Image Processing and Computer Graphics

Computer Graphics

Matthias Teschner

Computer Science Department
University of Freiburg
Outline

- organization
- research of the graphics group
- rendering pipeline
Organization

- class
  - 082 006: Monday 10-12, Tuesday 10-12
  - Prof. Matthias Teschner

- exercises
  - 082 021, 028, 029: Tuesday 10-12
  - tba

- check web page for the exact schedule
  - http://cg.informatik.uni-freiburg.de/teaching.htm

- two parts
  - computer graphics
  - image processing (starts on Dec 4)
Contact

- Prof. Matthias Teschner
  - teschner@informatik.uni-freiburg.de
  - 052 / 01-005

- tba
  - tba
Exercises / Exam

- exercises
  - Nov 7, Nov 14, Nov 21,
  - practical exercises
  - check web page for information
  - processing is optional, but recommended
  - use of the provided source code is optional

- exam
  - written exam
  - test exam
Course Goals

- introduction to the fundamentals of rasterization-based image generation
- functionality of the graphics rendering pipeline
- advanced rendering effects
- introduction to the OpenGL graphics API
- requirements
  - C / C++
  - basics in linear algebra
*Slide Sets*

- slide sets, exercises and solutions on [http://cg.informatik.uni-freiburg.de/teaching.htm](http://cg.informatik.uni-freiburg.de/teaching.htm)
Material

- T. Akenine-Möller, E. Haines: Real-time Rendering
  A. K. Peters Ltd.,
  http://www.realtimerendering.com
Further Readings

- D. F. Rogers: *Procedural Elements of Computer Graphics*
  McGraw-Hill, 1997
- A. Watt: *3D Computer Graphics*
  Addison-Wesley, 1999
- J. Foley, A. van Dam, S. Feiner, J. Hughes: *Computer Graphics – Principles and Practice*
  Addison-Wesley, 1990
- J. Encarnacão, W. Strasser, R. Klein: *Graphische Datenverarbeitung*
  Oldenburg Verlag, 1996
Syllabus

- Oct 16 - Rendering Pipeline
- Oct 17 - OpenGL
- Oct 23 - Transformations
- Oct 24 - Projections
- Oct 30 - Lighting
- Nov 6 - Lighting
- Nov 7 - Exercise
- Nov 13 - Rasterization
- Nov 14 - Exercise
- Nov 20 - Shadows
- Nov 21 - Exercise
- Nov 27 - Texturing
- Nov 28 - Transparency, Reflection
- tba - Evaluation, Q & A
Course Information

- key course
  - pattern recognition and computer graphics (rasterization-based rendering)

- specialization courses
  - advanced computer graphics (ray tracing)
  - simulation in computer graphics (e.g., fluids)

- master project, lab course, Master thesis
  - two tracks: simulation, rendering
### Seminars / Projects / Theses in Graphics

<table>
<thead>
<tr>
<th>Semester</th>
<th>Simulation Track</th>
<th>Rendering Track</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter</td>
<td>Rasterization Course</td>
<td>Rasterization Course</td>
</tr>
<tr>
<td></td>
<td>Simulation Course</td>
<td></td>
</tr>
<tr>
<td>Summer</td>
<td>Lab Course</td>
<td>Raytracing Course</td>
</tr>
<tr>
<td></td>
<td>- simple fluid solver</td>
<td>Lab Course</td>
</tr>
<tr>
<td></td>
<td>Simulation Seminar</td>
<td>- simple raytracer</td>
</tr>
<tr>
<td>Winter</td>
<td>Master Project</td>
<td>Master Project</td>
</tr>
<tr>
<td></td>
<td>- PPE fluid solver</td>
<td>- Monte Carlo raytracer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rendering Seminar</td>
</tr>
<tr>
<td>Summer</td>
<td>Master Thesis</td>
<td>Master Thesis</td>
</tr>
<tr>
<td></td>
<td>- research-oriented topic</td>
<td>- research-oriented topic</td>
</tr>
</tbody>
</table>