will never become functional.

Atau Tanaka's "Sensor-based musical instruments and interactive music" was one of the first articles I read about building electronic musical instruments. He describes a framework for seeing them as systems:

> The view of a musical instrument as an open-ended system comprised of multiple components can be applied to digital technology and becomes a musical perspective from which to broach questions of the "instrumentality" of hardware/software architectures of live computer music performance systems.[24]

He goes on to discuss what components are often included: "input device," "mapping algorithms," a "sound synthesis engine," "compositional structure," and an "output system."[25] The open-ended nature of the system comes from the "musical instrument's raison d'etre" that is "not

meant to carry out a single defined task as a tool is" and "often changes context … while maintaining its identity."[26] The philosophy of the open-ended system is embedded into my instruments. The continued process of asking environments how to listen informs new ways of hearing with the instruments, of finding meaning and creating sound. These ways of listening, without prescribed compositional form, are more meditative than performative. A meshing of Deep Listening[27] with NIME.[28]

If "a computer is a tabula rasa, full of potential but without specific inherent orientation,"[29] then the microcontroller is the blank slate taken to the extreme. These devices run one program, over and over. By allowing for the design of intricate networks of sensors, haptic inputs, robotic mechanisms, lights, and audio outputs, microcontrollers provide a free place to design a system. Another framing of computers paints them as the site of "a new kind of blurring of human and machine functions" that "renders visible what is inherently invisible."[30] The microcontrollers, tiny computers themselves, take this process of seeing the invisible directly into the hands of the users. And it is the hands that ultimately build the machines. The most spectacular part of building the instruments in this way is assembling all the parts of the system. Soldering breakout boards to printed circuit boards, building casings from acrylic and PLA, finding intriguing uses of material to signal the care put into the devices.

The Arduino fairy has given me the tools to build my instruments, but it is artistry that brings them together.

[26] Tanaka, 238. Additionally, the commentary about instruments' personalities resonates, although not entirely relevant: "The evolution of an instrument is less driven by practical concerns and is motivated instead by the quality of sound the instrument produces. In this regard, it is not so necessary for an instrument to be perfect as much as it is important for it to display distinguishing characteristics" (238-9).

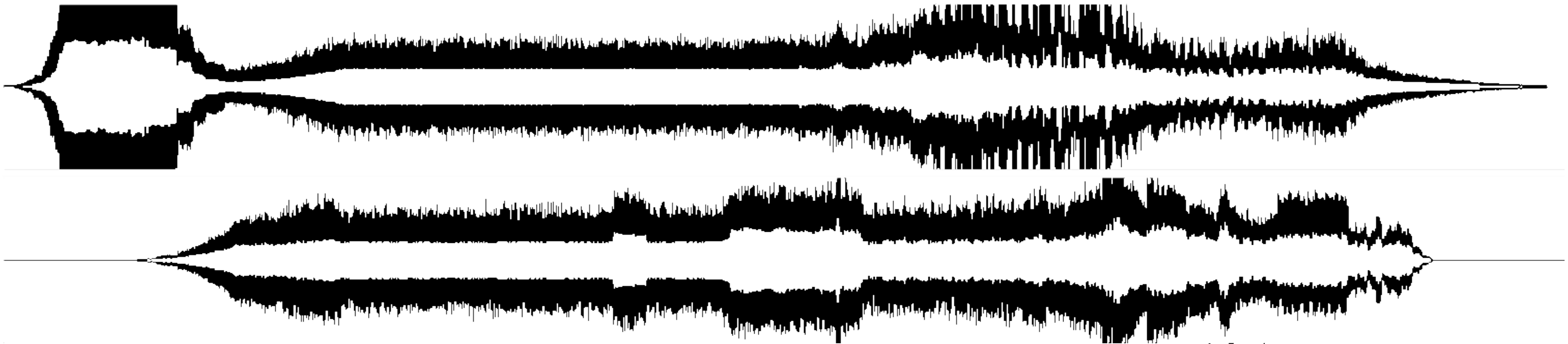
[27] Pauline Oliveros' practice of Deep Listening is one that resonates very strongly with me. She has described it as "a way of listening in every possible way to everything possible, to hear no matter what you are doing." She writes, "Deep Listening is exploring the relationships among any and all sounds whether natural or technological, intended or unintended, real, remembered or imaginary. Thought is included. Deep Listening includes all sounds expanding the boundaries of perception." To me, the idea of Deep Listening can act as a means for reconciling and undoing the damage done by the false dichotomy of human and natural. ("Deep Listening," The Center For Deep Listening, Rensselaer Polytechnic Institute.)

[28] New Interfaces for Musical Expression, or NIME, is an annual international conference about using new technology to create music. NIME has, like Arduino, become a term describing nearly any musical application of physical computing, novel controllers, or programmed systems.

[29] Tanaka, 239.

[30] John Johnston, "Machinic Philosophy: Assemblages, Information, Chaotic Flow," in *The Allure of Machinic Life: Cybernetics, Artificial Life, and the New AI* (Cambridge, MA: A Bradford Book, 2008), 131.

# vignette four



*untitled*

earth and touch, weather events, modular synth

2021, 4:42, Providence, RI

I remember climbing on rocks after a day of rain in the summer, trying my hardest not to fall into a river that once had too much pollution for life to grow. It was the second time I ventured to this trail, one not connected in any meaningful way to the walkable parts of the city. It demanded that I cross a highway with far too many lanes and too short a light. On the island between the northbound and southbound sides, I wondered when the last freight train had used these tracks.

The first visit to this place was to climb the observation tower, a spiral staircase upwards to nothingness. Plans to ascend were destroyed by a rainstorm. Rain that hard sounds the same on metal as on rock: loud and painful. A Dunkin' Donuts is only adequate shelter in an emergency.



I usually spent my time at home exploring. Walking through ever-changing paths in a never-quite-completed city, seeking out the hidden pockets of organic life under layers of concrete and asphalt. During the crisis, no one is cutting the weeds that sprout from the cracks in the pavement. They're the only signs of life in the hours when workers are inside, the danger they face unmitigated, thanklessly providing labor.

The city is bookended by two rivers. It is not named for this, as colonizers considered their ideology of fraternal[31] respect above respect for the land, not seeing the organic surroundings as having lasting presence. Where there once was a vast interconnected network of rivers and streams, only the largest remain. When men fill a river with dirt, why does that stop its unfathomable force?

The trails along the west river are more robust than the east river's. I can follow them for hours without traveling from end to end. Countless time spent along the path, resolving a landscape of turtles and highway underpasses, has left my memory of the space jumbled. Here, where I first learned to ride a bike, where my first baseball games were held, where I eagerly ate empanadas after school, is a space full of time collapsed into fragments.

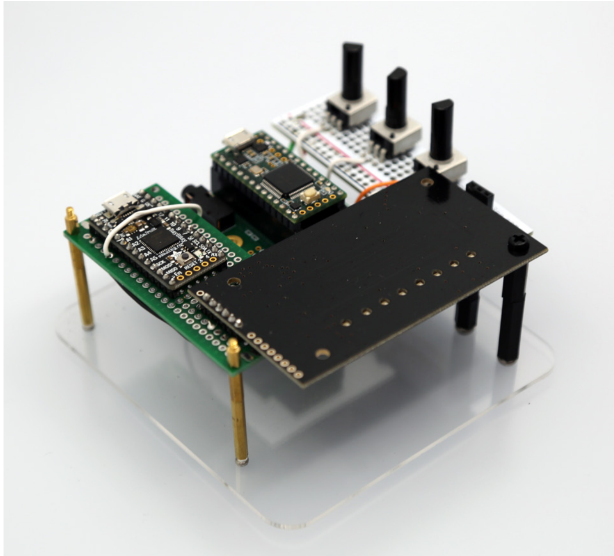
In most of those fragments, I remember the sun. The heat isn't lessened by the trees. I remember that there are no trees. The connecting trails, in woods that were not developed, are rife with trees. When a trail is made by man, rather than Earth, the artificiality can hurt.

31. Where does that leave those who aren't their brothers?

# chapter four

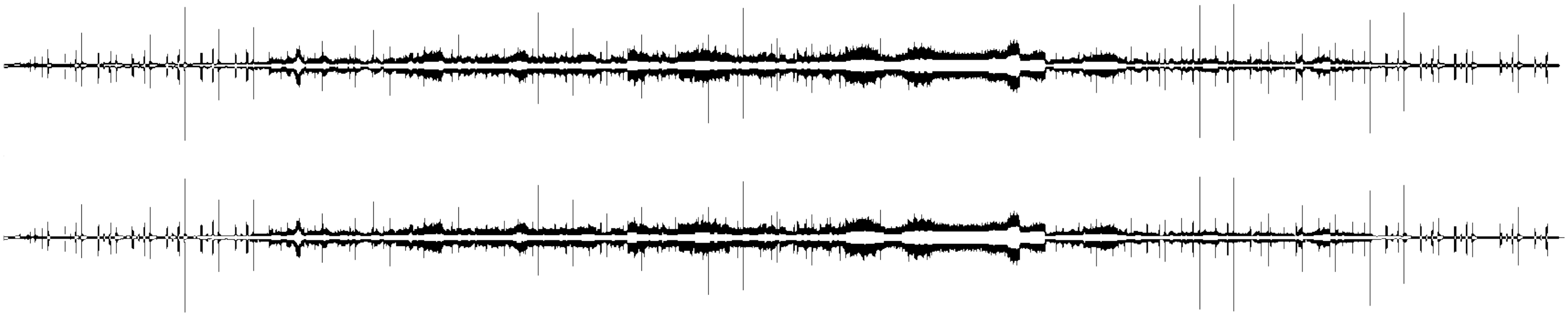
*chamber orchestra*

My instruments are born from questions that they do not answer. Instead, they pose more questions — abstractions about sound, place, and interaction — that I approach obliquely through the lens of the device. They provide a framework within which I can create a conversation and an interaction, but the framework is unspecified, malleable, and constantly in flux. earth and touch doesn't prescribe a way to perform with plants; it is not focused towards any one mode of playing. Where one person may look at it and see the knobs as the most prominent mechanism, another person may see potential for complex gestures in the act of placing and replacing wires, and another person may view a conversation as intimate and unable to be shared, and so on. Possibilities impart many meanings to the words earth, and, touch. These choices for how to situate oneself in the idea of the instrument lend themselves to different configurations of sound. What is most interesting, for me, is situating the ideas of all the instruments in relation to one another.



If my instruments are sites for conversation with inaudible worlds, then collectively they are an orchestra for the unhearable. From the outset, I wanted them to be able to work together. My first inclination was to build them as if they were to be components in a modular synthesizer, patchable and connected. I knew this wouldn't work for me, as I wanted each one to also stand alone. The origin of each instrument's sound needed to be within its programming, not apart from it. So instead, to create the conversation, they act as individuals. As individuals, they can be positioned and repositioned, their sound captured as it is heard in space or through the curated decisions of a mixer. Take a dozen 3.5mm audio cables in varying lengths on adventures to widen the potential sonic fields that can be brought into awareness. Let the instruments speak across distances, connected by passive signals manifested in wire, telling each other what the land, air, water, and invisible creatures are telling them. Collectively, they sing from the space, in the space, to the space, with each other, and to each other.

# vignette five



*together on the stage*

weather events, weather invents, earth and touch

2021, 4:34, Providence, RI

In a green pouch, that I took out of a small backpack, is a way to listen to the dirt beneath my feet. Three wires coated in green silicone still sit in the pouch. In the backpack, there's a robotic music box driven by the weather. Acoustic in nature, it is unlike the other instruments, but the microphone captures the whirrs and clicks of machinery. I have another device in my pocket, with lots of buttons, that is constantly reconstructing and reconfiguring the sound around it.

If this were a longer journey, I'd hesitate to bring them all together, fearing my clumsiness.

The first site for collaboration won't be the one that is most steeped in meaning. It will be somewhere nearby, in a place that is not yet one of the many I call home, or that I wish I could call home. It's taken longer to feel tethered to this place than I ever expected.

Out in the forest, prepared to listen, there is a sense of belonging. The lack of prior meaning doesn't matter. There is meaning enough singing through the instruments. Conversations breathe uncertain understandings to life, questions ringing and echoing through circuit boards, earth, humidity, and the questions themselves. I am listening to their musings, and I am searching for the answer within their voices.



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