Virtual Venues:

Using VR to facilitate more accurate and innovative lighting design and stage control.

Tyler Sorensen
Development

Aashna Mago
Design
User Testing

Aaron Furrer
Team Manager
Documentation

PROBLEM AND SOLUTION

Across musical genres, many artists utilize laser light shows synchronized to their songs to enhance the audience's experience at major concerts. Creating and rehearsing light shows can be much more cumbersome than planning the musical performances that they accompany. Artists could implement our system, Virtual Venues, to work with 3D models of venues and perform tasks related to lighting design while being fully immersed. Possible tasks include lighting placement within the virtual venue, synchronization of cues with music, and testing the show from various positions within the venue. At present, setting up equipment, tweaking settings, and rearranging lighting can be very tedious, especially within the time constraints set by the venue. Lighting design would be much simpler if it were possible to test and create lighting shows on a personal device wherever and whenever one wanted.

TASKS

Lighting Placement (simple): After the lighting project has been started and the venue selected, the user will begin the lighting placement. The placement portion of Virtual Venues features a unique drag-and-drop functionality that allows the user to easily place the desired lighting fixture within the venue. The option to choose a lighting fixture is new to our medium-fi prototype-- in the low-fi prototype, the user could select hanging positions within the venue, but couldn't choose specific fixture types, a missing feature that was noted by multiple users whom we tested. In this portion, the screen is represented by two 2D maps, one from a birds-eye perspective and one side view that allows the user to see light towers. The user can also group similar lighting fixtures together at this stage in order to make adjustments to all of them at once.
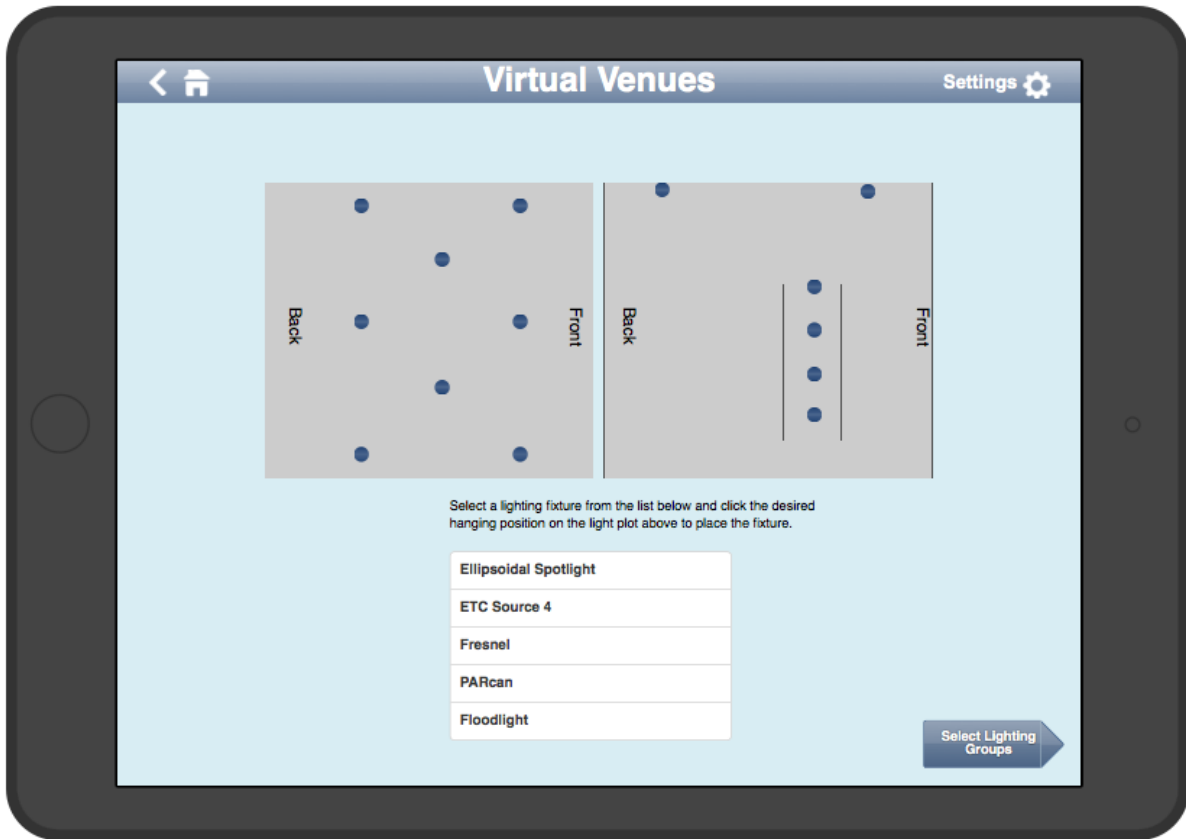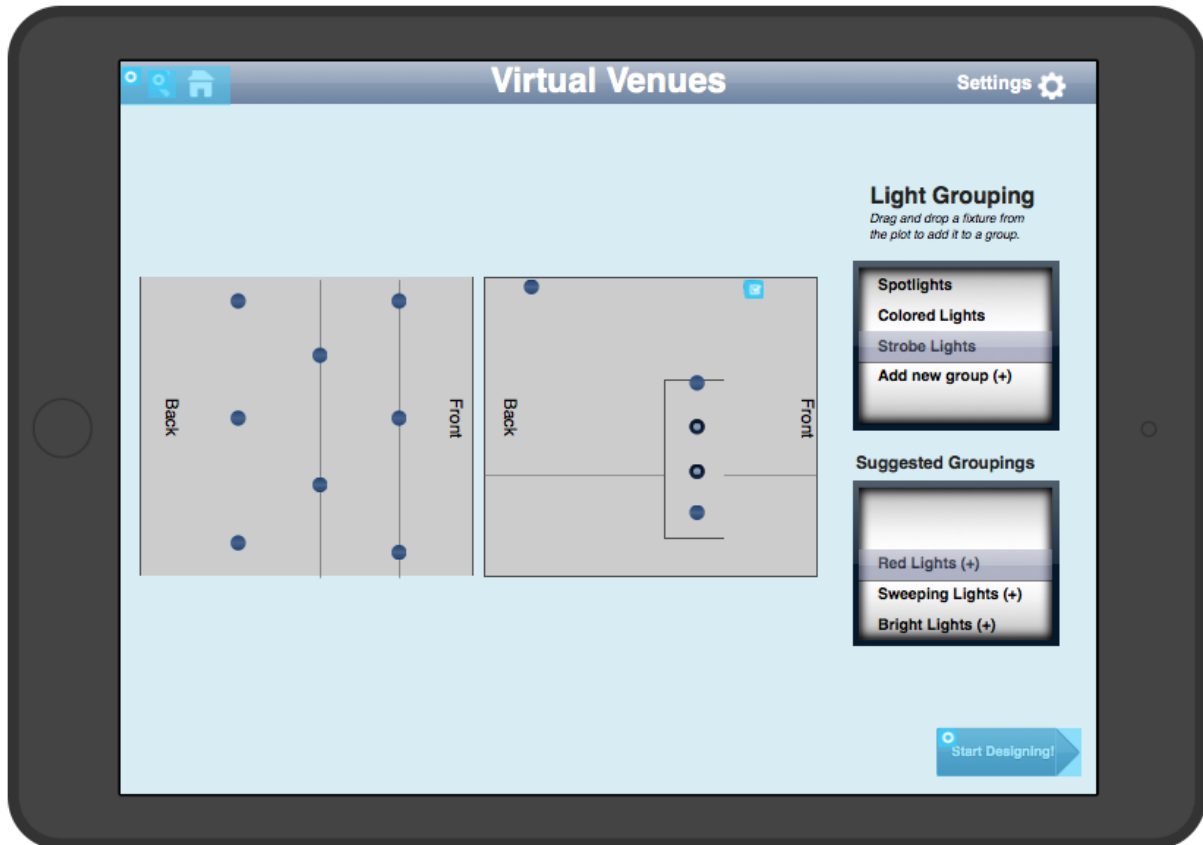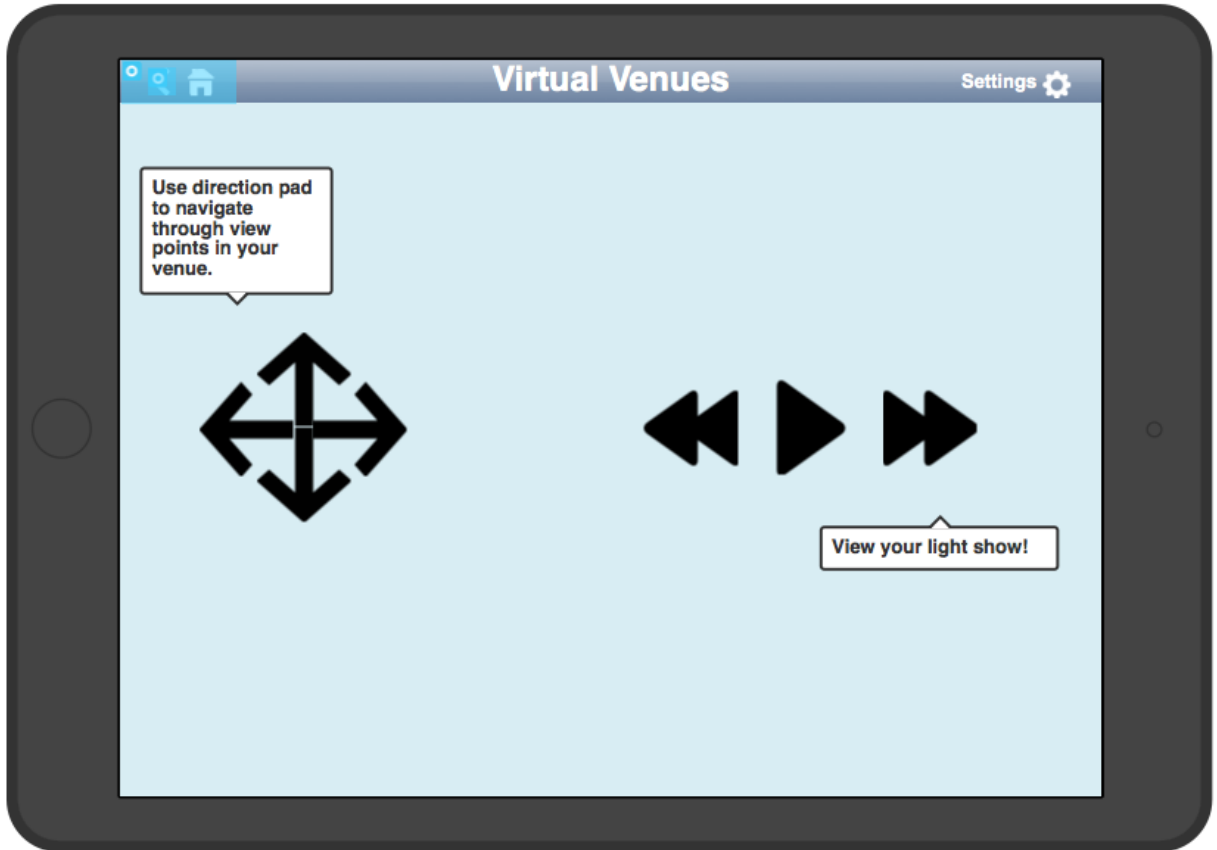
Fig 1. Lighting Placement Screen

Fig 2. Light Grouping Screen

Lighting Adjustments (medium): Once the lights have been placed, each one can be individually selected, adjusted, and tweaked using the virtual light board, or groups of lights can be adjusted together. To minimize the clutter and overwhelming number of controls on a standard lighting board, Virtual Venues will allow the user to tab through desired controls. This feature helps guide the inexperienced user through creating a light show as only the tools for one option are shown at a time (e.g., color, brightness, movement, etc.). Based on previous feedback, there is a larger focus on new and novice users, which led us to decrease the number of options and controls present. Another key feature is preset cues which allows the user to select from pre-programmed lighting options for various standard venues and make small changes to those if desired to better align with the music.
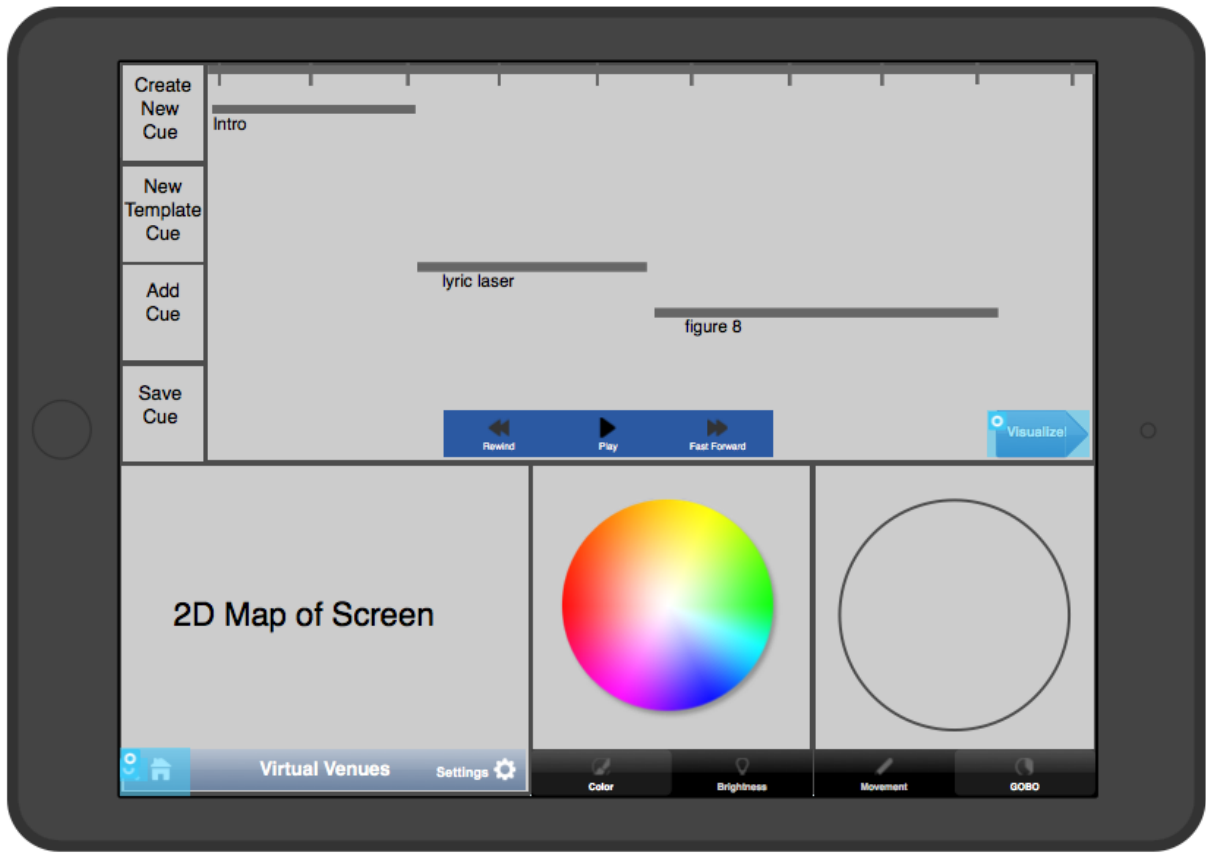
Fig 3. Lighting Adjustments Screen

Visualization (complex): Finally, at the end of adjusting and synchronization, the user can experience the light show that was just designed from a variety of locations throughout the venue. Although this is the most complex task in our application, it has the simplest user interface. The complexity comes from the underlying mechanics of producing dynamic lighting in virtual reality to match the light fixtures and cues that were just assigned to them. The user interface, however, merely consists of a direction pad and standard playback buttons (play, pause, fast forward, and rewind).

Fig 4. Visualization Screen

REVISED INTERFACE DESIGN

Since our last prototype, we have added an additional feature to the lighting placement screens. Previously, we forgot to include the option to select specific lighting fixtures and place them within the venue-- instead, the user could only select generic hanging positions. Now we have a prototype for what would eventually be a drag and drop functionality to select specific lighting fixtures (due to limitations with the prototyping tool, our medium-fi prototype instructs users to click on the lighting fixture type and then the corresponding hanging position rather than dragging and dropping).

During low-fi testing, we learned that our application would be most popular with inexperienced and amateur lighting designers, such as mobile DJs. The average DJ doesn't have access to HMDs and motion tracking systems, so we began thinking about integrating normal user input devices with our system, such as a mouse and keyboard. For our medium-fi prototype, we didn't have to worry about this, because our iPad-based prototype only represents the virtual touch interface that the user would see in VR. We are still lacking major features, like a 3D version of the venue in which the user can move around (probably using the keyboard arrows).
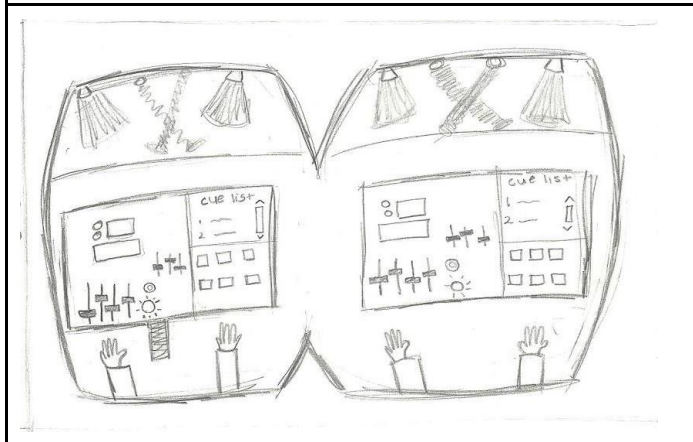
Beginning lighting designers also don't want to be overwhelmed with options, so we aimed to make our medium-fi prototype UI less technical than the low-fi UI. We reduced the number of options slightly (we could probably do more in this area) and added the ability to select "template cues" that are built-in features that can be tweaked and added to a show as cues. Based on user feedback from low-fi testing, we changed the positioning of many options and panels in the lighting design screen and added some features that we had omitted in the low-fi prototype, including a "timeline" and the ability to delay cues.

Lastly, we adjusted the direction pad in the visualization screen. Although this screen is simple there need to be some more guidelines as to what the user actually does on this screen. Originally the direction pad had an inner set of arrows for "teleporting"or making big jumps around the venue while the outer set of arrows were for more fine tuned navigation. These arrows purposes were unclear and we will only be incorporating one set as well as more descriptors on the screen so the user knows what that screen is meant for.
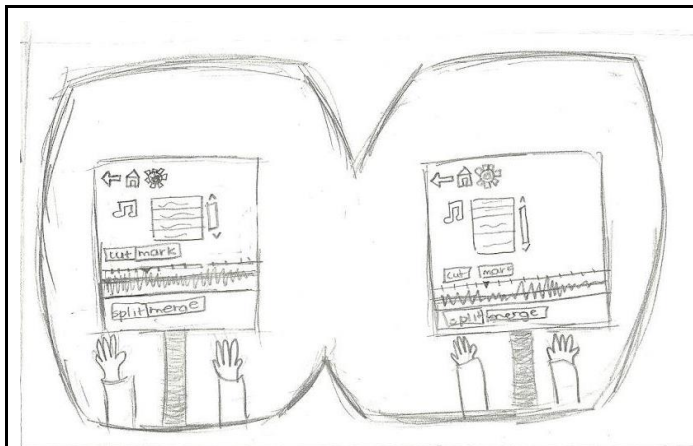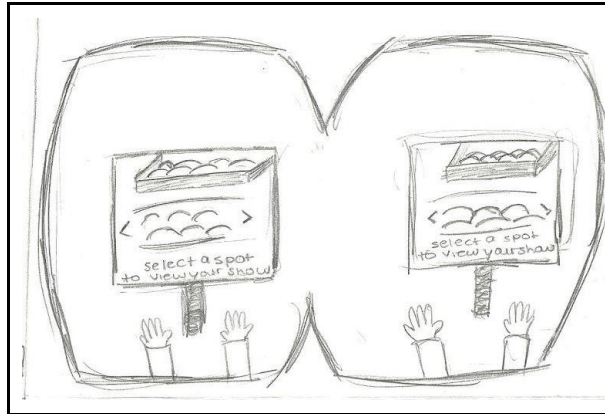
	Fig 5. Venue Selection This sketch shows the view that a user would have looking through the Oculus Rift at his/her virtual hands and a virtual touch screen. The user can choose venue options from a list in addition to adjusting some music-related options.
	Fig 6. Lighting Adjustments This sketch shows the view that a user would have looking through the Oculus Rift at his/her virtual hands and a virtual touch screen. The user has access to a lightboard-like interface and a cue list and is able to watch his/her lighting cues back while fully immersed in a virtual world.

Fig 7. Visualization

This sketch shows the view that a user would have looking through the Oculus Rift at his/her virtual hands and a virtual touch screen. The user is able to choose any position in the audience and watch his/her show from that vantage point to ensure that he/she is getting the expected effects.

PROTOTYPE OVERVIEW

To build our Medium-Fi prototype, we used a website called Proto.io. The tool was really helpful to see what the app would actually look and feel like. For the lo-fi prototype, we drew the light design screen in a quite narrow rectangle. But by using Proto.io, we were forced to create an interface that fits the dimension of an iPad screen. As a result we, moved the 2d map of the stage from the top left of the screen to the bottom left of the screen, to give the the cue list more room. While proto.io was helpful for imagining the layout of the touch screen, it did not visualize at all the 3D representation of the venue. Thus, there was no reason for us to make the lighting adjustment buttons work, since the lights could not be seen in the prototype. Thus, this prototype gave us no insight into what it will be like to design or visualize or lighting cue. Additionally, Proto.io was difficult to add complicated functionality into, and it would have been a major hassle to include evey single possible interaction in it. For example, we did not include a menu to select template cues, or show a selected light on the 2d map, because there is only so much functionality we could add before the prototype became a mess of buttons interconnected screens.

PROTOTYPE LINK

https://virtualvenues.proto.io/share/?id=b09335a7-7926-44bf-9c66-a8b2c000ae2c&v=2