Course overview

Digital Visual Effects, Spring 2005
Yung-Yu Chuang
2005/2/23
Logistics

- **Meeting time:** 1:20pm-4:20pm, Wednesday
- **Classroom:** CSIE Room 110
- **Instructor:** Yung-Yu Chuang (cyy@csie.ntu.edu.tw)
- **Textbook:** Readings from books, journals and proceedings.
- **Webpage:** (under construction) [http://www.csie.ntu.edu.tw/~cyy/vfx](http://www.csie.ntu.edu.tw/~cyy/vfx)
- **Mailing list:** vfx@csie.ntu.edu.tw

Please send me your email address to subscribe. Please add [VFX] in the title.
Prerequisites

• It is a plus if you have background knowledge on computer vision, image processing and computer graphics.

• It is a plus if you have access to digital cameras and camcorders.
Requirements (subject to change)

- 3 programming assignments (45%)
- 1 scribe (10%)
- Class participation (5%)
- Final project (40%)
This course is not about...
It isn’t about photography
It isn’t about 3D animations
It isn’t about watching movies
It isn’t about physical effects
It’s not about industrial tricks
Why this course?
Digital Visual Effects
Special effects (physical effects)
Special effects (make-up)
Special effects (miniature)
Special effects (matte painting)
Special effects (sound)
Old visual effects tricks
Stop action

The execution of Mary, 1895
Glass shot

Figure 1
A glass shot, as used for the shooting of Cleopatra (1963)

- foreground painting and background sets when misaligned, as seen 'off-angle' from camera
- full-scale set
- matte painting
- composite of painting and full-scale set, as seen through camera
Rear projection

King Kong, 1933
Digital Visual Effects: An Academic View

a.k.a. What you will learn in this course
Academic view

• Source creation: plates, 3D model, miniature
• Seamless combination: viewing, lighting, visibility, interaction
Computer-generated world

Not covered
High dynamic imaging/display
Feature tracking
Matchmove

Move matching using scene planes
Matchmove

Move matching using scene planes
Matchmove

Move matching using scene planes
Image manipulation

GraphCut Texture
Image manipulation

Poisson blending
Image morphing
Inpainting (wire removal)
Texture synthesis/replacement

Texture replacement
Semi-automatic matting painting

Image analogies
Video editing

Input (looped)  Synthesized Result

*Flow-based video editing*
Video matching

*Matrix*    *MOCO (Motion control camera)*
Matting and compositing

Titanic
Object selection

LazySnapping
Image-based rendering

Surface lightfield
3D photography (active)

*Cyberware whole body scanner*
3D photography (active)

Photometric stereo
3D photography (passive)

left

right

depth

Stereo
Image-based modeling

photogrammetric modeling and projective texture-mapping
Image-based modeling

photogrammetric modeling and projective texture-mapping
Image-based modeling

*photogrammetric modeling and projective texture-mapping*
Image-based modeling

Tour into a picture
Image-based modeling

Tour into a picture
View interpolation

Bullet time video
View interpolation

High-Quality Video View Interpolation
Making face

Gollum

Spacetime face
Video rewrite

Trainable videorealistic speech animation
Production pipeline
Preproduction

Storyboard

THE RETURN OF THE KING
Book Six - Chapter III
"Mount Doom"
Preproduction

Artwork
Preproduction

Reference & Research
Production

Shooting
Post-production
Visual effects production

**Preproduction**
- Storyboard
- Artwork
- Reference

**Production**
- Stills
- Plates

**Post-production**
- Scanning
- Matchmove and Matchmodel
- Effects Animation
- Character Animation
- Lighting and Rendering
- Compositing
- Shots

**Assets**
- Model Geometry
  - Skeleton
  - Textures
  - Skinning
  - Materials
Visual effects post-production
A case study
405: The Movie

- This movie were created solely by two visual effects artists in the year of 2000. It was a process that took over three months of nights, weekends and any spare moments that they could find.

- [http://www.405themovie.com/](http://www.405themovie.com/)
405: The Movie
## Making of 405

### Step 0: script and shooting plan

<table>
<thead>
<tr>
<th>Shot#</th>
<th>Description</th>
<th>Full CG</th>
<th>CG</th>
<th>Length Frames</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Title Animation</td>
<td>X</td>
<td>X</td>
<td>401</td>
</tr>
<tr>
<td>02</td>
<td>Freeway speeds beneath car</td>
<td></td>
<td></td>
<td>123</td>
</tr>
<tr>
<td>03</td>
<td>Speed Limit 65</td>
<td></td>
<td></td>
<td>120</td>
</tr>
<tr>
<td>04</td>
<td>LA Freeway from Overpass</td>
<td></td>
<td></td>
<td>238</td>
</tr>
<tr>
<td>05</td>
<td>Empty Freeway--Car enters frame</td>
<td>X</td>
<td>X</td>
<td>150</td>
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<tr>
<td>06</td>
<td>Pan From Freeway J looks at lack of traffic</td>
<td></td>
<td></td>
<td>237</td>
</tr>
<tr>
<td>07</td>
<td>Plane swings into landing position toward freeway</td>
<td>X</td>
<td>X</td>
<td>139</td>
</tr>
<tr>
<td>08</td>
<td>Hand on Gear shift</td>
<td></td>
<td></td>
<td>36</td>
</tr>
<tr>
<td>09</td>
<td>Plane lowers into view through rear window</td>
<td>X</td>
<td></td>
<td>84</td>
</tr>
<tr>
<td>10</td>
<td>Plane nears Car</td>
<td>X</td>
<td>X</td>
<td>65</td>
</tr>
<tr>
<td>11</td>
<td>J looks to side mirror--plane visible behind</td>
<td>X</td>
<td></td>
<td>84</td>
</tr>
<tr>
<td>12</td>
<td>Plane in sideview mirror</td>
<td>X</td>
<td></td>
<td>65</td>
</tr>
<tr>
<td>13</td>
<td>J looks from side view to rear view mirror -- plane behind</td>
<td>X</td>
<td></td>
<td>27</td>
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<tr>
<td>14</td>
<td>J eyes react in rear view mirror--remove traffic</td>
<td>X</td>
<td></td>
<td>33</td>
</tr>
<tr>
<td>15</td>
<td>Plane chases Car toward camera</td>
<td>X</td>
<td>X</td>
<td>77</td>
</tr>
</tbody>
</table>
Making of 405

Step 1: shooting
two days with a Canon Optura DV camera with progressive mode.
⇒ a 70-minute raw footage

initial editing
⇒ pickup shots
Making of 405

Step 2: building CG world
total 62 shots, 42 enhanced with digital VFX.
19 shots are entirely digital creations.
  plane, two cars, freeway background are digital

photo-based 3D environment
Making of 405

Real cars were used for close-up and interior shots.

A low-resolution mesh scanned by a cyberscanner.
Mapped with photographs.
Making of 405

DC-10 plane took a month to model in details for the needs of close-up shots.

59 objects, 142,439 polygons

reference modeling material painting
Making of 405

Step 3: traffic clearing

Clean plate

Close-up shots

Inpainting
Making of 405

Step 4: compositing

shot with the vehicle standing still in a backyard
Making of 405
Making of 405

Step 5: fine touchup

3D hat

compositing and inpainting
Making of 405

Step 6: music and delivery
Possible programming assignments

- Image stitching
- Matchmove
- 3D photography
Final project

- Research
- System
- Film
Final projects from a similar course in Georgia Tech.
In Your Face

Flying Goldfish Productions

In Your Face, GaTech DVFX 2002
Stop action

The Making Of
In Your Face

Making of In Your Face
“BEAUTY CREAM 9001”

DVFX 2003
GROUP 1 - TEAM SKewed

THOMAS MIKULKA
CHARLES BRIAN QUINN
OMAR ZAKI

Beauty Cream 9001, GaTech DVFX 2003
Face tracking

THE MAKING OF....
"BEAUTY CREAM 9001"
DVFX 2003
GROUP 1 - TEAM SKEWED

THOMAS MIKULKA
CHARLES BRIAN QUINN
OMAR ZAKI

Making of Beauty Cream 9001
Das Tattoo

Reid MacTavish
Graham Rodrigue
Derek Chambless

Das Tattoo, GaTech DVFX 2003
Feature tracking

The Making of...

Das Tattoo

Reid MacTavish
Graham Rodrigue
Derek Chambless

Making of Das Tattoo
Done in 50 Seconds

Done in 50 Seconds, GaTech DVFX 2003
View interpolation

The Making Of

Done in 50 Seconds

Making of Done in 50 Seconds
Hostage Point

Hostage Point, GaTech DVFX 2003
Matting

The Making Of:

Hostage Point

By:  Jamal Ashraf
     Amir Ebrahimi
     Siddharth Shah

Making of Hostage Point
Life in Paints, GaTech DVFX 2003
Tour into pictures

Making of Life in Paints
That is for today!

- Don’t forget to send me your email address so that I can add you to the mailing list.
- Check out the course website.
- Volunteers for next week’s scribe