A Percussionist’s Guide to Performing Live with Electronic Effects, Live Processing, and Electronic Instruments

Lecture Recital presented by Matt Jordan
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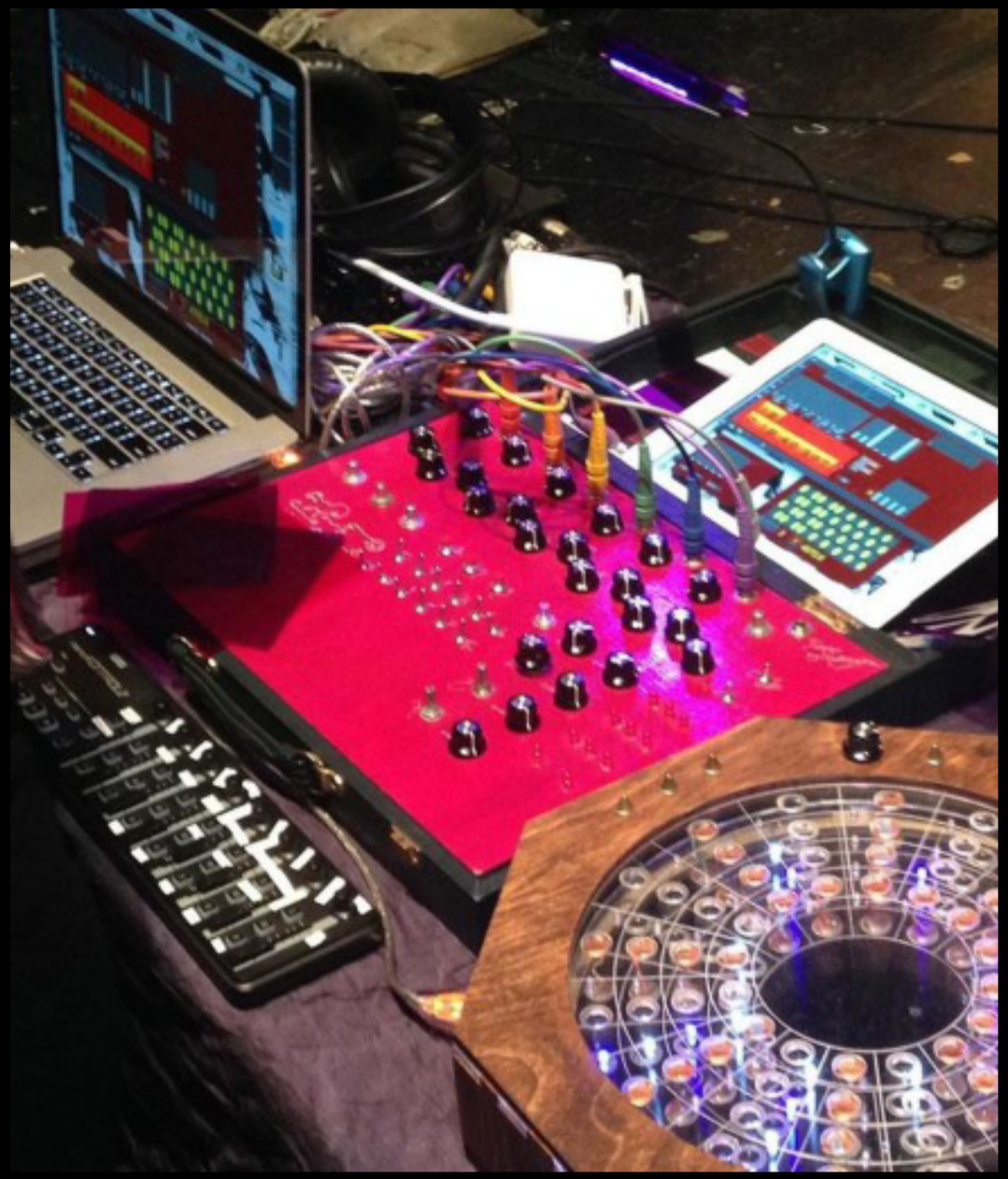
Presented in Partial Fulfillment of the Doctor of Music Degree
from the Florida State University

Introduction

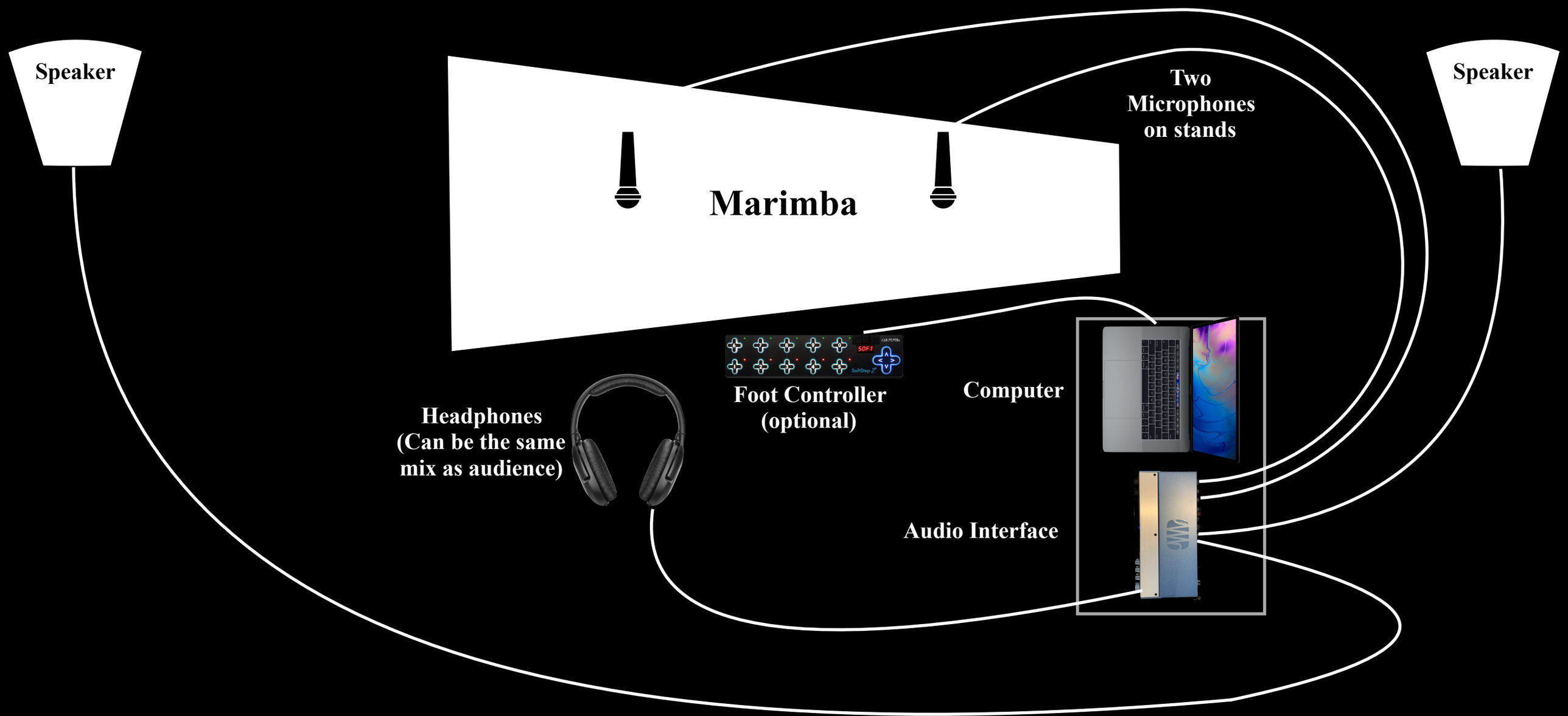
- Electroacoustic Music - music involving the integration of electronic elements.
- Music written for percussion and electronics is becoming standard practice
- Many undergraduate, graduate, and professional recitals contain electroacoustic pieces
- Four Types of Electroacoustic Music
  - Fixed Media (covered in last recital)
  - Electronic Effects
  - Live Interactive Electronics
  - MIDI Controllers



Works for Percussion and Electronic Effects

- Electronic effects are defined as “a technique where the computer or device amplifies and modifies the sound of the instruments without necessarily adding any additional unique sounds”.
    - Reverb and Delay are the most widely used of the electronic effects.
- Sometimes, the difference between Electronic Effects and Live, Interactive Electronics can be blurry as works will often use combinations of the two

Technical Setup for Works with Electronic Effects with or without Performer Manipulation

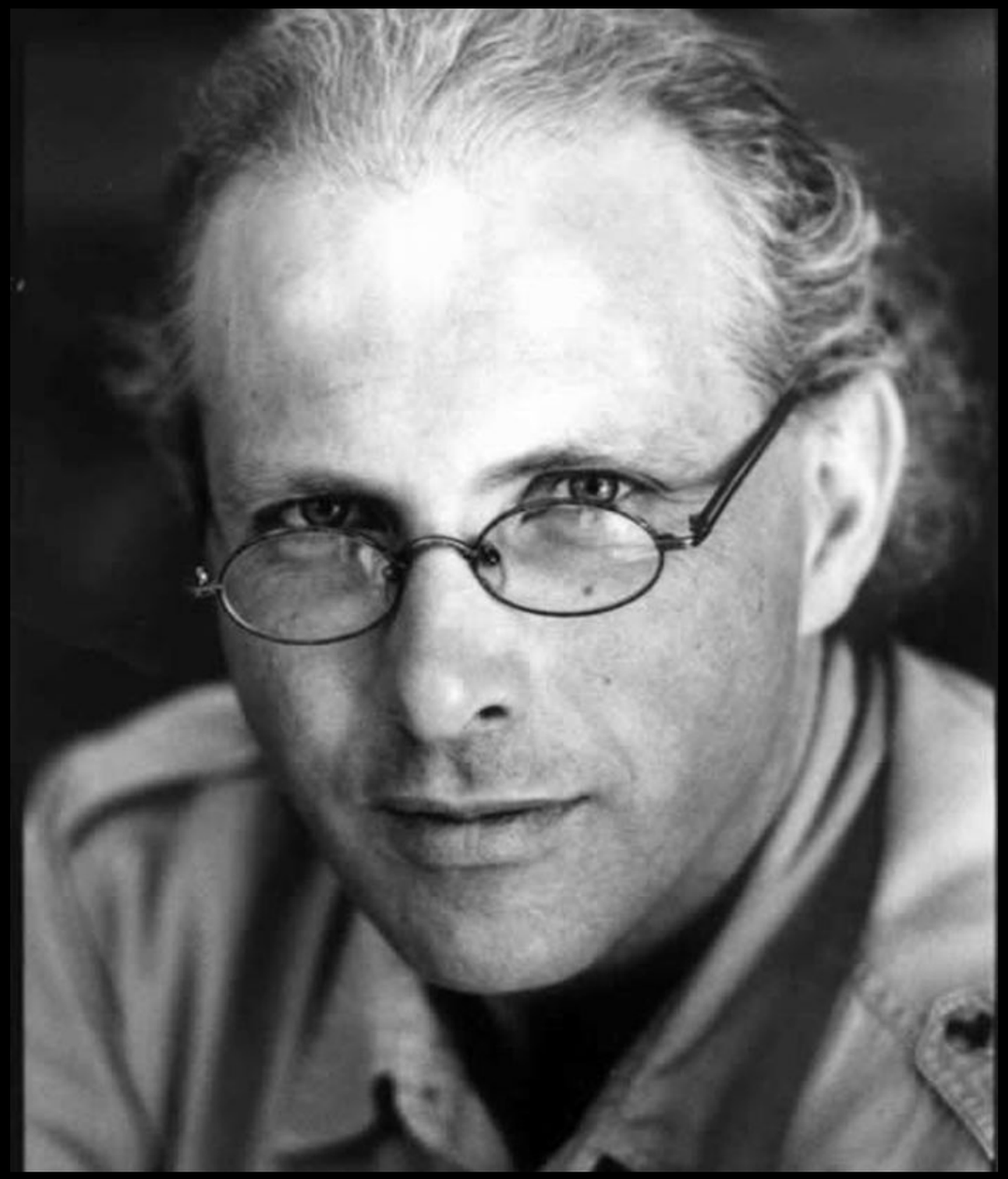


Common Practices

- Route the audio of both the “dry” (un-effected) and “wet” (effected) signal to the performers in ear monitors
- Much of the exact sound is up to the performer’s musical sensibilities
  - Delay feedback level (the number of times a note will repeat),
  - Wet/Dry volume (should the speakers only send the effected signal or should some dry signal be amplified as well?)
  - Panning (should there be a separation or should it be part of the sound of the instrument?)
  - Reverb (should it be added to the sound of the instrument only or also to the delay sound?)
- Generally, the balance for the audience through the speakers will need to be different than the balance in the performer’s in ear monitors.
  - This can change depending on the type of piece.
  - Generally, the performer will need to hear more of the wet signal so they can align accurately with the delayed signal.
- Playing works with delay means perfect rhythms and timing are crucial
- Have a “muted” patch before and after the piece so you don’t ruin the effect of the piece with footsteps, mallets clicking, etc. (you can hear all of that!)

The Hinchinbrook Riffs
By Nigel Westlake

- Originally composed for guitar and digital delay
  - Was transcribed by the composer for marimba in 2009
- Westlake is very detailed about the delay parameters
  - 600 ms delay time (1 quarter note)
  - 1 repeat only
  - Live marimba panned left, delayed marimba panned right
  - Avoid feedback of delay signal into the mics as much as possible
- Due to the long delay time but only having one repeat, there is a very clear compositional interaction between the acoustic instrument and the delayed signal.



The Hinchinbrook Riffs Delay Routing

The Hinchinbrook Riffs
Delay Designer

Delay Designer

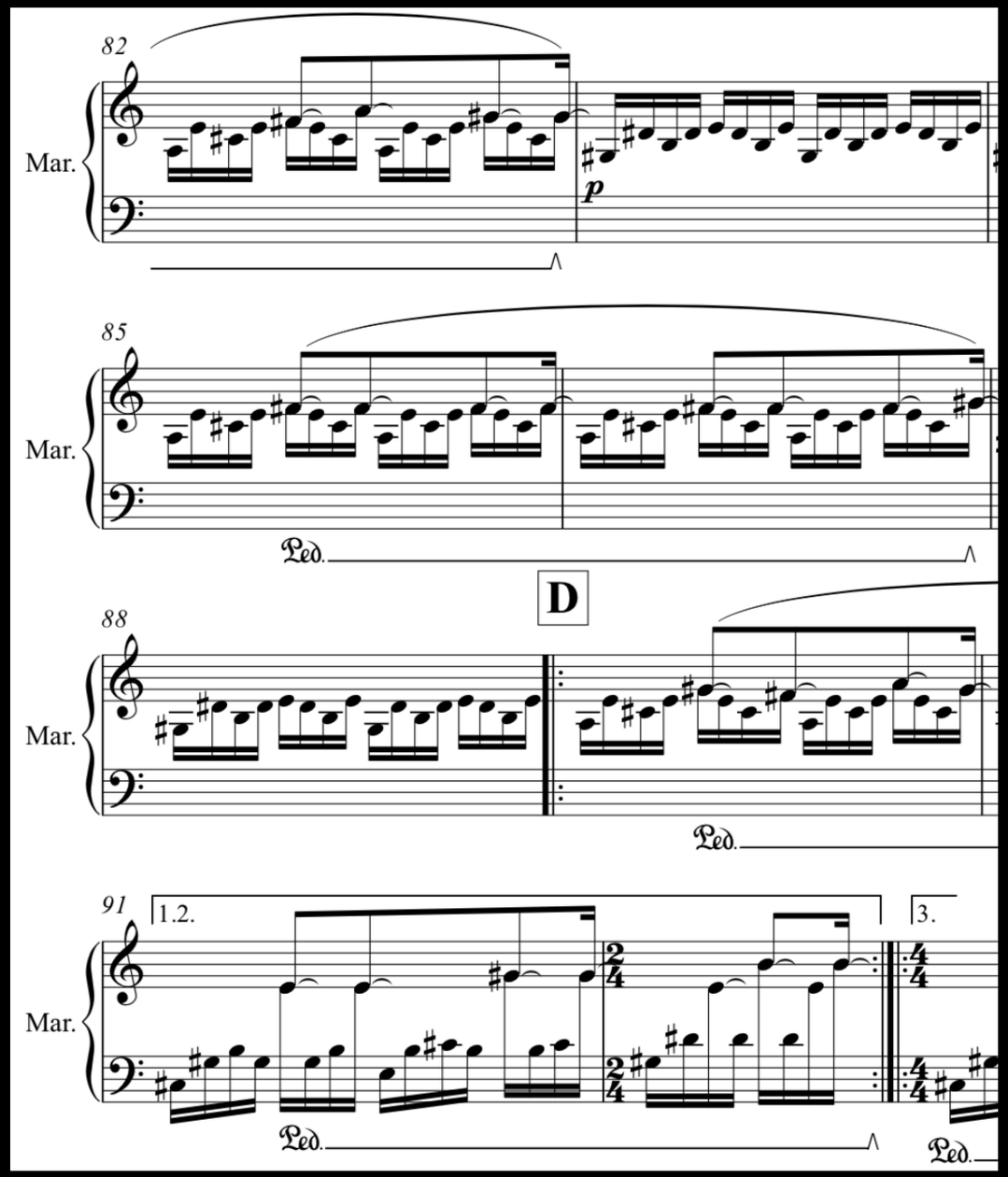
Excerpt of

The Hinchinbrook Riffs

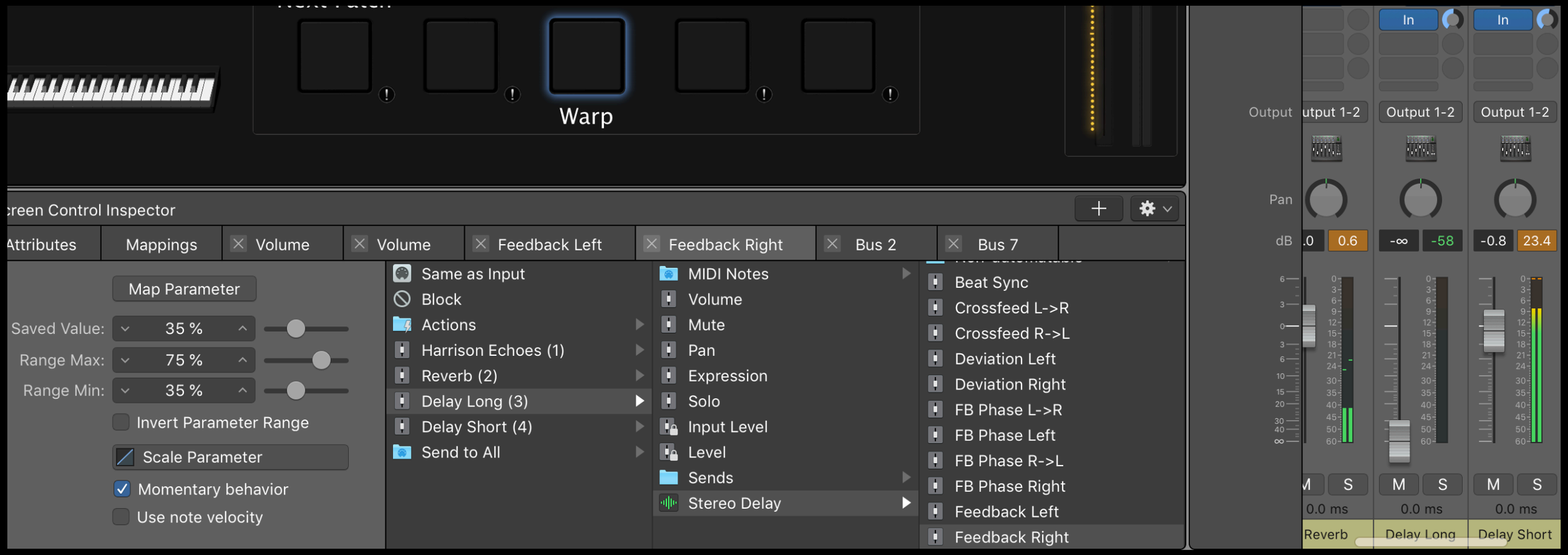
by Nigel Westlake

Echoes No. 1
By Greg Harrison

- Work for marimba and digital delay
- Was written using a Boss DD-20 Giga Delay guitar pedal
    - This pedal has a ‘warp’ setting that allows the performer to change the feedback value to 100% temporarily, which creates the illusion of a sustained sound when it has repeated enough times
    - This pedal is now discontinued, meaning the performer must find a suitable alternative
    - The composer invites the performer to experiment with different settings on their particular pedal to find something that is similar, but also states that if that function is not available then the markings may be disregarded
- The composers states that the delay is only there as an effect, it is not supposed to be too overpowering.



Echoes No. 1 “Warp Pedal” Setup



- The ‘warp’ effect from the Boss pedal can be reproduced in MainStage by mapping multiple effects to one foot controller.
  - I have approximated this effect by having separate delays—one with a short feedback time and one longer feedback time.
  - The following commands are mapped to the foot controller to morph between these-
    - Volume for Short Delay (at 0 dB when pedal is up, and -30 when pedal is down)
    - Volume for Long Delay (inverted - off when pedal is up, at 0 dB when pedal is down)
    - Feedback of Long Delay (35% when pedal is up, 75% when pedal is down)
    - Bus Send to Short Delay (high when pedal is up, low when pedal is down)
    - Bus Send to Long Delay (inverted - low when pedal is up, high when pedal is down)

Echoes No. 1
Long Delay Setup

Excerpt of

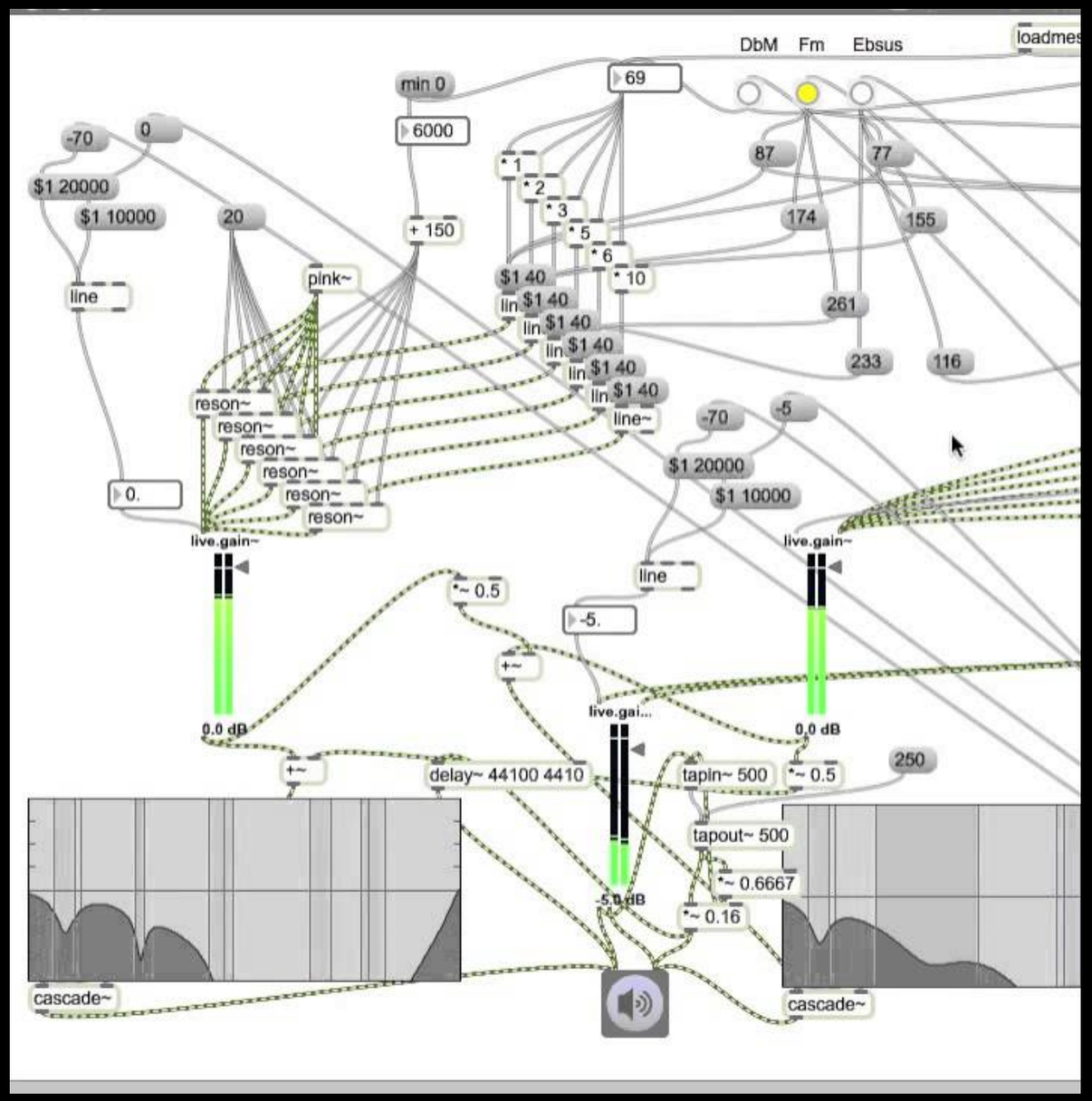
Echoes No. 1
By Greg Harrison

Selected Works with Electronic Effects

Composer	Work	Instrumentation
Nigel Westlake	Hinchinbrook Riffs	Marimba and Digital Delay
Greg Harrison	Echoes No. 1	Marimba and Digital Delay (with additional warp pedal)
Grigory Smirnov	Mirrors of Emptiness	Marimba and Digital Delay
Nigel Westlake	Fabian Theory	Marimba, 3 Toms, and Digital Delay (with Loop Pedal)
Jim Casella	Prime Ordinals	Djembe, Digital Delay, and Fixed Media
Mark Berry	Mare Tranquillitatis	Steelpan, Crotales, Digital Delay, and Pitch Shifter

Works for Percussion and Live Interactive Electronics

- Defined as any music where technology or devices are used to “generate, transform, modify, or trigger sounds produced by the performer”
- The computer’s behavior can change in response to musical or physical input, therefore participating actively in the live performance
- Often involves a more complicated setup
  - Can require multiple foot switch or trigger pad cues
  - Can also be triggered by certain pitches in some pieces



Technical Setup for Works with Live Interactive Electronics

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Overview of Max/MSP and Pure Data

- Original version made in 1985 by Miller Puckett at IRCAM in Paris
    - IRCAM is one of the primary research institutions for electroacoustic music
- Max/MSP and Pure Data are Object Based Programming Environments
    - Patches are made by arranging and connecting blocks of objects within a patcher
    - Primarily designed for Audio/MIDI/Video
    - Pure Data is the open source version of Max/MSP
- Max/MSP was purchased by Ableton in 2017, making Max/MSP available within Ableton Live as Max for Live

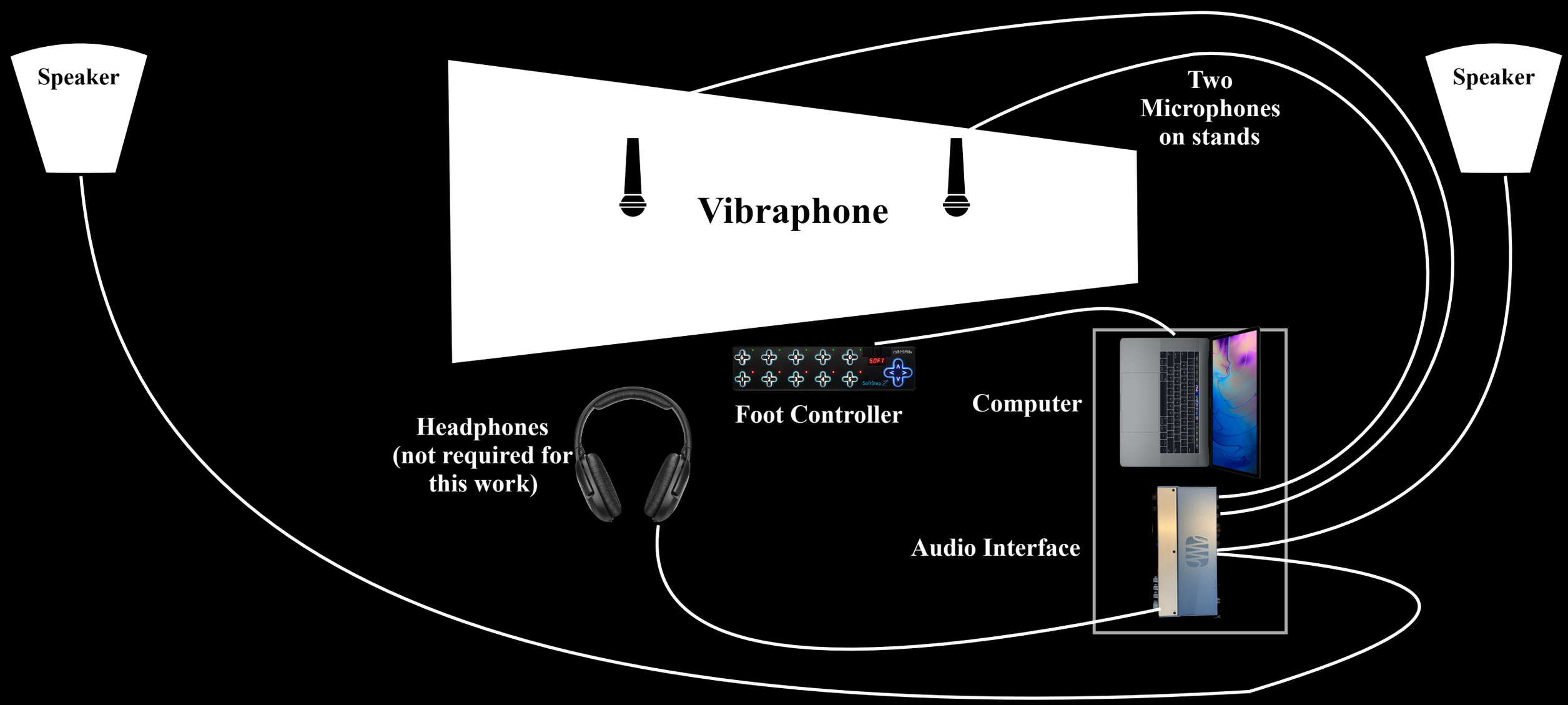
Common Practices

- While many times the exact content of the electronic elements cannot be controlled by the performer, it is important to know that the performer is accountable for all of the sounds that the audience hears, just as they would be in an acoustic percussion performance
- Most works for live interactive electronics are impossible for the performer to hear from the audience's perspective
    - Having a trusted colleague that can learn the piece and give honest feedback is crucial to dialing in the mix of a work
- Learning how each different patch's cues react to your performance is crucial
    - Improvising within each separate cue is recommended to understand the underlying processing
    - Timing is often crucial on these cues, understanding how the pedal or trigger reacts will allow you to better align with elements of the electronics

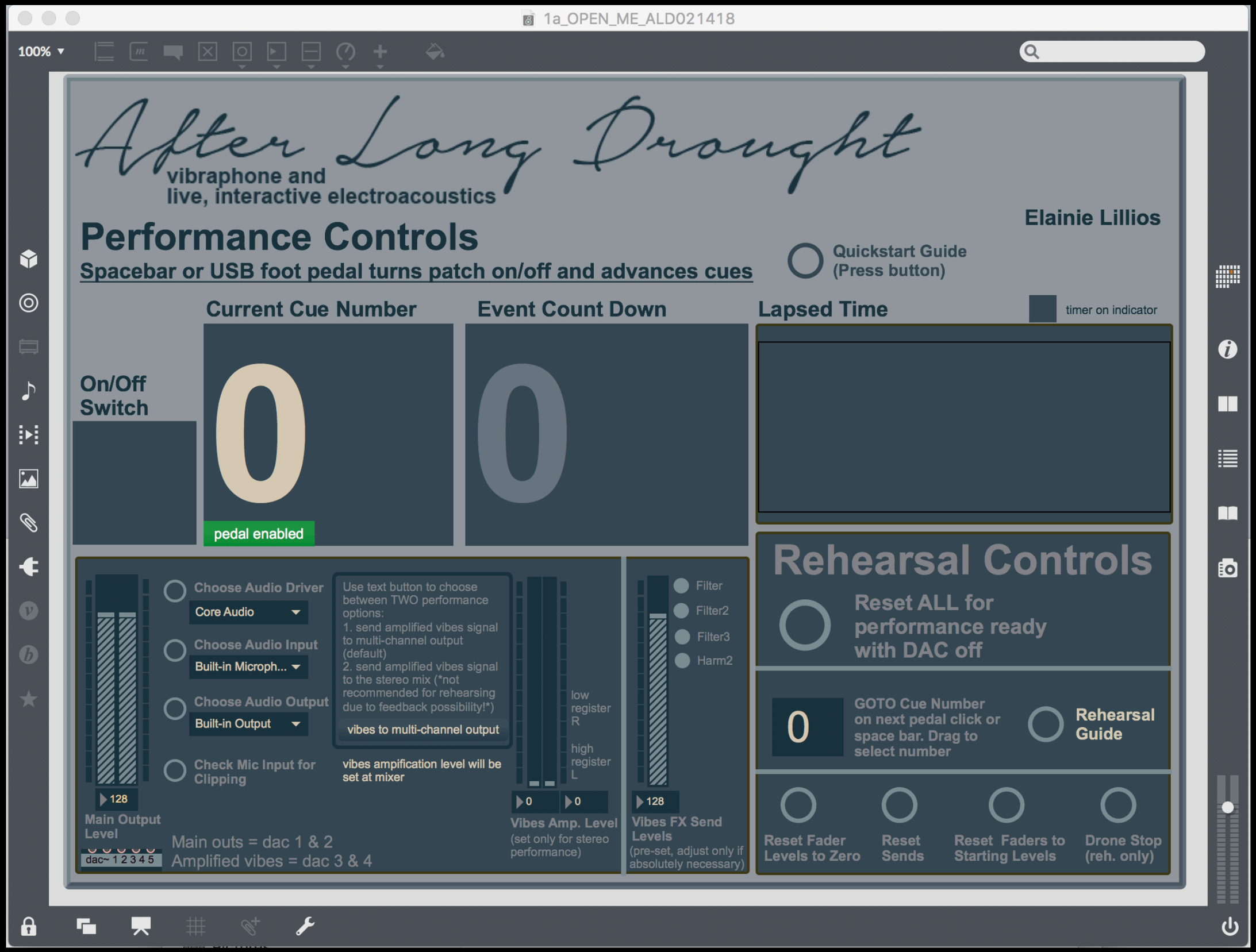
After Long Drought by Elainie Lillios

- Work written for vibraphone and electronics in 2016
- Commissioned by Scott Deal
- Uses Max/MSP to trigger variety of filter effects, delays, pitch changers, stutter effects, harmonizers, and auto pan effects
- No headphones needed for monitoring

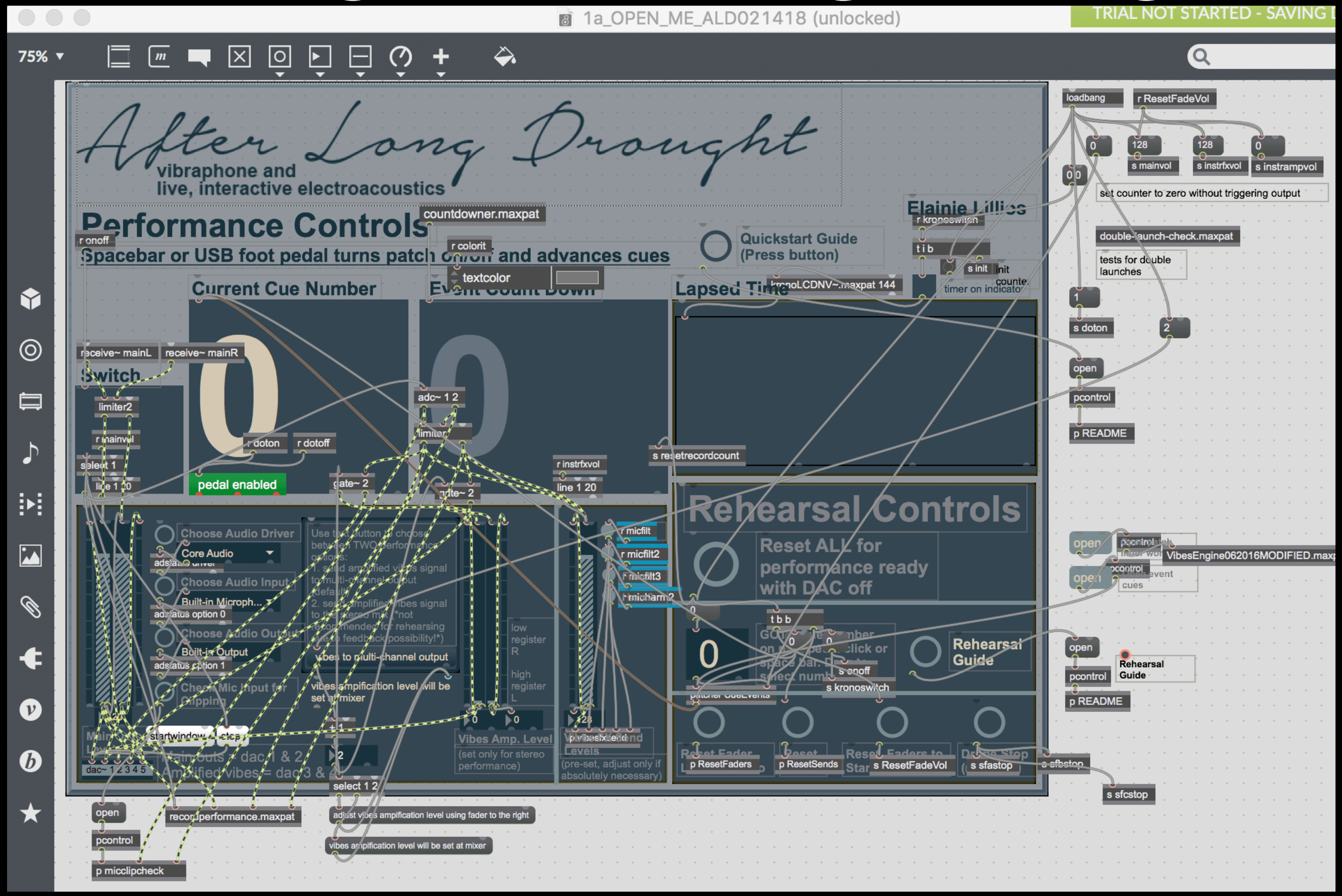
Technical Setup for *After Long Drought*
By Elainie Lillios



Max Patch for *After Long Drought*



Editing *After Long Drought*



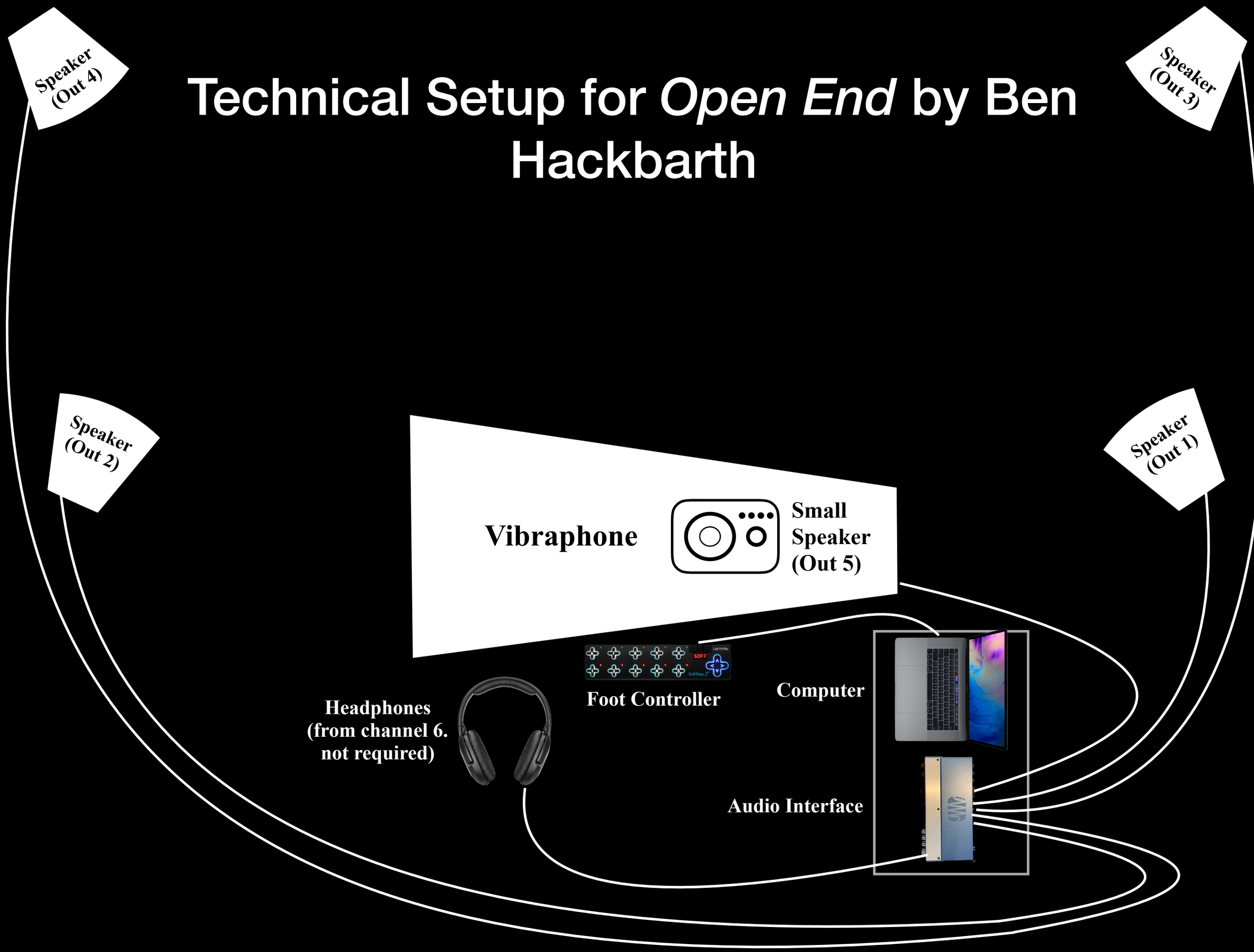
Excerpt of

After Long Drought by Elainie Lillios

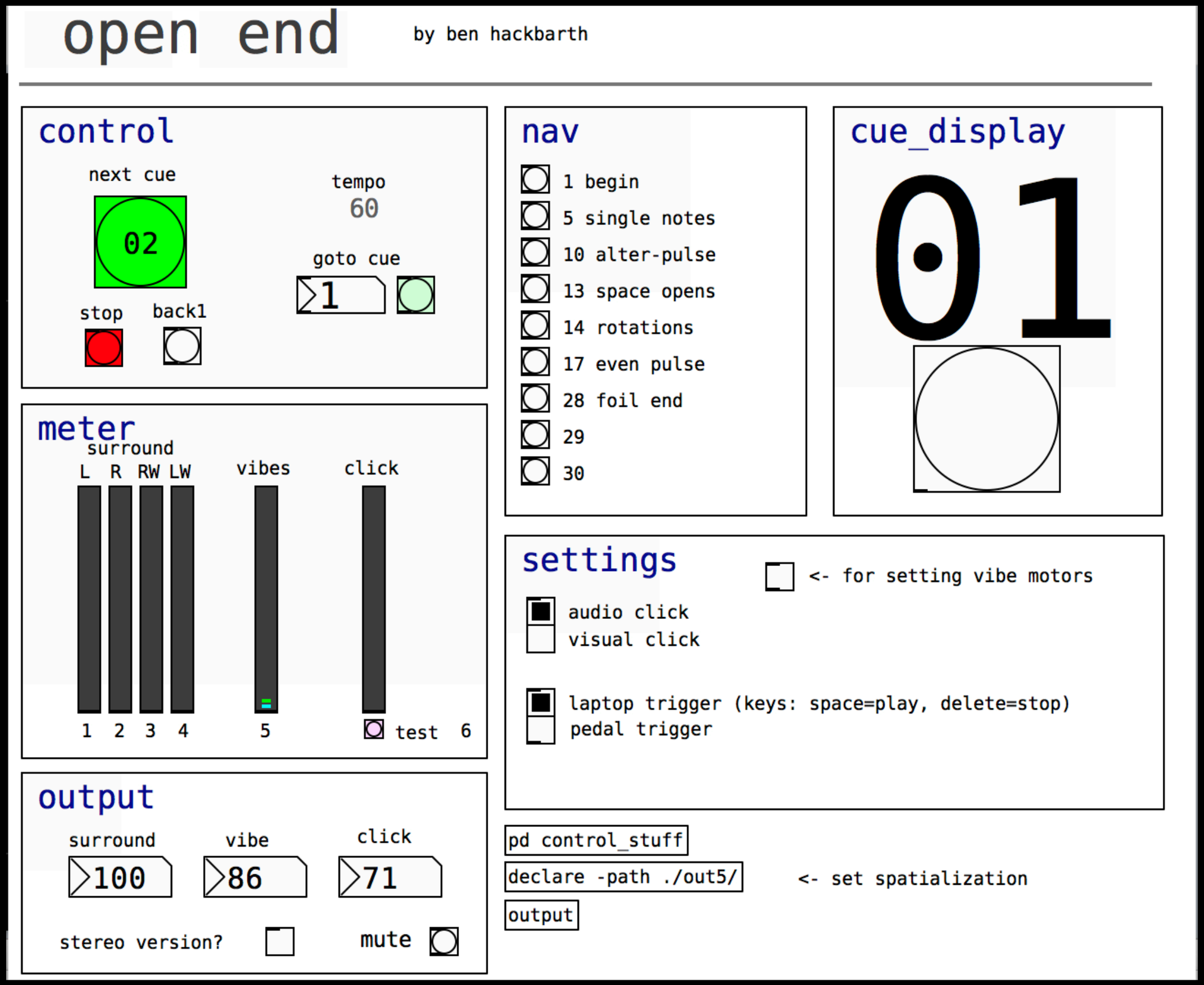
Open End
by Ben Hackbarth

- Work for Vibraphone and multi-channel surround sound audio
- Written in 2007 using Pure Data
- Does not use microphones, is pre-programmed with a combination of fixed media and live triggers

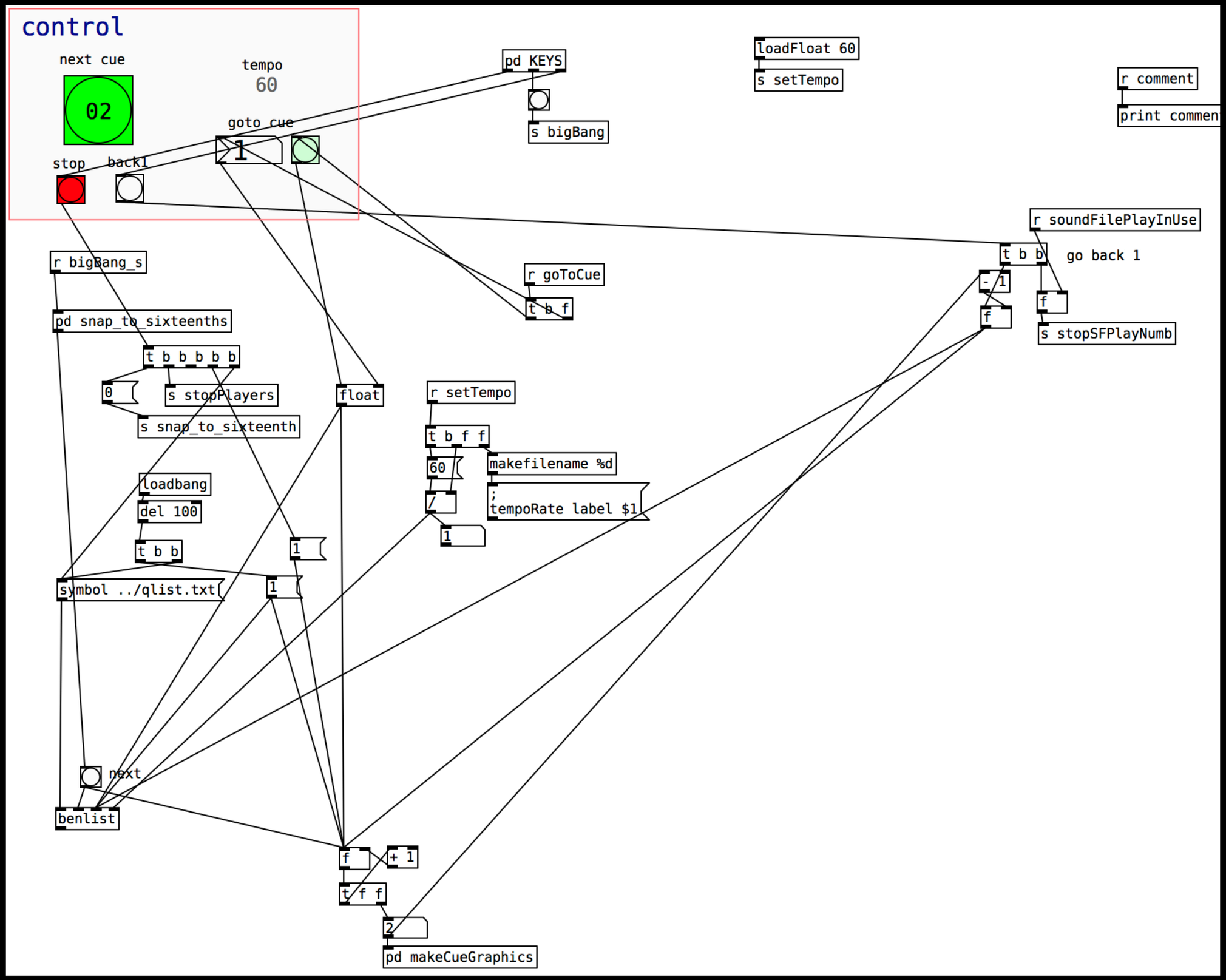
Technical Setup for *Open End* by Ben Hackbarth



Pure Data Patch for *Open End*



Editing *Open End*



Two Excerpts from

Open End

by Ben Hackbarth

Selected Works with Live Interactive Electronics

Composer	Work	Instrumentation
Elainie Lillios	After Long Drought	Processed Vibraphone and Max/MSP Patch (with Trigger Pedal)
Ben Hackbarth	Open End	Vibraphone and 5 channel Pure Data patch (with Trigger Pedal)
Jordan Munson	Those That I Fight I Do Not Hate	Bodhran and Max/MSP Patch with Video Projection
Kaija Saariaho	Six Japanese Gardens	Multi Percussion and Max/MSP Patch (with Trigger Pedal)
Cort Lippe	Music for Snare Drum and Computer	Snare Drum and Max/MSP Patch (with Trigger Pedal)
John Mallia	Husk, with Aura	Multi Percussion and Max/MSP Patch (with Trigger Pedal)

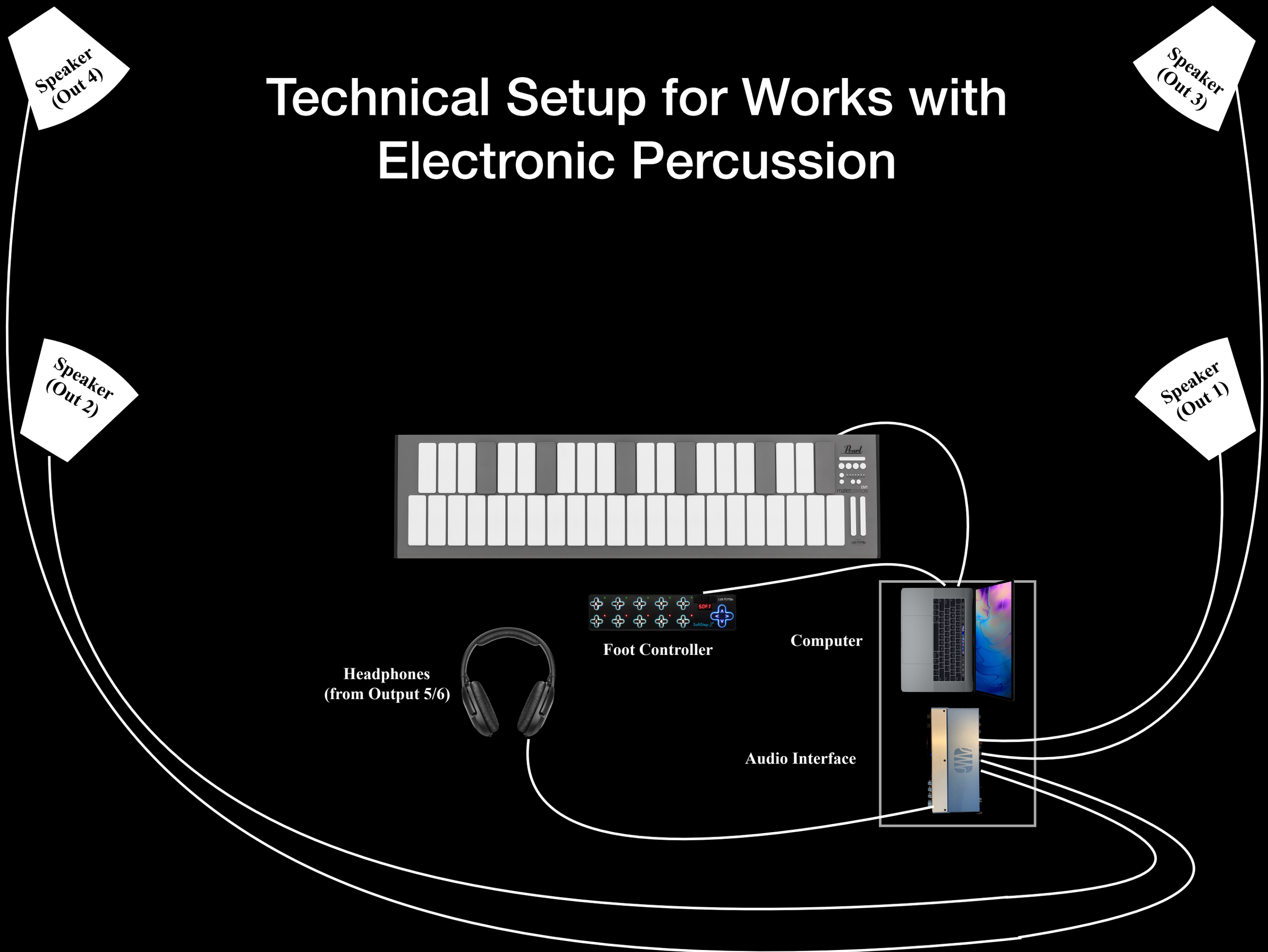
Works for Electronic Percussion

- Electronic Percussion instruments have completely taken over modern music production
  - Drum Machines
  - Electronic Drums
  - Programmed sampled drums
  - Mallet percussion controllers
- Used in many different live performance situations
  - Broadway musicals
  - Churches
  - Live Concert Tours
  - Jazz/Fusion
  - Marching Arts

Quote from *Percussion Instruments and Their History* by James Blades

“In latter years, as well as their prominence in the repertoire of the orchestra, percussion has been used importantly in such experiments as machine-music, musique concrète, and is today a feature of the highly scientific electronic music. Opinions are divided concerning the values and the future of Electronic Percussion and whether such remarkable 'machinery' as the Midi synthesizer will be further developed as a part of contemporary percussion, and ultimately present a serious challenge to 'live' music.”

Technical Setup for Works with Electronic Percussion



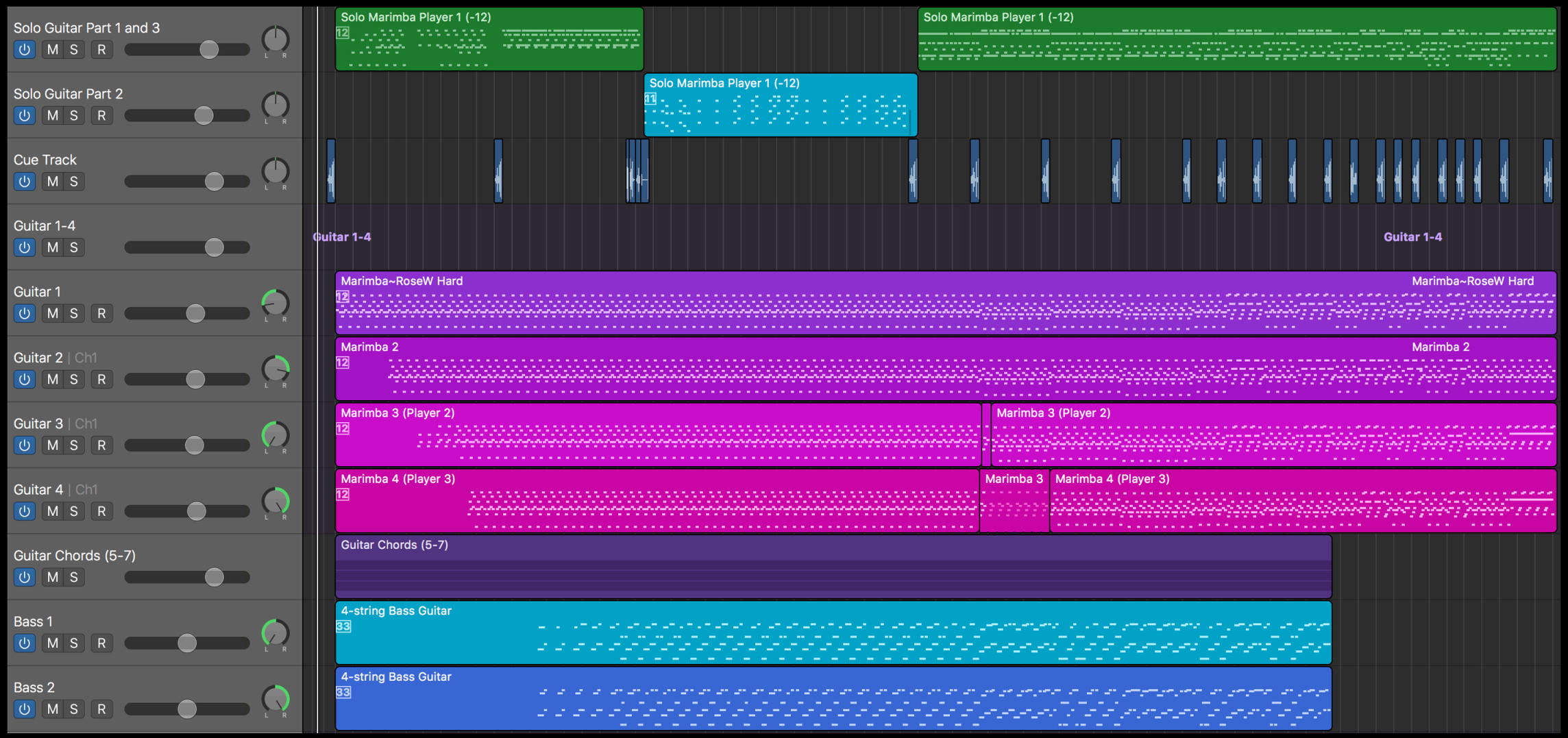
Common Practices

- Method of monitoring
  - Depends on use case, sometimes speakers are better sometimes headphones are better
- Latency Adjustment (buffer size)
- Velocity scaling
  - Based on playing style, mallet selection
- Mainstage is most commonly used software
  - Due to ease of assigning the different parameters

Electric Counterpoint Mvt. 3
by Steve Reich

- Originally for Solo Guitar and pre-recorded accompaniment track
  - Accompaniment is 7 electric guitars and 2 bass guitars
- Written in 1987 for guitarist Pat Metheny
- Was transcribed by percussionist Joby Burgess in 2008 for his Xylosynth
  - That arrangement was used as inspiration for this version

Transcription Process



- First the work was notated into Sibelius from the original score
- Then the completed file was exported as a MIDI file, and imported into Logic Pro X
- Logic Pro X was used to choose the appropriate patches, set panning, add cue tracks, automate volume and velocity curves, and export the finished audio files
- The audio files were then imported into Apple MainStage for live performance and patch switching for the solo instrument

Instrument Selection

- Each sound needs a different characteristic timbre

Addition of Quadrophonic Sound

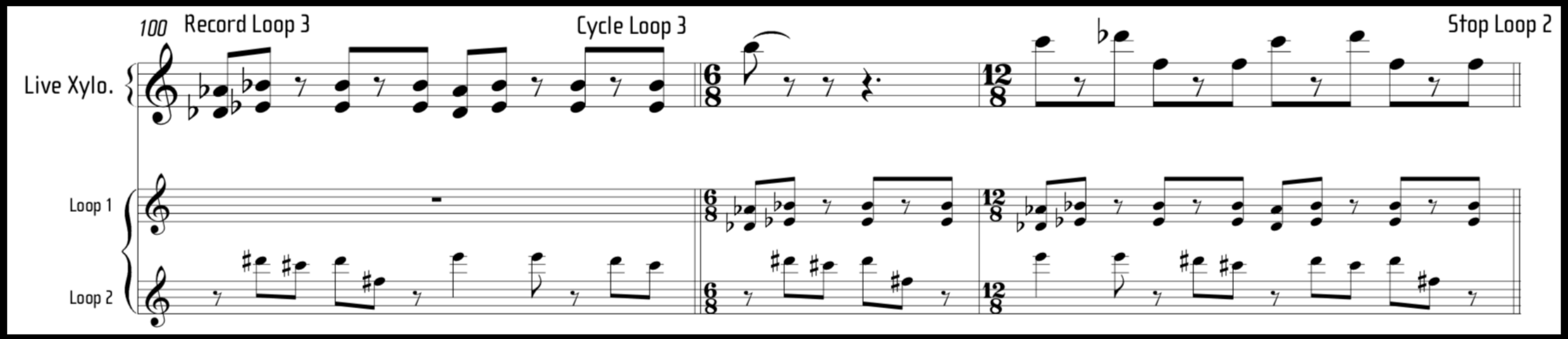
- Electric Counterpoint was originally intended to be played in Stereo.
- Movement 3 is setup perfectly to allow for quadrophonic sound, as there are 4 primary contrapuntal voices in the majority of the work, so they can be panned to the appropriate speakers
  - This allows for more clear separation of the voices, so the audience can really hear which voice is doing what, rather than it being so blended that you can’t identify the voices.

Electric Counterpoint

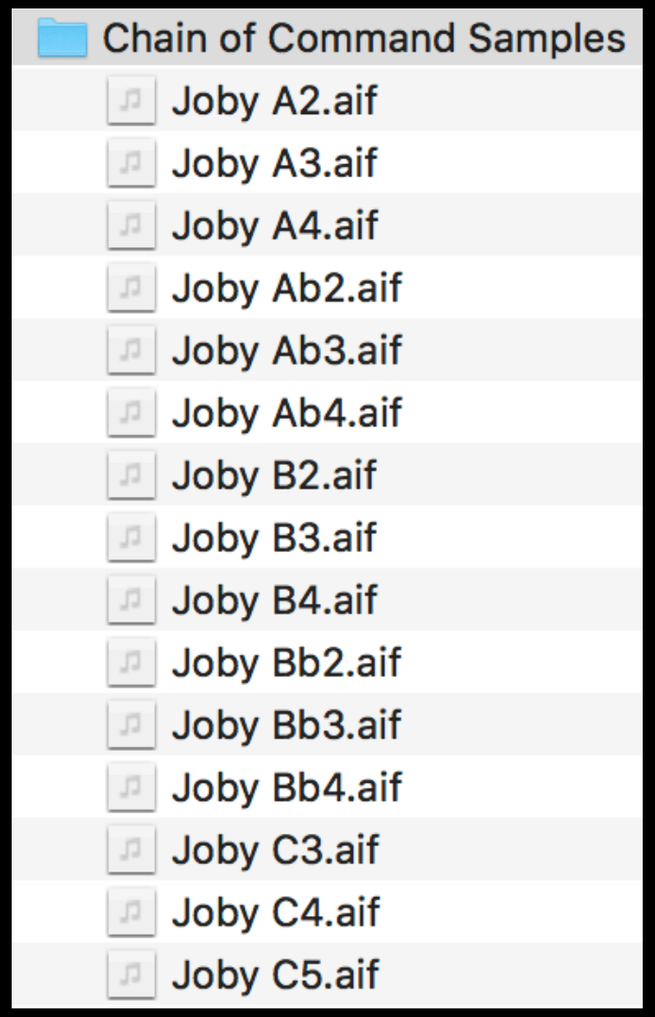
Mvt. 3

by Steve Reich

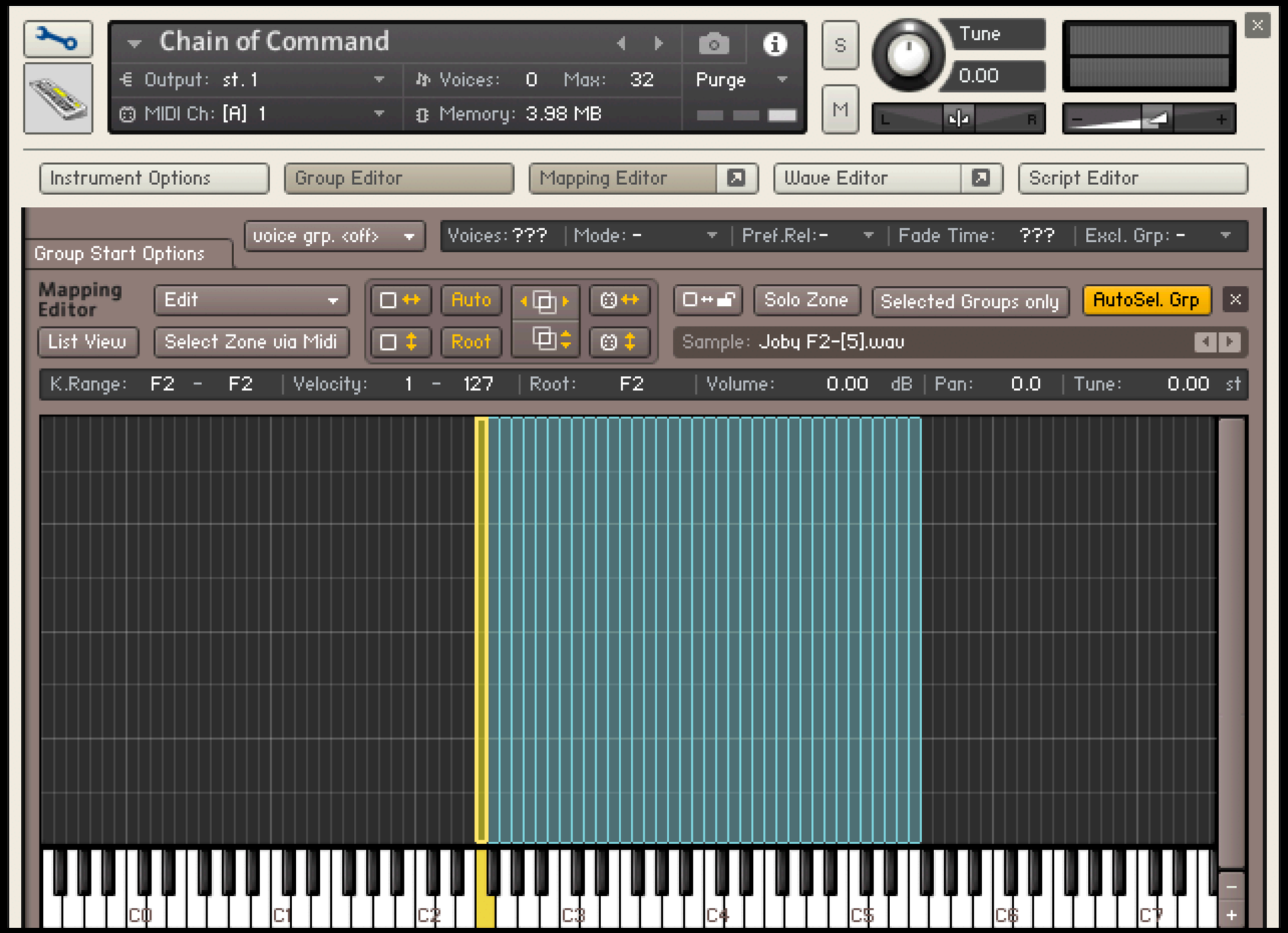
Chain of Command by Graham Fitkin



- Work for 3 octave Sampling Mallet Keyboard Controller and Live Looping Pedal
- Written for British percussionist Joby Burgess and his group Powerplant
- Every sample in the work is a slice of a quote from either George W. Bush, Donald Rumsfeld, or Dick Cheney
  - All samples come in a folder, notated with the note they belong on. It is up to the performer to assign them in their sampler
- There is no traditional “melodic” content in the work—what you see is not what you hear



Native Instrument Kontakt 5 Sampler Setup



Options for Looper

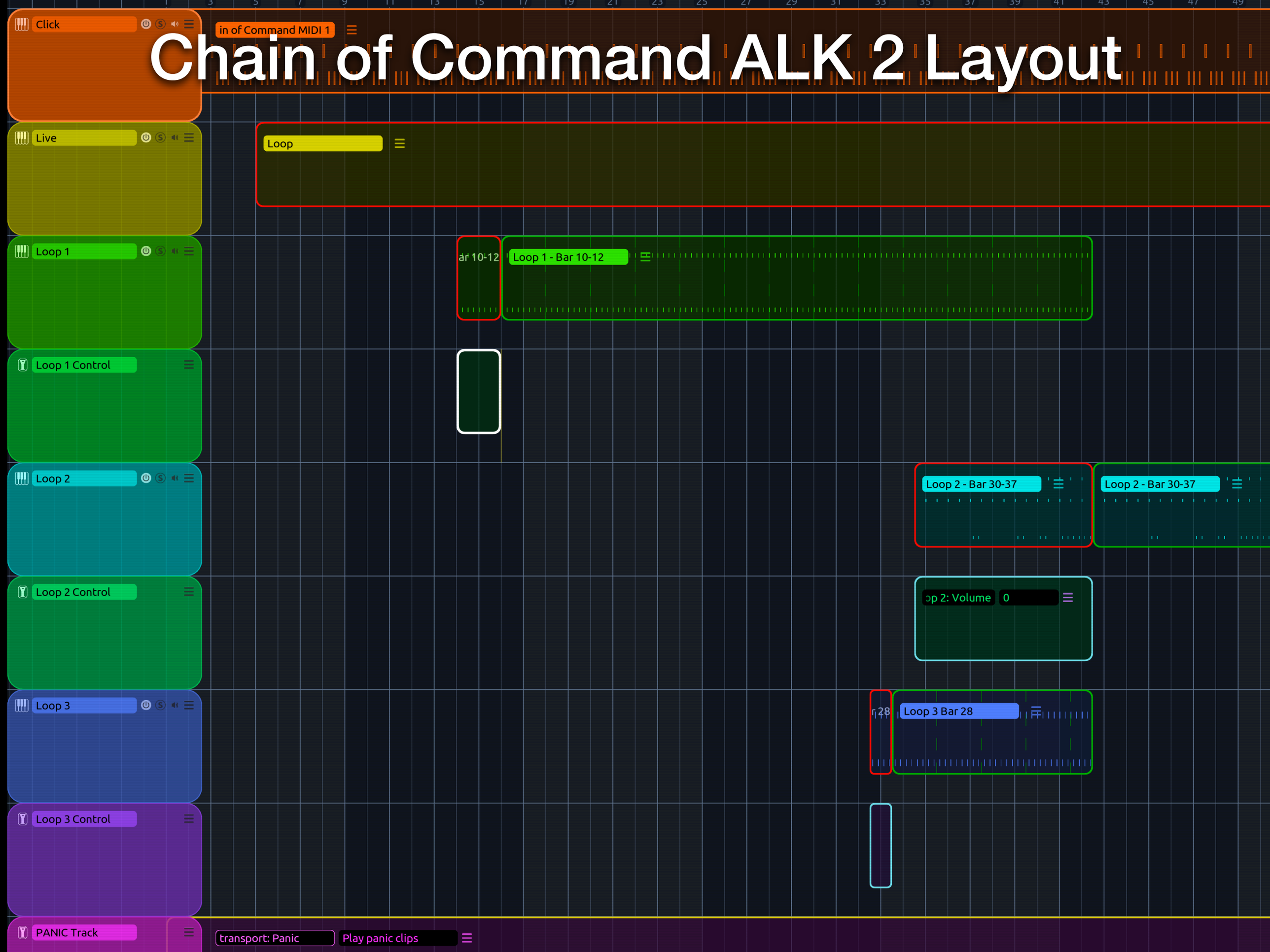
- Hardware Pedal (intended by composer, but not possible)
- Ableton Live or Apple Mainstage with Custom Mapped Pedals
- Sequenced Live Loop Software
  - Ableton Live with Audio Record Loops Automated
  - ZenAud.io ALK 2 Sequenced Looping Software

ZenAud.io ALK 2 Looping Software

- ALK 2 is a piece of software designed ONLY for sequenced live looping.
- There are not audio or MIDI editing features in this software—it's designed exclusively for these types of sequenced looping compositions.
- There are 5 main track types
    - Instrument - This type of track is used for software instruments, such as Kontakt 5 as mentioned previously.
    - Audio - This type of track handles all audio inputs and audio files.
    - MIDI - This type of track can pass MIDI information to other tracks.
    - Command - This passes MIDI commands such as On/Off/Trigger.
    - Control - This passes MIDI continuous control commands (CC).
- There are two main types of loops
    - Record Loop - This type of loop is where the mic, instrument, or control is actively being played, and is creating the loop.
    - Play Loop - This type of loop is where the mic, instrument, or control are not able to be played, but are looping based on a previous record loop.

ZenAud.io ALK 2
Eldad Zitrin Demo

Chain of Command ALK 2 Layout



Excerpt of

Chain of Command

by Graham Fitkin

Selected Works with Electronic Instruments

Composer	Work	Instrumentation
Graham Fitkin	Chain of Command	Sampling Mallet Controller with Live Loop Pedals
Vic Hoyland	Work-out for Marimba and KAT	Marimba and Mallet Keyboard Controller
Steve Reich	Electric Counterpoint (Transcription)	Mallet Controller with Fixed Media Accompaniment (Performer Created)
Philip Glass	Glassworks - Opening (Transcription)	Mallet Controller

Conclusion

- Electroacoustic Music is only becoming a larger part of percussion repertoire
  - Still not as popular as regular solo percussion music
  - As the curriculum changes to include works with electronics, the knowledge gap will become smaller and make it easier for students to get started.
  - The availability of technology makes it easier than ever to play these type of pieces

Conclusion (cont.)

- Due to the ever changing landscape of music technology, issues of performance practice and technological compatibility will continue to be an issue in the future.

  - Some works playable today might cease to be playable in the future, as a result of a discontinued piece of hardware or software, for example.

  - This has already happened with works by John Cage, as certain technologies used in his pieces such as analog radios becoming much harder to find as radio stations switch to digital transmissions.

Thank you for coming!