88 Fingers

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Abstract

88 Fingers is a performance in which up to 88 players in the audience perform on an automatized piano (i.e. a YAMAHA Disklavier) via their mobile devices.

The piano is presented in the performance space as if it would be the instrument of a solo performer (e.g. on stage or in the center of the space). Apart from the web-based system that allows the participants to select a single key of the piano and to play it during the concert, the concept of the performance does not impose *any* further constraints.

The performance is structured into two parts of 10 minutes separated by a discussion among the members of the audience of approximately 10 minutes.

The experience establishes a metaphor of a free and responsible society.

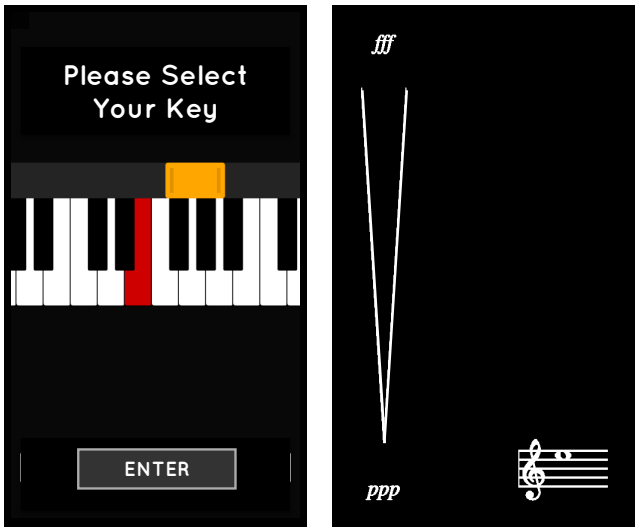

Figure 1: The interfaces presented on the participants' mobile device for selecting a key (left) and for controlling the selected key during the performance – here an E5 (right).

Description

At the beginning of the performance, the participants are asked to connect their mobile devices to a local Wi-Fi network and to visit a web page using a web browser. When accessing the web application, the participants are prompted to select the key they will control during the performance among the remaining available keys (see figure 1 on the left). When 88 players have selected a key, further connections will be refused. The players who successfully claimed a key, enter the interface shown on the right of figure 1.

The interface allows for triggering the selected key – shown in the bottom left – by touching the screen. The key is triggered without perceivable latency when the player places a finger on the screen and is released when the finger is removed. The initial vertical touch position determines the velocity.

Former Presentations

Preliminary versions of the performance have been presented at the following occasions in Paris:

- a cultural event of the JEP-TALN-RECITAL 2016 french speech processing conference at the Centre Pompidou, July 2016 (88 players of an audience 250 people, 10 minutes performance interrupted by a brief discussion)
- a presentation of the project at Ircam, October 2016 (around 25 players, 20 minutes performance without discussion)
- a performance at the IRCAM Forum Workshops, March 2017 (around 20 players, 30 minutes performance without discussion)

Setup

When the performance is setup in a concert hall, the piano should be presented on stage as if it would be the instrument of a solo performer (including appropriate lighting), while the players sit in the audience (can be darkened). Alternatively, the performance can be setup in a gallery space or foyer with the piano in the middle and the audience standing or sitting around it.

As shown in figure 2, apart from the players' mobile devices, the setup of the performance essentially consists of a local Wi-Fi network connected to a server computer that controls the piano via a USB MIDI connection.

In detail the following elements are required:

- a YAMAHA Disklavier (or similar)
- a computer running the server software
  - a dedicated software based on *Node.js*
  - a DHCP server
  - a DNS server
- one or multiple Wi-Fi access points

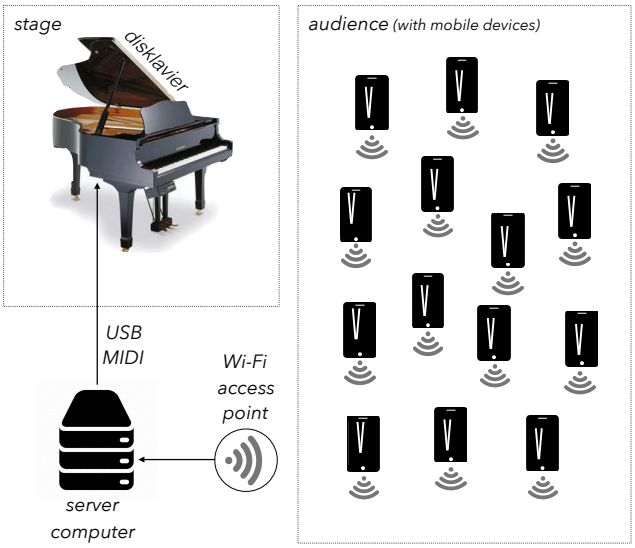

Figure 2: The technical setup of the performance consisting of the players' mobile devices connected through a local Wi-Fi network to the server that controls the *Disklavier* automatized piano via a USB MIDI connection.

It is recommended to dimension the Wi-Fi network to about 10 times the expected number of connections.[1] A space for an audience of 250 people should be equipped with Wi-Fi access points that are specified for a total of about 2000 connections.

Implementation

The web-based implementation of the performance uses the *Soundworks* framework.[2] It essentially consists of the following elements:

client-side (HTML5, in a web-browser)

- a graphical user interface using HTML5 touch events
- a WebSocket connection to send the touch information to the server

server-side (based on *Node.js*)

- WebSocket connections to receive the touch information from the clients
- a MIDI connection to transmit the note information to the automatized piano (using the *jazz-midi*[3] package)

The code has been published under the *BSD 3-Clause* open-source license on *GitHub*.[4]

[1]Please note that the number of connections to the Wi-Fi network and server can be much higher than the number of actual players limited to 88.
[2]https://github.com/collective-soundworks/soundworks
[3]https://www.npmjs.com/package/jazz-midi
[4]https://github.com/ircam-cosima/88-fingers

Authors

Apart from the participating members of the audience, no further performers participate in the performance of *88 Fingers*.

Norbert Schnell

Norbert Schnell is a researcher and developer focussing on real-time interactive digital audio processing and interaction design. Together with his colleagues of the Sound Music Movement Interaction team at IRCAM – Centre Pompidou in Paris he develops technologies and interaction scenarios on the frontiers between music listening and music performance. He was involved in numerous international research and development projects as well as artistic works in the field of music, interactive audiovisual installations, music pedagogy, and industrial design. He chaired the 6th International Conference on New Interfaces for Musical Expression (NIME 2006) and the first Web Audio Conference (WAC 2015). After having created musical interactions that – apart from digital technologies – involve traditional musical instruments, chessboards, gambling machines, balls, and kitchen utilities he currently explores collective interaction scenarios based on web-based mobile technologies that essentially involve people . . . many people engaging in making music together.

Benjamin Matuszewski

Benjamin Matuszewski has studied musicology and music theory before working several years as web developer in the media industry. In 2014 he joined IRCAM's endeavours in exploring web and mobile technologies to create novel ways to compose, perform, and listen to music. Since 2015 he is a PhD student at the *Centre de recherche Informatique et Création Musicale* (CICM) of the University Paris 8.

Acknowledgments

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[5]http://cosima.ircam.fr/