

AirPiano

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Abstract: The lack of haptic feedback in non-tactile musical interfaces often results in control limitations as well as orientation difficulties for the user [1]. The AirPiano presents a new system for non-tactile interaction with a musical device. The system allows easy orientation in a 3D space through multimodal feedback, and advanced control through a simple but versatile mapping scheme. As a result, the usability and user experience are increased.

1 Introduction

Non-tactile musical interfaces are known since 1920, as Léon Theremin first introduced the Termenvox, an early electronic musical instrument controlled without contact from the player. The progress of technology allowed the development of many other gestural non-tactile interfaces such as the Laser-Harp, D-Beam and the Lightning II. Such interfaces are especially interesting in the context of live-performances, however offer a very limited control and orientation in 3D space [2]. The AirPiano's system and interaction concept solve these problems and provide an advanced non-tactile control.

2 The AirPiano

2.1 Concept of Interaction

The AirPiano is a musical interface which allows playing and controlling software instruments through hand gestures in the air. Above the AirPiano board, is an invisible matrix consisting of 8 horizontal x 3 vertical virtual keys [Figure 1]. The user triggers the virtual keys by placing hands in the matrix. Easy orientation is accomplished through 24 LED stripes on-board that show the horizontal position of the keys, as well as the activation of keys in the vertical axis. This visual feedback becomes however rather an ambient confirmation after a bit of practice. Additionally, dynamics values are determined through the velocity of the triggering hand.

2.2 Technology

The AirPiano hardware uses an Arduino board and IR proximity sensors to analyze user gestures. Through USB communication, signals are sent to an external computer, and received by the AirPiano software [Image 1]. The software provides a setup interface for the virtual keys and sends mapped MIDI/OSC messages to common music applications.

2.3 First Feedback

Presenting the first AirPiano prototypes [Image 2] in exhibitions and over the internet resulted in great interest and positive feedback [3]. User-tests done with professional musicians confirmed the concept of interaction to be easy to learn, successful and fun.

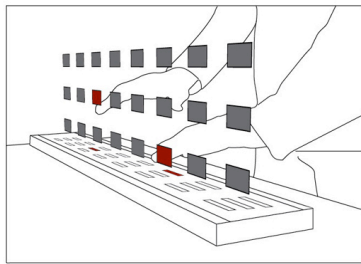


Figure 1: The Virtual Matrix

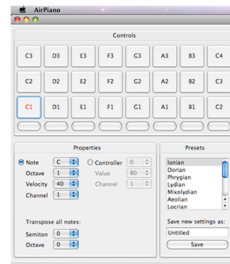


Image 1: AirPiano Software

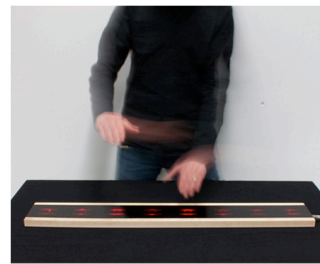


Image 2: AirPiano Prototype

3 Conclusion and Future Work

The AirPiano's combination of a virtual matrix and visual feedback supports non-tactile control and orientation in a 3D space. Its simple yet versatile interface allows musicians to experience a new and exciting way to play music. Furthermore, DJs and performance artists can take control over software without relying on a computer monitor and losing contact with their audience. In future development of the AirPiano, evaluation of the system in different user cases, size and functionality variations as well as the integration of more gestural control will be examined.

4 References

- [1] R. Scheibe, M. Moehring, and B. Froehlich. Tactile feedback at the finger tips for improved direct interaction in immersive environments. In 2007 IEEE Symposium on 3D User Interfaces, pages 123–130. IEEE Computer Society Press, 2007.
- [2] Dr. J. Rován, Dr. V. Hayward. Typology of Tactile Sounds and their Synthesis in Gesture-Driven Computer Music Performance. InterMedia Performance And Composition Technologies (IMPACT).
- [3] Videos: www.airpiano.de ; Discussions & Feedback: please google „AirPiano“