Real-time Graphics and Animation

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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*

- **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
Papers

• Video Textures (Dec. 8th)
  • Video textures
  
  • Panoramic video textures
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

• Skinining (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**

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

• Retargetting Animations (Jan. 19th)
  • Retargetting Motion to New Characters

• 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

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

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

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Some quotes

• “Many attempts to communicate are nullified by saying too much.” – Robert Greenleaf

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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