

HOMWORK ASSIGNMENT 10 (PRACTICE)

CO19-320322: COMPUTER GRAPHICS
320322: GRAPHICS AND VISUALIZATION

Fall 2016

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Jacobs University

Due: Friday, December 2, 2016, at 8pm.

Problem 10: Global Illumination *(5+6+7+7=25 points + 5+5=10 bonus points)*

In this assignment, you will extend your ray caster of Problem 8 to a ray tracer.

- (a) *Set-up.* Arrange a scene with multiple objects, where at least one object is partially mirroring and one is partially transparent (define a suitable refraction index). You may use implicit surfaces (like the spheres that we have had) or explicit surfaces (like the triangular meshes in OBJ format).
- (b) *Shadows.* For each intersection point of your primary rays with the objects, send out shadow rays to the light sources and adjust the local illumination model from Problem 8 accordingly.
- (c) *Mirroring reflection.* For each intersection point of your primary rays with the mirroring objects, send out reflected rays and combine the result with the result from Part (b) accordingly. Apply recursive calls up to a certain raytrace depth.
- (d) *Refraction.* For each intersection point of your primary rays with the transparent objects, send out refracted rays and combine the result with the result from Part (b) accordingly. Apply recursive calls up to a certain raytrace depth.
- (e) *Bonus 1.* Adjust Part (a) by defining area light sources and Part (b) to compute soft shadows.
- (f) *Bonus 2.* Particularly pretty results may receive additional bonus points.

Remarks: Solutions for the practical part have to be handed in via jGrader (<https://cantaloupe.eecs.jacobs-university.de/login.php>) by the due date. For late submissions you need to get in contact with the TA directly. You need to upload one zip-file that contains all source files (no executables or object files) for the programming assignments.