Computer Graphics and Theatre

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Abstract

In this paper, I discuss the multifaceted ways of integrating computer graphics and theatre. This includes my experience working with the Advanced Computing Center for the Arts and Design and the Ohio State University department of theatre, experimenting with CG to create graphics for physical and virtual environments.

The ultimate example of this application is achieved by *Sleep Deprivation Chamber*, the joint production between the ACCAD (Advanced Computing Center for the Arts and Design) and the theatre department at the Ohio State University. This production is presented in the Bowen Theatre at the Ohio State University form May 7th to May 27th, 2003. This production encompasses a broad range of computer graphics and interactive triggering technologies as a theatrical performance form.

I hope examples I describe in this paper show possibilities of creating new curriculum for theatre courses or interdisciplinary courses between theatre and computer graphics in which students can share their ideas and technical skills.

Keywords: set design, animation, performing arts, lighting, storytelling, 3D Model, computer aided rendering

1 Set Design- computer aided rendering

Computer aided rendering has been explored and emphasized for the design process in the theatre. This is because of the ease of manipulation, the portability, and the reusability that computer graphics offer. The result is an increase in creative possibilities and savings of time and money.

The design process starts with reading a script and making small thumbnail scenic sketches based on the script. After doing rough scaled drawings in the theatre space, the presentation sketches are created to show how the set is intended to look from the audience. Presentation sketches need to be rendered in full color, with stage lighting and mood indicated.

The presentation sketches for the set design can be achieved easily by using computer aided graphics. Ease of manipulating light and scenery, testing and indicating different moods of different scenes is the strongest aspect of using computer aided rendering for the design process.

These are examples of computer aided renderings of set design for two different plays. I created these designs using Alias: Wavefront's Maya 4.0.

***The mystery of Irma Vep*, done for the advanced set design class, 2002**

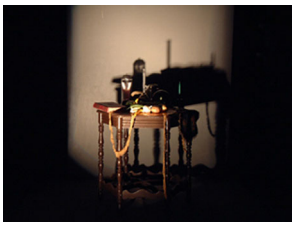
***Of Mice and Men*, done for the advanced set design class, 2002**

2 Digital and Physical Lighting

Another interesting way of incorporating computer graphics with theatrical contents can be exemplified with the class, Digital and Physical Lighting. This class is in the early stages of experimenting with combining digital elements with physical environments, and supported by ACCAD and the theatre department at The Ohio State University. This class was jointly taught by Maria Palazzi, the director of ACCAD and the associate professor of the design department and Mary Tarantino, the resident lighting designer of the Ohio State University department of theatre, 2002.

This class is composed of five different group projects. All the students were exposed to the two different environments and debate the differences and similarities of terminologies and aspects between digital and physical lighting.

For the final project, we needed to come up with creative solutions to combine these two different elements in the physical space. Each team consisted of students from the theatre department and ACCAD. Our team was composed of four members. Two of them created digital images, and two of them created the physical space including physical lighting and the screen surfaces.




Project #1. Physical Lighting of objects (left), by Drew Ward, Leo Xie, and Who Jeong Lee
Project #2. Digital Lighting of objects (right), by Sean Hennessy and Who Jeong Lee


Project #3. Physical Lighting of an Interior (Left), by Eric Farrar, Jim Hutchinson, and Who Jeong Lee
Project #4. Digital Lighting of an Interior (Right), by Kris Jones and Who Jeong Lee


The final project.
Lighting a World and Movement, *Rejuvenation*, by Who Jeong Lee, Eric Farrar, Jim Hutchinson, and Drew Ward

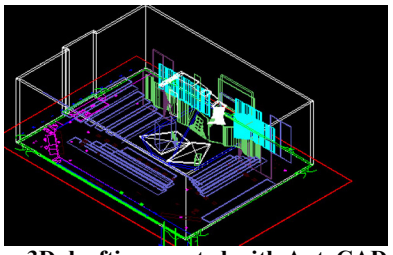
3 Creating the environment for the physical environment – *Memory of Water*

The set design for OSU's production, *Memory of Water*, shows how computer graphics can be used for communication during the actual theatre production. Comparison between the actual theatre production photos and the computer aided rendering shows how the set design concept, the mood and lighting design concept are achieved in the actual theatre performance.

Production Photo for Memory of Water Designed by Who Jeong Lee, OSU spring 2002

3D Model Created with Maya 4.0, created by Who Jeong Lee

Physical Mode



3D drafting created with AutoCAD

I begin by reading a script several times and familiarizing myself with the contents. Usually the first impression or observation from the script dominates the following design process. Concept sketches and notes are critical at this early process. In addition to these sketches and research, I created a short animation to visualize my set design concept with Maya 4.0 in the Form Visualization class at ACCAD. It is a short animation to visualize my design concept of the play. At the beginning of the design process when ideas are so abstract and complicated, creating a short visual conceptualization using computer graphics is very creative way of documenting the design concept and the initial impression of the play. The concept animation based on the concept of the play shows another way of combining theatrical contents with computer graphics.

A image of the animation, created by Who Jeong Lee

After being saturated by research and concept, the next step in the process is delivering the design concept into the real environment. For this process, establishing time, mood and the flow of action, and studying position and movements of the actors are critical. To

form definite thoughts about a design concept, I need to take notes or makes rough realization sketches based on the script and research.

4 Creating the environment for the virtual environment – *Illusion*

Illusion is my personal animation based on Shakespeare's *Macbeth*. This has been an ongoing project since I created the storyboard the summer, 2002.

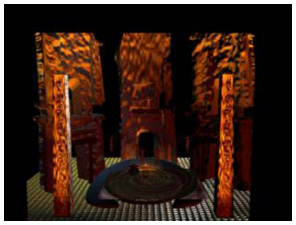
The animation, *Illusion*, shows how to adapt theatrical text and plot, and develop a story for the animation. The production process also shows how to apply set and costume design methods for developing the environment or characters of the animation.

Creating an environment for a theatre production and for animation requires different vocabulary and methodologies since they deal with different media. Content from the theare, however, can be abundant resources for any kind of story telling.

Story development

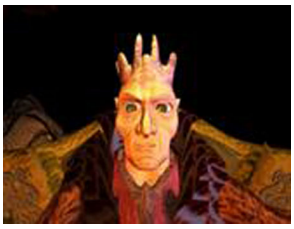
The story of *Illusion* comes from my set design concept developed in one of my set design classes. I tried to visualize my design concept; *Macbeth* becomes a part of his kingdom build on blood and skulls. I created a model based on this concept, but still could not represent all of my visual ideas into the traditional card model. The animation, *Illusion,* is an extended version of my physical model and *visualization* of my lyrical analysis of *Macbeth*.

Taking advantage of Maya, my animation shows the supernatural power of kingdom as a character, and choreographed motion of three witches, ghosts of dead men, and Macbeth. I applied traditional set, costume, and mask design methods during the process.



Environment Design

Dead men character



Main character, Macbeth

5 Creating the environment for the combination – *Sleep Deprivation Chamber*

Sleep Deprivation Chamber is a joint production between ACCAD and the theatre department at The Ohio State University. I participated to this production as an art director from its early brainstorming meeting. As an art director, I was responsible for overall visual output (physical and digital elements including the set design). The director, computer animators, videographers, designers, technicians from theatre and actors participated to this production. With great amount of support and anticipation, this production will be presented in the Bowen theatre at The Ohio State University after almost one year production preparation.

Every production or collaborative work has its own uniqueness and characteristics since new teams always create different kinds of team dynamics and working styles. I can explain this production with a lot of different perspectives, but in this paper, I will describe the brief introduction of this production and the application of computer graphics for this theatrical performance.

- *Sleep Deprivation Chamber* and postmodernism theatre

Many artists incorporated media into their arts since 1960s. For Robert Wilson and Robert Ashley, video or film provides additional architectural elements to the stage environment and allows for the great manipulation of time and space. Another good example is the Wooster Group. The New York based Wooster Group is one of the longest running experimental theatre groups. These artists and theatre group are often mentioned in discussions of postmodern theatre. Post modernistic plays are often characterized by their fragmented and non-linear story telling. The rejection of the linear is another feature of postmodern theatre – linear narrative, chronological time, plot sequences are all fragmented. Lateral spreading; non-hierarchical, simultaneous theatrical signs replace the orderly growth of the unified work.

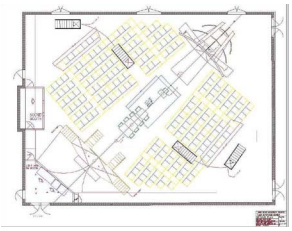
Sleep Deprivation Chamber is dream-like, imagistic, non-linear, and fragmented play written by Adam P. and Adrienne Kennedy, well known playwrights in the postmodern era. Taking advantage of computer graphics, poetic, dream-like, and nightmarish visual components are used to enhance the storytelling and to deliver the overall mood and psychology of the play.

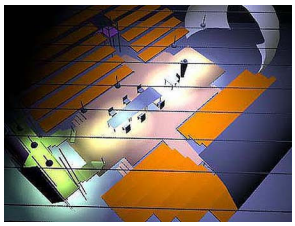
- The set design

The set is designed to create the image of a "road". Contrasting against this non linear format, the physical set is designed to convey the linear image of the road. With the projected road image represented in perspective, which shares the same vanishing point with the physical road, this physical space seems more linear, and creates the impression of journey, loneliness, endlessness, escape, and movement.

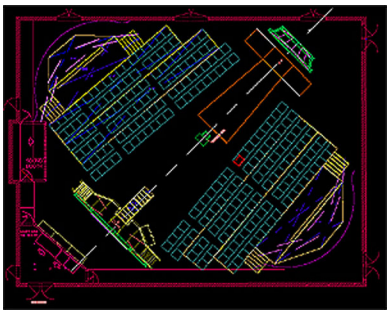
The set design was revised three times during the production process. For communication with the director, other designers, and the technical director, I used the 3D models created with Maya as well as a traditional card model. The following example

is the second revision of my set design. The space configuration was a main agenda.



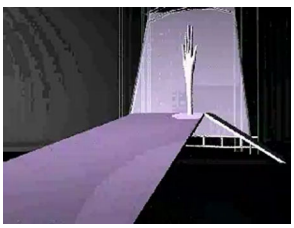


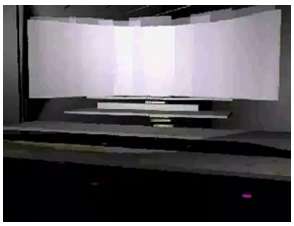
The ground plan (left) and 3D model for the second revision, created by Who Jeong Lee



Ground Plan - physical space configuration, designed by Who Jeong Lee

The physical performance space has five different projection screen surfaces; two right behind audiences, two at the end of diagonal line, and one from the grid.





Images from the animation I created to visualize the journey of the audience from the entrance to the seat

- Visual components

This linear physical road image is paradoxically connected with the general thread of this play, entrapment. By taking advantage of the DCE (digital composing effects), images on the screen surface deliver this fragmented, dream-like quality to the linear road achieved by the physical space. The main goal of infusing computer graphics into the physical performing space is to visualize poetic, nightmarish, and dream-like images in the main character's unconscious dream world as well as to interpose the physical performing space to reinforce this disjointed and mosaic like plot. Graphics created for this production are located at http://www.accad.ohio-state.edu/~wlee/SleepDep/digital/digitalcomponents.htm

The followings are examples of computer graphics used for this performance. The first example, Moth, is metaphorically used to visualize the main character's inner fear and anxiety. The color and number of moths are varied by character's emotional and psychological status, which is controlled and triggered in the real time.

The animation, Moth, created by Jenny Macy, ACCAD, OSU

Animation, Grave, created by Mike Altman, ACCAD, OSU

The second example is an animation created by Mike Altman, ACCAD, OSU. This is a good example how computer graphics in a virtual environment are used as an extension of physical environment.

There are many other visual components which are digitally and physically presented during the performance. You can see other computer graphics and animations at http://www.accad.ohio-state.edu/~wlee/SleepDep/SD_index.htm.

By applying several methodologies from the past and introducing new interactive technology to the performance, *Sleep Deprivation Chamber,* produces a broad range of possibilities of how to incorporate the technologies with theatre.

Acknowledgements

This paper would not have been possible without the support of ACCAD and the Ohio State University department of theatre. I would like to thank my friends and team members who participated in the production of the various projects with me. Especially, I would like to recognize the hard work and dedication by the team members of the *Sleep Deprivation Chamber* production. Thanks also to Maria Palazzi and Dan Gray, the resident scenic designer of The Ohio State University department of theatre for their advice and to Lesley Ferris for her encouragement and support.

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