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
- 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
Digital Visual Effects

Special effects (physical effects)

Special effects (make-up)

Special effects (miniature)
Special effects (matte painting)

Old visual effects tricks

Special effects (sound)

Stop action

The execution of Mary, 1895
Digital Visual Effects: An Academic View

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

Glass shot

King Kong, 1933

Rear projection

Academic view

- Source creation: plates, 3D model, miniature
- Seamless combination: viewing, lighting, visibility, interaction
Matchmove

Move matching using scene planes

Matchmove

Move matching using scene planes

Matchmove

Move matching using scene planes

Image manipulation

GraphCut Texture
Semi-automatic matting painting

Image analogies

Video editing

Flow-based video editing

Video matching

Matrix

MOCO (Motion control camera)

Video matching

Video matching

Video matching
Matting and compositing

Object selection

Image-based rendering

3D photography (active)

Titanic

LazySnapping

Surface lightfield

Cyberware whole body scanner
3D photography (active)

Photometric stereo

3D photography (passive)

Stereo

depth

left

right

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*

*Tour into a picture*

Image-based modeling

*Tour into a picture*

Image-based modeling

*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
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/)

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 Azimation</td>
<td>X</td>
<td>X</td>
<td>401</td>
</tr>
<tr>
<td>02</td>
<td>Freeway speed beneath car</td>
<td></td>
<td></td>
<td>1:23</td>
</tr>
<tr>
<td>03</td>
<td>Speed Limit 65</td>
<td></td>
<td></td>
<td>1:29</td>
</tr>
<tr>
<td>04</td>
<td>LA Freeway from Overpass</td>
<td></td>
<td></td>
<td>1:28</td>
</tr>
<tr>
<td>05</td>
<td>Empty Freeway—Car enters frame</td>
<td>X</td>
<td>X</td>
<td>1:56</td>
</tr>
<tr>
<td>06</td>
<td>Pan From Freeway—J looks at lack of traffic</td>
<td></td>
<td></td>
<td>2:37</td>
</tr>
<tr>
<td>07</td>
<td>Plane swings into landing position toward freeway</td>
<td>X</td>
<td>X</td>
<td>1:39</td>
</tr>
<tr>
<td>08</td>
<td>Hard on Gear shift</td>
<td></td>
<td></td>
<td>3:56</td>
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<tr>
<td>09</td>
<td>Plane lowers into view through rear window</td>
<td></td>
<td></td>
<td>1:14</td>
</tr>
<tr>
<td>10</td>
<td>Plane nears Car</td>
<td>X</td>
<td>X</td>
<td>1:65</td>
</tr>
<tr>
<td>11</td>
<td>J looks to side mirror—plane visible behind</td>
<td></td>
<td></td>
<td>1:14</td>
</tr>
<tr>
<td>12</td>
<td>Plane in sideview mirror</td>
<td></td>
<td></td>
<td>1:65</td>
</tr>
<tr>
<td>13</td>
<td>J looks to side view to rear view mirror – plane behind</td>
<td></td>
<td></td>
<td>1:27</td>
</tr>
<tr>
<td>14</td>
<td>Jayne reads in rear view mirror—remove traffic</td>
<td></td>
<td></td>
<td>1:33</td>
</tr>
<tr>
<td>15</td>
<td>Plane chases Car toward camera</td>
<td>X</td>
<td>X</td>
<td>1:77</td>
</tr>
</tbody>
</table>
Step 1: shooting
two days with a Canon Optura DV camera with progressive mode.
⇒ a 70-minute raw footage

initial editing
⇒ pickup shots

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

Real cars were used for close-up and interior shots

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

DC-10 plane took a month to model in details for the needs of close-up shots.
59 objects, 142,439 polygons
Making of 405

Step 3: traffic clearing

close-up shots

inpainting

Step 4: compositing

shot with the vehicle standing still in a backyard

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

Stop action

Beauty Cream 9001

Face tracking
Das Tattoo

Das Tattoo, GaTech DVFX 2003

Feature tracking

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
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