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EMID – Lehrman

## DrumPants

The brainstorming for this project took us in many different directions at first. We considered several different instruments before settling on a pair of pants that could turn the idle tapping we do during class, while working on homework, and everywhere else, into music. We all drum on our legs when we're bored, and thought it would be cool if we could make that fake drumming into real drumming. What we ended up developing was a really fun, intuitive controller that would make a fun toy for a long-time drummer or a beginner.

### How it Works

There are two parts to the drumpants. One part is the chord controller, which was designed and built by Aaron. Basically, it used max programming to voice lead through two different chord progressions, one was a chromatic descending fourths motion, and the other was heart and soul. The idea was to use progressions so that anyone could push buttons on the controller without knowing anything about music, and make something that sounds good, and that goal was achieved.

The rest of the instrument was designed to be simple and intuitive for a drummer, or as intuitive as a drumset would be for someone who had never drummed. Seven FSR's were glued between foam squares, hooked up through max to a drum patch in reason. Each FSR would trigger a different drum in the drumset. We had a kick, snare, hi-hat, ride and crash cymbals, and a high and low tom-tom. The foam pads had velcro on the back, and on a pair of extra-large sweatpants, we put the other side of the velcro in a simple configuration. The velcro allows the user to rearrange the drums in a configuration that is comfortable to them. The final piece was adding a function to record and playback. Using max, and two FSR's, one to record and one to play, we set up a

patch so that the user could record themselves playing a drumbeat. Then the patch would allow them to playback their beat and also play over it.

### Construction

The building of the drumpants was the simplest part, since it primarily required a lot of force sensitive resistors. Most of the work was just time consuming, rather than difficult. We spent a lot of time gluing the FSRs between squares of foam, and soldering long wires to the leads of the FSRs. A total of nine large FSRs and six small FSRs were used in the final project. There was also the attachment of the velcro to the resistors and to the sweatpants. One complication in construction arose in some interference we were getting between the sensors that shared the +5 volt source. To solve this, we wired some one mega-ohm resistors in parallel to the sensors. The resistors effectively knocked out almost all of the interference.

### Max

Just as with the first project, the max patch was the most difficult part of the assembly. The first part that was completed was Aaron's chord progression patch. He used a lot of math functions with bangs to make voice leading, and had number boxes keeping track of scale degrees, so in essence, the patch would keep track of what key it was in. Motion up and down through the chord progressions was controlled by FSRs, one up and one down for each progression. They were wired simply to bang when max read a 127 on the FSR, which was very easy to reach, because they were very sensitive. The FSR input was sent through a onebang, and was wired so that it would bang when it reached 127, but wouldn't bang again until the value dropped below 64, which prevented it from banging twice if the user accidentally held down the button.

The max programming for the actually drum part of the project was not terribly complicated. Similar to the bangs for the chord progression patch, each different FSR had a patcher that looked like the figure below, which is the patcher from the kick drum pad. When tapped, the FSR would bang in values into the makenote function, including a velocity, duration, channel, and the note number, that corresponded to a bass drum in the drumkit patch we used in reason, which happened to be thirty six. Each unique FSR was



patch Aaron found online called the ns\_kit7, which ran in the NNXT module. We used at first the keyboard, and then a slider in max to find out which midi note numbers corresponded to which drums in the patch. We then put those numbers into the respective patchers. The day of the presentation we played around with altering the sound of the drum kit to make it less synthesized by adding some distortion, and various other effects. For the performance we settled on a slightly distorted sound to give the kit a little edge.

### Problems and Afterthoughts

Overall, the assembly and creation of the drumpants wasn't too problematic, though there were a few things that gave us some trouble. Electrical interference and oversensitivity between the FSRs was a problem, though it was partially solved with some well placed resistors. Even so, during the presentation we had some problems with random FSR firing. Also, using the FSRs as drums worked well, but because of the onebang function which was necessary to prevent extra noise, it was hard to do rolls on our kit, or to play very quickly. Also because it takes some time for the FSRs to register the new resistance, it was sometimes hard to be precise while drumming. Occasionally a hit would not be detected, or the impulse wouldn't be long enough. One thing that may have helped this is if we used larger FSRs, or perhaps a different sensor that would be more responsive.

Although there weren't too many other technical problems, there were many other things we would have liked to add or could have added if we had more time to develop this project. One addition would include another pad that would scroll the the recording track, which would allow for multi-track recording. The max patch actually has the ability to record multiple tracks, but we didn't have enough FSRs to hook up more pads to allow the user to change tracks. Also, perhaps we could have taken from our first project, and implemented a channel changer, and added other options for the drum pants besides just a drum kit. We could have set up a bass with some bassline notes, different sound effects, or other interesting sounds. Another part of our interference problem was caused by the giant jumble of wires we had running from the pants to the Doepfer Box, which, if we had more time, we could have made a little bit neater.

### Summary

Overall I really enjoyed this project, and thought that the Drum Pants were a great MIDI controller. They were really fun not only to design and build, but also were great to play with. They achieved the initial desire to create a controller that turned idle drumming into real music, and also acts as an interesting controller by itself. Again, we had a great group of people, which helped in efficiently making a simple, intuitive and fun controller.

