Mims: Interactive Multimedia Live Performance System

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Abstract

We introduce Mims, which is an interactive-multimedia live-performance system, where pieces rendered by a performer's voice are translated into floating objects called voice objects. The voice objects are generated from the performer's current position on the screen, and absorbed by another flying object called Mims. Voice sounds are modulated by the behavior of Mims. Performers can control these objects and sound effects by using their own gestures. Mims provides performers and their audiences with expressive visual feedback in terms of sound manipulations and results.

Keywords: Interaction, audience, performer, visualize, sensor, physical, gesture.

1. Introduction

A performer's physical appearance plays an important role in live musical performances using laptops [5]. If the performer just stands behind the computer and manipulates his or her keyboard or mouse to generate sound, the audience may not understand what is happening on stage. The audience may also not be able to recognize whether this performance is in real time or is a pre-recording and may become bored. Reeve et al. called laptop performances ' secretive ' interaction [10]. They claimed that the way interaction is expressed between the performer and the computer affects the audience's experience and various artists use their voice and gestures to directly demonstrate their physical interaction with the computer to their audiences. Such voice performers [4][11] apply sensor devices to control the parameters of sound-processing programs. As these sound-processing programs, e.g., granular synthesis [8], automatically modulate pitch and the panning position, performers can assign complex-sound manipulations to these. In these live performances, audiences can appreciate modulated sounds and performers' movements at the same time. However, according to the first author's experience, both performers and audience find it hard to accurately recognize complex-sound conditions. For instance, it is difficult to identify the correct panning position for granular synthesized sound only from speaker output. In such situations, the audience may assume these sounds are just randomized because they are not always familiar with sound-processing programs. A performer may make a mistake in the next manipulation because he or she is not aware of the current-sound conditions. Fels et al. emphasis on the transparency of these sound manipulation [5]. We considered that only providing sound feedback is inadequate for live performance system, and some visual feedback would be necessary to enable audiences and performers to recognize process and result.

Based on these reasons, we developed Mims, which is an interactive system providing the performer and the audience with expressive visual feedback of sound manipulation. The system generates various graphical objects that symbolize the performer's voice on a screen from his or her standing position. There are other objects called mims to on the screen, whose positions and shapes are manipulated by the performer's gestures. When voice objects fly into mims, the mims hold them into themselves and modulate their sound outputs along with their own positions and shapes. As the panning parameter for the performer's raw voice is determined from his current standing position, the audience can easily identify the relationship between the visuals and the performer. The performer recognizes the current pitch and panning position or the modulation effects to the sounds from the visuals.

2. System Architecture

2.1. Overview

The system consists of a projector, two speakers, wearable sensors, vision sensors, and a wireless microphone system. All sound and video processing was programmed, using Max /Msp/Jitter [3]. Figure 1 shows an overview of the system architecture.

2.2. Hardware

Some performers use their original wearable instruments to manipulate their particular performance [7] [9] . We also

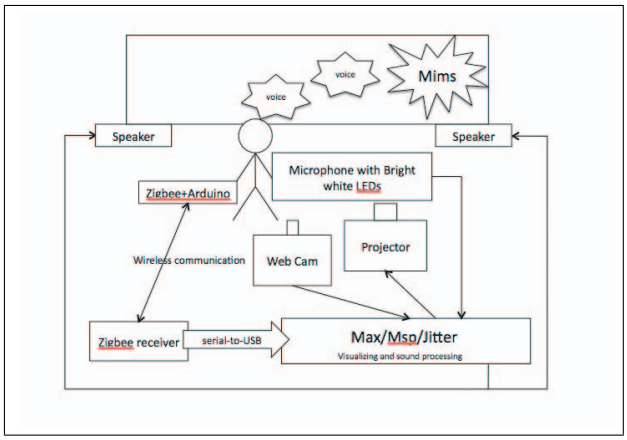

Figure 1. System Architecture

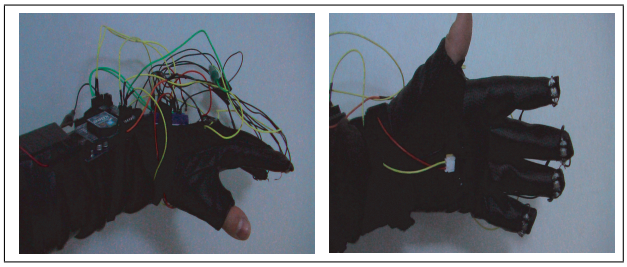

Figure 2. Hardware

made our original sensor glove to control mims. Development is still in progress. We present our prototype version in this paper.

We implemented buttons, a 3-axis accelerometer, and an infrared (IR) detector on the left glove to obtain information on the performer's gestures. An Arduino microcontroller board [1] received all the sensing data and sent them to the computer via an Xbee module [12] . The Xbee receiver was connected via a serial-to-USB port to the computer that fed the information to Max/Msp/Jitter.

2.3. Vision Sensor

We used a Web camera and bright white LEDs on the performer's right glove to track the position of the performer. The thresholding process enables the Web camera to track the correct location of the bright white LEDs on the performer's glove without being distracted by visible light. All video processing was done using Jitter with the cv.jit library [2].

2.4. Sound and Visual Manipulation

The voice sounds of performer is sampled per 50 milliseconds. All sampled voices convert into voice objects flying inside Mims objects. For instance, mims does not lock voice objects inside of them, they just fade out and the simple sound of the raw voice is played back. This causes delay-like effects. If mims lock the voice objects inside of them, voice sounds are played back in loop mode until they release them. The performer determines whether mims will

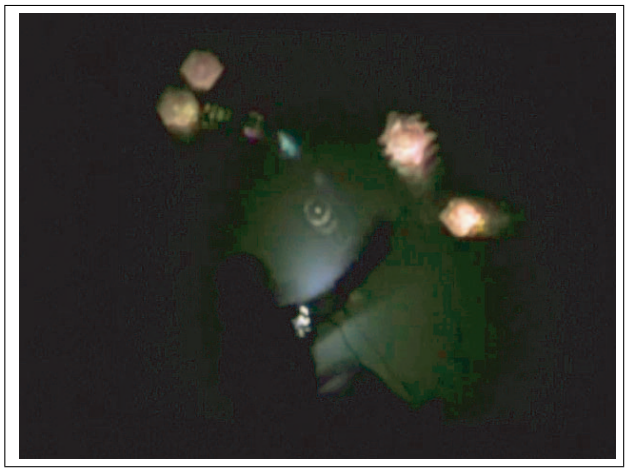

Figure 3. Snapshot of Performance

lock the voice objects or not by using a button on his or her glove. The performer uses the 3-axis accelerometer and IR detector to change the shape of mims, which means the type and depth of sound modulation. For example, if the performer's left palm face the right hand, mims become jagged, and the sound playback positions and directions are randomized. The sound's pitch and panning position are controlled by the position of mims. The performer changes the position of mims by using the position of his or her left hand. We also implemented a multiple and automatic Mims mode to create sounds with complex layers.

3. Conclusion and Futurework

We introduced Mims, which is an interactive-multimedia live-performance system that enables performers and audiences to obtain expressive visual feedback for interaction with computers. We now discuss the appropriate gesture mapping, and are currently working on creating even smaller sensor devices. We also plan to create multiplayer version of Mims system for installation.

The video of the latest version of Mims system is available on http://www.vimeo.com/3036685.

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