Assignment 5 Proposal

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There are two parts that I'm pretty interested in after these four assignments:
- Advanced Monte Carlo Rendering
- Mesh-Based Dynamics

Even though my asst 3 is not perfect, I'm still dreaming of implementing some advanced algorithm to enhance the ray tracing rendering performance.

1. So my first choice for assignment 5 is implementing **Bidirectional Path Tracing**. I'm expecting this algorithm can handle indirect lighting problems far more efficiently and robustly than ordinary path tracing.

- Suppose we go from camera to create the ray path: p1->p2->…->pi, so this time we also create a ray path from light: q1->q2->…->qj. Therefore the total ray path should be:
  p = p1->p2->…->pi->qj->….q2->q1
- Trace a shadow ray from pi to qj to see if they are visible
- If so, that means above path carries energy from the light to camera. Then we can evaluate this path's contribution accordingly.
- If not, which means the corresponding pixel in camera should be in shadow

2. Since I'm also interested in the bunny that Prof. Keenan shown on lecture, I still want to work on **implementing basic linear equations:** Laplace, heat, and wave equations on mesh. I'm also considering this part as an ***extra credit***.

- I actually have no idea how to implement this part right now. It seems like we need to implement this one based on asst.2 and asst.3.

3. If I can implement the first two parts smoothly, I may use 'late' days to implement **Photon Mapping** for ***extra credit***, which will definitely give me better result(it should make cornel box like a real one). But not