Course overview

Digital Visual Effects, Spring 2006

Yung-Yu Chuang

2006/2/22
Logistics

• **Meeting time:** 1:20pm-4:20pm, Wednesday (3 off-days, 3/29, 4/5, 6/1)
• **Classroom:** CSIE Room 111
• **Instructor:** Yung-Yu Chuang ([cyy@csie.ntu.edu.tw](mailto:cyy@csie.ntu.edu.tw))
• **Teaching assistants:** 楊善詠/黃子桓
• **Textbook:** Readings from books, journals and proceedings.
• **Webpage:** (user name/password)
  [http://www.csie.ntu.edu.tw/~cyy/vfx](http://www.csie.ntu.edu.tw/~cyy/vfx)
• **Mailing list:** [vfx@cmlab.csie.ntu.edu.tw](mailto:vfx@cmlab.csie.ntu.edu.tw) subscribe via [https://cmlmail.csie.ntu.edu.tw/mailman/listinfo/vfx/](https://cmlmail.csie.ntu.edu.tw/mailman/listinfo/vfx/)
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.
Why this course?
Digital Visual Effects

updated listing
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
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
Special effects (physical effects)

Figure 7  CANNON CAR

[Imagery of a car being fired by a cannon, showing the effect on the car's structure]

[Imagery of a car in a desert setting, with smoke and debris, indicating a crash or explosion effect]
Special effects (make-up)
Special effects (miniature)
Special effects (matte painting)
Special effects (sound)
Production pipeline
Preproduction

Artwork
Production

Shooting
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/
## Making of 405

### Step 0: script and shooting plan

<table>
<thead>
<tr>
<th>Shot#</th>
<th>Description</th>
<th>Full</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>
</tr>
<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>
</tr>
<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
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
Topics we plan to cover
Camera

Canon 10D
High dynamic range imaging/display
Image warping/morphing

someone not that famous

someone very famous

video
Feature tracking
Image stitching
MatchMove

Move matching using scene planes
Matchmove

Move matching using scene planes
Matchmove

Move matching using scene planes
Video matching

Matrix  MOCO (Motion control camera)
Video matching

Video matching
Matting and compositing

Titanic
Matting
Object selection

LazySnapping
Image manipulation

GraphCut Texture
Image manipulation

Poisson blending
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
Image-based modeling

Tour into a picture
Cyberware whole body scanner
3D photography (active)

Photometric stereo
3D photography (passive)

left

right

depth

Stereo
Image-based rendering

Surface lightfield
View interpolation

Bullet time video
View interpolation

High-Quality Video View Interpolation
Making face

Gollum

Spacetime face
Trainable videorealistic speech animation
Inpainting (wire removal)
Texture synthesis/replacement

Texture replacement
Semi-automatic matting painting

Image analogies
Video editing

Flow-based video editing

Input (looped)  Synthesized Result
Grading

• 3 programming assignments (50%)
  - HDR Imaging
  - AutoStitch
  - MatchMove

• Class participation (5%)

• Final project (45%)
  - Research
  - System
  - Film
High dynamic range imaging
Final projects from a similar course in Georgia Tech.
“BEAUTY CREAM 9001”

DVFX 2003
GROUP 1 - TEAM SKewed

THOMAS MIKULKA
CHARLES BRIAN QUINN
OMAR ZAKI

Beauty Cream 9001, GaTech DVFX 2003
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
Life in Paints

Life in Paints, GaTech DVFX 2003
Tour into pictures

Making of *Life in Paints*
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
Final projects from last year.
YoYo Flight

YoYo Flight !!
YoYo Inc. present
Jun, 28, 2005

B87506003 Tian-Hau Chang
B90902003 Yu-Hsin Chang
B90902096 Yu-Ting Tseng
B90902099 Pei-Shiuan He
Making of YoYo Flight

YoYo Flight !!
YoYo Inc. present
Jun, 28, 2005
That’s it for today!

- Don’t forget to subscribe the mailing list.
- Check out the course website.