

From toy to tutor: Note-Scroller is a game to teach music

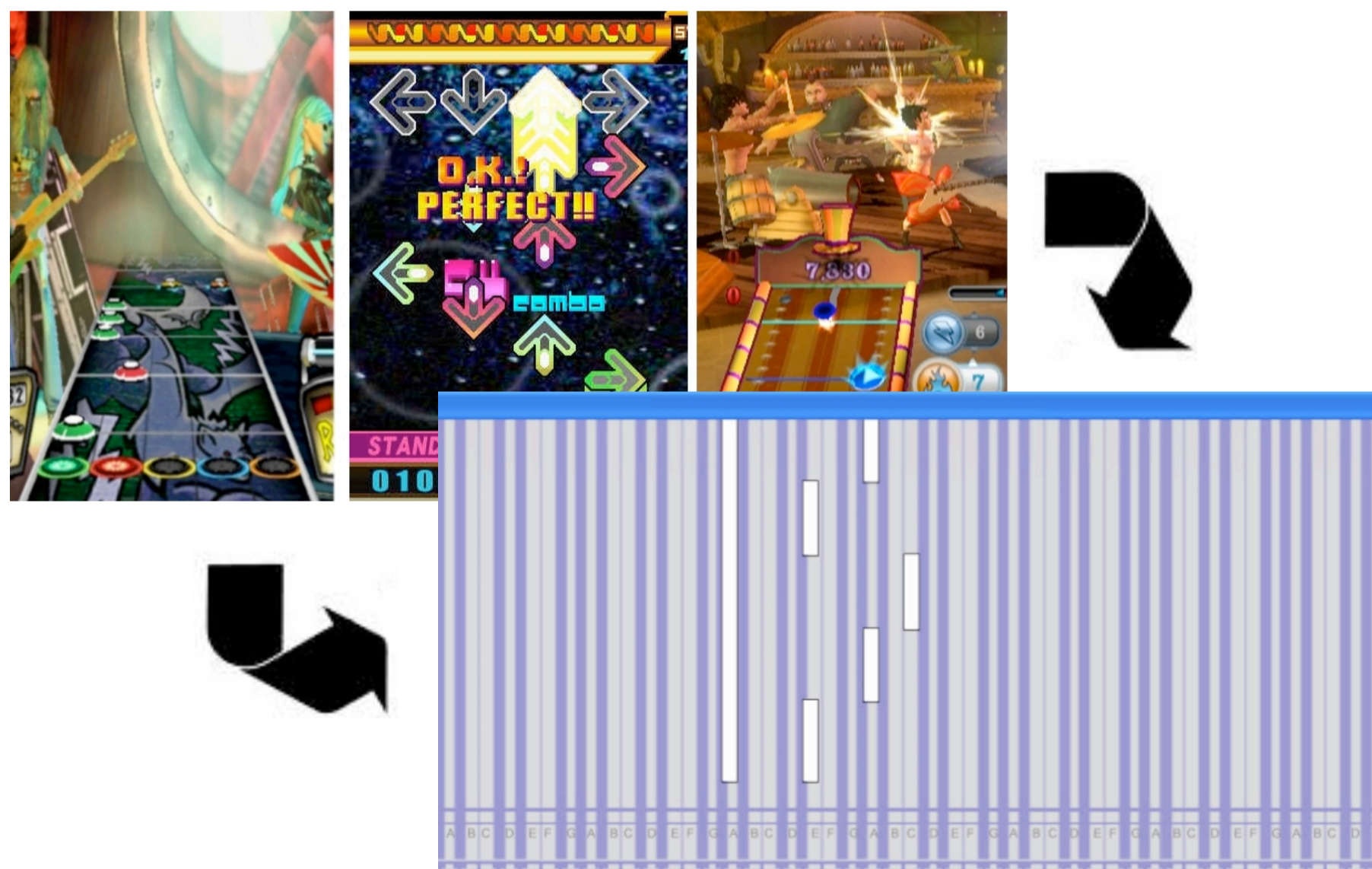
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Overview

The computer games industry has recently been producing titles in a new genre called “music” that toys with engaging the user in musical expression. The technology used in these games has allowed for novel interfaces for representing musical instructions which has yet to be tried within musical practice and tuition. The games themselves have greatly simplified the instruments and the music created to the point where the skills learnt are not transferable to the actual instruments that they seek to recreate.

Note-Scroller is an interactive system for providing the user with musical instructions using methods inspired by video games. The aim of this work is to explore the potential to take interface concepts from popular entertainment systems based on musical expression (see Guitar Hero, Dance Dance Revolution, Frets on Fire, Battle of the Bands etc) and develop a tutoring application that supports learning musical instruments in an entertaining and rewarding experience. Note-Scroller is an interface that has been designed to bridge this gap and act as a case study for evaluating the potential of such a movement. It is hoped that Note-Scroller will be fun and intuitive to use, teaching users how to play music on a piano-style keyboard.



The interface was inspired by games based on musical expression.

Design

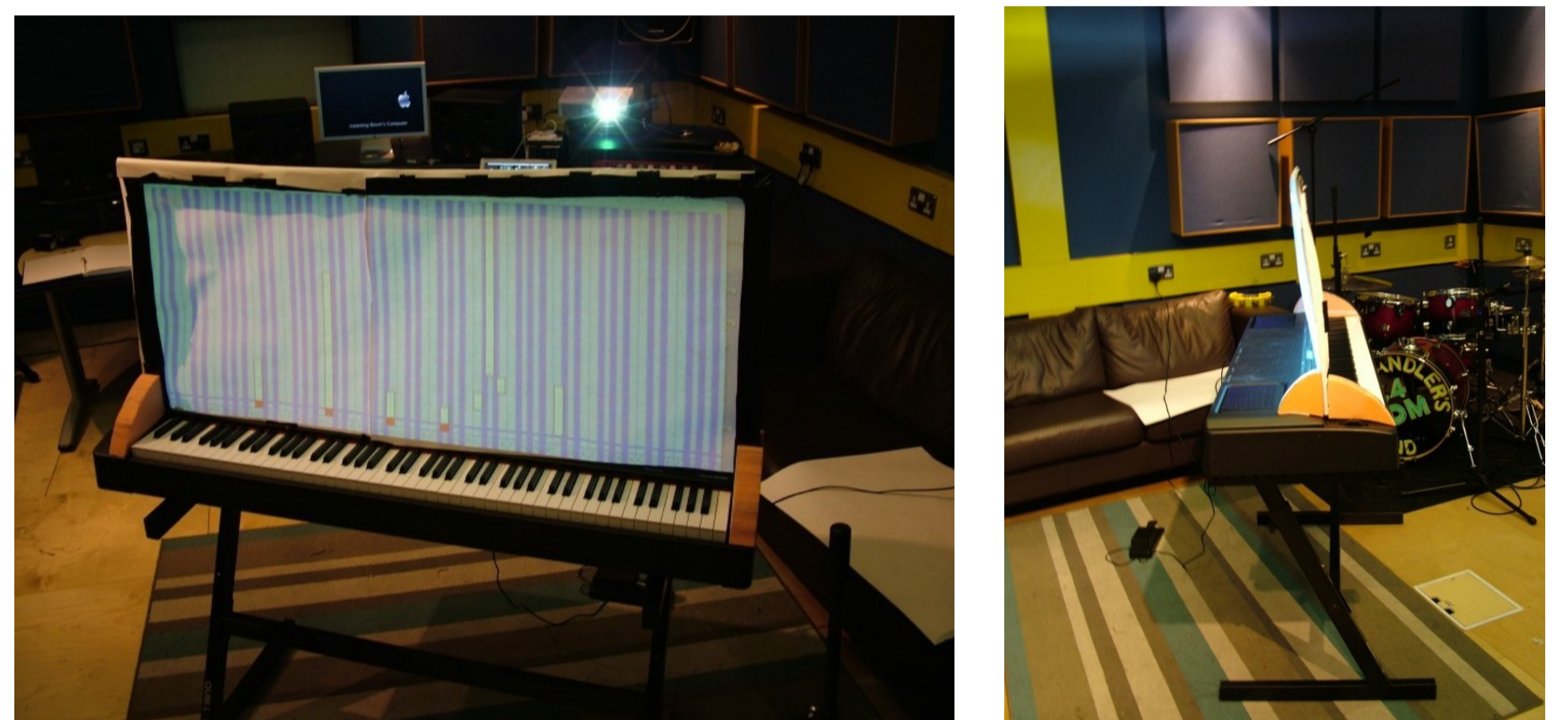
Similar to the displays featured in video games (such as Guitar Hero) the instructions flow to the user as and when they need to be executed. As these video games show, providing users with visual cues of what is coming next allows the user to prepare more efficiently for their subsequent actions utilizing any spare attention to plan subsequent actions. Another benefit to the animated display over static music sheets is that the user doesn't have to change their point of focus as the required information moves itself to where the user's gaze already is.

Using a MIDI connection to the keyboard, or a Moog PianoBar, the proposed system keeps track of which notes are being played correctly. By changing the display of the notes to green or red, (depending on whether they are being played), the system will provide the user with visual feedback.

The musical instructions will be projected onto a screen above the keyboard/piano, flowing down to where the keys are. Therefore when a note needs to be played, the graphic representing that note is close to the keys. As the note graphics are vertically aligned with the keys they correspond to, there is a clear natural mapping between the musical instructions and their executions. The system is designed to be simple to use in that the user opens the MIDI file and uses start, stop, tempo, zoom and position sliders to fully control the flow of information. The display is customizable so the user can configure how much information is shown to suit themselves.

Implementation

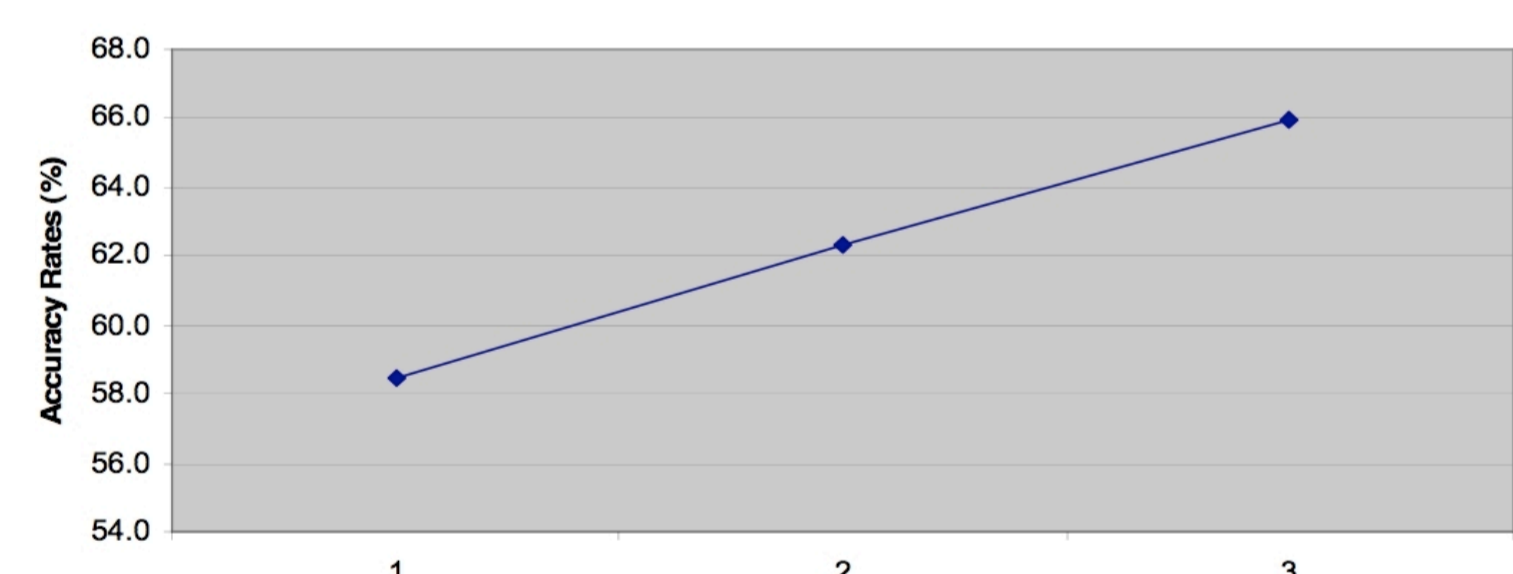
Note-Scroller is designed to be used in conjunction with a projector, screen, keyboard and MIDI input cable. The interface loads MIDI files by drawing all notes on a vertical piano roll that then flows down the screen. The user presses a key whenever a note graphic reaches the keys on the piano-style keyboard. The user can select which of the used MIDI instruments are shown and also the instruments played by the computer. When the notes pass by the playing line, the interface looks to see whether that particular note is being played and changes the display accordingly.



The interface projected over a midi-keyboard.

Testing

Preliminary testing of the Note-Scroller system has so far been promising, showing that music-illiterate players could perform basic pieces and on average thought the system was better for them to learn music rather than reading scores.



	Participant	A	B	C	D	E	F	G	Average
Learning Curve Test	1	59.3	51.8	40.5	66.9	67.3	80.3	43.2	58.5
Learning Curve Test	2	60.2	50.2	56.8	57.8	55.0	93.8	62.3	62.3
Learning Curve Test	3	62.9	62.9	51.2	74.6	73.0	86.4	50.9	66.0

A graph of the participants increase in accuracy.

Conclusions

By making the performance of music more accessible it was intended that such a system will remove the typical barriers that deter people from learning to play instruments such as the cost of tuition, availability and the requirement of reading standard music notation. However, Note-Scroller would also ideally be used in conjunction with other learning methods.

Work on improving Note-Scroller is ongoing as there are many opportunities arising within digital music that may add to the functionality of Note-Scroller and similar systems. One example would be in using live audio synchronization to provide a means of controlling the playback speed of the instructions by simply playing faster or slower. There are also interesting developments in haptic interfaces that could pave the way for a touch sensitive feedback loop to the system.

It is the long term goal of this work to use the popularity of video games, and their ability to reach and motivate millions of people, to teach transferable skills. Note-Scroller is just one example of how this could be done.