AN INTERACTIVE PLATFORM BASED ON VIRTUAL REALITY FOR ARTISTIC CONTENT

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Abstract. This paper presents an interactive platform based on virtual reality for artistic content. First experiments with this platform have shown that it is a powerful scheme for interactive experiences. A metaphor of The little prince is used as content. Beginning with the concepts of content and interaction, this led us to reflect on drama and presence, as well as on the interrelationships amongst them. As a conclusion, a new paradigm relating content, interaction, drama and presence is proposed.

1. Introduction

The fast evolution of Virtual Reality (VR) and Virtual Environments (VE) technologies has enabled a considerable development of application fields. Examples of this can be found in medical, industrial, automotive, and aero spatial fields, where VR is used as a powerful tool devoted mainly to training. Furthermore, VR has proved to be powerful for creative purposes. In the past years, some artists have explored this new technology, developing installations and performances focused in interaction [Weibel, 95] [Molina, 00].

Our closest references are the artistic projects by R. Parés & N. Parés, and their conception of interaction with real time synthetic stimulus. They focus the interaction process in what they call stimulus, postulating that interaction is in the transformation of the product by the user, whenever the rules stated by the author allow it. Hence, their study is strongly determined by real time [Parés, 97]. They have proposed an interaction-driven VR application designing model, in which interaction plays a leading role against a secondary role played by content [Parés, 01].

The approach to interactive drama by M. Antúnez is also interesting [Antúnez, 01]. According to him, the creation process of interactive drama is organized on the basis of two principles: definition of the tool, and narrative content. We will set a parallelism between these two principles and the concepts of Interaction and Content respectively, as will be stated later.

On the other hand, recently, some authors have begun to define the sense of presence, as ‘the feeling of being there’ [Huang, 99] [Jacobson, 02]. The sense of presence is the defining experience for virtual reality, and it has been proposed that presence is a multidimensional construct [Steuer, 92]. There are several proposals in the literature about a decomposition of the sense of presence. The main conceptual distinction is to consider separately immersion and involvement [Witmer, 98]. The first is a more physical experience, while the latter is more psychological. Other authors refer to these concepts as spatial-constructive and attentional components [Schubert, 01]. For a different viewpoint, focused on the artistic fact, see [Brea, 02; pp. 121-125], where an interesting discussion on presence and participation is presented.

According to Schubert, one of the second order components of presence treated in the literature is the drama. This was called plot by Slater & Wilbur [Slater, 97], and defined as “the extent to which the VE in a particular context presents a story-line that is self-contained, has its own
dynamic, and presents an alternate unfolding sequence of events...” For our purposes, the drama component is very important, and will be considered below as a main component of the sense of presence in an artistic virtual experience.

In this paper, we propose Asteroid B612, as a metaphor of The little prince, written by Antoine de Saint-Exupéry [Saint, 40]. Asteroid B612 is an experimental platform that uses VR oriented towards artistic content so as to open the way for new areas of research, raising questions on construction and deconstruction of the pre-designed experiment. This leads to a strong interdisciplinary work, which unites both artistic and technical fields.

The paper is organized as follows. Section 2 presents a description of the platform, including technical details and requirements. In section 3, the metaphor of The little prince is explained. In section 4, some ideas about the role of content and interaction are discussed, yielding the proposed paradigm [Content-Interaction-Drama-Presence]. Finally, some conclusions and future works are shown in section 5.

2. Description of the platform.

The proposed platform is a mono-user system, not a performance. The user is not an actor or a performer. There is no predetermined sequence of actions and a predefined story line. It is just a platform for experience.

2.1 The installation

The physical and logical structure of this platform is depicted in fig. 1. A video projector projects a computer-generated image of the asteroid on the ground. The individual carrying out the experiment is placed over this projection with a position sensor on his back. The sensor gives its relative position to the base station (BS), placed near the projecting space. The computer captures any movements of the individual through the sensor. These movements are used to rotate the asteroid in the opposite direction of the captured movement. This way, the individual carrying out the experiment can navigate exploring the whole surface of the asteroid, and controlling the speed of rotation. In order to minimize the effect of shadows, the projector is slightly off-centre, leaning the axis of the projection.

Fig. 1. Physical and logical diagram of the installation
The asteroid is covered of red little tiles (fig. 2). In this prototype version, we have placed some objects over the small world: some static and orbiting texts, and a semitransparent sphere grounded on the asteroid. Figs 3, 4 are snapshots of the experience.

When the subject is placed in the center of the projection, the asteroid does not move. If he moves himself (moves the sensor) more than 5cm from that centre, the asteroid begins to rotate. Outside this circle of 5cm of radius, the speed of rotation is linearly proportional to the distance of the sensor to the centre mentioned above.

Fig. 2. The Asteroid

Fig. 3. Snapshot 1
2.2 Technical details
The virtual world has been designed using 3Dstudio v4, and animated with WorldToolkit v9, running on a Pentium IV with Microsoft Windows 2000, and a Gforce 4 graphic card. As position sensors, a Flock of Birds, from Ascension Tech., was used.

2.3 Scenic space requirements
In order to achieve a high degree of immersion, a total absence of light is required in the space in which the experiment is implemented. Thus, as can be seen in the snapshots, the only light was the light of the projection.

A conventional video projector was used, and placed 4 m high. This gives a projection of approximately 1.5 m of diameter. Adding a wide angle lens we got an asteroid of approximately 2 m of diameter. Obviously, a higher placing of the projector will allow a larger projection, achieving a more powerful experiment, but loosing some luminosity.

Just like the character from Saint de Exupéry who bases his trip as a search, our experiment proposes a trip or search without end, in cycles, without pattern. In itself, this search is the experience that will make us reflect upon construction or deconstruction of the artistic work.

The Little Prince is a perfect simile of the experience of interaction inside an environment where the world is made to the measure of one user.

In the proposed platform, the asteroid is taken as our spatial reference world, being a physical extension of our own body, as it is for the little prince. From the point of view of the little prince, everything revolves around the asteroid, where he discovers himself throughout his trip. Just as for the little prince, this is also an introspective trip for the user of our platform. It is an exploration experience in which he is involved through the events that are part of his world.
4. The paradigm [Content-Interaction-Drama-Presence]

Starting from the sequential character of textual drama, we reconsider the relationship between content and interaction, in order to avoid that sequential character, present even in hypermedia and defined by the content proposed by the author and the interaction with the machine, that the user can not avoid, although he seems not to notice it. Thus, we merge Content and Interaction in our platform as an interface or an extension of our own body. We can then postulate that these two variables contribute to the sense of Presence as shown in equation 1, where P=Presence, C=Contents, I=Interaction,

\[ P = f_1(C, I) \]  

(eq.1)

We can also express this relationship in a graphical way, defining a plane where Content and Interaction are the two coordinates, as shown in fig.5. The experience places the subject in a determined area, defined by the interaction mechanisms and content explored by him, and supplying a degree of presence.

![Fig. 5. Presence as a function of Content and Interaction](image)

When we detach ourselves from content, and include interaction with unusual environments based on technology, we allow the individual in the experiment to construct his own drama. The Drama, the third variable, contributes as well as Content and Interaction to the sense of Presence, as shown in equation 2, where D=Drama.

\[ P = f_2(C, I, D) \]  

(eq.2)

This modifies the plane in fig. 5 transforming it into a three-dimensional space where Drama is the third coordinate, as shown in fig. 6. In this case, the experience is placed in a volumetric space.

![Fig. 6. Presence as a function of Content, Interaction and Drama](image)
Although Drama can be considered as an independent variable, in this kind of experience, the author does not define it as a story-line, but it is a component given by the subject. Hence, the apparent contradiction between $f_1$ and $f_2$, is solved if we consider a third subjective function, constructed by the user relating the proposed content and the interaction elements with his own cultural, social and emotional baggage, in order to build his own Drama, denoted by $D^*$ in equation 3

$$D^*=f_3(C,I) \quad \text{(eq. 3)}$$

Hence, fig. 5 can be seen as a projection of Presence in the Content-Interaction plane, as shown in fig. 7.

![Fig. 7. Projection of Presence in the plane Content - Interaction](image)

From this point of view, Drama is a redundant variable. However, we think that it is very interesting to consider it because eq. 3 connects Drama to the subjective perception of Content and available interaction mechanisms. Thus, our goal with this experiment is to gain a better insight on this subjective Drama, as a key variable in Presence.

5. Conclusions

In this paper we present an interactive platform based on VR oriented to artistic content. A discussion on the relationship amongst Content, Interaction, Drama, and Presence has also been presented. This leads us to propose a paradigm of these complex interrelationships.

This approach can be applied in training and educational techniques, where the subjective drama corresponds to the mental model that the trainee needs to construct in order to understand and/or control the system in which he is trained.

5.1 Future lines

The presented discussion about the role of interactive drama in the experiment carried out opens a way to future experiments involving many users. This will allow the study of scattering or variability of the subjective drama built by each user. Moreover, it will be interesting to analyse the extent to which the content and interaction created by the author influence and limit the construction of the drama.

In this sense, the presented platform is widely open to many extensions. Some of which are:

- The inclusion of living beings with some interactive behaviour and some intelligence, understanding intelligence as complexity in its interaction with the user.
- The addition of more sensors, increasing the interaction possibilities. An example could be the sensing of the hand and the inclusion of a virtual spotlight.
- The incorporation of sound. Either environmental sounds as well as event related sounds. In this way, the sense of presence will be strengthened.
6. Acknowledgements

This work has been partially supported by the Spanish Ministry of Science and Technology, and ERDF funds (project TIC2002-04348-C02-01). We would like to thank the Vicerrectorado de Cultura y Extensión Universitaria, of the University of Málaga, for putting at our disposal the theatre in which the experiment was carried out.

References


