Real-time Graphics and Animation

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WS 2005/2006

Course Topics

- Real-time rendering
- Image- and video-based editing and rendering
- Character animation
- Physics-based animation

Goals of the Seminar

- Get you acquainted with current research in computer graphics
- Improve your ability to critically read and analyze scientific papers
- Strengthen your presentation skills
- Stimulate active learning through group discussions, improve argumentation skills

What you have to do

- Present one paper in class
  - read the paper and necessary background material
  - prepare slides and give the presentation
  - lead the discussion in class
- Read the other papers before class
- Participate in the discussion

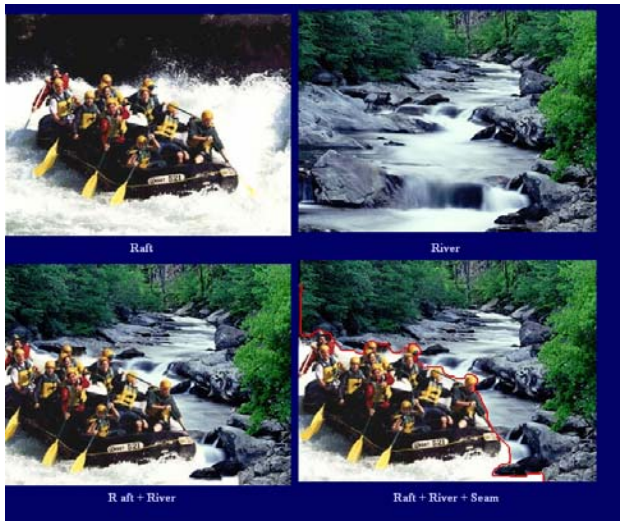
Topics & Schedule

1. Image Synthesis and Editing (Nov. 3rd)
2. Image Completion (Nov. 10th)
3. Image Cutout (Nov 17th)
4. Image Matting (Nov 24th)
5. Video Cutout (Dec. 1st)
6. Video Textures (Dec. 8th)
7. Real-time Raytracing (Dec. 15th)
8. Skinning (Dec. 22nd)
9. Skinning by Example (Jan. 12th)
10. Retargetting Animations (Jan. 19th)
11. Motion Capture and IK (Jan. 26th)
12. Control for Smoke Animation (Feb. 2nd)
13. Control for Liquids and Solids (Feb. 9th)

Papers

- Image Synthesis and Editing (Nov. 3rd)
- **Graphcut textures: image and video synthesis using graph cuts**
  Vivek Kwatra, Arno Schödl, Irfan Essa, Greg Turk, Aaron Bobick ACM SIGGRAPH 2003

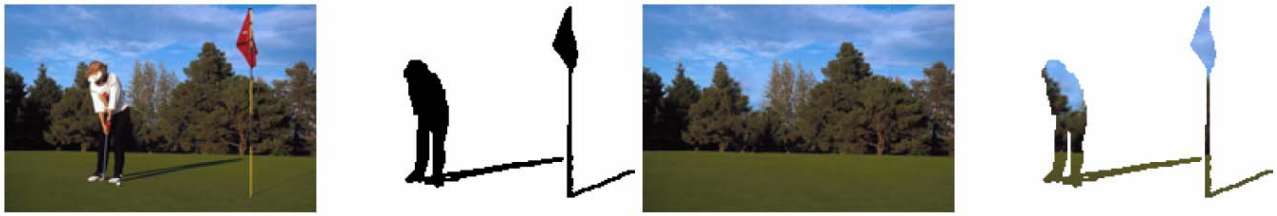
- **Poisson image editing**
  Patrick Pérez, Michel Gangnet, Andrew Blake, ACM SIGGRAPH 2003



Papers

- Image Completion (Nov. 10th)
- **Fragment-based image completion**
  Drori, I., Cohen-Or, D., and Yeshurun, H. ACM SIGGRAPH 2003

- **Image completion with structure propagation**
  Jian Sun, Lu Yuan, Jiaya Jia, Heung-Yeung Shum, ACM SIGGRAPH 2005



Papers

- Image Cutout (Nov 17th)
- **Lazy Snapping**
  Yin Li, Jian Sun, Chi-Keung Tang and Heung-Yeung Shum, ACM SIGGRAPH 2004

- **GrabCut: Interactive Foreground Extraction using Iterated Graph Cuts**
  C. Rother, V. Kolmogorov, A. Blake, ACM SIGGRAPH 2004

Papers

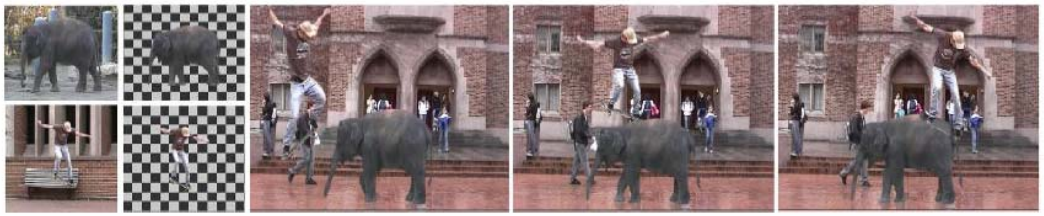
- Image Matting (Nov 24th)
- **A Bayesian Approach to Digital Image Matting**
  Yung-Yu Chuang, Brian Curless, David H. Salesin, and Richard Szeliski, IEEE CVPR 2001

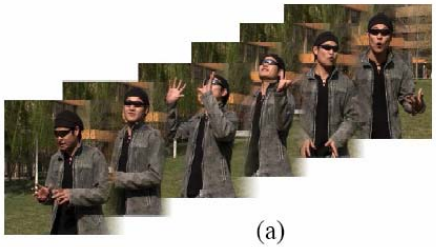
- **Poisson Matting**
  Jian Sun; Jiaya Jia; Chi-Keung Tang; Heung-Yeung Shum, ACM SIGGRAPH 2004

Papers

- Video Cutout (Dec. 1st)
- **Interactive video cutout**
  Jue Wang, Pravin Bhat, R. Alex Colburn, Maneesh Agrawala, Michael F. Cohen, ACM SIGGRAPH 2005

- **Video object cut and paste**
  Yin Li, Jian Sun, Heung-Yeung Shum, ACM SIGGRAPH 2005





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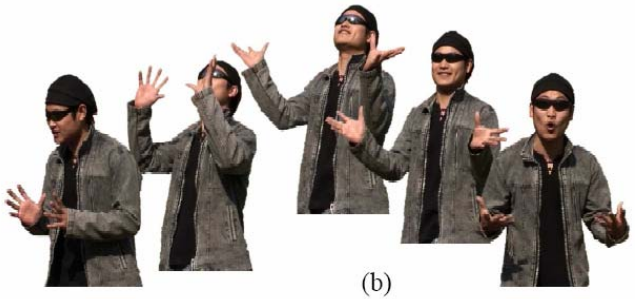

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Papers

- Video Textures (Dec. 8th)
- **Video textures**
  Arno Schödl, Richard Szeliski, David H. Salesin, and Irfan Essa, ACM SIGGRAPH 2000

- **Panoramic video textures**
  Aseem Agarwala, Ke Colin Zheng, Chris Pal, Maneesh Agrawala, Michael Cohen, Brian Curless, David Salesin, Richard Szeliski, ACM SIGGRAPH 2005

Papers

- Real-time Raytracing (Dec. 15th)
- **RPU: a programmable ray processing unit for realtime ray tracing**
  Sven Woop, Jörg Schmittler, Philipp Slusallek, ACM SIGGRAPH 2005
- **Soft shadow volumes for ray tracing**
  Samuli Laine, Timo Aila, Ulf Assarsson, Jaakko Lehtinen, Tomas Akenine-Möller, ACM SIGGRAPH 2005

Papers

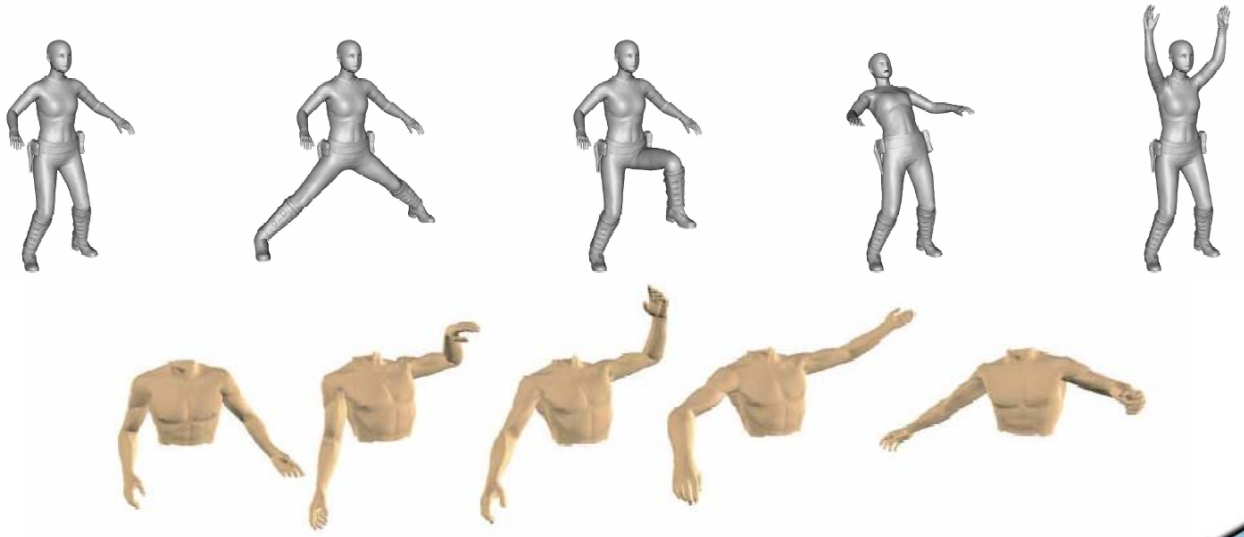
- Skinning (Dec. 22nd)
- **Pose Space Deformations: A Unified Approach to Shape Interpolation and Skeleton-Driven Deformation**
  J. P. Lewis, Matt Cordner and Nickson Fong, ACM SIGGRAPH 2000

- **Skinning Mesh Animations**
  Doug L. James and Christopher D. Twigg, ACM SIGGRAPH 2005

Papers

- Skinning by Example (Jan. 12th)
- **Multi-weight enveloping: least-squares approximation techniques for skin animation**
  Xiaohuan Corina Wang and Cary Phillips, 2002 ACM SIGGRAPH/Eurographics symposium on Computer animation

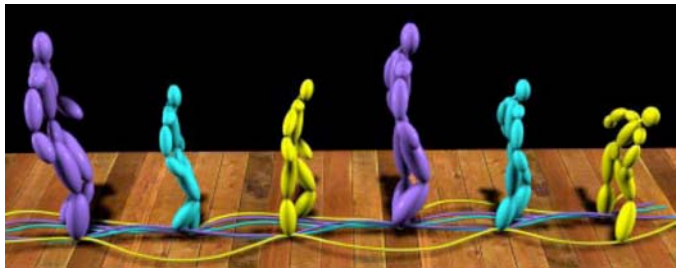
- **Building Efficient, Accurate Character Skins from Examples**
  Alex Mohr and Michael Gleicher, ACM SIGGRAPH 2003

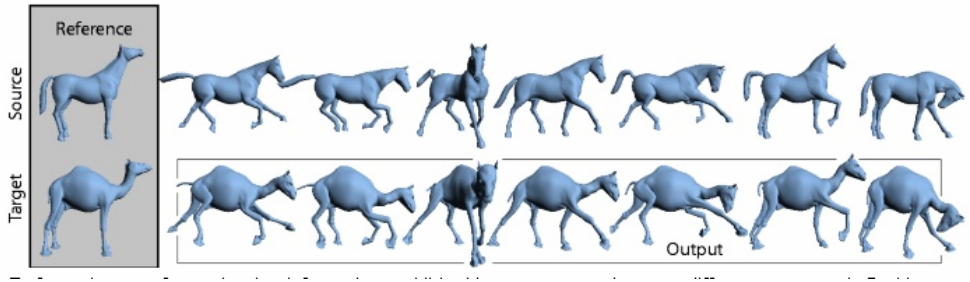


Papers

- Retargetting Animations (Jan. 19th)
- **Retargetting Motion to New Characters**
  Michael Gleicher, ACM SIGGRAPH 1998.

- **Deformation Transfer for Triangle Meshes**
  Robert W. Sumner and Jovan Popovic, ACM SIGGRAPH 2004

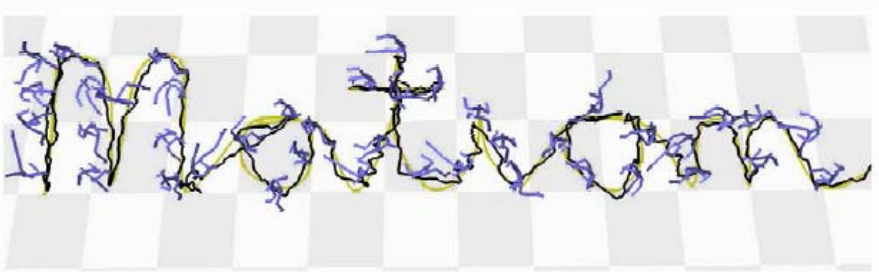


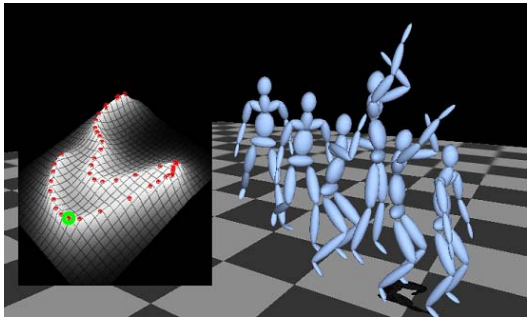


Papers

- Motion Capture and IK (Jan. 26th)
- **Motion graphs**
  Lucas Kovar, Michael Gleicher, Frédéric Pighin, ACM SIGGRAPH 2002

- **Style-Based Inverse Kinematics**
  Keith Grochow, Steven L. Martin, Aaron Hertzmann, Zoran Popovic, ACM SIGGRAPH 2004

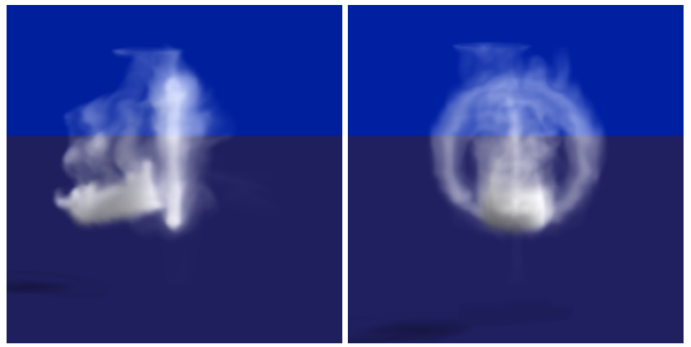




Papers

- Control for Smoke Animation (Feb. 2nd)
- **Keyframe Control of Smoke Simulations**
  Adrien Treuille, Antoine McNamara, Zoran Popovic, Jos Stam, ACM SIGGRAPH 2003

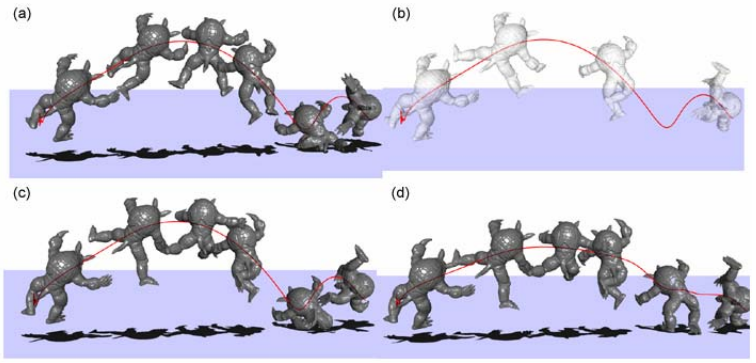
- **Target-driven Smoke Animation**
  Raanan Fattal and Dani Lischinski, ACM SIGGRAPH 2004



Papers

- Control for Liquids and Solids (Feb. 9th)
- **Taming Liquids for Rapidly Changing Targets**
  Lin Shi and Yizhou Yu, ACM SIGGRAPH/Eurographics Symposium on Computer Animation 2005

- **Directable Animation of Elastic Objects**
  Ryo Kondo, Takashi Kanai, Ken-ichi Anjyo, , ACM SIGGRAPH/Eurographics Symposium on Computer Animation 2005



Some Remarks

- Goal of your presentation:
  - Impart knowledge to the audience (not show off that you understood the paper)

Preparation

- Read the paper and background material
- Make sure you understand the subject
  - talk to assistant or contact authors if questions remain
- Think about potential visual aids, e.g., demos, videos, etc.
- Consider other material, e.g., handouts

Structure your talk

- Introduction
  - general context, motivation, problem statement
- Contents of the paper
  - core points of the paper, key contributions, relevant results, relation to other work
- Discussion
  - evaluate the paper from your own perspective
  - discuss pros and cons, talk about your own ideas for future work

Get your message across

- Stress the important points
  - "Tell'em what you are going to tell'em. Tell'em. Then tell'em what you told'em."
- Consider your audience
  - what prior knowledge can you expect?
  - how can you make sure people will be able to follow your presentation?

The Talk

- Practice your talk!
  - get feedback from others or use video camera
  - check the timing
- Talk to the audience not to the screen
- Talk clearly, not too slow or too hasty
- Give the audience time to understand what you tell them

Things to avoid

- Exceed the time limit
- Never practice the talk
- Lose yourself in detailed, confusing explanations
- Too many equations, too many bullets, …
- Ignore the audience

Some quotes

- "Before I speak, have something important to say." -Groucho Marx

see:http://www.erp.wisc.edu/profdev/Scientifically_speaking.pdf

Some quotes

- “A speech is a solemn responsibility. The man who makes a bad speech to two hundred people wastes only half an hour of his own time. But he wastes one hundred hours of the audience’s time-more than four days-which should be a hanging offense” - Jenkin Lloyd Jones

see:http://www.erp.wisc.edu/profdev/Scientifically_speaking.pdf

Some quotes

- " I'm rather like a mosquito in a nudist camp: I know what I ought to do, but don't know where to begin." -Stephen Bayne

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Some quotes

- “Be sincere; be brief; be seated.” - Franklin D. Roosevelt

see:http://www.erp.wisc.edu/profdev/Scientifically_speaking.pdf

Some quotes

- "Many attempts to communicate are nullified by saying too much." – Robert Greenleaf

see:http://www.erp.wisc.edu/profdev/Scientifically_speaking.pdf

Some quotes

- "The human brain starts working the moment you are born and never stops until you stand up to speak in public." - George Jessel

see:http://www.erp.wisc.edu/profdev/Scientifically_speaking.pdf

Some quotes

- “In science as in love, too much concentration on technique can often lead to impotence.” - P.L. Berger, Sociologist and author