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Creating an Immersive Wayfinding VR Experience Using Design Thinking and Uptale

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Abstract. This paper shares the design and development process of creating an immersive wayfinding VR experience to help visiting students find a "hidden room" in a university building. The design and development choices of selecting appropriate immersive learning tools and project assets are presented. The use of design thinking as a framework to guide the project is described.

Keywords: Immersive Wayfinding, Design Thinking, Uptale, Photospheres.

1 Introduction

"Lehigh RiVR Whereabouts" is an immersive interactive VR wayfinding experience that is designed to help students and visitors find a "hidden room" in a university building. The "hidden room" is our group's VR development lab. The structure of the building (known as Building C) is complex. It consists of a four-story building with multiple entrances and three large bays that extend out from the lower level of the building. The "hidden room" is located in the middle bay and most student visitors are unable to find the "hidden room" during their initial visit. As a result, it is challenging to give accurate text directions to locate the "hidden room". To address this issue, we designed and developed a multiplatform wayfinding VR experience (i.e., headset, web, and mobile) to provide student visitors with an authentic experience of getting into Building C prior to their arrival. This immersive wayfinding (iWF) experience was designed and developed with the intent of reducing visitors' anxiety, the possibility of getting lost, potential miscommunications, and receiving help-request calls from lost visitors in the middle of meetings that take place in the "hidden room".

2 Design and Development

To assist our audience to easily navigate between the possible six entrance ways into the building and to become familiar with building's layout, we created the iWF using Uptale [1], since it had been recently added to our university's digital library tools. Visitors to the building typically arrive at three of the six entrances. We also identified the hallway where visitors typically get lost or confused when trying to locate the "hidden room".

Uptale allowed us to import a series of 360º photos from a Ricoh Theta V [2] for creating the immersive and interactive environments without having to code. Uptale uses a web graphical user interface for developing VR experiences that use 360º photospheres where embedded hypermedia links can be used to assist with movement through a VR space [1]. For example, a main design feature of our iWF was adding buttons to connect the scenes for virtual navigation purposes. The selected 360º virtual environments were intended to help our visitors get to know the building's layout and key navigational landmarks for when they arrived.

3 The Workflow and Project Assets

We used different colors to distinguish the three different paths to get into the "hidden room" based on one of the three main building entrance doors. The colors are designed based on the logo of our Lehigh RiVR lab. The

audience can easily follow the color-based path in the VR experience based on the entrance door that they select. The color-based pathways also make the design more visually integrative throughout the user's experience.

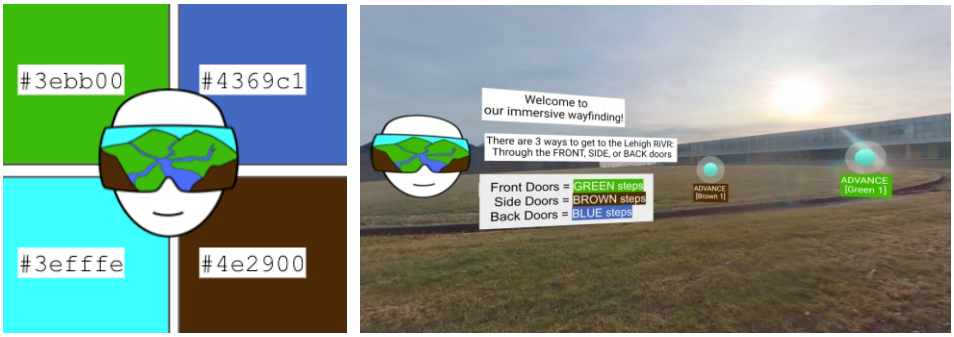

Fig. 1. The left figure shows the preparation of the color palette based on our lab's logo. The right figure illustrates the final product (screenshot from web VR) after applying the color palette asset.

4 Design Method

We used design thinking as the framework to guide the design and development of this project. Design thinking is a human centered hands-on approach to solve complex or wicked problems for specific audiences [3][4]. It includes five steps: empathize, define, ideate, prototype, and test. Below, we describe how we used the design thinking process for this VR project.

4.1 Empathize (Step 1) and Define (Step 2)

First, we tried to understand the target audience's struggles and anxiety on finding the right path in Building C. After going for a few short walks inside the building, we noticed that besides the multiple ways of entering the building, these paths often intersected halfway through a hallway. We identified this as one of the causes to why people get lost while trying to find their way to the "hidden room". At these important intersections, if a person takes a wrong turn, they would be walking towards other building entrances (i.e., not our lab's door). Therefore, we decided to enhance the virtual intersections with navigational cues that included buttons, arrows, and labels to help our audience take a direct route (see Fig. 2). The labels were designed in concise and effective ways to provide visitors with clear instructions.

4.2 Ideate (Step 3) and Prototype (Step 4)

We explored several different VR development software for this project based on our needs and concerns, and we selected Uptale for the features it provided and its ease-of-use to get started with developing an immersive experience with 360º photospheres. We used Google Slides to prototype the experience. That was the first time we explored and used the Uptale software. Google Slides enabled us to quickly articulate and share our design decisions and assisted us with rapid prototyping and testing of different parts of the project. Rapid prototyping assists designers to focus on the development itself rather than getting stuck or distracted by the features of a new software.

Fig. 2. This figure is one of the prototyped 360º environments in Google Slides. It shows the pathway options that might be chosen at a central intersection.

4.3 Test (Step 5) and Preliminary Results

The iWF was tested using an iPad, a VR headset (Meta Quest 1), as well as desktop and laptop computers. Our first user test happened during a university expo with prospective students and their parents. Most participants were drawn to the VR headset and reacted very favorably and highly engaged. Besides the university expo event, we have often shared a link to the iWF for new students and visitors who need to find our lab. The preliminary findings show that six participants used a web browser and completed the wayfinding in approximately 2 minutes. These participants had never been to the lab before and reported being able to find the "hidden room" without asking for help. We are still conducting user tests and have encouraged participants to find the lab using any VR platform they have access to. This project's greatest limitation is that the users must create and log into an Uptale account before experiencing the "Lehigh RiVR Whereabouts" iWF.

5 Considerations and Further Iterations

Immersive and interactive experiences, when appropriately designed, developed, and tested, can deliver instructions within complex, location-based scenarios. 360º photosheres can be developed to provide users with rich contextual information, minimizing the need for extensive verbal guidance to describe the surroundings effectively. The quick tags provided by Uptale were successful at assisting our audience to navigate easily by clicking hyperlinked buttons rather than wandering in the building. Since Uptale also provided us with options to add different media (e.g., text, videos, 3D models) to give clear instructions to our audience, we have initiated the second stage of this project, immersive capacity building for our VR lab operations with Uptale (see fig. 3).

This design and development work has implications for others who work in buildings that tend to have room locations that are difficult to find from main entrances. This may be especially important for building visitors who may have mobility disabilities and require a specific accommodated pathway to navigate from a designated building entrance to a specific room location.

Currently, we are considering the development of an immersive onboard training for our development lab, leveraging the mixed reality features of Meta Quest 3. This work holds promise to reduce the work on preparing 360º photospheres, which will allow for more time for the design and development of short instructional videos and written guidelines for using the various equipment and infrastructure of our lab.

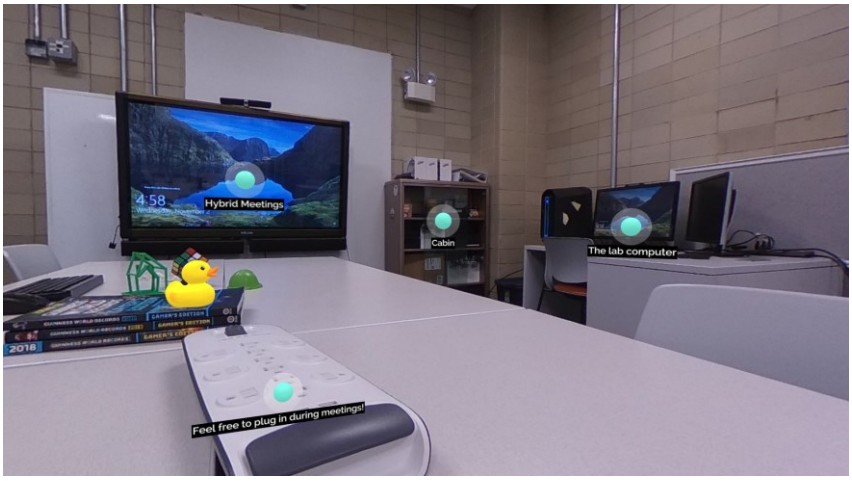

Fig. 3. This figure illustrates how Uptale tags can be placed in a 360 virtual environment to trigger specific "chunks" of instruction (e.g., how to set up hybrid meetings, how to open the cabinet, how to access the lab computer, etc.).

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