Musician Maker: Play expressive music without practice

John R Buschert Goshen College 1700 S Main St Goshen IN 46526 johnrb@goshen.edu

ABSTRACT

Musician Maker is a system to allow novice players the opportunity to create expressive improvisational music. While the system plays an accompaniment background chord progression, each participant plays some kind of controller to make music through the system. The program takes the signals from the controllers and adjusts the pitches somewhat so that the players are limited to notes which fit the chord progression. The various controllers are designed to be very easy and intuitive so anyone can pick one up and quickly be able to play it. Since the computer is making sure that wrong notes are avoided, even inexperienced players can immediately make music and enjoy focusing on some of the more expressive elements and thus become musicians.

Keywords

Musical Instrument, Electronic, Computer Music, Novice, Controller

1. INTRODUCTION

The origin of Musician Maker came from two ideas. 1. Make electronic instruments that are so natural that a person instantly knows how to play them. 2. Allow the computer to constrain the specific notes to good sounding ones. The hope was that a novice player could immediately focus on expression and improvisation – two areas typically developed only after extended time learning the basics of an instrument. It turns out that these two ideas are connected. Having the notes be somewhat constrained makes it much simpler to design instruments that are especially natural to play. The player need only provide a rough guide for the pitch and the computer decides the rest. This removes the difficulty that often takes a long time to learn: being able to play exactly the right note.

Nishimoto [1] et. al. suggested that versatility in musical instruments is not always an advantage. Their experiments showed that having a computer constrain the pitch on a special keyboard instrument could allow the player to be equally or even more musically expressive than a traditional keyboard. We are exploring that idea beyond the keyboard.

Much work on controller design has underscored the need for physical or haptic feedback to the player to give a direct sense of control. Bongers [2] suggested the name articulatory feedback for the sense of what is being produced at the point where it is being manipulated. In choosing controllers, we have

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avoided touchscreens for their lack of this important feedback and we have focused instead on systems with mechanical action that itself gives some haptic feedback.

It should be noted that the aim here is not to replace traditional instruments. There are elements of traditional music making that cannot be accomplished this way. Rather, the aim is to somehow open up the fun of making certain types of music to a wider variety of people – to make anyone into a musician. Let the computer handle some of the tedium of getting exactly the right note while still giving the player as much expressive freedom as possible. There is a clear tension here and we are still exploring it.

2. IMPLEMENTATION

Musician Maker consists of several controllers connected to a PC running a Python computer program which then outputs MIDI signals to a standard sound module. The computer program plays a background accompaniment which consists of a simple chord progression read from a score file. The players play music with their various controllers much as if they were ordinary musical instruments but with certain constraints. The computer program takes the signals from the controllers and adjusts the pitches somewhat so that they are limited to playing notes which fit the chord progression. In our present program, the allowed notes are just the usual notes of the chord – for a C chord, only the notes C, E, and G would be allowed.



Figure 1. The components of the Musician Maker system

The first three controllers we developed (shown in the video) are the Obloe, the Pluck n Play, and the Baronium. The design of the controllers follows from the aim of having enjoyable instruments that are exceedingly easy and natural to play. So the Obloe has a breath sensor since blowing to create a sound is very common. Many toys involve blowing to create a sound and most people can whistle so the basic act of blowing to

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make a sound needs little or no training. But most wind instruments control the pitch using complicated fingerings that take time to learn. In contrast, the pitch of the Obloe is controlled by simply twisting the end. Twist one way for high notes, the other way for low notes, the further you twist, the higher or lower the note. This would still be difficult to master if it were necessary to set the pitch exactly. It would be comparable to a beginning string player who needs to learn the exact finger placement to play in tune. But we are sacrificing some amount of control (let the computer do some adjusting) to gain an immediate ability to play fun music and still be expressive through timing, dynamics and some control of melodic direction. So the signal from the controller is taken as a general indication of what the player wants, but the computer then picks a precise note that fits the chord progression.

The Pluck n Play has a similar simplicity. The player plucks a small flexible tab to produce a sound whose volume depends on how hard the tab was plucked. For pitch control we have a simple slider that moves up and down connected to a stretchy length of rubber tubing. One question that came up was whether high notes should be up or down given that a string bass has high notes down. We made the software switchable but most people favor high notes being up even if they play string bass. The main reason seems to be that the tubing stretches and pulls against the slider as it is moved up (it is anchored on a force sensor to determine the slider position). We seem to have a natural association of tight with high notes.

The Baronium is perhaps a bit like a keyboard instrument but without any keys. Instead it has one long bar placed sideways. Pressing on it makes the sound and pressing harder makes it louder. The pitch depends on where you press.



Figure 2. The Baronium controller

We have developed two more controllers since the video was made. One is a marimba-like instrument but it has only one large bar. We call it the Marimbar. Pitch is determined by where you strike the bar and volume by how hard you strike. The other controller is harder to describe since it is not like any traditional instrument. It is called the Sway and Play and is something like a standing joystick. The note is produced by squeezing, a bit like a squeeze toy except that the note is sustained as long as you keep squeezing and responds to how hard you squeeze. The pitch is controlled by pushing the stick forward and back.

The computer generates MIDI messages for each of the controllers. We chose sounds that fit the type of instrument. The Pluck and Play is a string bass sound and the Obloe is a woodwind sound. The Baronium is not much like any physical instrument in its mechanics. It may seem superficially like a piano but it has no piano-like action or free travel. The bar is on supports that bend somewhat to sense the force and the note

can respond to aftertouch. We have found it works best with an accordion-like sound.

Improvisation and expressiveness are the aims. These are accomplished by letting the player control all the timing and the volume with no modification. So the expressive elements of dynamics and tempo are completely available. The melodic line is more constrained by the computer to fit the chord progression. It might be described as consisting of arpeggios on the chord of the moment. But still within that is wide latitude to move up or down the scale as another avenue for expression. We have not yet implemented ways for the player to bend pitches or to break free of the constraints when desired, but these are future possibilities.

3. FURTHER POSSIBILITIES

One area of interest is to make the constraints more sophisticated. We began with the simplest approach which limits the player to just the notes of the chord for the full duration of each chord. But we are exploring more complicated approaches such as allowing more freedom off-beat but still the full constraint on the primary beats, or allowing more freedom at some points in the song or among some instruments than others. Another possibility is to have the player in control of the constraint, choosing when to release it for more freedom. This would still allow beginners the ease of depending on the constraint until they wish for more control.

A second area of interest is in having one player in some kind of control of the accompaniment track. Simplest but still not trivial would be a player waving a baton to control the tempo. This player or another player might also control other characteristics of the accompaniment track or even the chord progression itself. Ultimately it may be possible to make the accompaniment track more like one of the instruments so that the players controlled nearly everything.

We also continue to build new controllers and have ideas for many more. In doing so, we are always looking for actions that have a natural connection to sound creation and thus will be intuitively easy to play.

4. CONCLUSION

Musician Maker demonstrates a new approach to musical instruments in which some of the tedious difficulties are handled by the computer while other elements important for expression and improvisation are controlled by the player. In this new realm, it is possible for novices to enjoy creating interesting music with virtually no training. For instrument designers, the system can serve as a laboratory for learning how to make interfaces that are truly natural and intuitive. For teachers, it introduces a new route to help young musicians focus on expressiveness and improvisation even before they have mastered a traditional instrument.

5. ACKNOWLEDGMENTS

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