Exploring the boundaries of Augmented Reality in a magic show performance

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ABSTRACT

"Magic for a Pixeloscope" is an experimental performance that merges augmented and mixed reality and full-body interaction within a classical magic show. The magician uses custom based hardware and software to create new illusions which are a starting point to explore new language for magical and theatre expression.

Categories and Subject Descriptors

H.5.1 [**Multimedia Information Systems**]: Artificial, augmented, and virtual realities; J.5. [**Arts and Humanities**]: Performing arts; J.7. [**Computers in other systems**]: Real time.

Keywords

Interaction design, magic, mixed reality, augmented reality, full-body interaction, magical expression, performance, interactive theater.

1. INTRODUCTION

Several remediations arose in theatre during its history contributing with new theatre approaches [6]. Each remediation caused a new way to understand the nature of theatre, the way to represent it and the role of actors on stage [1]. Indeed, nowadays, the performer can control most of the media and mechanic devices trough his body and actions. The body can be understood as the control space from where all the spectacular elements are derived [2]. Even if audience takes part on the show the new digital performer can master the advent of actions of the participants. Our purpose was to draw paths between interaction design, augmented and mixed reality (AR/MR) and taking them into the show conception from scratch affecting, indeed, its plot.

Theatre and especially magicians have always been reinventing their shows and their magical language expression with new tricks and illusions. With this purpose magic performances incorporate new technologies, new materials and inventions. Nevertheless, few magicians incorporate digital technologies [8][9][3]. We believe that digital technologies such as AR/MR and interaction can offer new ways to understand the creation of performances. This project pushes towards the usage of these technologies on stage [5] exploring how to provoke new experiences in the audience, promoting the analysis and understanding of this new communication media. We believe that the experience we designed for the audience could not be achieved using any other media.

2. CONCEPTUALIZATION

Previous research into conceptualizing mixed realities focused on moving from one physical place to another virtual one and vice versa via boundaries, which transparently connect separate, non-overlaid physical and virtual spaces [10][4]. One of the main conceptualizing ideas for the show was to explore this relation between the real and unreal, i.e. the relation between the physical and the digital or virtual; and how the relation between two worlds and the boundaries between them can be used to create a magical effect in the audience.

Four different combinations, i.e. transforms [11], were established for coupling these two worlds: 1) Physical world action with physical world effect (Ppt); 2) Physical world action with a digital world effect (Pdt); 3) Digital world action with a digital world effect (Ddt); 4) Digital world action with a physical world effect (Dpt)

The design and construction of the transforms from one world to the other and vice versa implies that a magical effect could exist in the physical world, in digital world or in both. To decide which kind of tricks could be suitable to bring physical and virtual worlds together achieving a high magical illusion 1) we studied the major magic effects categories, which already exist on the physical world; and 2) we analyzed if the magical effect could be performed also in the digital world.

"Magic for a Pixeloscope" incorporated several of these transforms through the use of custom developed interfaces allowing the magician and audience volunteers to perform them.

3. MAGIC FOR A PIXELOSCOPE

Custom based hardware and software was developed to capture and process the magician and audience volunteers' gestures and behaviours which were used to create digitally generated real-time stimuli. We developed two different interfaces which permitted the performance of the designed new tricks:

- An interactive table for close magic tricks where magician hand gestures and cards were captured by a camera, see Figure 1a. The live video capture was shown on a big screen and the real-time effects, controlled by the magician or the audience, augmented the video image in real time.

- A big interactive retro-projected screen. In front of it movement, behaviours, position and full-body gestures were captured, processed and used to interact with projected

elements in a 1:1 scale, see Figure 1b. In this setting, full-body interaction technique is used for a first person interaction without any outline of the users' silhouette or any avatar, enhancing the illusion of controlling the digital world and the magical effect.

a)   b)

Figure 1. Custom developed interfaces a) table for augmenting cards and magician hands; b) screen for full-body interaction.

4. CONCLUSIONS

Artefacts and magical stuff were tied up with technology from its beginning. Materials and objects have been evolving during decades arousing an enormous performance and accuracy. So far it is brave to overcome this context with the inclusion of new materials and technologies. It requires time, testing and integration of languages. Thus, our stage and technical proposal is the result of a long process of exploration and discussion of how interaction can be understood and how audience will understand it.

We decided to use full body interaction because physical interfaces may decrease the level of empathy of the participant and the credibility of the effect. The use of this set led us to have a free space where participants can move naturally in front the screen. Technicians will control the advent of the interactions giving the control of the interface to the magician in the precise moment.

Magicians have total control in the stage upon the tricks that they do and upon our reception of them. They are totally aware about what the audience feel and how. These are their qualities.

What we discovered during the process of development is that it is possible to break the digital fascination if the effect is presented with enough aura and atmosphere.

Digital magicians have to deal with the attraction that new interfaces have by default. People love new artefacts and adore that we can do with them. Although it is difficult to surprise and evoke emotions trough this technologies in the stage we tried to push in the right direction by focusing the attention in the drama of the action rather than in the technology itself. If the magical effect is presented in a moment where audience is specking something amazing, in a well plot driven instant and with enough energy, they will forget the praxis (how was done) and will flow by their emotions (how I feel it).

A good way to achieve illusion by mixing digital technologies with classical magic is by breaking the boundaries between physical and digital worlds through the usage of transforms. Not all the transforms could achieve the same grade of illusion in the audience, so magician performance, actions and attitude contributes to the understanding of transforms and audience fascination.

"Magic for a Pixeloscope" [7] is the seminal work of a few performance that we will develop trying to add in everyone the lessons learned during the initial performances. We will design new tricks and effects and will test their grade of illusion.

5. ACKNOWLEDGMENTS

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