Sound Sports:
E.M.S. – The Expressive Music Shoes

James Lin
Music 250A
with Wilmot Yeh
jameslin@stanford.edu

ABSTRACT
In this paper, I will discuss the Expressive Music Shoes (E.M.S.) and talk about the device’s functions, uses, and capabilities.

Keywords
Expressive, Improvisation, Music, Sounds, Shoe(s), Glove(s), Sound Box, Contact Points, Circuits, Songs

1. INTRODUCTION
The device I built is called Expressive Music Shoes. Along with the SoundBox and the Expressive Music Gloves, it is a completely portable music product that allows the user to play preloaded songs by either applying pressure to the shoe(s) or the glove(s).

2. CONCEPT
The concept for the Expressive Music Shoes came from wanting to create a musical device that was portable and could be played by using parts of the human body. The idea took on many shapes and forms before becoming the final product. Initially, the concept involved a jacket that would produce sounds based on the movement of the body. For example, if one were dancing or going for a run, the various twists and turns made by the body would output various musical notes.

The next evolution of the idea involved focusing on shoes and trying to make some musical device out of them. The first concept was for the shoes to be able to play individual notes, thus allowing the user to play any tune. However, this posed a problem as there was no simple method for mapping out an easy interface of even an octave of notes across two shoes. Therefore, that idea was thrown out.

Instead, I decided to focus on one capability: the ability for the shoes to play pre-loaded songs. Each step the user would take would trigger the next note in the song. Therefore, he/she would have complete control over the tempo, style, and expression of the piece.

3. PROCESS
I started by disassembling an old floor toy keyboard that I had. My idea was to take the device apart, analyze and figure out how everything worked, and then rebuild the parts into my shoes. I found out that I could create the triggers for my shoes by creating “contact points.” Each contact point would be its own circuit (with each circuit being connected to a central board which stored all the songs). In its initial state, each circuit would be broken. By completing any of the circuits, a contact point would be triggered.

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Copyright remains with the author(s).
between the two sheets, I was able to create a disconnected circuit that would be easy to make complete by applying some pressure.

I made two of these contacts points and attached each to the bottom of each shoe (see Figure 3). In addition, I made additional smaller contact points, and attached these to the side of the left shoe. These contact points would be used to trigger different songs that the shoes would play.

Finally, I decided to add the same functionality to a pair of gloves (see Figure 4). I made two more contact points and attached each to the inside of each glove. These contact points could be triggered a variety of ways, increasing the expressiveness of how the device could be played.

Both the shoes and gloves were connected to the SoundBox, which contained a speaker, a power source (requiring 4 AA batteries), and a central board that stored and outputted all the songs.

4. PERFORMANCE
The Expressive Music Shoes are very easy to pick up and perform. When you turn on the device (using the SoundBox), you trigger the song you want to play using the side of the left shoe. Once the song is triggered, you are ready to go. From this point, any contact point that is pressed will cause the SoundBox (which contains the speaker) to play the next note in the loaded song.

At any time, you can switch songs by triggering it with your shoe, or you can start the current song over again by re-triggering it. Unfortunately, there is no way to rewind or skip forward in a song.

The performance can be as expressive or static as you like. By combining various movements of the shoe(s) and the glove(s), one can put on a very dynamic performance. For example, one shoe can be tapping the ground, the other shoe can be kicking a ball, one glove can be hitting the body, and the other glove could be hitting a wall. The Expressive Music Shoes really does let the user explore the creativity of his/her performance and heavily implements the concepts of expression and improvisation. By being able to control this, one can generate different feelings just by how the song is presented to the audience.

5. PLAYING TECHNIQUES
The best part of the Expressive Music Shoes is that it can be played many different ways, it can be played as expressively as one wants, and it allows for the use of improvisation.

Using the shoes, you can trigger notes a variety of ways. You could walk around, dance with someone, go running, tap the shoe, rock back and forth over the shoe, step on stuff, or jump up and down. With the gloves, you could squeeze your hands, tap your fingers, press your hand on surfaces, clap your hands, apply the gloves on your body, or squeeze some object.

Since any contact point can trigger the next note in a song, there are a limitless amount of combinations one could use to play a song.

6. FURTHER DIRECTION
It would be great if the wires could be eliminated, in order to allow for more freedom in the movement of the body. In addition, the aesthetics could be improved if the shoes’ contact points were placed inside instead of be attached to the outside bottom. It also might be worth looking into eliminating the SoundBox and building the speaker(s) into the shoe as well, thus making the device entirely self-contained.

The addition of more contact points could also be a great way to expand the device and create more possibilities for an expressive performance. For example, I could build contact points in a hat, on a jacket, or in a pair of sweatpants.

In terms of control, it would be nice to be able to control the volume of the song based on how hard the contact point is hit. So if one were to be jumping up and down, the song would be loud, but if one were to be casually gliding around, the tune would be more peaceful.

In the future, it also might be worth exploring again the possibility of having the shoe(s) or contact points play individual notes instead of just a pre-loaded song. Obviously, with the expansion of more contact points throughout the body, it would be much easier to do this. In this case, the ability to record and playback a user’s melody could also be incorporated into the device.