Senior Project Report

MMP495

Undergraduate of Music Media Production

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Under the Guidance and Influence of

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Synopsis

The MIDI performance apparatus that I have created, this semester, is the combination of an electronic drum set and a Dance Dance Revolution controller that were reprogrammed using Max/MSP to communicate MIDI data to Ableton Live. From Live, a session can be built, allowing a performer to design a song for performance using dance-like motions. Considering the sonic precision of electronic music, coupled with the high-energy gestures required to trigger the apparatus, the project was designed to both fully immerse the performer and actively engage the audience, while serving as an evolving medium with which I may write, produce, and perform music as an artist, following my education at Ball State University. The following report will cover my motivations for the project and the process through which it came to fruition, the projects that developed alongside the apparatus, and the planned future of their development.

Motivation

I have studied percussion since I was a child and continued to do so through high school, with growing intensity. At the same time that I was fostering my enthusiasm for music, I discovered an arcade game called, "*Dance Dance Revolution*," which required the player to step on arrows in rhythm with the game's music; shortly thereafter I had begun to compete in tournaments for the game. Three years ago, the original idea for this project came to mind during an extended drive back to Muncie from visiting my family. Having come to Ball State University to study music as a percussionist, following many years of private lessons, and

having my past experience with Dance Dance Revolution, it struck me as a novel idea to somehow combine the two activities into a high-energy performance apparatus. By elevating an electronic drum set to a standing shoulder height and placing a Dance Dance Revolution controller on the ground below it, one can already imagine the broad range of motions available. Additionally, with electronic music evolving at such an intense rate, the possibilities for producing music through this apparatus seemed endless. When it crossed my mind, I was so determined not to forget it that I immediately pulled over on the shoulder of Interstate 65 to sketch it in a notebook. However, at the time of its conception, I was not yet a Music Media Production major, so the idea stayed in the notebook in which it was originally drawn for over a year.

The following fall semester brought many things, the first of which was my switch from the Music Education department to the Music Media Production department. The second was my first electronic dance music concert. The duration of my stay at the concert was only approximately four hours, but it was enough to fascinate me. Musically, the rhythmic elements of the music were so pronounced that the time that was not spent dancing was spent dissecting how they were achieving such a musical groove. Everyone in attendance was not only engaged, but engaged in the most positive way that I had yet experienced in a concert environment. Whether it was offering free glowsticks, teaching a dance move, or showing you an art showcase that they were interested in, the audience was its own culture and I left that concert brimming with newfound enthusiasm for both the musical genres it provided and the audience it created.

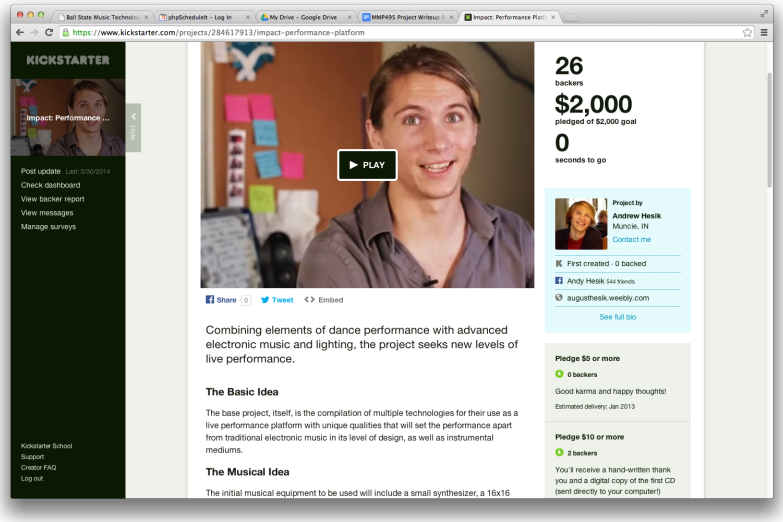
The third of that fall semester's tidings was the stress of school. Taking 18 credit hours worth of classes was nothing new, but they were entirely disjunct from each other in the placement within the curriculum. I had reached a point where I neither knew what I wanted to

accomplish professionally, nor whether or not I would be able to finish my degree. While waiting to meet with the former director of the department about the course of my education, I talked briefly with Jesse Gaze about my recent troubles, to which he simply asked, “Well, what do you do?”

I had no immediate answer for him, but I believe it was the question that I needed to be asked, at the time, for exactly that reason. I spent the next several weeks considering it and finally connected my recent experiences to answer it. I wanted to make music, I wanted to perform that music, and I wanted to make people feel what I had felt the night of that concert. With these considerations came the memory of the apparatus I had scribbled in a notebook only a year before. After consulting Dr. Michael Pounds about the possibility of using it as my senior project and receiving confirmation on its viability, I immediately began assessing my approach.

Origin

The project required several hardware components that I did not, at the time, possess. I had no electronic drum set. The only DDR controller I did own was so frail that it had since been taped back together from its years of use. I had no musical software, no MIDI controllers, and no notable means of producing music. All these objects would have to be purchased, which presented the first obstacle in accomplishing this project. To my great fortune, I had recently read about several projects getting crowd-funded through an organization called, “Kickstarter.”



The front page of the Kickstart Campaign, post-funding.[1]

Kickstarter works like this: an individual or organization creates a page detailing their project, listing their needs, expected costs, projected completion date, and a list of rewards that backers can expect to receive in return for their financial support. Once the project's biographical page is finished, the project's founder(s) may select to run their campaign for 30 or 60 days. The project is then reviewed by Kickstarter's staff and, once given staff confirmation, the project's campaign then begins. The founders then have the selected length of time to advertise their project and generate enough interest and funding to meet their goal by the end of the campaign. If the financial goal is not met, the campaign fails; no money is taken from the backers and no money is given to the project. If, however, the financial goal is met, the project is officially funded. Kickstart receives 5% of the generated funding, any credit card processing fees are deducted by Amazon (through which all the funds are awarded), and approximately 14 days later, the funds are deposited into the project's Amazon Payments account.

With the help of a friend, Hobie Crase, a graduate student of the telecommunications

[1] https://www.kickstarter.com/projects/284617913/impact-performance-platform

department, we created an official video for the campaign. I wrote as thorough a description as I could think of and began advertising my project on Facebook, by word of mouth, and through a multitude of forums related to music production. Despite following Kickstarter's advice and setting my financial goal to the bare minimum required for the project, I began to worry when, halfway into the campaign, not half of the project was funded. However, within the last several hours, a final few critical backers surfaced and the project met its goal. I was free to begin the next step.

November into December of that year was spent researching the most frugal hardware choices for the project. Not only did I need hardware, but I also needed the requisite texts to aid in researching and fully understanding the tools at my disposal. By the beginning of winter break, I had settled on an Alesis electronic drum set with 8 pads and had found a DDR controller that was comparable to those found at an arcade. Having saved enough of the budget with those choices, I was also able to obtain a MIDI keyboard for composition and a Quneo controller by Keith McMillan Instruments to improve my workflow in Ableton. The following spring semester was spent reading the textbooks that I had purchased and applying that newly obtained knowledge to the songwriting curriculum that I was, at the time, enrolled in. Over the course of that spring semester (as well as the summer and fall semesters after it), I furthered my knowledge of musical composition and enrolled in the Computer-Human Interface course to further explore the realm of developing electronic instruments.

During the same period, I founded the Electronic Dance Music Club[2] with the intent of finding other amateur producers with whom I may exchange knowledge and expand my repertoire. The club's development was slow to start, but grew to have a solid following of enthusiastic members who regularly attended meetings, which consisted of varying formats,

[2] https://www.facebook.com/groups/204765949732053/

but was none-the-less enriching and productive.

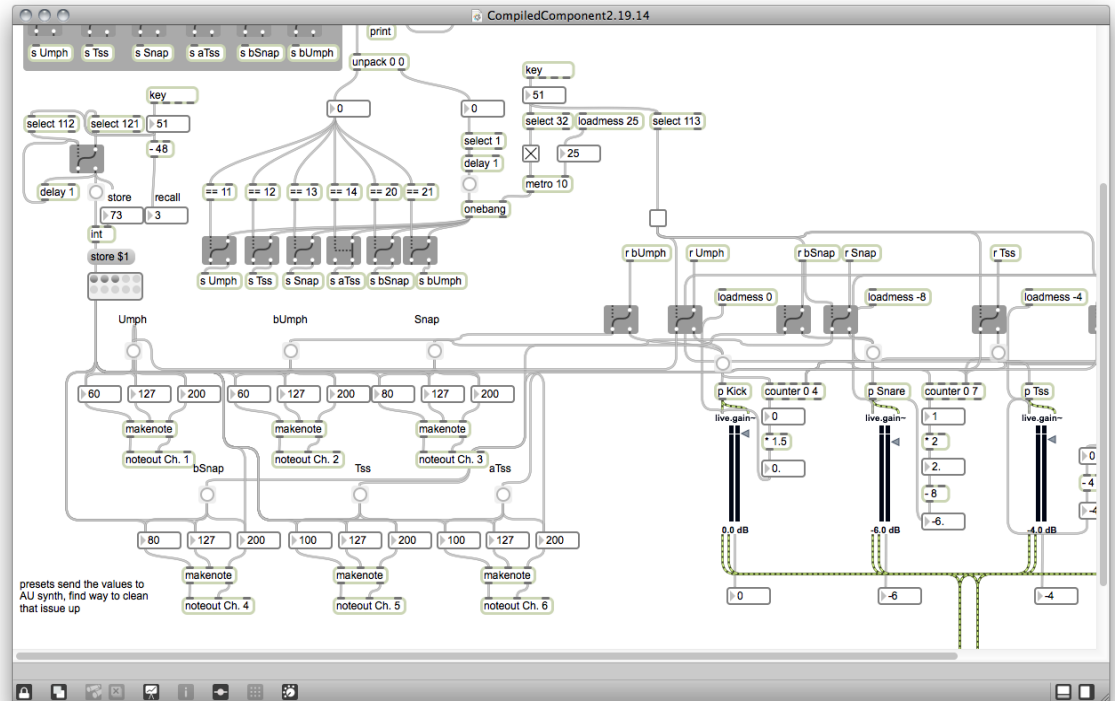
Technical Development

Spring semester of 2014, I officially enrolled in the class that encompassed the creation of a senior project, which meant the opportunity to begin assembling the physical elements of the project. Alongside the my enrollment in MMP495 Project/Recital, I also enrolled MUST450 AND MUST491 Max/MSP courses to explore the programming language that ultimately drives the entirety of the apparatus.

I began with the Dance Dance Revolution controller. As it did not natively communicate anything other than toggle readings to a video game console, I had to first find a way to get that information into a computer and in readable format. I had previously contacted a Max/MSP programmer and author, V. J. Manzo, about a project that he had completed that was similar to my own in its use of the Dance Dance Revolution controller. After a brief discussion, he suggested that I download a copy of his Max/MSP patch, unlock it, and examine how he got the controller to communicate. Following my examination of his patch and trying a small variety of other suggested tools, I concluded that the most efficient way to get the controller's data was through the "*hi*" (or ''human interface'') object in Max. I was then able to get a list of each button's identification number, the toggle value, and the general behavior of the controller. From there, I programmed a series of gates to separate the controller's toggles, so that I could then attach them to instruments.

The original conceptualization of this project was such that I would create specific sounds for each of the triggers; with this in mind, I began exploring MSP after I successfully got the DDR controller communicating with my laptop. These endeavors in MSP lasted

several weeks, exploring the availability of oscillators, filters, effects, and combinations with which I could create timbres. In the end, I ended up with a working Kick drum synth, a Snare drum synth, and a Hi-Hat synth, but quickly came across two issues: First, there was an inherent absence of any musical expressivity for these newly developed instruments. Second, the controller's data was being communicated terribly erratically and was creating unwanted artifacts in the produced sounds.



This above image was taken at the exact point in which I'd finished developing a standalone VST version of the code for the DDR pad (bottom right) and decided on pursuing a strictly midi-based compilation of the code (the beginning of which can be seen on the bottom left). The uppermost section of this patch is the module I developed for communicating with the DDR pad, which will be freely available through V. J. Manzo's code archive.[3]

[3] For larger versions of these images with a brief explanation of each module, visit: https://docs.google.com/document/d/1FJ8b_CvkzvBhE5eSfSWmGw_nSEZBfdV-JNMmxRwu1Hk/edit?usp=sharing

At this point, the DDR controller was outputting data erratically. One of my classmates, Aaron Anderson, suggested an object called, ‘onebang,’ which would filter out any extra data until it was told to open its gate again. With this, I created module that would open the onebang’s gate at a rate determined by a metronome, whose tempo is controllable within the final patch.

While working on the data conditioning module, I gave some thought to how I would alter the controller’s use to broaden the options I would have in specifying its sounds. If all that it was doing was communicating ‘bangs’ to my computer, I could set up separate modules to make those bangs trigger raw MIDI data. The controller module that resulted from this allows each button to be given a pitch value, duration, and velocity, which are all connected to a parallel preset module, so that I can save settings that differ between songs. Once those were complete, I created three additional copies and routed them to different output channels for Ableton. With the extra channels and an easy keyboard mapping to alternate between them, the DDR controller could then control separate instruments through various points of a track. Of course, having this new flexibility rendered the original MSP-dependant patch unusable for my immediate purposes and, consequently, was cut from the final patch.

This left only the drum set to program. I had selected it based on its built-in MIDI capacity, so I assumed it would be relatively quick to implement it into the project alongside the DDR controller. However, upon plugging it in via USB, it did not immediately give the desired results. The drum set communicated well with Max/MSP’s native AU synth, but when routed to Ableton Live and a drum rack, the note-off messages were sent so rapidly that Ableton only played a fragment of the sample’s attack before cutting off. Furthermore, the

MIDI information that it received labelled each drum a pitch that was only originally designed for the external module that it came with; the pitches values were disjunct from each other.

To fix these issues and refine the controlling Max patch, I simply utilized a *''stripnote''* object to remove the note-off messages and then routed each drum's pitch value to a module that would allow me to program related values. After attaching a preset module to this, I programmed thirty-six presets to cover the melodic scales of C3 up to B3 in major, natural minor, and harmonic minor. These additions allow the drum set to not only trigger samples (with velocity sensitivity) but also to control a melodic synth. The only limiting factor to giving the drums scalar motion is, without any note-off messages, synths must have a definitive decay and release setting. The drum set was also given four different channels of output for the same purpose as the DDR controller: to allow the performer to switch the electronic drum set between different virtual instrument tracks within a Live set.

With both of the hardware components communicating with Ableton (with greater flexibility than I had originally planned), the apparatus has finally reached physical manifestation. All that remains is to create music with it. In the remaining weeks preceding the Habitat's presentation date, I have created a musical example to showcase its abilities, including the Max patch's keyboard interface, the drum set and DDR controller's multichannel functionality, and the Live set arrangement with which I will compose music in the coming year. The presentation of the project took place on the 24th of April, 2014, in Soundhouse C, at 5:00pm. I promoted the presentation through an event on Facebook[4]. Utilizing a projector and historical narrative, I was effectively able to explain the creation of the project.

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[4] https://www.facebook.com/events/658046460915513/

Results

The apparatus is now fully functional in the way I had envisioned in its original conception. Through its construction and development, I have refined my ability as a programmer with Max/MSP and come to more thoroughly understand the language. I've also come up with a plethora of ways to further the project and different ideas for additions and attachments that can be made. Across the entirety of the project's timeline, I have continued to write and produce music that has gradually improved and become more sophisticated.[5]

Alongside composition and hardware development, I continued to coordinate the Electronic Dance Music Club, which continued to refine my songwriting and production skills, and founded the 'Illuminate: Sensory Arts Festival,'[6] which took place on April 25th, the day immediately following my presentation of my apparatus. The festival was created to showcase the musical work of the club's members and, through founding the festival, I became acquainted with all the processes involved with the task: booking a venue, coordinating staff, acquiring sponsors, promotion, booking performers and artists, and collaborating with other organizations.

Illuminate took place without any notable error. Promotional efforts saw that there were 74 people who had responded that they were going to attend, on Facebook. Within the first hour between 35-50 people arrived and throughout the night, numbers fluctuated between 75-150 attendants. Set-up for the event took approximately four hours and tear-down, the following morning, took approximately three. Having to fund the event primarily out-of-pocket, the total amount invested was approximately $160 and the event's success earned back roughly 93% of the original costs. All musical acts earned $50 a piece, running the net total earning of the event to 218% the original cost; all acts were satisfied with the event, along

[5] https://soundcloud.com/soundbiscuitproductions
[6] https://www.facebook.com/events/524320567683406/

with the audience, and the post-event response online has been steady. Plans for next year's event are already beginning to take form.

The line at the front door, by 10:00pm

The crowd dancing to Re:Born, at 11:00pm.

The crowd, still dancing to Diphox's headlining performance, at 2:30am.

The presentation of this project consisted almost solely of the information contained within this report, including the history and projected future. With that, there are a couple things that I anticipate the audience understands, having attended. First, they have a general knowledge of how the apparatus works and the processes that took place to see it to fruition.

Second, I hope to have encouraged them, through my own endeavors, to pursue whatever professional ambitions they desire with tenacity and courage. Third, through my experiences in creating the project, I came to realize just how much unidentified artistic talent was lying dormant in the immediate vicinity of Muncie and I hope to draw their attention to its presence. Unique performance art, new music, and fresh ideas often go unrecognized because the surrounding populace listens with a passive ear. Through diligent planning, organization, and negotiation *Illuminate* drew attention to its performers. The experience of doing so has been one that I will do again on an annual basis, but it will take much more than one person to bring fine works of art to the popular eye. If each of the audience members departs and listens to one unsigned track on SoundCloud, I would consider that goal for my senior presentation to have been met.

The Future

The original idea for this project did not come alone. Over the course of my performance career as a student, I have received much feedback. Among the comments I have heard, one of the most recurring ones has been a remark upon the fact that I perform with impassioned enthusiasm and seem to (from an audience perspective) have difficulty containing that and it is alleged to show in my physical gestures. Through my compositional work, this has led me to create the performance moniker, ‘Animal,’ with which I plan to identify myself as, as a performer. Consequently, the project has recently received the working title of, ‘Habitat,’ to more closely associate it with the persona that I have begun to develop.

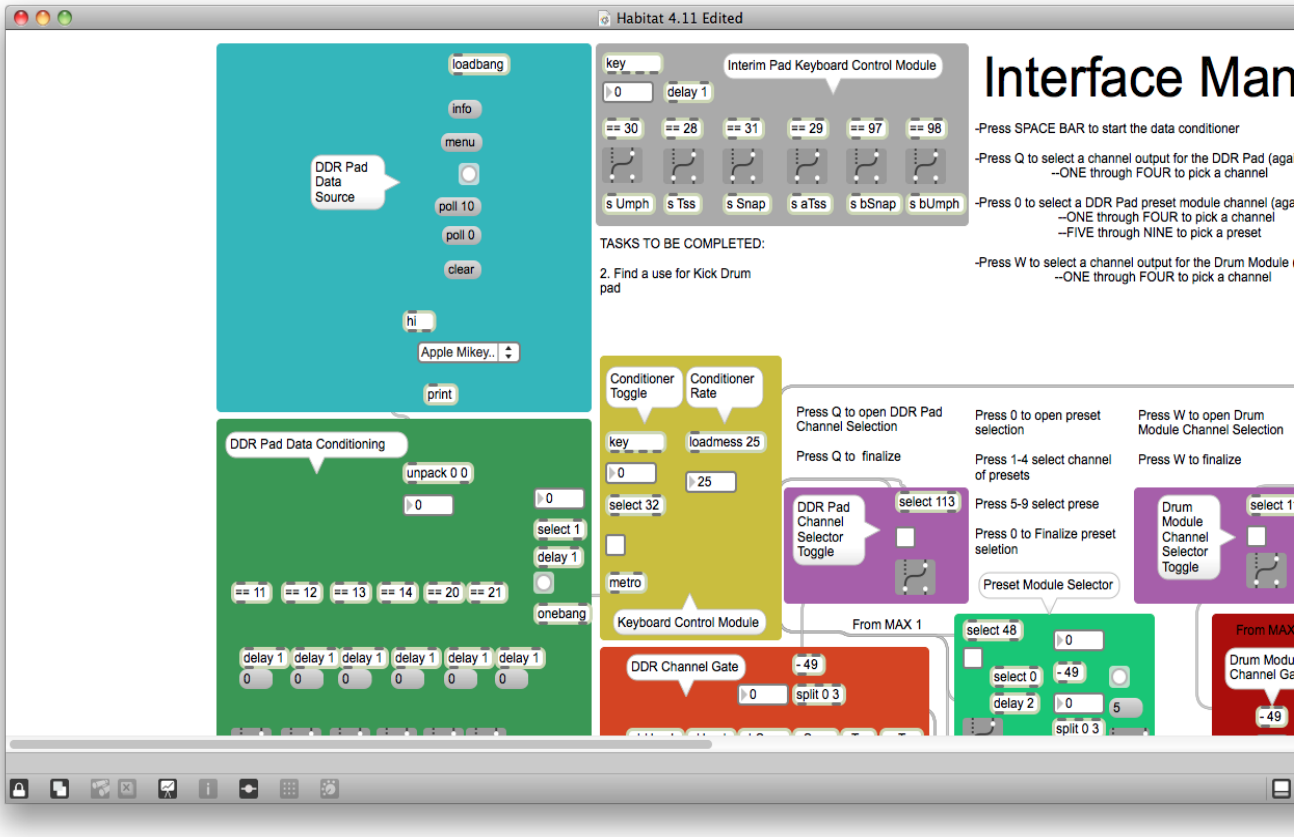
With the project in its present state, I will begin composing music using the apparatus and generating media with which I will begin fulfilling the rewards originally promised to my Kickstarter backers. The first tier of these rewards coincides with my first professional

objective; I will write, produce, and release an EP titled, ‘Solid Colored Splendor,’ specifically designed for the apparatus. The EP was named for the fact that it will explore the many genres and styles musically, so that I might find one that most appropriately suits my interests. The Habitat can facilitate a broad variety of dance moves that cross a multitude of cultures, ranging from hip-hop to gamelan. The production of this EP will not only facilitate my practiced use of the apparatus, but further refine my compositional repertoire and prepare me for the step that follows. Once released, the second tier of Kickstarter rewards to be fulfilled is an online concert for a select group of backers. This concert will serve as a landmark in both musical output and performance preparation. Pending its success, I will then begin taking video and sound samples to venues to begin booking shows. This is supported by my experiences with founding *Illuminate* and will be made easier by the Habitat’s unique performance.

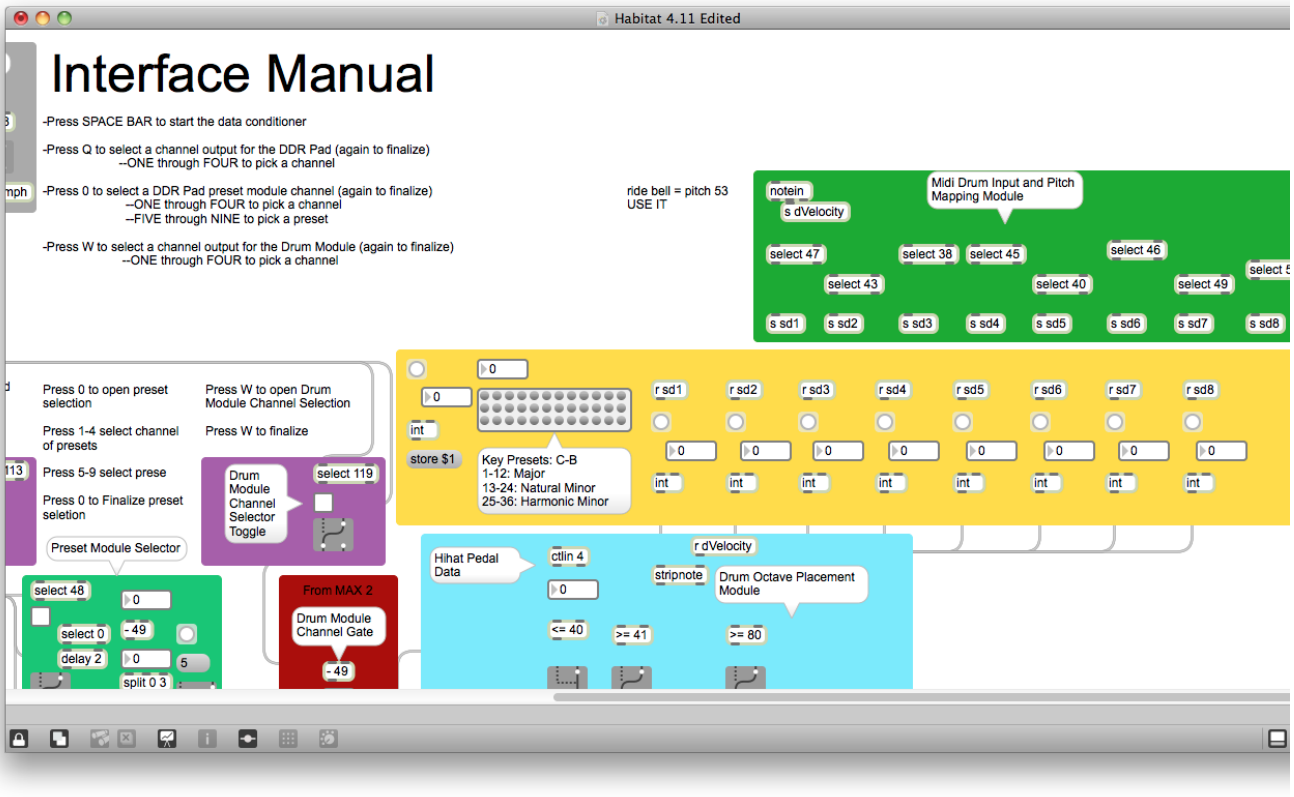
Over the course of the first year of shows, I will be developing the Habitat further, adding a lighting array that will be controlled via an Arduino breadboard, as well as various other improvements. Alongside those improvements, I will also be finishing the full length album version of the original EP that I will have released prior. Once I have developed enough of a reputation as a performer, saved enough money, and produced enough music, I will then move to Chicago, Illinois and fully immerse myself in the profession of musical performance.

Outside of the immediate professional goals of performance and production, I am planning to organize future concerts and facilitate showcases for independant artists. Furthermore, I will be continuing to program in Max/MSP. The standalone MSP version of the DDR controller’s patch will be released, open-source, on V. J. Manzo’s website and I will be maintaining professional relationships with both V. J. Manzo and Aaron Anderson, as well as anyone else who exemplifies proficiency or interest in the realms of visual programming and

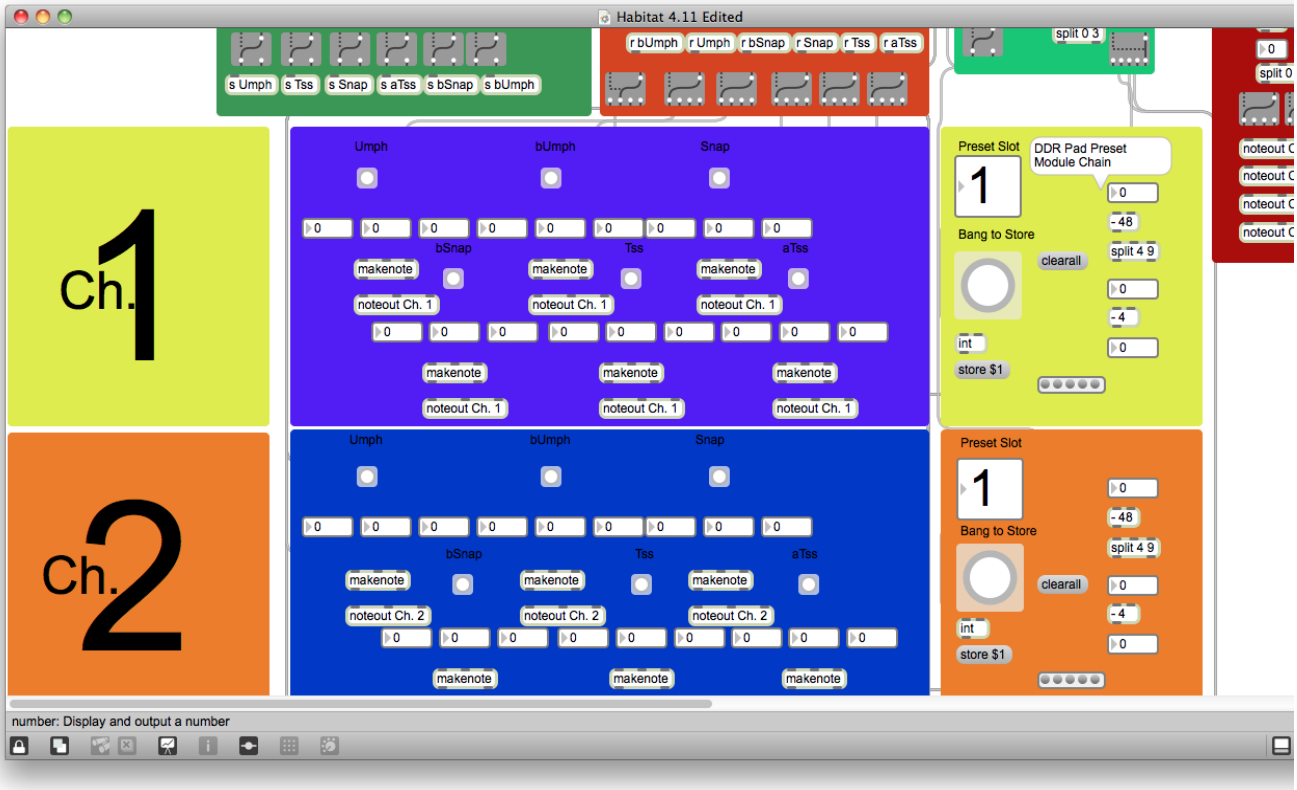
interface design. This will also lead me to create further physical interfaces with which to explore new ways to perform electronic music and continually foster my enthusiasm for my profession.



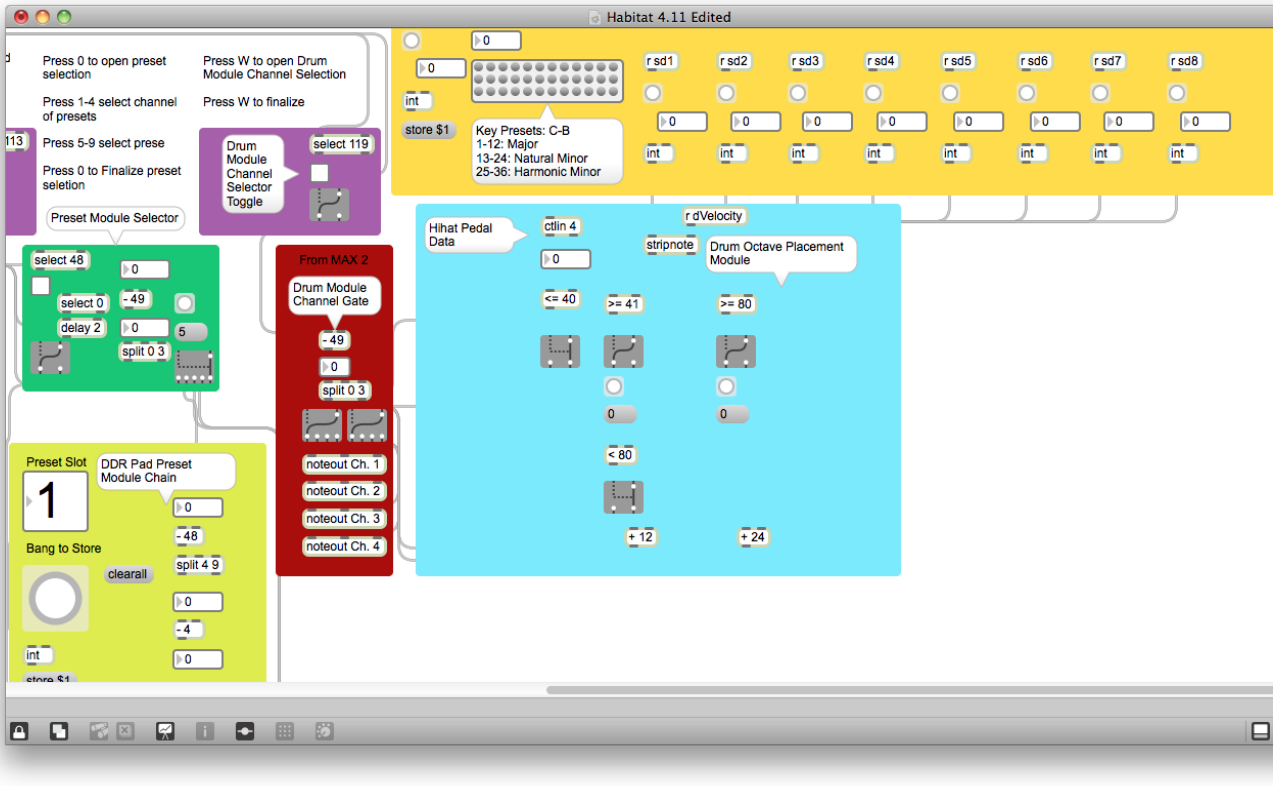
The human interface module (top left) identifies hardware. The green square below that separates the data from the Dance Dance Revolution controller; the yellow box, to the right of that, controls the rate at which the onebang filters out information.



The green module (top right) separates the electronic drum set's information, much like the DDR controller. The yellow module below that assigns pitch values to each drum pad; the presets are programed for 36 different keys.

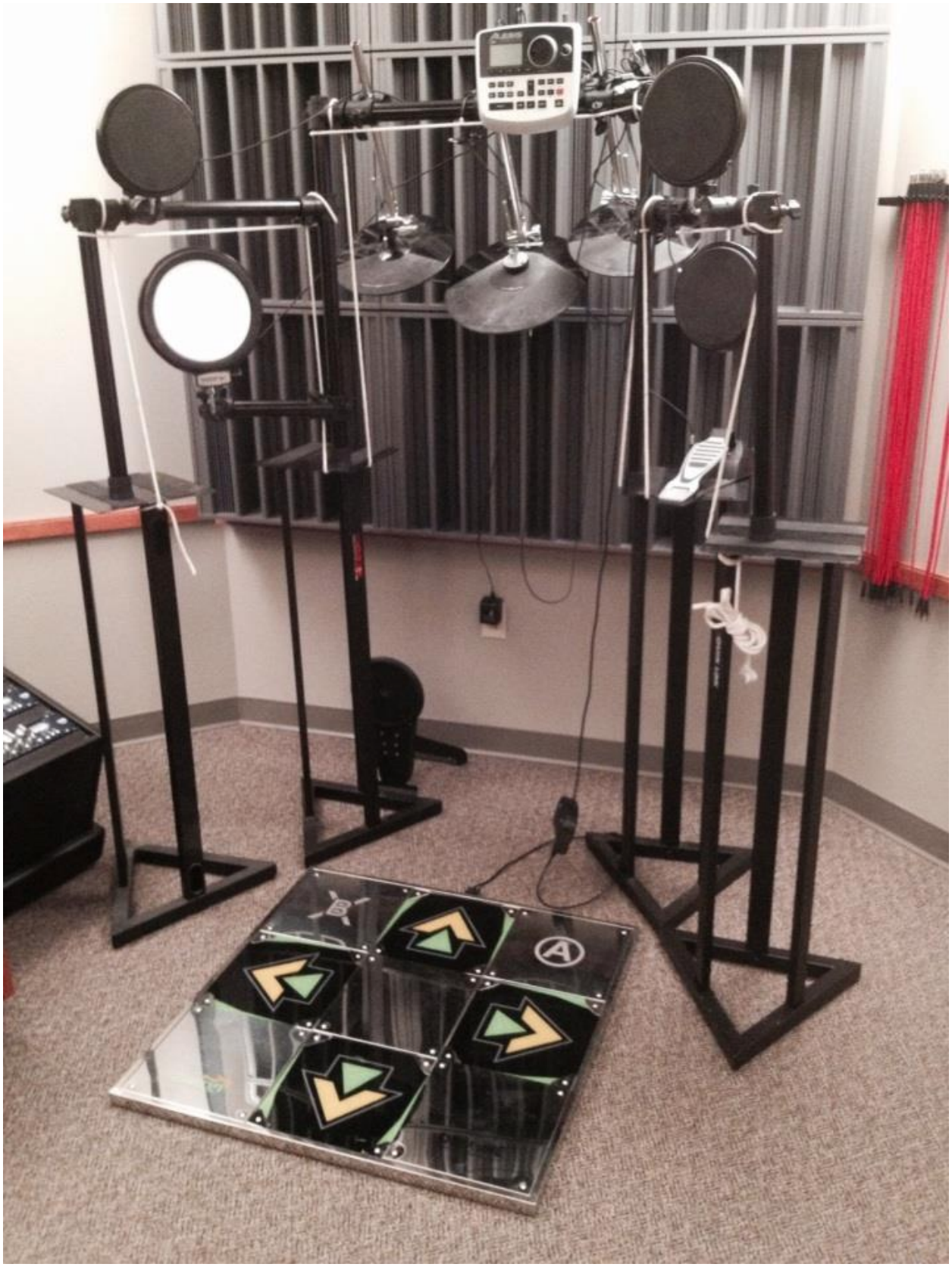


The horizontal modules, labelled Ch. 1 and Ch. 2, assign each DDR controller button three values: pitch, duration, and velocity. They are attached to preset modules (on their right side) to allow for several different motifs within a song. Each channel can be set to a different virtual instrument track.



In an attempt to utilize the hi-hat pedal, the light blue module read the hi-hat pedal data and gives the drum's pitch values an octave designation. The red rectangle allows for the drum set to be assigned to four different virtual instruments, as well.

The electronic drum set (raised to shoulder height by monitor stands) and the Dance Dance Revolution controller (below).



Bibliography

"edmproduction." *Electronic Dance Music Production*. N.p., n.d. Web. . <http://www.reddit.com/r/edmproduction>.

-I utilize this forum to learn new production methods, practice previously learned techniques, keep my knowledge of musical trends more current, and maintain a community presence.

Keith, Kothman. "TeachingMusic." *TeachingMusic*. N.p., n.d. Web. 1 Jan. 2014. <http://teachingmusic.keithkothman.com/>.

-Taking Ball State's School of Music's Max/MSP course, this is my reference guide/blog for module programming and tools. Much of what I learned in the class was applied throughout the coding process.

Manzo, V. J.. *EAMIR*. V. J. Manzo, 1 Jan. 2007. Web. 20 Aug. 2012. <http://www.eamir.net/forum/index.php?option=com_kunena&func=view&catid=1&id=8&Itemid=69>.

-V. J. Manzo, an author of a book on Max/MSP for the purposes of music, created a Max patch that made use of the Dance Dance Revolution controller's interface. After a brief discussion, it was by his recommendation that I began my research by breaking his patch down to its basic components and starting there.

Robinson, Keith. *Ableton Live 8 and Suite 8 create, produce, perform*. Burlington, MA: Focal Press, 2010. Print.

-Ableton Live 8 is the DAW through which I am assigning synths and samples to my hardware interface. To become more fluent in workflow and more aware of all the technical facets at my disposal, I read this text from cover to cover.

Snoman, Rick. *Dance Music Manual: Tools, Toys and Techniques*. 2nd ed. Amsterdam: Focal Press, 2009. Print.

-In order to obtain a more permanent, historically based knowledge of electronic dance music, I also read this book from start to finish; it encompasses past methods, the history of genres and sound synthesis techniques, and suggests a variety of hardware and software options.