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)
- **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 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?
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

King Kong, 1933

Rear projection

Special effects (physical effects)
Special effects (make-up)

Special effects (miniature)

Special effects (matte painting)

Special effects (sound)
Production pipeline

Preproduction
- Storyboard
- Artwork
- Reference

Production
- Stills
- Plates

Post-production
- VFX
- Editing
- Music
- Sound
- Film

Preproduction
- "The Return of the King"
- Book Six - Chapter III
- "Mount Doom"

Artwork
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 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>123</td>
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</tr>
<tr>
<td>03</td>
<td>Speed Limit 65</td>
<td>123</td>
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<td></td>
</tr>
<tr>
<td>04</td>
<td>LA Freeway from Overpass</td>
<td></td>
<td></td>
<td>238</td>
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<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>237</td>
<td></td>
<td></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>36</td>
<td></td>
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<tr>
<td>09</td>
<td>Plane lowers into view through rear window</td>
<td>X</td>
<td>84</td>
<td></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>X</td>
<td>84</td>
</tr>
<tr>
<td>12</td>
<td>Plane in sideview mirror</td>
<td>X</td>
<td>X</td>
<td>65</td>
</tr>
<tr>
<td>13</td>
<td>J looks from side view to rear view mirror—the plane behind</td>
<td>X</td>
<td>X</td>
<td>27</td>
</tr>
<tr>
<td>14</td>
<td>J eyes react to rear view mirror—plane behind</td>
<td>X</td>
<td>X</td>
<td>30</td>
</tr>
<tr>
<td>15</td>
<td>Plane chassis, 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

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

Step 3: traffic clearing

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

Tracking

Image stitching

Feature tracking
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

Matting and compositing

Matting

Object selection

Video matching

Titanic

Matting

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

Tour into a picture

photogrammetric modeling and projective texture-mapping

Tour into a picture

3D photography (active)

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

Video rewrite

Trainable videorealistic speech animation

Inpainting (wire removal)

Inpainting
Texture synthesis/replacement

Texture replacement

Semi-automatic matting painting

Image analogies

Video editing

Flow-based video editing

Grading

- 3 programming assignments (50%)
  - HDR Imaging
  - AutoStitch
  - MatchMove
- Class participation (5%)
- Final project (45%)
  - Research
  - System
  - Film
High dynamic range imaging

AutoStitch

MathMove

Final projects from a similar course in Georgia Tech.
Life in Paints, GaTech DVFX 2003

Making of Life in Paints

In Your Face, GaTech DVFX 2002

The Making Of In Your Face

Making of In Your Face
Final projects from last year.

That’s it for today!

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