Composition for Conductor and Audience: New Uses for Mobile Devices in the Concert Hall

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ABSTRACT

Composition for Conductor and Audience is an audience interaction piece first performed for an audience of over seventy-five people in June of 2011. The audience becomes the orchestra in this composition as they control different musical variables using the touchscreen surfaces on their personal mobile devices. To the authors' knowledge this is the first concert piece for bi-directional networked interactivity on audience-owned mobile devices to ever be performed. Audience members participated using the iOS / Android application "Control", a generic solution for creating touchscreen interfaces written by the first author. Over twenty members of the audience participated in the performance, matching gestures made by the conductor with corresponding gestures on their mobile devices.

Author Keywords

Music, mobile, network, interaction

ACM Classification Keywords

H5.5 Information interfaces and presentation: Sound and Music Computing: Methodologies and Techniques.

General Terms

Experimentation, Performance

INTRODUCTION

Musical concerts have traditionally positioned the audience as passive listeners. However, advances in technology in recent years have engendered new strategies for enabling audience participation. These range from the Boombox Experiments of the rock band The Flaming Lips, who gave audience members boomboxes with cassettes inside and directed individuals to play them at particular times, to the more technologically ambitious experiments of Jason Freeman, who explores large-scale tracking of audience movements using computer vision techniques[1].

Composition for Audience and Conductor enables audience members to control musical parameters of a performance using their personal touchscreen devices. After a brief introduction on how to participate, the conductor cues the beginning of the piece and directs the audience by slowly moving

one arm up and down. Audience members are instructed to move a simple virtual slider in response to these gestures. Up to eight audience members may participate simultaneously; the exact number depends on the varying number of sonic parameters exposed for control at each moment of the composition. Audience members with devices that are not controlling musical parameters await activation in a queue. This queue, along with the conductor's gestures and the gestures of all participating audience members, is visualized and projected for the audience to see.

Although participants are assigned a number, participation in the piece is relatively anonymous; the conductor has no idea which participant is assigned to which number. The conductor is, however, informed of how the anonymous audience members are complying with his or her wishes via the display of a touchscreen control surface. If an audience member is not obeying the conductor the conductor can cut them from the piece by pressing a button labelled with the number assigned to the participant. Participants who have been cut are placed in the queue to await reactivation. The personalities of different participants lead them to either follow or ignore the gestures of the conductor; "disruptive" audience members can be quickly cut from the performance. This creates the conceptual basis for the piece: will anonymous audience members choose to obey a conductor who has no real power over them?

IMPLEMENTATION

The software implementation for audience participants and their mobile devices was realized using the iOS / Android application Control[2], written by the first author. At the time of the performance Control was only available for iOS; an Android version has since been released. Control enables a number of important features of this performances. Devices running Control are auto-discoverable using the Bonjour/Zerconf protocols, and once a device has been discovered servers can push interfaces to it over the network. These interfaces can be modified dynamically over the course of the performance.

Control is not an application written specifically for this piece; it is a generic solution for realizing touchscreen interfaces for controlling musical, artistic and virtual reality projects that has been downloaded over twenty-thousand times since its release earlier this year. Projects realized us-
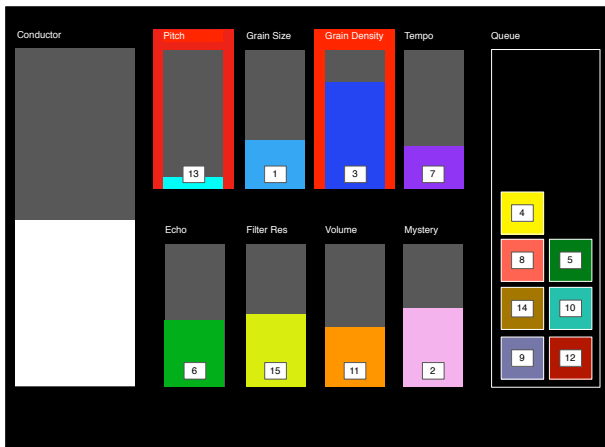
Figure 1. Visualization projected during the performance. The conductor's arm movement is represented on the left, the participants in the center and the queue of waiting participants on the right. Two participants, highlighted in red, are not matching the conductor's gestures and are thus deemed in violation.

ing Control range from navigational controls for a simulation of nanoscale cancer treatment delivery to touchscreen interfaces controlling the light and sound setups of large theater venues.

The logic of the piece and the visualizations are handled by a server running LuaAV[3], a prototyping platform for media arts based on the Lua programming language. The LuaAV script communicates with the mobile devices (and vice-versa) using Open Sound Control (OSC)[4], an open-ended UDP based network protocol common in the digital arts. The music is created using the electronic music application Ableton Live.

PERFORMANCE
The piece is composed of six separate scenes, with each scene lasting approximately one minute, presenting and arranging a variety of ambient noises and textures. Each scene has different parameters that it exposes for control by the audience; the visualization and the mobile device interface lets participants know what sonic parameter they are controlling.

Before the piece begins, a server scans the wireless network for devices running the Control application. Whenever a device is found the server immediately pushes it a welcome screen that informs the device owner they are connected and to wait for the commencement of the piece. The conductor cues the beginning of the piece through a touchscreen interface designed in Control; this interface also allows the conductor to cut participants from the performance and advance from one musical scene to the next.

At the beginning of the piece, each participant is presented with an interface, assigning them an anonymous number and indicating whether they are currently part of the performance or awaiting activation in the queue. Eight initial participants are selected at random to control musical parameters and presented with a slider to try and match the gestures of the

conductor. The conductor holds a smartphone running Control while conducting; Control tracks his gestures using the phone's accelerometer and gyroscope and sends this information to the server to be visualized. When an audience member fails to follow the actions of the conductor within a generous given range of tolerance (twenty percent), a flashing violation warning appears on their mobile devices. As shown in Figure 1, the visualization projected to the audience also shows which members are not following along by highlighting them in red. If the audience member fails to change their behavior and follow along the conductor is free to cut them from the performance. The cut is reflected in the projected visuals with a briefly flashing large red X and accompanying buzzer sound.

RESULTS AND CONCLUSION
The piece was first performed in June 2011 to an audience of over seventy-five members. Twenty-four members participated in the piece and downloaded Control immediately prior to the concert; instructions on how to download the software and join the local wireless network were projected while audience members were taking their seats. Although audience members responded enthusiastically to the piece there were technical challenges related to the auto-discovery system that have since been overcome in the Control software. These technical problems led to a different performance environment than the authors had originally envisioned; some audience members were helping each other, trying to solve technical problems during the piece and creating a low-buzz of conversation. In retrospect, this may have helped the piece be more entertaining; participants did not feel out of place exclaiming when they were cut from the piece or had been selected to participate.

During the initial performance of the work Control was only available for iOS through the App Store; it is now also available for Android devices via the Android Market. Future performances of Composition for Conductor + Audience and other audience participation pieces should thus be open to even higher levels of participation.

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