Arch534 Advanced Computer-aided Architectural Design  
Spring 2008, 3 Credits  

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Office hours: Tuesday & Thursday, 10:00-11:00 AM  
Meeting time & place: Tuesday & Thursday, 11-12:30 PM (Rm. 440, CAD Lab)  
Course Web address: http://www.public.iastate.edu/~cschan/534/index.html

“I can never stand still,”  
“I must explore and experiment,”  
“I am never satisfied with my work,”  
“I resent the limitations of my own imagination.”  

-- Walt Disney --

If you have any condition, such as a physical or mental disability, which will make it difficult for you to carry out the work as I have outlined below, please notify me in the first two weeks of the semester so that we may make appropriate accommodations.

1. Objectives

The objectives of this course are to explore the “common denominators” of design across all design fields. Design, in this regard, is defined as the exploration of all possible methods to create objects/artifacts/products. Thus, four areas of studies are included:

(1) Exploration of design methodologies of analogy, parti, metaphor, and deformation,  
(2) Exploration of Character Animation (or Motion Builder) to understand organic design,  
(3) Exploration of particle animation to understand design by motion, and  
(4) Exploration of virtual reality to understand design in virtual environment.

The intention of this course to explore different design methodologies used for creating unusual forms, and to explore the role and significance of visualization in the design process. In doing so, we will project from current state-of-the-art technologies to glimpse of the future.

Modern technology -- multimedia and virtual reality -- has provided the impetus to radically improve the human designer's ability to see and understand physical reality. However, the benefits of applying the technology for form creation have not been discussed nor proved. This course serves as a starting point to see how novel ways of doing and novel ways of presenting could yield novel forms.

Students are expected to experiment with synthesis of sound, light, motion, user interactivity, modeling, and additional forms to construct environments that enable novel kinds of spatial narratives. Exemplars for experimentation will be cross-cultural forms that expose students to alternative worldviews.

Applying scripting languages available in 3d packages (i.e. Maya Embedded Language (MEL) and 3dMaxScript, Cinema4d COFFEE) students can go beyond the mouse, transcending the factory-set limitations of current 3D software. By working with code it is possible to create intelligent forms using...
methods analogous to those through which intelligent life evolves: emergent behavior and self-organizing systems.

This course intends to: (1) apply techniques from pure digital modeling, rendering, animation, or computer programming to advanced uses of virtual reality; (2) explore issues of art in information technology, and (3) get insight into the science of design.

2. Focus and concentrations

Virtual reality (VR) is an emerging area in fields of scientific research. It has been utilized as a presentation tool to show a design (concept), a simulation tool to demonstrate a design (concept in reality), and a training tool for learning procedural knowledge (problem solving skills). The goals of this course are to explore:

1. 3D images – digital art.
2. Intelligent forms – Novel form.
3. Virtual environment -- sound, light, motion, user interactivity.

Focuses of this class are on:

1. Methods of creating novel forms – design methods and creation methods.
2. Methods of creating 3D stereoscopic images – basic concepts of vision.
3. Virtual reality in arts and design – interface between MAX and C6 (Plugin on Conduit, or VRML interface).

Particularly, concentration is on the aesthetic value and realism to be presented in the model. The tools used to create images and geometry are ChromaDepth, DepthCharge, and 3DS MAX. But, students could choose to finish the model in Cinema 4D, Maya, or Reino and port the model into MAX for 3D stereoscopic view creation.

3. Expectations and grading:

There will be one proposal, two assignments, and a final project to be completed in this semester. The entire process is to create novel forms in a novel environment which could not be done by conventional / traditional design methods.

- Web display of the project proposal (10 points): Present one precedent studies, propose a design to be completed, design methodologies to be utilized, and explain the expected outcome.
- Assignment 1 (30 points): Apply the proposed methodology to create the form which must be a novel one with some context included.
- Assignment 2 (30 points): Convert the form to 3D image as a PC version. Of course, the form itself could be improved and modified from the beginning to the end of the semester.
- Final project (30 points): Final project will be due in C4/C6 format – Composition of the parti, metaphor, deformation, or analogy plus sound, light, motion, or user interaction to create a novel environment.

Team work is also encouraged. The final grade is cumulative from the assignments, and is determined roughly by the following criteria:
100 to 90: A
89 to 80: B
79 to 70: C
69 to 60: D
Below 59: F

Factors affect the final grade:

1. Projects will be graded on the completeness of presentation, imaginations applied, and the creativity expressed. The schedule of deadlines will be strictly enforced. Incompletes will not be given without extenuating circumstances.
2. According to the general department regulations, students are required to attend every class. More than three unexcused absences during the course of the semester may result in the reduction of the final grade.
3. The final grade in a course is based on the quality of the work accomplished at the time of grading. Late submissions and absences of the class will hurt the final grade.

4. Software and hardware facilities

We shall use publicly available software (MAX and Character animation for modeling) throughout the term. Most of the software packages are available in the College of Design PC Lab or are free for download (Motion Builder for modeling, Anaglyph, ChromaDepth, DepthCharge, and Web browser for VRML models).

The created 3D images from Anaglyph, ChromaDepth, and DepthCharge system will need special pairs of glasses to see the 3D results, which will be handled through bulk rate purchase.

5. Readings

Reading materials available on the course Web page are:
1. Design Cognition by Chuck Eastman.

Some materials are also available through the Internet.

Suggested books and articles for technical reference:
1. Autodesk MAX tutorial Web page: http://usa.autodesk.com/adsk/servlet/item?siteID=123112&linkID=9861688&siteID=9241175
2. MAX character animation on rigging: http://cal3d.sourceforge.net/modeling/tutorial.html
4. Introduction to VRML: [http://www.web3d.org/x3d/vrml/](http://www.web3d.org/x3d/vrml/)

6. Tentative Class Schedule (will be changed as necessary)

<table>
<thead>
<tr>
<th>January 15</th>
<th>January 17</th>
<th>January 22</th>
<th>January 24</th>
<th>January 29</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course introduction</td>
<td>Web design review</td>
<td>Loft modeling --Parti &amp; Analogy</td>
<td>Character modeling --Low polygon char Ch12</td>
<td>NURB modeling Ch. 13</td>
</tr>
<tr>
<td>January 31</td>
<td>February 5</td>
<td>February 7</td>
<td>February 12</td>
<td>February 14</td>
</tr>
<tr>
<td>Reino Head Ch. 14</td>
<td>Character animation Ch. 15 --Metaphor --Deformation</td>
<td>Character editing Ch. 16 Assignment 1 due Assignment 1 issued</td>
<td>Character Rig Ch. 17</td>
<td>Skin and Flex Ch. 18</td>
</tr>
<tr>
<td>February 19</td>
<td>February 21</td>
<td>February 26</td>
<td>February 28</td>
<td>March 4</td>
</tr>
<tr>
<td>Animate a character Ch. 19</td>
<td>Lip sync animation Ch. 20</td>
<td>Particle animation</td>
<td>Career Day</td>
<td>Particle animation --Smoke Ch. 22</td>
</tr>
<tr>
<td>March 6</td>
<td>March 11</td>
<td>March 13</td>
<td>March 16</td>
<td>March 20</td>
</tr>
<tr>
<td>Particle animation --Rain, water Ch. 22</td>
<td>Intro to VR Assignment 2 due</td>
<td>Anaglyph Assignment 3 issued</td>
<td>Spring break</td>
<td>Spring break</td>
</tr>
<tr>
<td>March 25</td>
<td>March 27</td>
<td>April 1</td>
<td>April 3</td>
<td>April 8</td>
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<tr>
<td>Chromadepth</td>
<td>Chromadepth</td>
<td>Stereoscopic</td>
<td>Stereoscopic</td>
<td>Intro to C4/C6</td>
</tr>
<tr>
<td>April 10</td>
<td>April 15</td>
<td>April 17</td>
<td>April 22</td>
<td>April 24</td>
</tr>
<tr>
<td>Virtual environment Examples of C4/C6</td>
<td>MAX and VRML Assignment 3 due Final project issued</td>
<td>Concept of VRML</td>
<td>MAX / C4 / C6 Interface</td>
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<tr>
<td>April 29</td>
<td>May 1</td>
<td>May 6</td>
<td>May 8</td>
<td>Final project due.</td>
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<tr>
<td>Jury week. Work session Tutoring</td>
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<td>Final exam week.</td>
<td>C4/C6 presentation</td>
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Proposal: Design proposal (10)
Assignment 2: Stereoscopic modeling (30) Final project: C4/C6 VR modeling (30)