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Making The Tempest

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Technical Report   TR-18-02   Relatório Técnico

January   -   2018   -   Janeiro

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The Tempest is an experiment based on the Shakespeare's play, produced as a proof-of-concept of the VR Kino Theater platform.

CCS Concepts: • **Applied computing** → *Media arts*;

Additional Key Words and Phrases: real-time cinema, immersive theatre, storytelling, virtual reality

1 INTRODUCTION

The consolidation of Virtual Reality technology and its wide adoption as a promise for the future of media is motivating a quest for the development of new applications in many areas. In this scenario, the entertainment industry has shown great interest in exploiting the possibilities of the medium. Some examples are Cinematic VR and Location-Based Hyper-Reality.

VR Kino+Theater is one initiative in this direction. It combines Theatrical Performance with Live Cinema using Virtual Reality and Gaming technologies. To demonstrate the capabilities of the platform, we produced (at IMPA's VISGRAF Lab) a proof-of-concept experiment based on the Shakespeare's play "The Tempest".

The play, written circa 1610, is believed to be the last work that the author wrote alone. It was first published in the *First Folio* of 1623. The Tempest is very different to Shakespeare's other plays and reveals a concern with the nature of a play, as well as, with the theatrical illusion.

The motivation to adopt The Tempest as the basis for our experiment is due to intrinsic qualities of the play, particularly the *magic*, which is one of the main themes of its narrative.

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Additionally, The Tempest has been used recently in related contexts. The Royal Shakespeare Company, as part of the commemoration of the 400th anniversary of Shakespeare's death, in a partnership with Intel, produced the play creating an audience experience using performance capture and computer graphics to render a digital character – Ariel the sprite – live on stage.

The Tempest has also been the subject of many adaptations to the cinema. Most notably, the "Prospero's Book", written and directed by Peter Greenaway, and the 2010 film directed by Julie Taymor featuring Helen Mirren in the role of Prospera.

Our experiment differs from these previous productions of The Tempest and other initiatives in VR Theater because, as far as we know, it is the first time that actors – using VR – are fully immersed in a virtual set and their live performance is shown to the public on a movie screen as a real-time computer graphics film under the director's interactive control.

Related work that combines Virtual Reality and Theater has been conducted at NYU. Most notably the projects: "To Be With Hamlet" and "Holojam in Wonderland" of the Future Reality Lab.

2 THE EXPERIMENT

The VISGRAF Lab's production based on The Tempest was created by a multidisciplinary team of performing arts professionals, designers, and computer scientists who want to push the boundaries of what is possible in this area.

Given the experimental nature of the project, we decided to select a few scenes to produce, instead of the entire play with all its scenes. This allowed us to concentrate on the magical aspects of Shakespeare's work and explore their expressiveness potential.

2.1 Characters and Narrative Arcs

The structure of The Tempest can be divided into four narrative arcs with the following themes: *Love* ; *Revenge*; *Comedy*; and *Magic*.

The main characters of the play are: Prospero, duke of Millan and sorcerer; Miranda, Prosperos's daughter; Antonio, Prospero's brother; Ariel, a spirit servant of Prospero; Caliban, Prospero's slave; Alonso, the king of Naples; Ferdinand, son of Alonso; Stephano and Trinculo, respectively the king's butler and jester.

The Love theme concerns Miranda and Ferdinand. The Revenge theme involves Prospero, Antonio and Alonso. The Comedy theme revolves around Trinculo, Stephano and Caliban. The Magic theme is centered in Prospero and Ariel.

2.2 Scene Selection and Casting

Our selection uses three parts of the play that are related with the theme "magic". It consists in: two dialogues (with cuts) of Act I, Scene II: Prospero and Miranda (Tem I.ii.1 / Tem I.ii.186); Prospero and Ariel (Tem I.ii.187 / Tem I.ii.304) and the Epilogue (end of Act V, Scen I). Therefore, the experiment involves only the characters of Prospero, Miranda and Ariel. The total duration is approximately 20 min. As in some recent adaptations of the play, including Julie Taymor's Film, Prospera, the main character is female – interpreted by the actress Helena Varvaki. The roles of Miranda and Ariel are played respectively by Daniela Salles Abreu and Rick Yates.

3 PRODUCTION DESIGN

The development of our experiment followed mostly the traditional steps for the creation of a audio-visual narrative product. The software tools included Blender, 3D Studio Max and Unity. Here, we will highlight the particular aspects related to VR.

3.1 Sets and Props

The story takes place on a Mediterranean island. The first dialogue happens inside Prospera's Cell, while the second dialogue is at a Clearing in the forrest and the epilogue is at a Viewpoint facing the sea. We modeled the whole island, the ocean and sky, with more geometric details for the locations of action in each scene.

The Cell, in addition to bookshelves, contains a table and a chair that are extensibly used during the first dialogue. Since the actors interact physically with these elements, they correspond to tracked tangible objects with both a real and virtual versions. Other props include a chemical set and a candelabrum.

The Clearing, located near the seashore, is surrounded by rocks and trees. This setting is suitable for various effects inspired by the second dialogue, such as the imprisonment of Ariel inside a tree.

The Viewpoint is on top of a cliff at the edge of the island and makes possible both a global and local views of the place.

3.2 Digital Characters

The digital characters constitute the most important element of the production, because it features a live theatrical performance in Virtual Reality. For this reason, we have chosen to emphasise the verbal and motion expressions as the prominent acting aspects. Below we discuss the technical issues involved.

- **Body:** modeling, rigging and skinning was done using the MakeHuman (Prospera / Miranda) and Fuse (Ariel). The digital avatars were generated from the actor's biometry.
- **Wardrobe:** some clothes and hood were built with Marvelous Designer, other garments from pre-existing assets.
- **Masks:** all characters wear full face masks for practical and artistic reasons (among them, the influence of Commedia dell'arte on Shakespeare's work). They were custom designed using Z-Brush and Substance, based on 3D scans of the actor's faces.
- **Eyes:** the movement of the eyes were procedurally generated by the Unity package Realistic Eye Movements.
- **Motion:** character movement was produced using inverse kinematics. For this purpose, the Optitrack system tracked the actor's head, torso, hands and feet. This data controlled the avatar's skeleton using the Final IK Unity package.

3.3 Effects

Shakespeare's magic was revealed with the help of various visual effects. Some of them were quite simple and mechanical, such as the use of physical supports to make things appear to fly. Other effects were programmed in Unity using gaming techniques and packages such as Mesh Explosion.

3.4 Lighting

The visual look and atmosphere of the play is mostly due to light design. As such, a great effort was invested in establishing the appropriate mood for each ambient.

In the Cell the goal was to acheive an intimate environment. For this we resorted to a combination of Volumetric Lighting and Fog Shadows coming from the window, and complemented by a warm Particle Emission Lighting originating from the candles.

At the Clearing, the plot called for both day and night illumination. This was achieved using HDR Light Mapping from the Time-of-Day Unity package. For the night illumination a campfire was also created with Particle Lighting.

3.5 Cinematography

The intrinsic cinematic nature of VR Kino+Theater implies that Cinematography plays a key role in the production.

The director controls a live image on the movie screen by selecting the active view using an special-purpose multi-camera switcher. Its interface contains the views of 12 pre-programmed cameras showing in real-time the CG simulation. A view is activated by a simple click. The director interface also contains additional controls for triggering simulation events.

The cameras are divided in two blocks: one block with 8 multi-purpose cameras, such as close ups, medium shots and character's points of view; and another block with a sequential list of cameras which are custom designed for specifc parts of the action.

The VR Kino+Theater Camera Subsystem is implemented on top of the Unity Cinemachine package.

4 STAGING PROCESS

The staging process was perhaps the most unique aspect of the experience and it took full advantage of the VR technology.

4.1 Blocking

During the pre-production phase, storyboards and 2D floor-plants were produced for planning the performance. This data was used, before the rehearsal phase, for blocking the action of the actors using an interactive CG tool with both a 2D and 3D views.

4.2 Rehearsals

The rehearsal was entirely done using VR. Initially the actors refined positioning. Subsequently, they combined the action with full performance including text interpretation. Finally, the director added synchronization of camera views from the timeline. Everything was recorded in 3D for reviewing and documentation purposes.

5 RESULTS

The Tempest had two public presentations with positive feedback.