Collaborative Music Creation Using Smart phones

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ABSTRACT

This paper will present how smart phones make it possible to gain new ways of interacting with music. Smart phones being devices that allows at the same time many interactive interfaces and advanced communication features can be seen as new networking tools around musical creation.

Author Keywords

Smart phones, Music, Collaborative processes, Design, Interface, Interaction, Pure Data, Network**.**

ACM Classification Keywords

H.5.2 [User Interfaces]:Graphical user interfaces (GUI) -- Input devices and strategies (e.g., mouse, touch screen)--Prototyping; H.5.3 [Group and Organization Interfaces]:Computer-supported cooperative work--Synchronous; H.5.5 [Sound and Music Computing]:Methodologies and techniques –Systems; K.8.0 [General] :Games;

INTRODUCTION

Smart phones are used by a wide range of users. What we can agree to be a smart phone is in fact a small computer coupled to a touch screen – for input, an accelerometer –to adjust screen orientation, a microphone and speaker, as well as specific access to communication protocols and networks –GSM, Bluetooth, Wi-Fi . Over the past few years many developers have worked towards making those devices musical instruments ranging from transposition of real musical instrument (piano, guitar …) to most sophisticated electronic music instruments such as famous sequencers or synthesizers. Coupling those capacities in music making and networking could result in new ways of collaborative music making, easing the process of synching tempi over a Wi-Fi network. What are interesting are also the social aspects of smart phones: as they are wide used devices it can be seen as an incubator to new social behaviors. With smart phones many people have in their pocket a device that combines several technologies that offer a good range of user interactivity for musical purposes, even more, they have the possibility to create their own instrument from scratch using free software.

STATE OF THE ARTS

Over the past few years, bloggers have been blogging about musical applications on smart phones, for instance the Palm Sounds' blog lists and impressive number of tests. Communities have formed around new concepts of interactive music with the help of RJDJ. Thousands of videos are available on you tube showing people from around the world performing music with smart phones.

Regarding virtual instruments a smart phone can almost do anything a computer can do. The multi-touch interfaces can offer some interesting controls over slowing evolving drone synthesizers or simply to play piano or guitar (even ocarina). The accelerometer can give new ways of controlling sound textures or effects linking movement to sound production. Smart phones can be seen as ersatz of existing instruments, some kind of gadget version of the real one or in a more open minded fashion it can define its own uses and be taken as an instrument that needs to be practiced to achieve satisfactory musical content: for instance in my experience a smart phone is a great tool to work with Larsen. It offers a great fluidity of control over movement. Moreover this practice allows playing with several models of phones: the microphones and speakers integrated in each device are specific to this device which will characterize its acoustic features as an instrument (timbre for instance), using a minimal set of effects controlled via phones accelerometer will enable to explore sonic capabilities of those devices.

Regardless of the hardware specifications of smart phones, the software offer is also really important. The port of free open source software widely used by artists, interaction designers etc. like Pure Data and its library form (libpd), Processing or OpenFrameworks offers for those platforms amazing collaborative prototyping tools. In this spirit the Rjdj example is particularly interesting, as it introduced the concept of reactive music, or augmented soundscapes relying on the already active Pure Data community. This enables anyone to experiment with their device developing their own applications based on tutorials, templates, ideas coming from the communities of artists, researcher, hobbyist, gravitating around that software. The Pure Data community has already produced a project developing collaborative music creation tools called Netpd. Netpd is in a transitional state at the moment.

A FRAMEWORK FOR COLLABORATIVE JAMMING SESSIONS WITH IPHONES

Through the prism of the Pure Data software and using the framework developed by the RJDJ team, it's possible to elaborate a concept of collaborative jam session using smart phones. In electronic music the synchronization of instruments is important, as smart phones can send and receive data over a Wi-Fi network it will ease the process of synching without having to do anything more than just

connecting on the same access point and launching an application. As the RJDJ application (or the ScenePlayer application for android) can read Pure Data programs, it is simple to imagine that two to more people can use their smart phones to load Pure Data patches to play custom made drums or synthesizer while being synched to one another, they also have the possibility to use the microphone to add environnemental sounds or lyrics, and record their production (each instrument separately). The convergence of hardware, software could lead to DIY (Do It Yourself) Collaborative Electronic Music for smart phones. But how is it possible to structure such a framework?

The software framework would be composed of several instruments (Pure Data patches) and a master metronome running on a remote computer that will send its tempo (or more precisely beat count) to iPhones connected to the same Wi-Fi network. Users will have access to number of instruments ranging from sequencers to drum pads or synthesizers, each being classified to the level of practice you need to produce satisfying musical content. Three approaches could be raised here; some of them have been already explored through an artistic residency exploring the possibilities of Pure Data for smart phones development:

- the easiest would be the "generative" approach, where each instrument will produce on its own its musical content, the user will then have the possibility to influence the outcome with simple levers of action. For instance Spat-Birds (see Figure 1) is a generative audio application in which you control five birds that can be moved around in a stereo field, singing along. You have the possibility to select a bird and place it in the audio field, you can poke it with a hammer so that it flies away, you can also shake your phone to make them all fly and sing in all directions. Finally you can toggle the 'Auto' mode to let them fly as they wish. This approach will be perfect to research non-rhythmic sounds such as textures and ways to control them.

- The second is to approach musical creation as "sequencing" operations. Each instrument will be based on 8-step sequencer looping through a customizable pattern. The interface would show sliders and buttons to parameterize the outcome (see Figure 2) offering more control but also requiring a more dedicated attention to play with others. Each application will be synched to a "master" metronome running on a remote computer.

- The last one would be the "performative" set of instruments. With those instruments the user is a performer that has to control every aspect of sound creation in real-time. Those can enable to build systems like live loop recording from the microphone, or performative piano patches where the user would have to hit the screen to produce electronic piano sounds. Each interaction with the touch screen, would be place in a "wait list", then scheduled to be played on next beat.
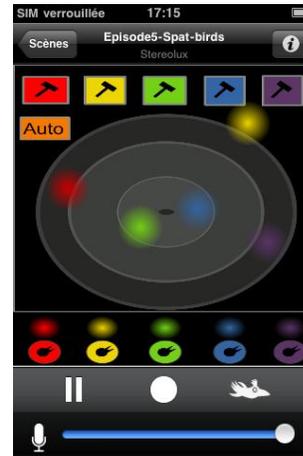
Figure 1. This is a screen shot of Spat-birds: a generative audio application.
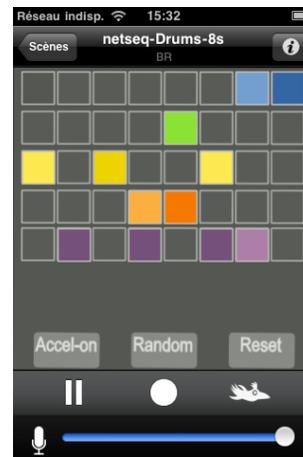
Figure 2. This capture represents an eight step sequencer with five lines to display the patterns of five drum elements.
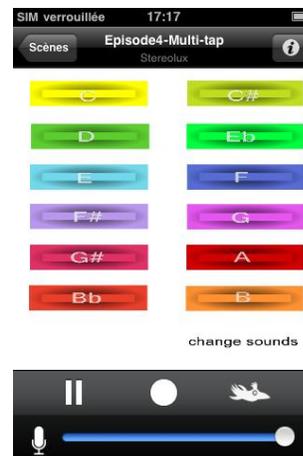
Figure 3. A capture of a performative synthesizer, the user can choose a base sound and play notes on the touch screen. Accelerometer can control several types of effects and note durations.

Each category will reveal interesting questions relating, to music software creation: some technical, some design

related. Some of those instruments need to be very intuitive for beginners to be able to use them straight away, some needs to be precise and reliable enough to be used by professionals in concerts.

At the moment using only Pure Data as a development tool will result in the fact that Android phones cannot receive data from other phones, and suffer from big latencies issues, in the other hand iPhones can not send data over network but have a relatively low audio latency. According to these observations we can acknowledge that there is a lot of room for improvements. This paper only considers using ready to use tools as a support for DIY methodology but considering other environments at lower level of access over the various components of smart phones shall offer better integration concerning networking possibilities and better interaction design possibilities. The library libpd used in the RJDJ application and in several other musical applications on iOS and Android, is a great tool for experimenting those processes its portability, its license, and the wide Pure Data community as potential creators are three important assets to this work.

ARTISTICS AND SOCIAL APPLICATIONS
Those concepts can easily be extended to artistic installations, performances or interactive entertainments. It's interesting to note that we can synchronize several smart phones together over Wi-Fi, but we can also enslave them to another synching source. With minimal efforts you can synch all smart phones on the Wi-Fi network to a remote source: for instance the computer of a performer in a concert or the computer of a bar playing music. This could lay the foundation of new uses, making electronic music accessible as a social and interactive gaming experience for many music lovers, without having to be an experienced musician. It can be comparable to what games like Guitar Hero or Frets on Fire have done in the past few years that is to say enabling people without a musical background to have a real feeling of playing guitar, but the approach presented in this paper will not suffer from creativity restrictions: in guitar hero you play a partition with more or less success, in the approach depicted above it is more of an improvised jam session. The result will be influenced by choices of musicians in the instruments they mix and the way they use them, the achievement will not be to be in synch but to produce satisfying musical outcomes.

Those techniques could also be used for participative happenings. It would be possible to unite several people to play a song on their phones each participant choosing one note and one sound. It could also be easy to create programs that would answer to one another: on a 32 beat pattern the first iPhone will play on beats 0-7 the second one on beat 8-15 etc. developing the process of musical questions and answers. Each phone will play an instrument so we can imagine two participants playing the drums each with one sequencer, another playing a bass line with a sequencer to have a strong rhythmic section, after that it would be possible to have one generative participant playing drones, and two performative instruments: one based on cut-up sounds from the microphone input, and one manipulating samples in real-time. Each musician will have to hold his role and listen to one another audio performance, playing with the several levers his application allows him to.

CONCLUSION
This research is at the conceptual state, even if the concepts have been tested and revealed interesting potential. It raised issues in several technical topics of interest such as procedural audio, interaction design, augmented instruments, networking but also social ones such as programming and music mediation, collaborative artistic processes all towards a wide and ever growing range of users. Observation of behavior using this kind of software could lead to social research on the comportment of people collaborating trying to achieve musical goal. At this point the next step are to test instruments–with a novice public, generalize and standardize interaction principles and graphic user interfaces according to those tests, aiming at the release of a first version of the framework for participative performances.

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