

# Course overview

Digital Visual Effects, Spring 2005

*Yung-Yu Chuang*

2005/2/23

# 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](mailto:vfx@csie.ntu.edu.tw)

Please send me your email address to subscribe.

Please add [VFX] in the title.

# 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.

# Requirements (subject to change)

---

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

**This course is not about...**

# It isn't about photography

---



# It isn't about 3D animations

---



# It isn't about watching movies

---





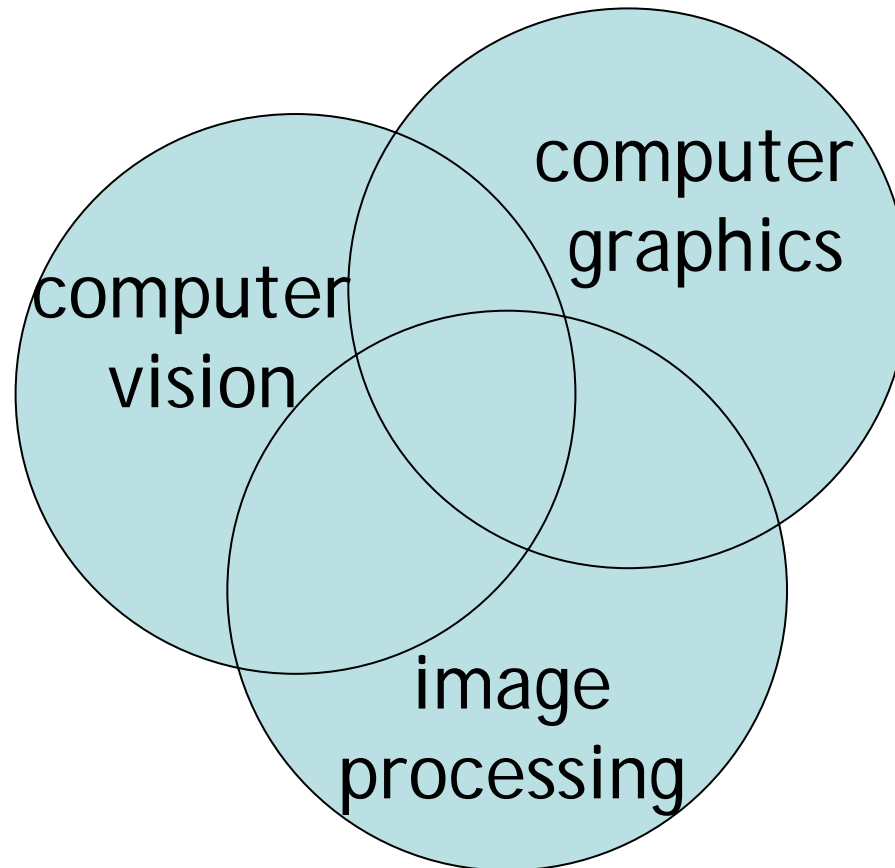
# It isn't about physical effects

---



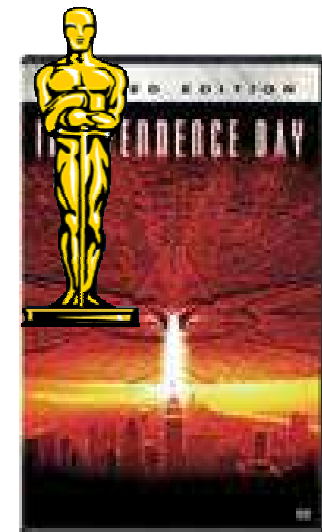
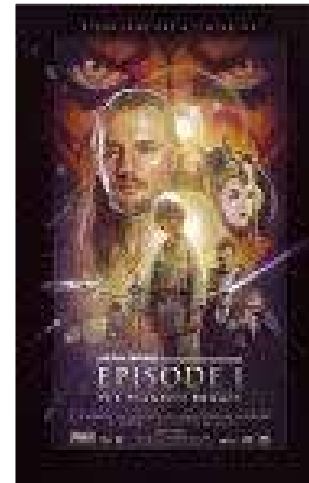
# It's not about industrial tricks

---



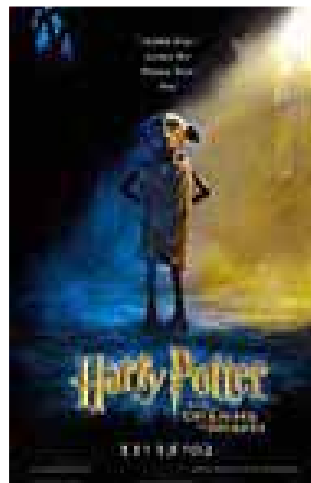
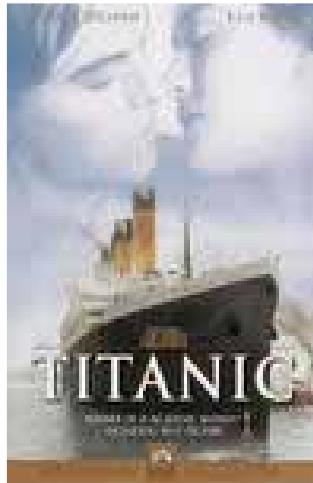
**Why this course?**

# Digital Visual Effects



# Digital Visual Effects

---

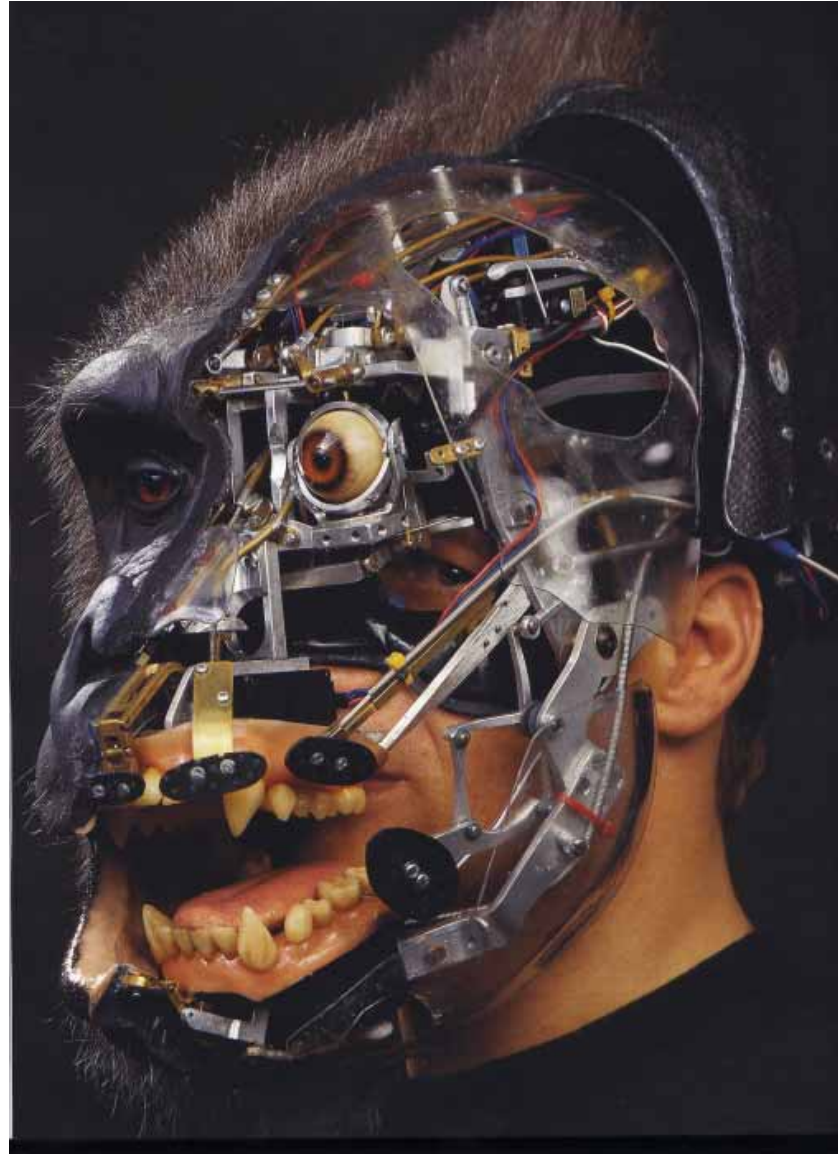


# Special effects (physical effects)

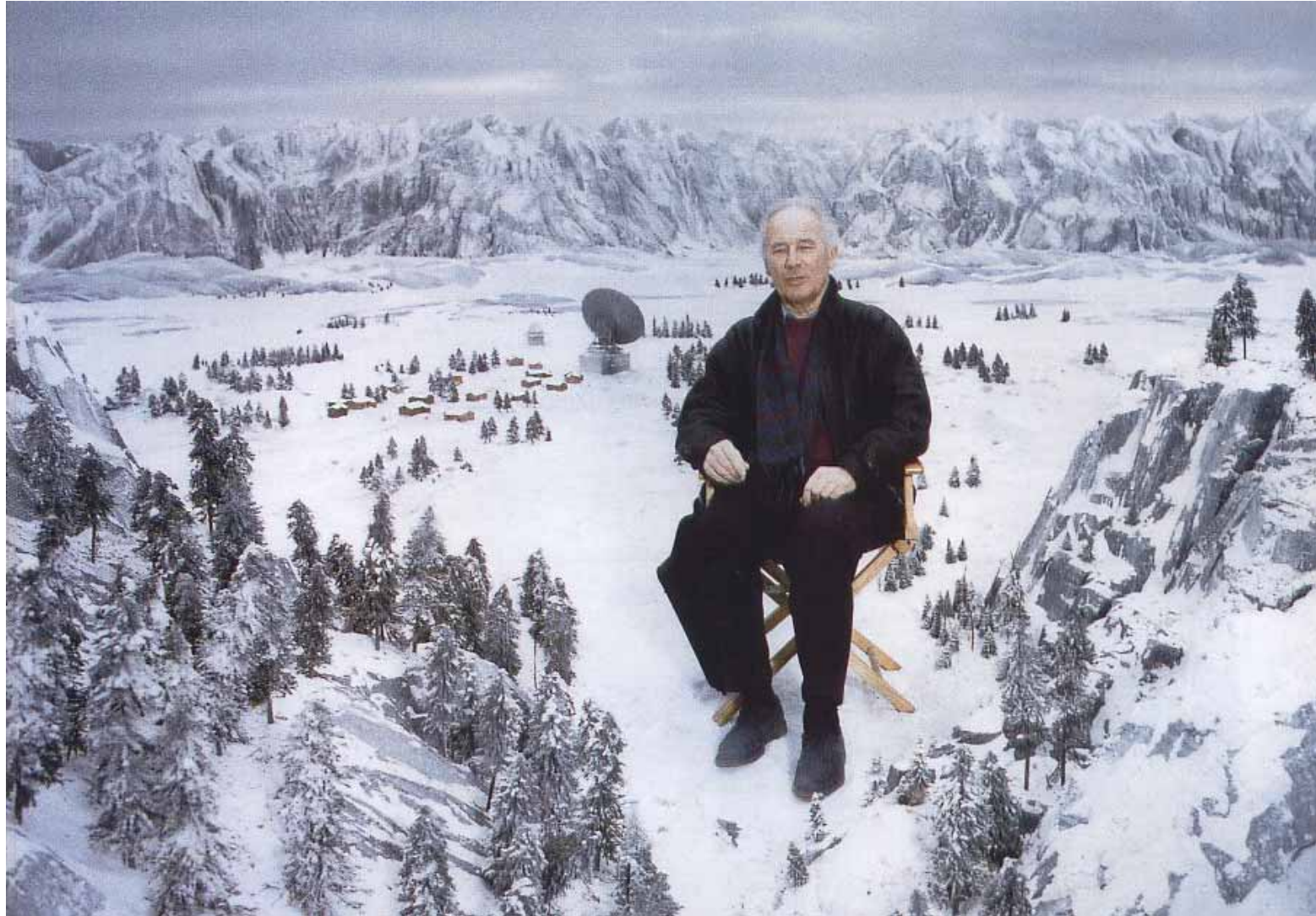


# Special effects (make-up)

---



# Special effects (miniature)





# Special effects (matte painting)



# Special effects (sound)

---



# **Old visual effects tricks**

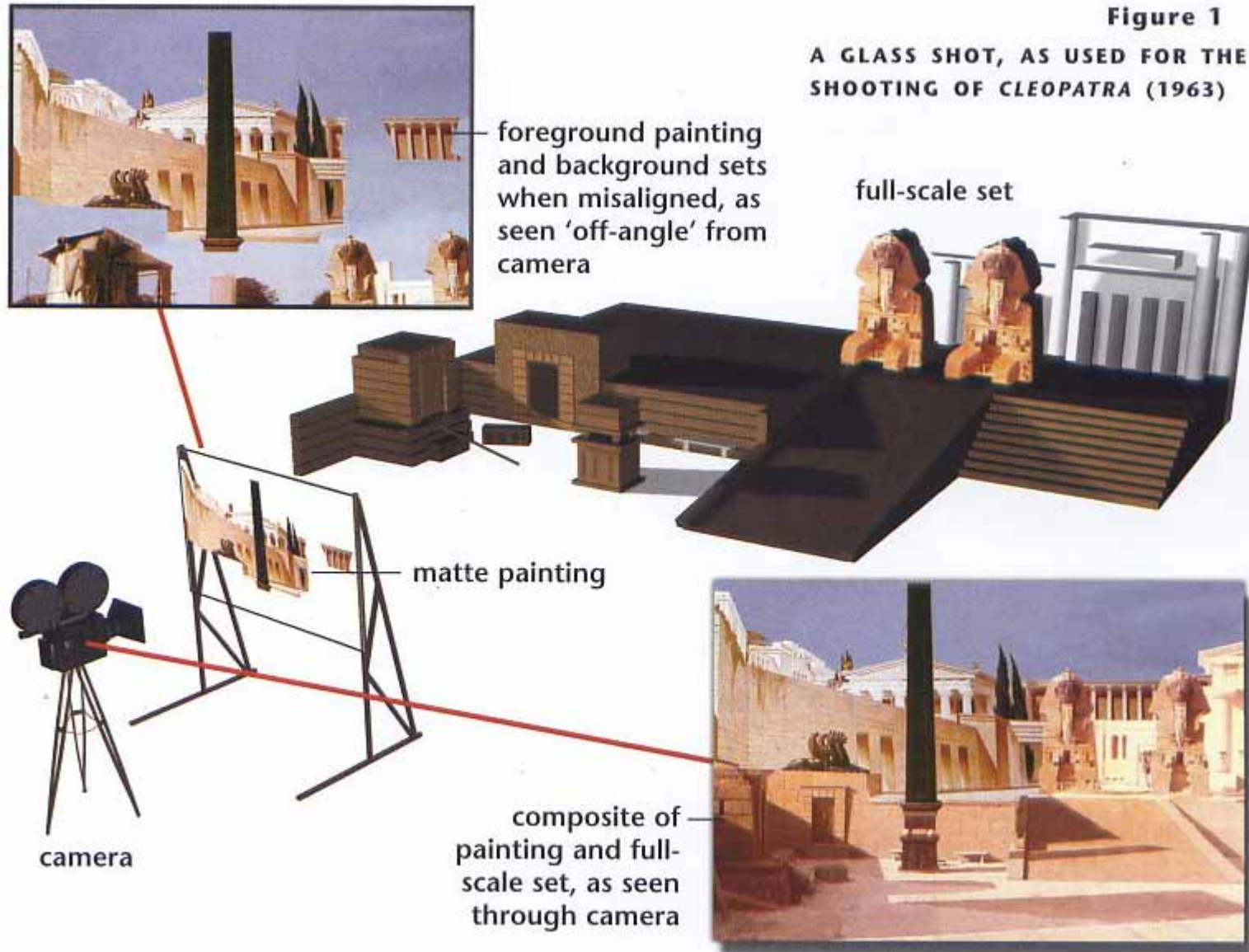
# Stop action

---

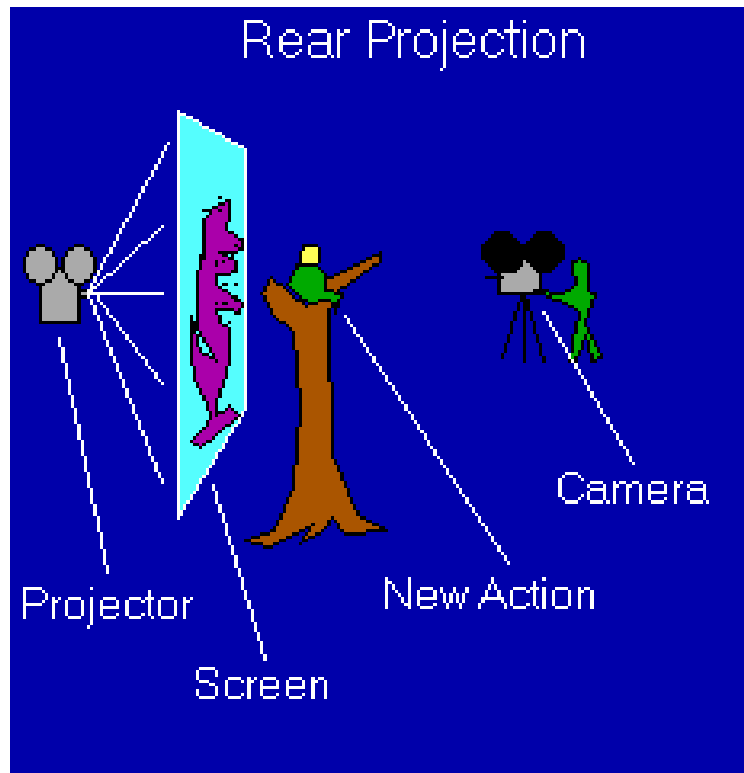


*The execution of Mary, 1895*

# Glass shot



# Rear projection



*King Kong, 1933*

# **Digital Visual Effects: An Academic View**

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

# Academic view

---

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



# Computer-generated world



Not covered

# Camera

---



Canon 10D

# High dynamic imaging/display

---



# Tracking

---



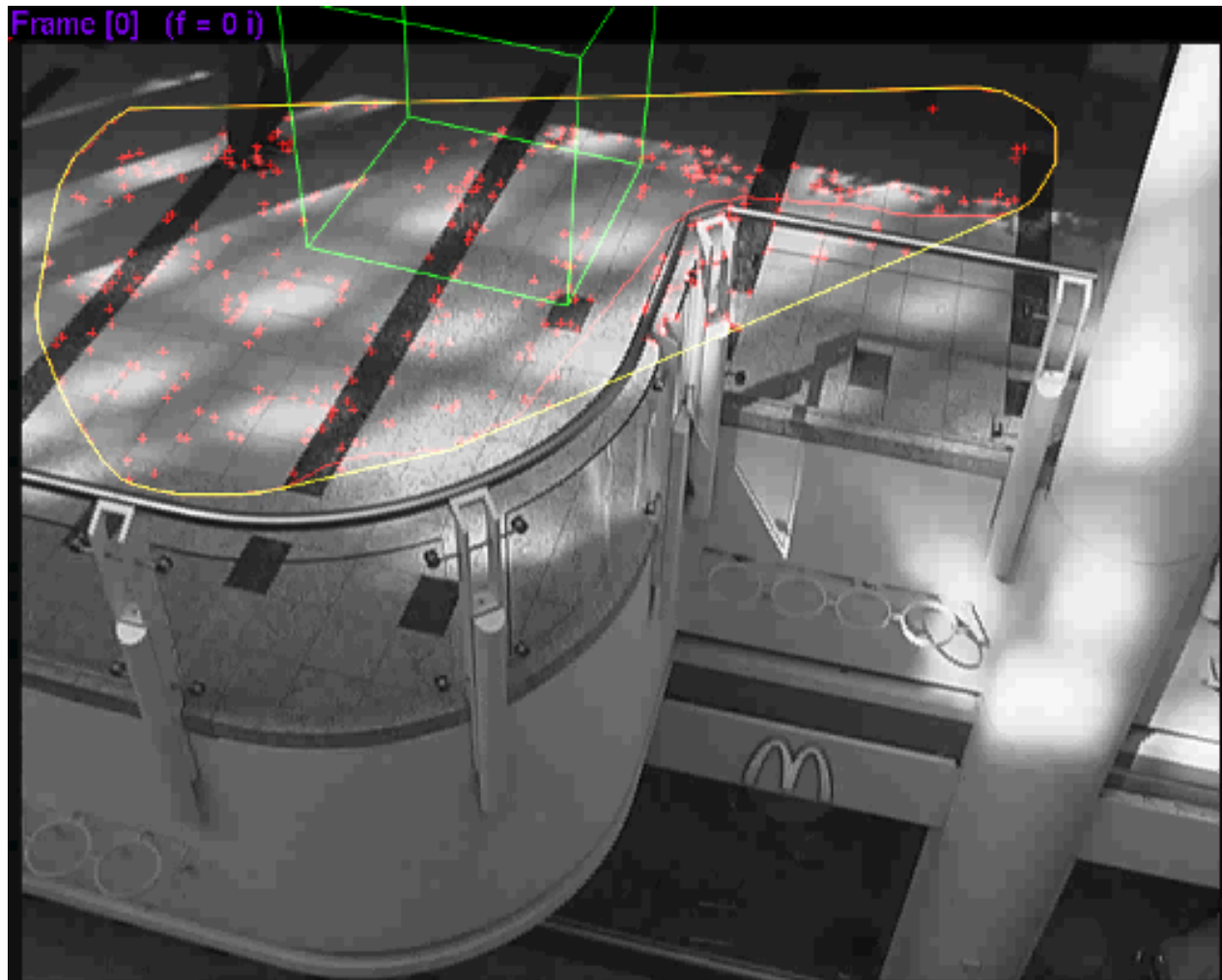
Feature tracking

# Matchmove



*Move matching using scene planes*

# Matchmove



*Move matching using scene planes*

# Matchmove



*Move matching using scene planes*

# Image manipulation

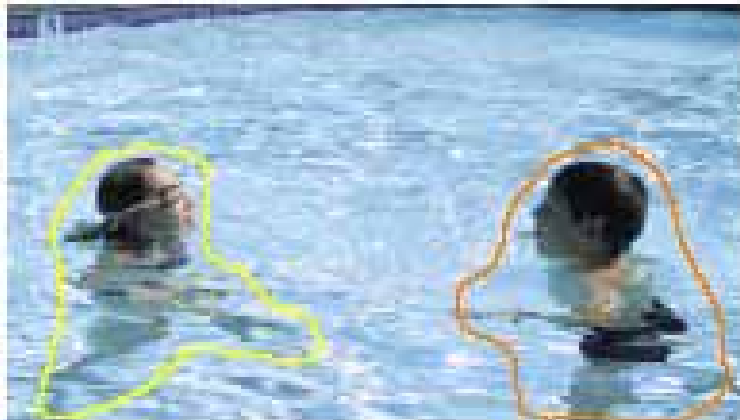
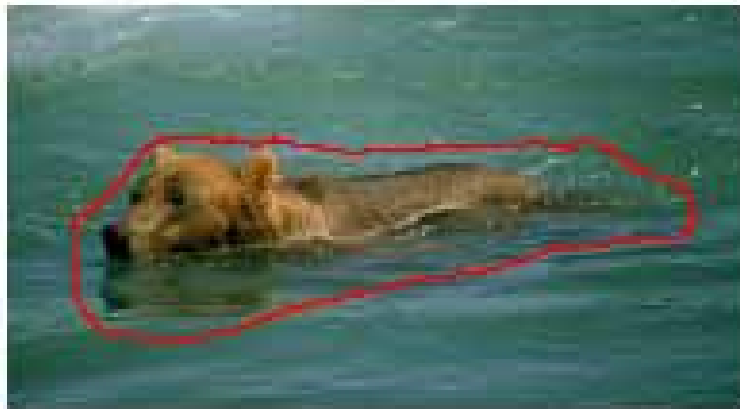
---



*GraphCut Texture*



# Image manipulation



*Poisson blending*

# Image morphing

---



*Image morphing*

# Inpainting (wire removal)



*Inpainting*

# Texture synthesis/replacement

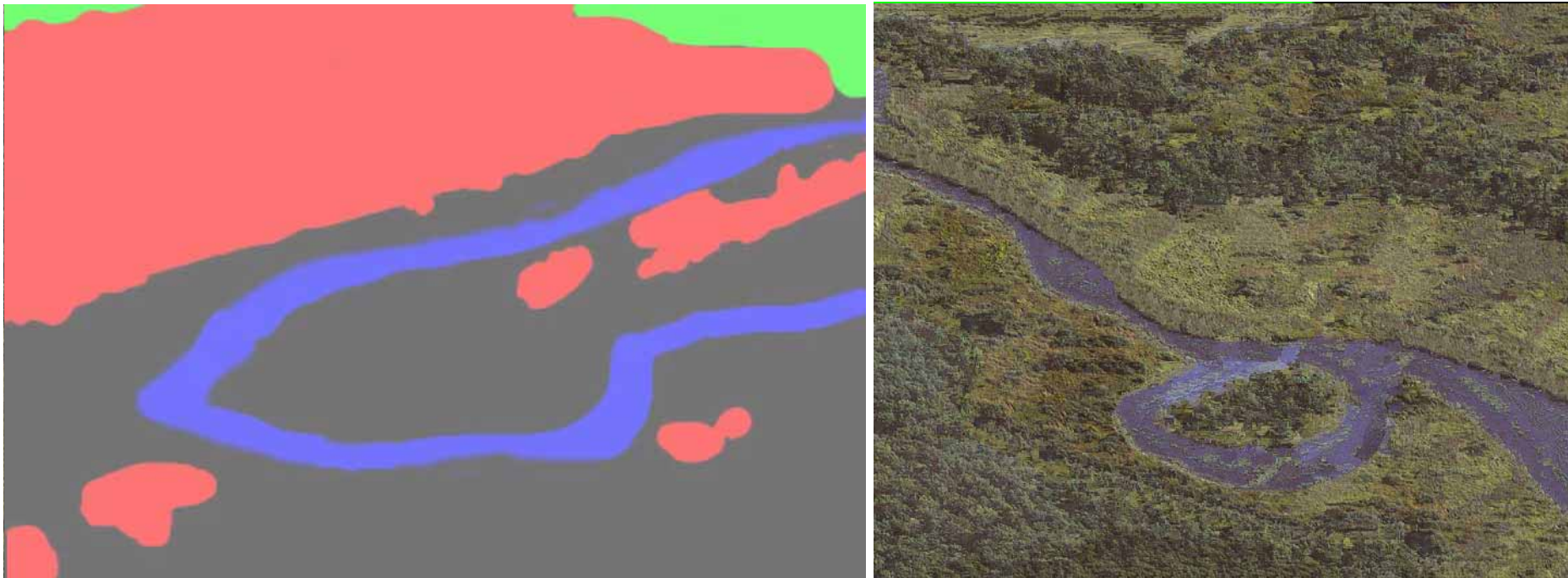
---



*Texture replacement*

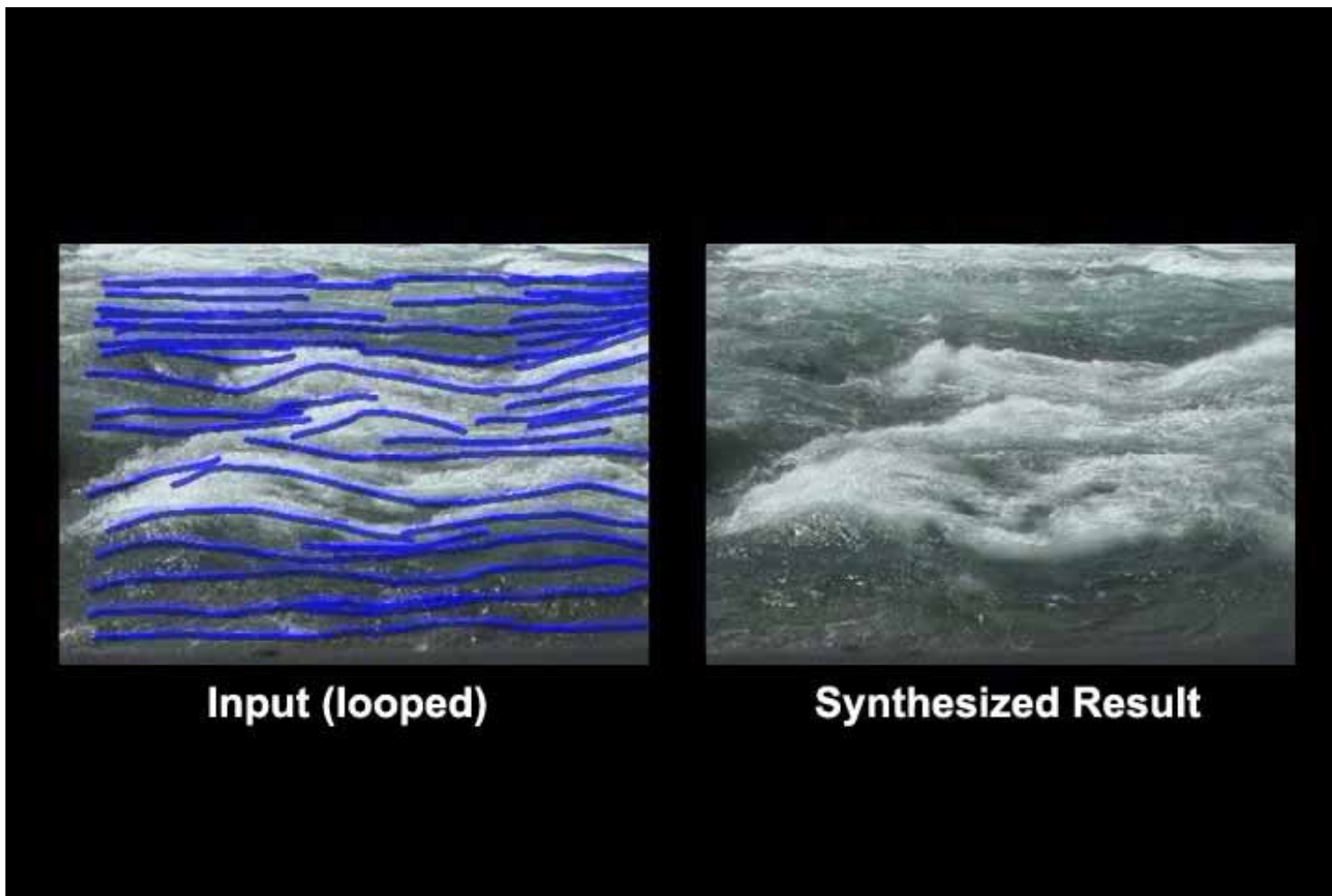
# Semi-automatic matting painting

---



*Image analogies*

# Video editing



*Flow-based video editing*

# Video matching

---



*Matrix*



*MOCO (Motion control camera)*

# Video matching

---



*Video matching*



# Matting and compositing



*Titanic*

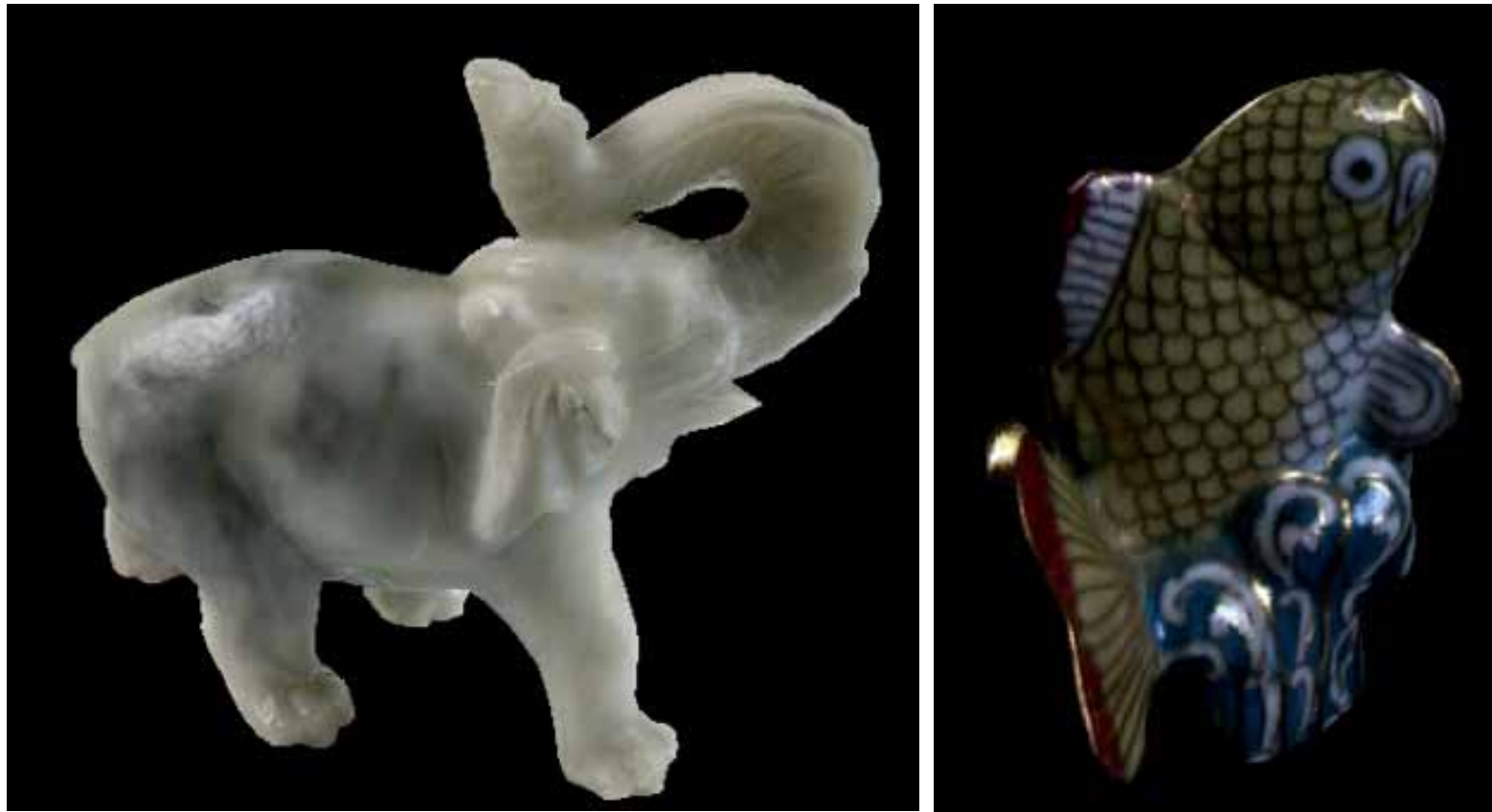
# Object selection



*LazySnapping*

# Image-based rendering

---



*Surface lightfield*

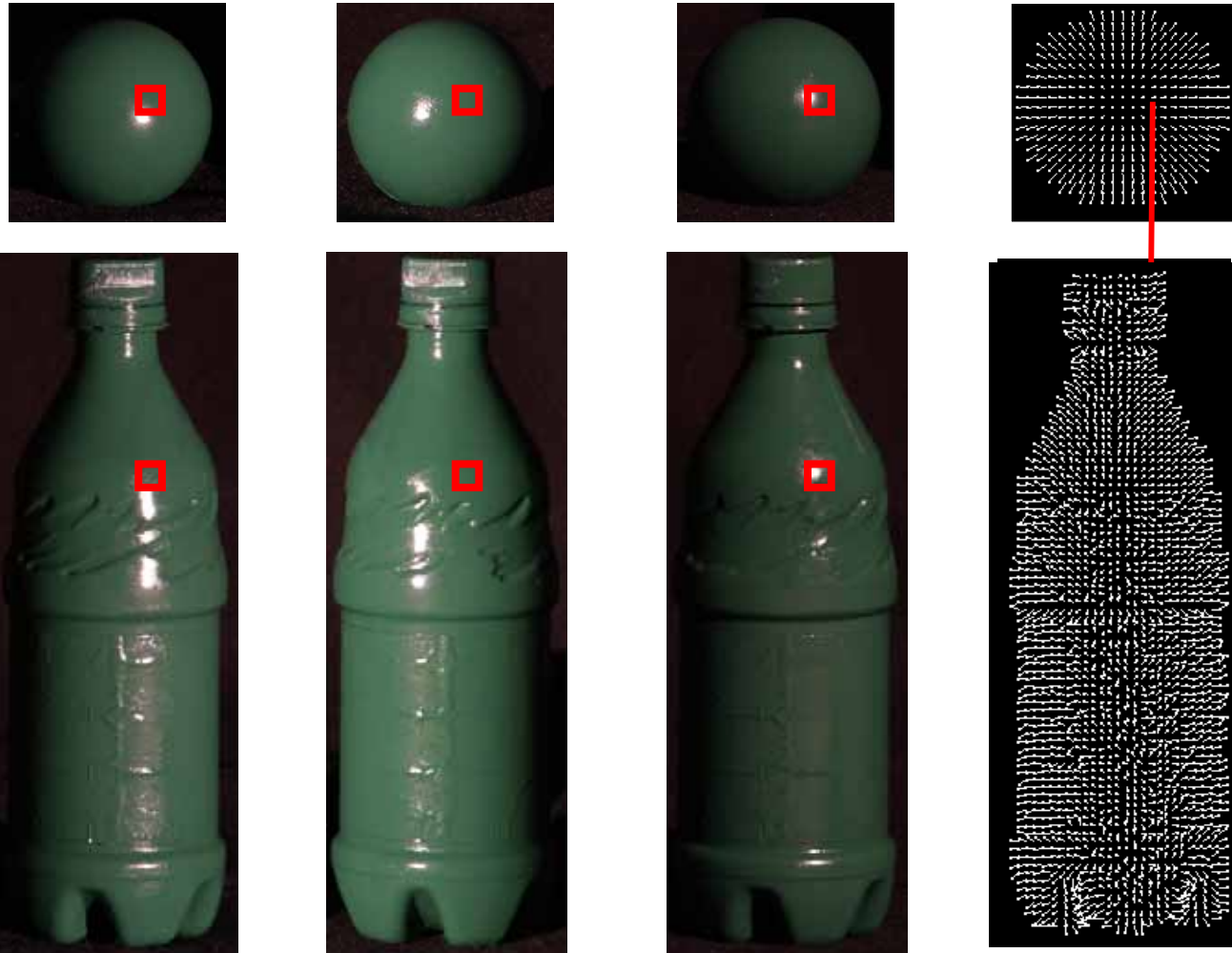
# 3D photography (active)

---



*Cyberware whole body scanner*

# 3D photography (active)



*Photometric stereo*

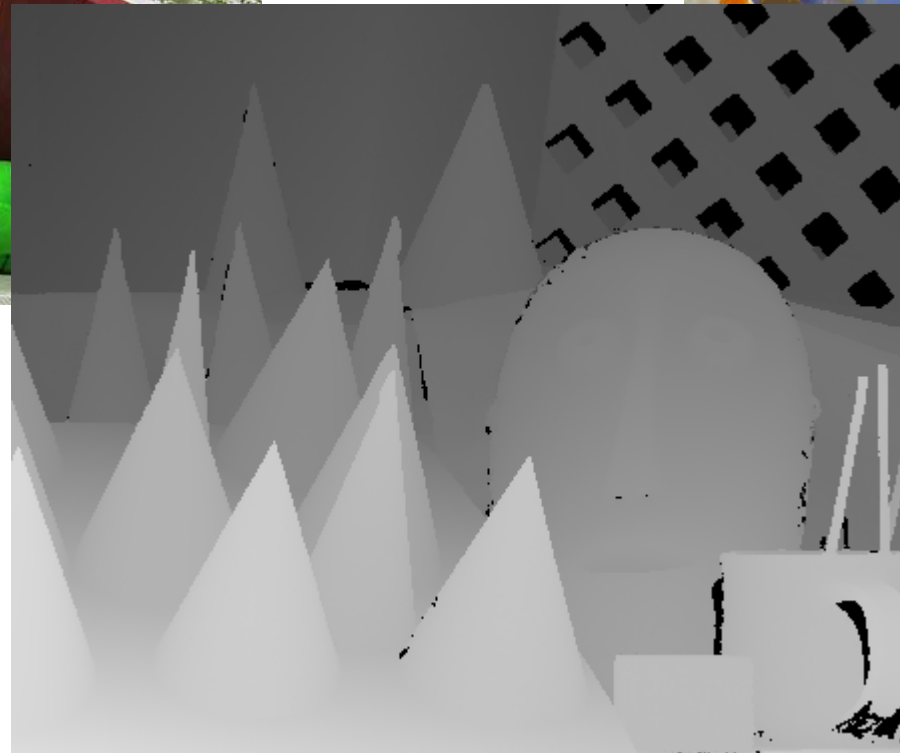
# 3D photography (passive)



*left*



*right*



*depth*

*Stereo*

# 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*

# View interpolation

---



Bullet time video

# View interpolation

---



High-Quality Video View Interpolation

# Making face

---



*Gollum*



*Spacetime face*



# Video rewrite

---

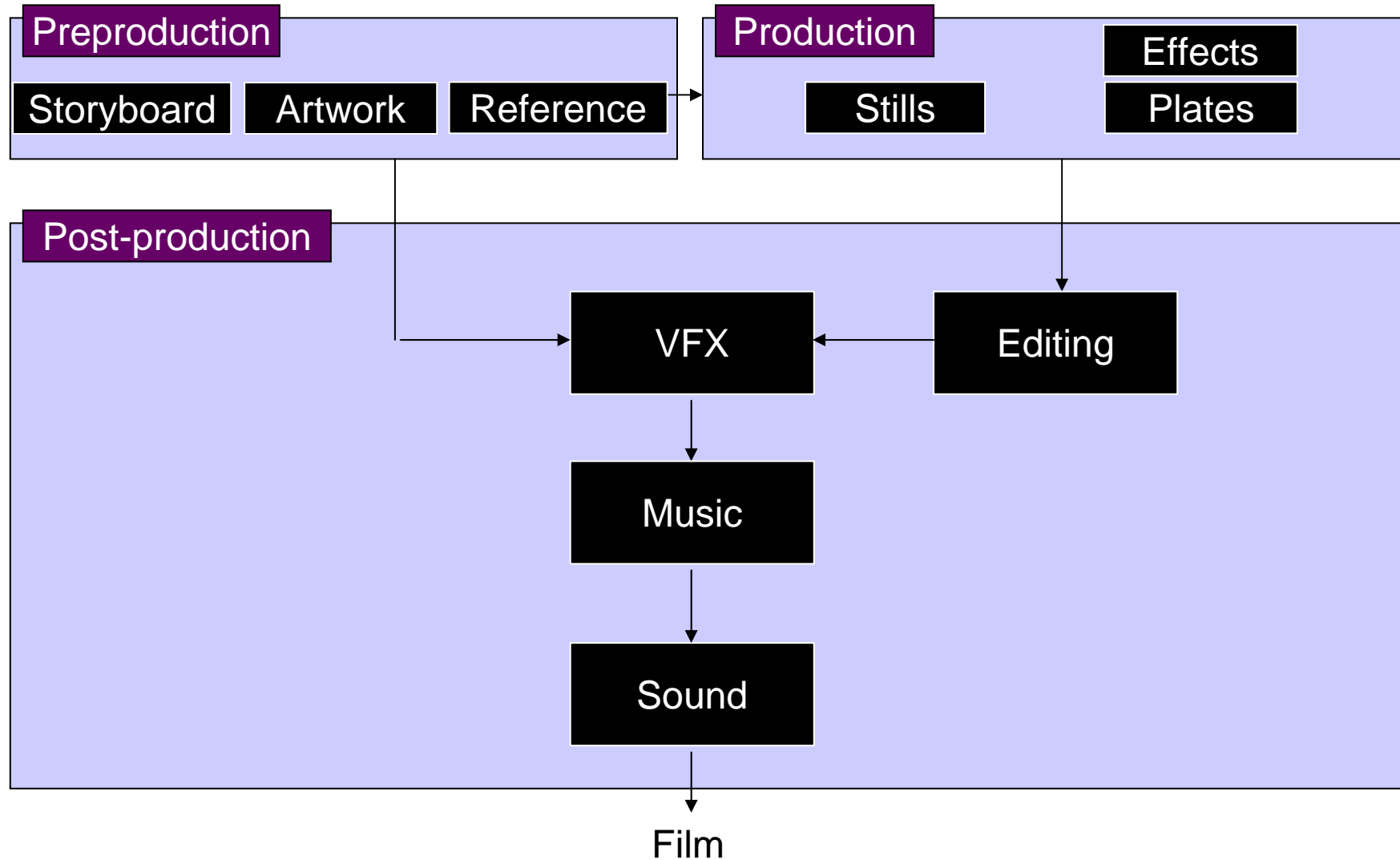


Trainable videorealistic speech animation

# **Production pipeline**



# Production pipeline



# Preproduction

---



Storyboard

# Preproduction

---



Artwork

# Preproduction

---



Reference & Research

# Production

---



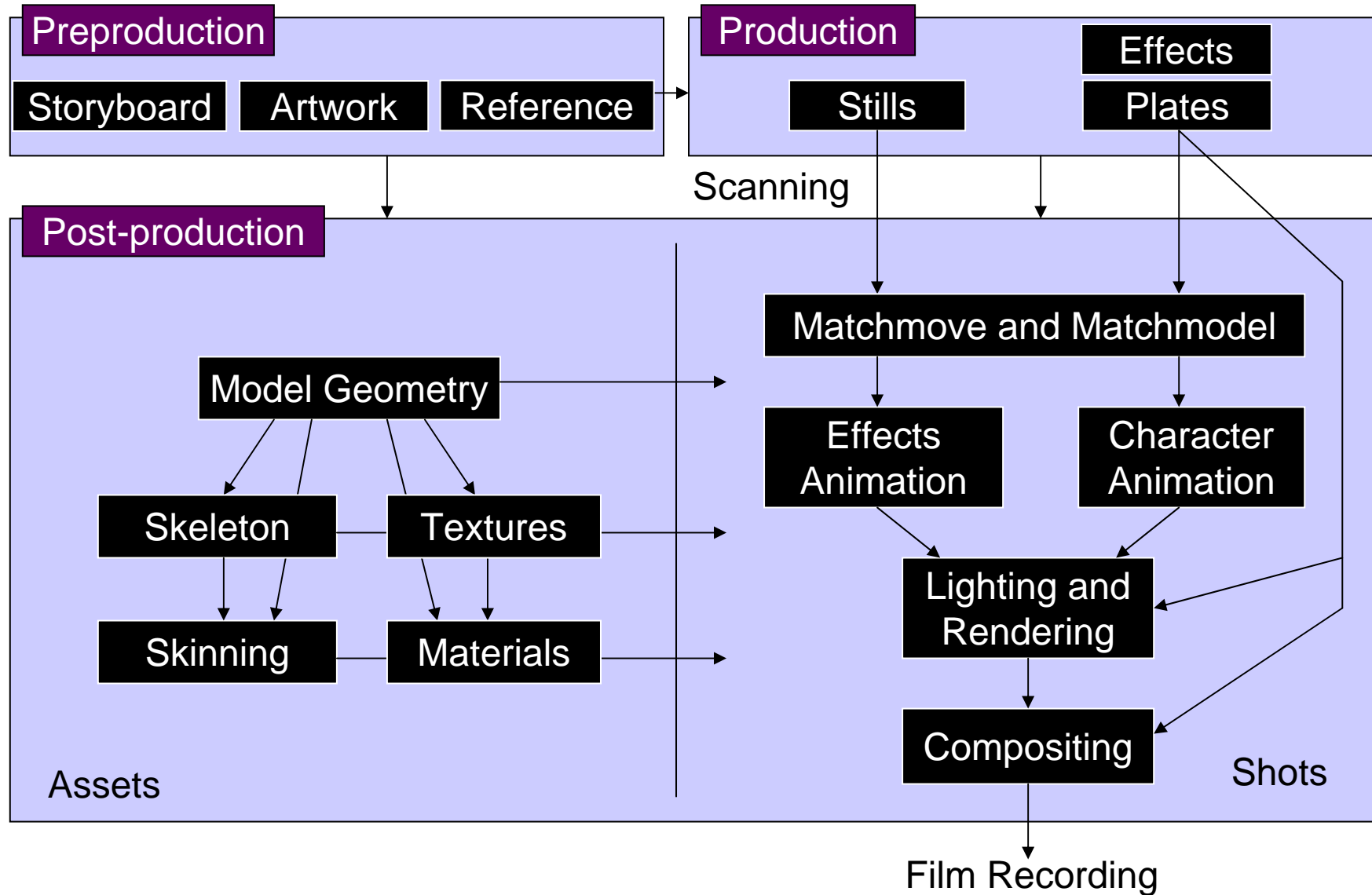
Shooting

# 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



# **A case study**

# 405: The Movie

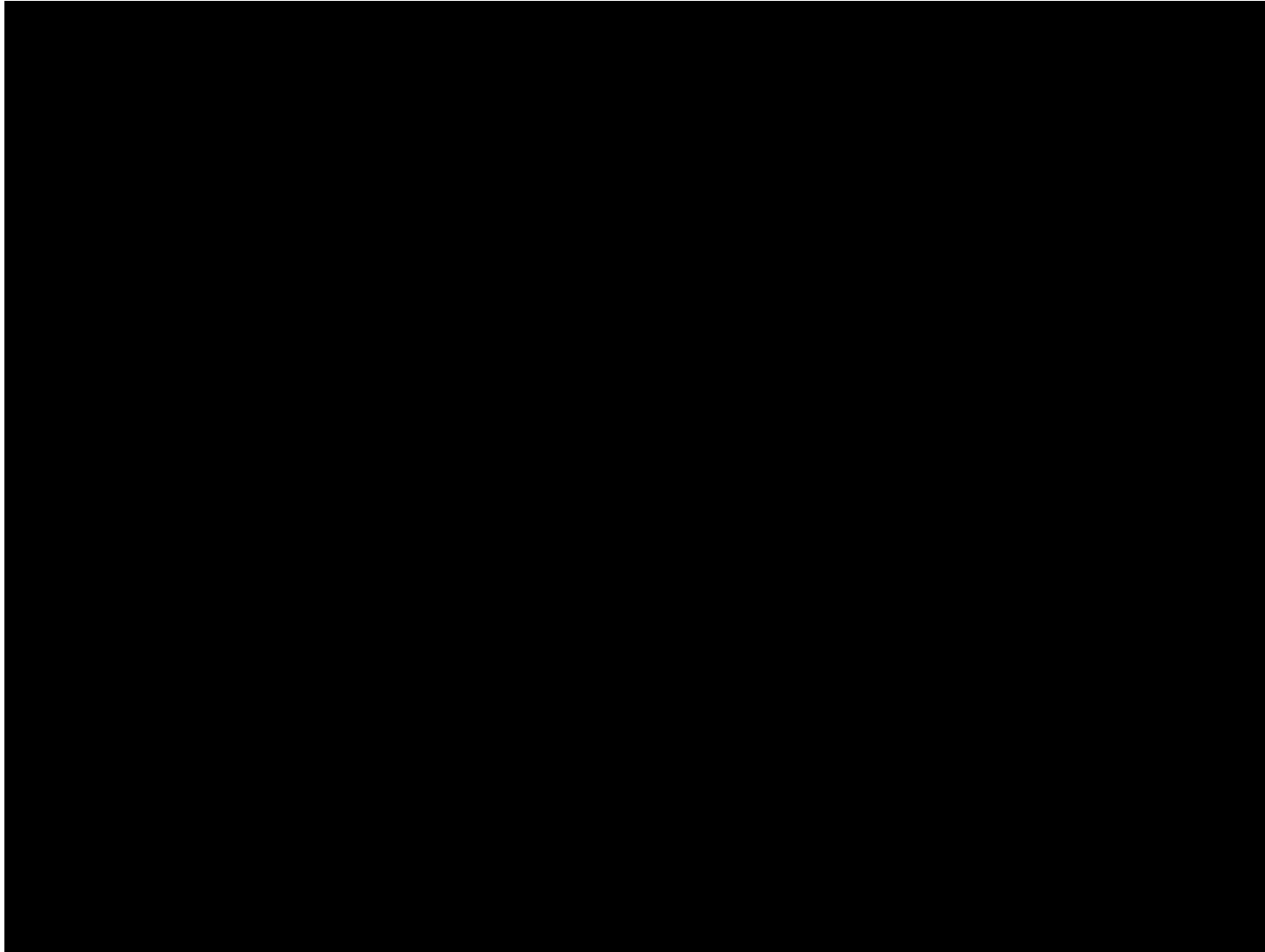
---

- 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/>



# 405: The Movie

---



# 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

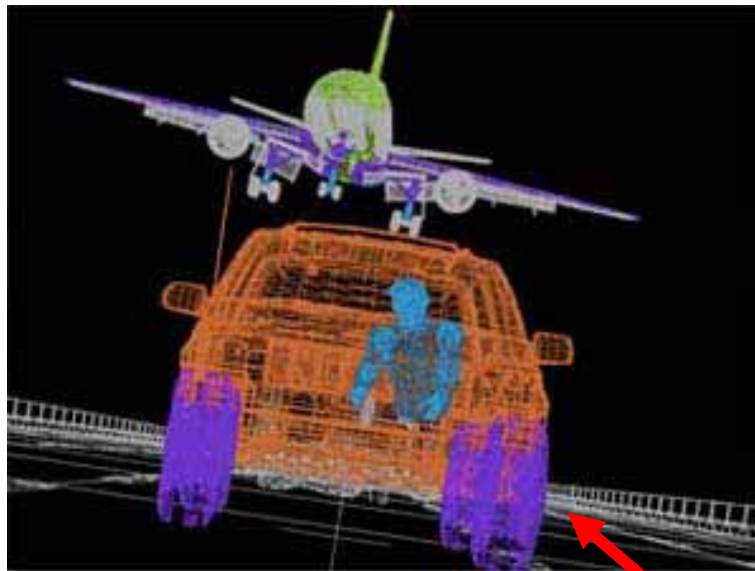


photo-based 3D environment

# Making of 405

Real cars were used for close-up and interior shots



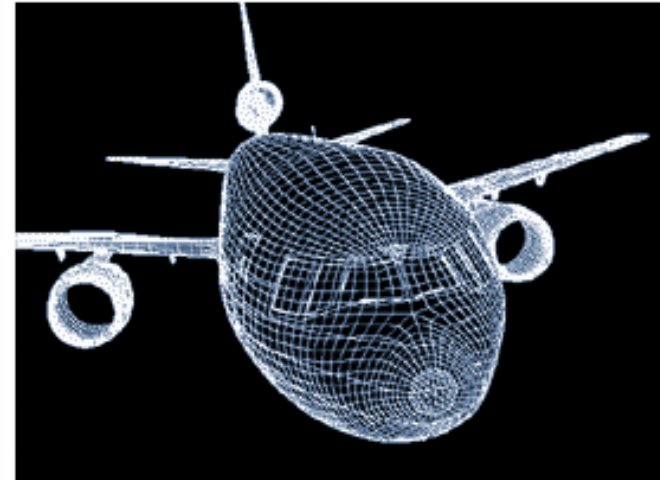
A low-resolution mesh scanned by a cyberscanner. Mapped with photographs.



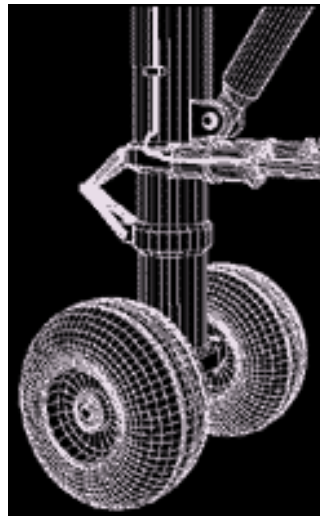
# Making of 405

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

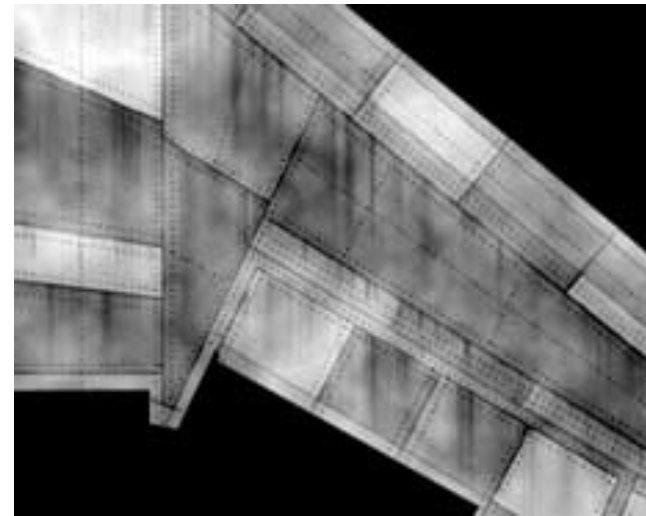
59 objects, 142,439 polygons



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



# Possible programming assignments

---

- Image stitching
- Matchmove
- 3D photography

# Final project

---

- Research
- System
- Film

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



# In Your Face

---



*In Your Face*, GaTech DVFX 2002

# Stop action

---

The Making Of  
In Your Face

Making of *In Your Face*

# Beauty Cream 9001

---



**"BEAUTY CREAM 9001"**

**DVFX 2003**

**GROUP 1 - TEAM SKEWED**

**THOMAS MIKULKA  
CHARLES BRIAN QUINN  
OMAR ZAKI**

*Beauty Cream 9001, GaTech DVFX 2003*

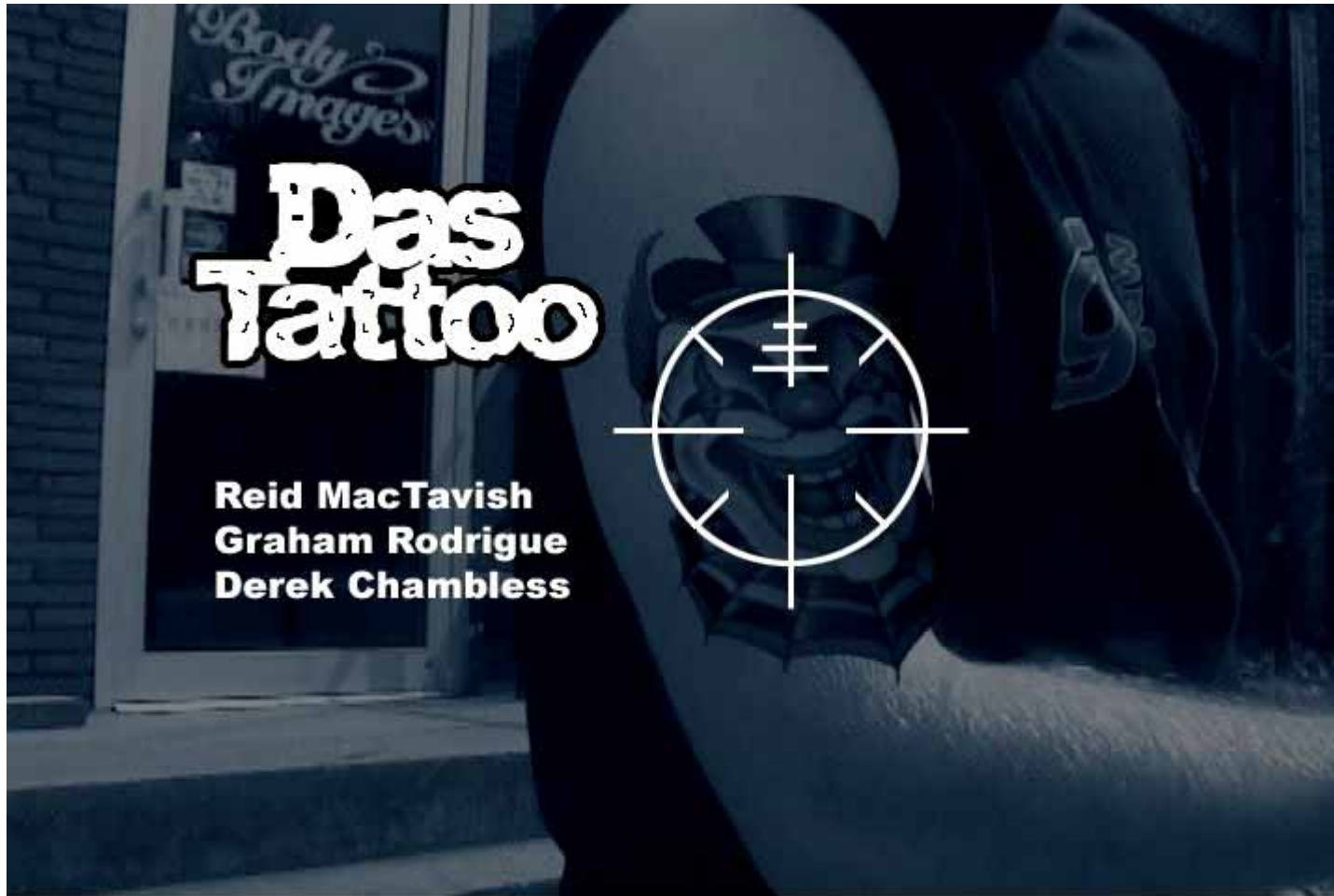
# Face tracking



Making of *Beauty Cream 9001*

# Das Tattoo

---



*Das Tattoo*, GaTech DVFX 2003

# Feature tracking

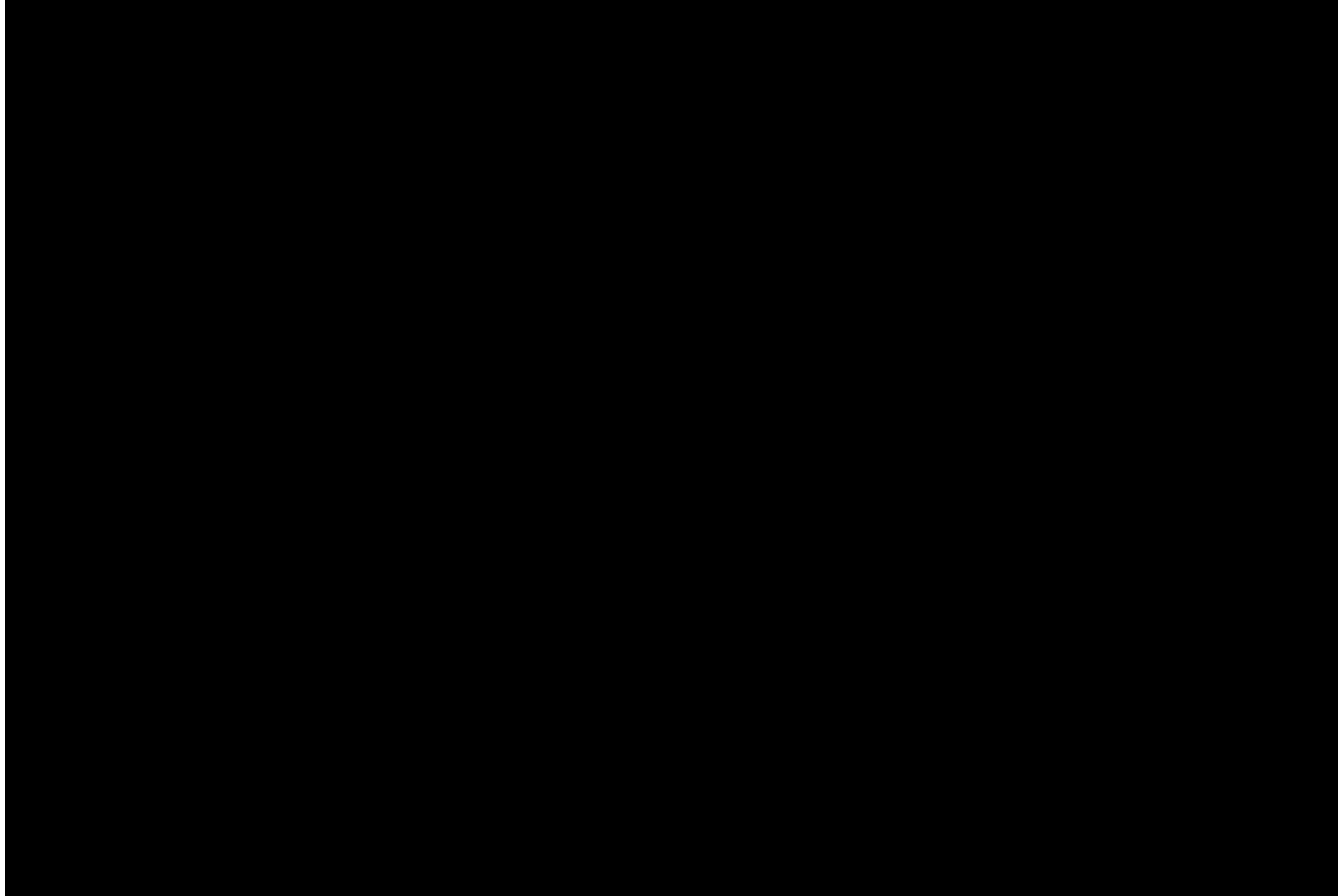
---



Making of *Das Tattoo*

# Done in 50 Seconds

---



*Done in 50 Seconds*, GaTech DVFX 2003

# View interpolation

---

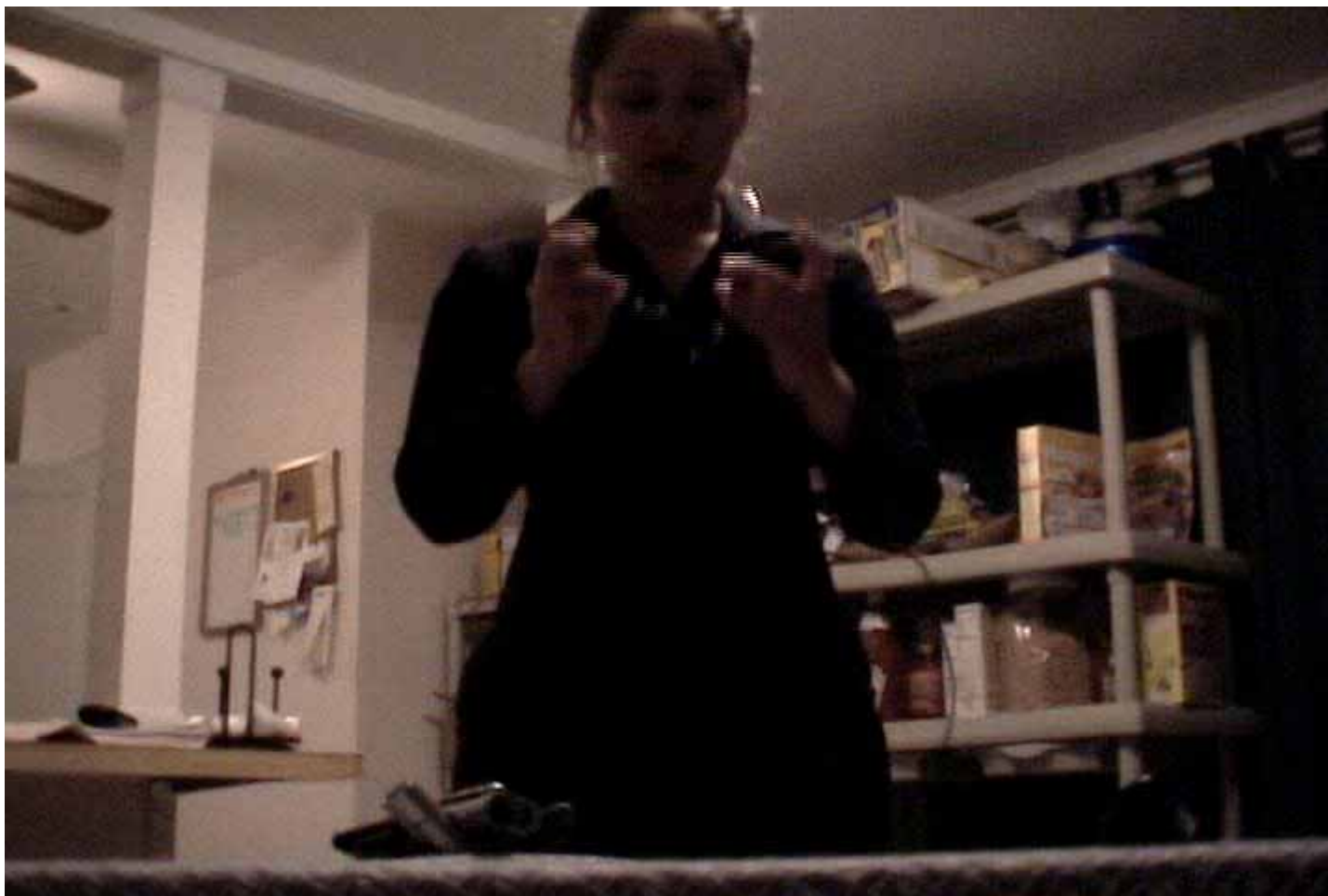


Making of *Done in 50 Seconds*



# Hostage Point

---



*Hostage Point, GaTech DVFX 2003*

**The Making Of:**

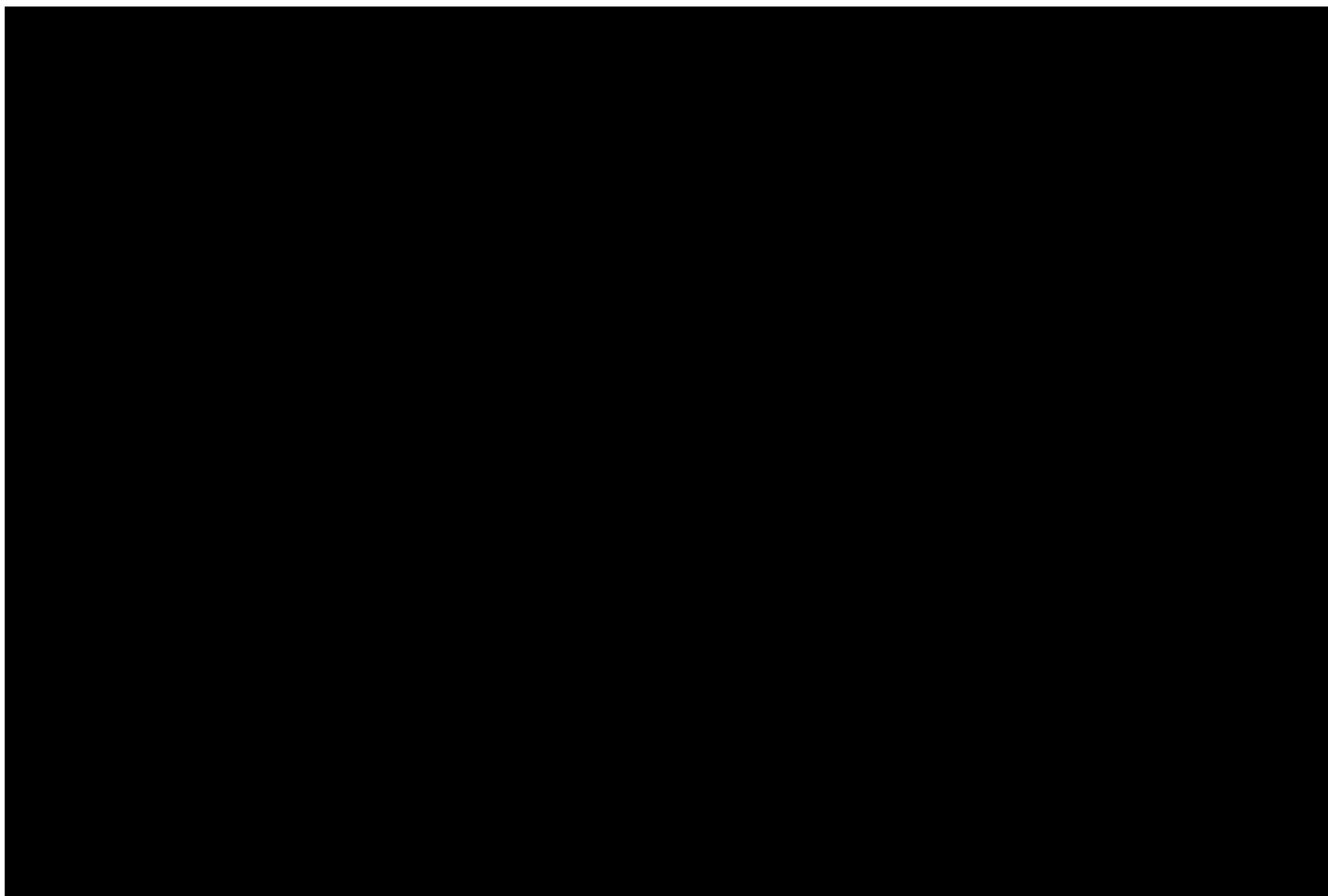
**Hostage Point**

**By: Jamal Ashraf  
Amir Ebrahimi  
Siddharth Shah**

Making of *Hostage Point*

# Life in Paints

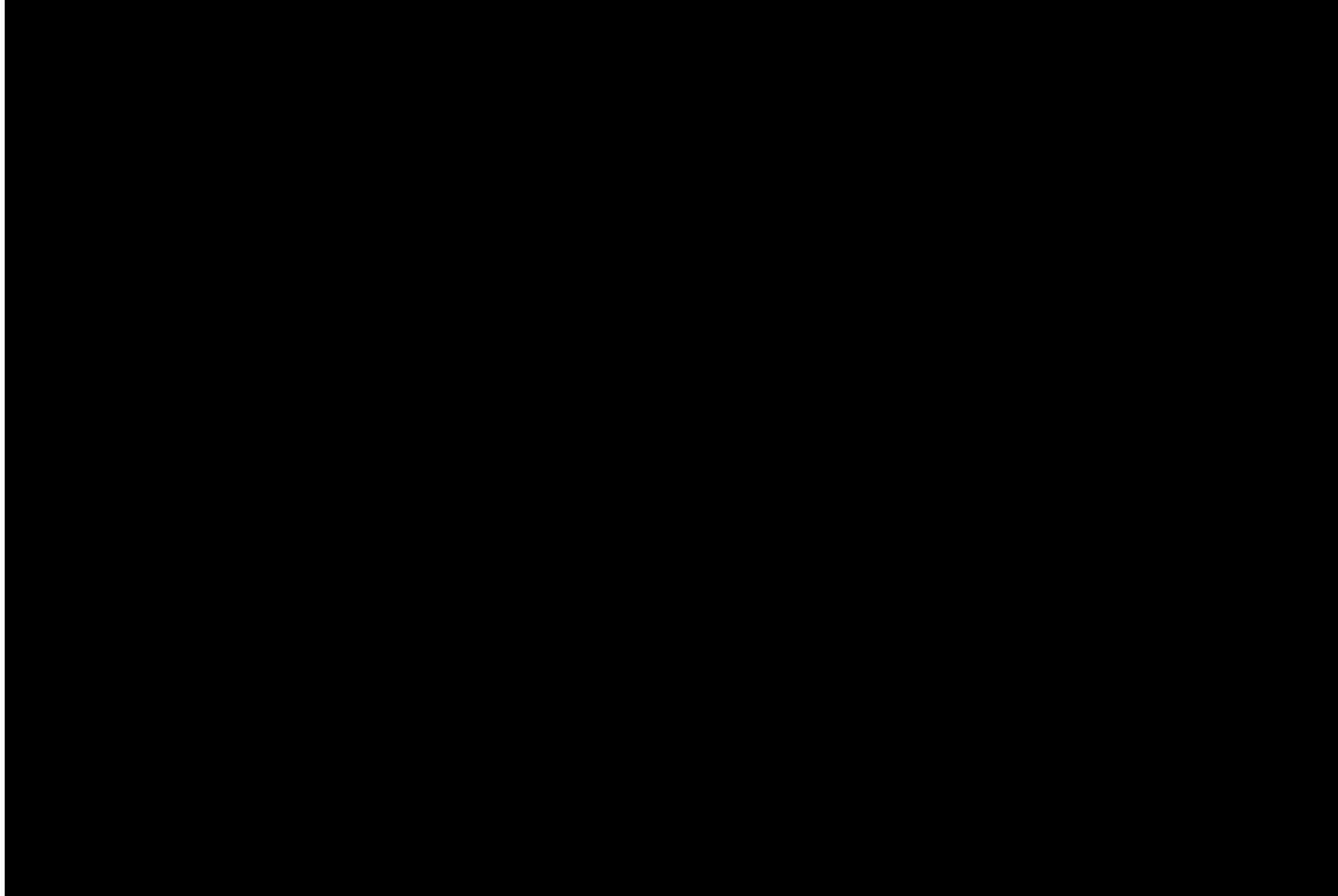
---



*Life in Paints*, GaTech DVFX 2003

# Tour into pictures

---



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