

Course overview

Digital Visual Effects, Spring 2005

Yung-Yu Chuang

2005/2/23

DigiVFX

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

DigiVFX

- 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)

DigiVFX

- 3 programming assignments (45%)
- 1 scribe (10%)
- Class participation (5%)
- Final project (40%)

This course is not about...

It isn't about photography

DigiVFX



It isn't about 3D animations

DigiVFX



It isn't about watching movies

DigiVFX



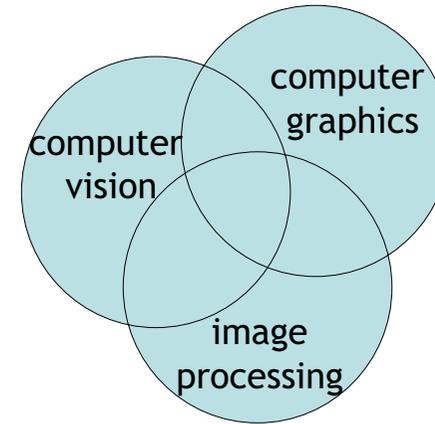
It isn't about physical effects

DigiVFX



It's not about industrial tricks

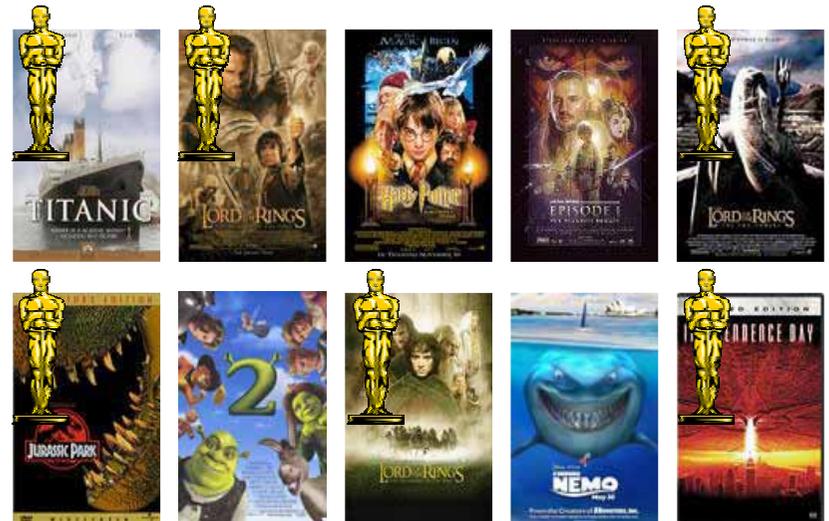
DigiVFX



Why this course?

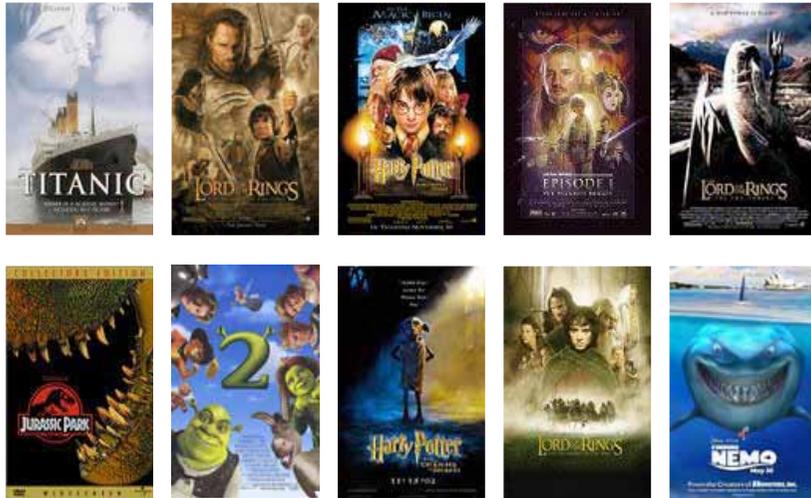
Digital Visual Effects

DigiVFX



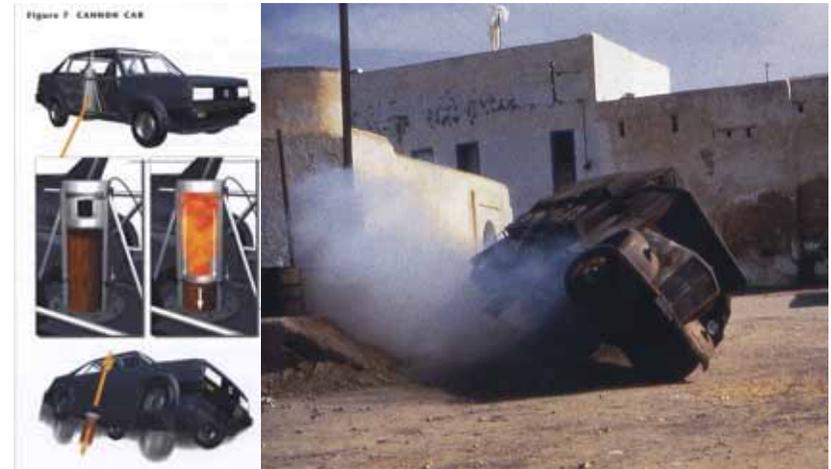
Digital Visual Effects

DigiVFX



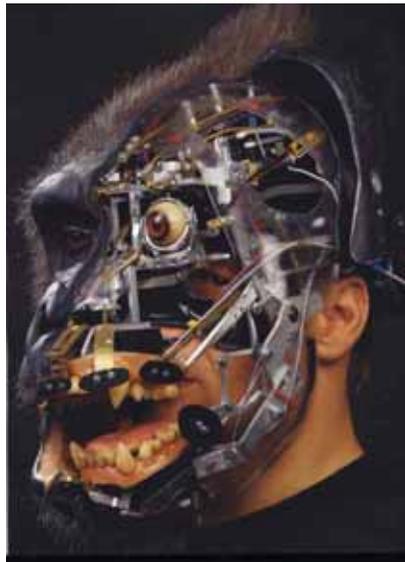
Special effects (physical effects)

DigiVFX



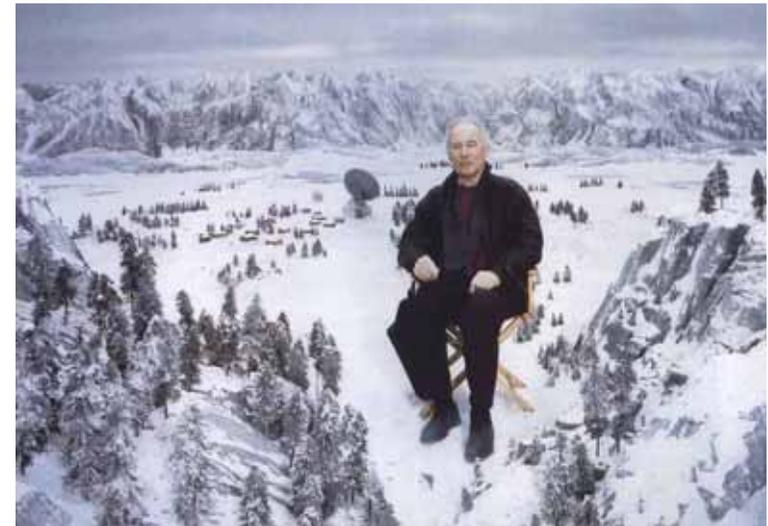
Special effects (make-up)

DigiVFX



Special effects (miniature)

DigiVFX



Special effects (matte painting)

DigiVFX



Special effects (sound)

DigiVFX



Old visual effects tricks

Stop action

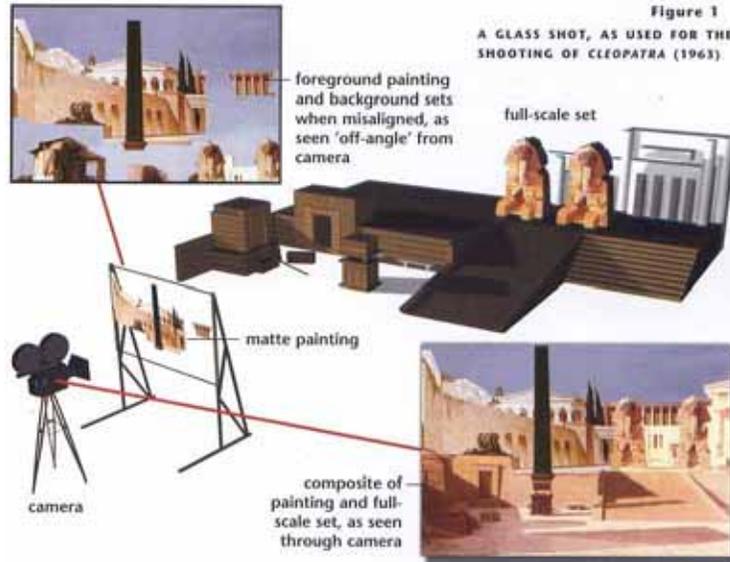
DigiVFX



The execution of Mary, 1895

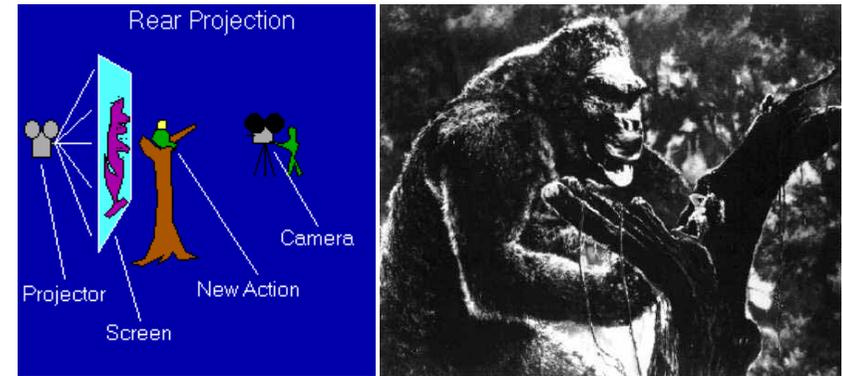
Glass shot

DigiVFX



Rear projection

DigiVFX



King Kong, 1933

Digital Visual Effects: An Academic View

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

Academic view

DigiVFX

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

Computer-generated world

DigiVFX



Not covered

Camera

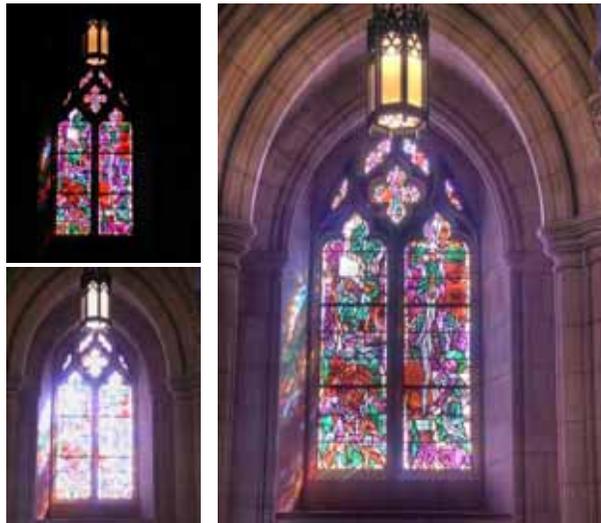
DigiVFX



Canon 10D

High dynamic imaging/display

DigiVFX



Tracking

DigiVFX



Feature tracking

Matchmove

DigiVFX



Move matching using scene planes

Matchmove

DigiVFX



Move matching using scene planes

Matchmove

DigiVFX



Move matching using scene planes

Image manipulation

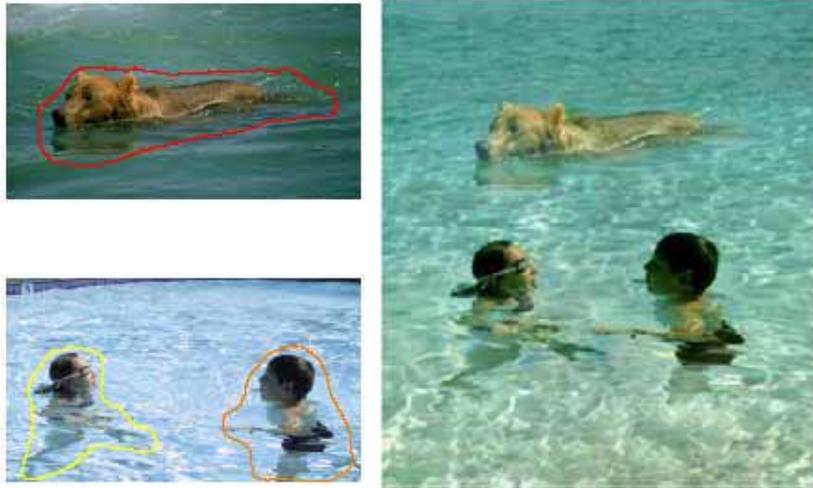
DigiVFX



GraphCut Texture

Image manipulation

DigiVFX



Poisson blending

Image morphing

DigiVFX



Image morphing

Inpainting (wire removal)

DigiVFX



Inpainting

Texture synthesis/replacement

DigiVFX



Texture replacement

Semi-automatic matting painting

DigiVFX

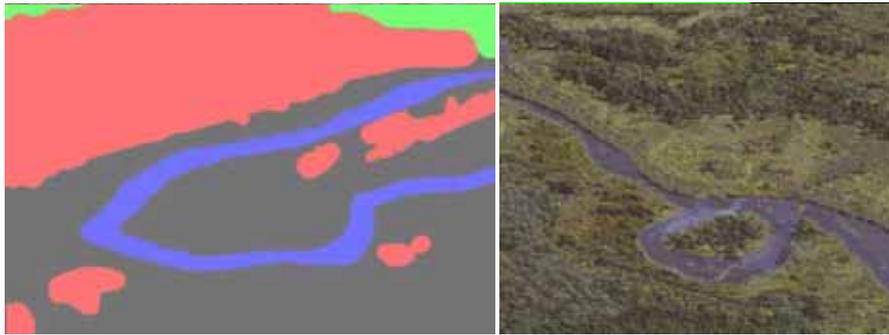
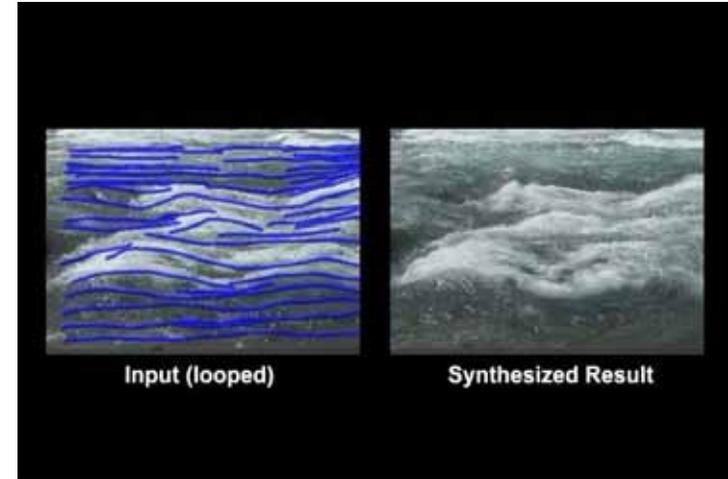


Image analogies

Video editing

DigiVFX



Flow-based video editing

Video matching

DigiVFX



Matrix

MOCO (Motion control camera)

Video matching

DigiVFX



Video matching

Matting and compositing

DigiVFX



Titanic

Object selection

DigiVFX



LazySnapping

Image-based rendering

DigiVFX



Surface lightfield

3D photography (active)

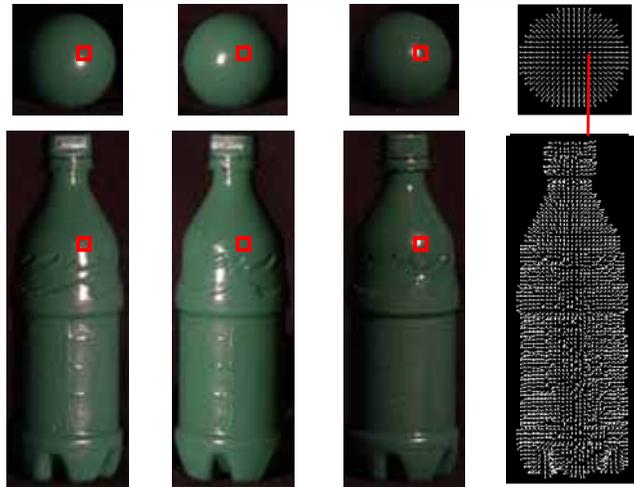
DigiVFX



Cyberware whole body scanner

3D photography (active)

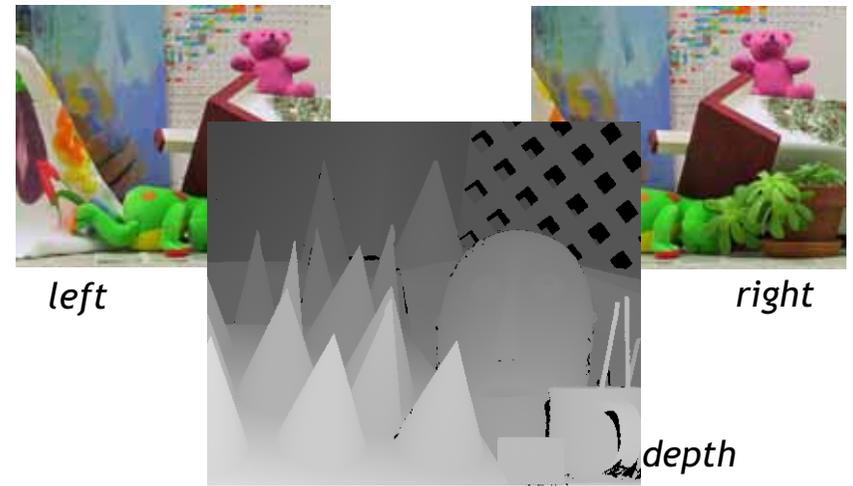
DigiVFX



Photometric stereo

3D photography (passive)

DigiVFX



Stereo

Image-based modeling

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photogrammetric modeling and projective texture-mapping

Image-based modeling

DigiVFX



photogrammetric modeling and projective texture-mapping

Image-based modeling

DigiVFX



photogrammetric modeling and projective texture-mapping

Image-based modeling

DigiVFX



Tour into a picture

Image-based modeling

DigiVFX



Tour into a picture

View interpolation

DigiVFX



Bullet time video

View interpolation

DigiVFX



High-Quality Video View Interpolation

Making face

DigiVFX



Gollum

Spacetime face

Video rewrite

DigiVFX

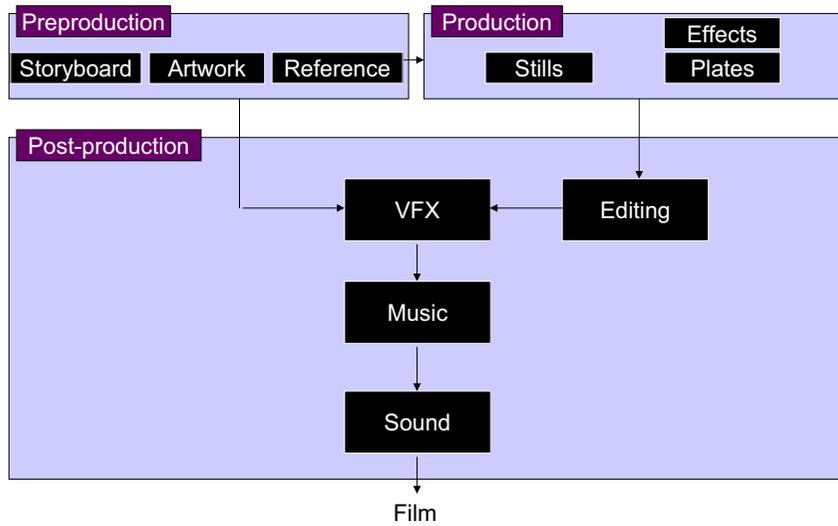


Trainable videorealistic speech animation

Production pipeline

Production pipeline

DigiVFX



Preproduction

DigiVFX



Storyboard

Preproduction

DigiVFX



Artwork

Preproduction

DigiVFX



Reference & Research

Production

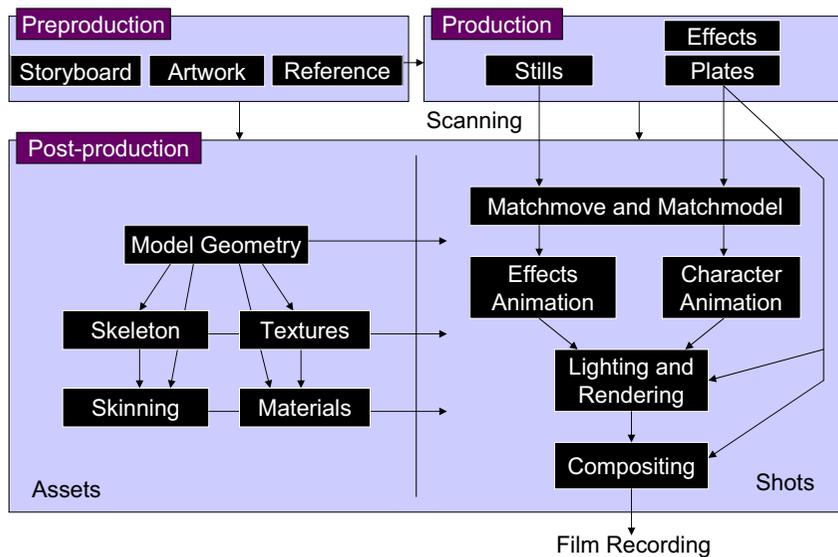


Shooting

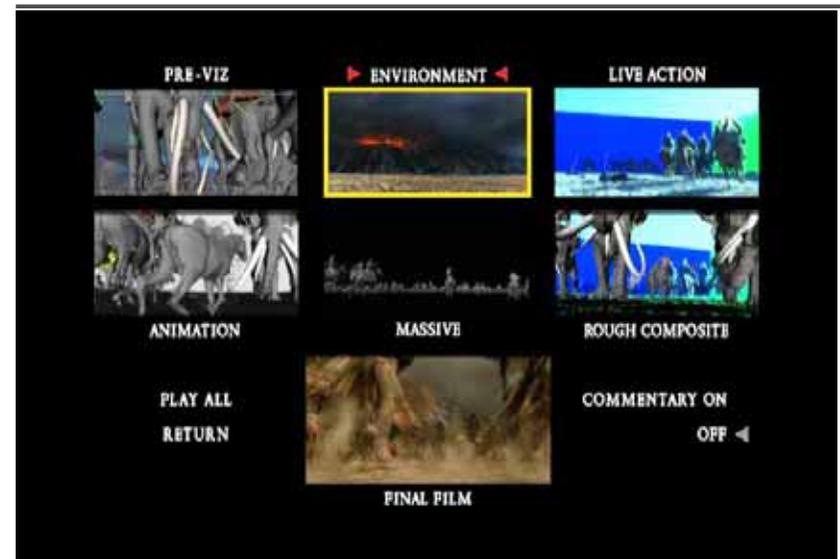
Post-production



Visual effects production



Visual effects post-production



A case study

405: The Movie

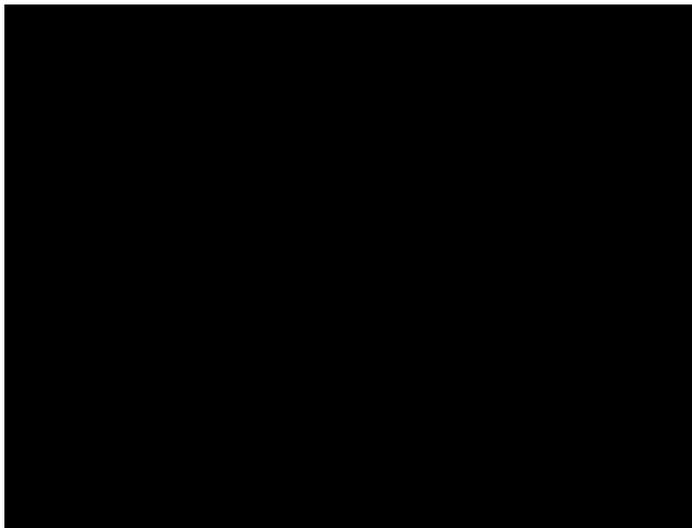
DigiVFX

- 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/>



405: The Movie

DigiVFX



Making of 405

DigiVFX

Step 0: script and shooting plan

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

Making of 405

DigiVFX

Step 1: shooting

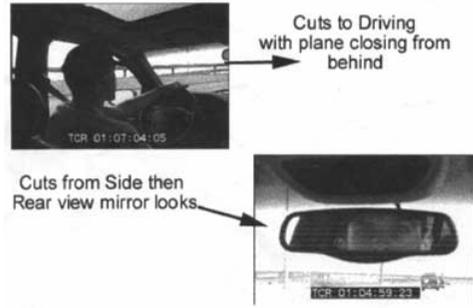
two days with a Canon Optura DV camera with progressive mode.

⇒ a 70-minute raw footage



initial editing

⇒ pickup shots



Making of 405

DigiVFX

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

DigiVFX

Real cars were used for close-up and interior shots



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



Making of 405

DigiVFX

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

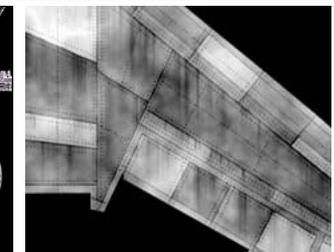
59 objects, 142,439 polygons



reference



modeling



material painting

Making of 405

DigiVFX

Step 3: traffic clearing

clean plate



close-up shots



inpainting

Making of 405

DigiVFX

Step 4: compositing



shot with the vehicle standing still in a backyard



Making of 405

DigiVFX



Making of 405

DigiVFX

Step 5: fine touchup



3D hat

compositing and inpainting

Making of 405

DigiVFX

Step 6: music and delivery



Possible programming assignments

DigiVFX

- Image stitching
- Matchmove
- 3D photography

Final project

DigiVFX

- Research
- System
- Film

**Final projects from a similar course
in Georgia Tech.**

In Your Face

DigiVFX



In Your Face, GaTech DVFX 2002

Stop action

DigiVFX



Making of *In Your Face*

Beauty Cream 9001

DigiVFX



Beauty Cream 9001, GaTech DVFX 2003

Face tracking

DigiVFX



Making of *Beauty Cream 9001*

Das Tattoo

DigiVFX



Das Tattoo, GaTech DVFX 2003

Feature tracking

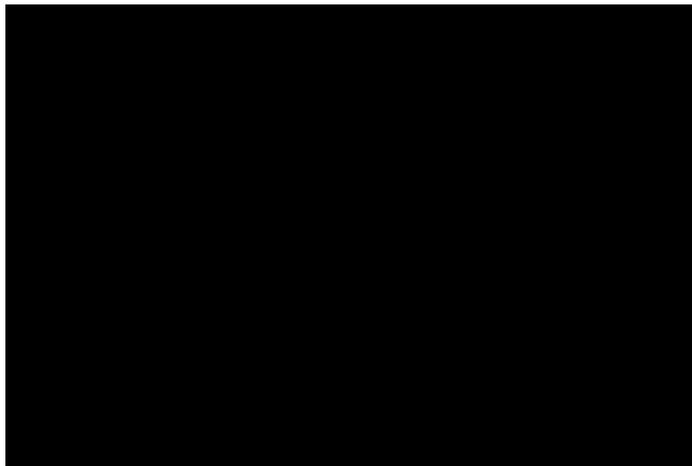
DigiVFX



Making of *Das Tattoo*

Done in 50 Seconds

DigiVFX



Done in 50 Seconds, GaTech DVFX 2003

View interpolation

DigiVFX



Making of *Done in 50 Seconds*

Hostage Point

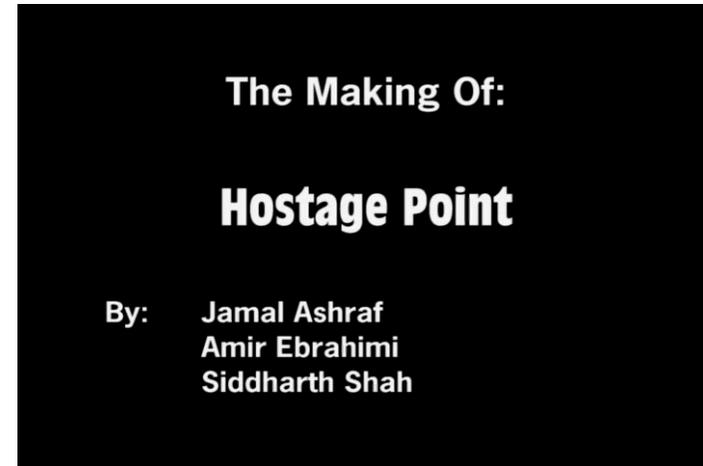
DigiVFX



Hostage Point, GaTech DVFX 2003

Matting

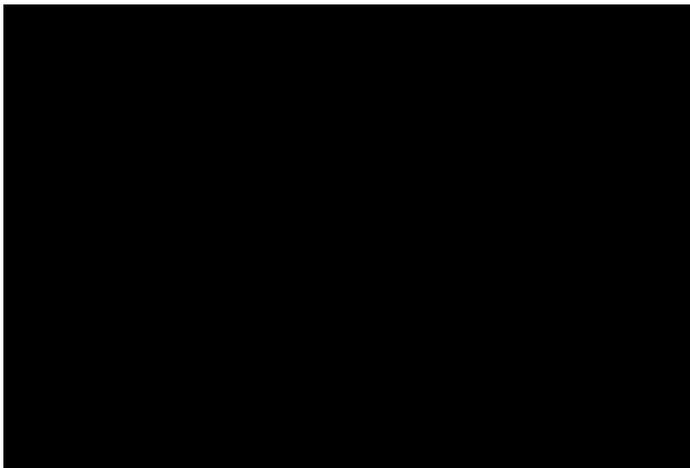
DigiVFX



Making of Hostage Point

Life in Paints

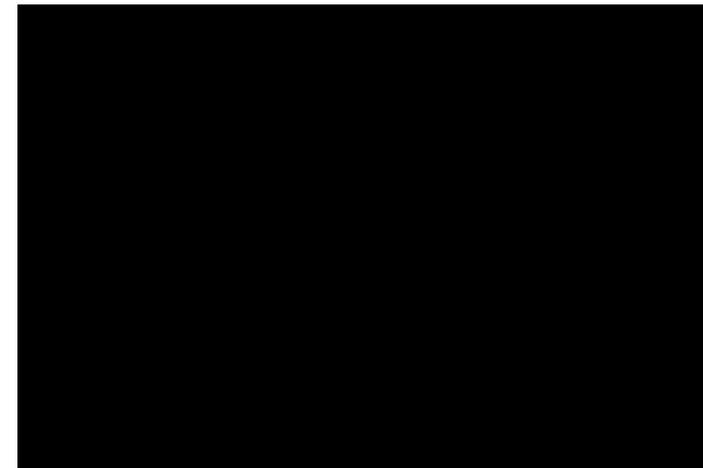
DigiVFX



Life in Paints, GaTech DVFX 2003

Tour into pictures

DigiVFX



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