Rhythmic Instruments Ensemble Simulator Generating Animation Movies Using Bluetooth Game Controller

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ABSTRACT

We developed a rhythmic instruments ensemble simulator generating animation using game controllers. The motion of a player is transformed into musical expression data of MIDI to generate sounds, and MIDI data are transformed into animation control parameters to generate movies. These animations and music are shown as the reflection of player performance. Multiple players can perform a musical ensemble to make more varied patterns of animation. Our system is so easy that everyone can enjoy performing a fusion of music and animation.

Keywords

Wii Remote, Wireless game controller, MIDI, Max/MSP, Flash movie, Gesture music and animation.

1. INTRODUCTION

Many persons have a desire to perform music with instruments. However, playing musical instruments requires some degree of training, and as a result, it is difficult to obtain the skill of performing well.

Recently, as computer technology advances, numerous music video games have been developed as simulators of musical instrument performance, for example, Beatmania or Guitarfreaks of Konami. However in those games, players are so passive that they are only pushing buttons on controllers according to preloaded music. They cannot perform their own music. A video monitor shows only the performance data and provided images.

In this paper, we proposed a musical instrument performance simulating system, which generates animation. Players use a normal wireless game controller known as a Wii Remote, which is developed by Nintendo using Bluetooth technology. They can play rhythmical instruments by operating the controller. The action of players is reflected to sound data, such as velocity, timing, etc. Additionally animation movies are generated based on the sound data. If multiple players perform an ensemble, each player generates his own movie and influences the images of the others. They can enjoy a performance by not only music from the ears, but also animation from the eyes.

2. METHOD

2.1 Concept

We use rhythmic instruments as a musical ensemble, which include drum sets and percussions in various genres, such as pop, latin, ethnic, techno, etc. They have no clear melody and it is easy to make a sound by a comparably simpler action like hitting than other melodious instruments. The performing action is directly related to the generating of sound expression. Even beginners or children can play them in a demonstration.

We use a Wii Remote as the wireless controller by Bluetooth technology, which is easily connected to a computer. In past reports, Bluetooth controllers are often used for musical performance [1][2]. Wii Remote is an obtainable device on the market at a reasonable price, and has useful operation. A wireless device can make it possible to construct an unfettered environment for the music performance, and players can perform freely from bothersome wires. Wii Remote has three axis acceleration sensors, and various physical motions can be detected, such as shake, hit, slide, turn, twist, etc. Rhythmic performance is highly related to these handy actions, and it means players directly make rhythmic sounds by handling it.

Our system generates animation movies synchronized in real time with music performing by players. The visual aspects of playing music are as important as the sound itself. Players enjoy performing music more by animation, which can be controlled and make various patterns synchronized with musical expression such as tone, velocity, tempo, etc. If multiple players perform an ensemble, an animation generated by each player interacts with the others, and as a result, variations of animation are increased. The interaction of movies is interesting for all players related to the ensemble, because unexpected motion graphics are generated. In our system, a maximum of four players can perform together at a time.
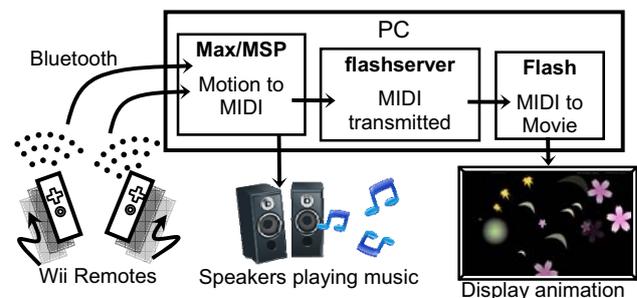

Figure 1. System configuration.

2.2 System Configuration

Our system is configured on a PC, Wii Remotes, speakers, display, Max/MSP software, and Adobe Flash player (see Figure 1).

Players perform rhythmic music by handling Wii Remotes. The motion data of a controller are transmitted to the Max/MSP. The aka.wiiremote [3] external for Max/MSP can handle the Wii Remote. In the Max/MSP, motion data are transformed into musical expression data of MIDI. Acceleration data are assigned to MIDI parameters such as, note number, velocity, duration, and some control change values, which cause a MIDI sound module to generate music. The flashserver [4] software allows for a communication between Max/MSP and Flash. The MIDI data are transmitted to Flash to be transformed into animation control parameters, such as, color, shape, motion, timing, etc. As a result, music and animation are synchronized with the action of players.

In the case of multiple players, basically it works similarly except for the animation. If a collision of two animations originated from different players occurs, both animations are interacted with each other to change their patterns of movies.

2.3 Performance

To perform music, we aim to evolve to more creativity, while keeping the simplicity and popular attractiveness. A player uses the Wii Remote like beating a drum to generate sounds and animation movies. The generated sound is one of rhythmic instruments selected in advance. Anytime a player can change his instruments by pushing buttons on the Wii Remote. Each button has assigned rhythmic instruments, such as hi-hat, snare, kick, cymbal, bongo, conga, wood block, triangle, castanets, maracas, etc. The vertical axis of an accelerometer is used to trigger sounds with velocity, and the horizontal axis to change tones and colors. Our system can handle a maximum of four Wii Remotes at a time.

The generated animations are consisted of moving patterns of small geometrical figures or graphics of natural products such as leaves, flowers, stars, lightings, etc. As the motion gets faster, the volume of sound and the size of patterns of animation become lager (see Figure 2). Each controller has its own color for drawing graphical patterns, for example red, yellow, green, and blue. If the different colored patterns are collided, two colors are mixed to make a new color and the size, direction, and velocity are changed. Consequently, multiple players can perform an ensemble in animation movies.

Figure 2. Screenshot of movie collaborated with two players.

3. DISCUSSION

In 2006 we developed a circle canon chorus system for enjoyable singing ensemble [5]. In its demonstration someone hesitated to sing. Meanwhile, our rhythmic performance system is easy to play without feeling shy. In a demonstration, everyone enjoyed playing rhythmic music and was surprised by the generated animation. Additionally, our system can connect a normal MIDI controller via the MIDI interface, for example, MIDI keyboard, MIDI guitar, and Wind synthesizer (see Figure 3). Therefore, we can perform a session with melody or chord instruments, and a different type of animation ensemble is expected. Some photos and movies of the demonstration are shown on our web site [6].

4. CONCLUSION

Using a Wii Remote, we developed a rhythmic instrument performance system generating animation, which is so easy that everyone can enjoy it. In the near future, we will build a friendly interface for playing more varied instruments and enjoying the ensemble of sounds and images.

5. REFERENCES

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Figure 3. Ensemble of Wii remote, wind synthesizer, and MIDI guitar with animation projected in a back wall.