

# THE ORGAN WEB APP

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## ABSTRACT

The Organ Web App is a web audio application that presents different aspects of the Henry Willis pipe organ at the Union Chapel<sup>1</sup>, including its history, pipes, console and hydraulics. The app features a small collection of audio samples from the organ in order to let users play on the keyboard and try different timbres. It is aimed at sharing the historically important heritage of the Henry Willis pipe organ with as wide an audience as possible. The Organ Web App makes use of the Web Audio API as its primary audio engine for sample-based synthesis. Positive and negative aspects of the app were identified using an online questionnaire. This paper presents the technical framework of the app and discusses the improvements based on the feedback from user evaluation.

## 1. INTRODUCTION

The Organ Web App is developed as part of the Organ Project<sup>2</sup> undertaken by the Union Chapel. The aim of The Organ Project is to make the Henry Willis pipe organ more accessible to the local community and beyond. The project not only honours the legacy of this instrument by keeping up a recital diary, but also encourages performers to play it in different styles. The versatility of the organ is also reflected in the education strand for adults and children. However, people who have never been to the Union Chapel may have no access to the organ which is hidden away behind screens at the chapel<sup>3</sup>. Therefore the Organ Project would like to reach out beyond the live audiences by creating an app to provide users with information about different parts of the Henry Willis organ and enable users to play the organ.

Rapid development of web technologies has enabled the web browser to become a powerful tool for sonic interaction [2]. We developed a web app using the Web Audio API to realise the project. The Organ Web App provides users with a comprehensive exploration of the Henry Willis

pipe organ through a virtual tour. Users are able to play the organ using computer keyboard or mouse by choosing from six different timbres first. The Organ Web App was evaluated using an online questionnaire, based on which some improvements were implemented.

## 2. IMPLEMENTATION

The Organ Web App is developed to satisfy both artistic and pedagogical goals. Figure 1 presents the hierarchical considerations for building the app. On the client side, *Howler.js*<sup>4</sup>, a modern web audio JavaScript library is applied. It uses the new Web Audio API and falls back to HTML5 audio, hence browser support is strong. On the server side, *Node.js*<sup>5</sup> is used as the web server. In order to play using the original organ sound, the sound of six different timbres was recorded and used as samples. The Organ Web App is built on technologies shown in Figure 1, which is freely available to be used in the latest version of Firefox, Chrome and Safari<sup>6</sup>.

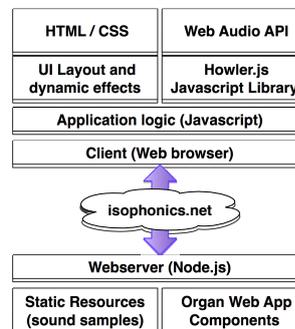


Figure 1. The client-server architecture of the app.

Figure 2 outlines how the app works. In the opening page, a hint of “Click to Step Inside” will be displayed when the cursor hovers over the image of the chapel’s gate. After clicking the image, the introduction page will be presented. For more detailed information about different aspects of the Henry Willis pipe organ, users can click the orange bubbles, after which the corresponding information will fade in. For instance, information about the console is introduced through image and text by clicking the *Console* bubble, while a video as well as the text about hydraulics

<sup>1</sup> <http://www.unionchapel.org.uk>

<sup>2</sup> <http://www.unionchapel.org.uk/about-us/the-organ-project/>

<sup>3</sup> <http://www.unionchapel.org.uk/visiting/see-the-building/>



<sup>4</sup> <http://goldfirestudios.com/blog/104/howler.js-Modern-Web-Audio-Javascript-Library>

<sup>5</sup> <https://nodejs.org/en/>

<sup>6</sup> <http://www.isophonics.net/organapp/index.html>

are shown by clicking the *Hydraulics* bubble. The *Play* bubble will lead users to another interactive interface to play the organ. It allows users to switch among six different timbres, and then hear the corresponding organ sound by clicking the keyboard or pressing the specific computer key according to the instructions. Finally, the last page presents the basic information about the app and two hyperlinks: one is linked to the donation website for supporting the Organ Project; the other one is the online questionnaire for user evaluation. Moreover, users are able to share the app through social media.

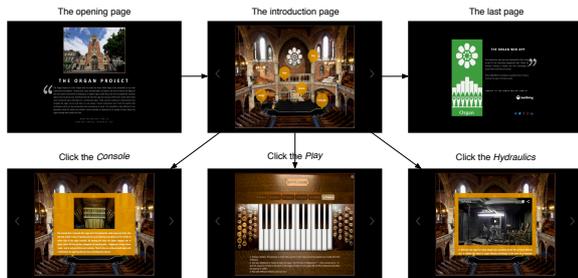


Figure 2. Implementation of The Organ Web App.

### 3. EVALUATION

To call for participants, The Organ Web App was circulated through emails and a web page<sup>7</sup>. People were invited to use the app first and then complete an online questionnaire<sup>8</sup>. In total 51 participants completed the survey. 23.5% of the participants were male, and 76.5% were female. The participants had a diverse range of age distribution and music background.

We received positive feedback from the wide majority of the participants according to the statistic analysis. Figure 3 gives the overall ratings of how difficult or easy the participants found to learn and use the app, measured on a scale of one (difficult) to five (easy). Finally, 80.4% of the participants would recommend the app to a friend. Potential areas of improvement emerged from the thematic analysis based on the positive and negative aspects of the app listed by the participants in the last two questions. Some highlights of the suggestions included making the app more mobile friendly and making the organ played in the app more like a synthesiser.

### 4. IMPROVEMENTS

As mentioned in Section 3, the corresponding audio file with fixed length was played when the user plays the note. However, the duration of the sound should depend on the duration of the note played on the key. Therefore sample-based synthesis was considered to improve the app. *Sonic Visualiser* was used to extract the attack, decay, sustain and release sections of the envelope of the pre-recorded organ sound samples [1]. A fixed amount of cycles of a periodic

<sup>7</sup> <http://www.isophonics.net/content/organ-web-app>

<sup>8</sup> <https://qmul.onlinesurveys.ac.uk/the-organ-web-app-evaluation>

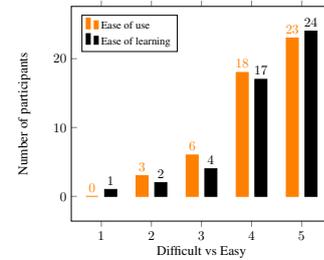


Figure 3. Overall participant's assessment.

waveform from the sustain section was stored for looping. In this way, the organ sound fades in once the user plays the note, then the audio file loops as long as the user keeps the click or key-press, and finally the sound fades out when the user releases the note. The size of the samples were also reduced in order to minimise the overall load time when a timbre is selected. Due to the low latency of the Web Audio API, once a timbre is chosen, the actual playback latency is low.

### 5. CONCLUSIONS

With the help of web technologies, The Organ Web App achieved the goal of The Organ Project which was to let more people familiarise themselves with the Henry Willis pipe organ. The Web Audio API provides a powerful mechanism to retrieve, playback and manipulate audio content inside a web app. Sample-based synthesis was considered as an improvement which allows for looping the sustain part of the audio samples and thus enables us to reduce the size of the audio files holding the samples. The app was well received by users according to an online survey. The improvements discussed in Section 4 will be evaluated and a comparative study with the previous version of the app will be conducted in our future work.

### 6. ACKNOWLEDGMENTS

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### 7. REFERENCES

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- [2] Rob Canning. *Real-Time Web Technologies in the Networked Performance Environment*.