# 15-300 Fall Milestone Max Slater

https://thenumbat.github.io/15400-s21/

### Changes

No significant changes; the milestones given in my proposal can proceed as planned.

# Accomplishments/Milestone

My original milestone for the fall semester included the following:

- 1. Complete background reading.
- 2. Become comfortable with current codebase/implementations.
- 3. Begin benchmarking current CPU implementations.

I have accomplished points 1 and 2 after reading relevant papers (listed below) and reading/setting up the project's current codebase. However, I have not yet started benchmarking current implementations due to lack of time. I plan to work on this step over winter vacation.

# Surprises

No significant surprises either; I have found previous academic work and the state of the current project to be as described to me.

#### Revisions

Going into next semester, I may need to scale back the pace at which I set my 15-400 milestones. The current pace is targeting my 125% goal, and I may have too many other responsibilities to achieve everything listed by June. However, I believe the 100% goal is realistic in any case, and still should result in a strong result and useful end product.

#### Resources

I am still working on getting an RTX GPU, as they're currently extremely hard to purchase. I have at least gotten funding approved to acquire one, and this is not (yet) a blocking issue for working on the project.

### References

- [1] Eric Galin, Eric Guérin, Axel Paris, and Adrien Peytavie. Segment tracing using local lipschitz bounds. Computer Graphics Forum, 39(2):545–554, 2020.
- [2] Michal Hapala, Tomáš Davidovič, Ingo Wald, Vlastimil Havran, and Philipp Slusallek. Efficient stack-less byh traversal for ray tracing. In *Proceedings of the 27th Spring Conference on Computer Graphics*, SCCG '11, page 7–12, New York, NY, USA, 2011. Association for Computing Machinery.
- [3] Miles Macklin, Kenny Erleben, Matthias Müller, Nuttapong Chentanez, Stefan Jeschke, and Zach Corse. Local optimization for robust signed distance field collision. *Proc. ACM Comput. Graph. Interact. Tech.*, 3(1), April 2020.
- [4] Rohan Sawhney and Keenan Crane. Monte carlo geometry processing: A grid-free approach to pde-based methods on volumetric domains. *ACM Trans. Graph.*, 39(4), 2020.
- [5] Rohan Sawhney, Keenan Crane, Ruihao Ye, and Johann Korndoefer. Fcpw: Fastest closest points in the west. 2020.
- [6] Evan Shellshear and Robin Ytterlid. Fast distance queries for triangles, lines, and points using sse instructions.

  Journal of Computer Graphics Techniques (JCGT), 3(4):86–110, December 2014.
- [7] Martin Stich, Heiko Friedrich, and Andreas Dietrich. Spatial splits in bounding volume hierarchies. In *Proceedings of the Conference on High Performance Graphics 2009*, HPG '09, page 7–13, New York, NY, USA, 2009. Association for Computing Machinery.
- [8] Ingo Wald, Will Usher, Nate Morrical, Laura Lediaev, and Valerio Pascucci. RTX Beyond Ray Tracing: Exploring the Use of Hardware Ray Tracing Cores for Tet-Mesh Point Location. In *High-Performance Graphics* - Short Papers, 2019.
- [9] Robin Ytterlid and Evan Shellshear. Bvh split strategies for fast distance queries. *Journal of Computer Graphics Techniques (JCGT)*, 4(1):1–25, January 2015.