Interactive Photorealistic Rendering (Advanced Computer Graphics)

Tobias Isenberg

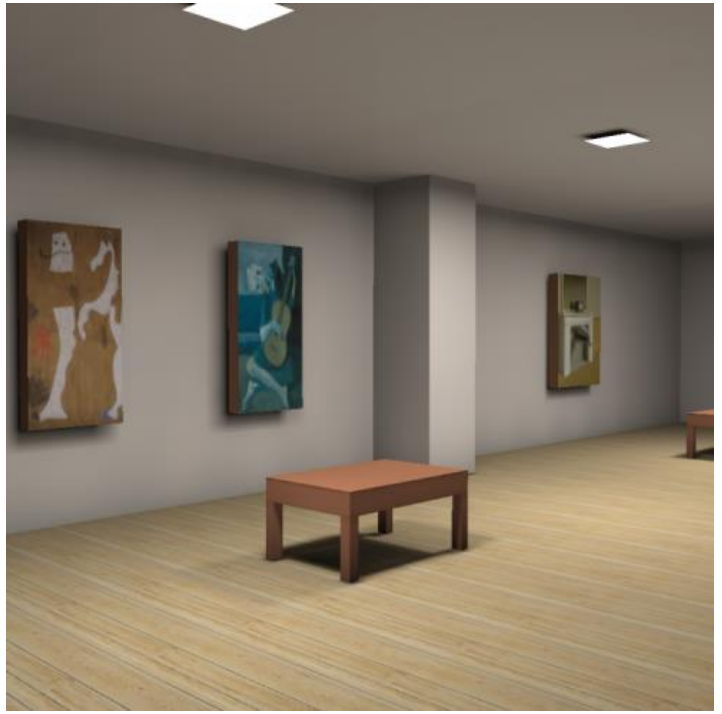
informatics mathematics Inria

Lecture topics

- computer graphics on the GPU

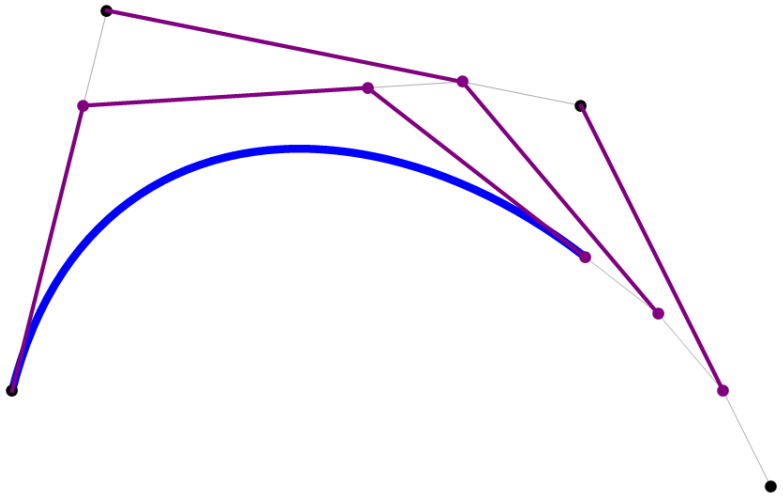
Lecture topics

- computer graphics on the GPU
- global illumination: raytracing & radiosity



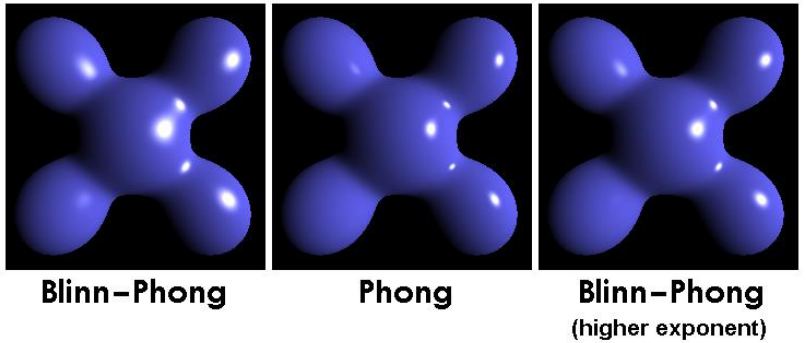
Lecture topics

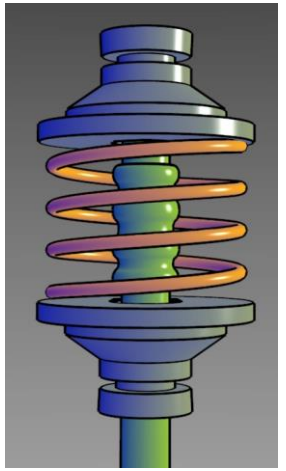
- computer graphics on the GPU
- global illumination: raytracing & radiosity
- curves and surfaces

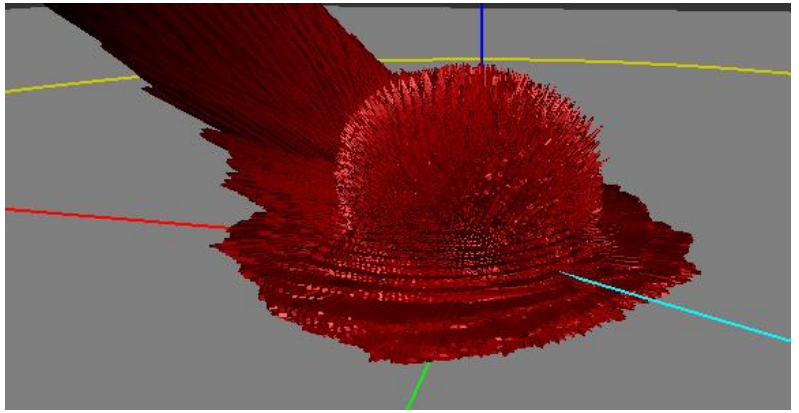


Lecture topics

- computer graphics on the GPU
- global illumination: raytracing & radiosity
- curves and surfaces
- advanced illumination models, BRDFs

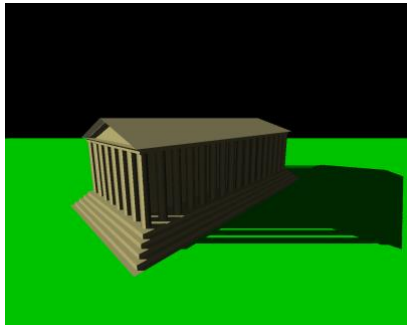


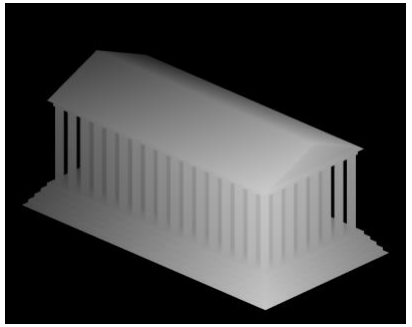


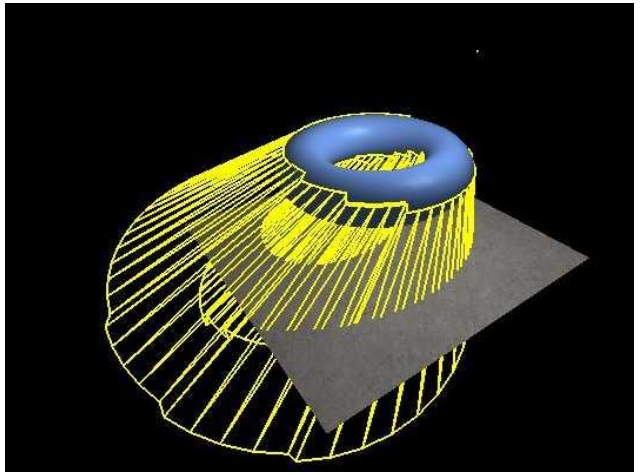


Lecture topics

- computer graphics on the GPU
- global illumination: raytracing & radiosity
- curves and surfaces
- advanced illumination models, BRDFs
- shadow computation







Lecture topics

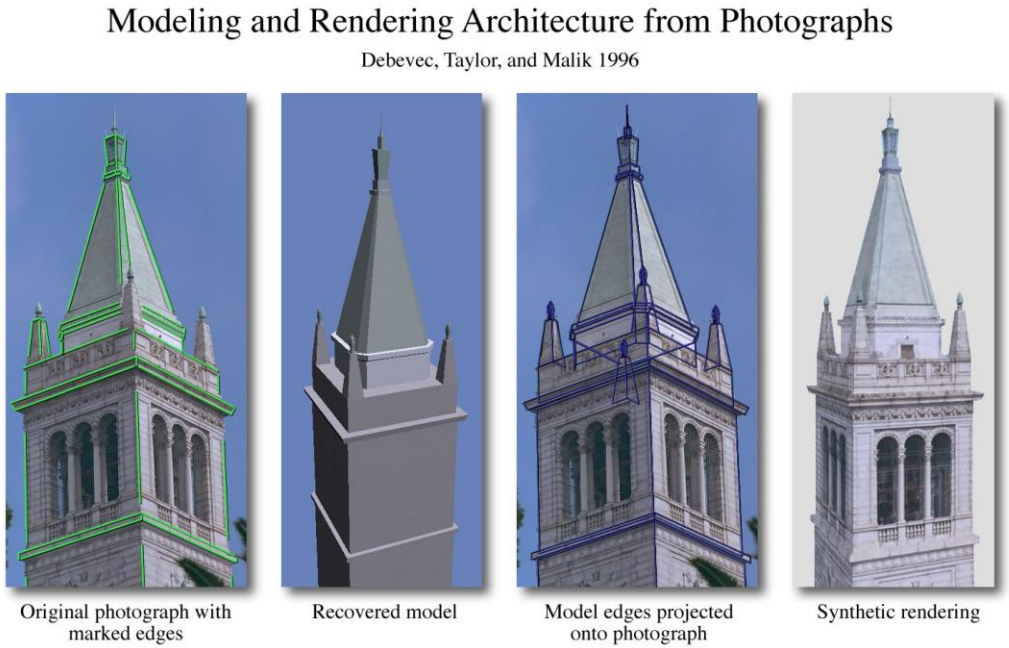
- computer graphics on the GPU
- global illumination: raytracing & radiosity
- curves and surfaces
- advanced illumination models, BRDFs
- shadow computation
- sub-surface scattering

Lecture topics

- computer graphics on the GPU
- global illumination: raytracing & radiosity
- curves and surfaces
- advanced illumination models, BRDFs
- shadow computation
- sub-surface scattering
- real-time GPU raytracing

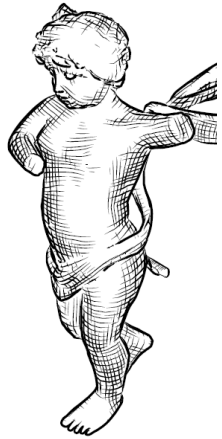
Lecture topics

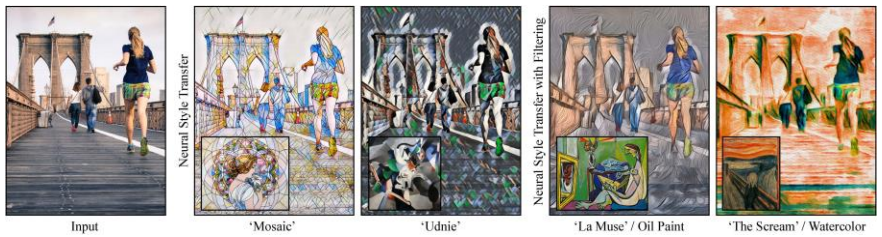
- computer graphics on the GPU
- global illumination: raytracing & radiosity
- curves and surfaces
- advanced illumination models, BRDFs
- shadow computation
- sub-surface scattering
- real-time GPU raytracing
- image-based rendering



Lecture topics

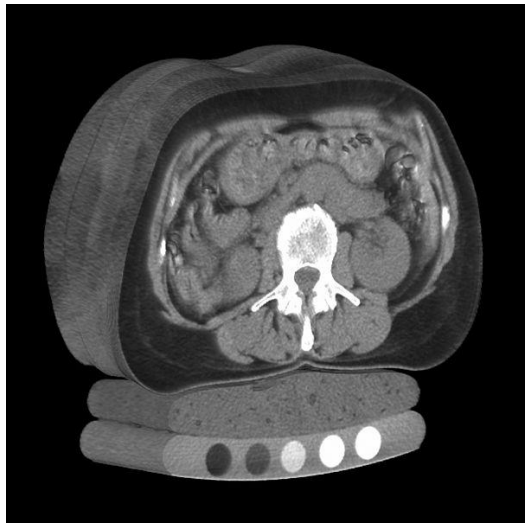
- computer graphics on the GPU
- global illumination: raytracing & radiosity
- curves and surfaces
- advanced illumination models, BRDFs
- shadow computation
- sub-surface scattering
- real-time GPU raytracing
- image-based rendering
- non-photorealistic rendering

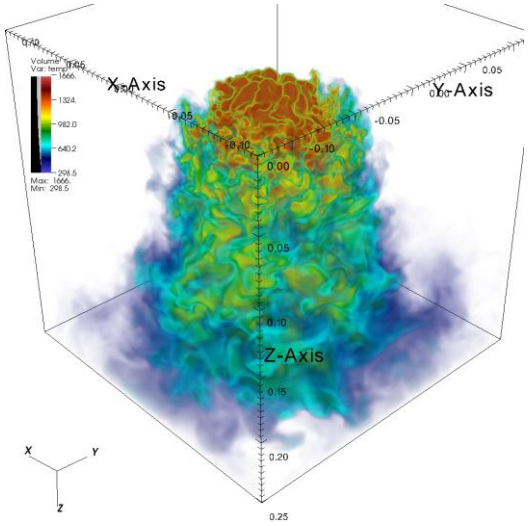




Lecture topics

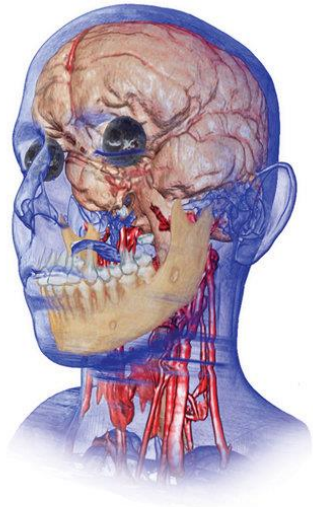
- computer graphics on the GPU
- global illumination: raytracing & radiosity
- curves and surfaces
- advanced illumination models, BRDFs
- shadow computation
- sub-surface scattering
- real-time GPU raytracing
- image-based rendering
- non-photorealistic rendering
- voxels & volume rendering

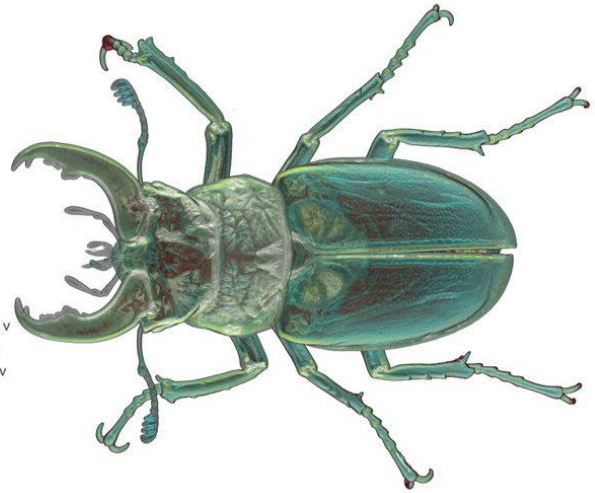




Lecture topics

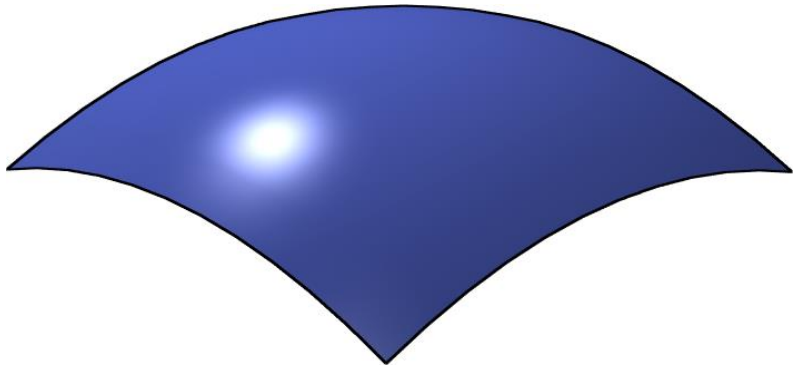
- computer graphics on the GPU
- global illumination: raytracing & radiosity
- curves and surfaces
- advanced illumination models, BRDFs
- shadow computation
- sub-surface scattering
- real-time GPU raytracing
- image-based rendering
- non-photorealistic rendering
- voxels & volume rendering
- applications, topics in visualization

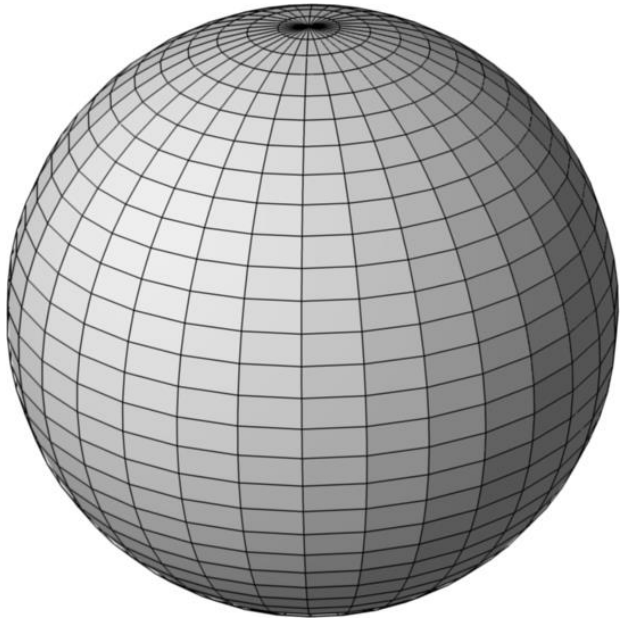


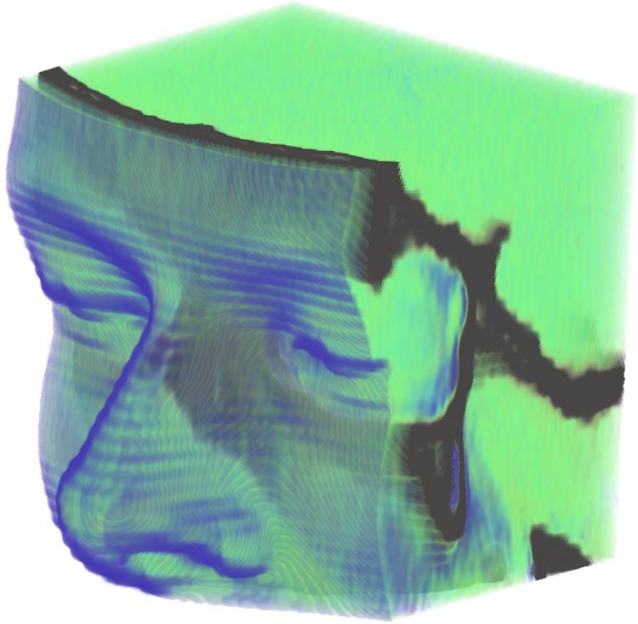


Expected background: Basic CG class

- object representations, 2D/3D transformations

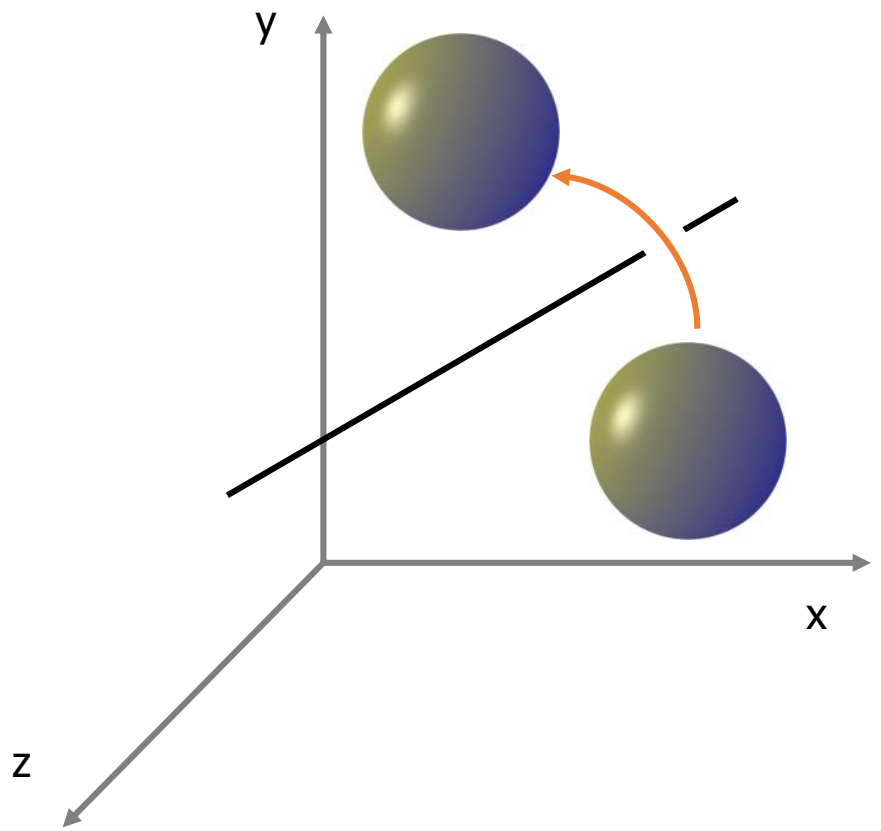






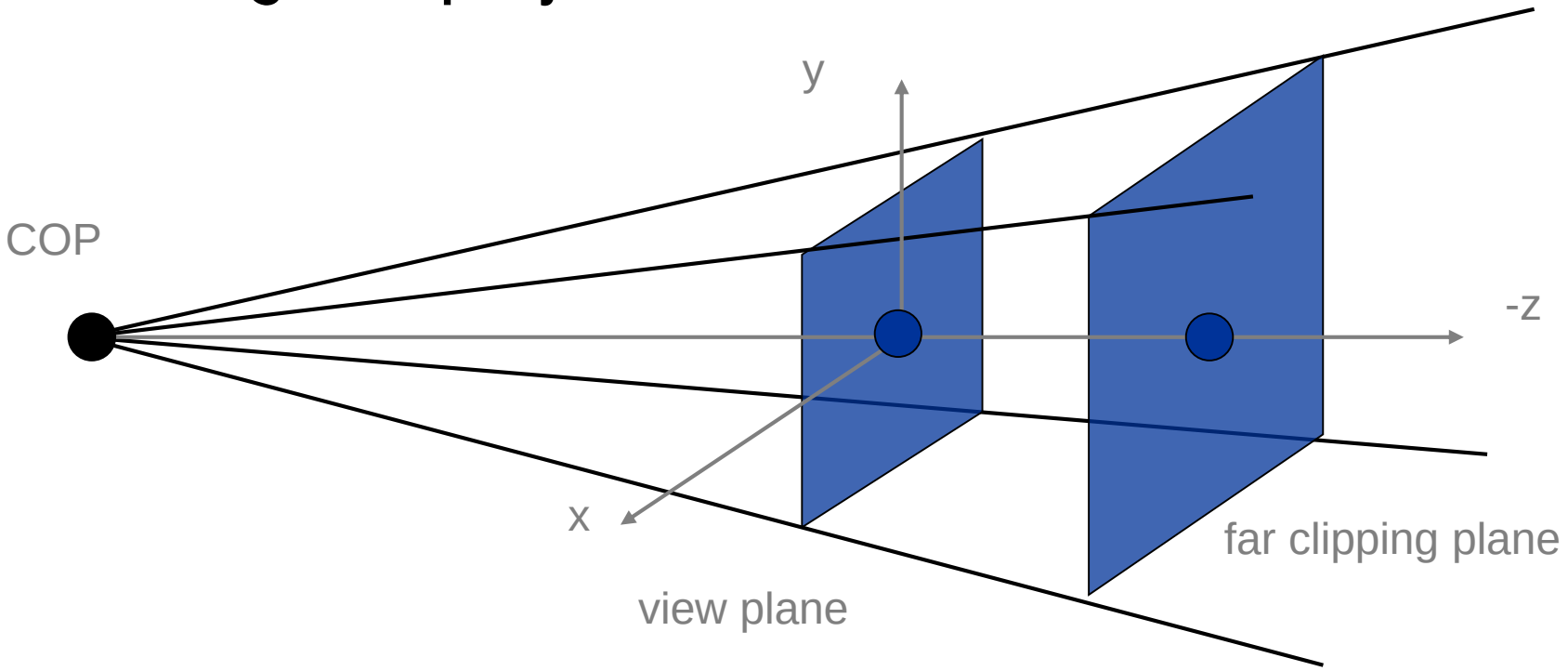
Expected background: Basic CG class

- object representations, 2D/3D transformations



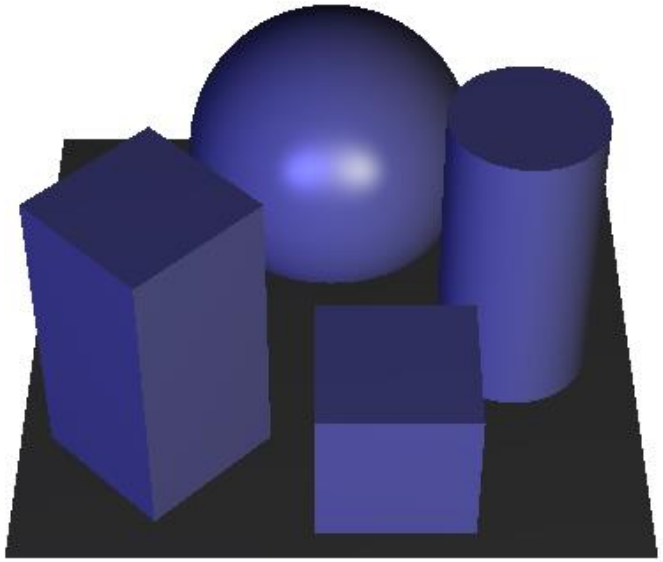
Expected background: Basic CG class

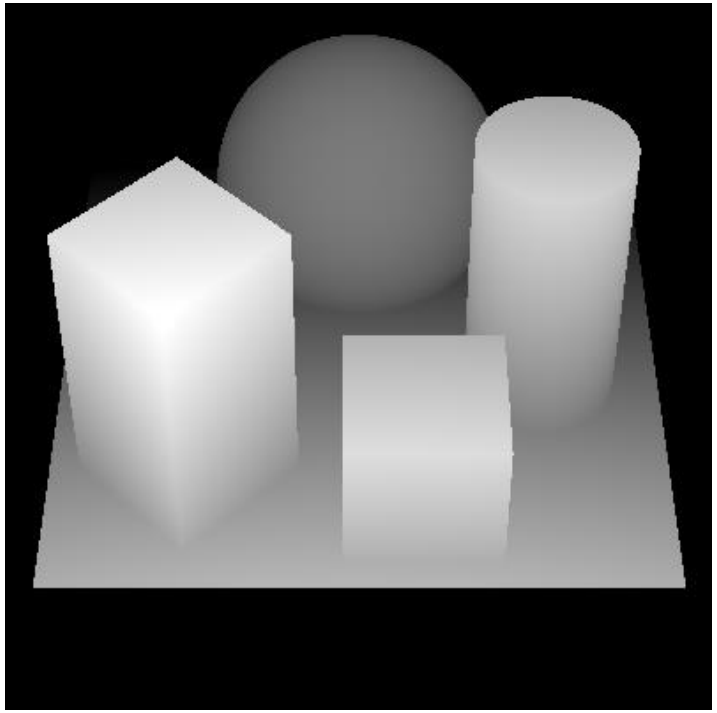
- object representations, 2D/3D transformations
- viewing and projections



Expected background: Basic CG class

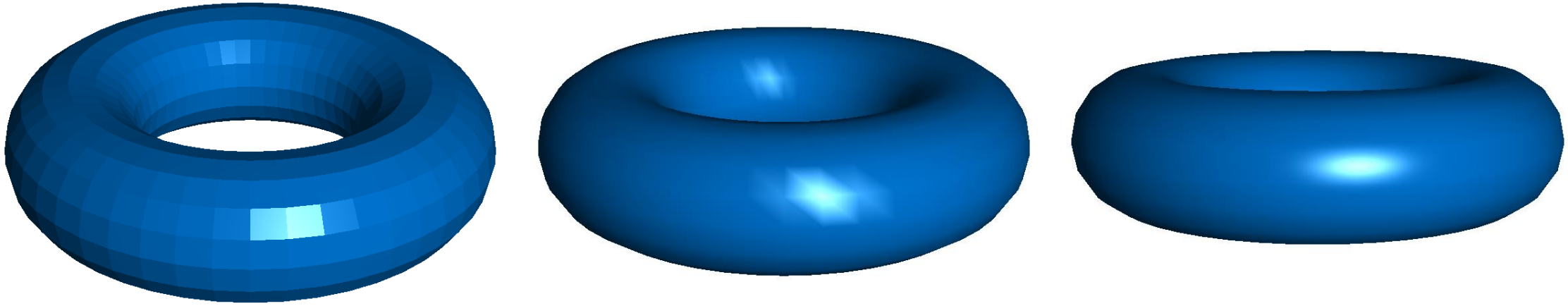
- object representations, 2D/3D transformations
- viewing and projections
- hidden surface removal, anti-aliasing





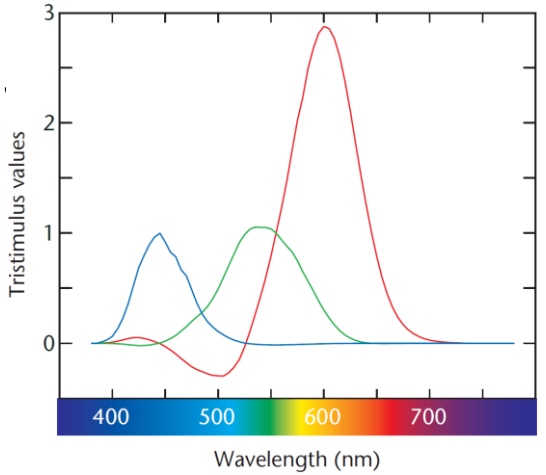
Expected background: Basic CG class

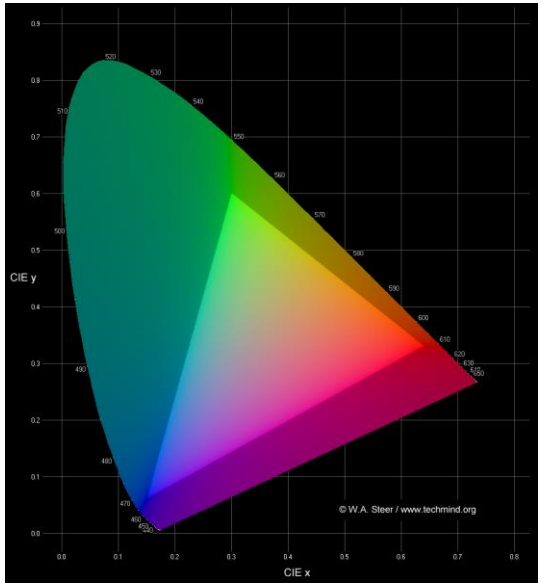
- object representations, 2D/3D transformations
- viewing and projections
- hidden surface removal, anti-aliasing
- illumination and shading



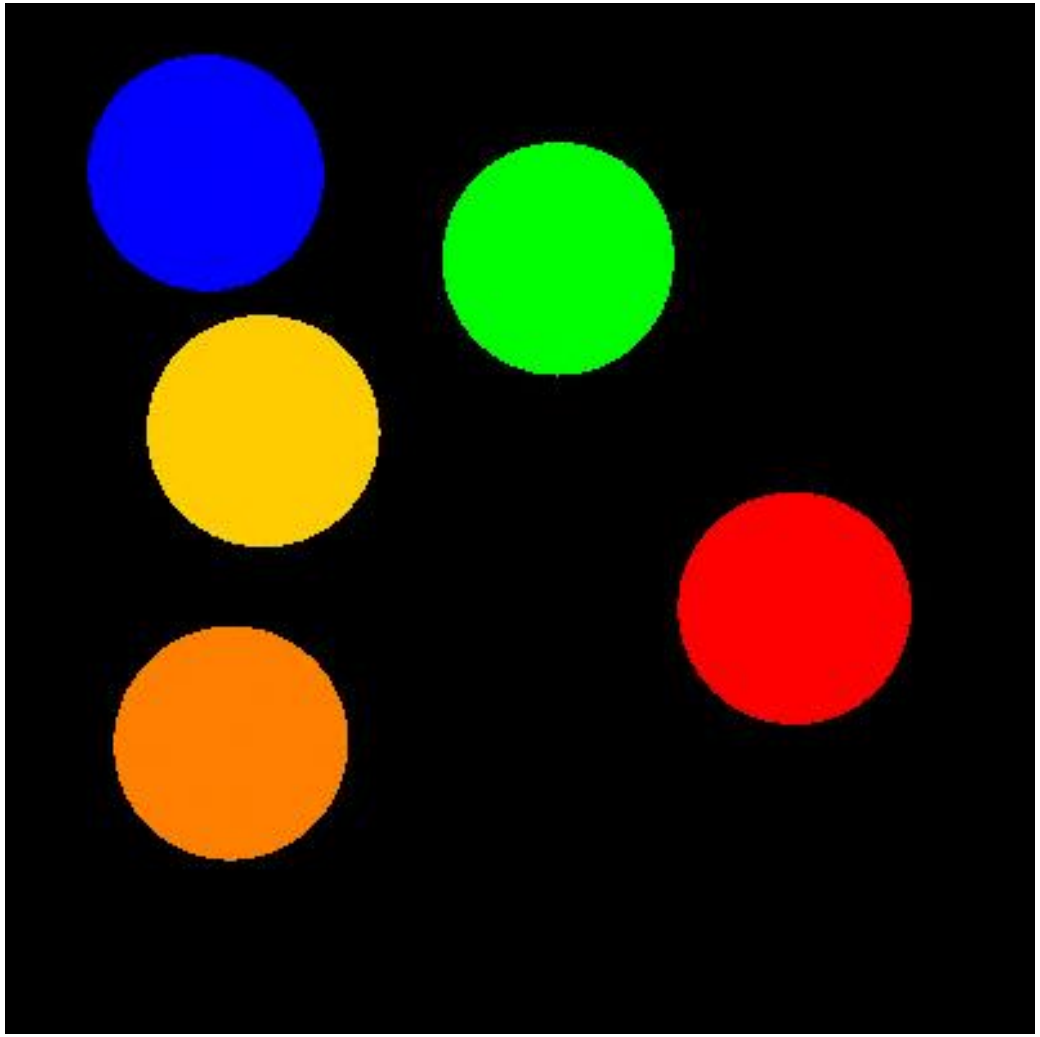
Expected background: Basic CG class

- object representations, 2D/3D transformation
- viewing and projections
- hidden surface removal, anti-aliasing
- illumination and shading
- texture mapping and color models

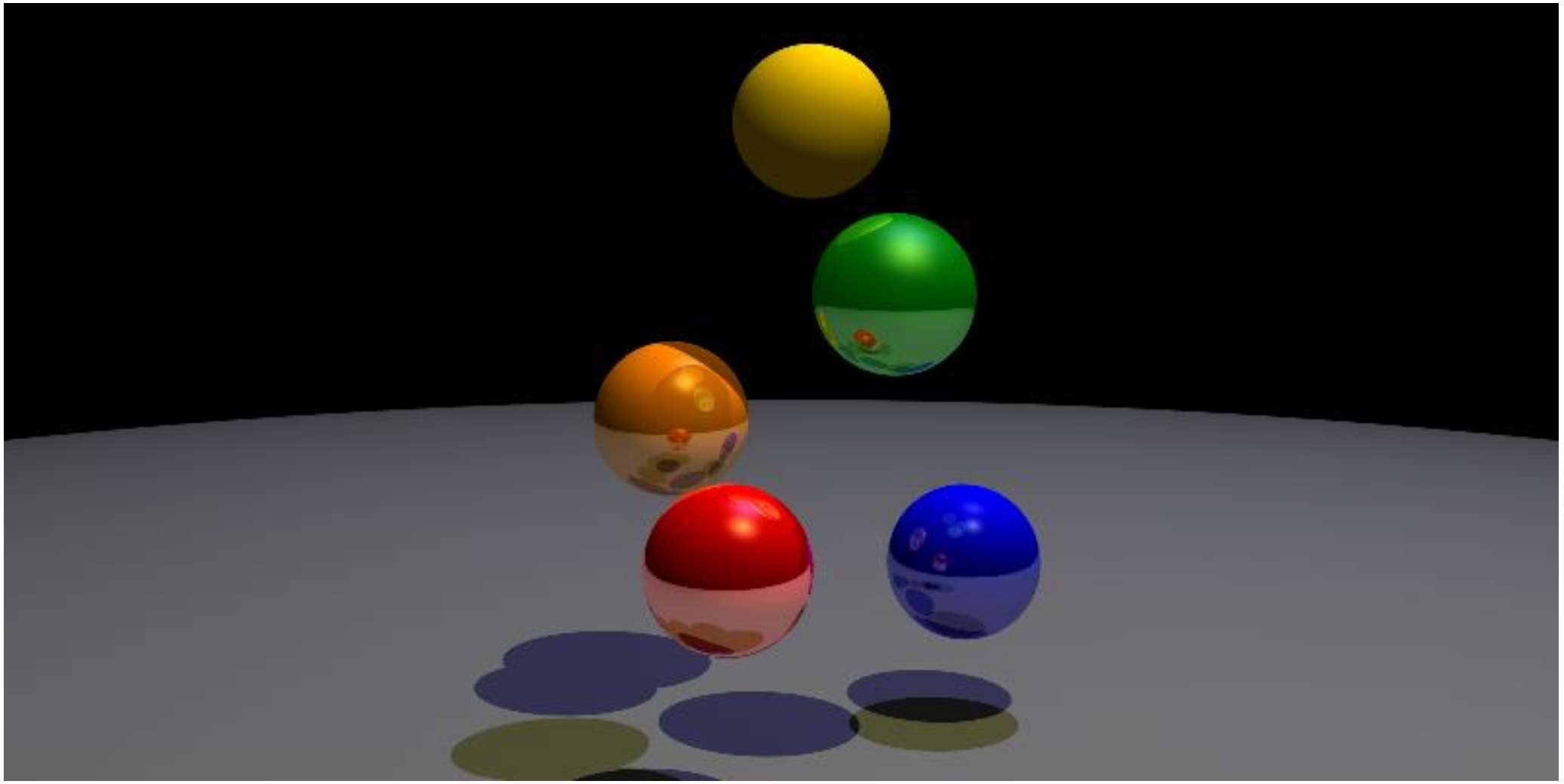




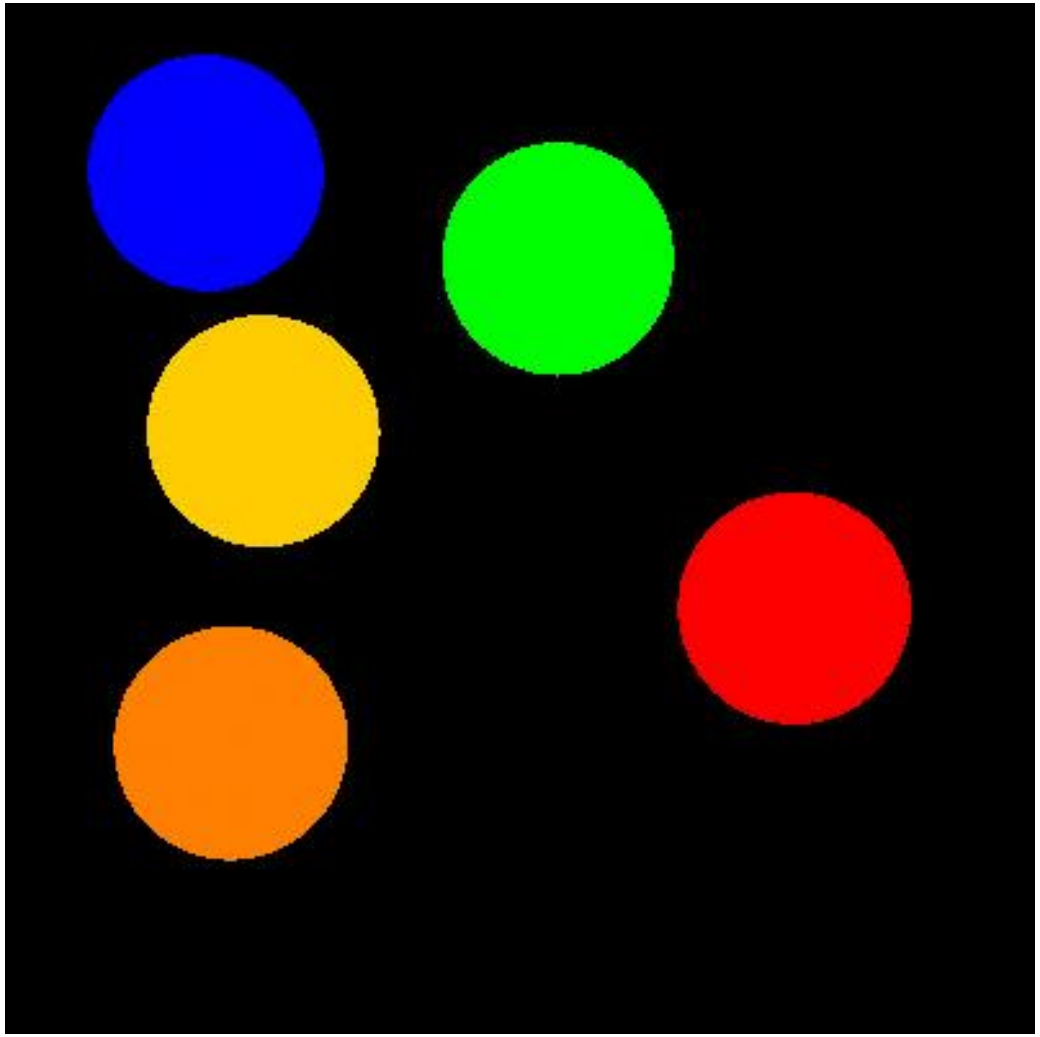
Lab sessions: Raytracer



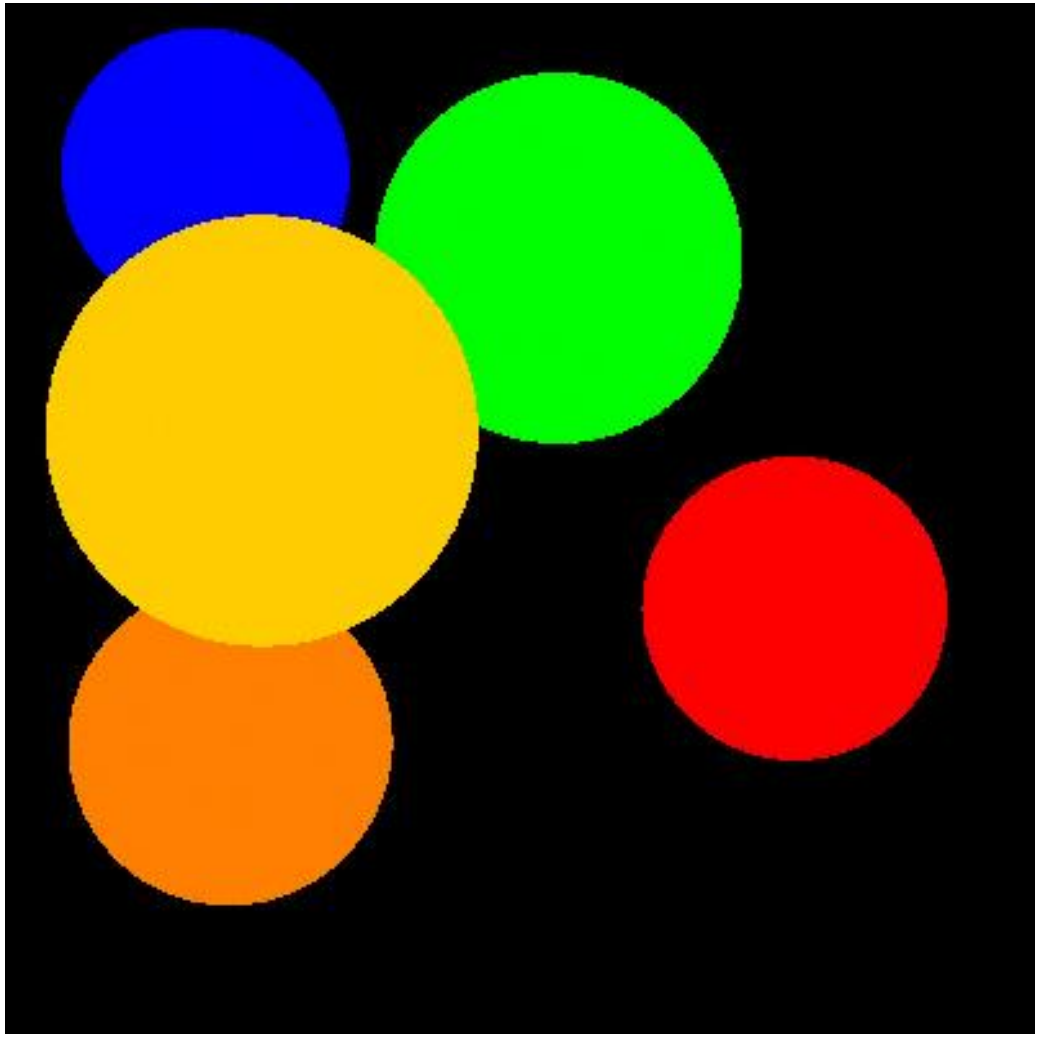
Lab sessions: Raytracer



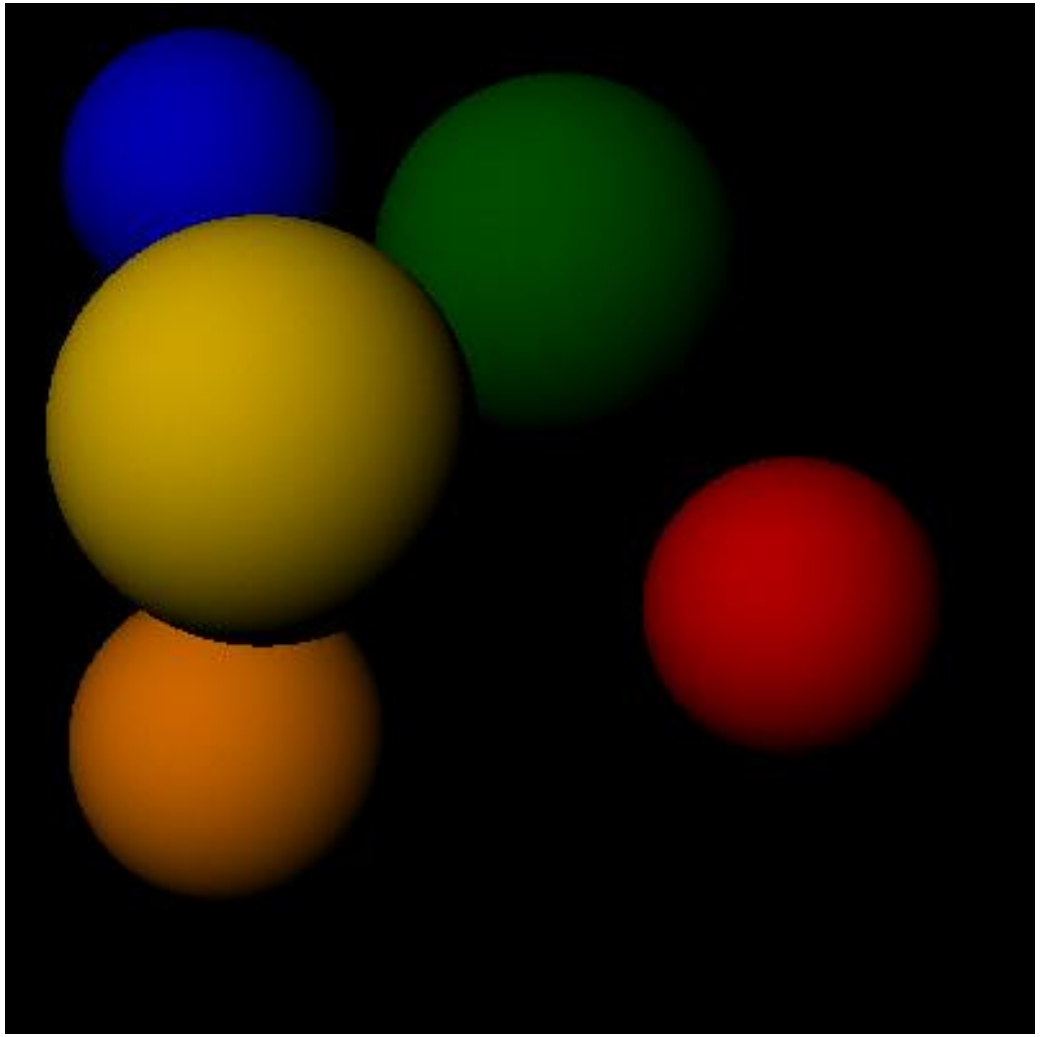
Lab sessions: Raytracer



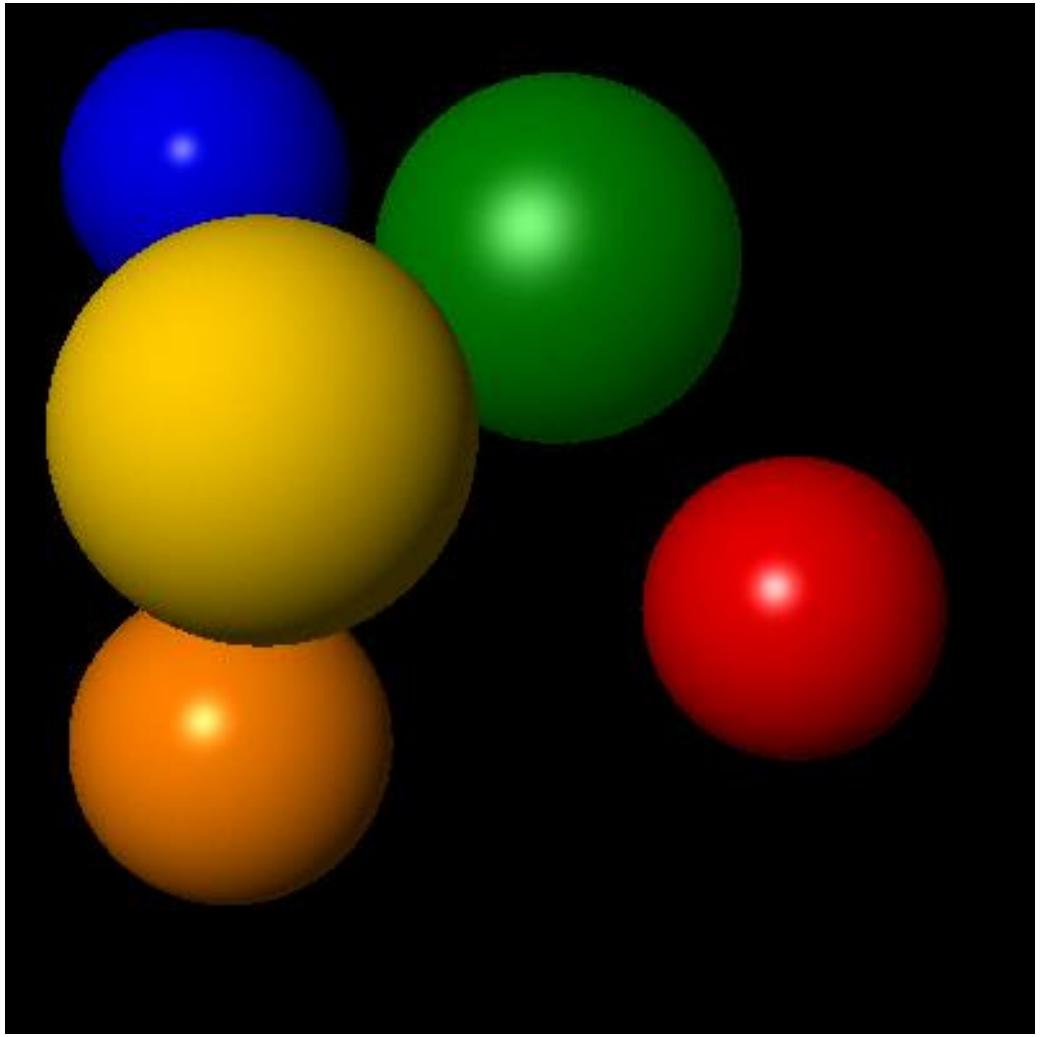
Lab sessions: Raytracer



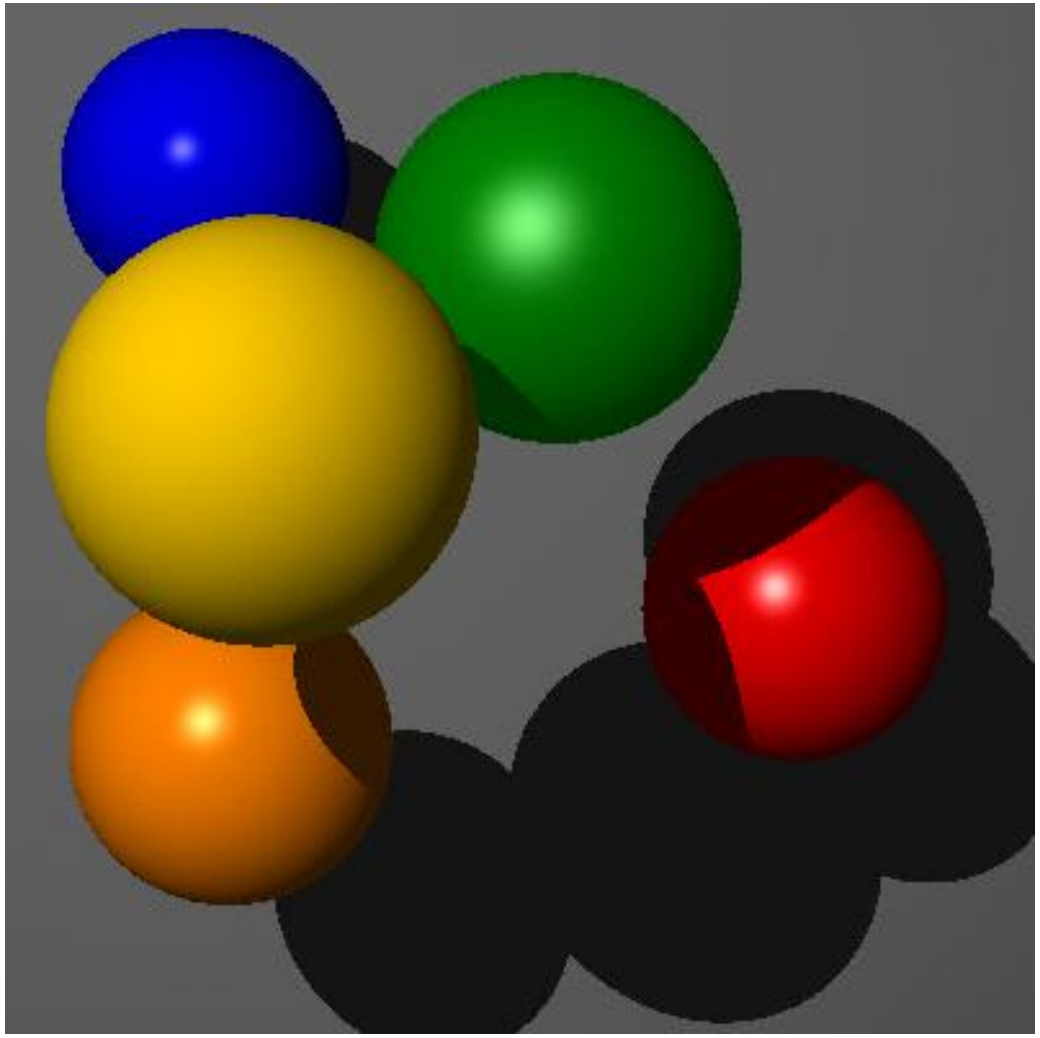
Lab sessions: Raytracer



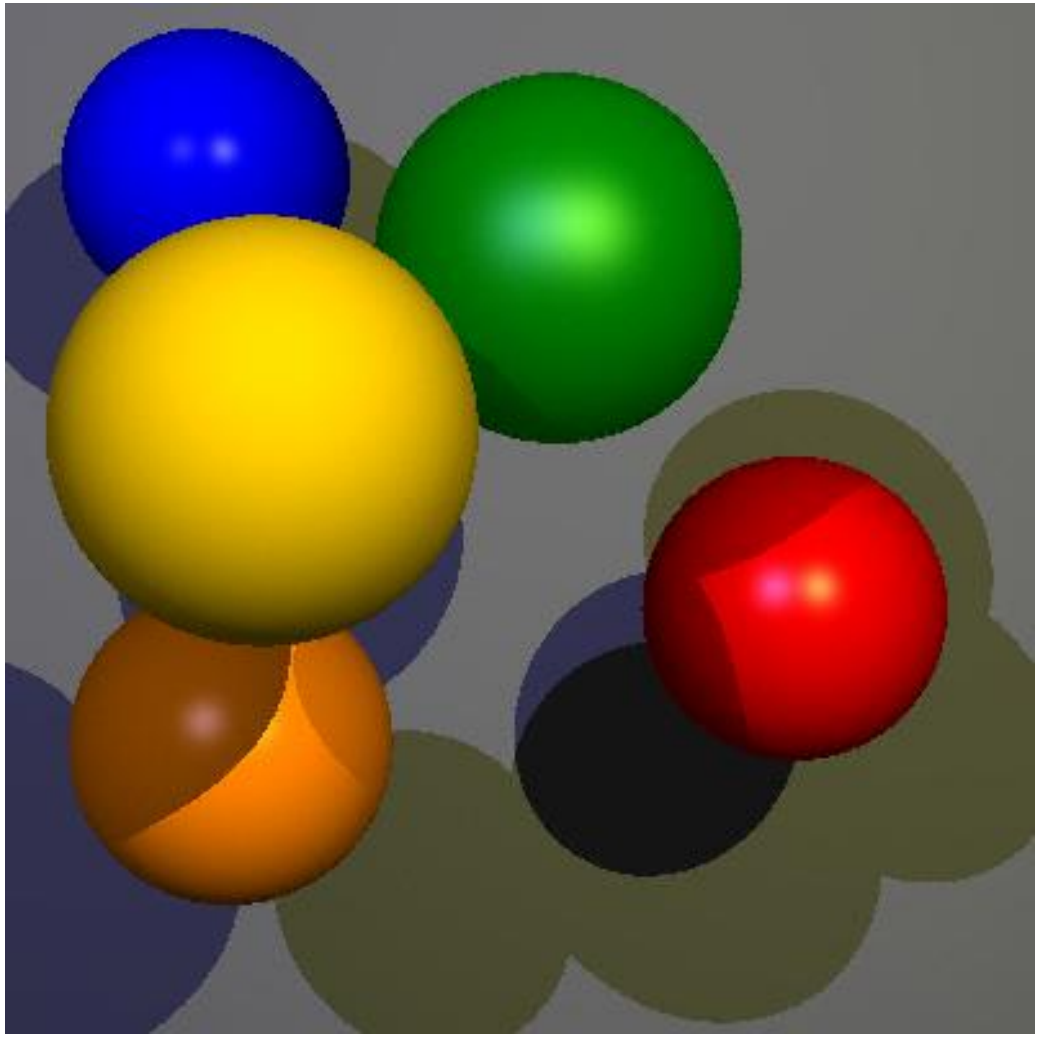
Lab sessions: Raytracer



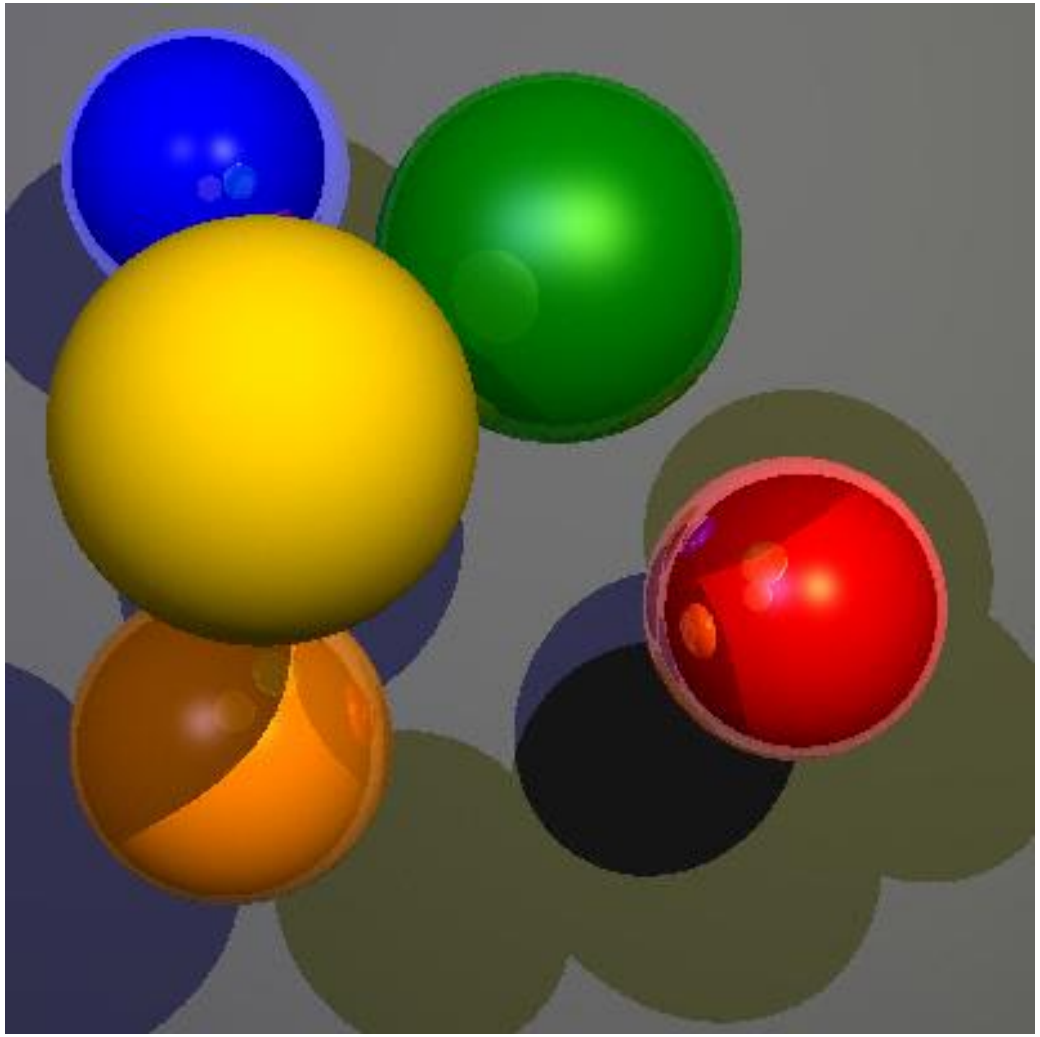
Lab sessions: Raytracer



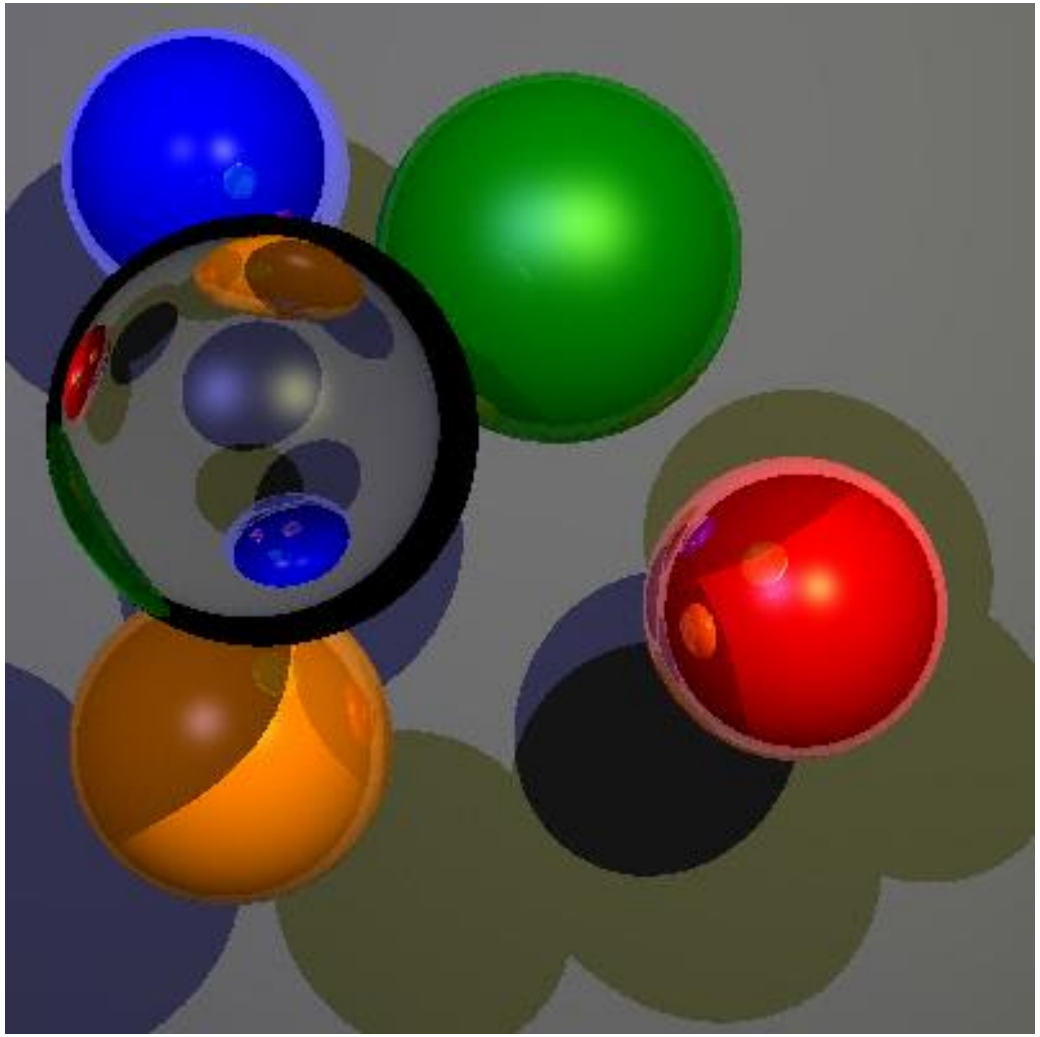
Lab sessions: Raytracer



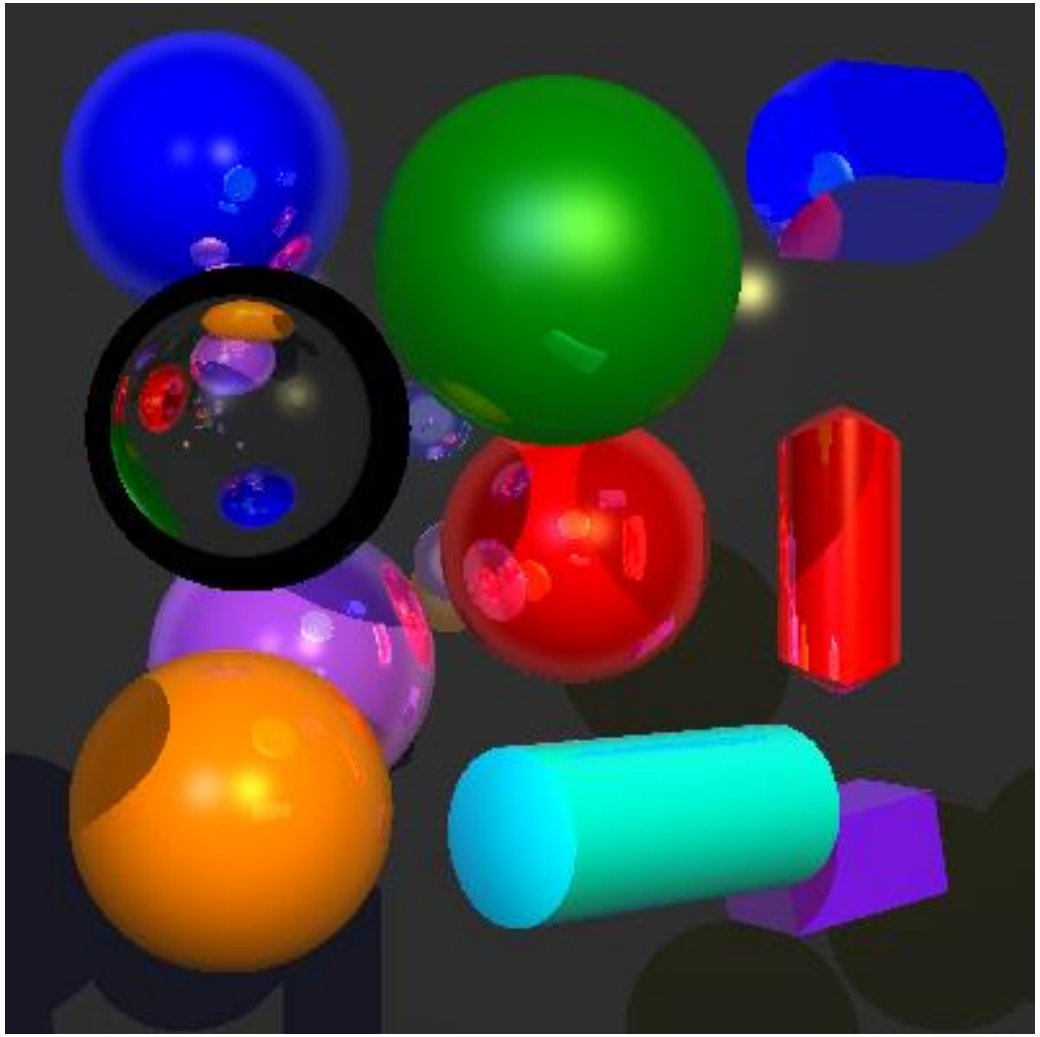
Lab sessions: Raytracer



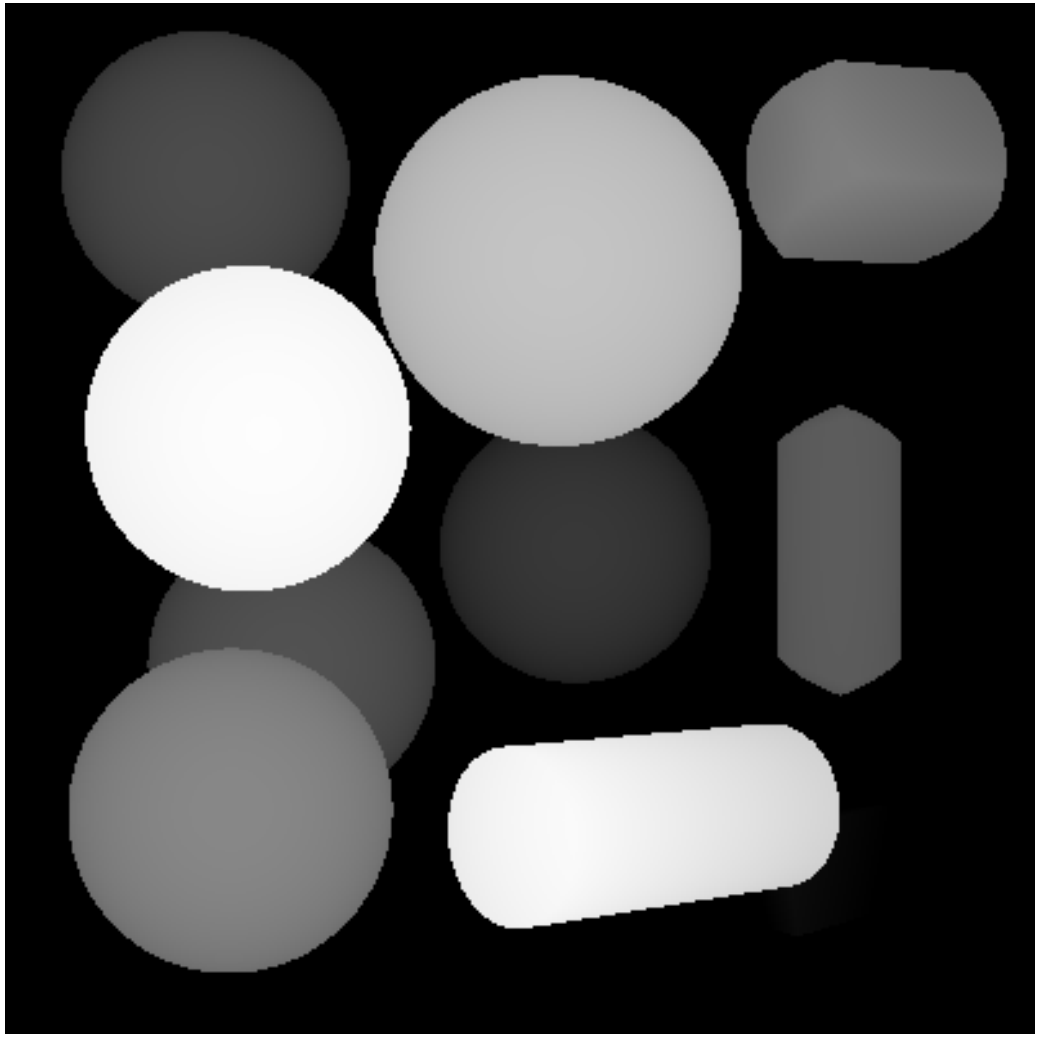
Lab sessions: Raytracer



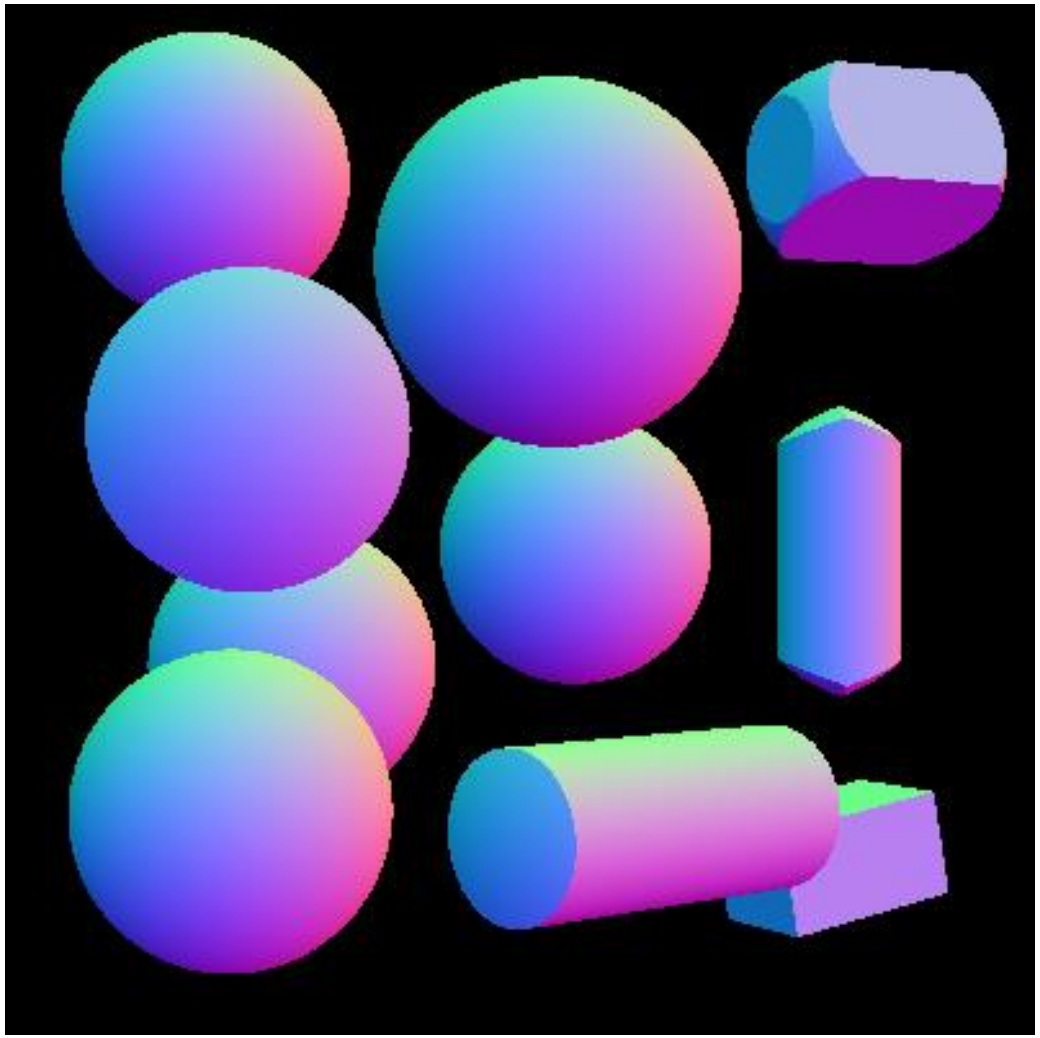
Lab sessions: Raytracer



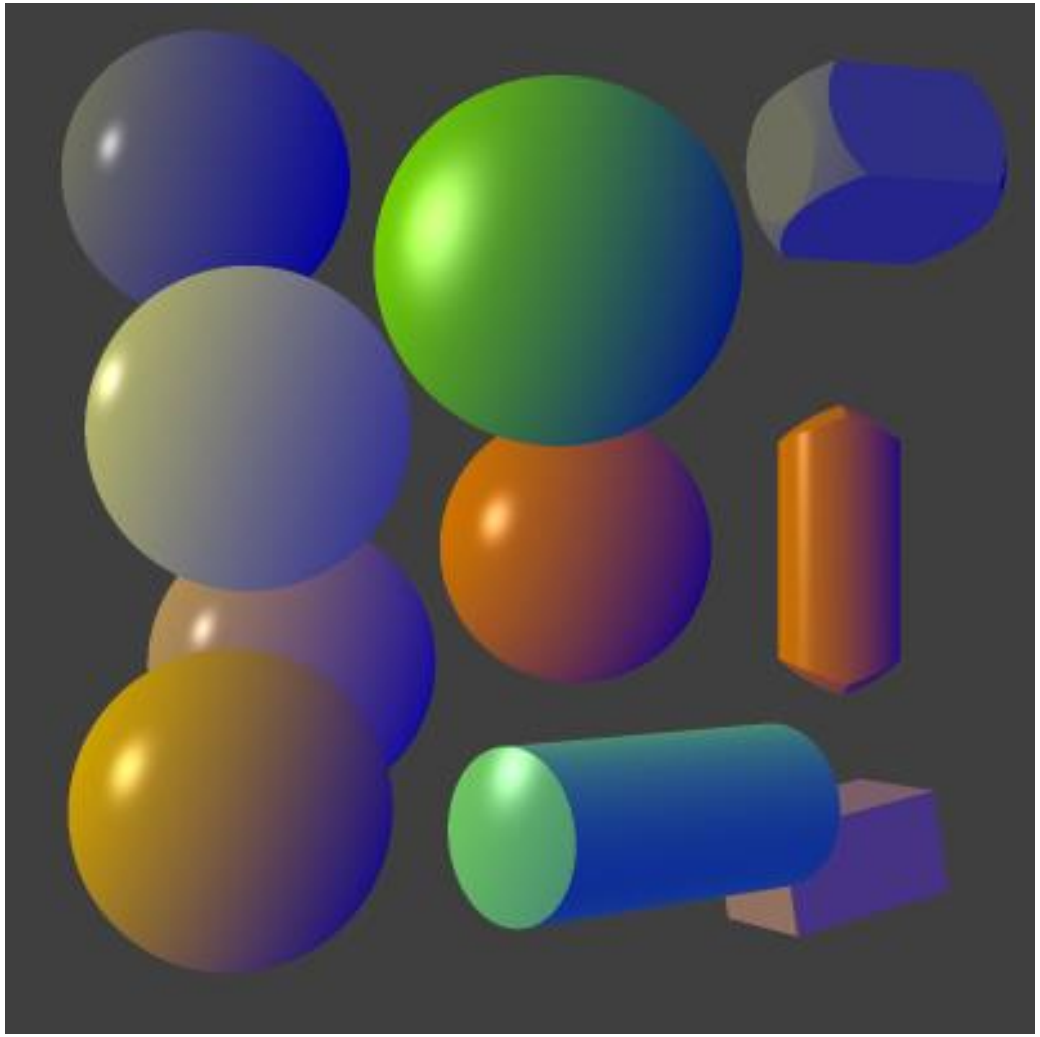
Lab sessions: Raytracer



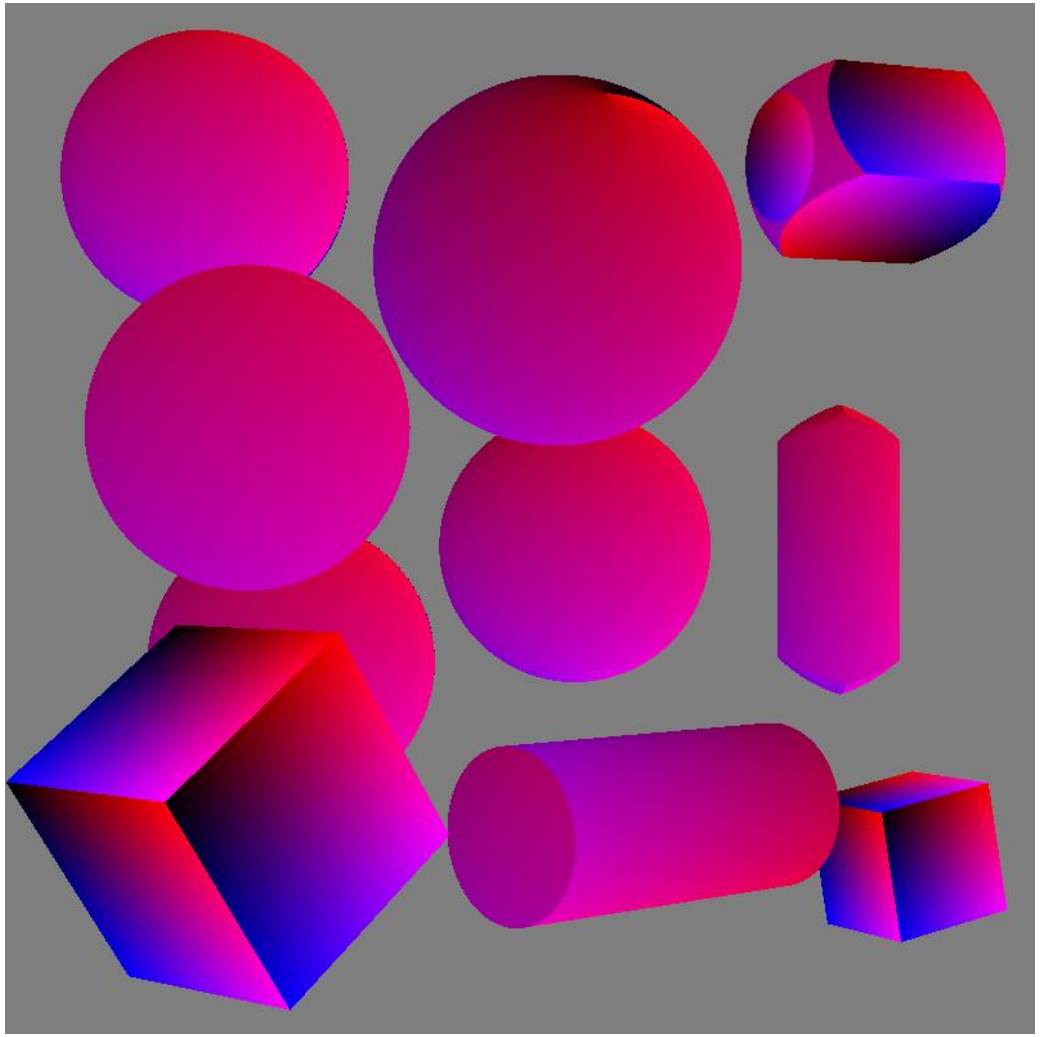
Lab sessions: Raytracer



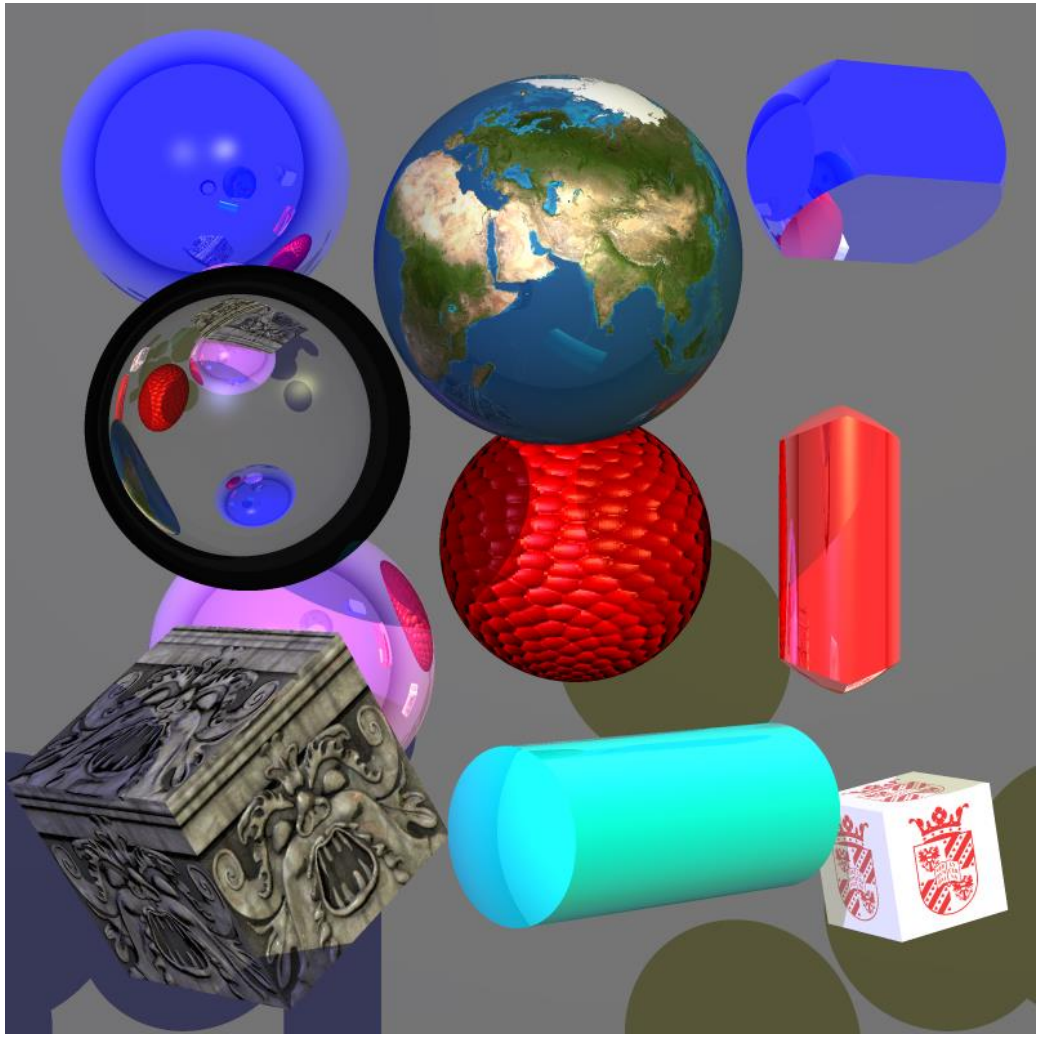
Lab sessions: Raytracer



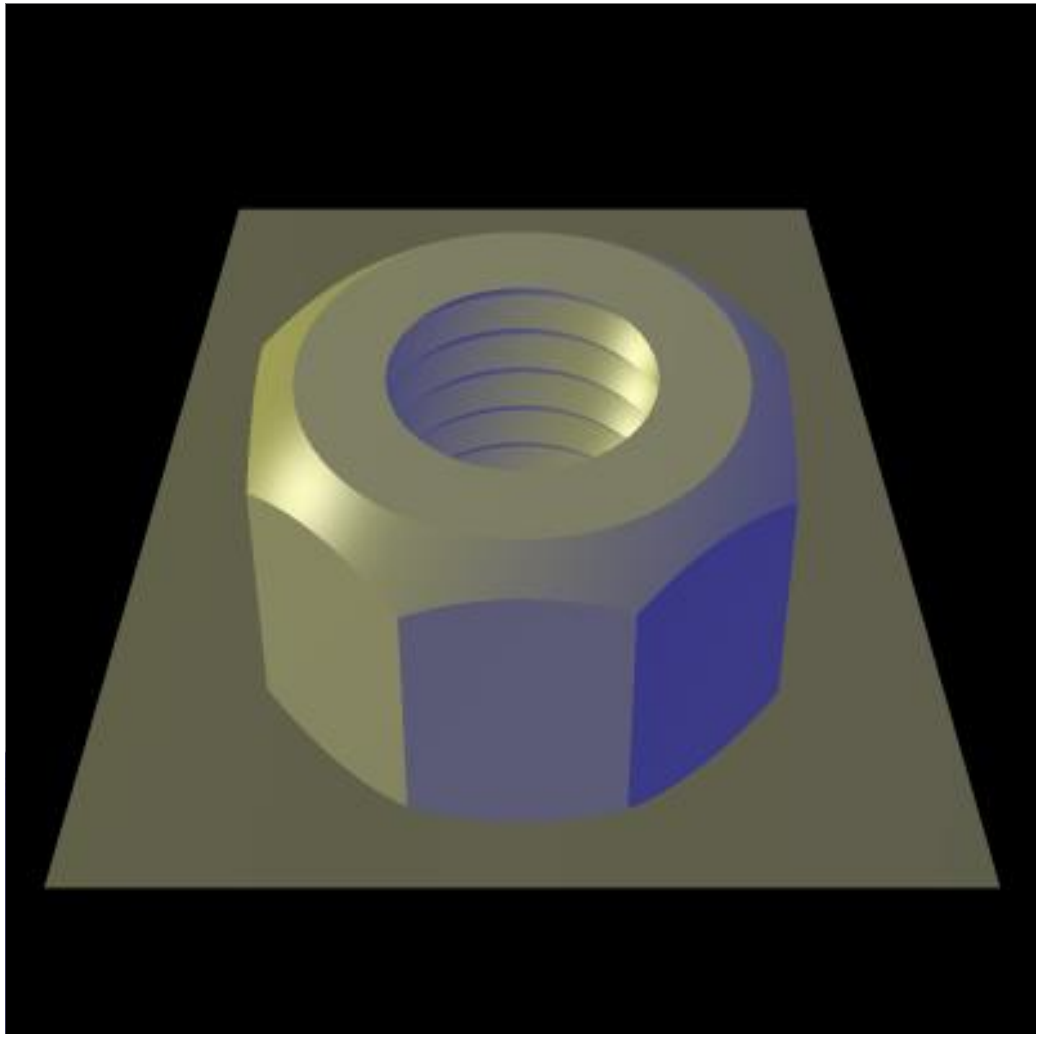
Lab sessions: Raytracer



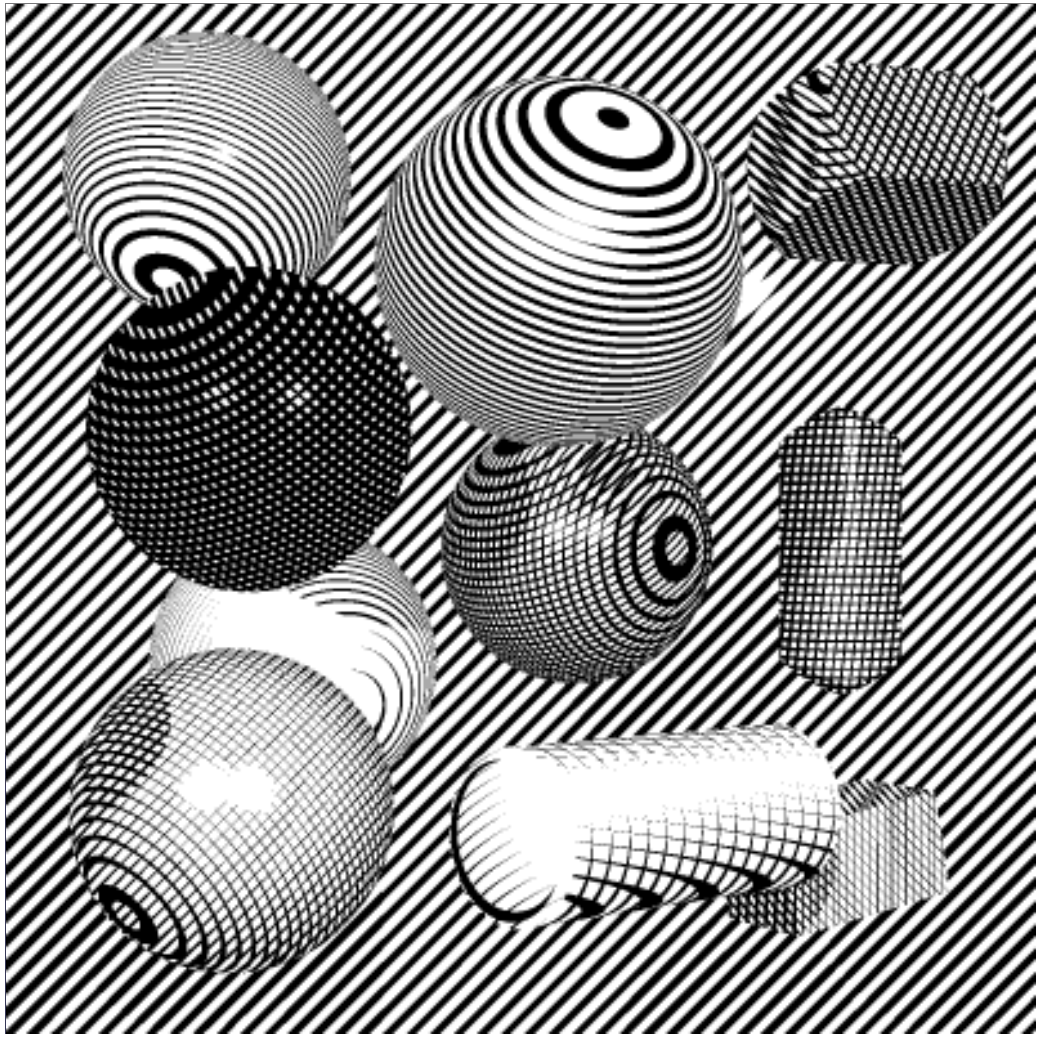
Lab sessions: Raytracer



Lab sessions: Raytracer

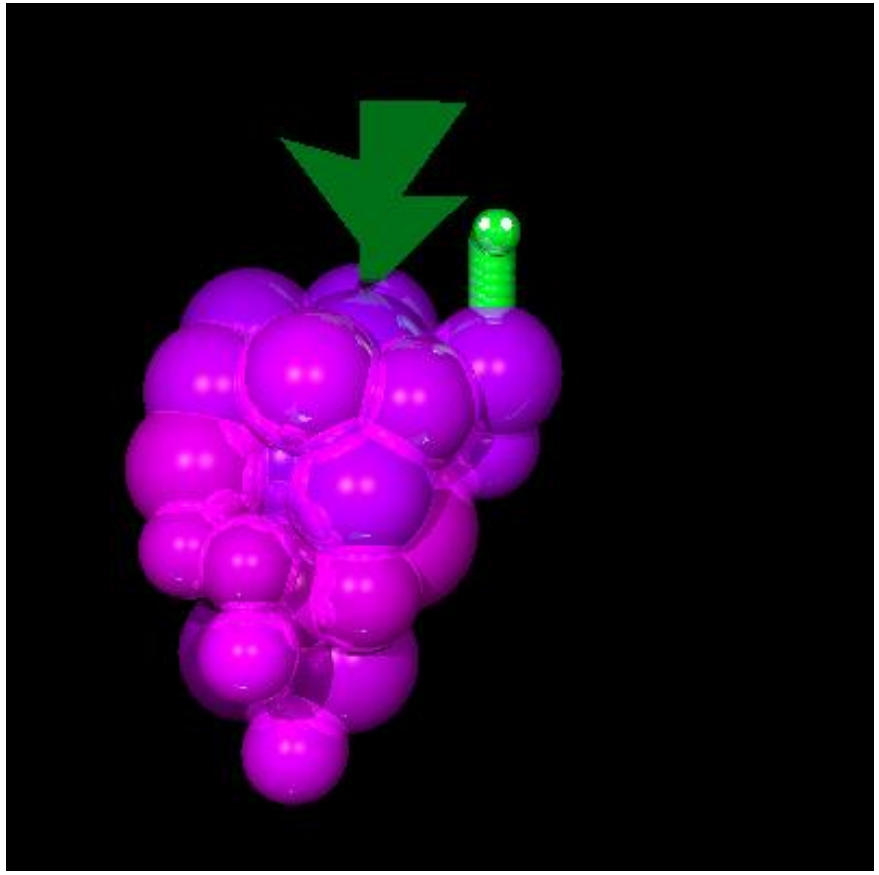


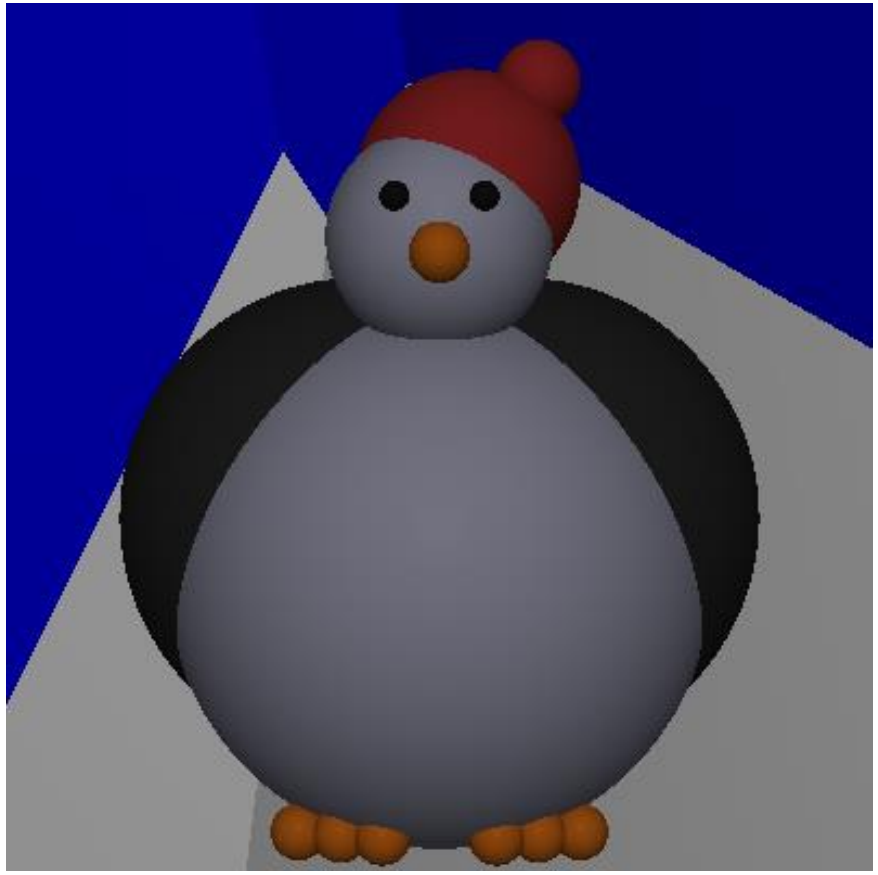
Lab sessions: Raytracer



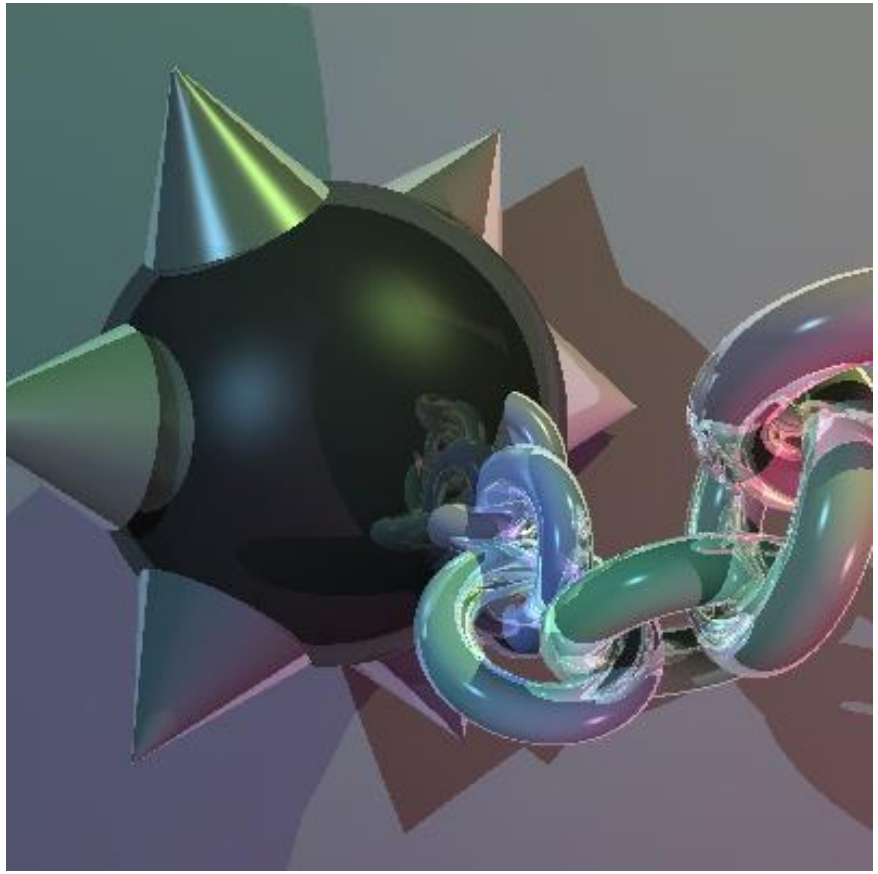
Example results from past years

Example results from past years

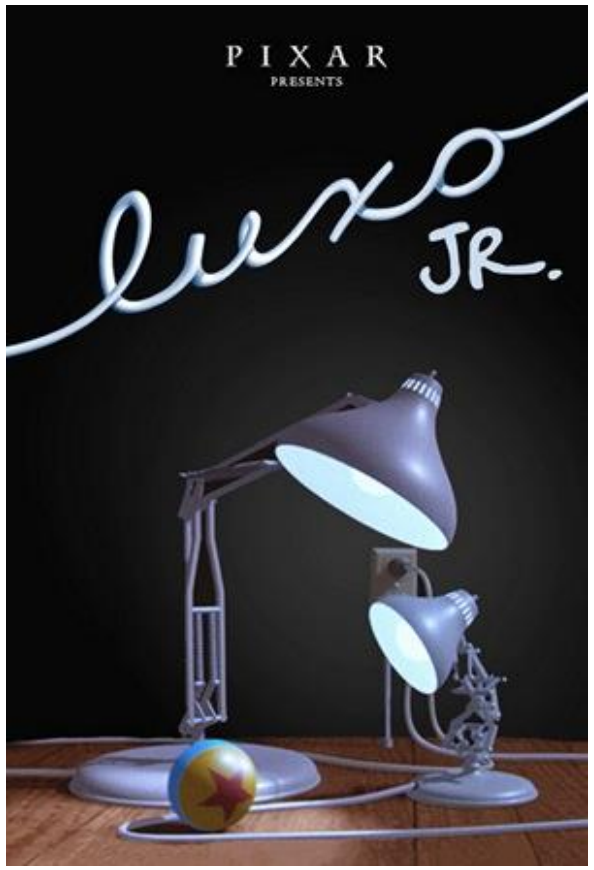


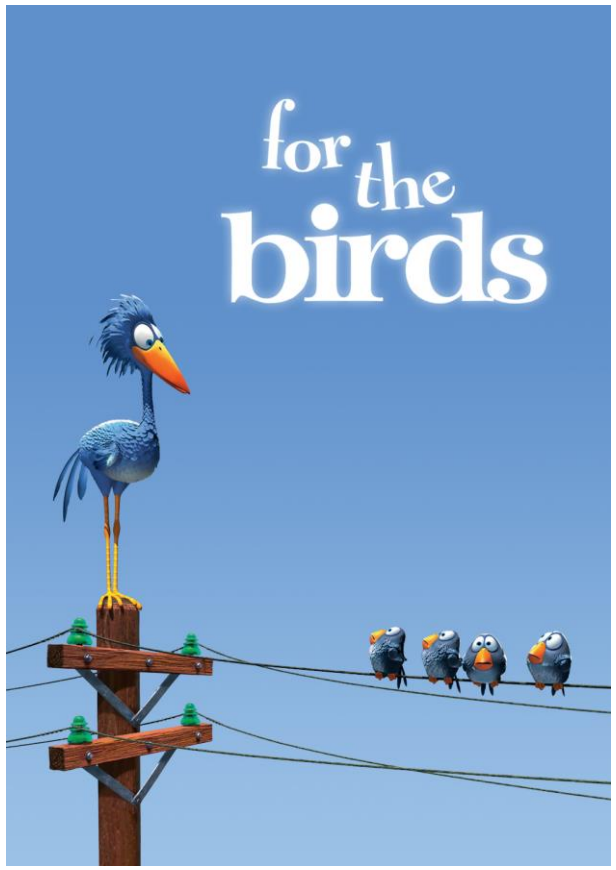


Example results from past years



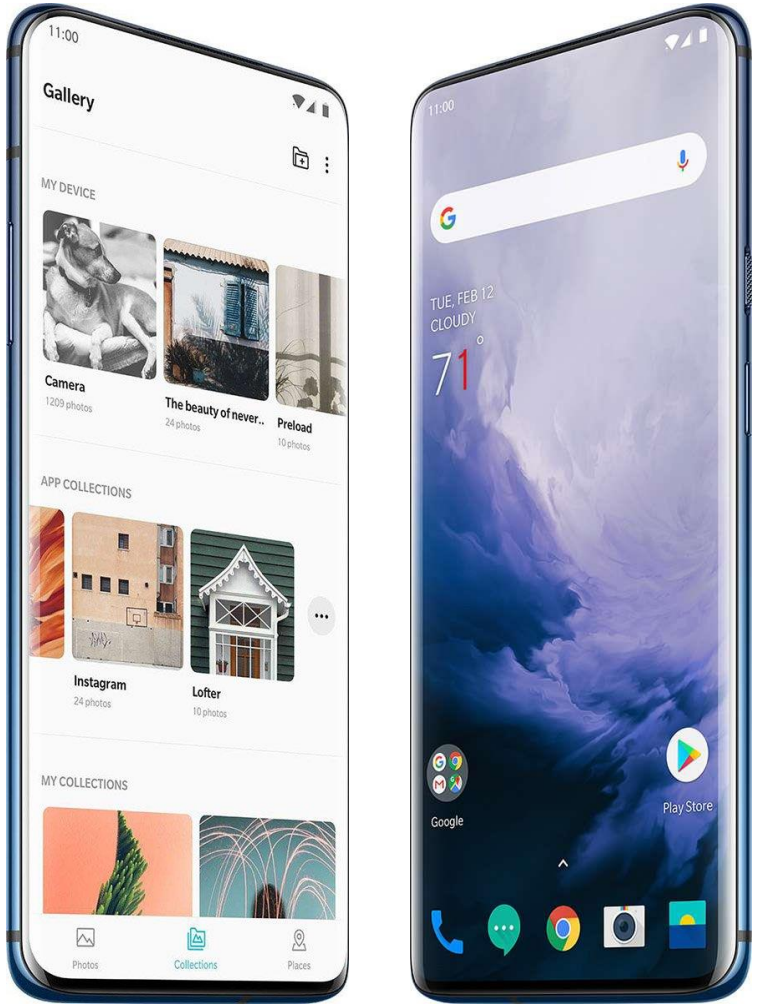
Serious applications





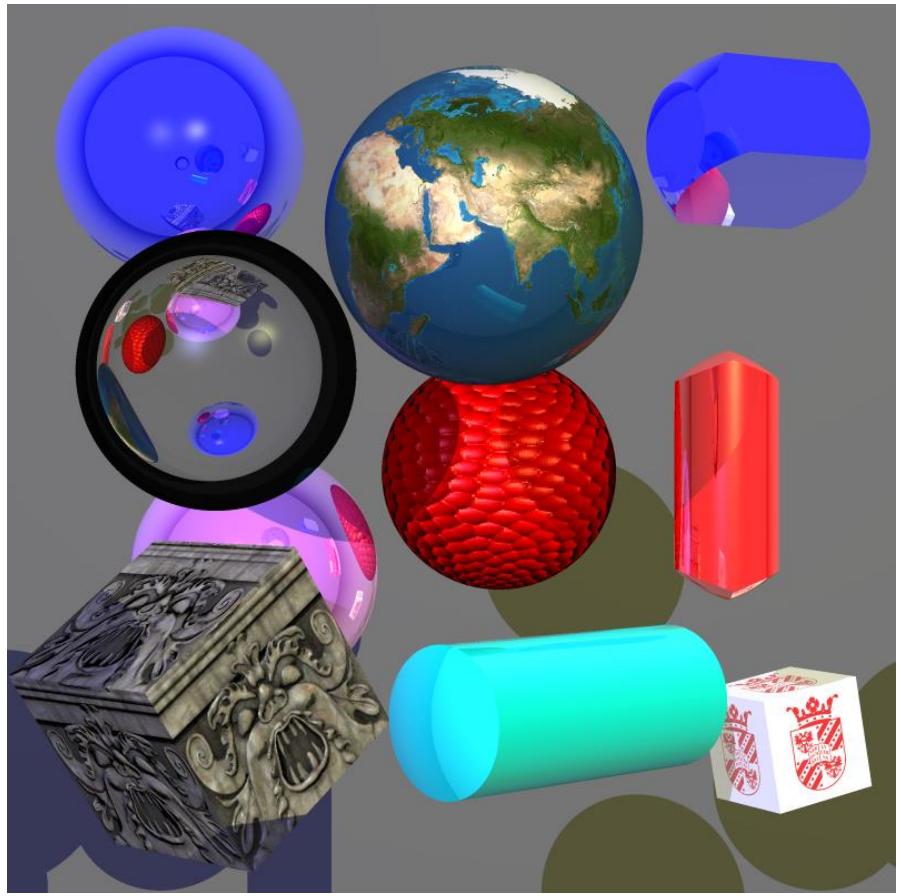
Serious applications

Serious applications



Grading

- final grade: 50% tutorial, 50% exam



+1/1/60+

Introduction to Human-Computer Interaction **Exam on 23/03/2016**

- Time period: 8:00 – 11:00
- Duration of the exam: 180 min
- Number of pages: 8
- Materials allowed: Pencils, erasers

Please write your answers directly on the exam paper.

☐0	☐0	☐0	☐0	☐0	☐0	☐0	☐0
☐1	☐1	☐1	☐1	☐1	☐1	☐1	☐1
☐2	☐2	☐2	☐2	☐2	☐2	☐2	☐2
☐3	☐3	☐3	☐3	☐3	☐3	☐3	☐3
☐4	☐4	☐4	☐4	☐4	☐4	☐4	☐4
☐5	☐5	☐5	☐5	☐5	☐5	☐5	☐5
☐6	☐6	☐6	☐6	☐6	☐6	☐6	☐6
☐7	☐7	☐7	☐7	☐7	☐7	☐7	☐7
☐8	☐8	☐8	☐8	☐8	☐8	☐8	☐8
☐9	☐9	☐9	☐9	☐9	☐9	☐9	☐9

← Encode your student number here, and write the student number again as well as your given name and family name below. If you cannot remember your student number, use the number X you see at the top of the exam sheet in this code +X/Y/Z+.

Student number:
.....
Given name:
.....
Family name:
.....

- The questions with the symbol ♣ can have none, one, or more than one possible correct answers. All other questions have exactly one correct answer.
- Please answer the questions like this: ☒; use a **pencil** (hardness HB), and make clear marks. To correct, clearly erase the wrong mark and put a new one (if needed). If you cannot erase because you did not bring a pencil, make the incorrect box completely black.
- All multiple-choice questions are worth one point. For it to be counted as answered correctly, all correct answers and no incorrect answer have to be selected.
- Do not fold the answer sheet(s), do not write on the back.

Question 1 Student did **NOT** bring a pencil. Do **NOT** fill out yourself.

☐ Student brought a pencil.
☐ Student did not bring a pencil.

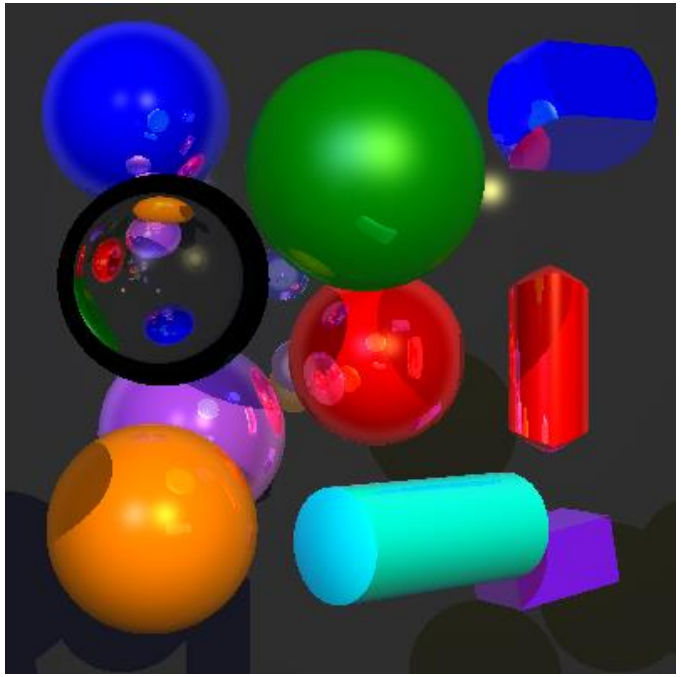
Multiple-Choice Questions:

Question 2 Driving to the supermarket but ending up at work is an example of which type of error

☐ description error
☐ a mistake
☐ capture error
☐ none of the above
☐ mode error

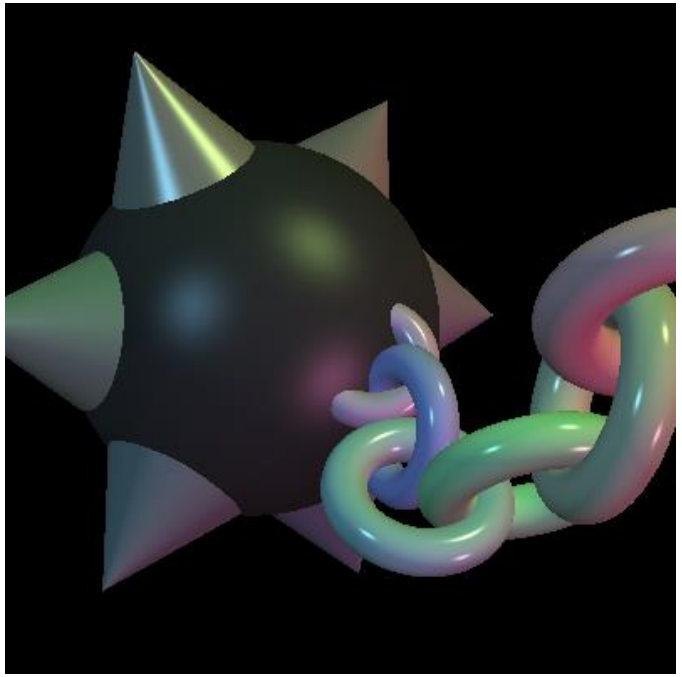
So what will we learn in this class?

- cool computer graphics techniques



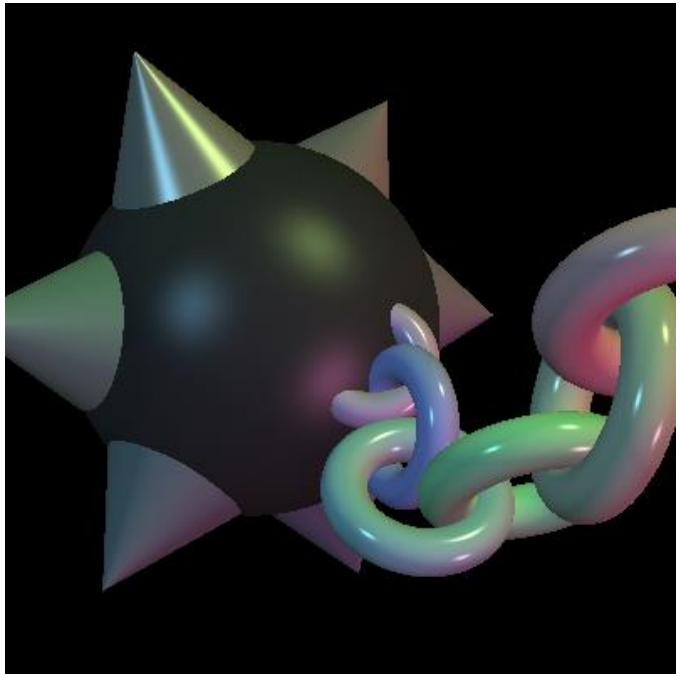
So what will we learn in this class?

- cool computer graphics techniques



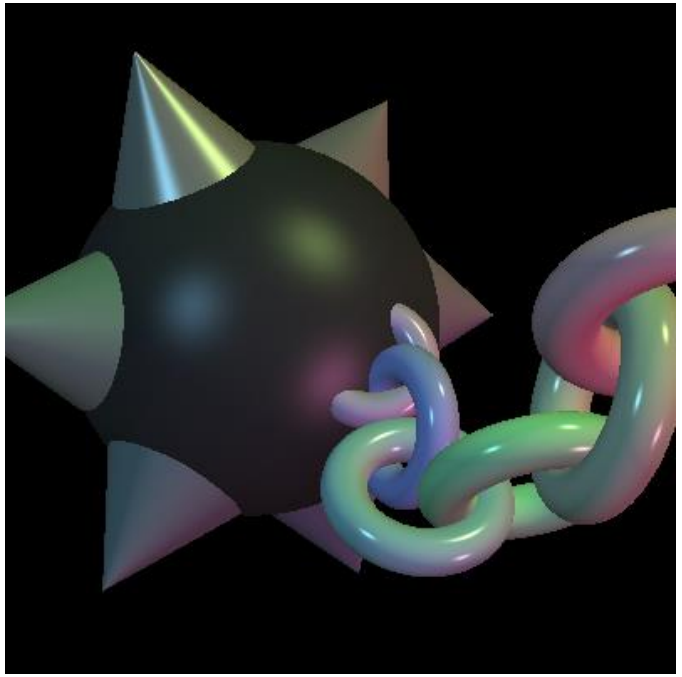
So what will we learn in this class?

- cool computer graphics techniques
- efficiency and effectiveness



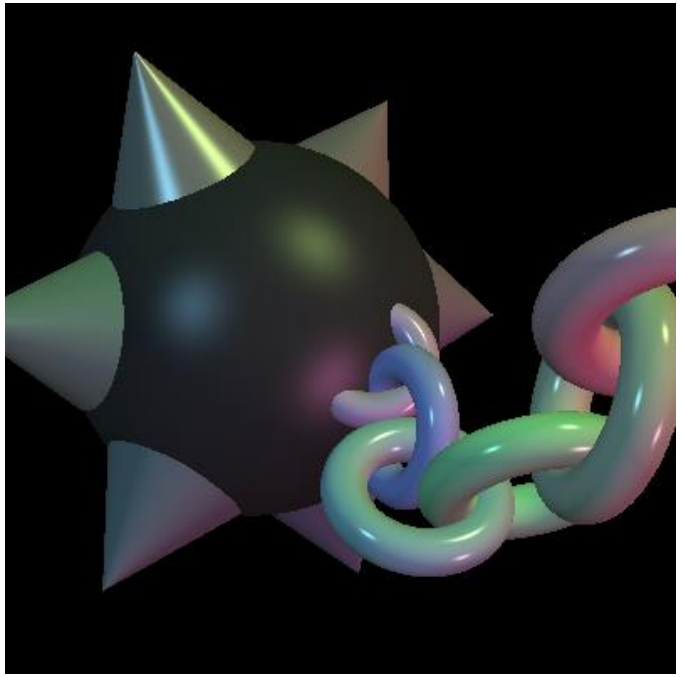
So what will we learn in this class?

- cool computer graphics techniques
- efficiency and effectiveness
- computational complexity (not always O(…))



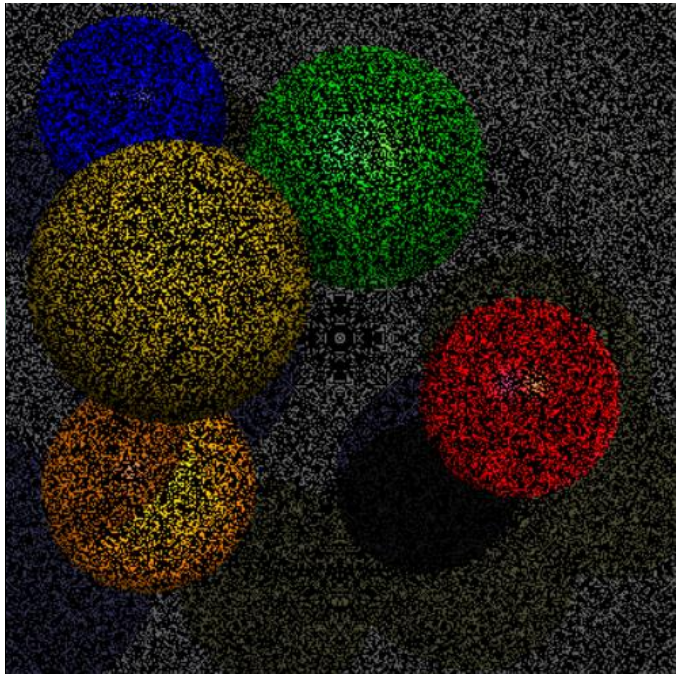
So what will we learn in this class?

- cool computer graphics techniques
- efficiency and effectiveness
- computational complexity (not always O(…))
- parallel computation (GPU & CPU)



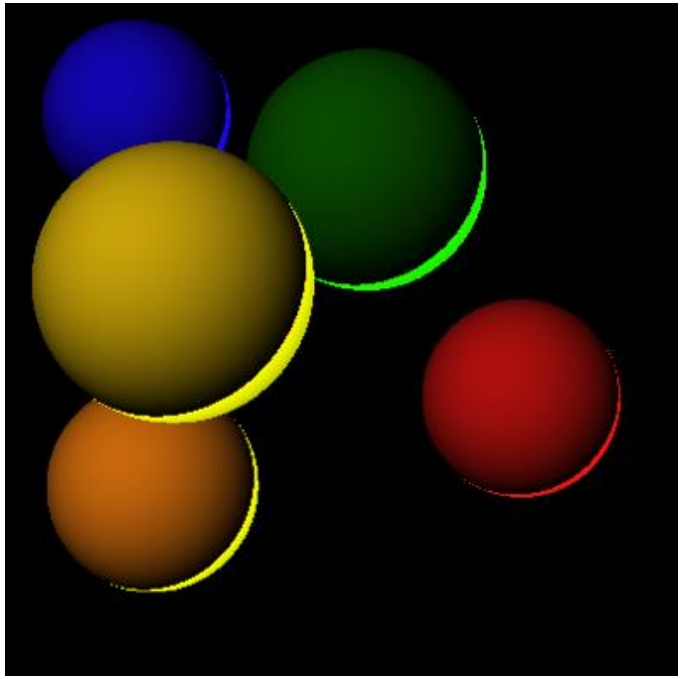
So what will we learn in this class?

- cool computer graphics techniques
- efficiency and effectiveness
- computational complexity (not always O(…))
- parallel computation (GPU & CPU)
- numerics in computer science



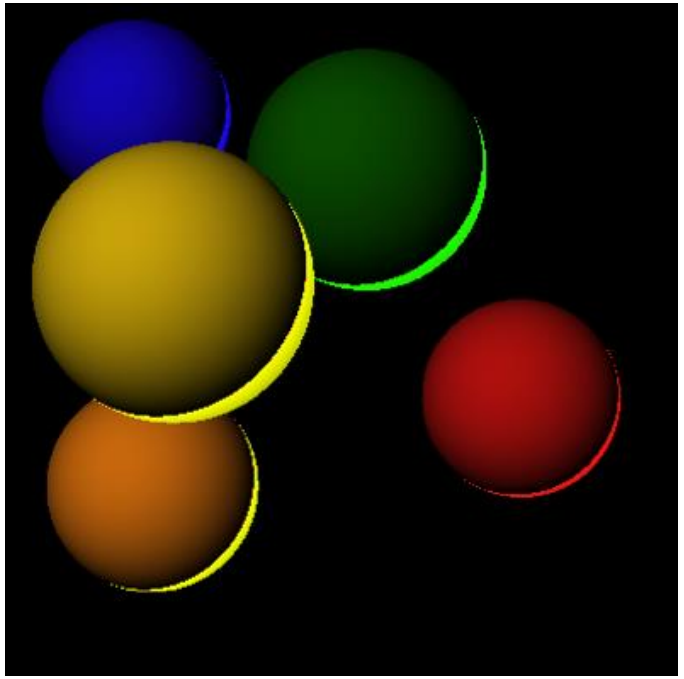
So what will we learn in this class?

- cool computer graphics techniques
- efficiency and effectiveness
- computational complexity (not always O(…))
- parallel computation (GPU & CPU)
- numerics in computer science
- visual debugging and error analysis



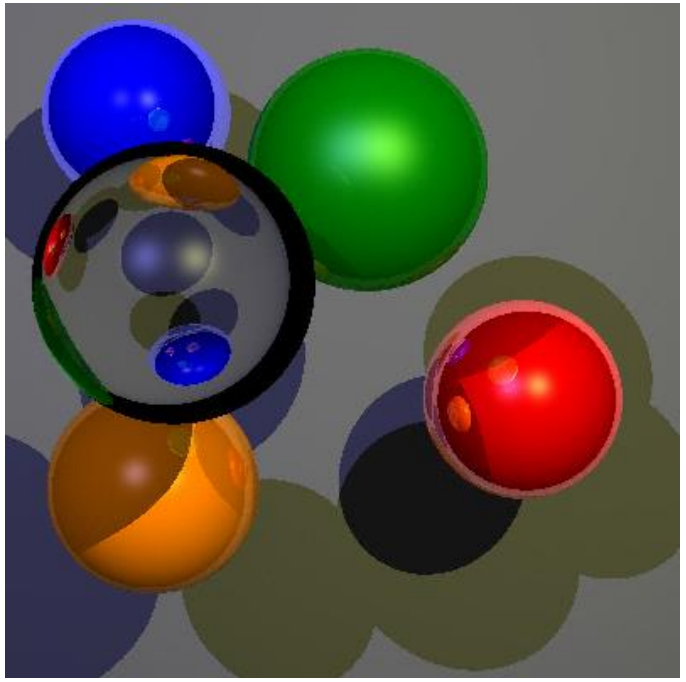
So what will we learn in this class?

- cool computer graphics techniques
- efficiency and effectiveness
- computational complexity (not always O(…))
- parallel computation (GPU & CPU)
- numerics in computer science
- visual debugging and error analysis
- compilers (implicit casting, rounding, differences)



So what will we learn in this class?

- cool computer graphics techniques
- efficiency and effectiveness
- computational complexity (not always O(…))
- parallel computation (GPU & CPU)
- numerics in computer science
- visual debugging and error analysis
- compilers (implicit casting, rounding, differences)
- human perception (color, shadows, bump mapping)



Internships @ Inria informatics mathematics / Aviz Visual Analytics Project