Seminar
Advanced Topics in Rendering

Matthias Teschner
Outline

– Introduction
– Organization
– Presentation
– Topics
– Summary
Computer Graphics

CGI Making of Share a Coke VFX Breakdown by ARMA
Graphics Courses

– Key course
  – Image processing and computer graphics (modeling, rendering, simulation)

– Specialization courses
  – Advanced computer graphics (global illumination)
  – Simulation in computer graphics (solids and fluids)

– B.Sc. / M.Sc. project, lab course, B.Sc. / M.Sc. thesis
  – Simulation track, rendering track
  – By appointment per email, semester-aligned
### Seminars / Projects / Theses in Graphics

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<th>Semester</th>
<th>Simulation Track</th>
<th>Rendering Track</th>
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<tr>
<td>Summer</td>
<td>Key Course</td>
<td>Lab Course - Simple Ray Tracer</td>
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<td>Lab Course - Simple fluid solver</td>
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<td>Winter</td>
<td>Master Project - PPE fluid solver</td>
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Department of Computer Science, University of Freiburg
Outline

– Introduction
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Requirements

– Oral presentation of a rendering topic
  – English / German
  – Slides should be in English
– Written report
  – English / German
Goal

– Familiarize yourself with a topic
– Prepare a comprehensible presentation
– Presentation should be based on scientific publications
  – Do not just reproduce the material
  – Adapt the organization and the focus of the material in order to get a comprehensible presentation
Presentations

– Take place at the same time and in the same room as the introduction
  – Announced in the course catalog and on our web page
    https://cg.informatik.uni-freiburg.de/teaching.htm
    – Advanced Topics in Rendering
    – Schedule

– Attendance is mandatory
Report and Submissions

- Written report (approx. 10 pages)
- Submission of presentation slides and written report in two separate PDF files
  - YourLastName_report.pdf
  - YourLastName_presentation.pdf
- Per email to Prof. Teschner
- Until the last day of lectures of the semester
Consultations

– Voluntary
– Requested per email
– General discussion of the outline
– Content questions
– Discussion of the fully prepared presentation
– Not later than one week prior the presentation
Registration

– Check for available topics and dates
  – https://cg.informatik.uni-freiburg.de/teaching.htm
    – Advanced Topics in Rendering
    – Schedule
– Send an email to Prof. Teschner with your registration request stating name, topic, date, matriculation number
– Do not forget to check your registration in the campus management system
Outline

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Presentation

– 25 min – 35 min per presentation
– 10 min – 15 min discussion
  – Technical questions
  – Form of the presentation
– Example presentation and example report on our web page
Preparation

– Know your topic
  – Examine relevant material thoroughly
  – Do not try to circumvent problems
– Create slides
  – Allow 1 to 2 minutes per slide
  – Slides should be uniform and not too dense
  – Incorporate illustrations, slide titles should be helpful
– Rehearse your presentation
  – Gather feedback, adapt your presentation accordingly
Presentation

– Introduction
  – Introduce yourself and the title of your presentation

– Overview
  – Give an idea, but not too detailed

– Motivation
  – Illustrate the principle and / or applications
  – Explain the goal of your presentation
  – The audience should be eager to listen your presentation
Presentation

– Results
  – Discuss capabilities, properties, benefits, drawbacks

– Main part
  – Should be structured in sections
  – Separate different sections of the presentation explicitly
  – Each section should be introduced and summarized

– Summary
  – Tell the audience what you have told them
  – Ask for questions
References

- Third-party material has to be labeled

Good

Good

Bad


Bibliography

– Examples

– General form
  – [...] Authors; Title of the material; Name of journal, conference, book, thesis, tutorial, web page, date.

– Wrong form
Presentation

– Check the presentation environment prior to the presentation
– Avoid idiosyncrasies
– Stay in time
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Topics

– General concepts
– Rasterization
– Radiosity
– Ray tracing
– Related topics
General Concepts

- Human visual system / light modeling / radiometry
- Materials / shading models / BRDFs
- Rendering equation
- Monte Carlo integration
- Aliasing / Antialiasing
- Sampling / Reconstruction
Rasterization, Radiosity

– Rasterization
  – Topics, not covered in the key course
  – E.g. shadows

– Radiosity
  – Concept
Ray Tracing, Related Topics

- Ray tracing
  - Path tracing
  - Bidirectional methods, e.g. photon mapping
  - Volume ray tracing
- Related topics
  - Acceleration data structures
  - Dual Conturing, (Marching Cubes)
Sources

- Andrew Glassner
  Principles of Digital Image Synthesis
  http://www.realtimerendering.com/raytracing.html

- Matt Pharr, Wenzel Jakob, Greg Humphreys
  Physically Based Rendering
  http://www.pbr-book.org/
Sources

- Philip Dutre, Kavita Bala, Philippe Bekaert
  Advanced Global Illumination
  A K Peters

- Eric Haines, Thomas Akenine-Moeller
  Ray Tracing Gems
  Apress
Outline

- Introduction
- Organization
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Summary

- Oral presentation of 25-35 min
- Written report of 10 pages
- Topics overview and presentation dates
  - https://cg.informatik.uni-freiburg.de/teaching.htm
    - Advanced Topics in Rendering