

Course overview

Digital Visual Effects, Spring 2008

Yung-Yu Chuang

2008/2/19

Logistics

- Meeting time: 10:20pm-1:10pm, Tuesday (17 weeks, no holiday this semester, :<)
- Classroom: CSIE Room 104
- Instructor: Yung-Yu Chuang (cyy@csie.ntu.edu.tw)
- Teaching assistants: TBD
- Textbook: Readings from books, journals and proceedings.
- Webpage: (user name/password)
<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/>

This course is NOT about ...

It isn't about photography



It isn't about 3D animations



It isn't about watching movies

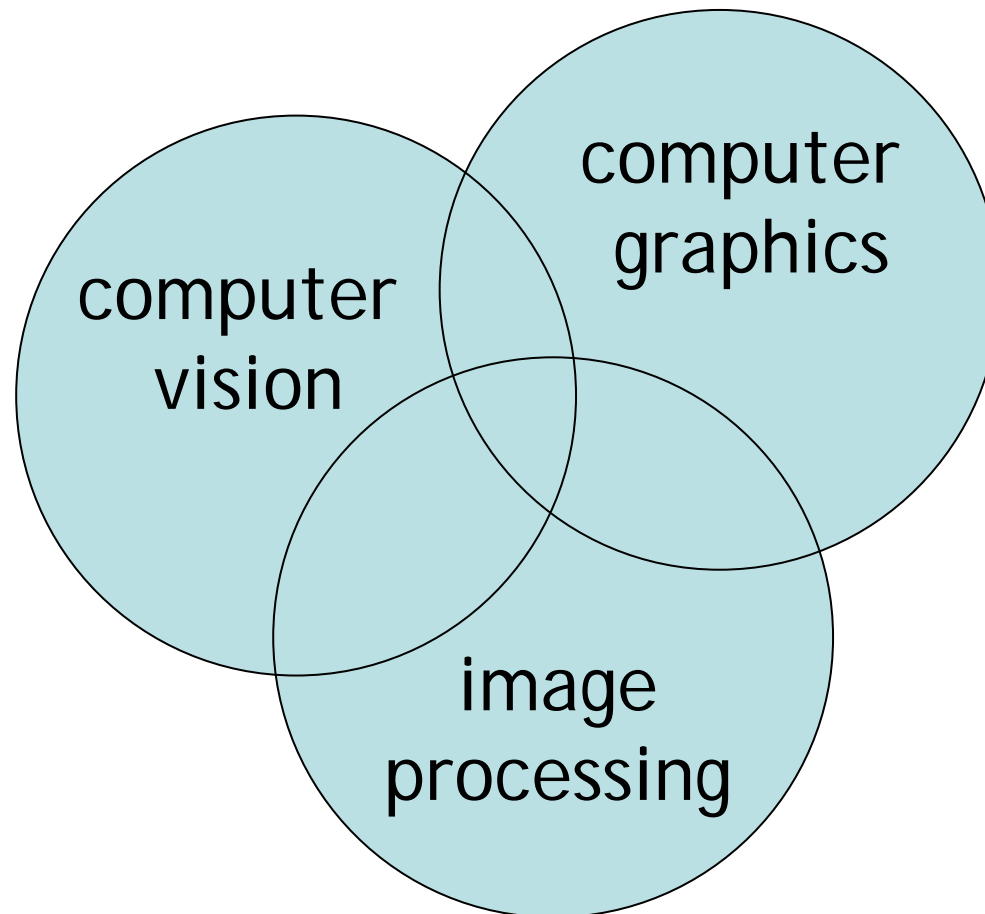


It isn't about physical effects



It's not about industrial tricks

You will learn more about Taylor and Poisson than Lucas and Spielberg in this course. If you hear Lucas in the class, it is more likely to refer to Bruce Lucas, not George Lucas.

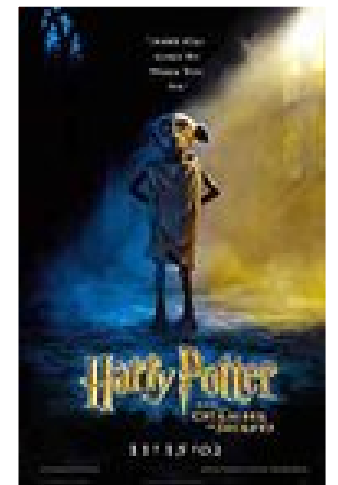
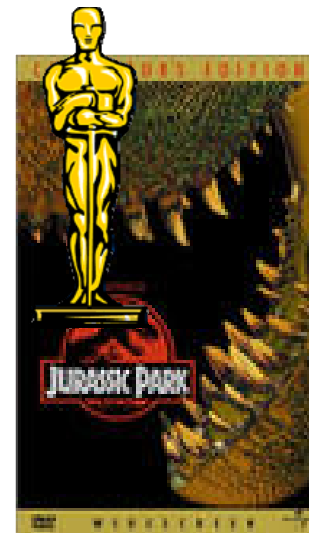


Prerequisites

- It is a *must* that you have programming experiences.
- It is a *must* that you have basic knowledge on linear algebra and probability.
- 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.

This course is about ...

Digital Visual Effects



Reality?



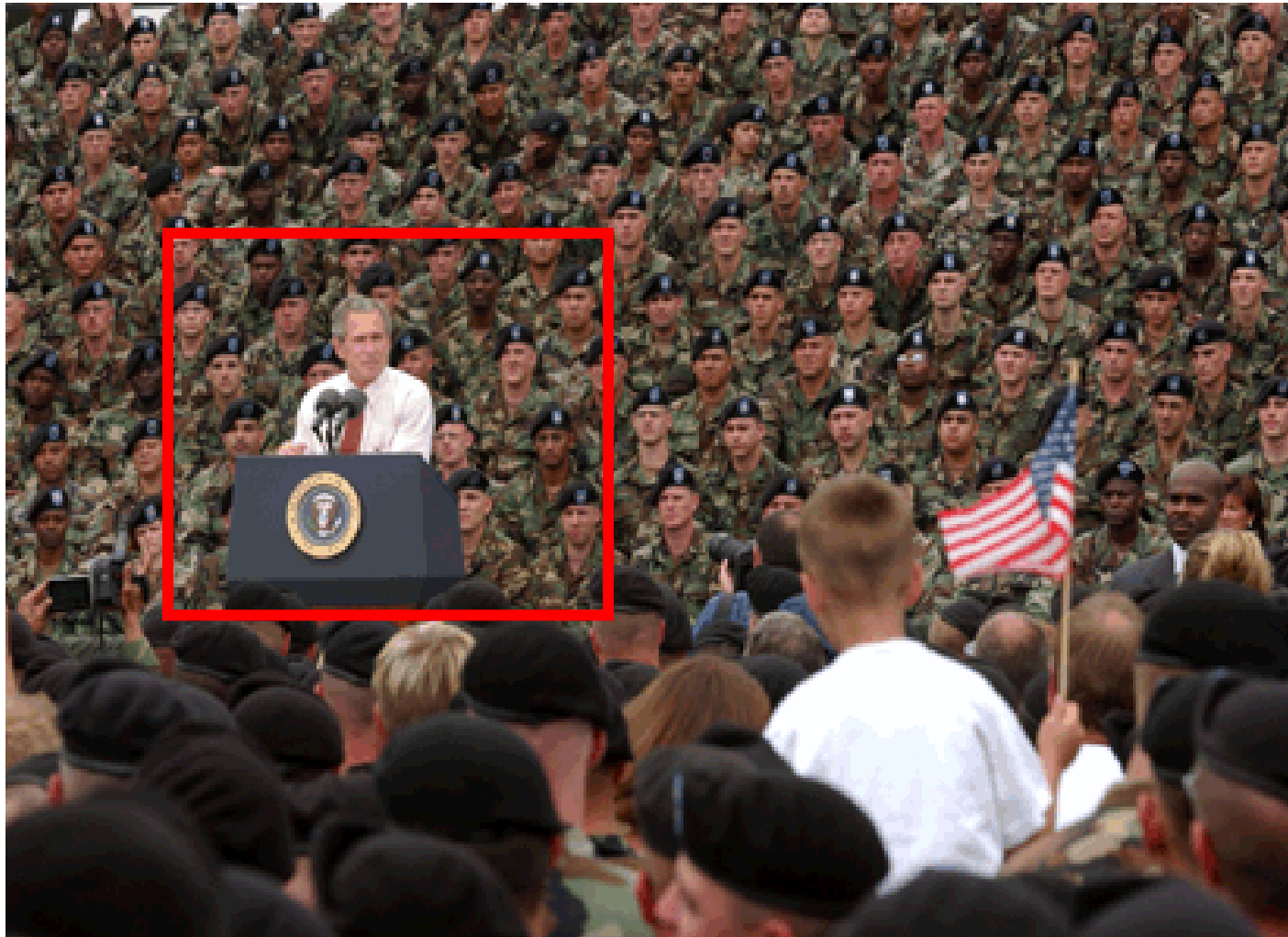
Retouching



Iraq War, LA Times, April 2003



Bush campaign's TV AD, 2004



Texture synthesis and inpainting

This section shows a sampling of the duplication of soldiers.



Domestic example



The Liberty Times
2007.12.17



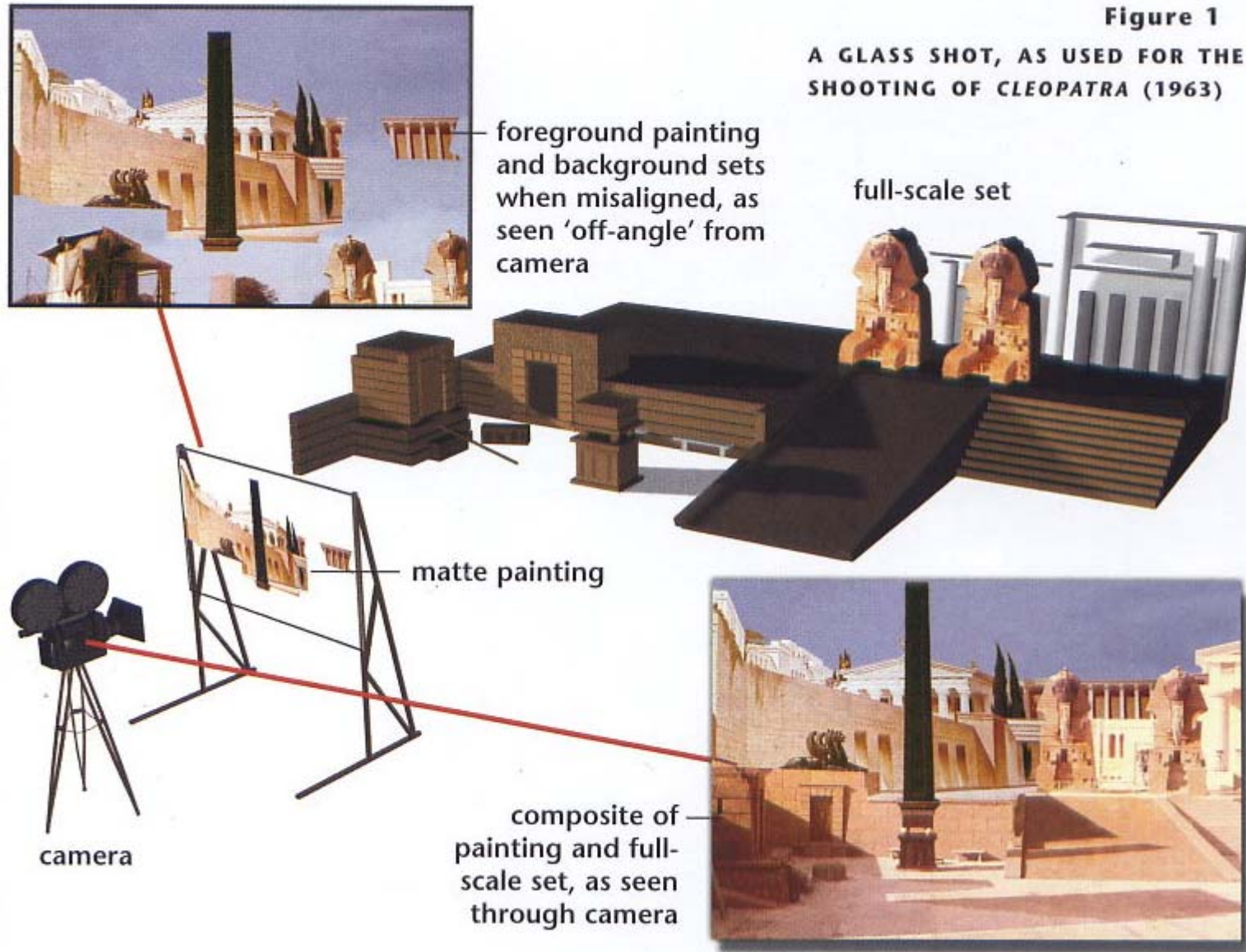
Special effects

Stop action



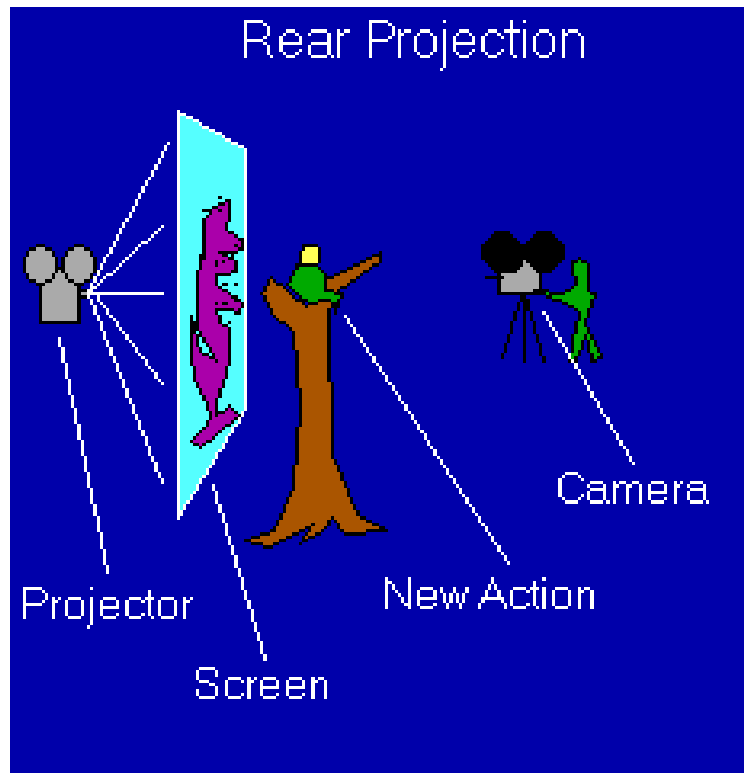
The execution of Mary, 1895

Glass shot



Rear projection

stop motion



King Kong, 1933

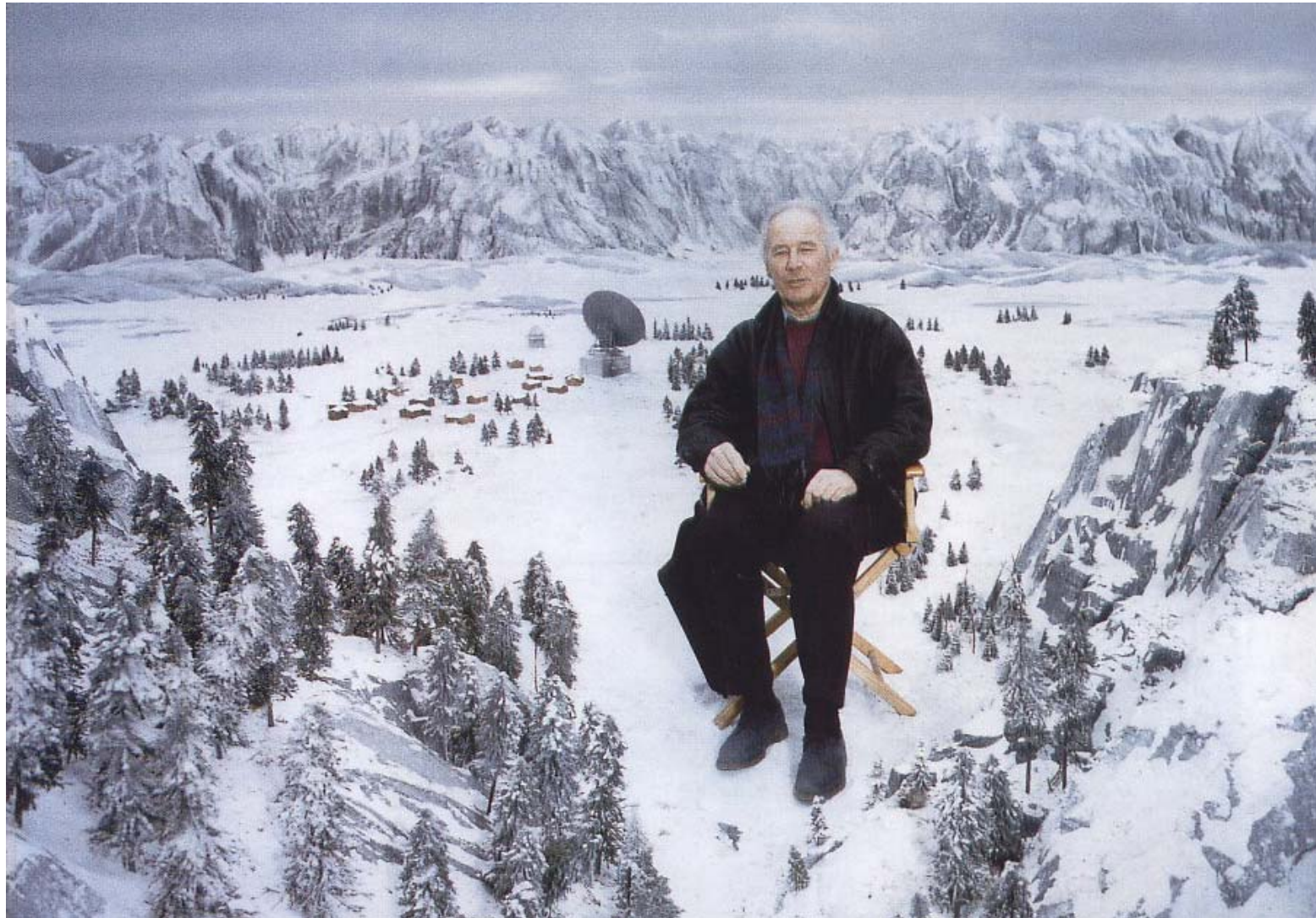
Special effects (make-up)



Special effects (physical effects)



Special effects (miniature)



Special effects (matte painting)



Lord of the Rings



Illusion - forced perspective

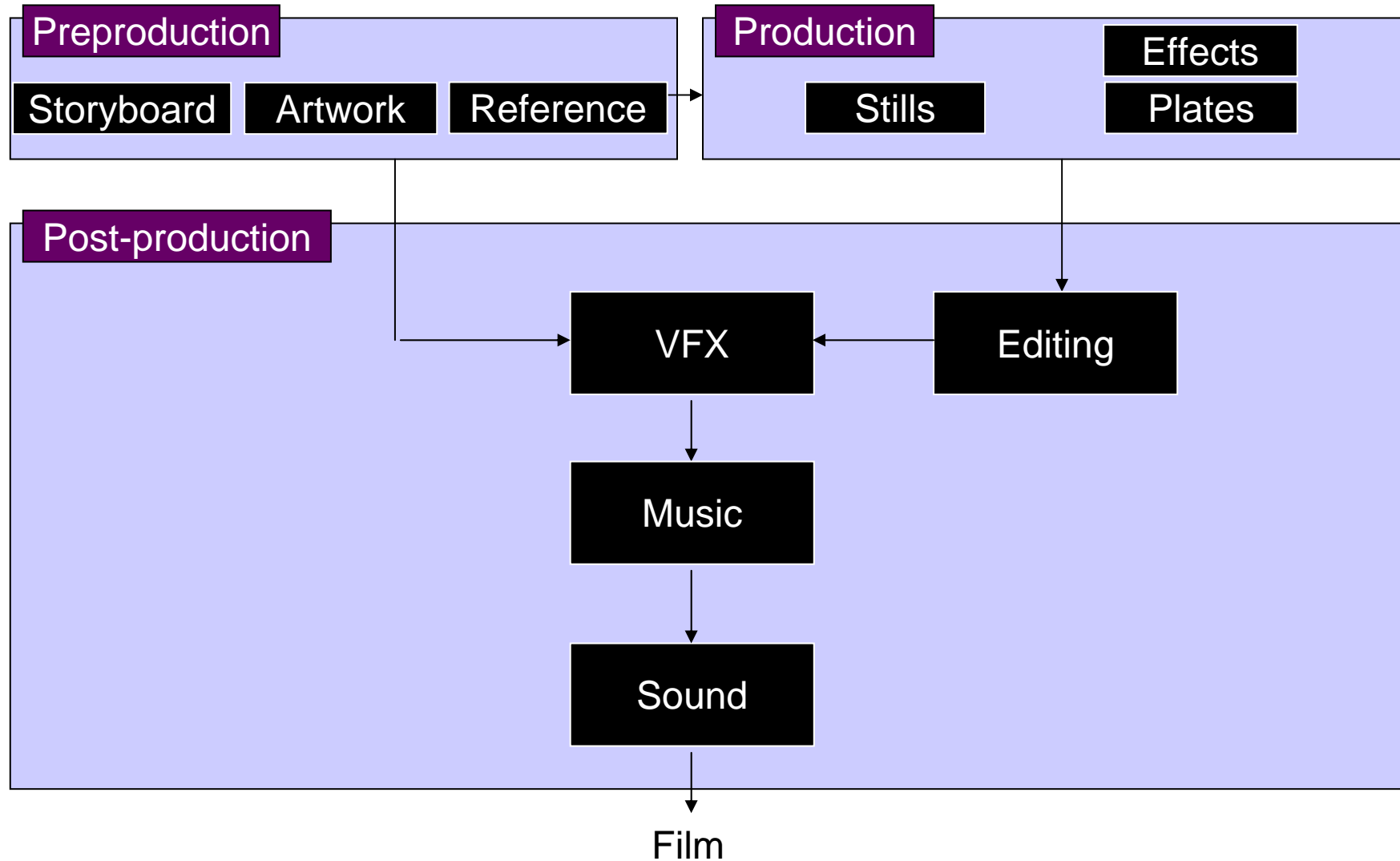


Computer-generated model



Production pipeline

Production pipeline



Preproduction



Storyboard

Preproduction



Artwork

Preproduction



Reference & Research

Production

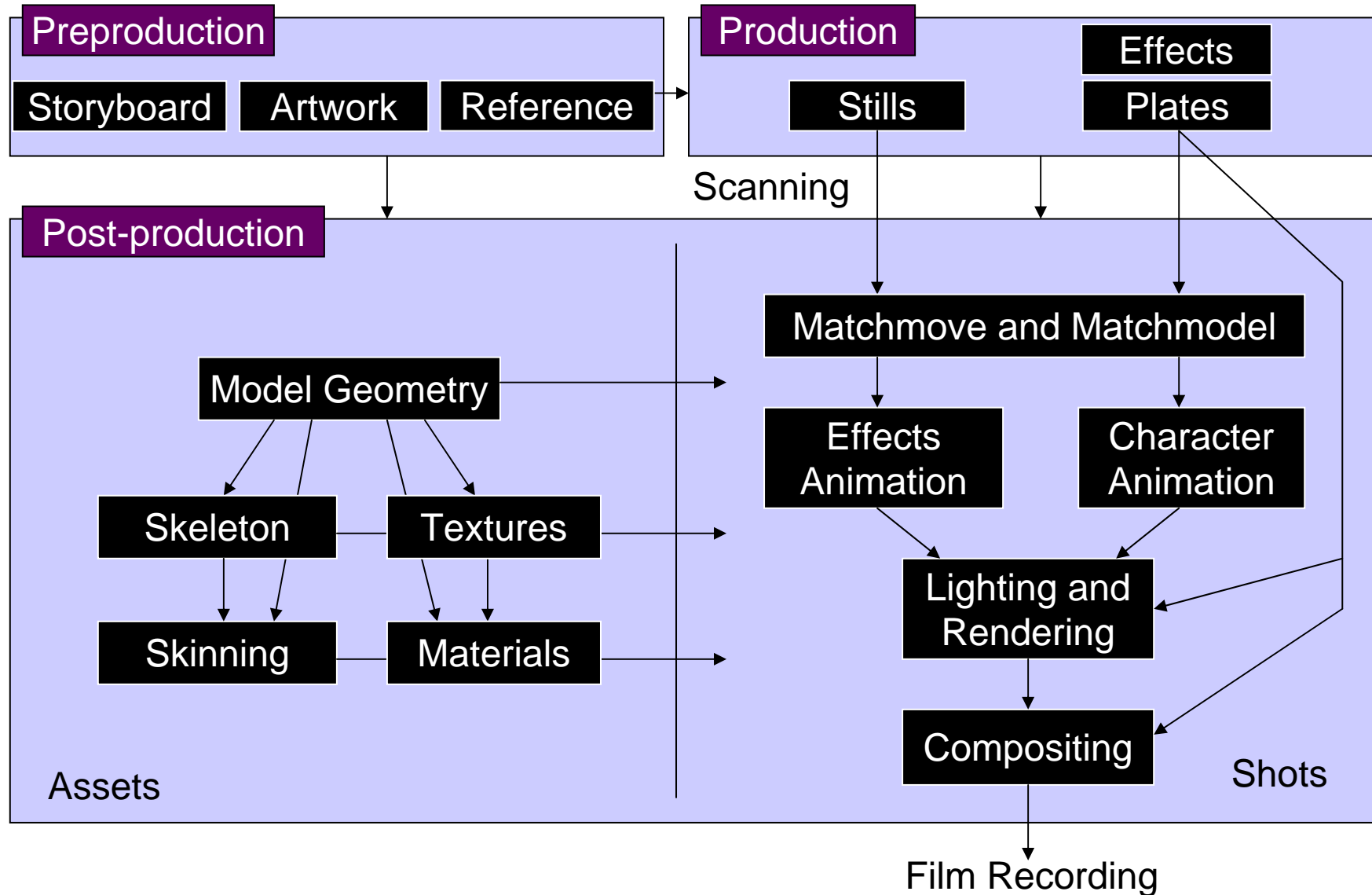


Shooting

Post-production



Visual effects production



Visual effects post-production

PRE-VIZ

▶ ENVIRONMENT ◀

LIVE ACTION

ANIMATION

MASSIVE

ROUGH COMPOSITE

PLAY ALL

RETURN

COMMENTARY ON

OFF ◀

FINAL FILM

The image displays a menu for visual effects post-production. It features a grid of preview windows and control buttons. The 'ENVIRONMENT' window is highlighted with a yellow border. The 'FINAL FILM' window shows a completed scene with mammoths and a rider. The 'COMMENTARY ON' button is set to 'OFF'.

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

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

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



initial editing
⇒ pickup shots



Cuts to Driving
with plane closing from
behind

Cuts from Side then
Rear view mirror looks



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

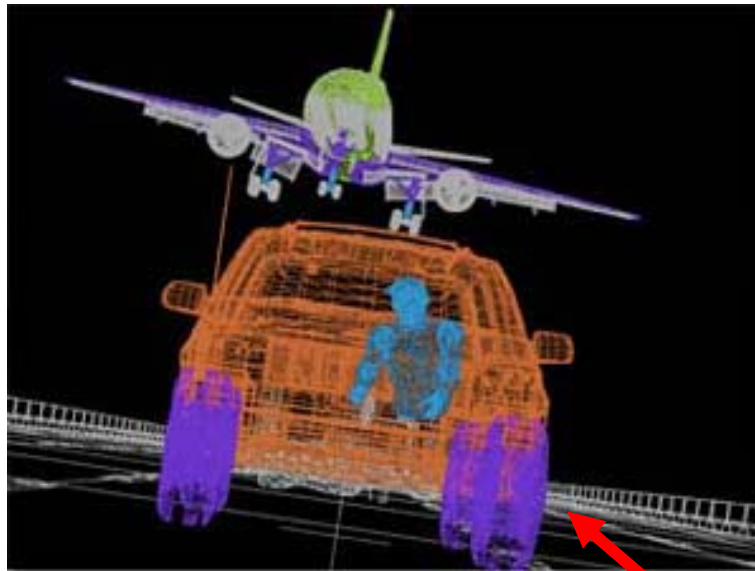


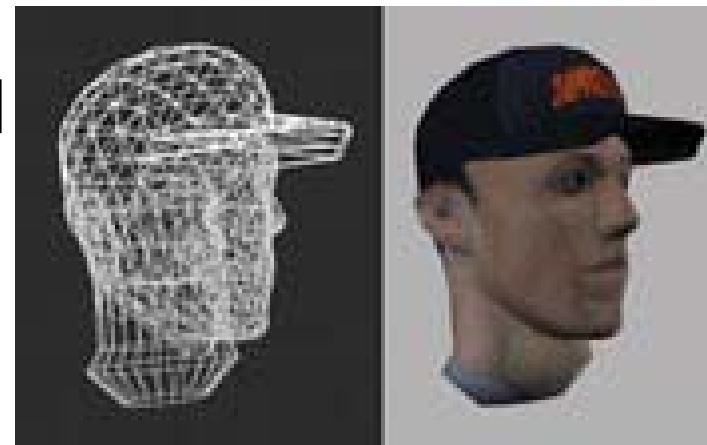
photo-based 3D environment

Making of 405

Real cars were used for close-up and interior shots



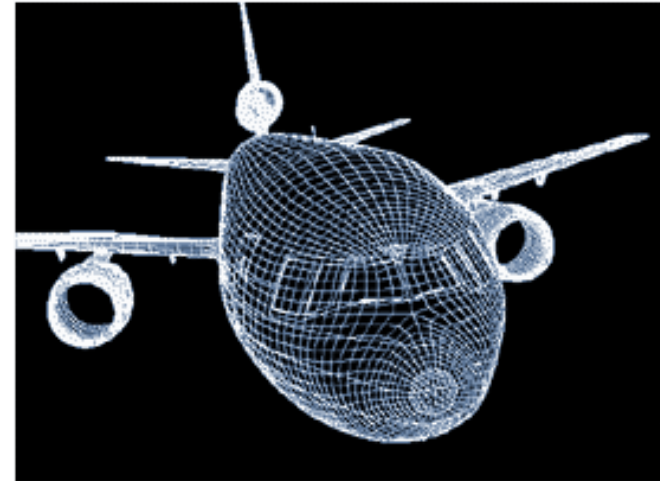
A low-resolution mesh scanned by a cyberscanner. Mapped with photographs.



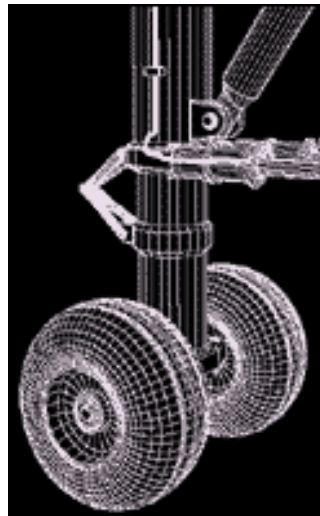
Making of 405

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

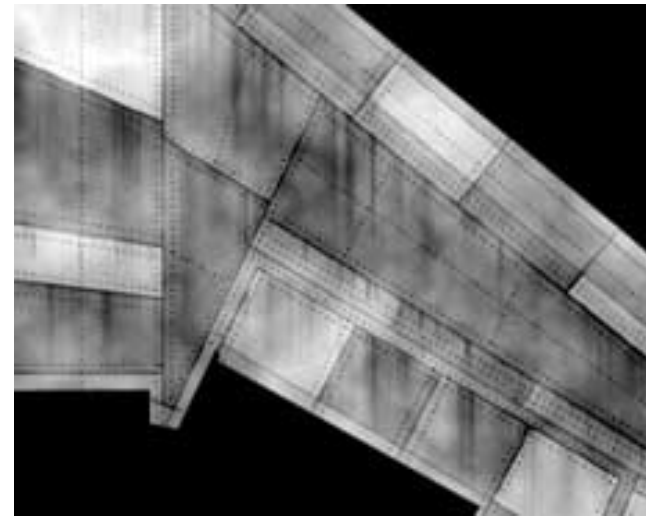
59 objects, 142,439 polygons



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



Bloody Omaha



Topics we plan to cover

Camera



Canon 10D

High dynamic range imaging/display

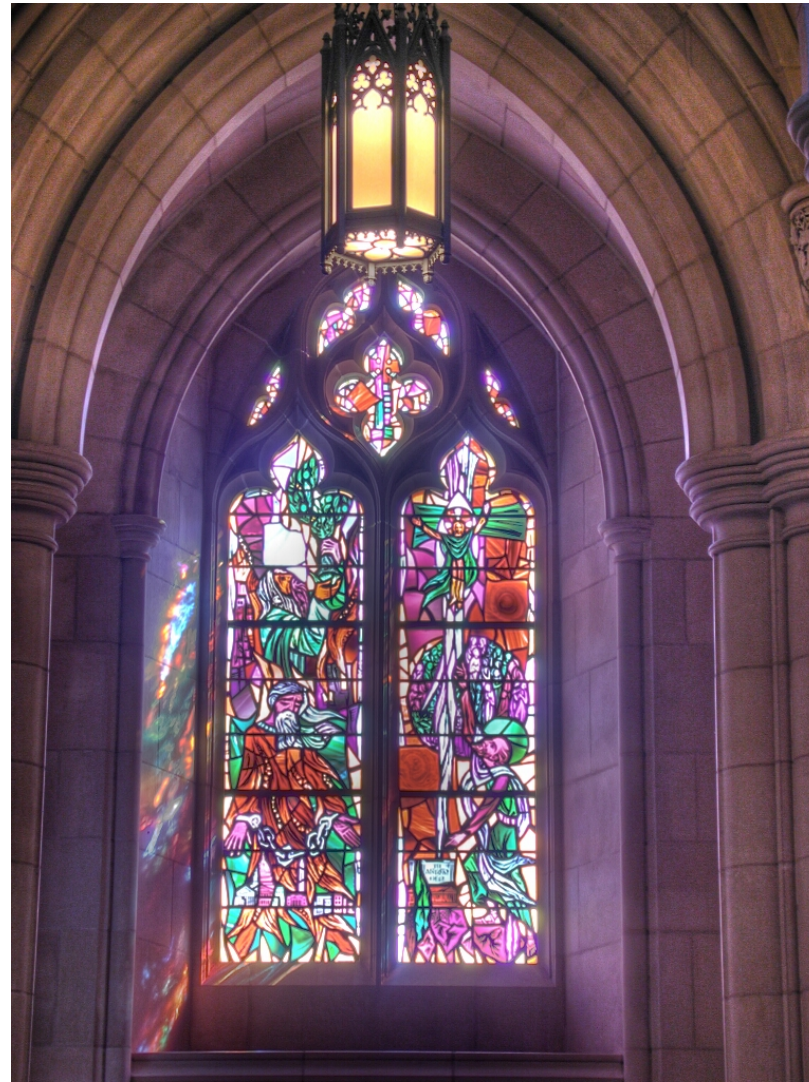
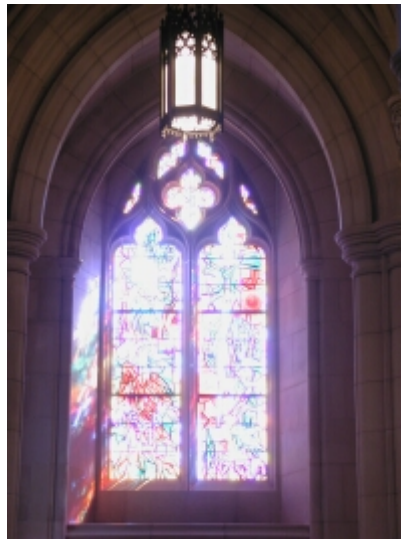
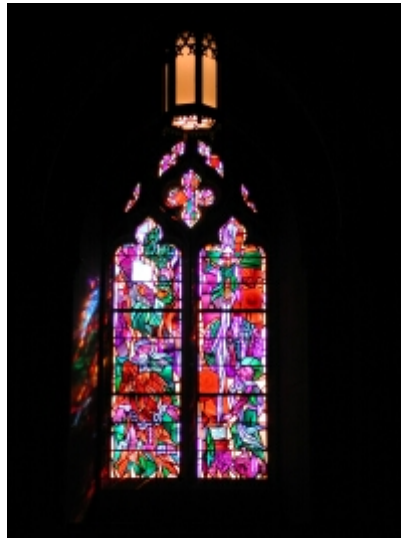
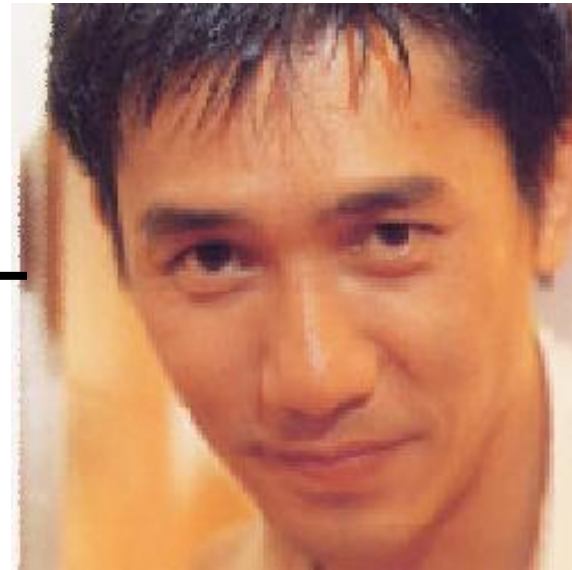


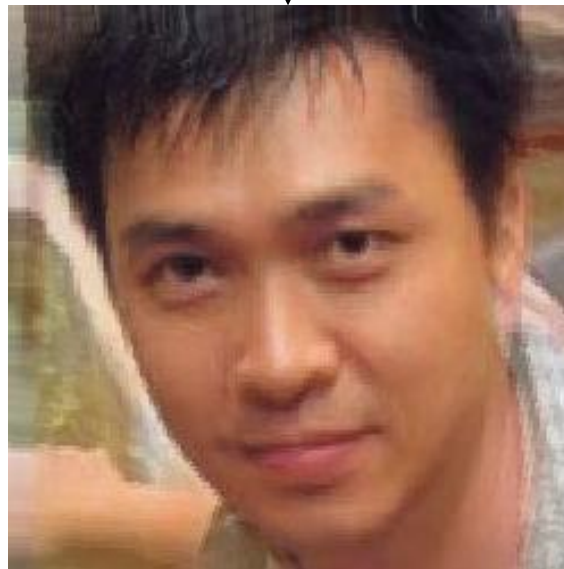
Image warping/morphing



someone not
that famous



someone very
famous



[video](#)

Image warping/morphing

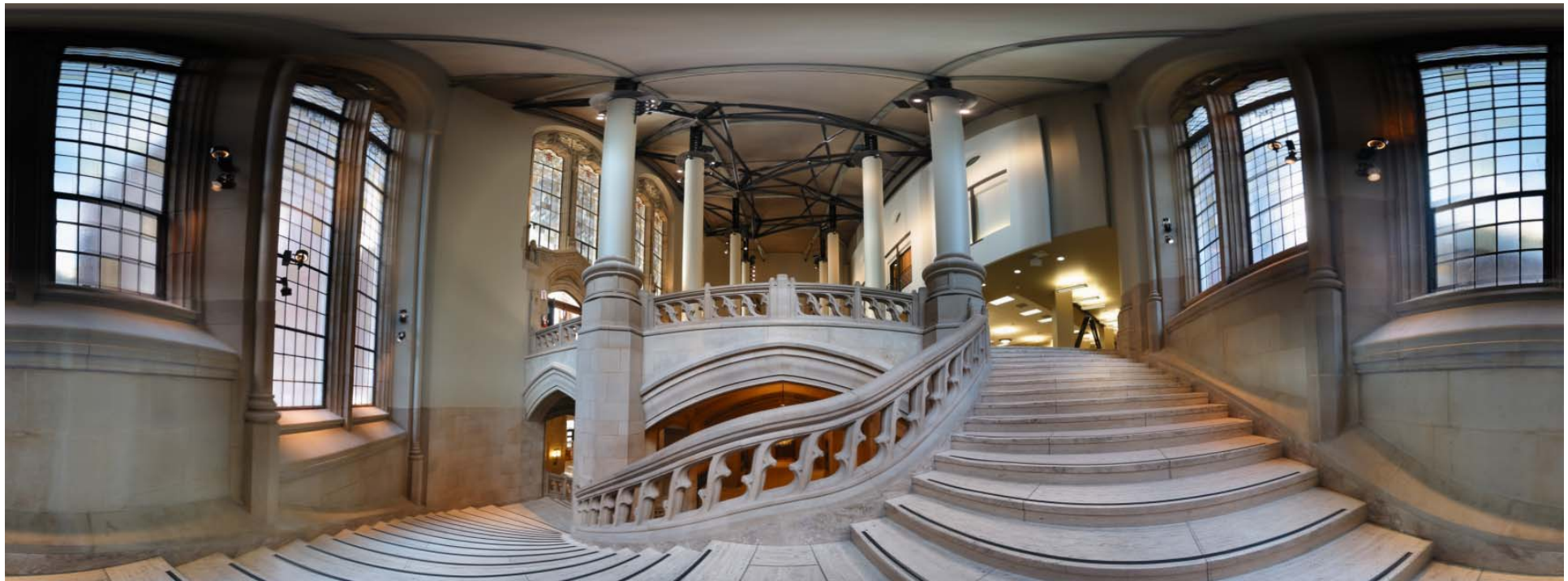


Tracking



Feature tracking

Image stitching

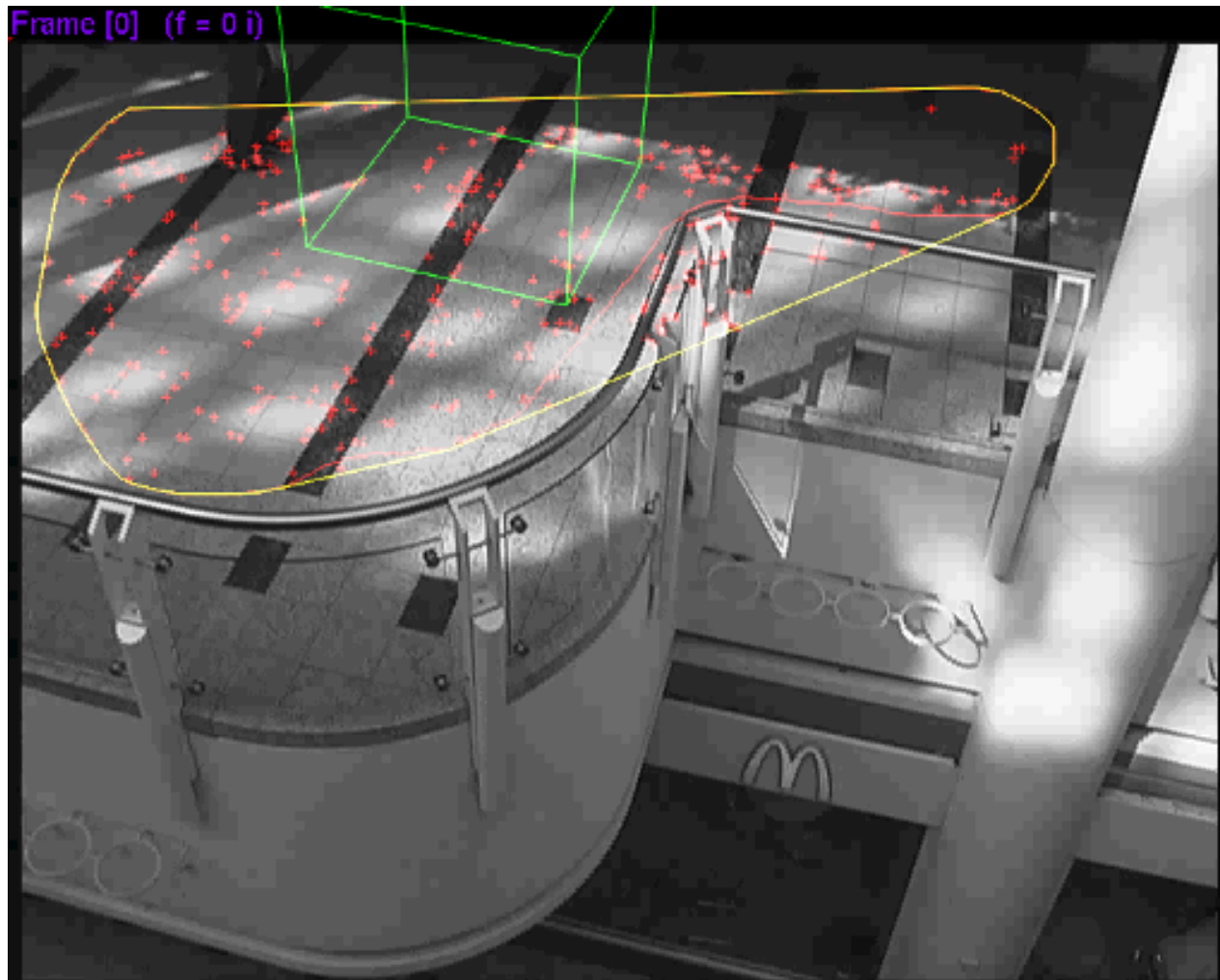


MatchMove



Move matching using scene planes

Matchmove



Move matching using scene planes

Matchmove



Move matching using scene planes

Photo tourism



Photo Tourism

Exploring photo collections in 3D



(a)

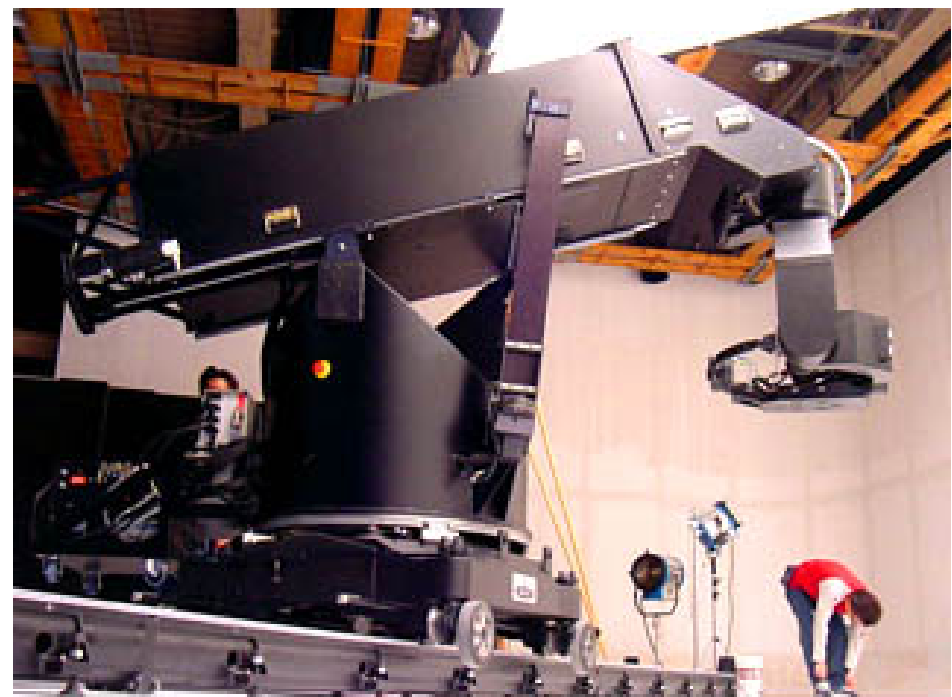


(b)



(c)

Video matching



Matrix

MOCO (Motion control camera)

Video matching



Video matching

Matting and compositing



Titanic

Matting



Object selection



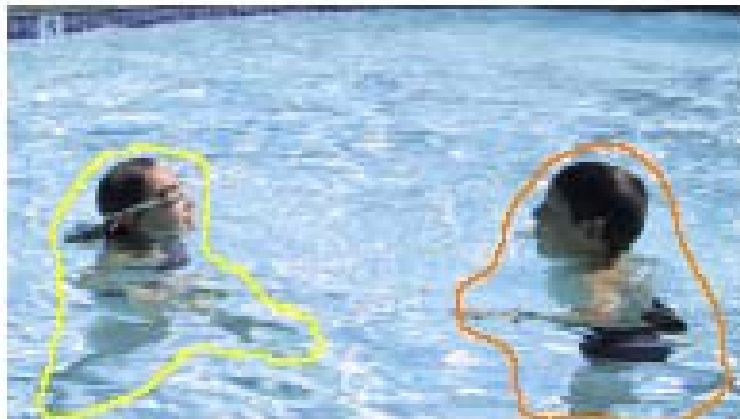
LazySnapping

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



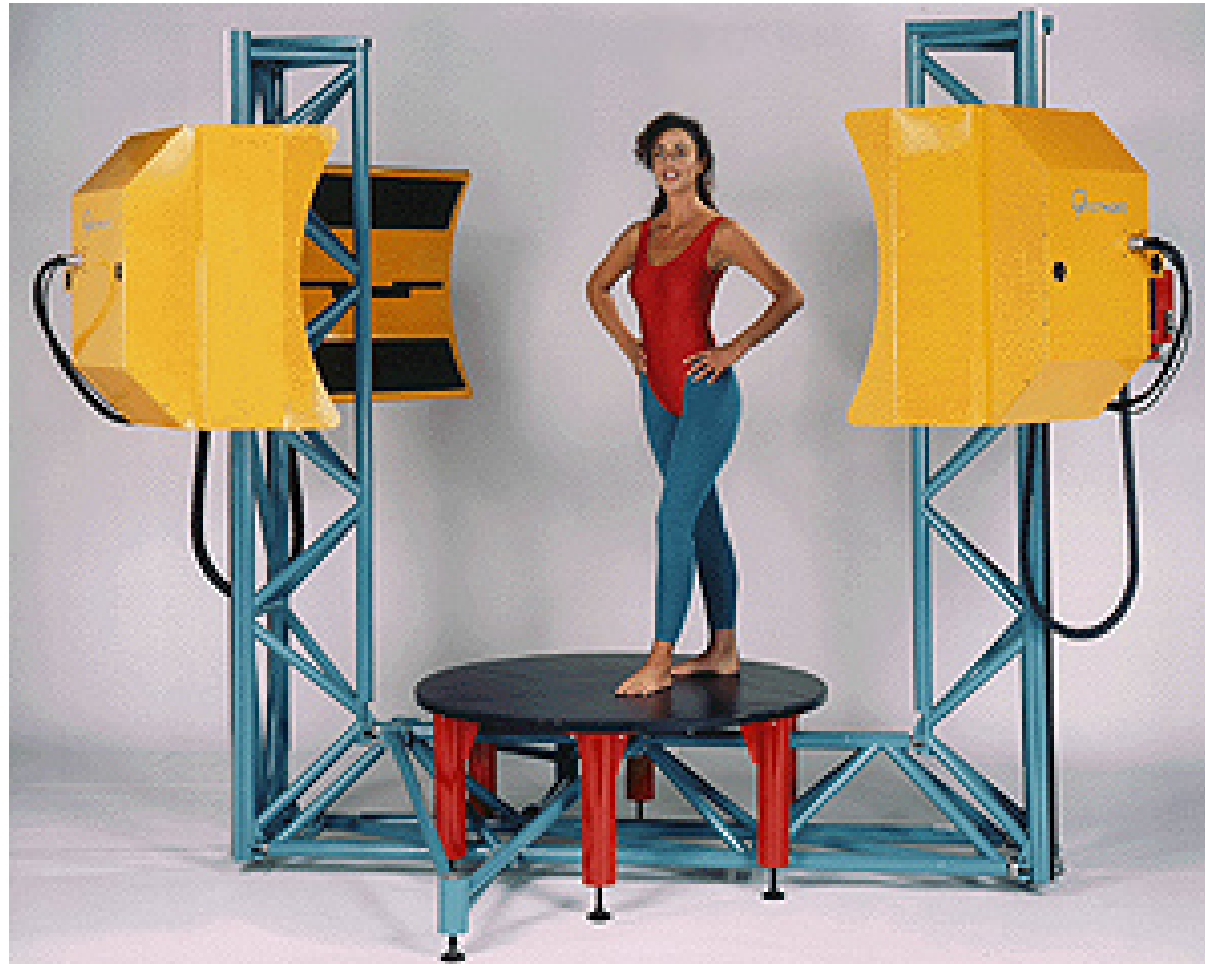
Tour into a picture

Image-based modeling



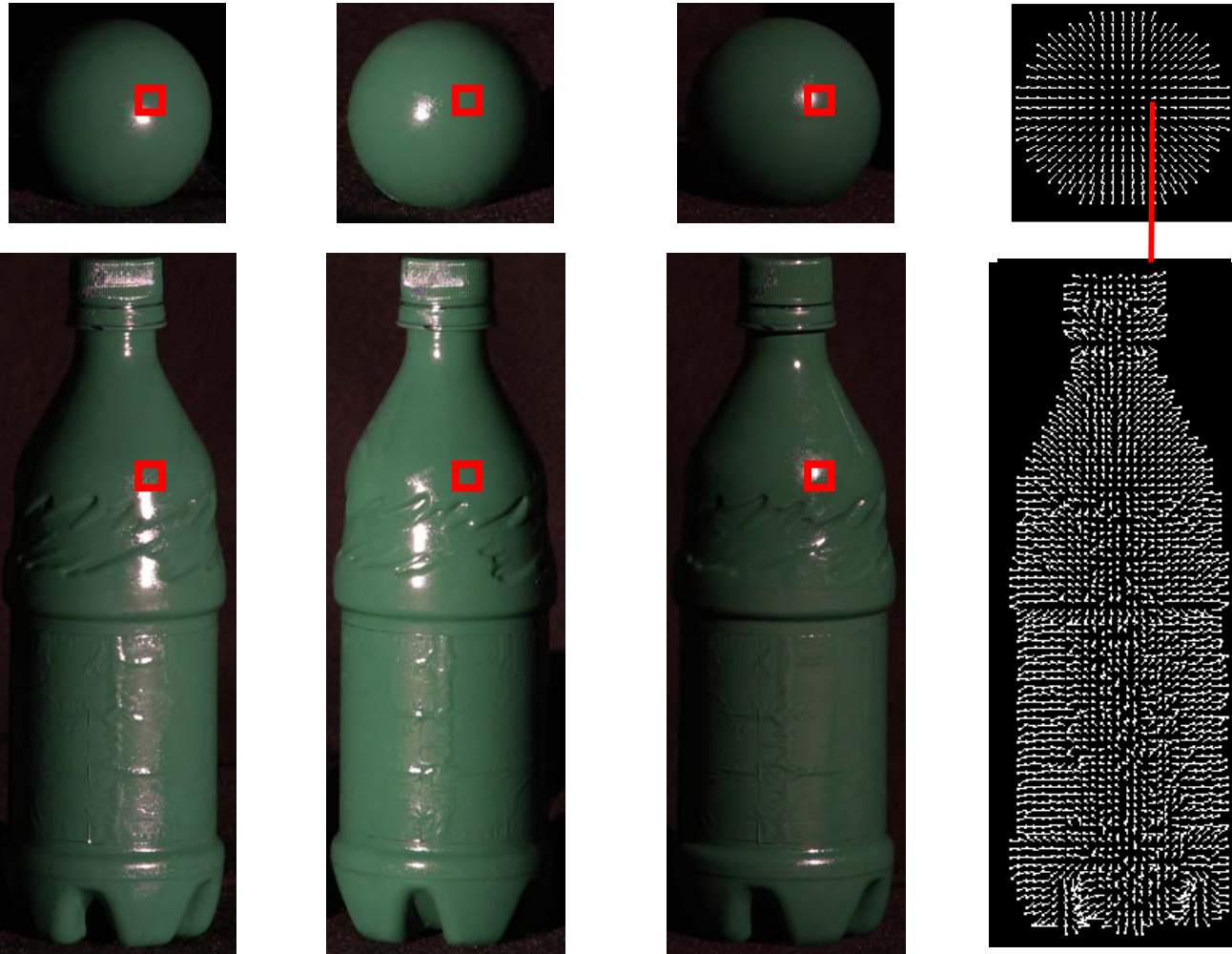
Tour into a picture

3D photography (active)



Cyberware whole body scanner

3D photography (active)



Photometric stereo

3D photography (passive)

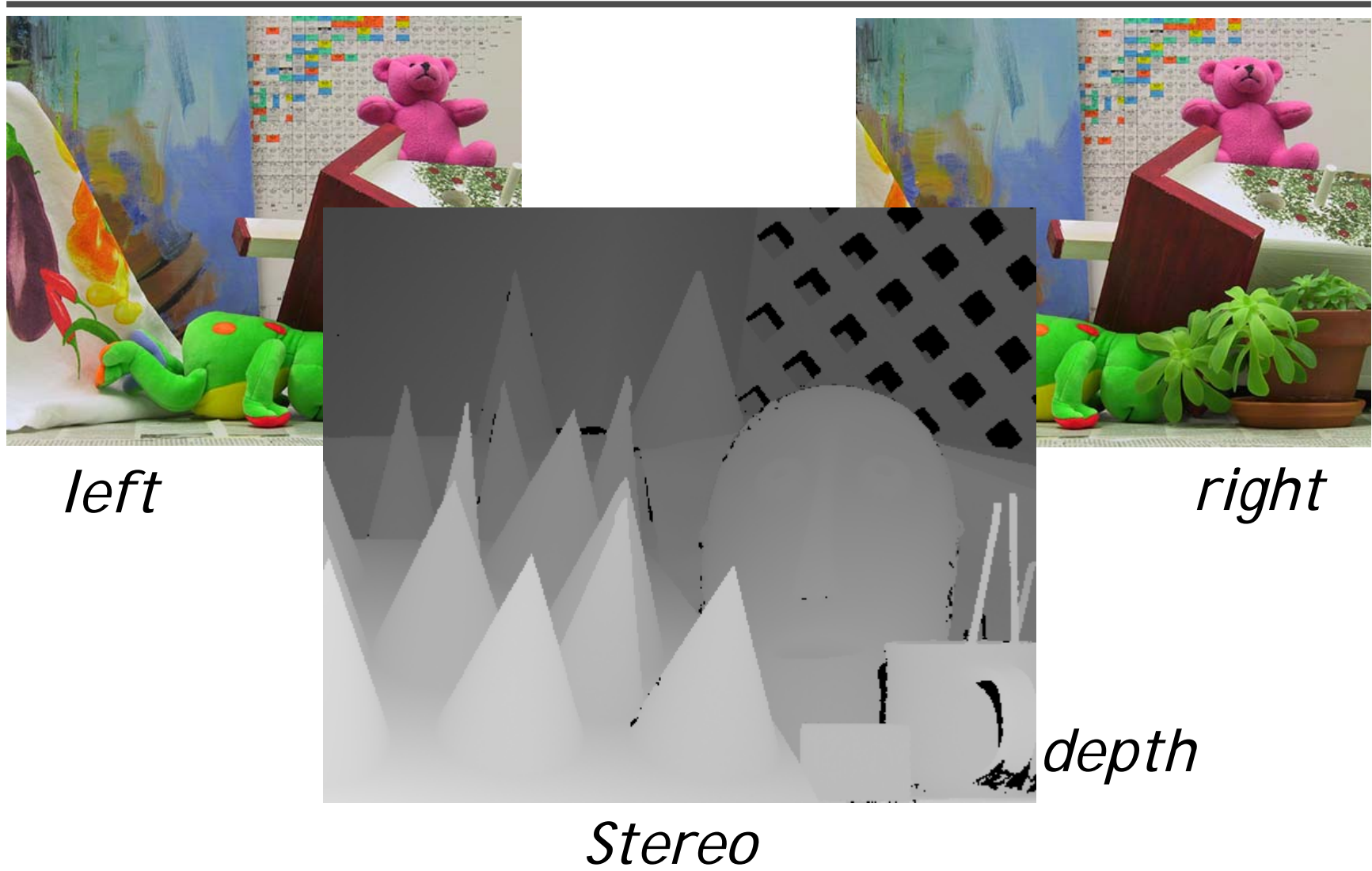
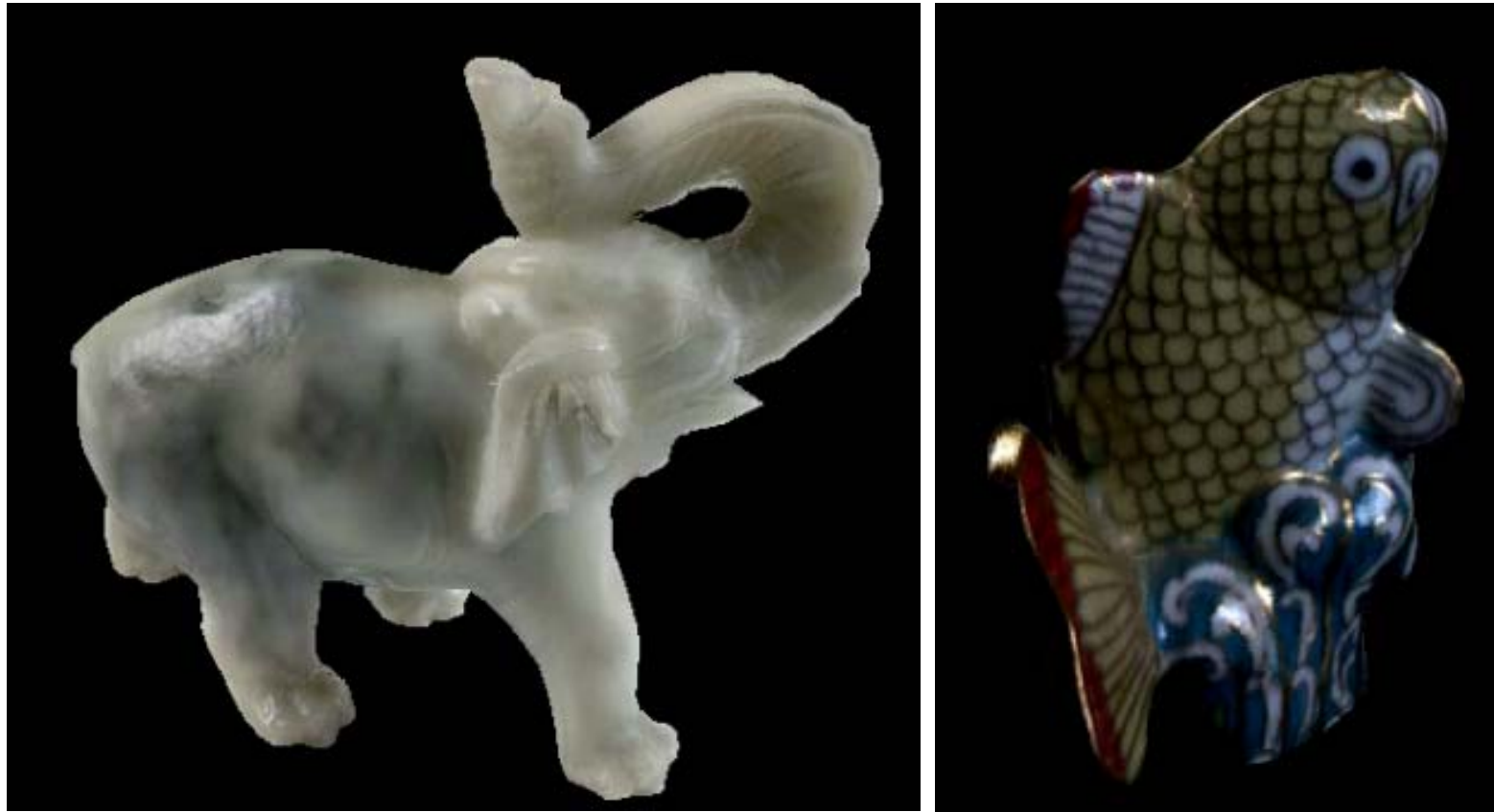


Image-based rendering



Surface lightfield

View interpolation



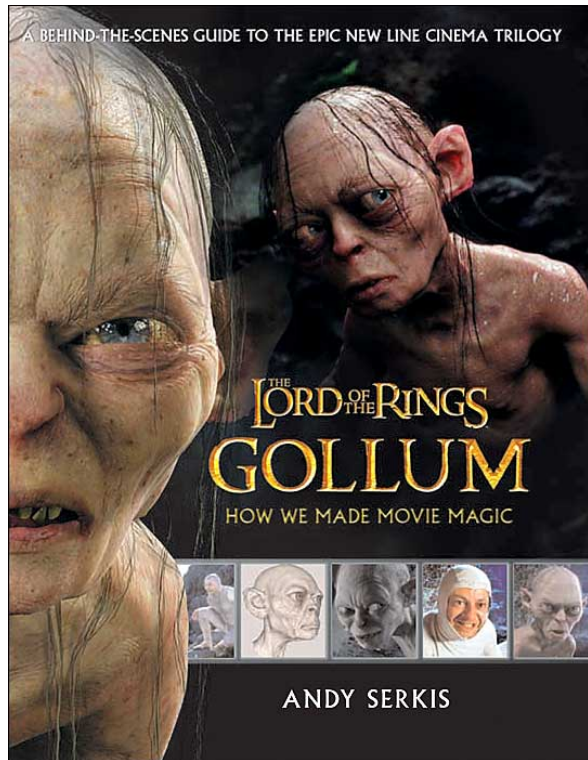
Bullet time video

View interpolation

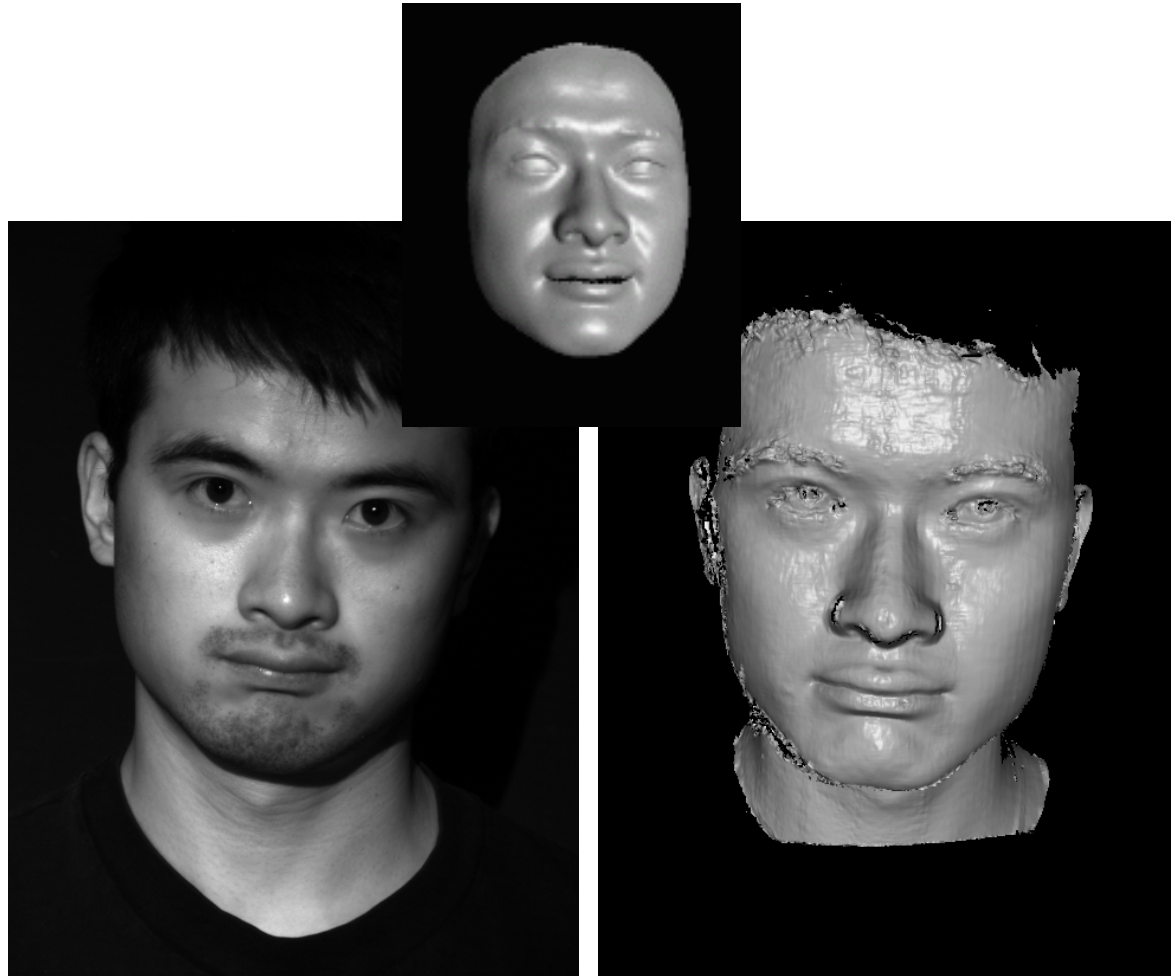


High-Quality Video View Interpolation

Making face



Gollum



Spacetime face

Video rewrite



Trainable videorealistic speech animation

Inpainting (wire removal)



Inpainting

Texture synthesis/replacement



Texture replacement

Semi-automatic matting painting

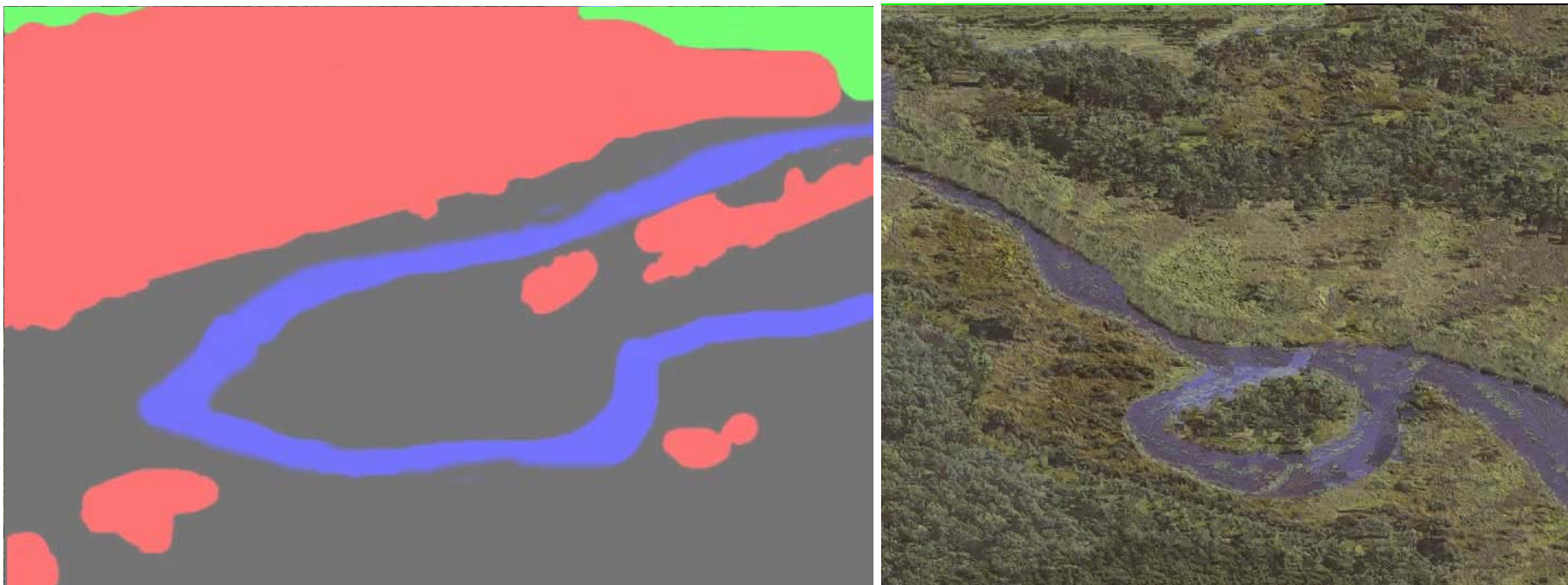
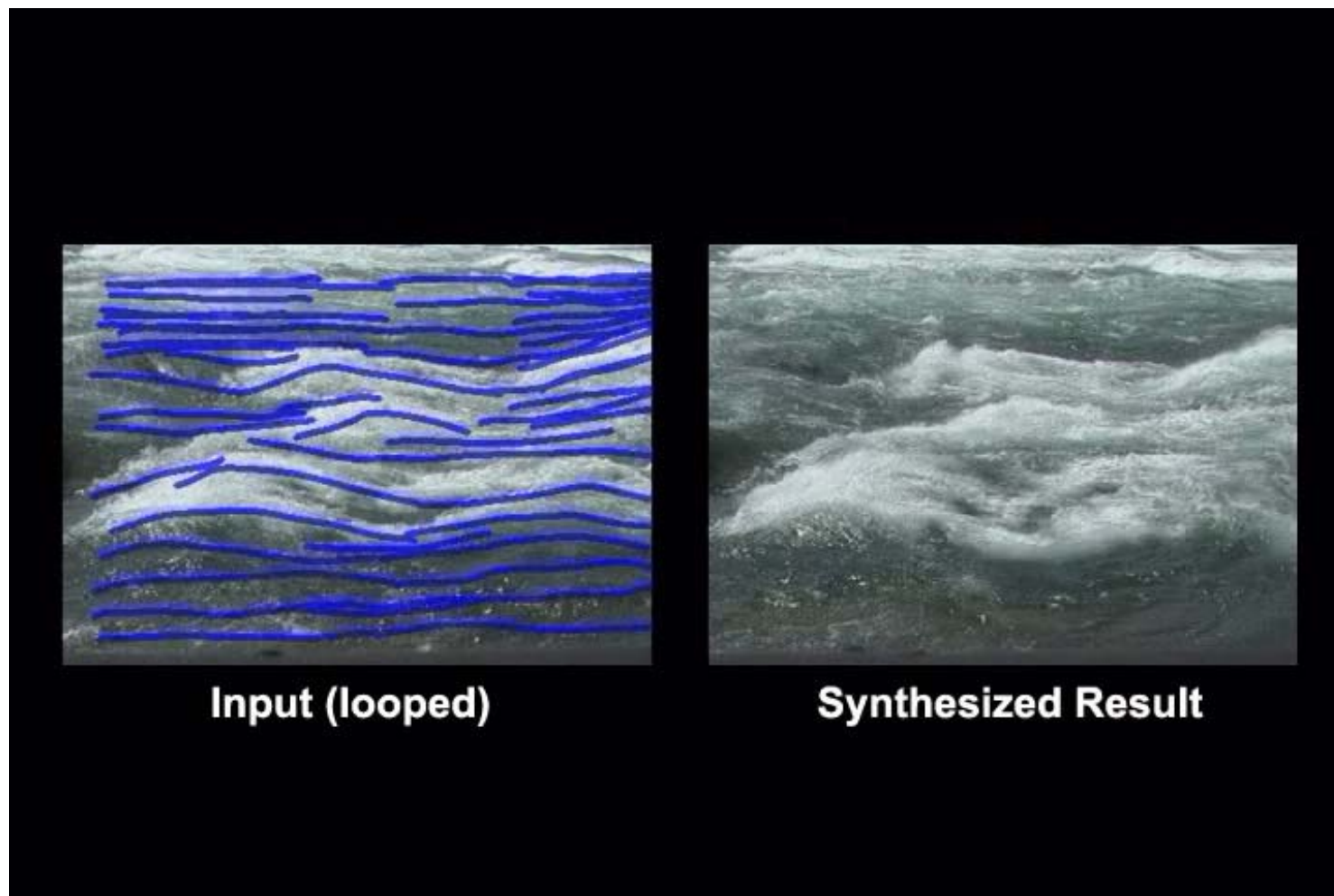


Image analogies

Video editing

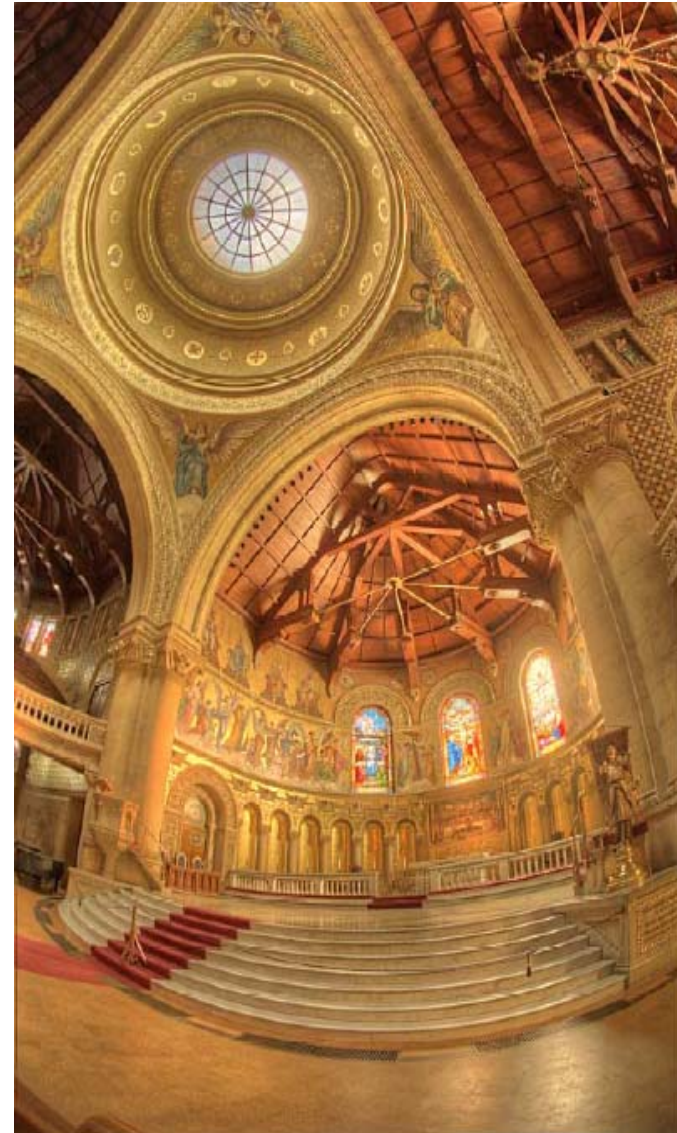
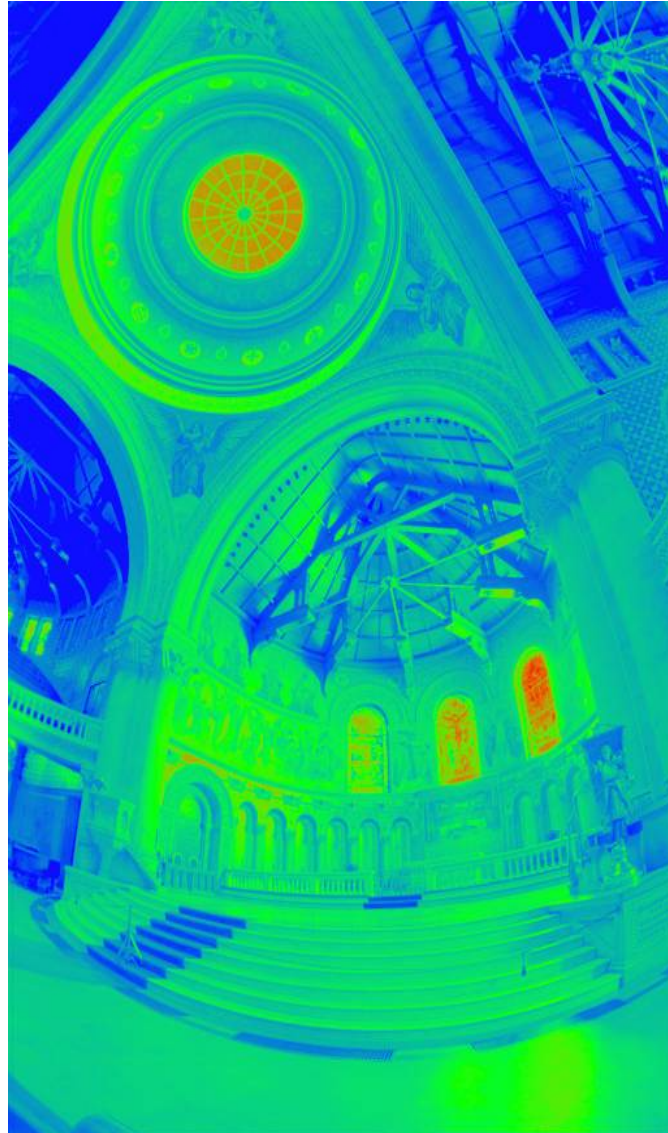


Flow-based video editing

Grading

- 3 programming assignments (50%)
 - HDR Imaging
 - AutoStitch
 - MatchMove
- Class scribe (8%)
- Class participation (6%)
- Final project (36%)
 - Research
 - System
 - Film

High dynamic range imaging



From last semester (鄭逸廷 陳柏叡)



From last semester (吳侑親, 張書瑋)

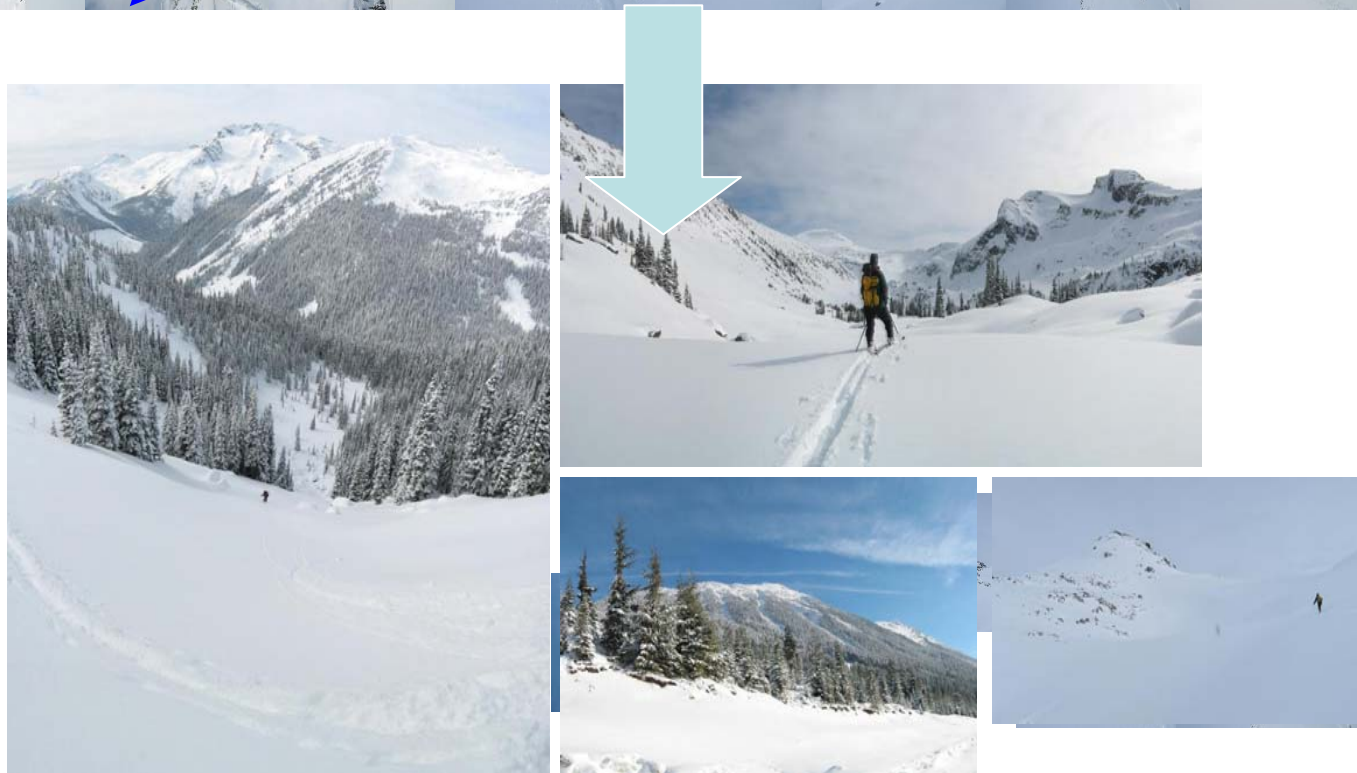
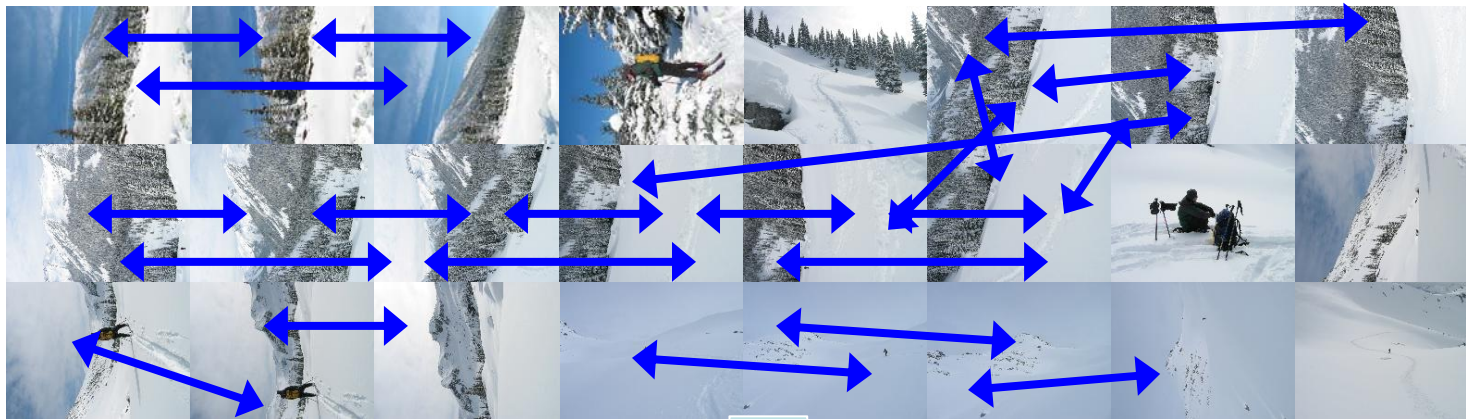
DigiVFX



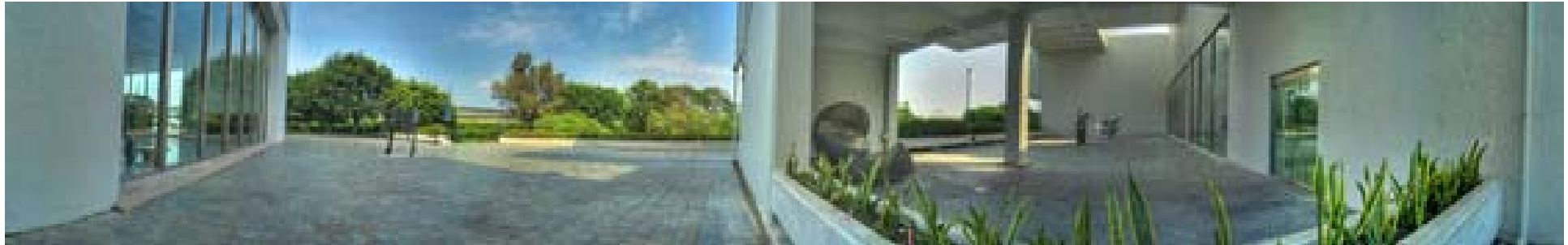
From last semester (王瑋馥, 余雁雲)



AutoStitch



From last semester

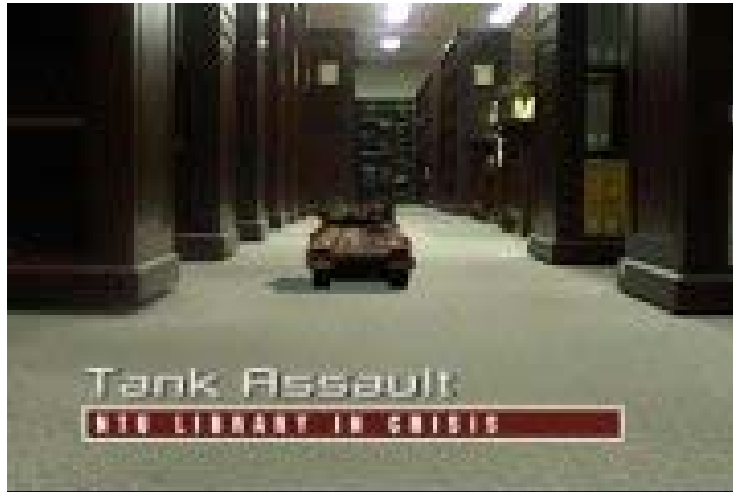


鄭逸廷 陳柏叡



李佳燕 黃政基

MathMove



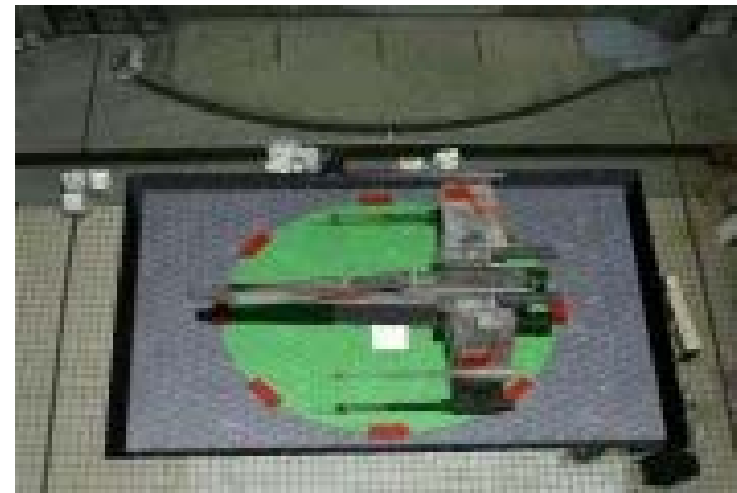
梁家愷 鐘志遠



姜任遠 林立峯



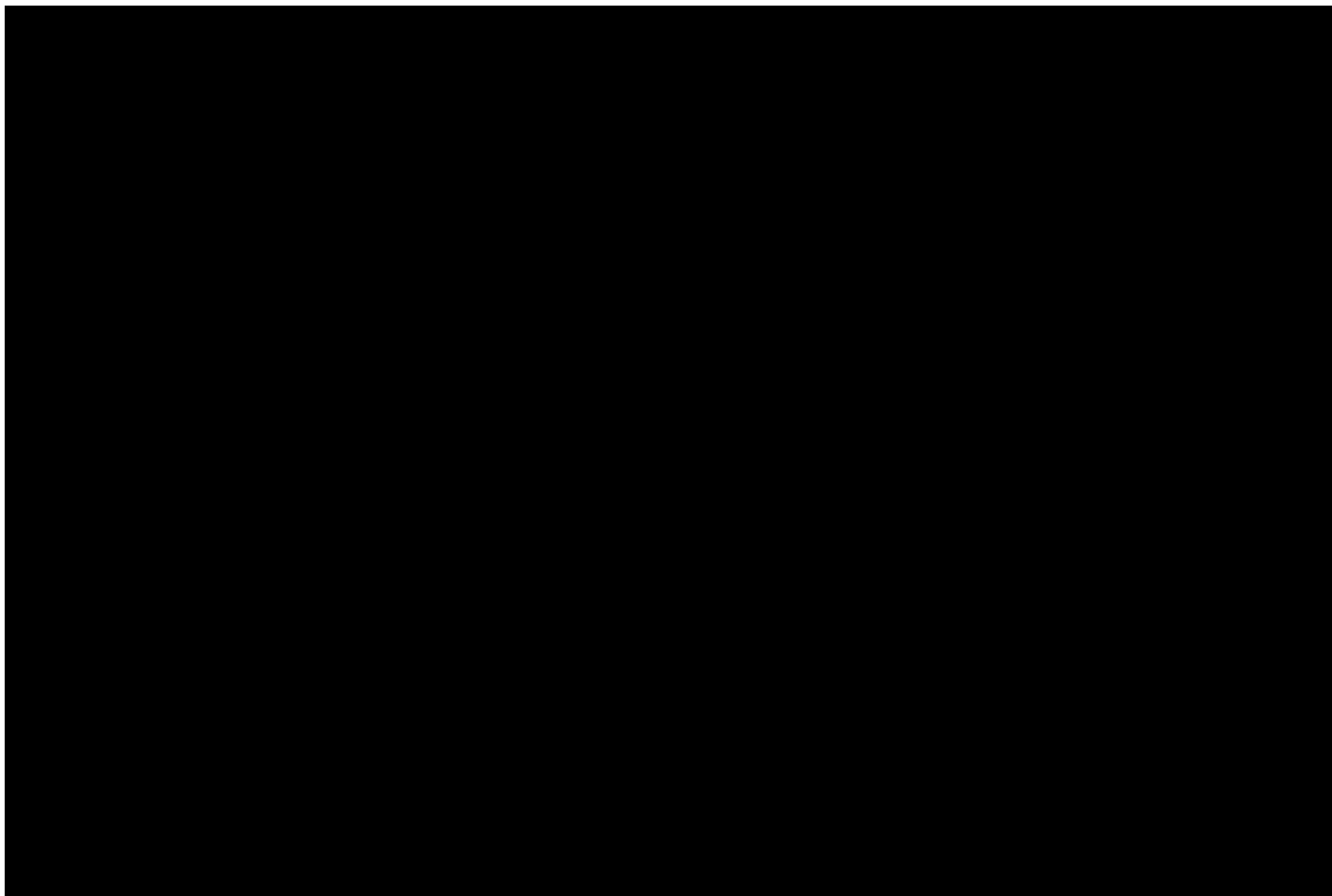
楊宗碩 林柏劭



翁憲政 洪韶憶

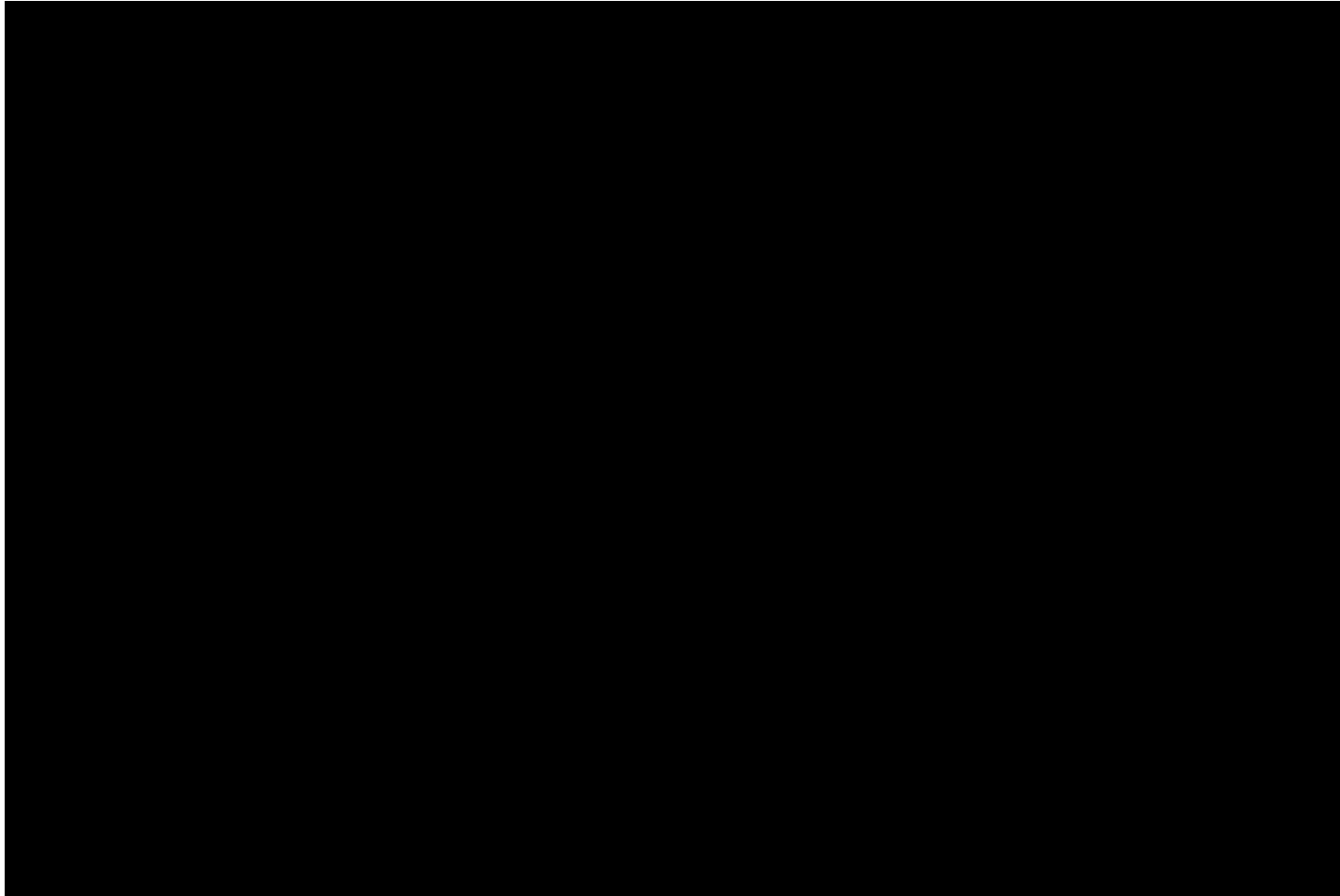
**Final projects from a similar course
in Georgia Tech.**

Life in Paints



Life in Paints, GaTech DVFX 2003

Tour into pictures



Making of *Life in Paints*

In Your Face



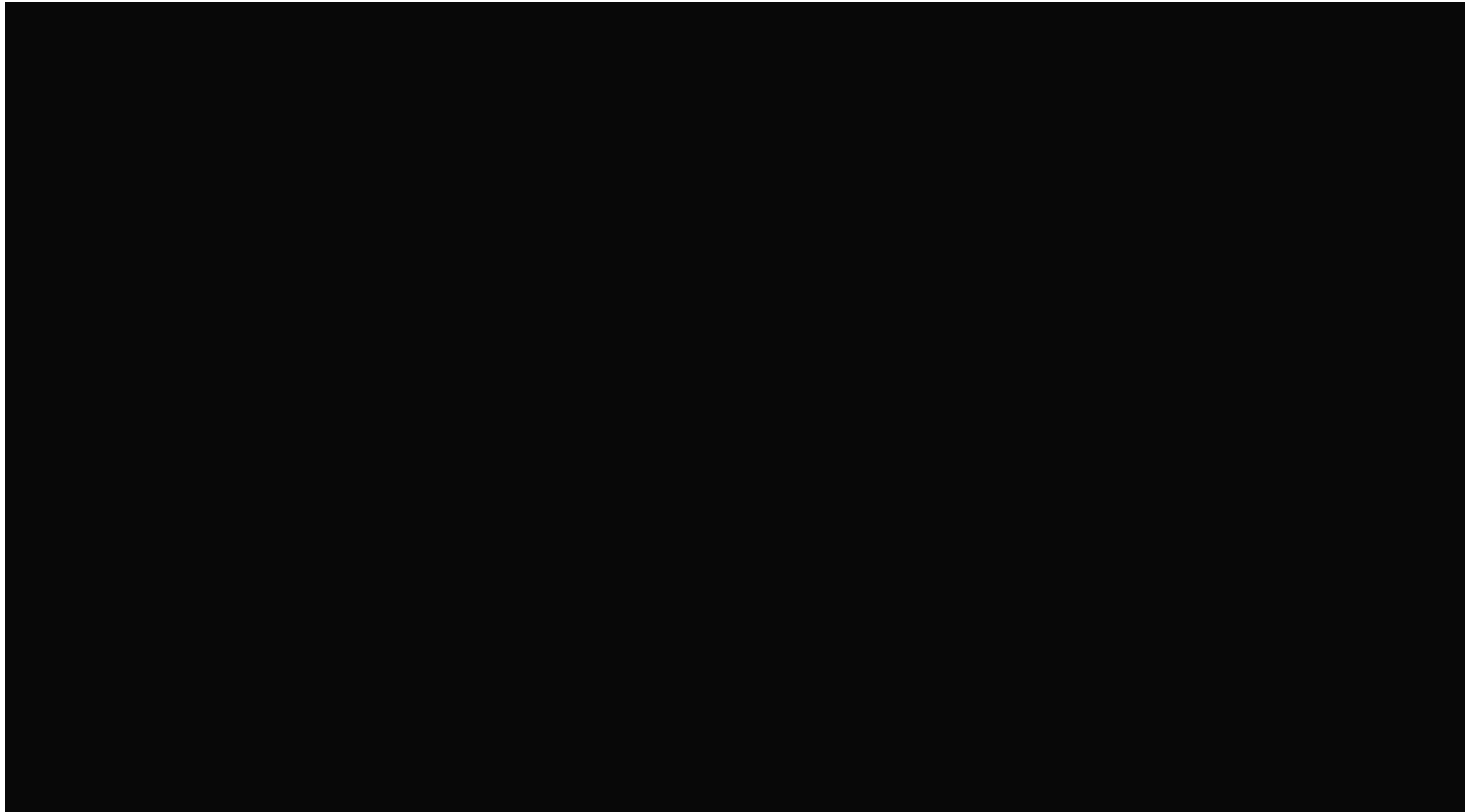
In Your Face, GaTech DVFX 2002

Stop action

The Making Of
In Your Face

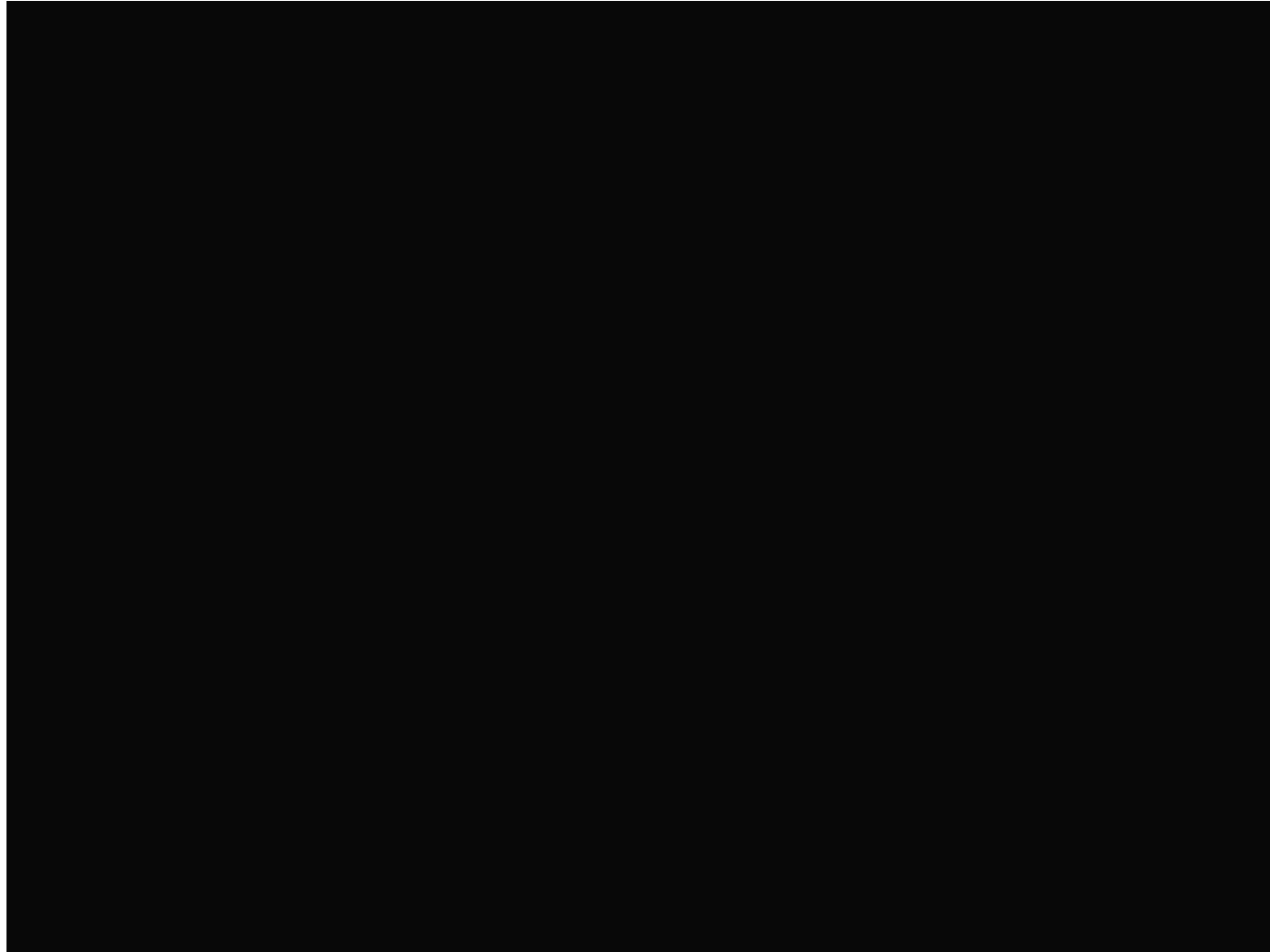
Making of *In Your Face*

Tennis



Tennis, GaTech DVFX 2007

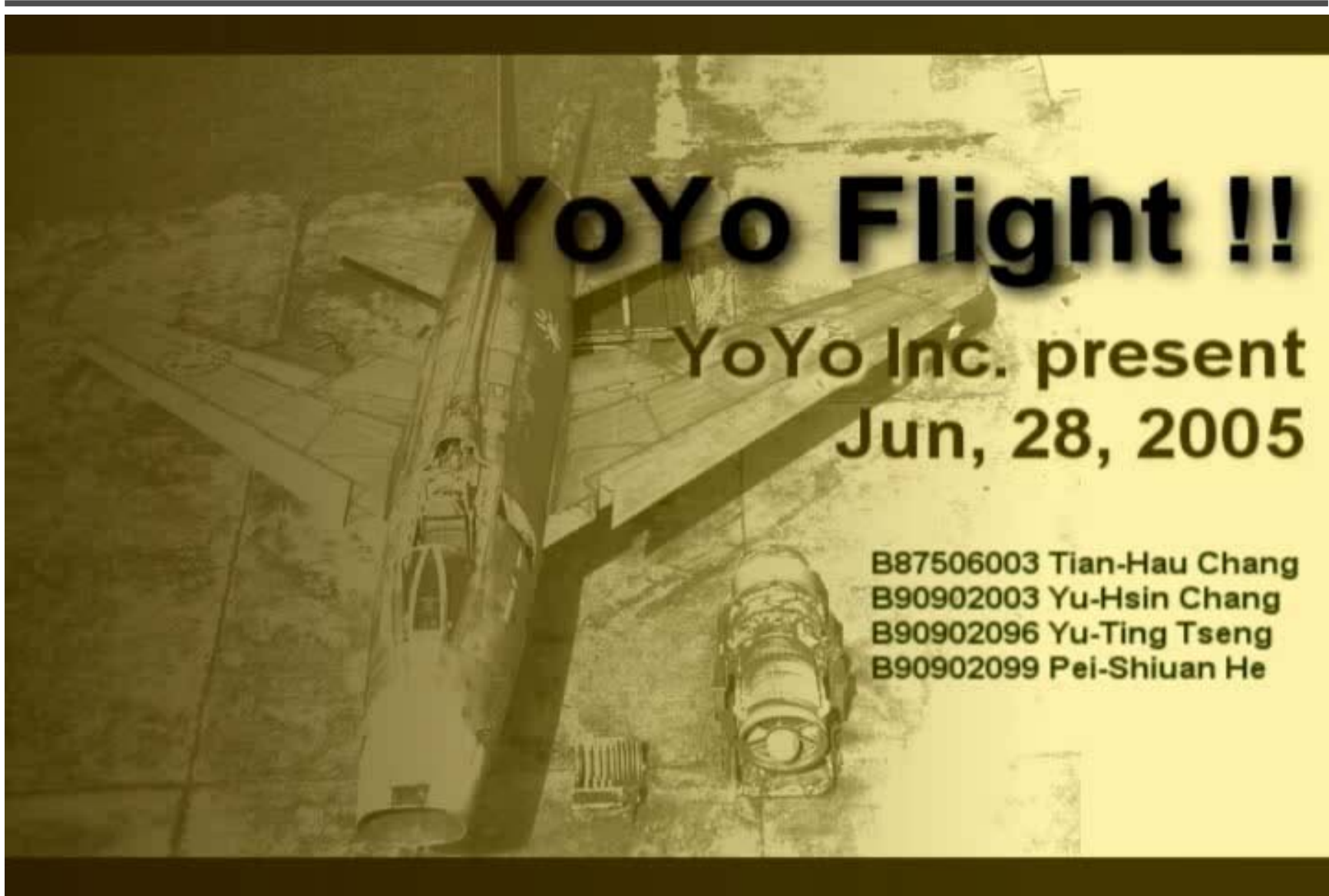
MatchMove/CGI



Making of Tennis

Final projects from the past.

YoYo Flight

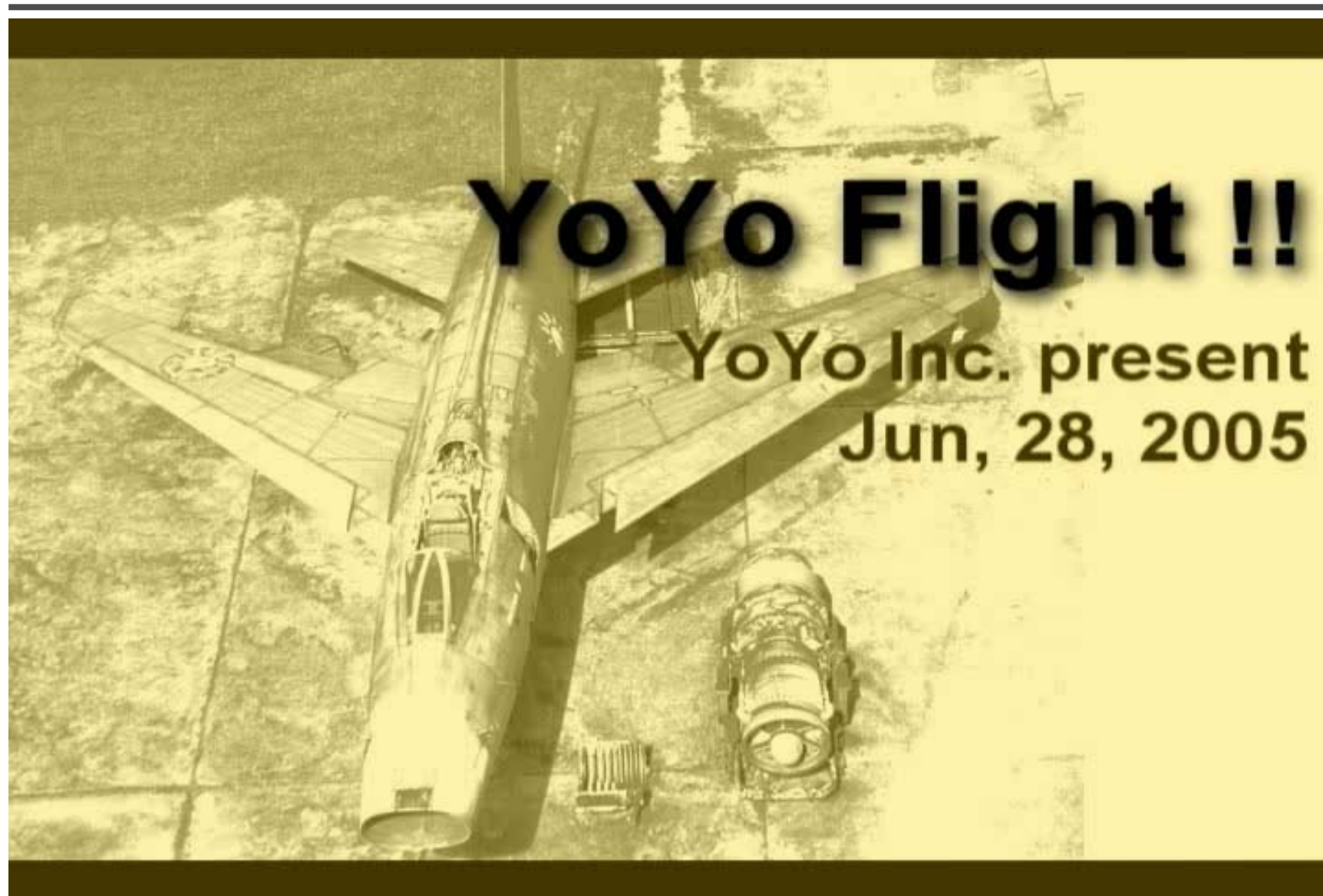


YoYo Flight !!

**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



That's it for today!

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