Course overview

Digital Visual Effects, Spring 2007

Yung-Yu Chuang

2007/2/27

Logistics

- **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)
- **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/
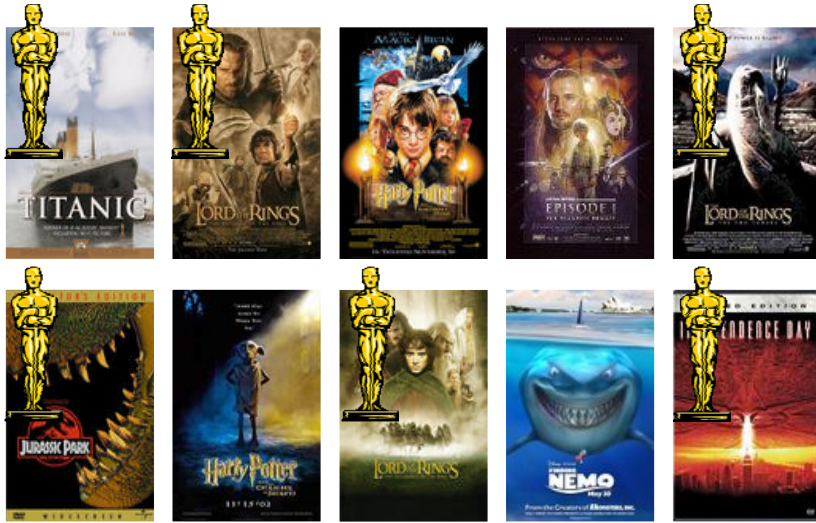

Prerequisites

- 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?

Retouching

Iraq War, LA Times, April 2003
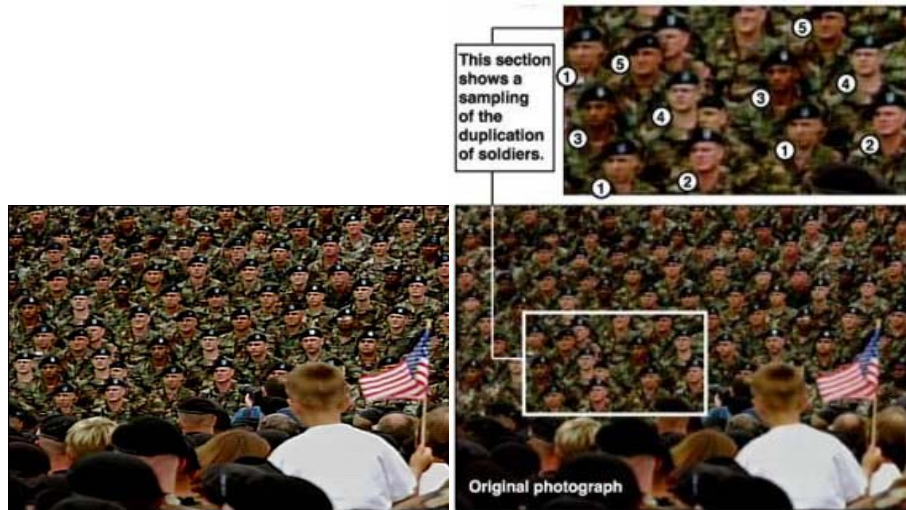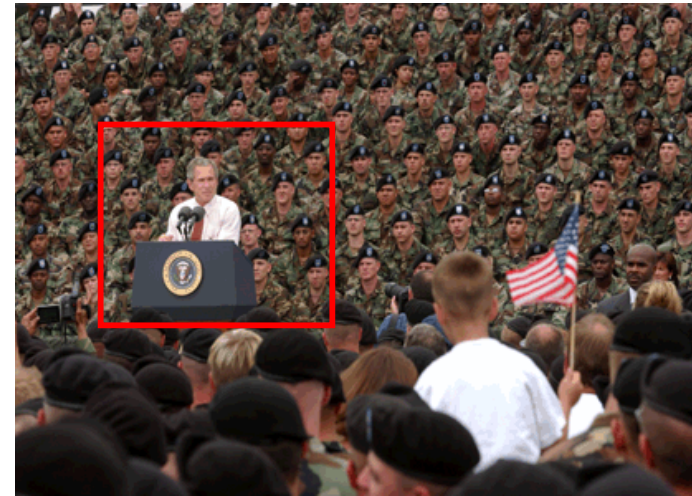

Digital photomontage

Bush campaign's TV AD, 2004

Texture synthesis and inpainting

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
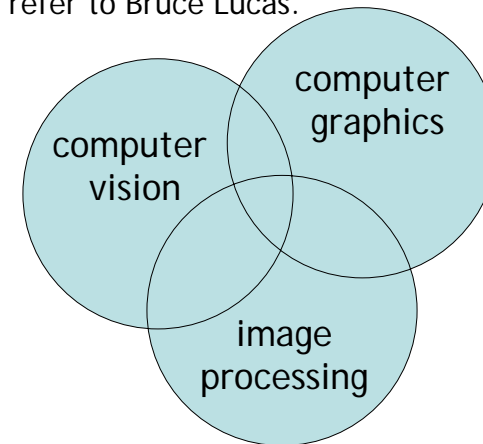
It's not about industrial tricks

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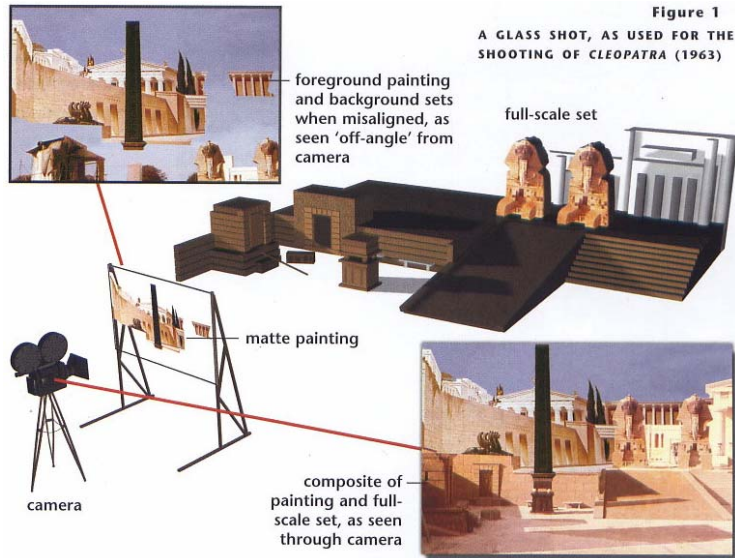
computer graphics

computer vision
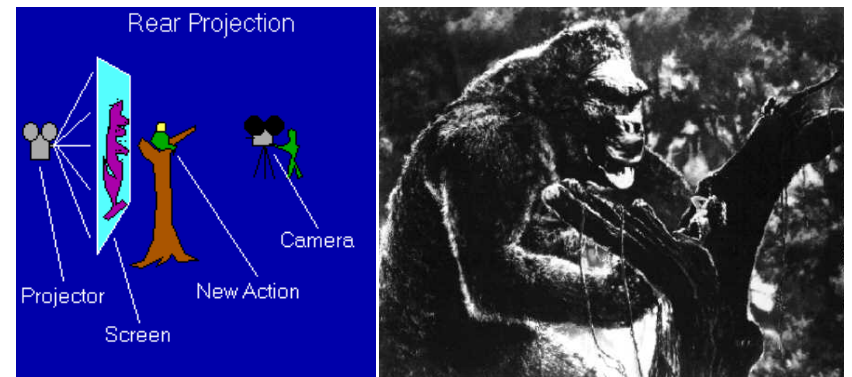
image processing

Special effects

Stop action

The execution of Mary, 1895
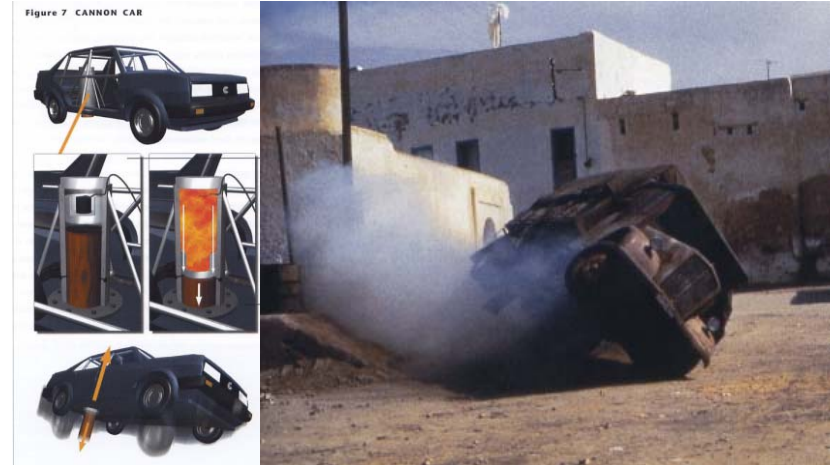
Glass shot

Rear projection

King Kong, 1933

Special effects (make-up)

Special effects (physical effects)

Figure 7 CANNON CAR

Special effects (miniature)

Special effects (matte painting)

Lord of the Rings

Illusion - forced perspective

Computer-generated model

108/1 v.65   182 (72-224)
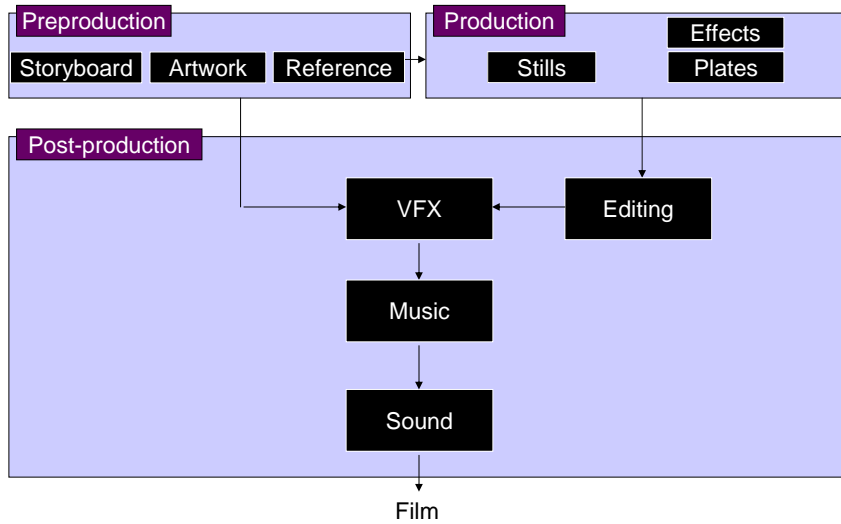
Models-6

Production pipeline

Production pipeline

Preproduction
Storyboard   Artwork   Reference

Production
    Effects
Stills   Plates

Post-production

VFX ← Editing

VFX → Music → Sound → Film

Preproduction

THE RETURN OF THE KING
Book Six - Chapter III
"Mount Doom"
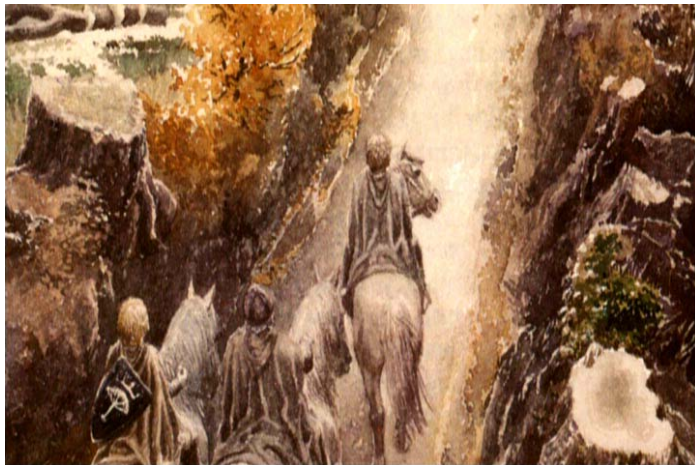
Storyboard

Preproduction

Artwork

Preproduction
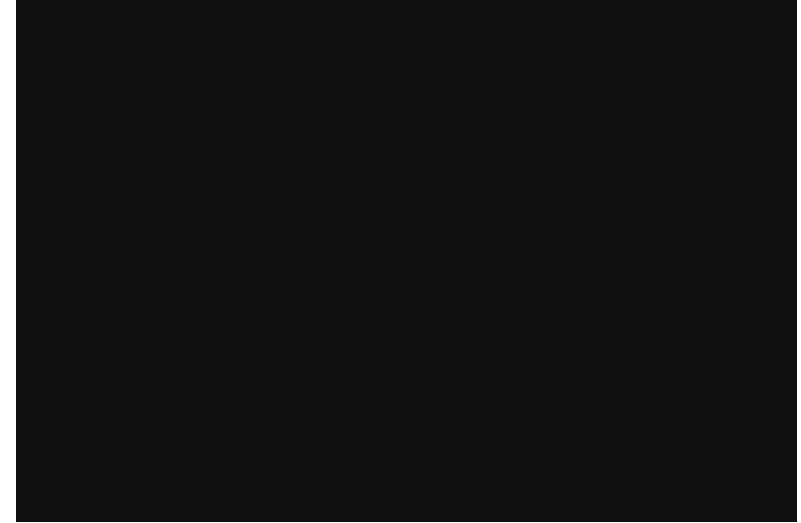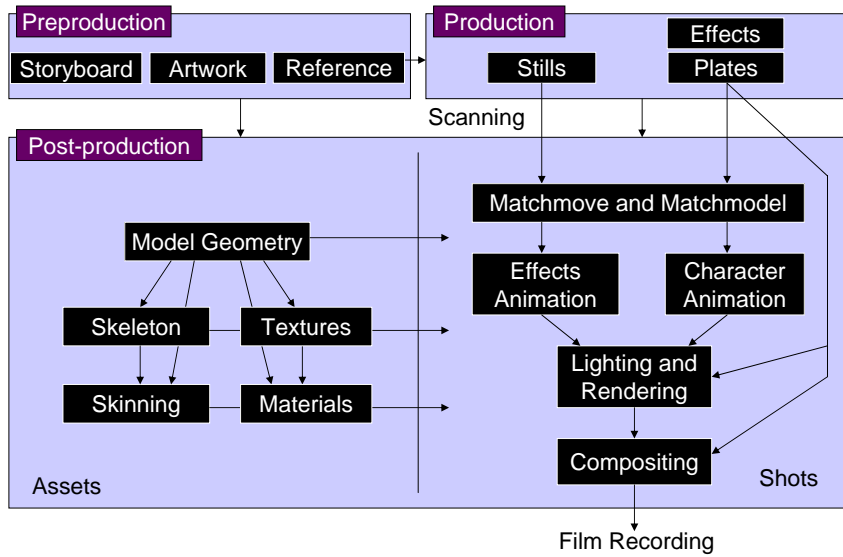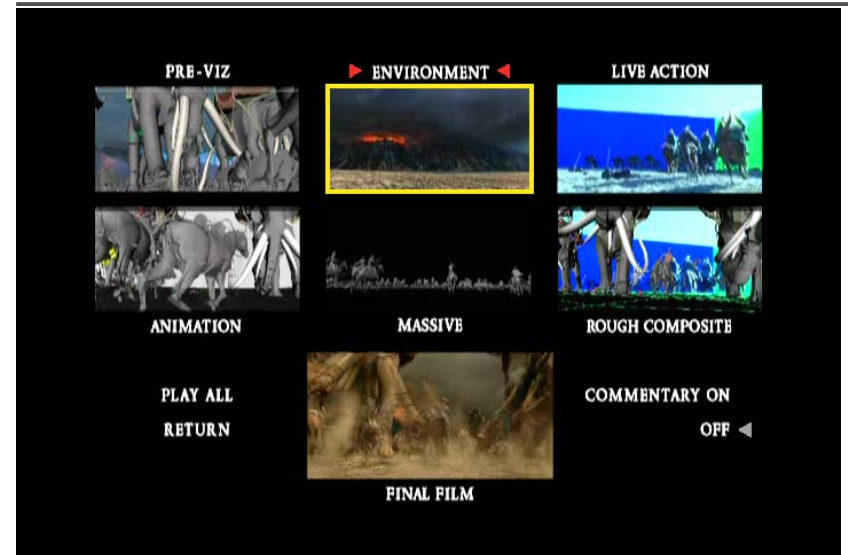
Reference & Research

Production

Shooting

Post-production

Visual effects production

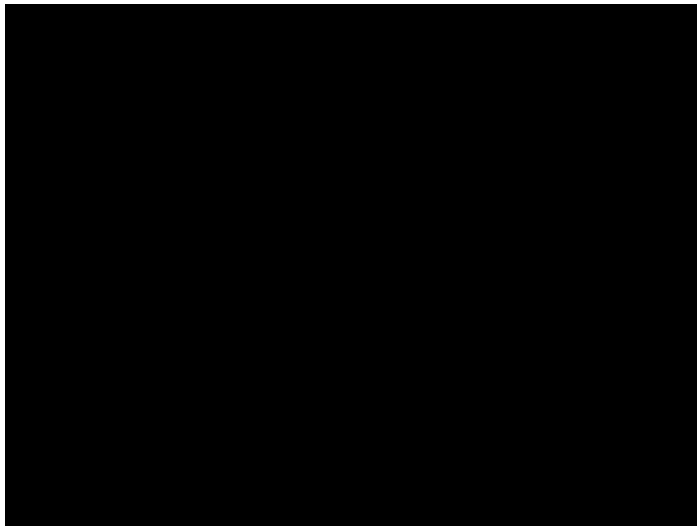## Visual effects post-production

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

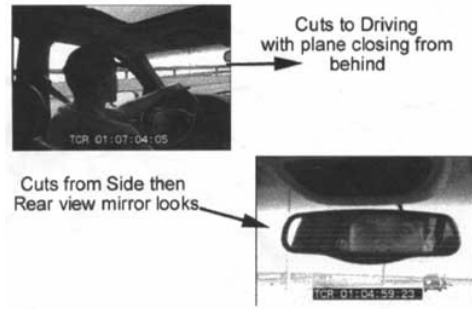| Shot#	Description	Full CG	CG	Length Frames
01	Title Animation	X	X	401
02	Freeway speeds beneath car			123
03	Speed Limit 65			120
04	LA Freeway from Overpass			238
05	Empty Freeway--Car enters frame	X	X	150
06	Pan From Freeway J looks at lack of traffic			237
07	Plane swings into landing position toward 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

TCR 01:07:04:05

Cuts from Side then
Rear view mirror looks.

TCR 01:04:59:23

Making of 405

Step 2: building CG world
total 62 shots, 42 enhanced with digital VFX.
19 shots are entirely digital creations.
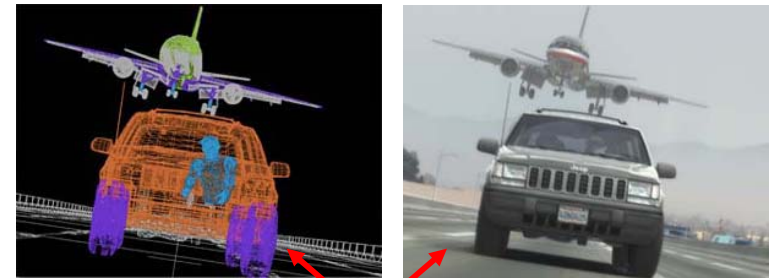plane, two cars, freeway background are digital

photo-based 3D environment

Making of 405

Real cars were used for close-up and interior shots

DC10_FX22   TCR 01:41:17

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

Making of 405

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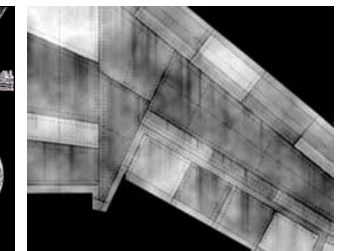to model in details for the
needs of close-up shots.

59 objects, 142,439 polygons
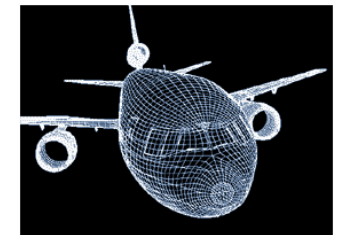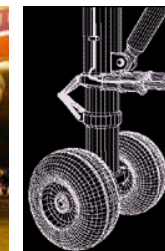
reference   modeling   material painting

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

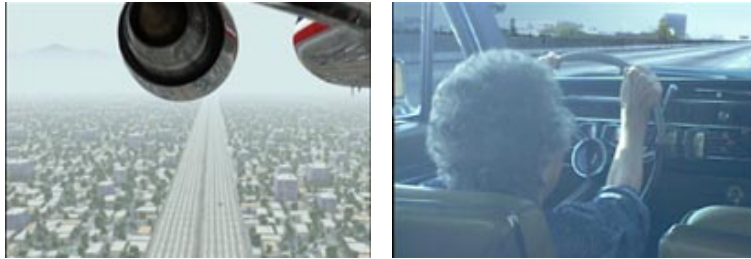## Making of 405

Step 5: fine touchup

3D hat   compositing and inpainting

Making of 405

Step 6: music and delivery
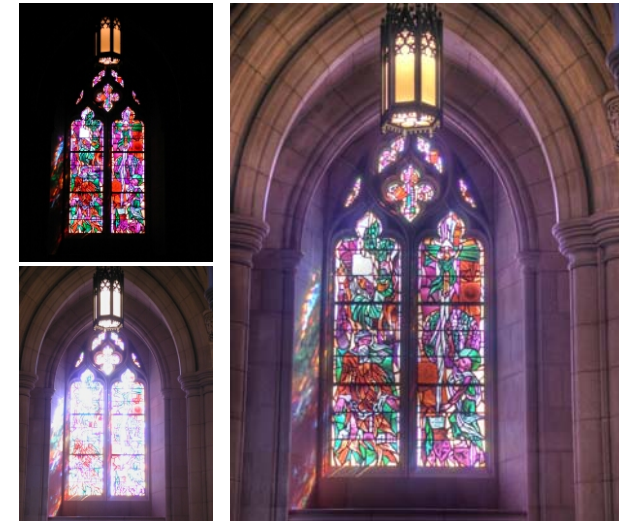

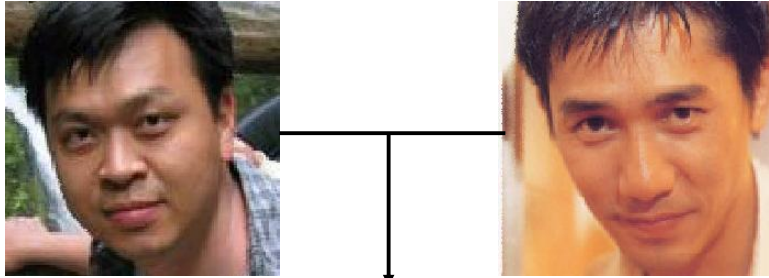

Topics we plan to cover

Camera

Canon 10D

High dynamic range imaging/display

Image warping/morphing

someone not
that famous

someone very
famous
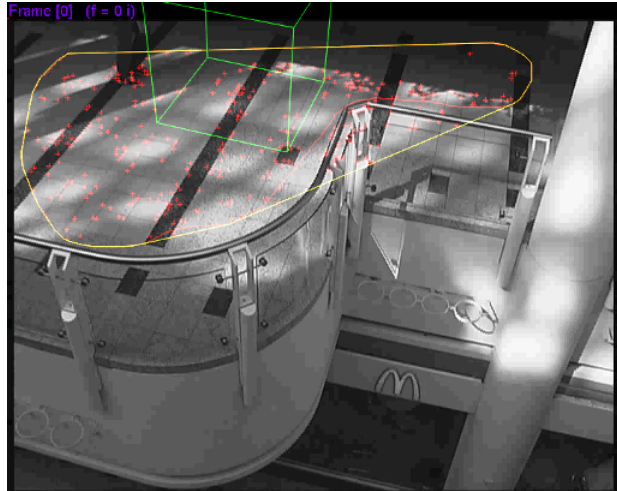
video

Tracking

Feature tracking

Image stitching
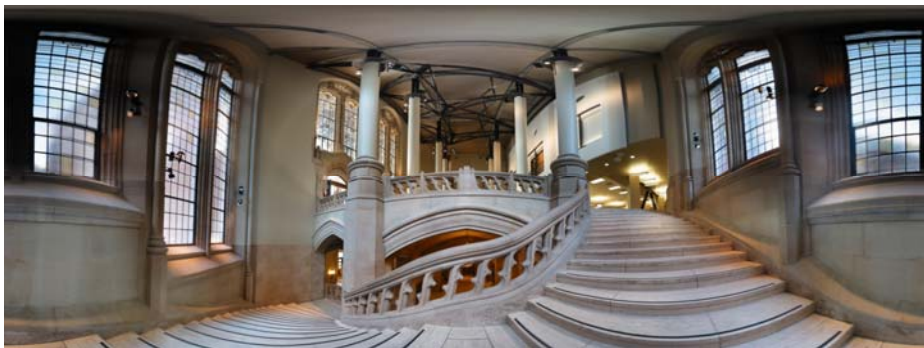
MatchMove

Move matching using scene planes

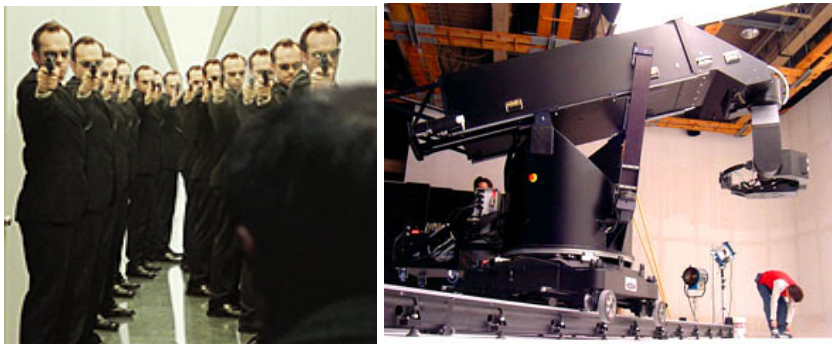## Matchmove

Move matching using scene planes

Matchmove

Move matching using scene planes

Video matching

Matrix   MOCO (Motion control camera)

Video matching

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)
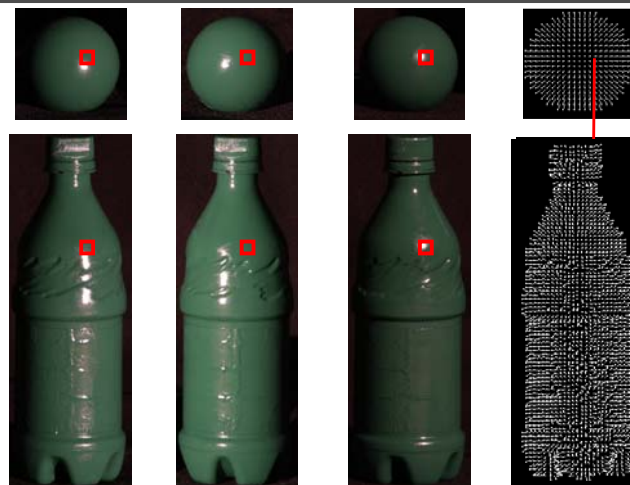
Photometric stereo

3D photography (passive)

left   *right*

depth

Stereo
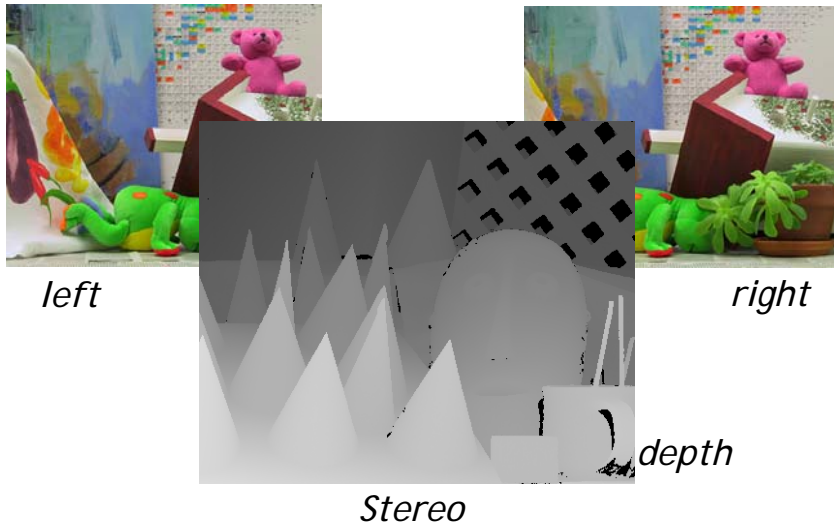
Image-based rendering
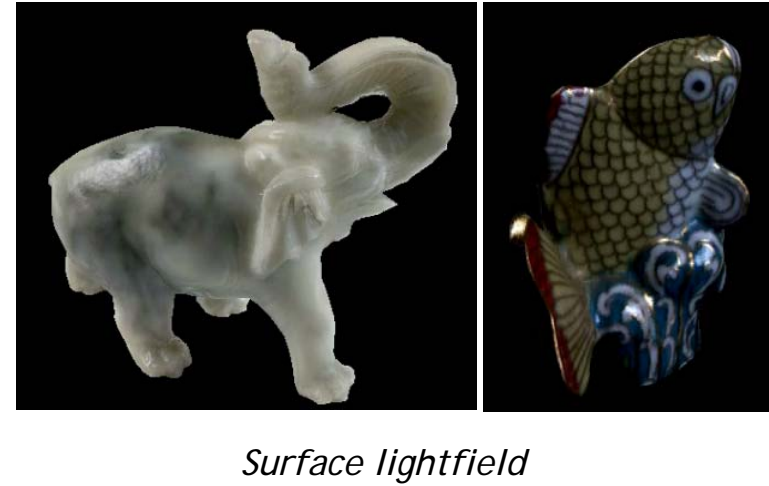
Surface lightfield

View interpolation

Bullet time video

View interpolation

High-Quality Video View Interpolation

Making face
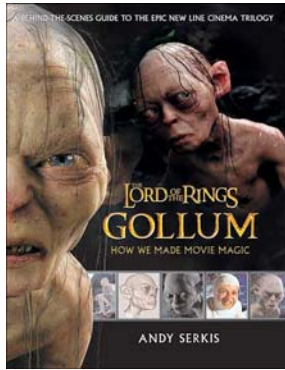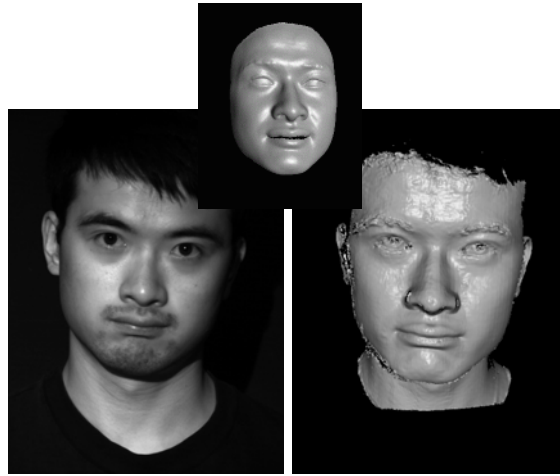
Gollum   *Spacetime face*

Video rewrite

Trainable videorealistic speech animation

Inpainting (wire removal)
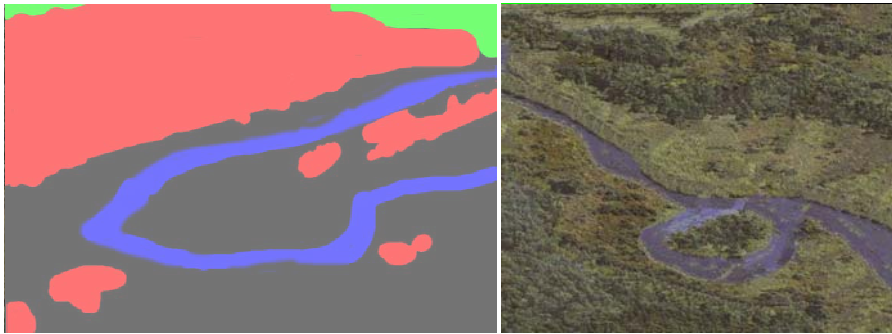

Inpainting

Texture synthesis/replacement
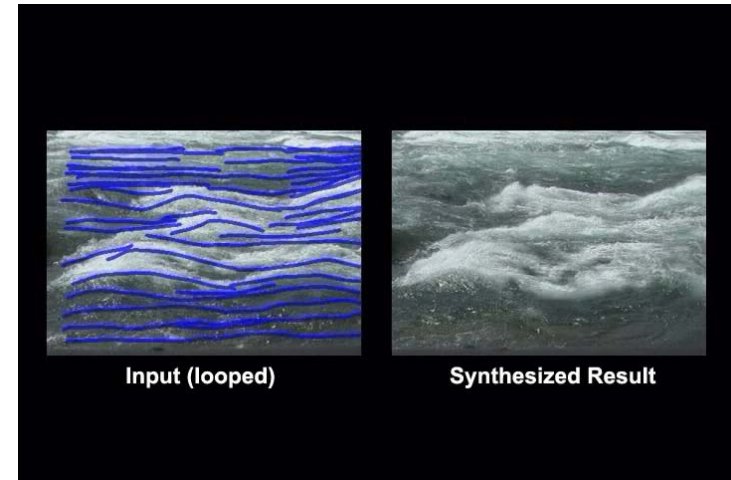

Texture replacement

Semi-automatic matting painting

Image analogies

Video editing

Input (looped)　　　Synthesized Result

Flow-based video editing

Grading

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

High dynamic range imaging
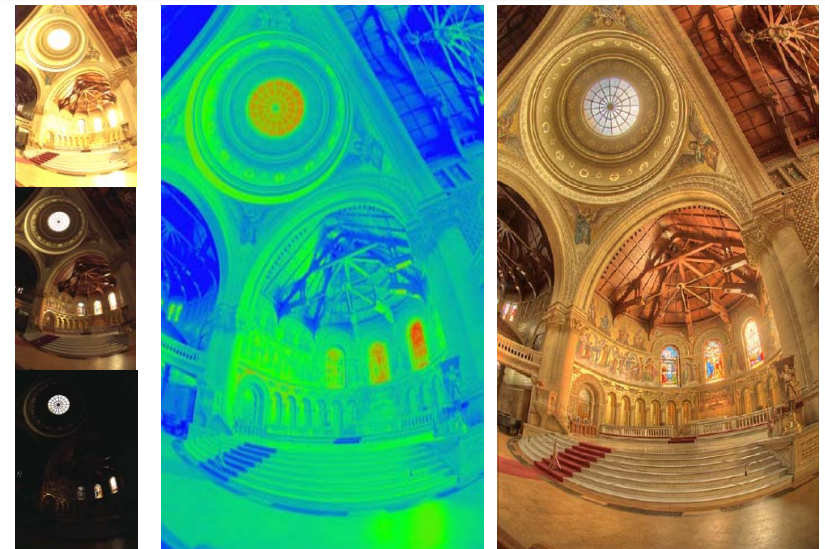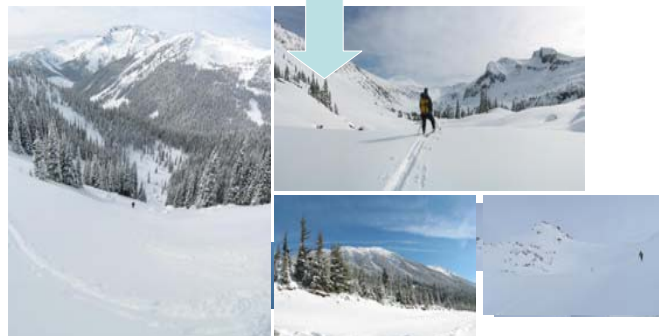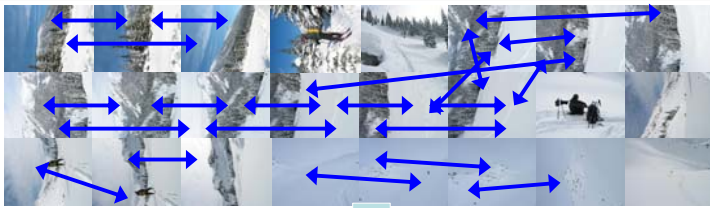
From last semester (吳侑親, 張書瑋)

From last semester (王瑋馥, 余雁雲)

AutoStitch

From last semester

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.

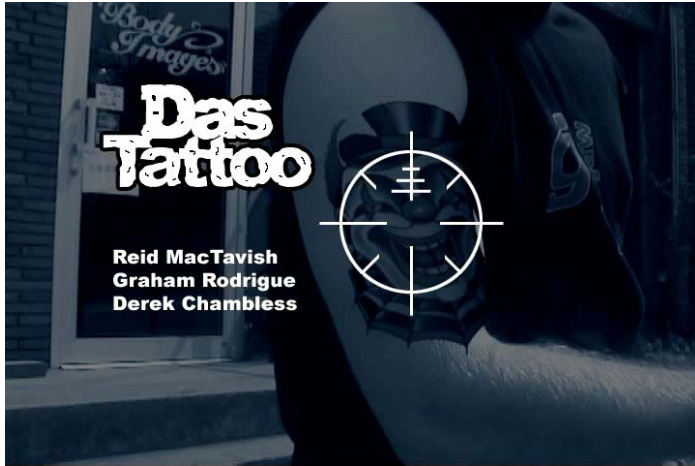## Beauty Cream 9001

Beauty Cream 9001, GaTech DVFX 2003

Face tracking

Making of *Beauty Cream 9001*
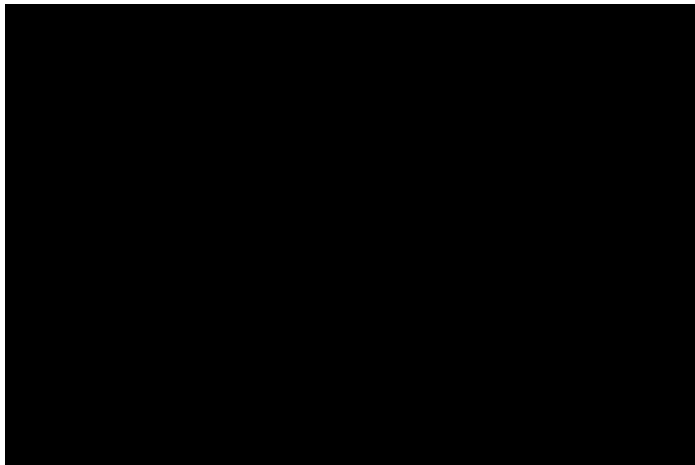
Das Tattoo

Das Tattoo, GaTech DVFX 2003

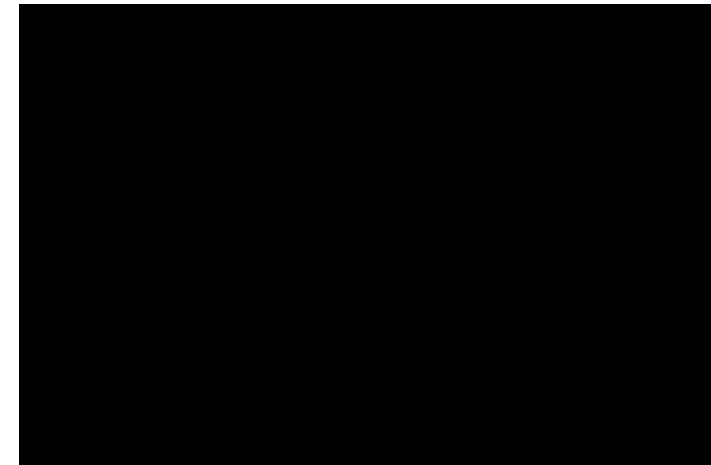## Feature tracking

Making of *Das Tattoo*

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

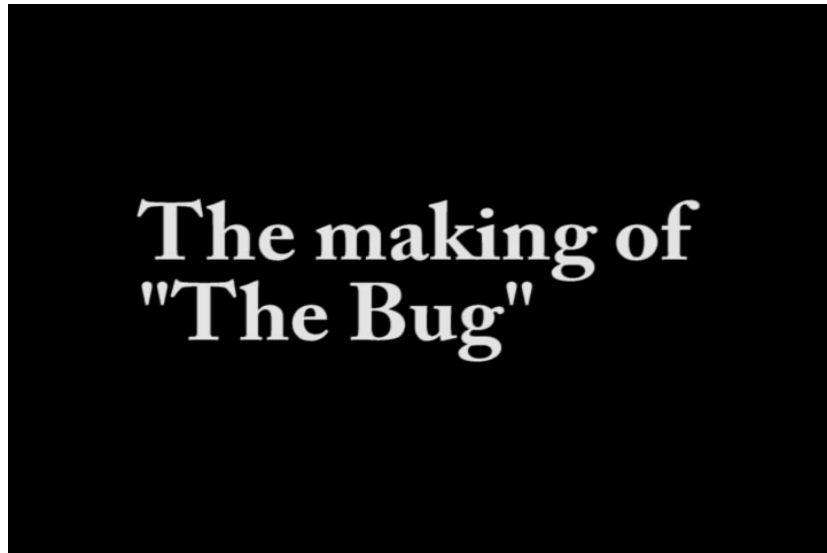Making of *In Your Face*

Final projects from the past.

The Bug

Making of The Bug

Clones

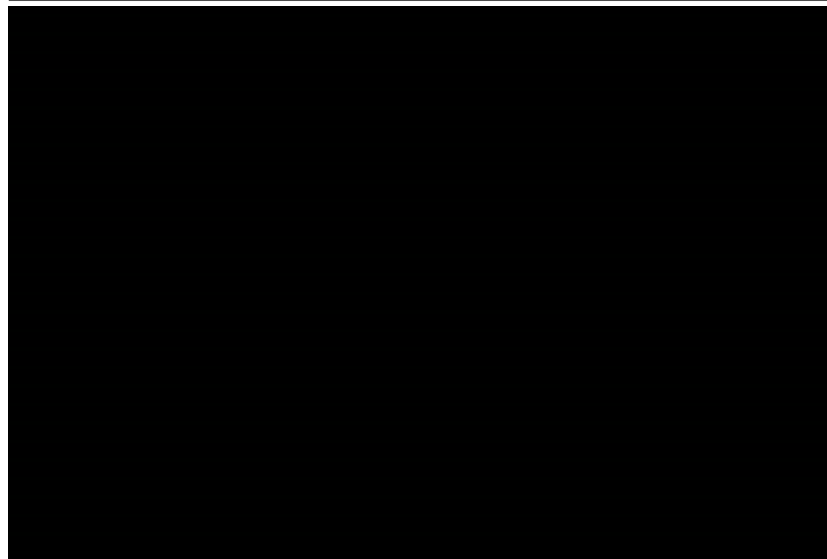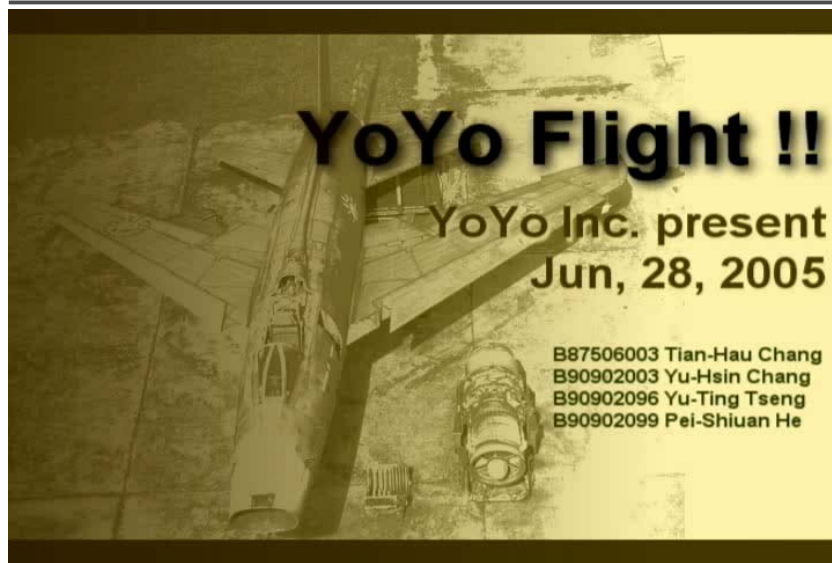## Making of Clones

Magic Finger

- The film
- Making of

YoYo Flight

Making of YoYo Flight
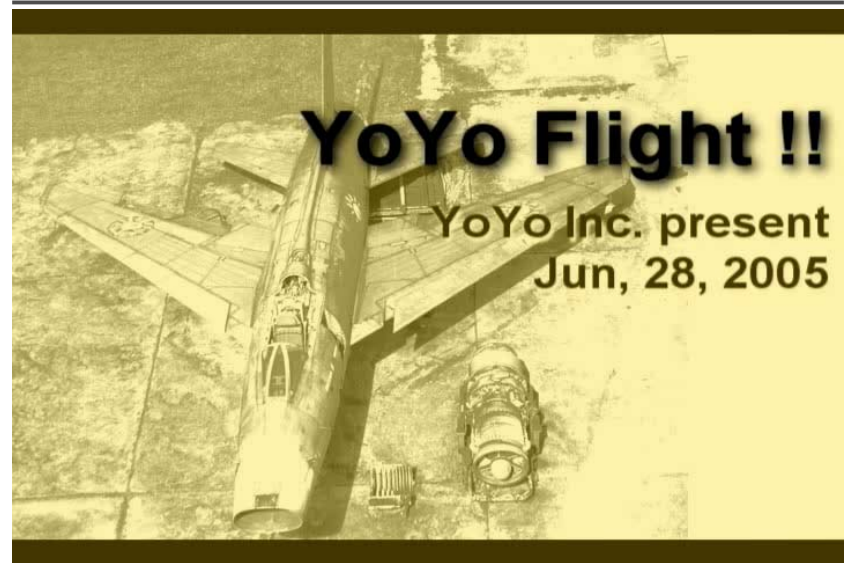
That's it for today!

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