Perfect Take: Experience design and new interfaces for musical expression

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ABSTRACT
"Perfect Take" is a public installation out of networked acoustic instruments that let composers from all over the world exhibit their MIDI-works by means of the Internet. The primary aim of this system is to offer composers a way to have works exhibited and recorded in venues and with technologies not accessible to him/her under normal circumstances. The Secondary aim of this research is to highlight *experience design* as a complement to *interaction design*, and a shift of focus from functionality of a specific gestural controller, towards the environments, events and processes that they are part of.

Keywords
NIME, Networked Music, MIDI, Disklavier, music collaboration, creativity

1. INTRODUCTION
Have you ever dreamt of having your compositions performed far from home, without you having to be present, neither online or in real life? "Perfect take" is a prototype system that allows for composers to remotely exhibit[1] and have their works recorded on an acoustic ensemble by means of MIDI-files submitted over the Internet. This interface for musical expression does not focus on the *interaction* of a new gestural controller *per se*, but rather focus on the *experience* of a process, service, event or environment in which these operate. In so doing we emphasize the role of a strong "value proposition" - a cornerstone of *experience design*[2] that tries to embody the motivations of users have for using a technology [26][31]. A first prototype is devised involving a Disklavier piano by Yamaha, but will involve a NotomotoN [21] (a robotic drum featuring twin drum heads, a metal body, and 18 solenoid beater assemblies) and other MIDI-operated instruments in an attempt to create an interesting ensemble.

NIME'12, May 21-23, 2012, University of Michigan, Ann Arbor.

[1] The reason for using 'exhibit' rather than 'perform' when referring to our system is not to confuse anyone concerning its asynchronous nature.

[2] "*Experience design (XD) is the practice of designing products, processes, services, events, and environments with a focus placed on the quality of the user experience and culturally relevant solutions, with less emphasis placed on increasing and improving functionality of the design*." [1]

The ideas for "Perfect Take" came out of the will to open up public spaces at the Research Center for Science and Technology of the Arts (CITAR)[3] and ultimately cultural institutions such as Casa da Musica[4] in Porto, Portugal for music-makers from around the world, and by so doing we hope to:

1. Offer the musicians a way to have works exhibited and recorded in venues, and with technologies not accessible to him under normal circumstances.
2. Make foreign works of music available to an audience in the place of the concert.
3. Have these recordings available for "collective creation" or appropriation and re-using under a creative commons license.

2. BACKGROUND TOPICS
Computers and networking technologies have affected all parts of our lives including how we make and perform music. Distances in time and space have shrunk, making sounds from the past and from distant shores accessible to anyone, anywhere by means of digital bits and the Internet, which has revolutionized not only listening but also the social phenomenon of music creation [27]. "Networked Music" is an area that researches this phenomenon and also device systems supporting it. A survey of these has been provided by Tanzi [28], Föllmer [10], Weinberg [29], Barbosa [3], Renaud et al. [23] and Carôt [5]. These Network music systems are traditionally categorized in terms of the locations of the performers (local vs. remote), the temporal quality of the interaction (real-time vs. non real-time) and each of these naturally have their particular advantages such as the "surprise, immediacy, and flexibility" of real-time, or live musical interaction [29]. "Perfect Take" on the other hand, is a non-real time system which has its own advantages such as the ability to sketch, edit and work on musical ideas before presenting them. MIDI and sequencing software have emerged as technologies *par excellence* (despite its limitations and criticism) for this task, and thus our technology of choice for communicating asynchronous musical information.

2.1 The quest for perfection
"[I]*n composition you have all the time you want to think about what to say in fifteen seconds, while in improvisation you have only fifteen seconds*." [7]
At first sight, the prospect of 'exhibiting' your work, rather than 'performing' it in real-time over the Internet seems less interesting in a world of instant communication, however, the advantages of using an non real-time system as opposed to a

[3] http://artes.ucp.pt/citar
[4] A multi-venue performing arts centre.

real-time one are not only manifold, but also different in nature. The first and most obvious is that the composer does not have to be present in time or space, which leaves him to do other things while his works are being exhibited to an audience. Secondly, a non real-time system allows composers to carefully work through musical ideas before presenting them and is an advantage as old as musical notation itself, and readily apparent when staff notation emerged in Italy during the middle ages[5]. Musical notation *"allowed* [western classical] music *to become more polyphonic and complex than an oral tradition could sustain."* [2] as "[i]*n an oral tradition, all cultural representations are easily remembered ones; hard-to-remember representations are forgotten, or transformed into more easily remembered ones, before reaching a cultural level of distribution*" [25]. Mozart is also said to have been using a well worked out system of sketches on paper that he kept in his *Verzeichnüss aller meiner Werke* ("Catalog of all my works"), and often relied on a keyboard to work out his musical thoughts. [19] Another example is Canadian pianist Glenn Gould, who at advent of recording technologies spliced together several recorded takes in to one [13], in a quest for perfection. A third advantage of a non real-time system is that it affords novices to achieve a more agreeable musical result than in a live performance and thereby providing Wessel and Wright's ideal of "low entry fee with no ceiling on virtuosity" of new interfaces for musical expression [30]. These all speak for a non real-time networked system as opposed to a live one. However, there are some clear tradeoffs with asynchronous performance such as mutual adaptive behavioral resonances, or *entrainment* where the audience merges with actions and goings-on not only in the music but also up on stage, and brings with it a certain magic to live performance [20]. Entrainment tends to have a positive effect on performers and their playing and the lack of it is clearly one of the disadvantages of such a system. Further concerns relates to that of replacing the performer.

2.1.1 Elimination of the performer

Recorded music in MIDI not only has certain advantages over live performance but also over traditional forms of musical notation in the sense that it eliminates the performer from the traditional triad of western classical music: composer, performer and audience [18]. As MIDI information doesn't require interpretation, it circumvents traditionally sensitive issues such as "score compliance" [12] (the duty on behalf of any performer to comply with the notation) or *authenticity* of a performance. Naturally, elimination of the performer may also be seen as disadvantageous as any interpretation, or the subtle shadings of personal intonation - nuances of pitch, duration, volume and timbre is not perfectly rendered by the MIDI protocol, it however allows works to be as close to as possible as intended by the composer.

2.2 The 'exhibition' of music

Not only does the ability to document music come with many advantages that we utilize in our system, the other major technological revolution has been in the dissemination of music by means of network technology. The potency of these two technologies combined is probably why most music today is rather recorded and remote, or 'exhibited to' than 'performed for' its audience. What started with Vinyl and CDs is now mp3s and streaming audio that brings music from all corners of the world and times past to our doorstep. Despite the proponents of live music as opposed to recorded, few are those that would disagree that it has enriched music culture immensely. In the light of this, it comes quite natural to have non real-time, remote concerts on acoustic instruments by means of MIDI data. Ignoring the advantages that either of these two technologies offers would seem unfavorable. Furthermore, as much local, live-performed music today involves a fair share of "'babysitting' and 'knob-twiddling' […] that is so unsatisfying to watch" [24]; playing recorded MIDI-works for an audience does not come with a terrible loss. Instead, venues and public spaces opened up to the global music making public will prove a new paradigm-shift of collective creation that should be welcomed with enthusiasm.

2.3 Similar systems

One of the first attempts to remotely control an acoustic instrument over a network, a Disklavier piano, was the "Radio-Drum driven Disklavier," [14] linking a Drum to control a Yamaha Disklavier grand piano by means of a computer in 1998. Since then Yamaha launched the "Remote Lesson" software in 2007 to support real-time 'at-a-distance' teaching for the study of the reproduction of particular performances by connecting two or more Disklaviers, preferable over Internet2, T1 and DSL connections, although the latter plagued by delay-times over a second. However, there are no systems to date that let composers join together in collaborative concerts for a local audience by means of recorded MIDI such as "Perfect Take" suggests, although there are few systems that offer composers "telepresence" on MIDI instruments, mainly Disklaviers [11] [22].

In "Networked Music Performances", or real time high quality bidirectional musical interactions [23] instruments controlled by MIDI-data over a network is often employed such as in the GIGAPOPR [17] or the "Ten-hand piano" [4] installation at Casa da Musica, a distributed musical structure with up to ten interactive performance terminals situated along the hallways, collectively controlling a Disklavier. However, as these systems are more for interacting in real-time than for the exhibition and recording of carefully elaborated compositions, they exclude artists who prefer not to perform or improvise live, but yet would like to employ network technology, the Internet and join others in concerts for exposing their work.

In this sense, fellow composers and anyone making creative use of recordings is seen as collaborators, which in turn renders "Perfect Take" not a system for mere unilateral distribution of digital content; but bilateral as all recordings will be available for re-use by the greater public under the Creative Commons license [8]; a legal model for cultural contents rights management that condones copying for purposes of re-use. As a platform for sharing works, "Perfect Take" resembles the collaborative database ccMixter [6] and Freesound.org[6], albeit for piano works and facilitates re-using, or re-contextualizing music, a form of collaboration sometimes referred to as "collective creation" in networked music research:

"Collective creation and the production of open and continuously evolving works are two of the most appealing artistic breakthroughs the Internet can offer to music composers and creators in general" [16]

3. IMPLEMENTATION

An initial prototype of "Perfect Take" (see Figure 1 and 2)

[5] Guido of Arezzo, an Italian monk and music theorist was the first to map note names to parts of the human hand as mnemonic aid for Gregorian chants.

[6] http://www.freesound.org

consists of a website where users register and submit MIDI-files to a server running Apache, PHP and a mySQL database. Submitted files are validated for correct format and track number and sorted by an application written in C++, openFrameworks[7] and the "libjdksmidi-2004" C++ Class Library for MIDI[8].

Once the files are validated they are added to the client-side stack (performance program) (See Figure 3). A similar program is provided to the audience with information such as origin, biography etc. MIDI playback and stereo recording is done through a Max/MSP patch that also function as an administrator interface subsequently sending the resulting Audio Interchange File Format (AIFF) files back to the server where they are made available for both users and the general public. At the moment the server and processing run on separate machines to allow the system to be open for MIDI-submission around the clock.

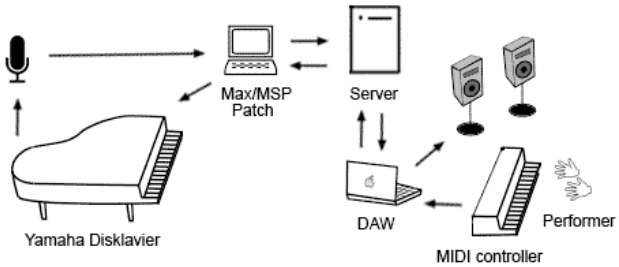

Figure 1. A first prototype of "Perfect Take".

Figure 2. Testing the setup of "Perfect Take".

[7] http://www.openframeworks.cc/

[8] https://github.com/jvcleave/ofxThreadedMidiPlayer/blob/master/example-ofxThreadedMidiPlayer-playback/addons/jdksmidi/include/jdksmidi/world.h

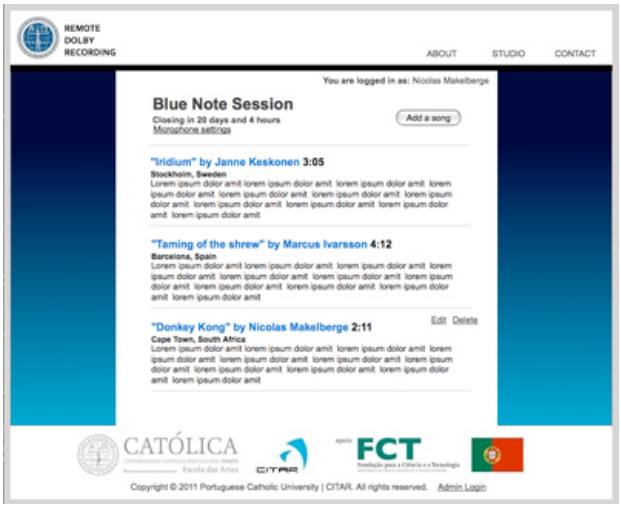

Figure 3. The stack or performance program as visible to a registered user.

3.1.1 Sessions

Invitations to participate in concerts are advertised as "sessions" and vary according to what MIDI instruments, microphones; polar patterns (Bi, Uni or Omni-directional) are part of the ensemble. In the first prototype a Disklavier piano has been employed using a pair of omnidirectional AKG ck92's creating a neutral sounding stereo image. Other parameters that will determine sessions relate to things that influence the character of recordings of acoustic instruments. In the case of the piano: where on the high and low ends of the harp plus proximity to the hammers microphones are placed[9]. If the top of the grand piano is "down" or "off" affect overall sonorities and will be experimented with.

Moreover, there are many issues to record instruments in a public space, such as interference of obstructing noise however; this may be seen as a welcomed characteristic rather than undesired, as with most live-recorded music.

4. CONCLUSIONS AND FURTHER WORK

The "Perfect Take" system allows for composers to remotely submit MIDI-works as part of a group-concert on acoustic instruments in a public space. Through this system composers have the ability to be part of international concerts, have their music exposed and recorded in venues not normally available to them. The system being non real-time allows for those with less technical skill, and professionals alike to provide less error-prone music than in a live performance. Further advantages include for composers to know when and where and (in future prototypes) also for how many their works have been exhibited. For local audiences the system provides music from all over the world, exhibited on real acoustic instruments as opposed to an mp3 or CD.

These advantages do not concern the *interactivity* of a new gestural controller *per se* or any new sensors or mappings, but rather extends the NIME discourse to involve the overall *user experience* of an entire system *interfacing* a composer with his audience. Therefore, *experience design*: or a focus on the process, service, event or environment of new interfaces for musical expression, may be a neglected compliment to the *interaction* design we see so often in NIME.

[9] Closer proximity produces a more distinct, sharper or brighter sound as opposed to a warmer and rounder.

Initial trials and interviews with a set of composers revealed remote co-'exhibition' and recording of musical works to be an exciting value proposition, but naturally depend on the venue of the session. Video to complement the recorded audio appear to be the one thing that would improve the overall value proposition among composers and therefore worth investigating with further tests on a larger sample of composers. Although, if a great value proposition makes or brakes new interfaces for musical expression will have to be the topic of further research and might reveal why so few has made it into the mainstream.

Further research includes integrating contextual and social user experience where sessions may be advertised by means of social networking technologies such as Facebook and Twitter. Also a wider range of MIDI-controlled instruments beyond the Disklavier will be implemented to offer composers a greater set of timbres and sound worlds to realize a work. Further development will incorporate some organized form of feedback to administrators concerning issues that might impact the nature of future sessions. Also integrating a third party publishing platforms for audio-files such as ccMixter [6] and Freesound.org [9] would benefit the overall user experience of the system and help it reach a larger audience. Ultimately the authors would like to see "Perfect Take" or similar systems adopted around the world to open up concert venues, studios and exhibition spaces for the presentation of music from all over the world, to allow for the production of international concert programs, augmented by HCI technologies, to be enjoyed by local audiences to create an significant experience and significant value proposition for both user and audience alike.

5. ACKNOWLEDGMENTS

CITAR and DESIRE (Marie Curie Initial Training Network).

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