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NAKANISYNTH: A Freehand Drawing Waveform Synthesizer

Abstract

NAKANISYNTH is a synthesizer application that allows users to produce sound loops by freehand drawing sound waves and envelope curves. Since the only input required involves drawing two waveforms, users can easily produce various sounds intuitively without complex manipulation. This application has a keyboard where users can edit waveforms and make sounds simultaneously. Therefore, it is easy for the user to understand the relationship between a waveform and the sound it produces.

Keywords: synthesizer, sound synthesis, user interface

1 Introduction

Most musical synthesizers have several parameters for producing sound. These synthesizers can manipulate sound in intricate ways, but their interfaces tend to be complex. Therefore, it can take a lot of time to learn how to use these devices, which can be a barrier to entry for beginners. In this context, we suggest freehand drawing waveforms as an alternative to the manipulation of several parameters .

In the field of computer music, there are related works that use the same technique of converting a freehand drawing waveform into a sound. Wavetable (Gerard Roma and Anna Xambo, 2008) and Graph-Sono (Seiichiro Matsumura, 2009) are musical interfaces that enable users to draw waveforms [1]. In our application, we have removed complex controllers from the interface to make it more simple and intuitive.

2 System

NAKANISYNTH is an iOS application developed with openFrameworks. The upper half of the screen is used for drawing waveforms and the lower half is used to play sounds(See Figure 1).

2.1 Freehand Drawing Waveform

Users can draw a waveform of any length on any position along the horizontal area. In each of the waveforms, the value of the vertical axis means amplitude and the value of the horizontal axis means time. The drawn waveform data is interpolated with linear interpolation based on the sample rate and the maximum length of wave data used within the application, which is stored in an array (see Figure 2). A maximum of five wave's data can be saved. A frequency is generated by resampling the array. It is easy to observe the differences in sounds created by waveforms because users can edit and change waveforms while simultaneously making sounds.
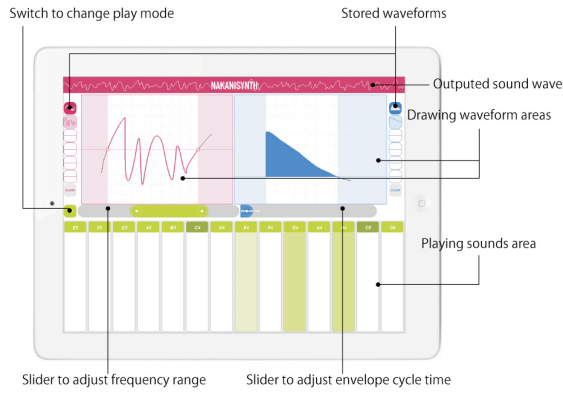
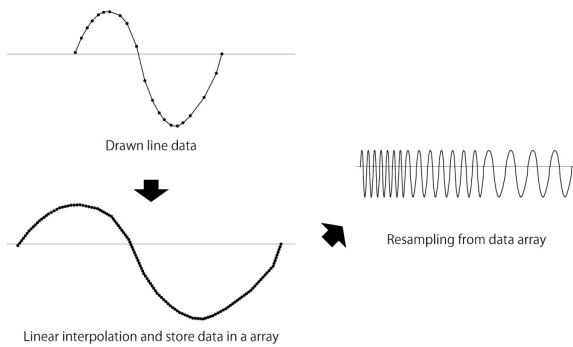Figure 1: User interface of NAKANISYNTH

Figure 2: Process of waveform data

2.2 Playing Sounds

Users can make a maximum of 10 sounds simultaneously by touching the playing sounds area (see Figure 3). The frequency increases from the left to the right of this area. Users can also change the frequency range with a slider. There is an option to choose between keyboard mode or ribbon controller mode. In the ribbon controller mode, the frequency changes continuously so that users can make a beat sound or vibrato.

The volume becomes louder from the bottom to the top of the playing sound area, which users can adjust manually. The cycle of envelope loops is adjusted with a slider. Therefore, the user can make a looped melody

and modulate it by shortening the cycle time. In order to make it easy to imagine the relationship between the waveform and the generated sound, a visualization of the waveform's sound output is shown in the playing sounds area.
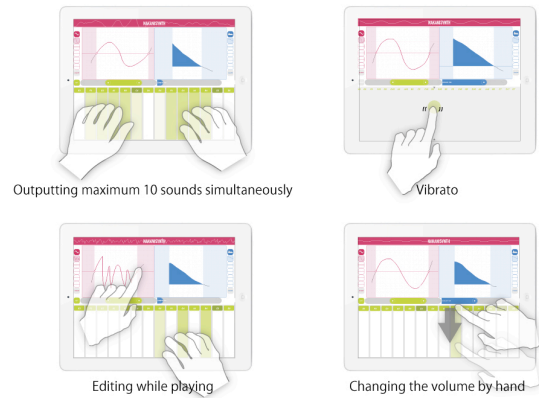

Figure 2: Playing NAKANISYNTH

3 Conclusion and Future Work

In this work, we focused on the intelligibility of sound synthesis. When we exhibited the application at an event for children, we confirmed that it is a useful and enjoyable device because many children enjoyed producing sounds with it. In future versions, we will add functions such as modulation and other effects, and ensure that it is of high enough quality to be a viable instrument for music composition and live performance.

References

[1] Gerard, R., and Anna, X., *A tabletop waveform editor for live performance*, Proceedings of the 2008 Conference on New Interfaces for Musical Expression(NIME08), pp. 249-252, 2008.

[2] Seiichiro, M., *18th International Conference on Artificial Reality and Telexistence*, pp.356-357, 2008