NetBeat and *Net4Tet* – Networked Performance Instruments for Electroacoustic Music Students

Arne Eigenfeldt
School for the Contemporary Arts,
Simon Fraser University
Burnaby, B.C., Canada
arne_e@sfu.ca

Abstract

This paper describes two software performance instruments designed for students in electroacoustic music. NetBeat *is a networked drum ensemble that allows users to listen to one another via headphones, and form ensembles;* Net4Tet *is a network performance instrument designed for a quartet of users to perform together as an ensemble.*

1. Introduction

Musical ensembles, particularly small chamber groups, accomplish much of their musical complexity through sophisticated visual, as well as aural, interactions; however, electroacoustic performance ensembles are few and far between. One reason for this is the nature of the instruments themselves: unlike acoustic ensembles, there has not been a standardisation of instrumentation. Thus, unlike students of acoustic music, students of electroacoustic music very often lack the opportunity to perform. *NetBeat* and *Net4Tet* are software instruments that have been used in beginning electroacoustic music courses as tools to introduce performance and group interaction, using the network as a medium.

2. (Non)-Streaming Audio

Both *NetBeat* and *Net4Tet* overcome the problems of streaming audio by not streaming at all. Each player has all the possible samples of all performers on her drive, and players send performance information (very similar to MIDI data) over the network, triggering samples and processing on other ensemble members systems.

This requirement for coordinating sample libraries fosters an ensemble attitude. *Net4Tet* comes with a default sample library, which includes four folders (Gestures, Short, Soundscape, Text) of thirteen to eighteen samples each, in order to get the students started; however, students have quickly substituted their own samples, in order to personalize performance. This is easily done by dropping a master sample folder onto the sample menu within the program.

Coordination of sample libraries is less important in *NetBeat*, since there is no external audience. Users can map other user's performance data onto whatever samples they wish. *NetBeat* comes with thirteen percussion instrument samples. Similar to *Net4Tet*, personal sample libraries can be easily used by dropping a master sample folder onto the sample menu within the program.

3. NetBeat

NetBeat is a networked drum ensemble, with each player capable of creating a unique beat, using a variable grid to select note onsets for two different percussion samples, as well as a volume curve, tempo and time signature (see Fig. 1). The upper graph displays note onsets, with the higher rectangles selecting the first sample (of the selected instrument's pair of percussion samples), and the lower rectangle selecting the other sample. The lower graph displays the volume curve.
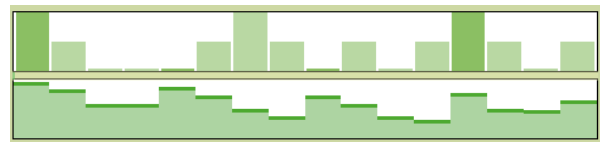

Figure 1 *NetBeat* onset grid and volume curve

Other performers on the network appear as separate coloured icons, next to a "ensemble" grid (see Fig. 2).

Players can choose to explore their own beats, or interact with one another. In the latter case, players can select another performer, at which point their own tempo and time signature "slaves" to the partner, and both members can hear each other's beats (now in sync). Other performers will see the formation of this interaction, as both performer's coloured icons will appear highlighted in the grid. Other players can then choose to join this ensemble, or any other ensemble that may form. An important aspect of *NetBeat* is the fact that all players listen via headphones, and there is no separate audience, outside the network. Many ensembles can form at the same time, but players will only hear the ensemble of which they are currently a member.
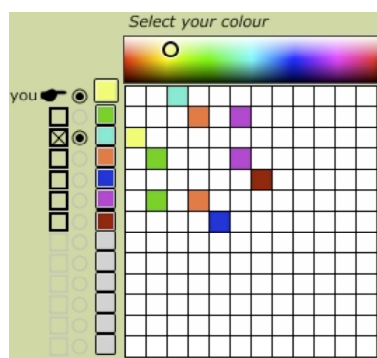

Figure 2 *NetBeat* ensmble grid

In Figure 2, seven players are active, and three ensembles have been formed: yellow/light blue, green/orange/purple, dark blue/red. The displayed player (yellow) is listening to light blue, and has synced her own beat to light blue.

4. Net4Tet

Net4Tet is an electroacoustic software instrument that allows sample playback and interactive processing. Ensembles, limited to four players, can be selected using a icon grid similar to *NetBeat*. However, while *NetBeat* has operated as more of a game, in which players can enter and exit ensembles, creating a type of network drum circle that can play for hours, *Net4Tet* has been used as an actual electroacoustic performance instrument, in which ensembles where preformed.

The *Net4Tet* instrument interface is fairly straightforward, and beginning users can immediately trigger and process sounds. When a player clicks on a large red XY grid, a random sample is chosen from the selected sample folder, and either played once (trigger mode), or looped continuously for as long as the mouse is depressed. If the player drags the mouse

during audio playback, the X-axis controls panning, and the Y-axis controls amplitude. At the most basic level, *Net4Tet* can teach students how to shape phrases using amplitude and panning control.

Users can select up to three types of signal processing: filter (centre frequency, amount of resonance); delay (amount, feedback); degrade (sample rate, number of bits). See Figure 3 for the Filter display. If processing is selected, the mouse's XY movement affects the signal processing parameters. However, users cannot directly select parameter values; instead, a complex interaction ensues, in which mouse movement influences parameter ranges and speed of change, while the actual parameters execute a random walk within the ranges. As such, users tend to explore the resulting signal processing dynamically, rather setting a static value and initiating playback.
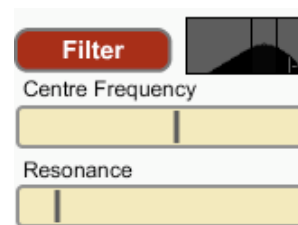

Figure 3 Signal processing display for filter

Selecting ensemble members allows players to hear the ensemble's collective performance. Like *NetBeat*, players in *Net4Tet* listen to one another via headphones; however, *Net4Tet* has been used in performance, in which case audio output of each member is sent to monitors, for both performers and audience members, to hear.

It has been found to be an interesting learning experiment to situate ensemble members within eyesight of one another, and then in separate rooms, and later discuss how both visual and aural cues, versus aural alone, affect ensemble performance.

7. Conclusion
Both *NetBeat* and *Net4Tet* allow beginning electroacoustic music students to explore aspects of ensemble performance. In the case of *Net4Tet*, it also allows them to interactively explore signal processing in a dynamic way.

6. Availability

NetBeat and *Net4Tet* are available as MaxMSP patches (version 5) and Mac OS X applications at the author's website:

http://www.sfu.ca/~eigenfel/software.html