Immercity: communicating about virtual and augmented realities

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ABSTRACT

Augmented and Mixed Reality technologies bring often definitions understanding issues for novice users. In this paper, we introduce our work in progress, Immercity, regarding the development of a content curation application which manage the idea of communicating on these technologies by their use.

CCS CONCEPTS

• **Human-centered computing** → **Mixed / augmented reality**; **Virtual reality**; *Empirical studies in interaction design*; • **Computing methodologies** → *Virtual reality*;

KEYWORDS

Virtual Reality, Augmented Reality, Content curation

1 INTRODUCTION

When working on Virtual, Augmented and Mixed Realities, one of the first difficulties is to communicate about their differences and definitions. Indeed, they posed ambiguity and representation problems as well for informed than novice interlocutors.

In the context of the collaboration between LIRMM[1] and Capgemini CSD[2], it seemed interesting to deliver a technology watch. Today, content curation is principally made on specialized websites and blogs, social or businesssocial networks, and on dedicated platforms or tools. As far as we know, the idea of communicate about VR and AR technologies by using them as a support has not been exploited yet. Some interesting initiatives designed to communicate on these technologies by their use exists, like the VENTURI[3] project, which aims to democratize Mixed Reality concepts to novice users by experimenting with a prototype.

Thereby, by seeking to digress and diffuse the technology watch in an original way, we conceived a multi-technological application, Immercity. It aims to centralize information from the technology watch within an only one metaphor on different medium. This multi-technological aspect support the communication main objective with a secondary one: illustrate differences between these technologies.

2 IMMERCITY APPLICATION

2.1 Cross-platform application

In the context of this work, it seems important to remind some definitions. An Augmented Reality (AR) system aims to complete the user perception by adding virtual information and respects three essential rules [Azuma 1997]: (1) Combine real and virtual objects, (2) Interact in real time, (3) Be recorded in three dimensions. [Fuchs 2016] extends the Virtual Reality (VR) definition by determining a fundamental principle, the "perception, cognition, action" loop: in any VR application, the user is in immersion and interaction with a virtual environment. He perceives, decides and acts in this environment. The cross-platform aspect of the application immediately seems to be a necessity: the use cases need to consider a fixed use on the workplace as well as a mobile use on exhibition or conferences.

2.2 City metaphor choice

In the aim of illustrating differences of these technologies for novice users, it seemed important that the manipulated object remains the same. Thereby, interacting differently with the same 3D model, exploit the different capabilities of each technologies and raise awareness on them. The idea to use the 3D representation of a city had been took on. By associating this choice with the cross-platform constraints, the operating principles have been designed for each technology. On a web browser, the application would allow to display a 3D perspective view of the city and access to the information. In VR, the user, equipped with a Cardboard, would move inside the city in order to access to the information. In AR, it would be possible to bring out a 3D model of the city, from a visual tag representing its 2D plan. The user would use this tag in order to see the city emerge on 3D. By interacting with each building, the user would access to the different information distributed, the city becoming in this way a metaphor of what would have been a blog or website main menu.

3 PROTOTYPES

Prototypes had been realized with the aim to confirm the feasibility of the application, while restricting their area to the city visualization only. There were realized via Unity3D[4], as part of a Bachelor degree's internship [Masseport 2016]. For the city modeling, the objective being to simply communicate, a low realism level has deliberately been looked for. Furthermore, key building colors and graphical styles have deliberately been chosen in order to stand

*Also with, Capgemini CSD[2]. Capgemini Technology Services.
[1]Montpellier Laboratory of Informatics, Robotics and Microelectronics
[2]Capgemini Customer Service Development
[3]http://venturi.fbk.eu
[4]http://unity3D.com

out from the decorative elements and easily draw user's attention. Building colors had been adjusted basically, on observation results.

3.1 Web browser prototype

For the prototype's view realization, a fixed camera had especially created and positioned in order that all the key buildings could be easily identifiable. Based on the different types of information intended to be diffused beforehand, six key buildings have been selected [Figure 1]: a school (for definitions and concepts), a kiosk (for last news), a supermarket (for a referencing of existing devices), a library (for scientific literature), a cinema (for videos and demonstrations), and a house (for preferences and bookmarks).

Figure 1: Key buildings

3.2 Virtual Reality prototype

The VR prototype offers the user, equipped with a Cardboard, to immerse his self within the city and to move from a building to another. It is based on the Google VR SDK[5] for Unity3D. Interact with the key buildings let the user to move between each of them and a visual pointing method had been selected. For this purpose, the cursor included in the Google VR SDK had been readjusted. The cursor has been improved in order to add a second one, indicating the loading time necessary for triggering the action.

Two different ways for highlighting the key buildings have been implemented. The first one simply involves making the cursor wider when it flights over one of them. However, this solution was not satisfying because the buildings did not highlight enough between each other. Another solution had so been implemented. It consists in positioning colored and animated spheres, suspended in front of each key building, allowing users identifying them.

3.3 Augmented Reality prototype

The AR prototype consists in overlaying the city's 3D model over its 2D plan. By importing the visual tag in the Unity 3D scene then placing it directly under the city's 3D model, it made possible the city to emerge it from its 2D plan, placed behind a business card. In order to interact with buildings, a simple way had been implemented, by tapping on the building.

4 EXPERIMENTS

Experiments were made on a panel of 37 persons, mainly men (70%), from 21 to 59 years old, with an average of 36 years old and with an important part of 20-30 years old (48%). For most of them, it was their first experience in VR (68%) and AR (70%).

[5]http://developers.google.com/vr/unity/

First, subjects were invited to freely use the prototype while their behaviors and reactions were noticed. Then, they were asked to follow a sequence of oral instructions, in order to observe specific behaviors such as difficulties to recognize, find, or select a key building. Each subject used one of four test version, in order to compare and focus on the different implementations: cursor type, selection method and key building highlighting. After all, an open discussions about the experience was steered, in order to collect feedback.

5 PERSPECTIVES

Further to the experiments, some tracks of visual improvements to be brought to the application emerged. The interest of a loading cursor being confirmed. Nevertheless, it slightly lacks visibility, certain users having put a time of adaptation before noticing it. It could so be interesting to emphasize the loading cursor by a different color than the initial cursor on which it is inserted. As much in VR as in AR, the necessity of animations highlighting the key buildings was underlined. By taking into account the results of the experiments and the users' remarks and suggestions, it would be advisable to implement one unique solution for each technology. It could be interesting to position an element floating on every key building. These improvements will allow to end in a first version of the application in which the users will be able to access to the information, in the form of web pages, when they will interact with a key building.

6 CONCLUSION

We imagined a content curation application allowing to share information and structure it within a unique 3D element which represent a city. Prototypes were developed in order to validate the feasibility the sharing this 3D element in Virtual and Augmented Realities. This work allowed to validate visual elements implemented, to invalidate others and to imagine some more adapted. We now have to analyze other elements stemming from experiments in order to improve other aspects of the application, in the objective to produce a first version. It will then be necessary to focus on different ways to exploit the interactions which propose these technologies in the process of representation and access to the information.

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