

Realtime Sampling System for the Turntablist Version 2: 16padjoystickcontroller

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ABSTRACT

In this paper, I describe a realtime sampling system for the turntablist, and the hardware and software design of the second prototype, *16padjoystickcontroller*.

Keywords

DJ, Turntablism, Realtime Sampling, MAX/MSP, Microchip PIC microcontroller, MIDI

1. INTRODUCTION

This realtime sampling system for the turntablist is a work in progress focused on developing live performance tools for the turntablist. The goal is to augment the turntablist's ability to create unique sounds from the turntable with a realtime system that will enable the turntablist to capture, manipulate, and playback those sounds during the performance. The *16padjoystickcontroller* is the second prototype of this project. The software program is written in MAX/MSP, and the hardware interface is a combination of homebrew controllers and off-the-shelf controllers.

2. BACKGROUND

In the past few years there has been a boom in the commercial market of DJ related products, both in software and hardware. Final Scratch [1] and QFO turntable [2] are amongst the most unique and innovative. However, for the turntablist there is little that is useful. Lead by pioneers like Christian Marclay and Grandmaster Flash who started to *play* the turntable in the late 1970's, turntable performance has become a distinctive form of musical expression. The primary interest of the turntablist is to generate sounds from the turntable and the DJ mixer, rather than playing and mixing pre-recorded music as the typical DJ does. Dr. Sample [3] and Kaos Pad [4] are some of the preferred tools, but because the turntablist uses both hands when s/he plays, these devices are impossible to use at the same time. For this reason, foot controlled devices for guitarists are commonly used, like the Line6 Pod series [5] and RC-20 [6]. But these devices all have their parameter controls by the foot pedal. This forces the turntablist to bend down each time when s/he wishes to change any of the settings during a performance. Another problem is that most hardware samplers do not allow sampling and playback at the same time.

This realtime sampling system is a project that emerged out of my own frustration and necessity as a turntablist. The first version, *footcontrolledsampler*, was developed in the NIME class at NYU ITP taught by Gideon D'Arcangelo, then later presented at NIME03 in Montreal. This second version was

developed in the Controller Design class, also at NYU ITP, taught by Eric Singer.

3. SYSTEM OVERVIEW

The system consists of one turntable, dj mixer, soundcard interface, laptop computer, and a controller device. (Figure 1) The sounds generated by the turntable and mixer are sampled and manipulated with the laptop computer, and returned to the dj mixer. All operations of the laptop computer are done through the controller device.

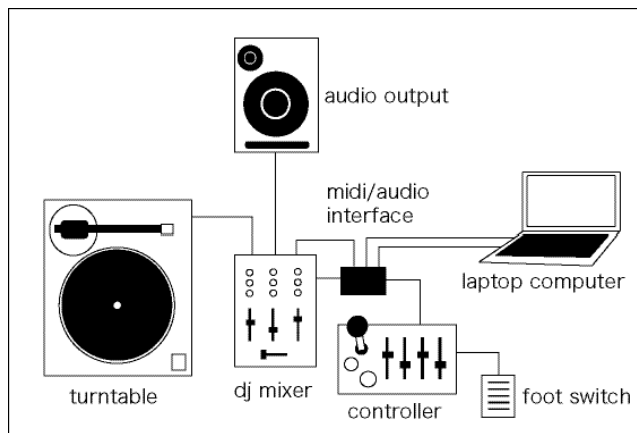


Figure 1. System Layout

4. INTERFACE

4.1 Hardware

The *16padjoystickcontroller* (Figure 2) is made of a 4-directional joystick with a set of buttons and knobs, a YAMAHA FC5 foot switch, and an AKAI MPD16 drum pad. The movement and logistics of the turntablist, and the set of MAX/MSP objects that I used in my program mainly influenced the design.

As mentioned before, the turntablist has both hands occupied while generating sounds. The only option for capturing these sounds by the same performer is with the foot. However, after the sounds are captured, the controls to manipulate these sounds need to be close to the turntable and mixer so this new interaction can blend in to the existing flow of the turntable performance.

The joystick component was inspired by the *waveform~* object in MAX/MSP. This object has a function where within the

sample, the user can control the length of the loop points with the vertical movement, and the location of those loop points with the horizontal movement of the mouse. I simply mapped the four directions of the joystick to the mouse input of this function.

The AKAI MPD16 was implemented for it's tactile feel. Either a sample is divided into 16 segments to be triggered individually, or pitch shifted 16 steps to represent an octave, depending on the mode.

All input signals, besides the MPD16, are sent to a Microchip PIC16F876 microcontroller, and translated to MIDI data. The MDP16 sends MIDI separately though USB. I chose MIDI as a protocol because the circuitry and coding are very simple with the PIC series and in MAX/MSP. The PIC was programmed with PICBASIC.



Figure 2. Version 2 – 16padjoystickcontroller

4.2 Software

The software program was written with MAX/MSP. (Figure 3) Four sample banks are prepared with their waveform, loop points, volume, joystick mode, and output level displayed. The main function is the loop point control that takes MIDI data from the joystick. The area between the loop points is colored gray in the waveform of the sample. The same data from the joystick is applied to other functions, such as panning and playback speed, when the joystick mode is changed.

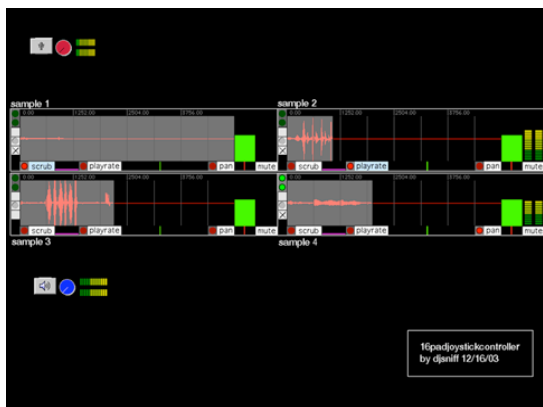


Figure 3. MAX/MSP program interface

5. FUTURE DEVELOPEMENT

The third version of controller and software, *Lupa 1.0*, is in development. (Figure 4) The hardware will improve by giving the turntablist easier control over each sample bank, and more feedback from the console itself. The software design will focus more on the GUI. The goal is to have the turntablist interact with the laptop computer as little as possible. Therefore a graphical feedback scheme that is simple and intuitive is crucial.



Figure 4. Version 3 – Lupa 1.0

6. ACKNOWLEDGMENTS

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7. REFERENCES

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