

EAMIR – an interactive music system for education

by V.J. Manzo

Imagine a room where music is produced simply by touching the wall or the floor. Imagine a room where physical gestures that you've used since birth are mapped to notes and harmony. Imagine a room with new musical instruments designed to let individuals without any formal music training create and perform meaningful music.

EAMIR (Electro-Acoustic Musically Interactive Room) is an interactive music system that allows individuals with mild and profound disabilities to create a unique, tonal musical expression without the physical and technical limitations found in the performance of traditional acoustic instruments.

EAMIR instruments connect with original software designed to allow these individuals to create music by using physical gestures that individuals are familiar with. The EAMIR instruments are accessible interfaces such that can be played by stepping on a foam floor tile, touching an LCD screen, waving a hand in the air, etc. Each of these gestures produces a meaningful series of musical events that are fully customizable.

I have been a K -12 music educator for many years and I began the EAMIR project as a way to get my students (in particular, those with special needs) to the place where they can create tonal music, not just noise, with ease by using sensors and original interfaces. My goal, in a very “Suzuki” way, was to get these students using gestures that they were already familiar with to control the performance and make the computer interpret these gestures to create music. The computer would be used to supplement a lot of the mental musical concepts like tonality and form that the students will develop later. This allows the student to compose and perform in a new and liberating way.

One of the first EAMIR systems was a piece of software called Lazy Guy that allows a student to wave a laser pointer in the air to create music. The color of the laser pointer is tracked by the software and, depending on its horizontal orientation, produces notes from low (far left) to high (far right). The notes can be filtered from atonality to any note mode with any tonic. The software can also be mapped to control chords (like the 7 chords that occur naturally in a given scale). A user could then play all of the chords in a given key just by pointing the laser at different parts of the screen. The vertical orientation of the laser controls dynamics, adding even

more performance expression. It's conceptually a lot like a Theremin except that it is easier to control, much more space and cost efficient, and the pitches can be restricted to a single diatonic mode.

The EAMIR software is entirely open source. This means that any educator (or student) can download a standalone application (Mac or PC) to use in their classroom and then, if they want, download the source code and customize it for their own needs. All of the EAMIR software is written in a language called Max (Max/MSP/Jitter by Cycling '74).

Max is a powerful graphical object-oriented programming language that is much different from traditional functional programming. There is no command line—programs are created graphically by flowing data from one object to another. One of the best parts of Max is that you can easily integrate objects and code written in other programming languages like C, Java, and LISP.

In addition to using new interfaces for musical expression, the EAMIR project has software to connect with numerous interfaces that your students are already familiar with such as Nintendo Wii-motes, Dance Dance Revolution pads and Guitar Hero controllers. Through the Guitar EAMIR-o software, I mapped the buttons on the Guitar Hero controller to play the notes of a scale (any mode and any tonic). There is a button that will shift octaves and a button that will enable each of those scale degrees to become chord functions. In a recent class, I had one student play chords and another student play a solo on top of it. Since they already knew this interface so well, they were able to compose and perform music easier than if they were using a glockenspiel. All of these controllers are unmodified so students can bring in their own controllers from home and simply plug in to your computer.



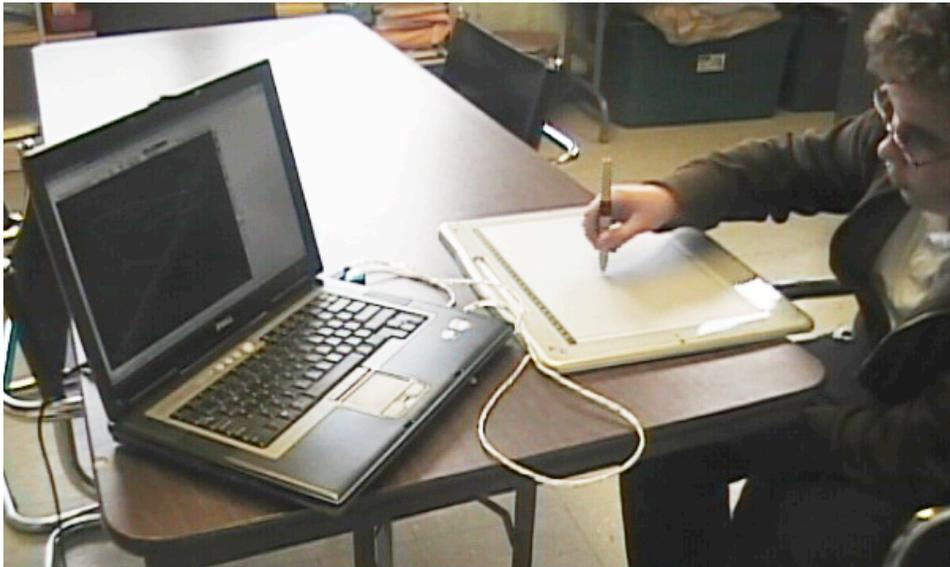
Two students using the Guitar Hero controller and EAMIR software to play chords and scales in the key of C Major

The Tiles project allows students to step on a foam floor tile to create music. The amount of force they exert on the tile is measured using sensors by Electrotap and mapped to pitch so that if they step down on the tile and then really put their weight into it, they'll hear a low pitch glissando into a high one. Different tiles can be mapped to different sounds and, as I mentioned, since the software is open source, programs can be made that allow the tiles to be used in limitless ways.



A group of students explore the sonic effects of exerting force on these foam tile pressure sensors

With the EAMIR software, teachers specify the tonic and mode and can easily perform with students that would otherwise have great difficulty performing and composing. One of the best parts of EAMIR is that, in time, students begin to conceptualize about musical things like chord functions and tonality while gaining an understanding of the relationship between physical gestures of the performance and their affects on things like dynamics and spacialization.



A 6th grader using a graphics tablet and EAMIR Monochrome software to simultaneously draw and compose music

The implementation of EAMIR in a classroom is easy and inexpensive. For information on EAMIR including downloads, documentation and video demonstrations, visit <http://www.eamir.org>. The EAMIR project is constantly expanding with new software and new controller ideas. Free registration is required so that we can notify you when new interfaces and software are available. Since EAMIR is an open source community, you can create your own software and post it on the EAMIR site for other educators to use.

EAMIR was created by Vincent Joseph Manzo in 2007. He is a professor at Kean University and Montclair State University where he teaches courses in music technology. For more information on his research, visit <http://www.vincemanzo.com>.