

Digital Musicianship Training for Classically Trained Music Students in a Laptop Orchestra

Lee Cheng

The Hong Kong Institute of Education
lcheng@ied.edu.hk

Abstract

Laptop orchestra is a music platform that focuses on collaborative music making within a computer-mediated environment. It is usually formed by an interdisciplinary team with expertise in different disciplines such as music, composition, multimedia, and computer science that contribute to various aspects of a laptop orchestra. The iLOrk presented in this paper is a laptop orchestra from the Hong Kong Institute of Education that specializes in teacher education. It was formed by a group of music education students who were not familiar with computer music and performance technology. To complement the team's lack of a technical foundation, it is necessary to develop iLOrk members' knowledge and skills in the manipulation of digital instruments and participation in a laptop orchestra performance. A series of activities were designed to transform their classically oriented musical competencies into technologically oriented digital musicianship, including (1) development of an iOS app *i-Orchestra* for orchestral simulation; (2) the use of MIDI controllers as musical instruments; and (3) compositional work dedicated to a laptop orchestra. This paper details the strategies and pedagogical considerations in the digital musicianship training of classically trained members of this laptop orchestra.

Keywords

iLOrk, laptop orchestra, digital musicianship, i-Orchestra, iOS app

Introduction

Laptop orchestra is a music platform that has recently become available as a result of advancements in mobile computing and audio signal processing technology. It enables individuals to perform music collaboratively in a computer-mediated environment. As a new type of collaborative music-making platform, a laptop orchestra shares various performance practices with other conventional music ensembles, such as orchestras, choirs, and concert bands. Those existing forms of music ensemble follow their historically informed practices that have accumulated for centuries. Without an established performance practice framework, a laptop orchestra is more open to sonic experimentation. For example, a composer's musical ideas may not necessarily be represented by conventional staff notations with fixed pitch and timbre, regular rhythm, and standard

instrumentation. A laptop orchestra is usually formed by an interdisciplinary team with expertise in different disciplines such as music, composition, multimedia, and computer science that contribute to its various aspects.

Early documentation of laptop orchestras can be traced back to Truman [1], who explored the motivation of the formation of the Princeton Laptop Orchestra (PLOrk), which was founded in 2005 driven by the curiosity of music creation with a large group of people playing computer-based meta-instruments. The Stanford Laptop Orchestra (SLOrk) is another successful premier laptop ensemble founded by Ge Wang in 2008 [2]. Most laptop orchestras are affiliated with higher education institutions where people with expertise in different areas could gather and at the same time functions as a classroom for interdisciplinary exploration in the electronic and sonic arts.

The laptop orchestra presented in this paper, iLOrk, is a laptop orchestra affiliated with the Hong Kong Institute of Education, a higher education institution that specializes in teacher education programs. Instead of a combination of students from various disciplines, iLOrk is composed solely of students from the music education programs, in which the curriculum mainly covers music knowledge content, pedagogy, and educational studies. Despite some basic training on music technology as part of their curriculum, the knowledge and skills they possessed are incomprehensive in covering the necessary knowledge and skills required in a laptop orchestra; the absence of an interdisciplinary composition results in a lack of a technical foundation, which is one of the important components of a laptop orchestra. Therefore, it is necessary to develop the iLOrk members' knowledge and skills in the manipulation of digital instruments and participation in a laptop orchestra performance.

Digital Musicianship

Musicianship from the Western art tradition encompasses a range of musical competencies including aural perception skills of intervals, rhythm, and chords, music reading, and harmonization skills [3]. Technological elements are included in the set of musical competencies in a laptop orchestra, which repositions the center of the

musicianship framework to a more technological orientation. These sets of musical competencies are not only located in the musicians' interactions with the musical instruments, but also *within* the instruments, because they are also responsible for the design and preparation of the digital tools [4] [5]. To develop iLOrk members' knowledge and skills in the manipulation of digital instruments and participation in a laptop orchestra performance, one of the aims of iLOrk is to broaden their musical horizons via digital musicianship training. A series of activities were strategically planned to transform the iLOrk members' classically trained musical competencies into technologically oriented musicianship necessary for collaborative music making in a laptop orchestra.

Digital Musicianship Training in iLOrk

The activities for digital musicianship training in iLOrk included: (1) development of an iOS app for orchestral simulation; (2) the use of MIDI controllers as musical instruments; and (3) compositional work dedicated to a laptop orchestra.

i-Orchestra - iOS App for Orchestral Simulation

Software samplers and synthesizers are the key elements that turn general-purpose laptops into musical devices for performance. To let iLOrk members become familiar with the use of a non-acoustic instrument in a performance, an iOS app *i-Orchestra* was developed to simulate orchestral instruments in a mobile setting. It voices orchestral instrument samples by transmitting a MIDI message to the app via a MIDI keyboard to the iOS device. Each member simulates an orchestral part using the app, and the team collaborates to form a virtual orchestra in the setting of a mobile device ensemble. They were directed to perform a classical symphony - a musical style with which classically trained students are familiar.

The pedagogical consideration here is to train the iLOrk members to manipulate performance technology while keeping them in the comfort zone of conventional music performance practices, including the use of conventional staff notation, keyboard instruments, and orchestral timbres. In addition to the MIDI keyboard, the iLOrk members were also responsible for adjusting the parameters on the app, including volume, articulation, and key. Figure 1 shows the user interface of the app *i-Orchestra* on an iPhone.



Fig 1. App icon and user interface of iOS app *i-Orchestra* on iPhone.

Using MIDI Controllers as Musical Instruments

Laptop orchestra performances seldom make use of MIDI keyboards for two reasons. First, not all laptop orchestra players are trained pianists or keyboardists. Second, the use of MIDI keyboards limits the interaction between the player and the laptop to the finger-style playing techniques of keyboard instruments, which contradicts the notion of a laptop orchestra as breaking through the traditional performance practices. Various types of controllers are widely used in laptop orchestras, making available more input methods, including gesture control, touch sensitivity, and triggering mechanisms.

To further digital musicianship training, the iLOrk members were directed to practice conventional music with non-keyboard-type MIDI controllers. They were assigned various types of MIDI controllers, including Launchpad (an 8×8 grid multi-button controller), EWI (electronic wind controller), and nanoPad2 (X-Y touchpad and trigger pads). Pure Data patches were designed for some of the MIDI controllers to convert the controller messages into meaningful MIDI messages to the software sampler and synthesizer. By driving iLOrk members away from keyboard instruments, they recognized that score music could be interpreted not only by finger-style playing techniques but also linearly, two-dimensionally, or in other manners offered by those MIDI controllers.

A range of musical styles, including classical concertos, jam sessions, and choral music were explored by the iLOrk members with those MIDI controllers. Figure 2 shows the use of the wind controller as a solo instrument for a classical concerto.



Fig 2. *Andante in C for Flute and Orchestra*, K.315 by Wolfgang Amadeus Mozart, featuring a wind controller as the solo instrument.

Compositional Work

The conventional staff notation that is widely used nowadays to visually represent musical ideas originated in European classical music and was specifically designed for musical performance in the Western music tradition. A laptop orchestra does not conform to the music-making idiom of the Western art tradition, and thus conventional staff notation was rarely used to represent the composers' musical ideas. It is therefore necessary for iLOrk members to explore the possibilities of musical expression via unconventional notation methods. Compositional works that incorporate linear representation and free improvisation for various parameters such as pitch, tone, amplitude envelope, and frequency modulation were created specifically for iLOrk as both a performance repertoire and a learning tool. Figure 3 shows an example of the compositional work for iLOrk.

Fig 3. *Moonrise* (2015) by Lee Cheng.

In this piece, iLOrk members must perform with conventionally notated music and at the same time adjust the parameters according to the paired effect track using

linear representation so as to achieve the aesthetic expectation of the compositional work, which is not represented in the conventional staff notation. Sessions of collective free improvisation allowed the individual musicians a higher degree of autonomy for creation of their own timbre through their aesthetic judgment by adjusting the above-mentioned parameters and therefore involved the members in the musical instrument design process.

Future Work

The above-mentioned activities account for the first phase of digital musicianship training of iLOrk in one semester. The activities in the first phase have largely focused on complementing the lack of technical foundation of the laptop orchestra's members. The iLOrk members have made progress in manipulating basic hardware and software in the collaborative music making process, along with a more developed understanding of the laptop orchestra as a new musical platform. The advantages of an entire team with a high level of musical ability began to emerge when the iLOrk members were asked to improvise with their digital instruments. They were able to achieve an impressive improvisational performance featuring the characteristics of the timbral and textural variety offered by those digital instruments with remarkable progress.

Despite the interim improvement of the iLOrk members' competencies in manipulating the digital instruments and participating in a computer-mediated performance, extra knowledge and skills are necessary for a laptop orchestra, including the ability to develop, construct, and set up a digital instrument, which is a core competency in digital musicianship. The next phases of training shall incorporate the learning of digital audio signal processing, multimedia programming language (e.g., Pure Data, Max/MSP), electronic circuit board design (e.g., Arduino), and compositional techniques for an electronic ensemble.

Conclusions

Laptop orchestra is a computer-mediated musical platform that radically reshapes the conventional music-making context coined in the Western art tradition. The digital musicianship training in iLOrk demonstrated that a laptop orchestra is not only a platform for new musical expression, but also a vehicle for music students' digital musicianship training. It could be used in a classroom that transforms classically trained students' musical competencies into technologically oriented musicianship, allowing them to penetrate the framework of conventional musicianship and fostering their virtuosity in digital artistry for production of a convincing and expressive performance [6].

References

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