

# Course overview

Digital Visual Effects, Spring 2007

*Yung-Yu Chuang*

2007/2/27

# Logistics

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- Meeting time: 1:30pm-4:20pm, Tuesday (16 weeks, no holiday this semester, :<)
- Classroom: CSIE Room 104
- Instructor: Yung-Yu Chuang ([cyy@csie.ntu.edu.tw](mailto: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](mailto:vfx@cmlab.csie.ntu.edu.tw) subscribe via  
<https://cmlmail.csie.ntu.edu.tw/mailman/listinfo/vfx/>

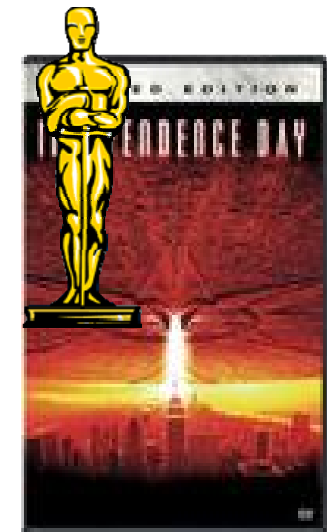
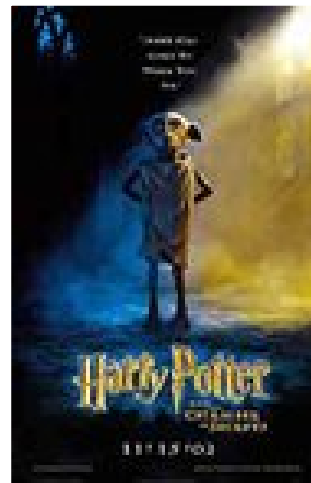
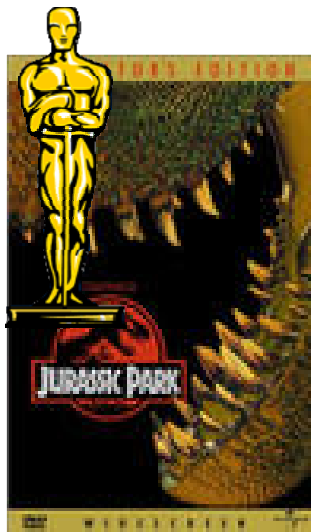
# Prerequisites

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- It is a *must* that you have programming experience.
- 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



[updated listing](#)

# Reality?

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# Retouching

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# Iraq War, LA Times, April 2003

DigiVFX





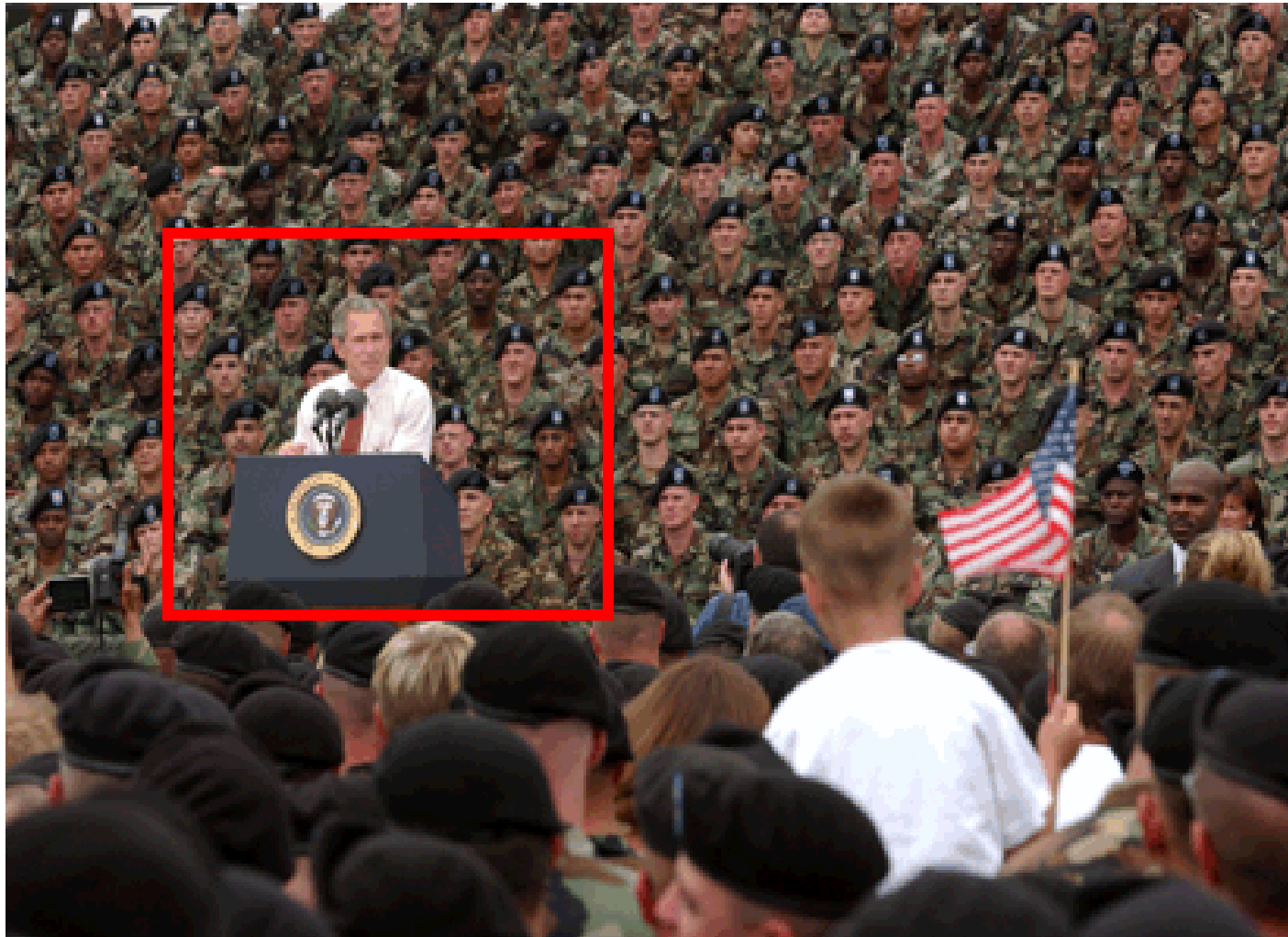
# Bush campaign's TV AD, 2004

This section shows a sampling of the duplication of soldiers.



# Texture synthesis and inpainting

DigiVFX



**This course is NOT about ...**

# It isn't about photography

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# It isn't about 3D animations

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# It isn't about watching movies

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# It isn't about physical effects

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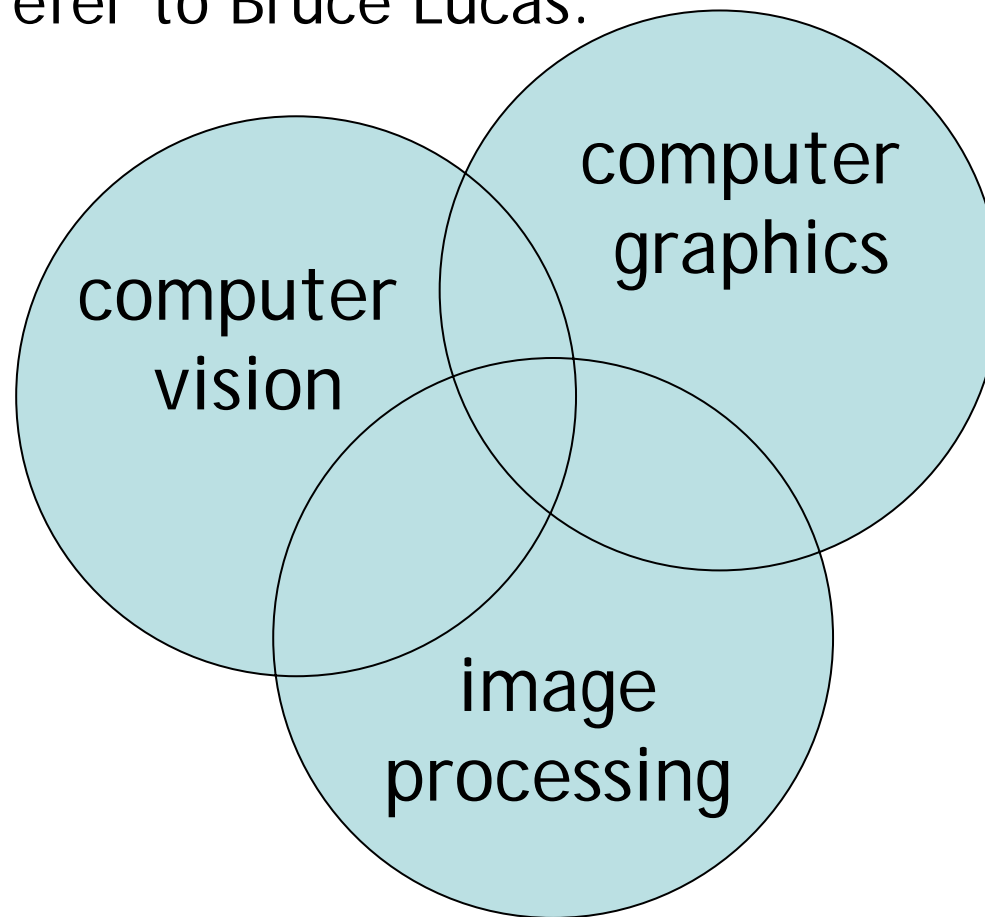




# It's not about industrial tricks

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You will learn more about Taylor and Poisson than Lucas in this course. Even if you hear Lucas in the class, it is more likely to refer to Bruce Lucas.



**Special effects**

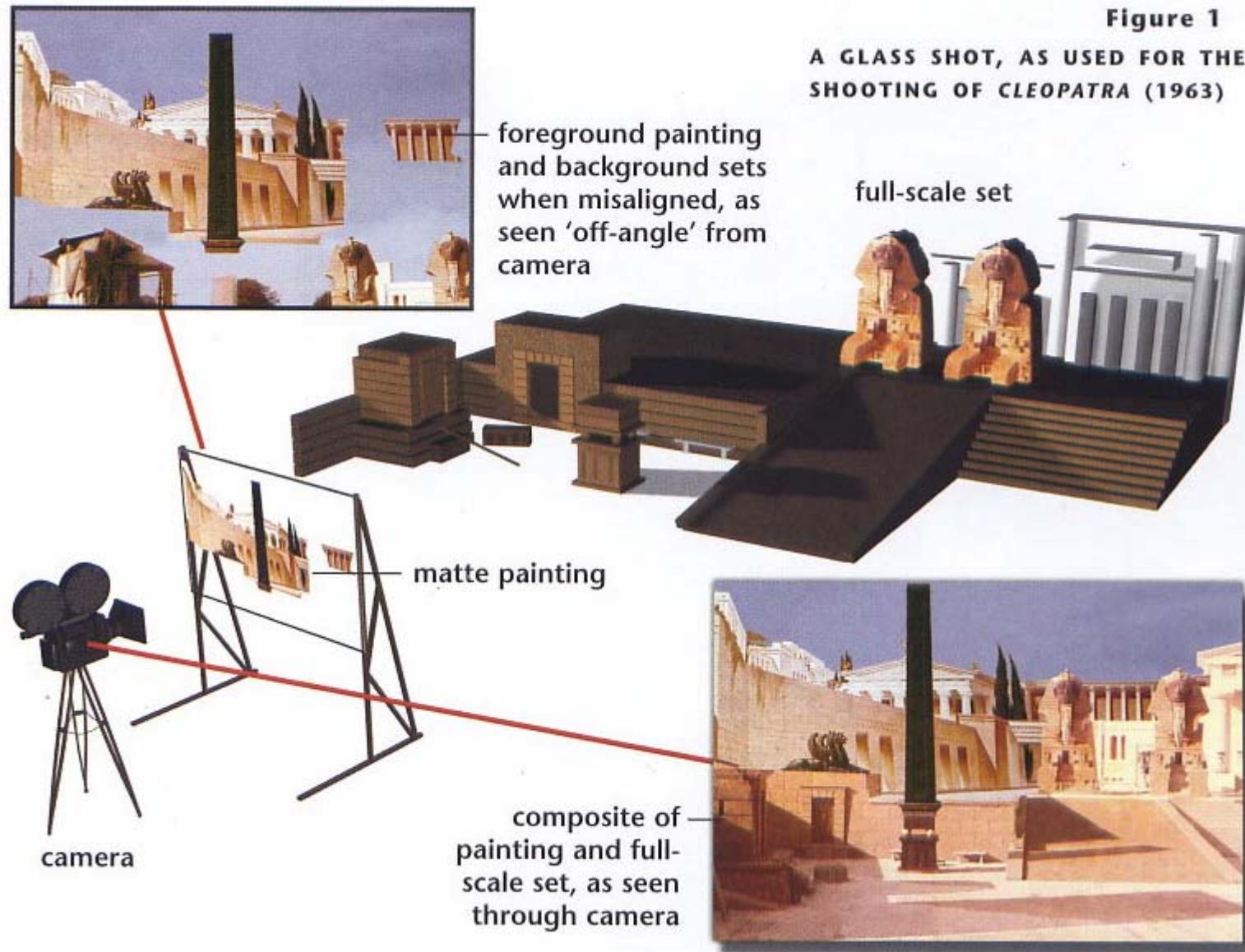
# Stop action

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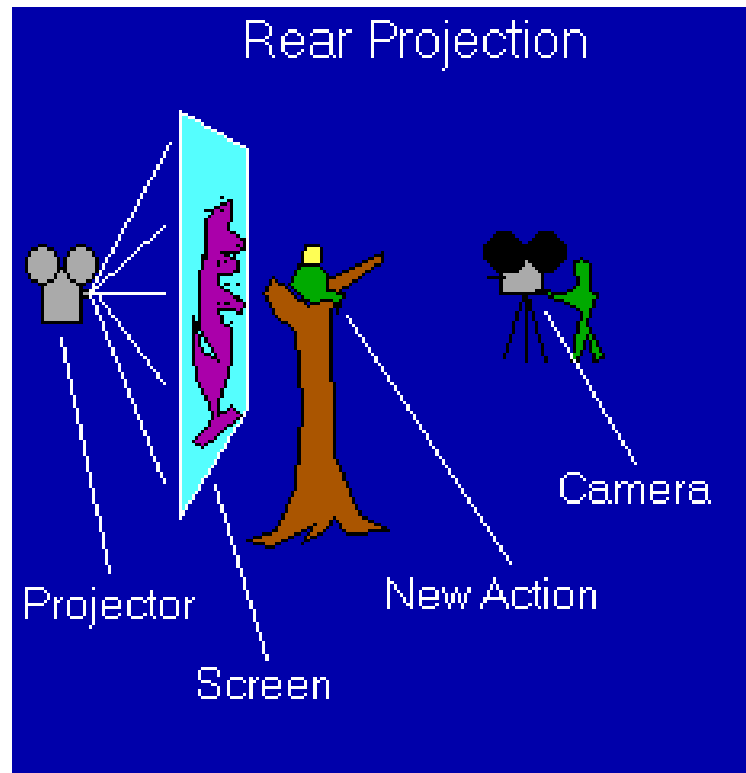
*The execution of Mary, 1895*

# Glass shot



# Rear projection

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*King Kong, 1933*



# Special effects (make-up)

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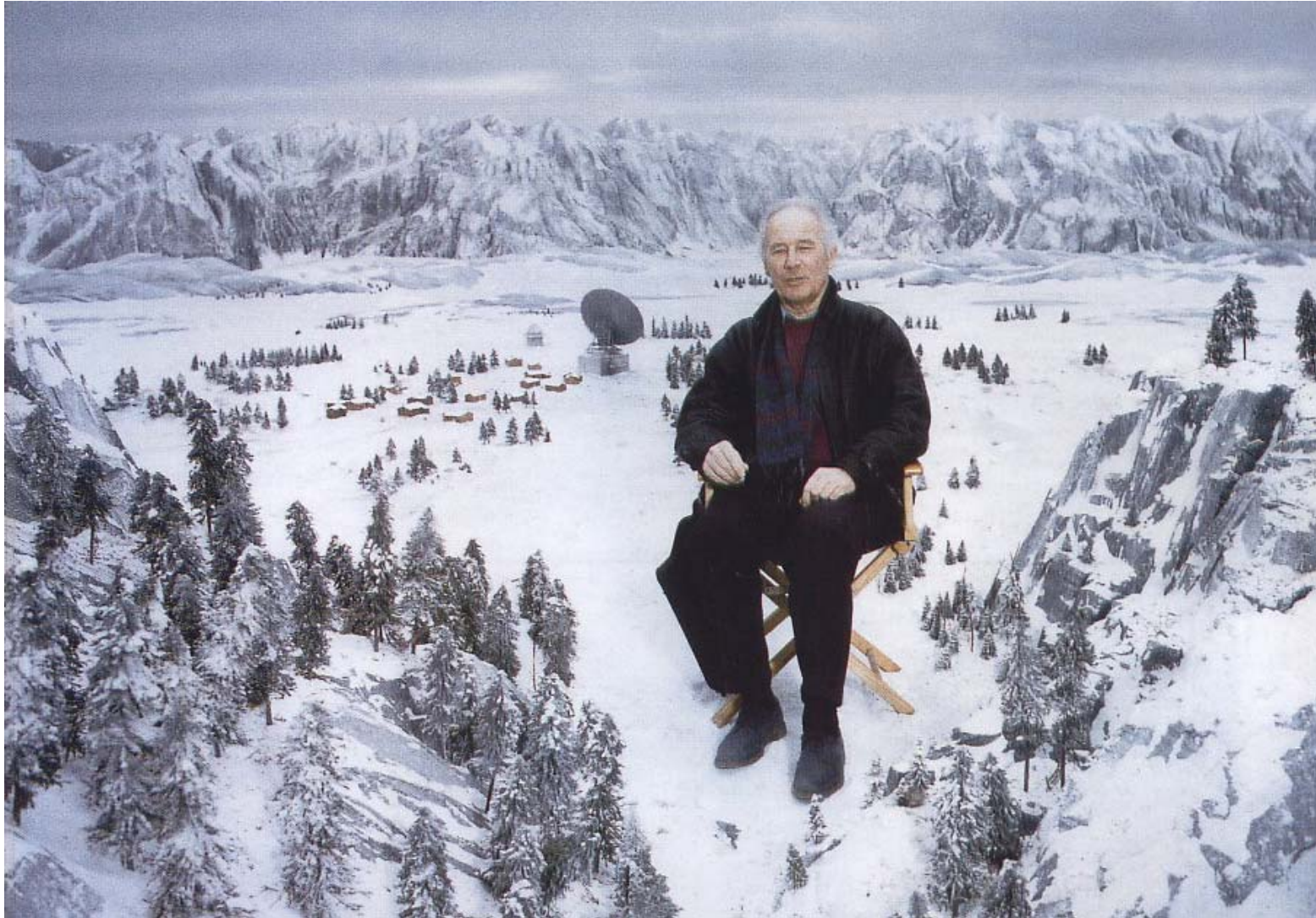


# Special effects (physical effects)





# Special effects (miniature)



# Special effects (matte painting)





# Lord of the Rings

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# Illusion - forced perspective

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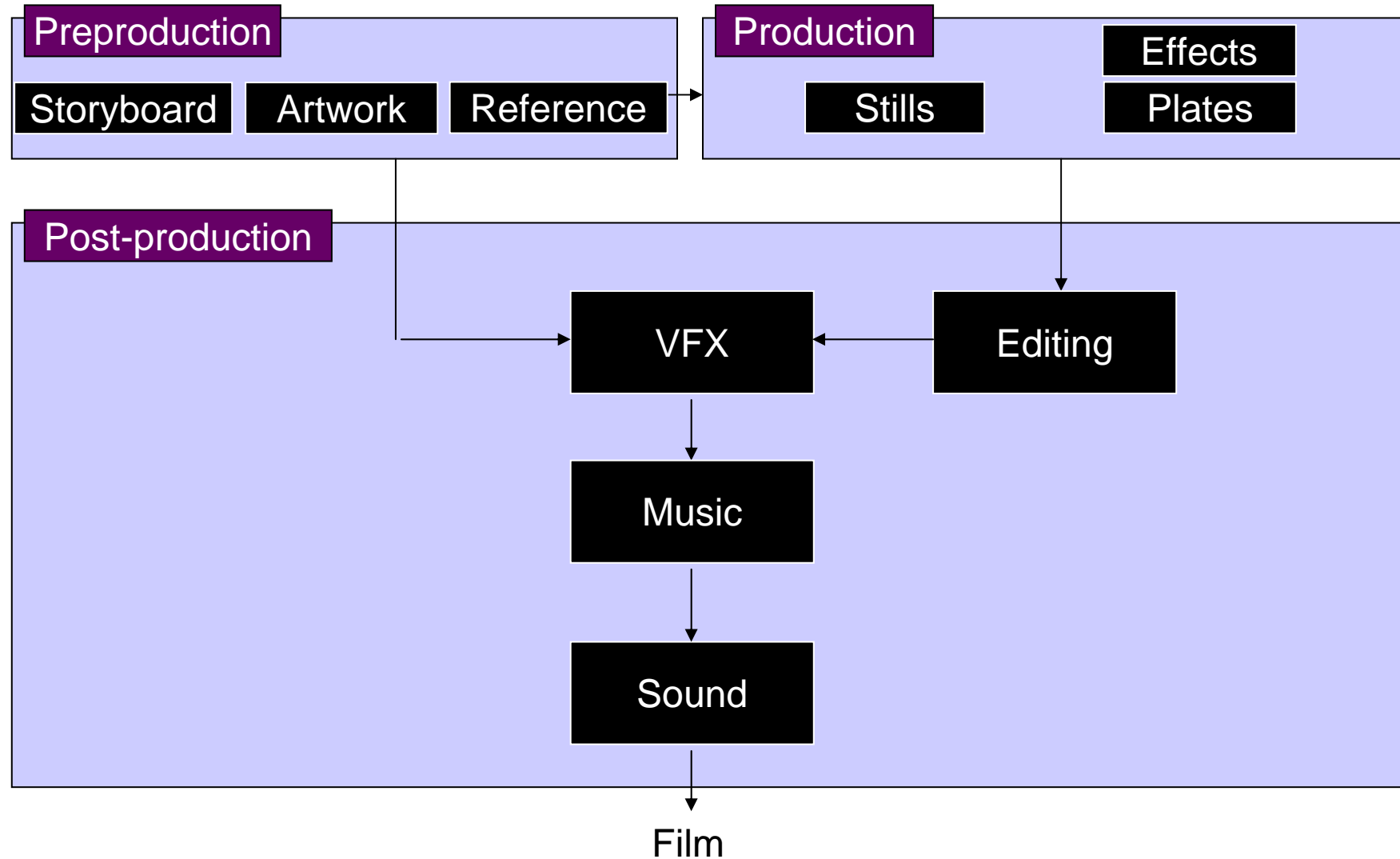
# Computer-generated model

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# Production pipeline

# Production pipeline





# Preproduction

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Storyboard

# Preproduction

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Artwork

# Preproduction

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Reference & Research



# Production

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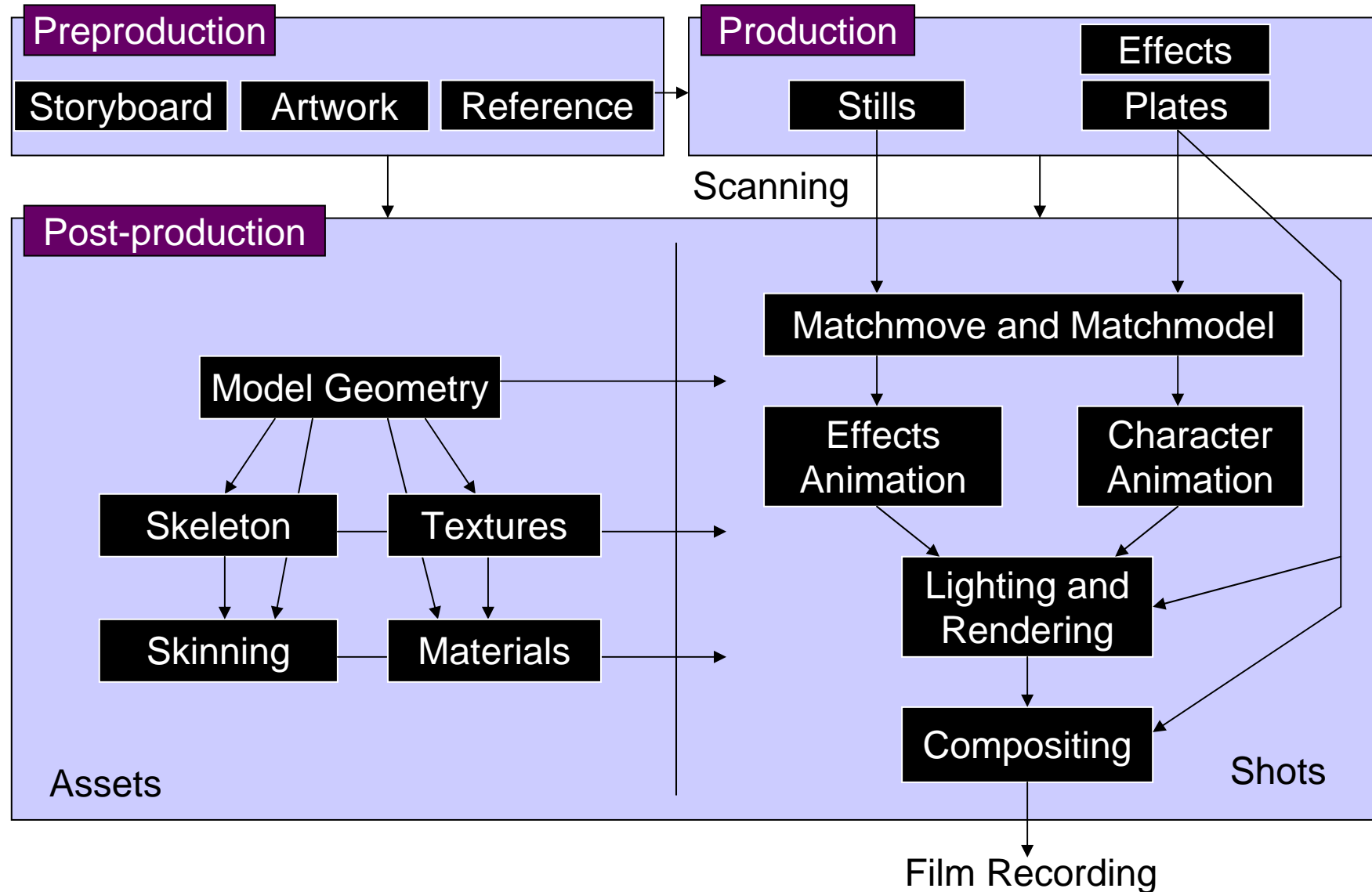
Shooting

# Post-production

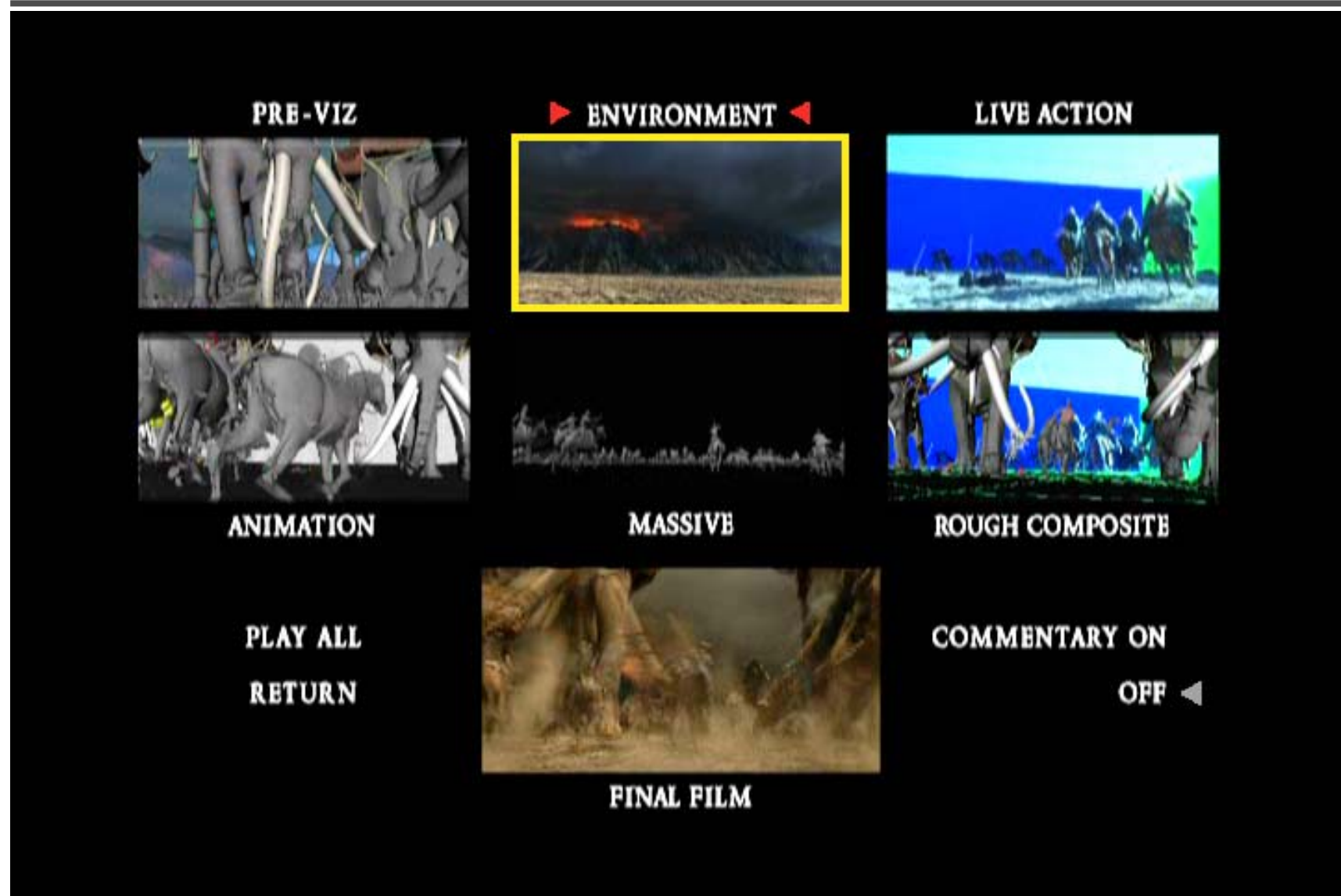
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# Visual effects production



# Visual effects post-production





# ***A case study***

# 405: The Movie

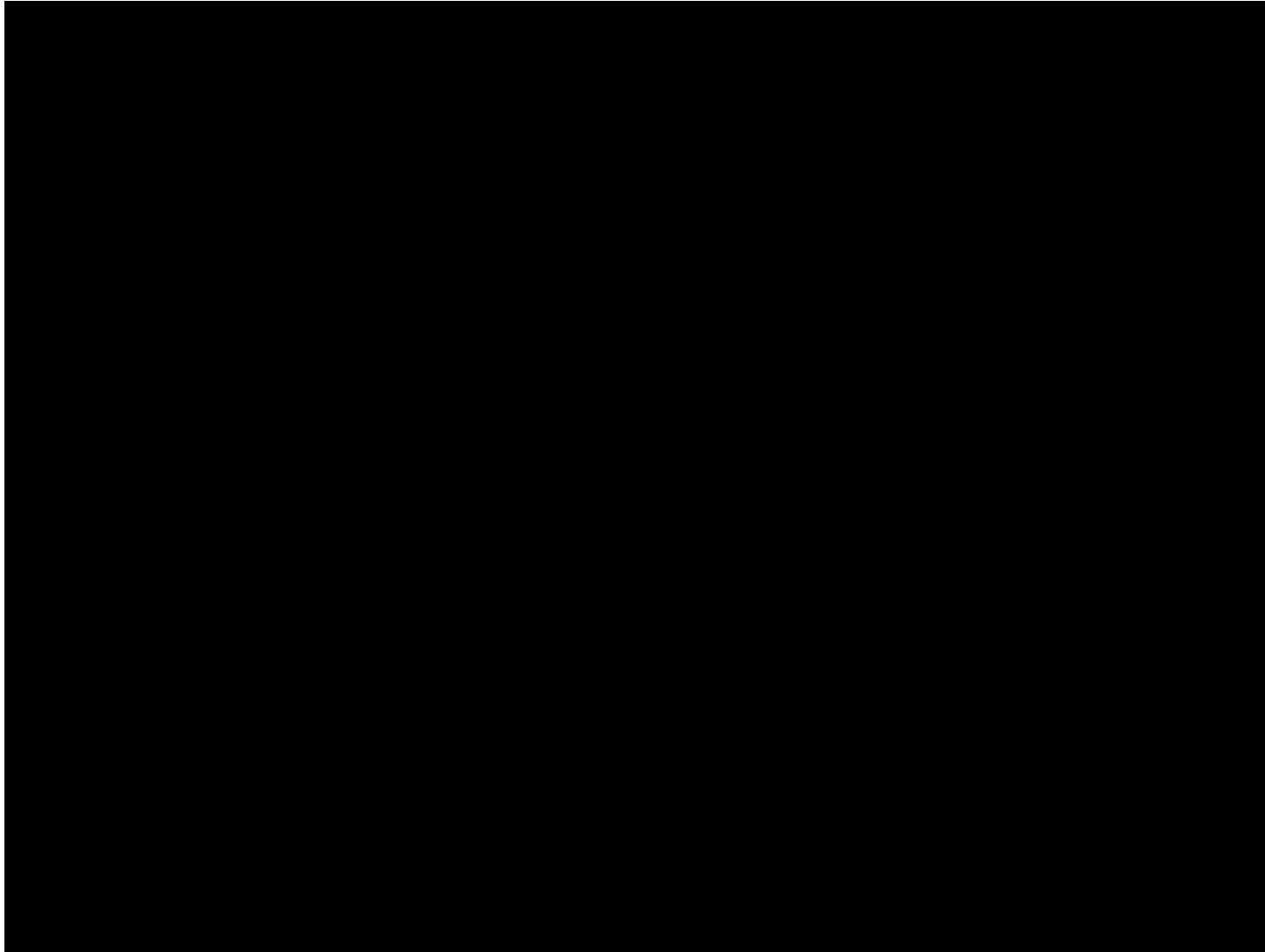
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- This movie were created solely by two visual effects artists in the year of 2000. It was a process that took over three months of nights, weekends and any spare moments that they could find.
- <http://www.405themovie.com/>



# 405: The Movie

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# Making of 405

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## 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

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## 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

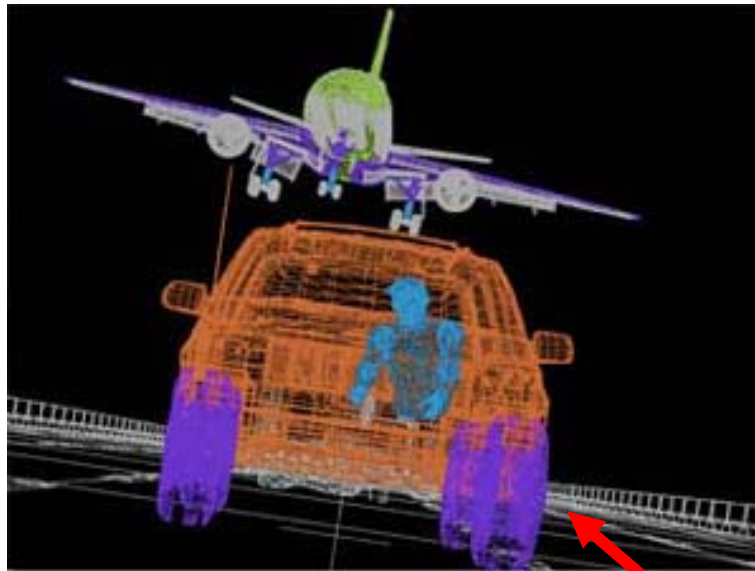


photo-based 3D environment

# Making of 405

Real cars were used for close-up and interior shots



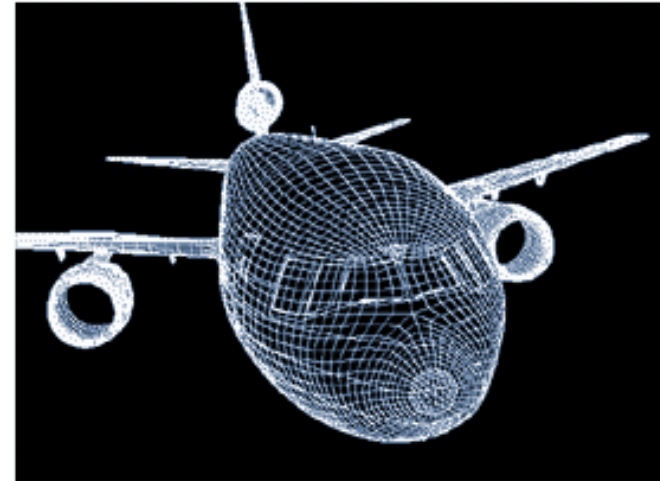
A low-resolution mesh scanned by a cyberscanner.  
Mapped with photographs.



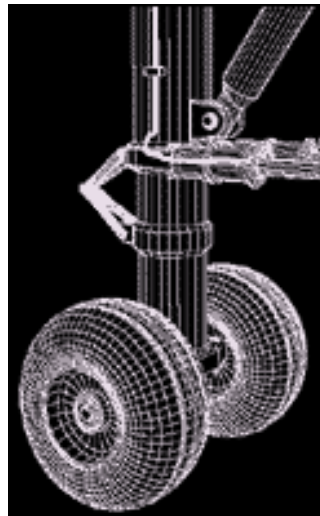
# Making of 405

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

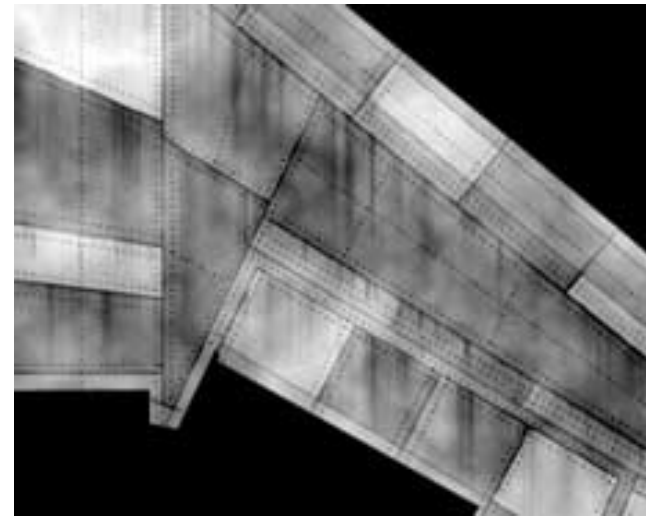
59 objects, 142,439 polygons



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

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# Making of 405

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## Step 5: fine touchup



3D hat



compositing and inpainting

# Making of 405

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## Step 6: music and delivery



**Topics we plan to cover**

# Camera

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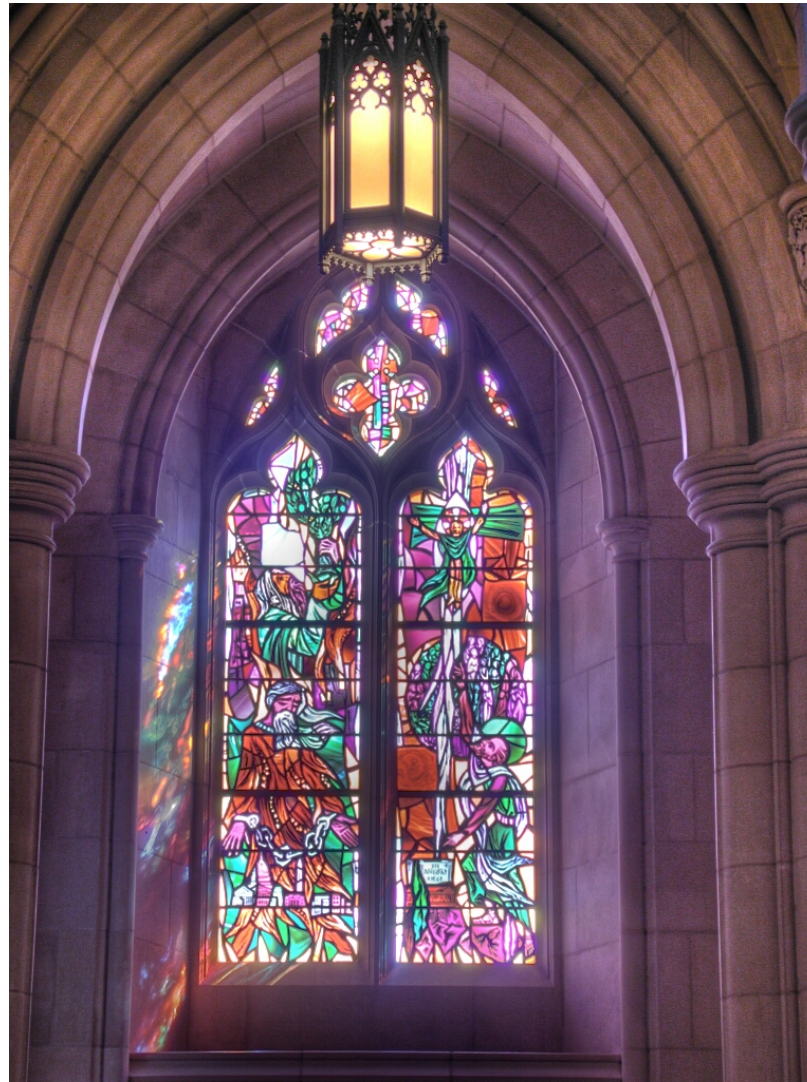
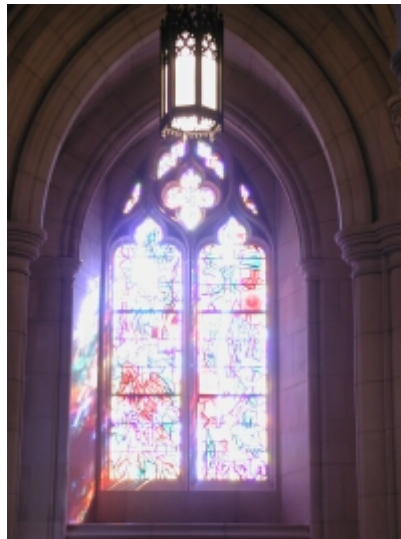
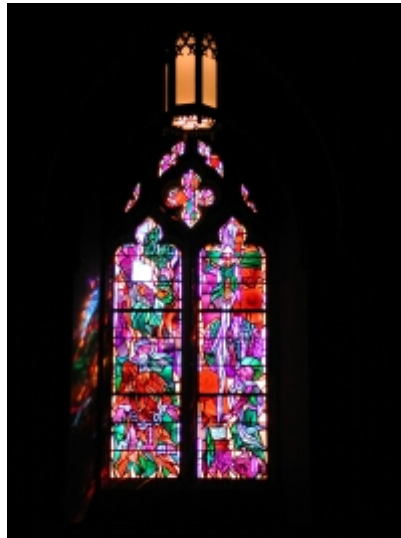


Canon 10D



# High dynamic range imaging/display

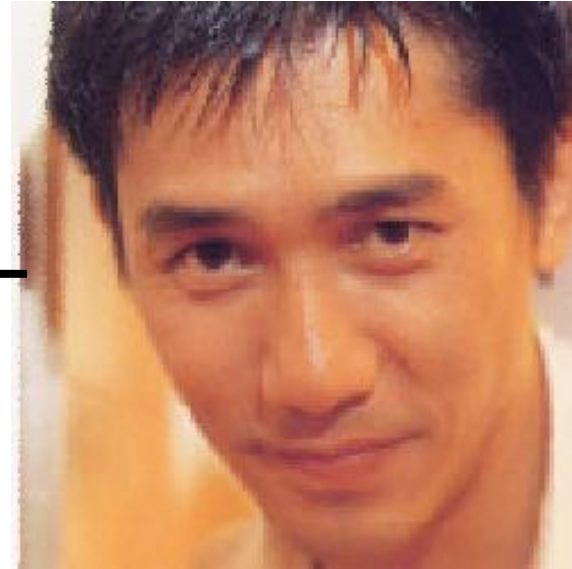
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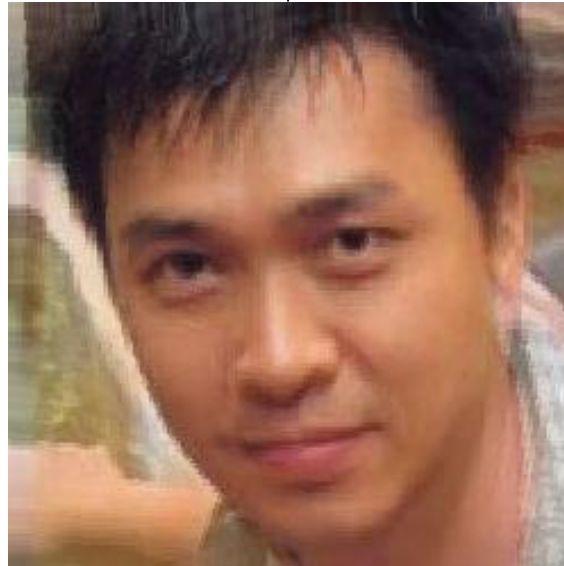
# Image warping/morphing



someone not  
that famous



someone very  
famous



[video](#)

# Tracking

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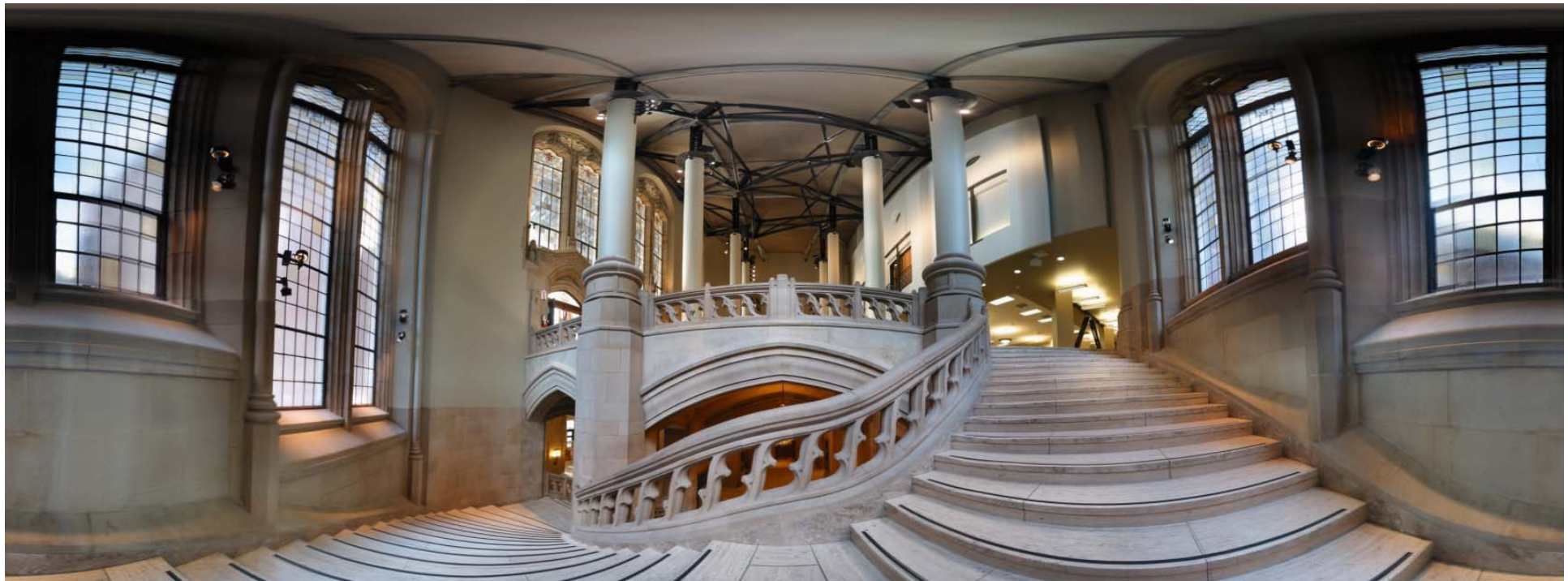


Feature tracking



# Image stitching

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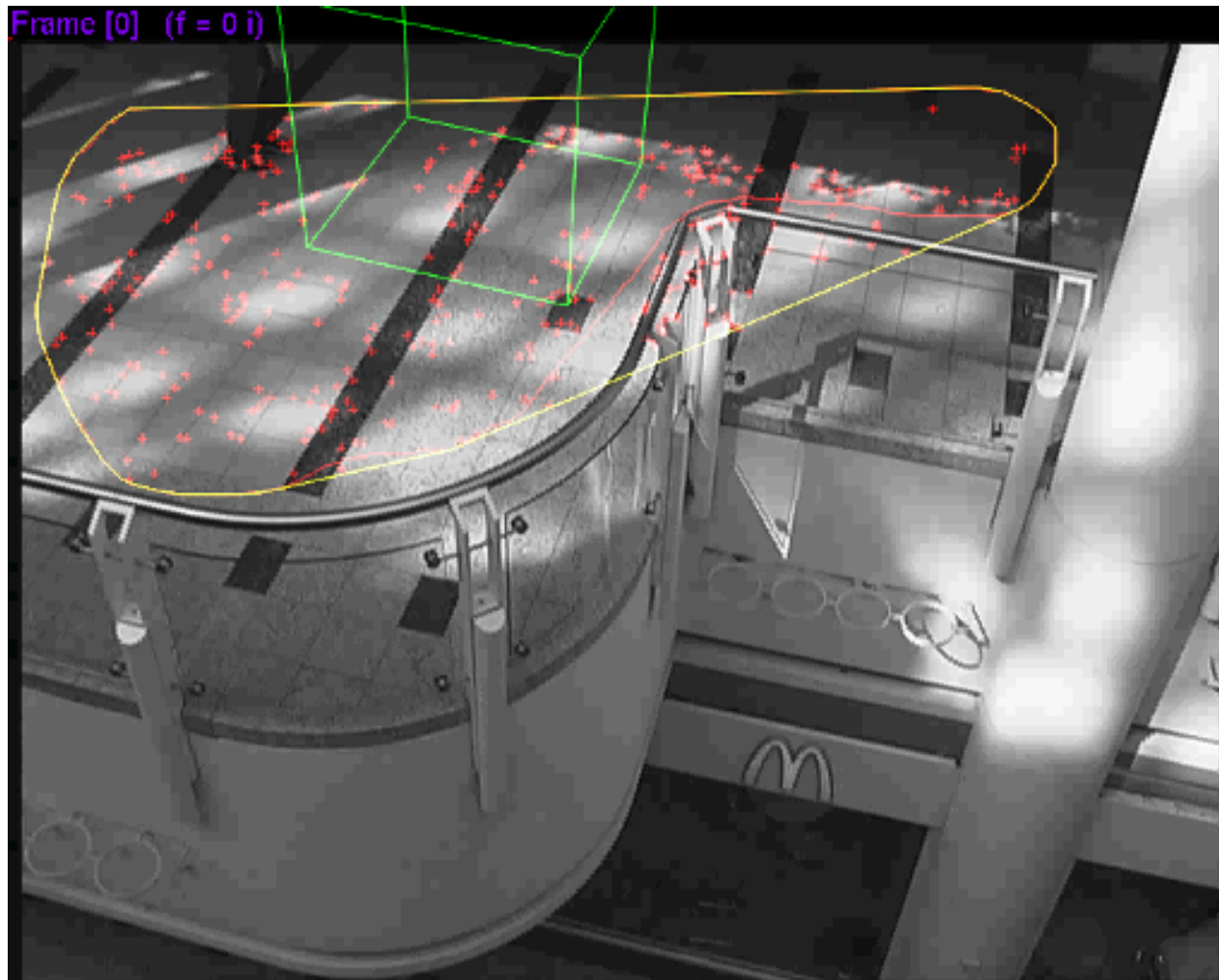
# MatchMove



*Move matching using scene planes*



# Matchmove



*Move matching using scene planes*

# Matchmove



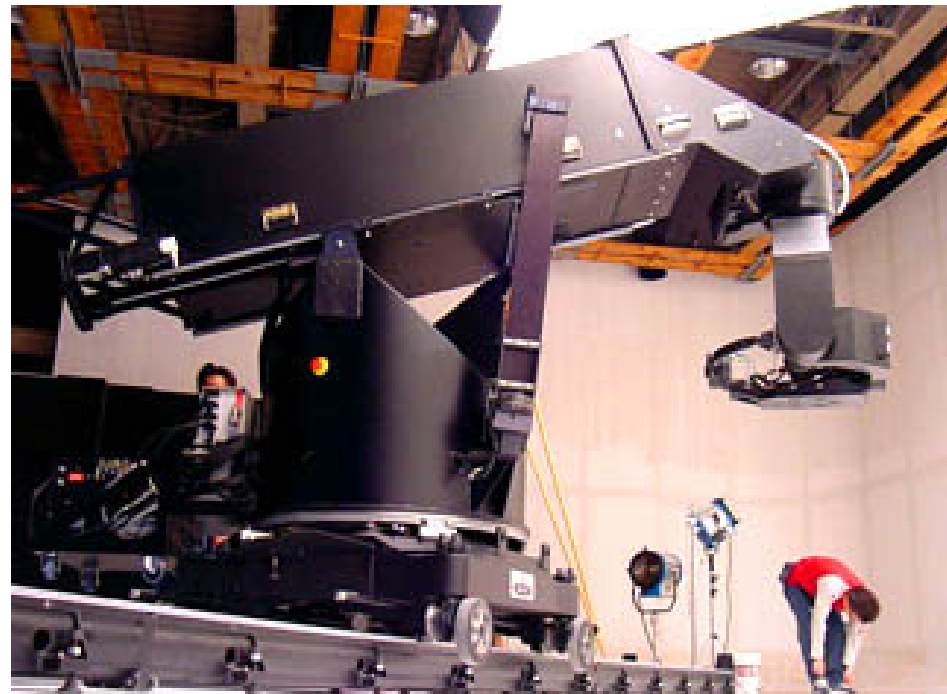
*Move matching using scene planes*

# Video matching

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*Matrix*



*MOCO (Motion control camera)*

# Video matching

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*Video matching*

# Matting and compositing



*Titanic*



# Matting

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# Object selection



*LazySnapping*

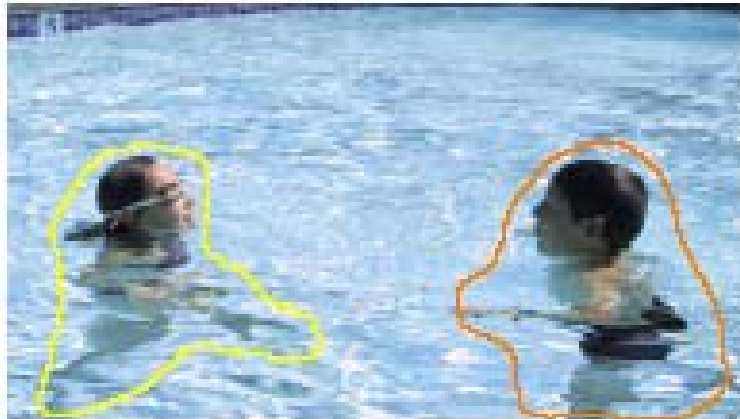
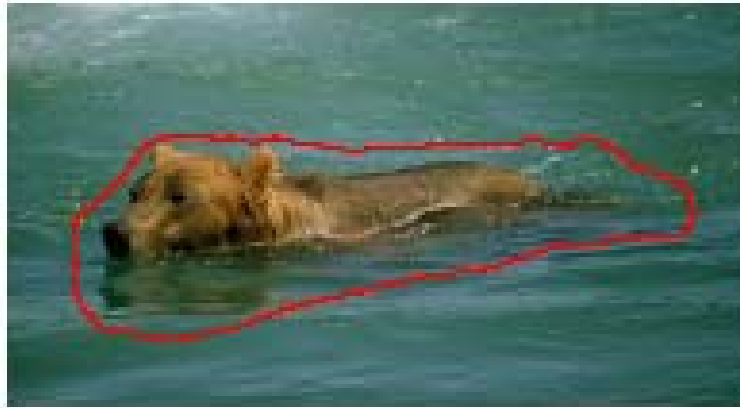


# Image manipulation



*GraphCut Texture*

# Image manipulation



*Poisson blending*

# Image-based modeling

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*photogrammetric modeling and projective texture-mapping*



# Image-based modeling



*photogrammetric modeling and projective texture-mapping*

# Image-based modeling

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*photogrammetric modeling and projective texture-mapping*

# Image-based modeling

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*Tour into a picture*

# Image-based modeling

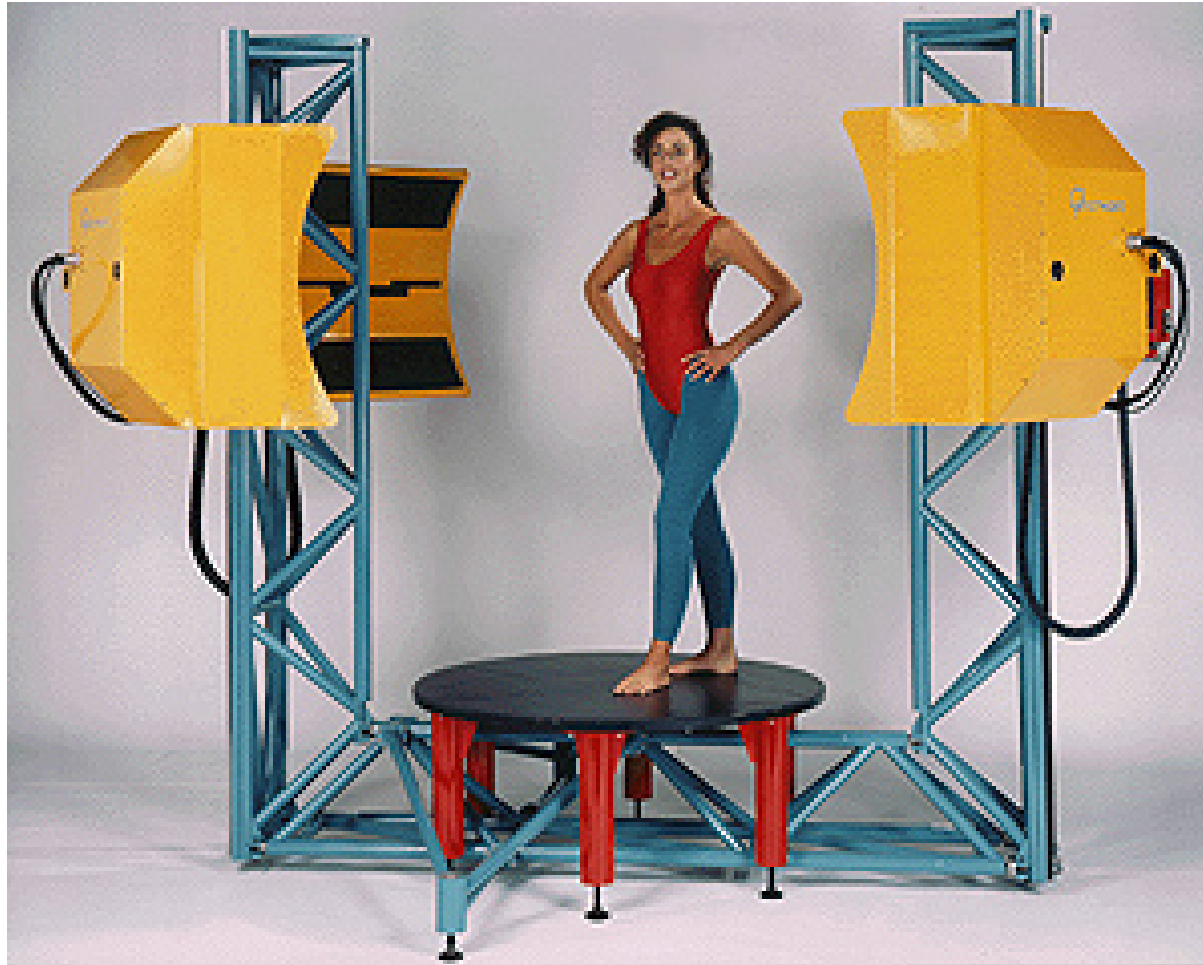
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*Tour into a picture*

# 3D photography (active)

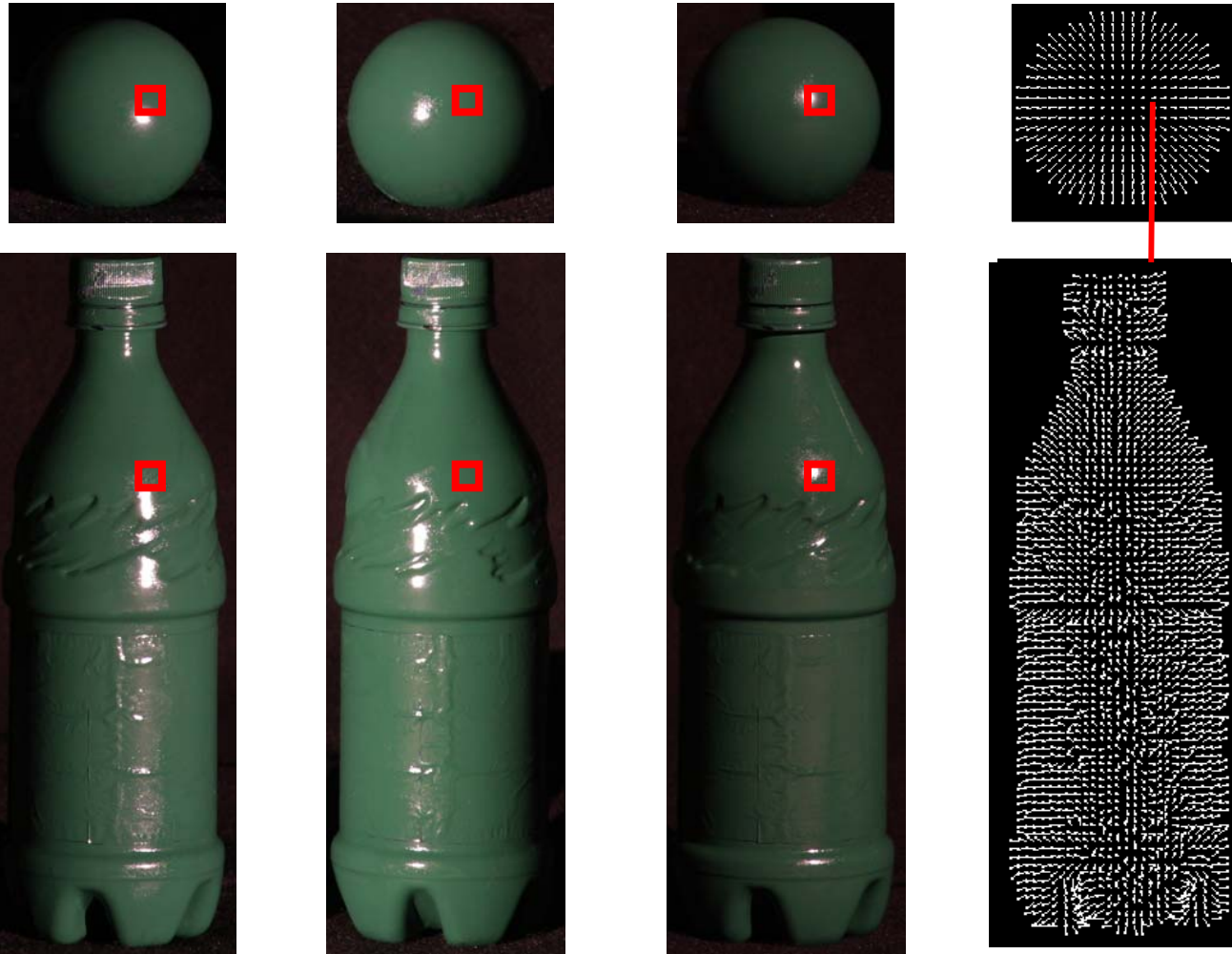
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*Cyberware whole body scanner*



# 3D photography (active)



*Photometric stereo*

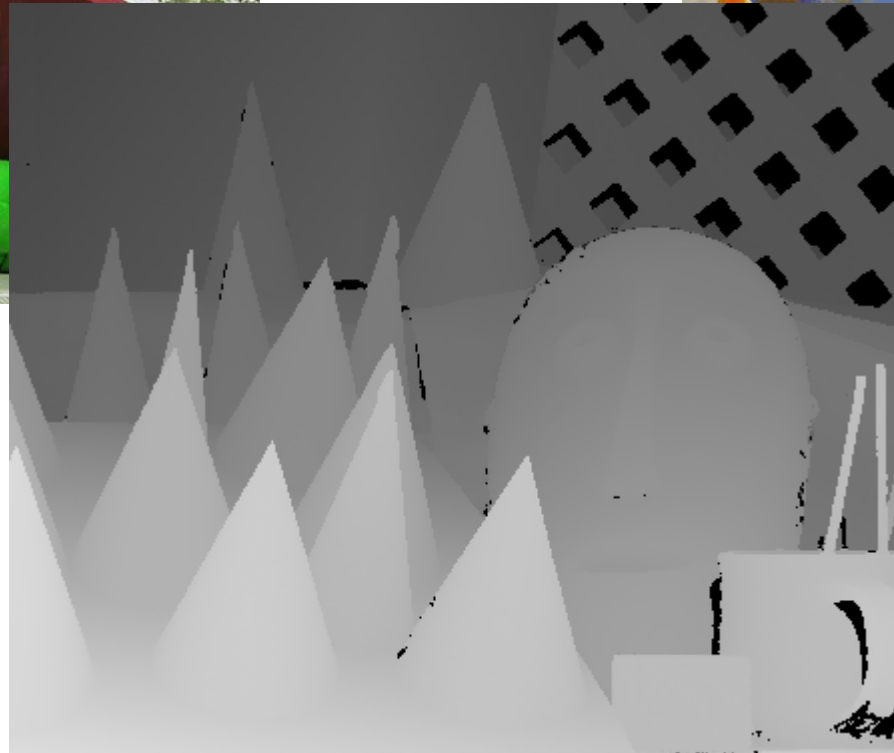
# 3D photography (passive)



*left*



*right*



*depth*

*Stereo*

# Image-based rendering

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*Surface lightfield*

# View interpolation

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Bullet time video

# View interpolation

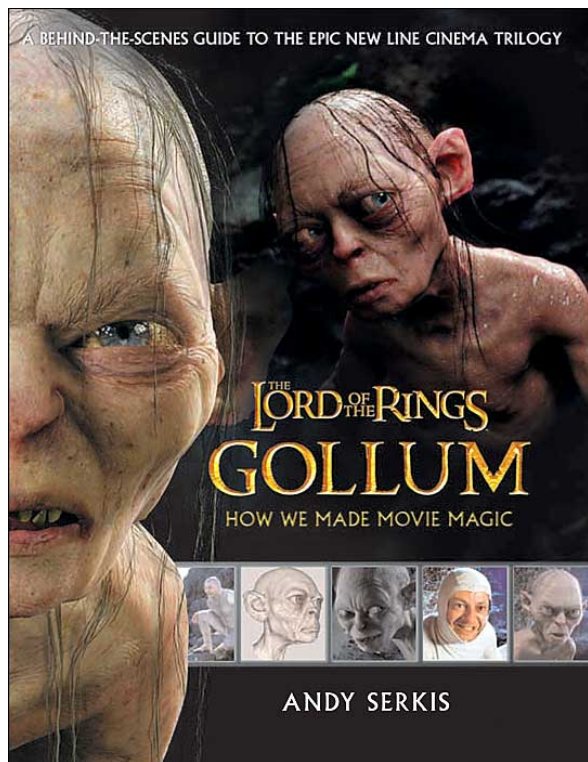
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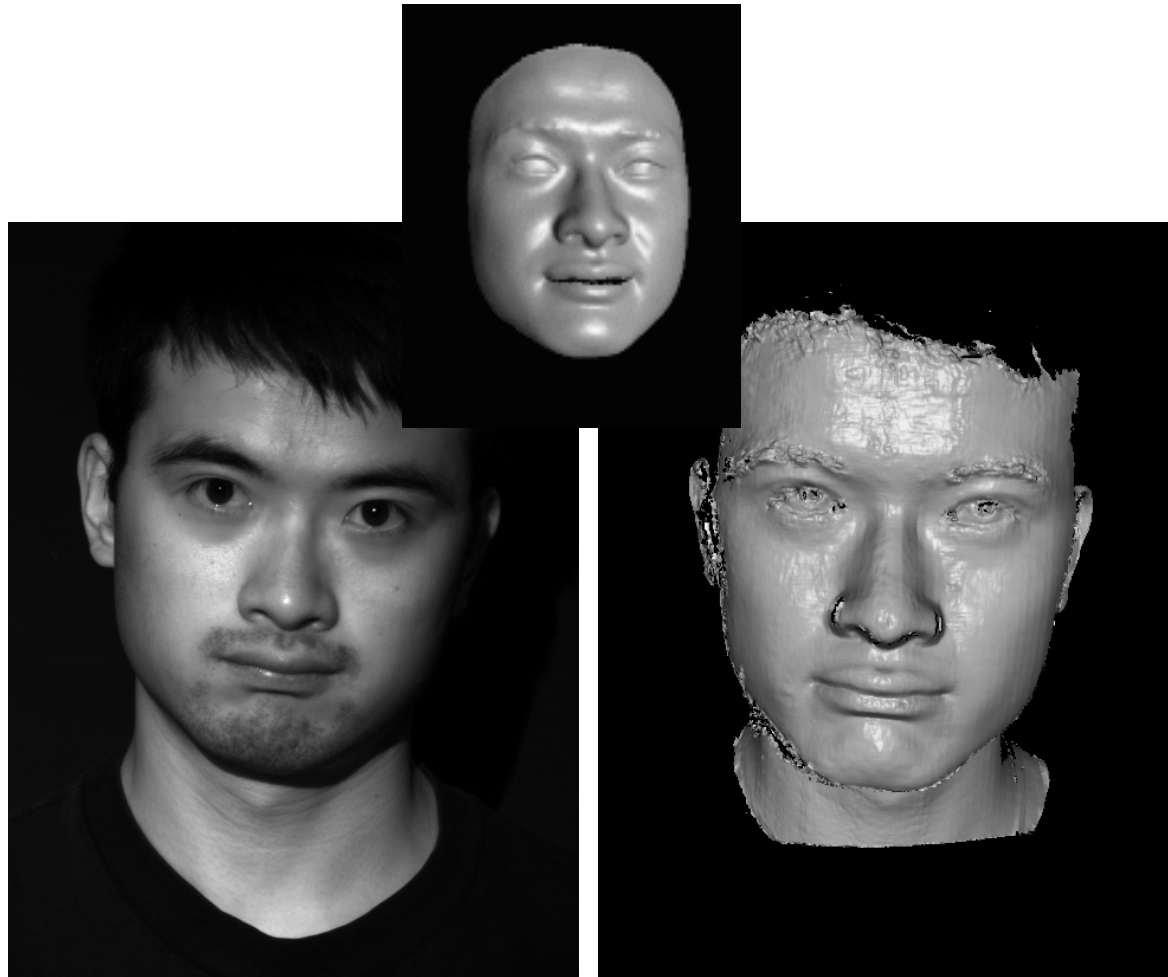
High-Quality Video View Interpolation



# Making face



*Gollum*



*Spacetime face*

# Video rewrite

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Trainable videorealistic speech animation

# Inpainting (wire removal)

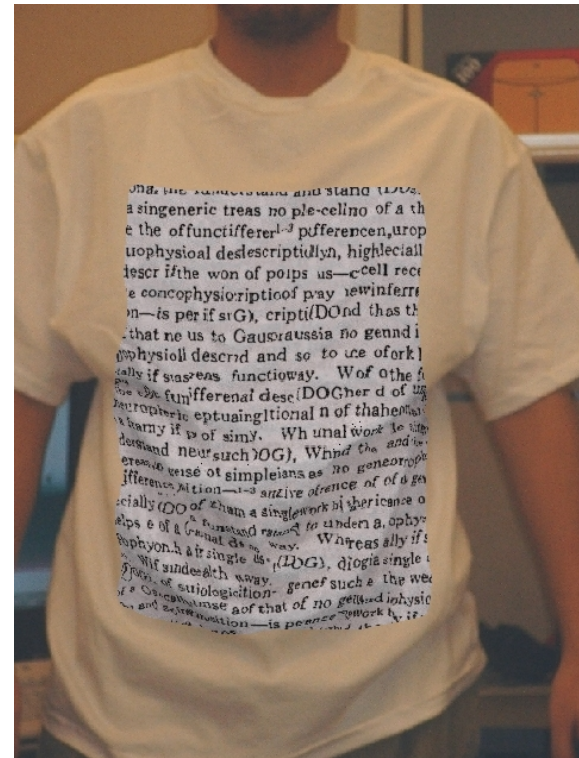
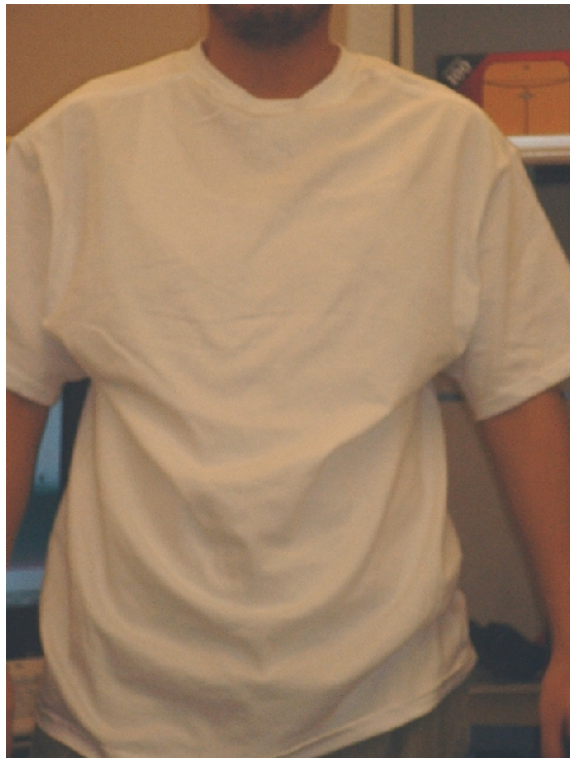


*Inpainting*



# Texture synthesis/replacement

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*Texture replacement*

# Semi-automatic matting painting

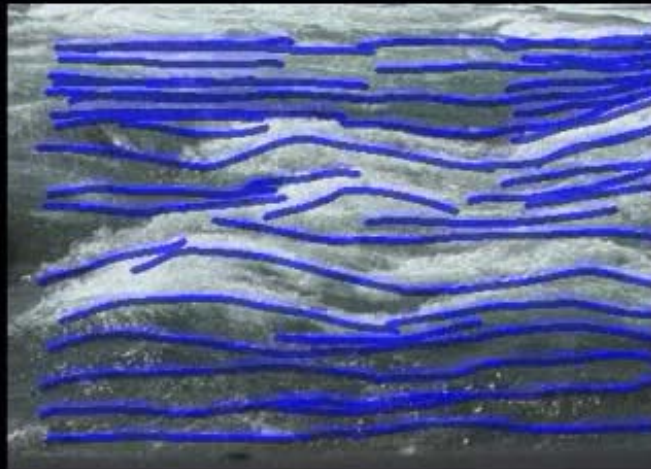
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*Image analogies*



# Video editing



**Input (looped)**



**Synthesized Result**

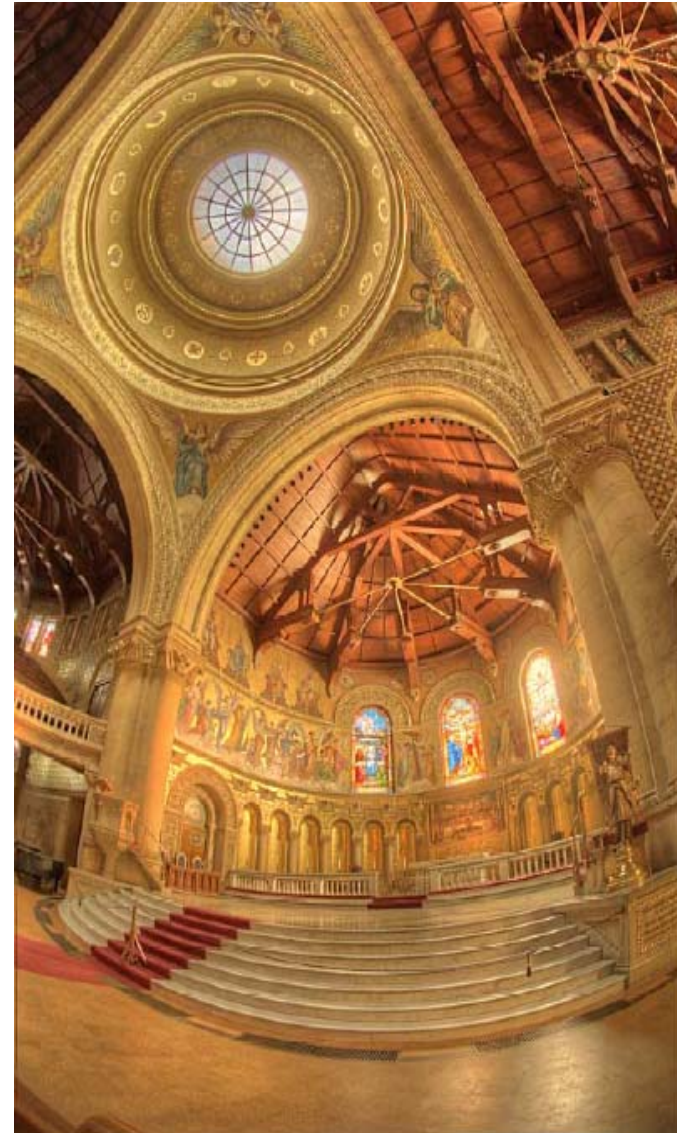
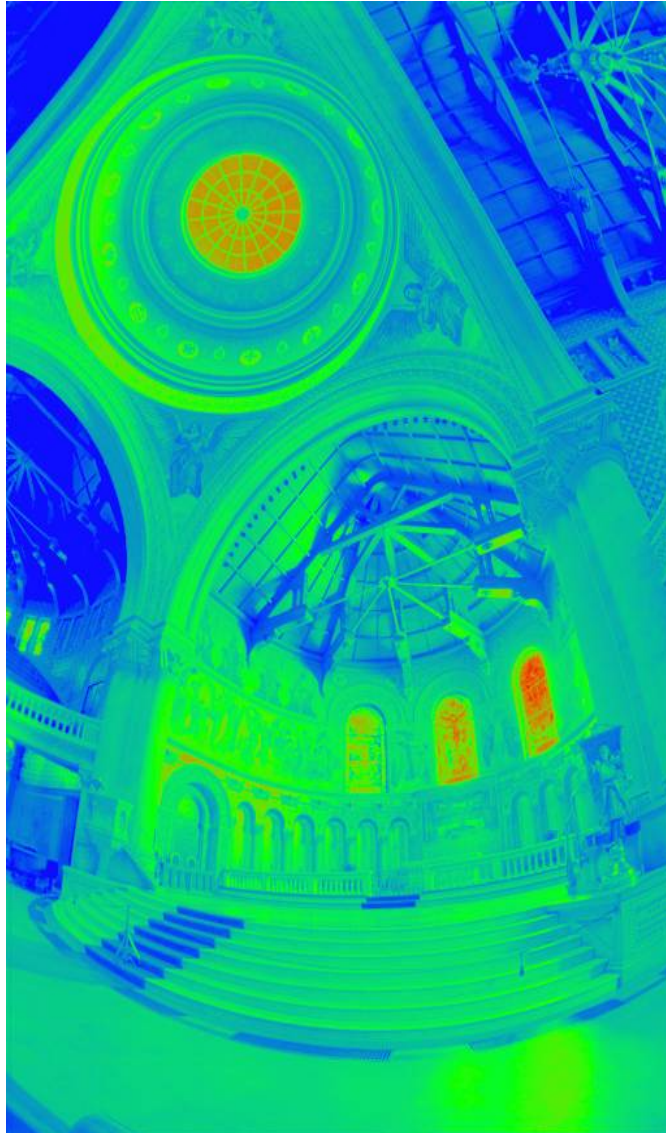
*Flow-based video editing*

# Grading

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- 3 programming assignments (56%)
  - HDR Imaging
  - AutoStitch
  - MatchMove
- Class participation (4%)
- Final project (40%)
  - Research
  - System
  - Film

# High dynamic range imaging





From last semester (吳侑親, 張書瑋)

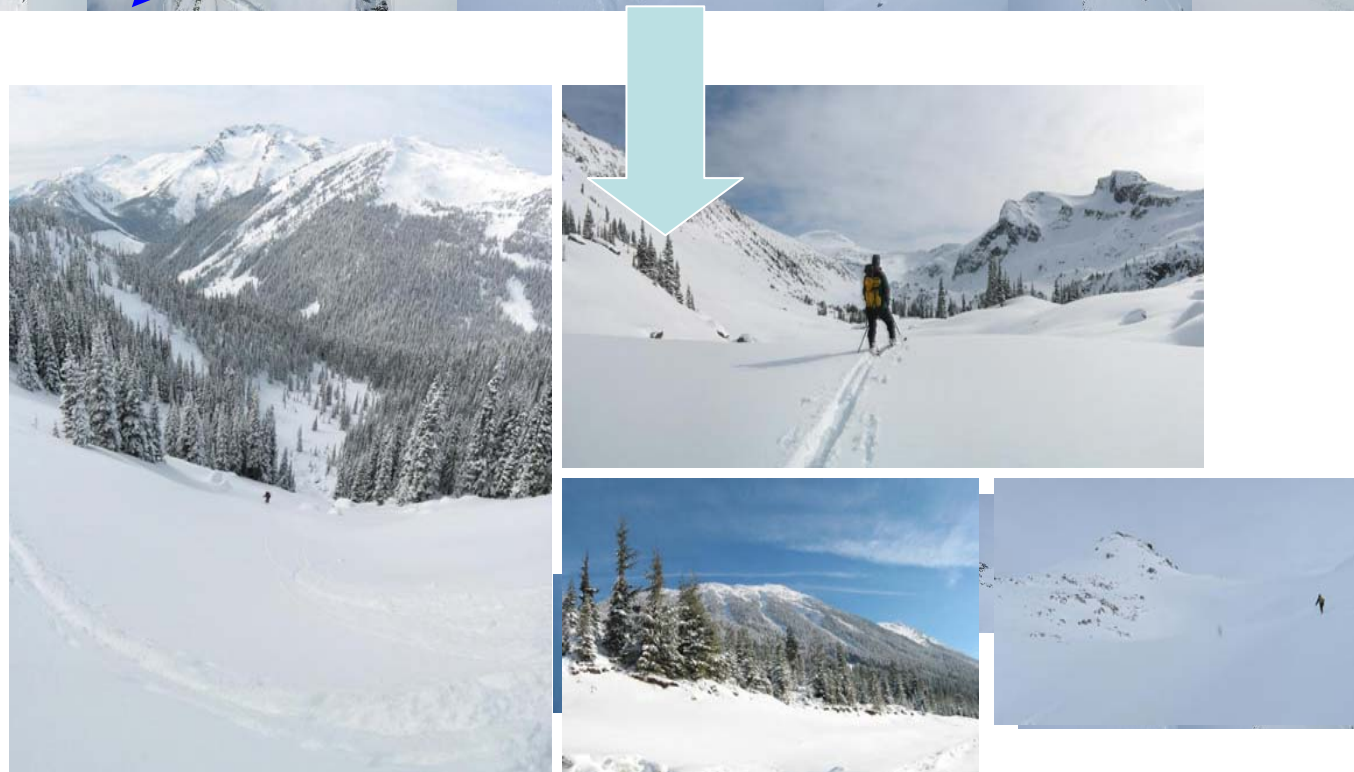
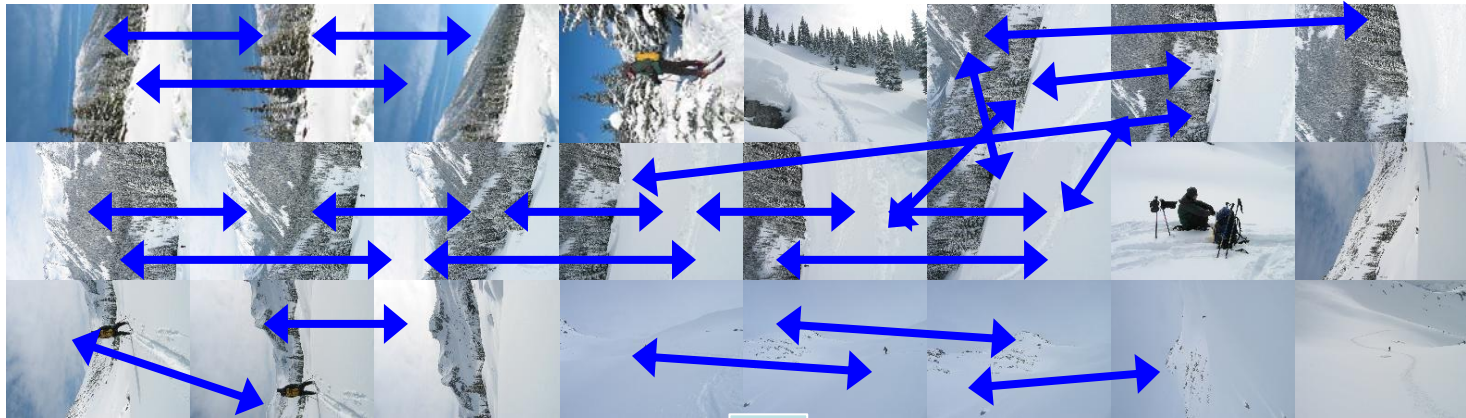


From last semester (王瑋馥, 余雁雲)





# AutoStitch



# From last semester

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DigiVFX

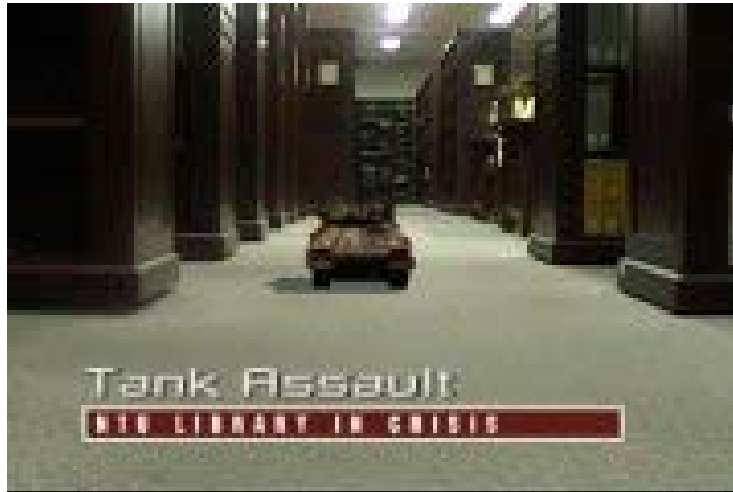


胡仲榮



李佳燕 黃政基

# MathMove



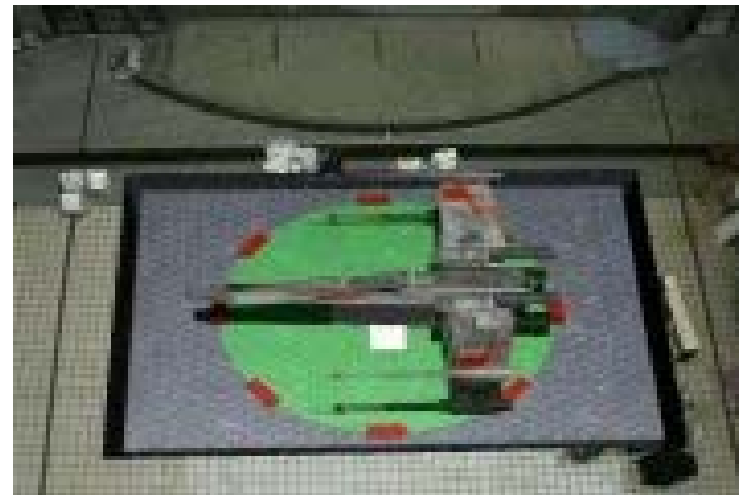
梁家愷 鐘志遠



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.**



# Beauty Cream 9001

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**"BEAUTY CREAM 9001"**

**DVFX 2003  
GROUP 1 - TEAM SKEWED**

**THOMAS MIKULKA  
CHARLES BRIAN QUINN  
OMAR ZAKI**

*Beauty Cream 9001, GaTech DVFX 2003*

# Face tracking

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Making of *Beauty Cream 9001*

# Das Tattoo

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*Das Tattoo*, GaTech DVFX 2003

# Feature tracking

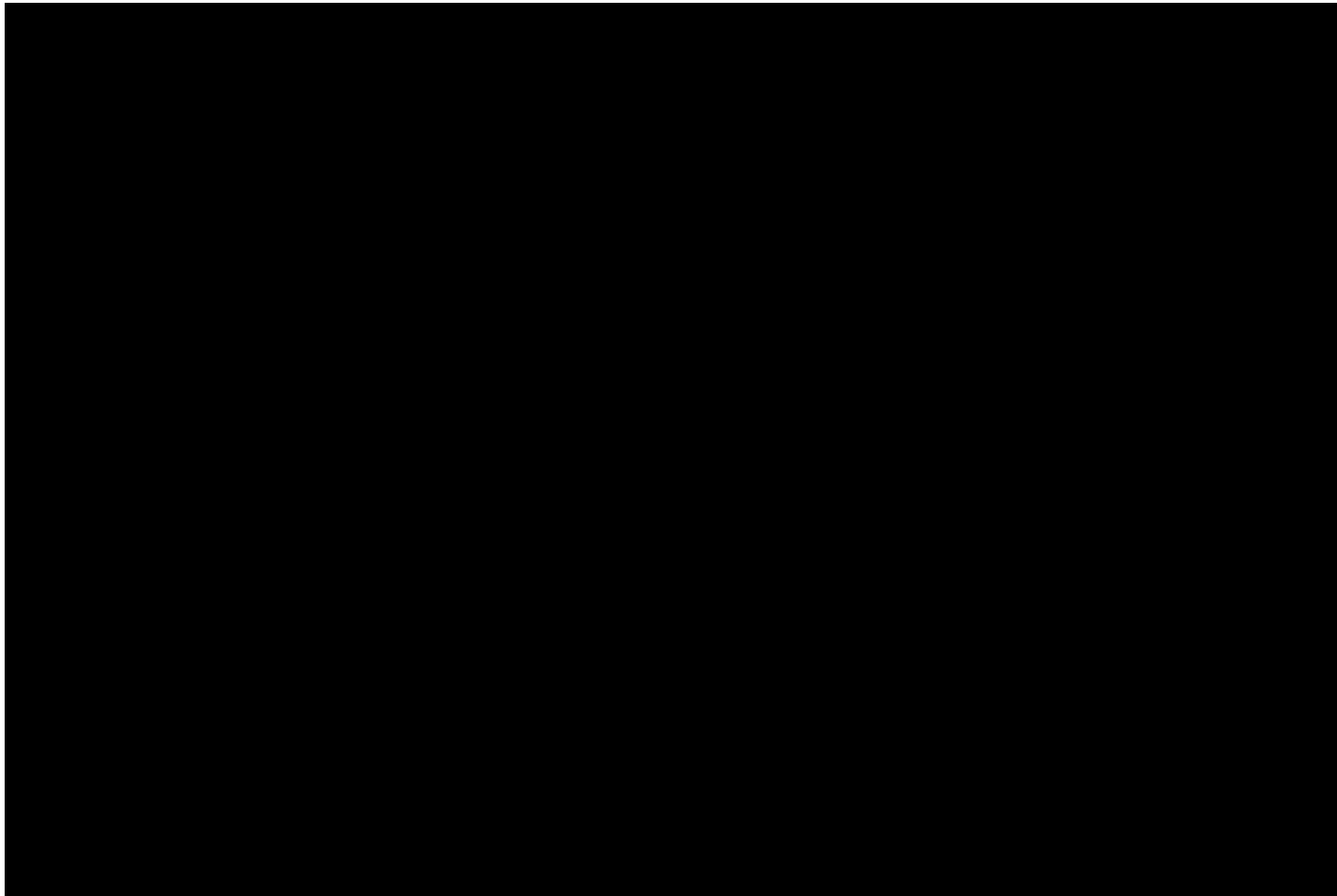
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Making of *Das Tattoo*

# Life in Paints

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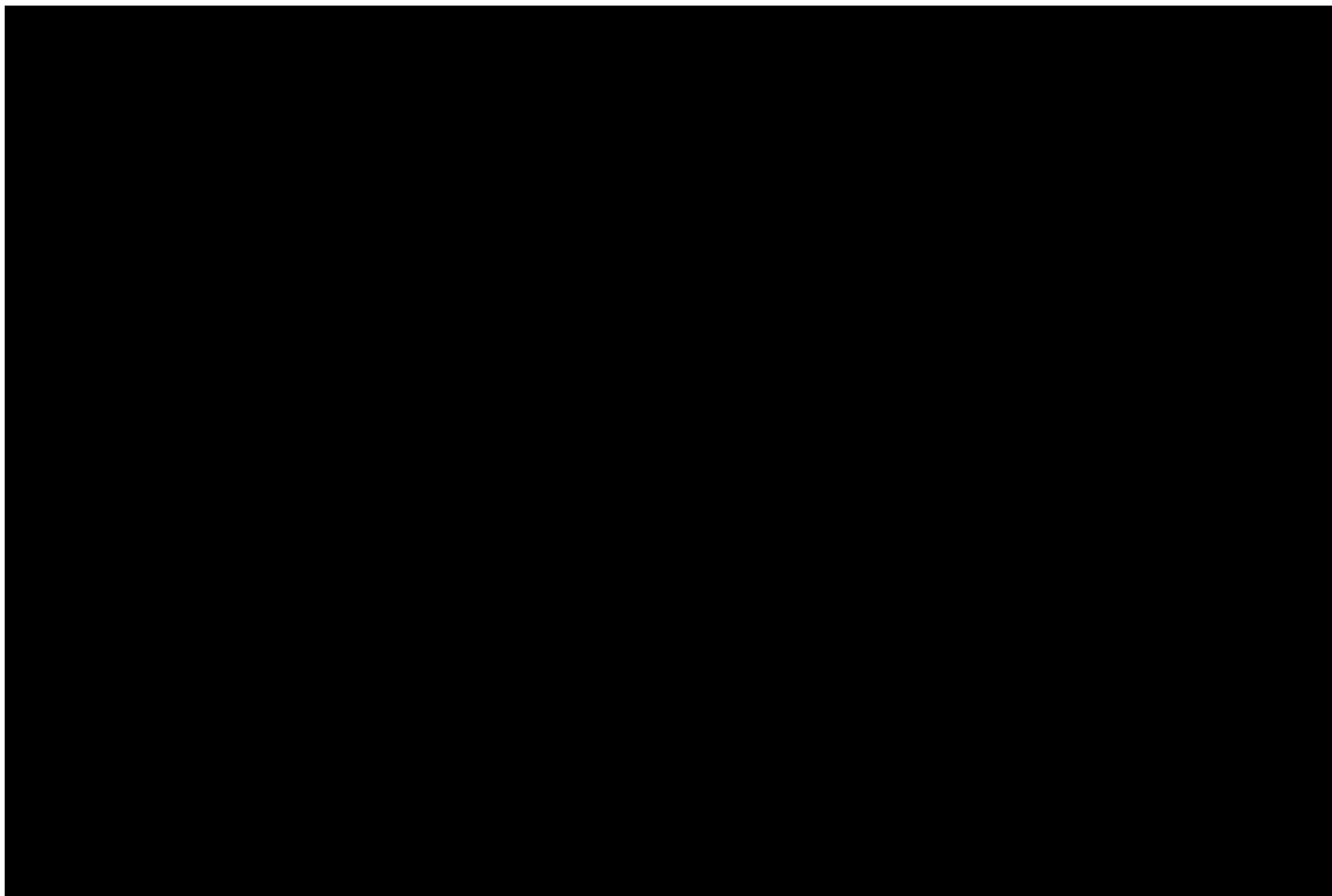


*Life in Paints*, GaTech DVFX 2003



# Tour into pictures

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Making of *Life in Paints*

# In Your Face

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*In Your Face*, GaTech DVFX 2002

# Stop action

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The Making Of  
In Your Face

Making of *In Your Face*

**Final projects from the past.**

# The Bug





# Making of The Bug

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The making of  
"The Bug"

# Clones



# Making of Clones

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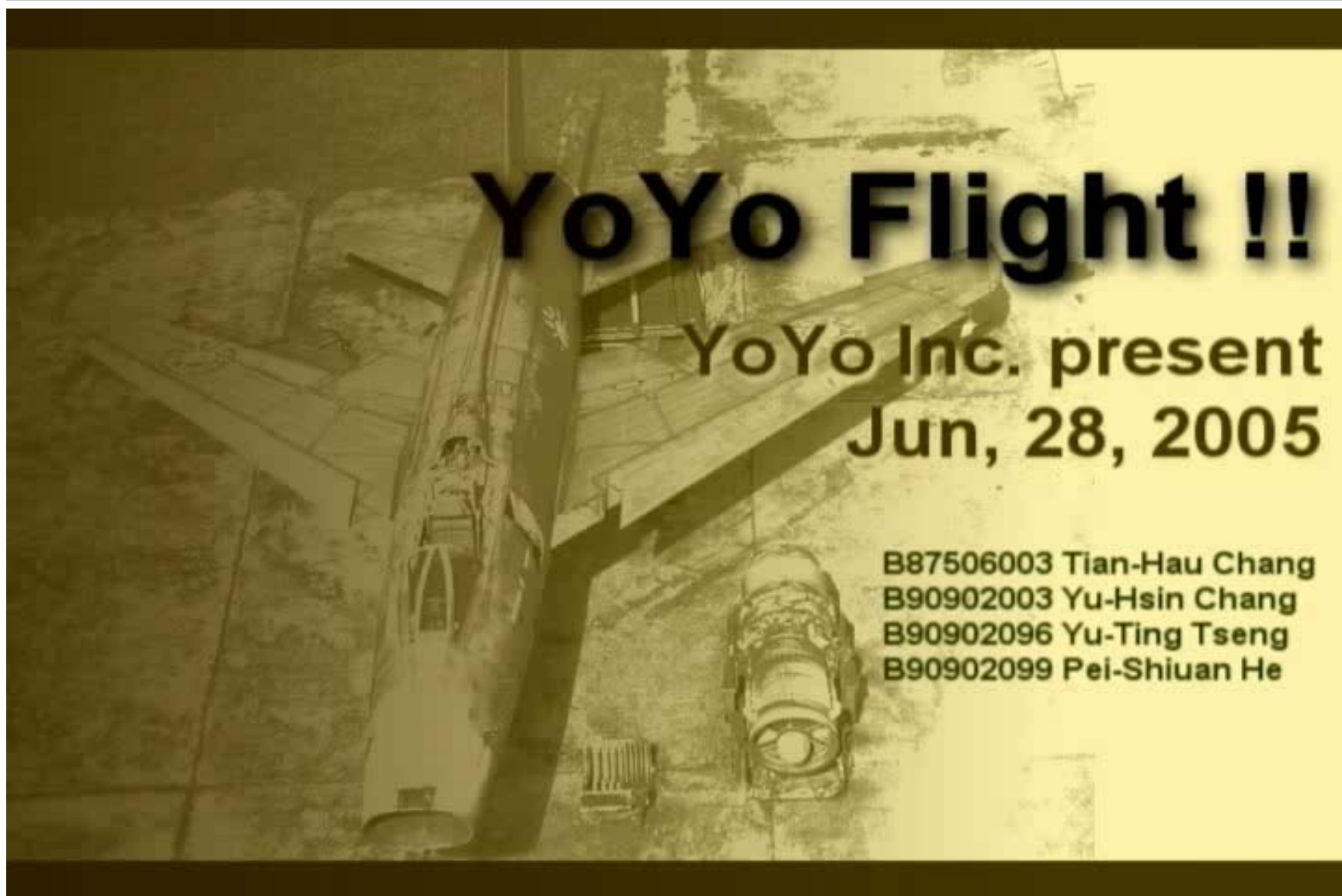


# Magic Finger

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- [The film](#)
- [Making of](#)

# YoYo Flight





# Making of YoYo Flight

DigiVFX



# That's it for today!

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