Alper Sahistan,

Ph.D. Student

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Education

University of Utah, SCI Institute Ph.D Student	2022–*current*
Bilkent University Department of Computer Engineering M.Sc. in Computer Science	2019–2022
Bilkent University Department of Computer Engineering B.S. in Computer Science	2015–2019

Research Interests

Areas of research include *ray tracing, volume rendering, scientific visualization, and computer graphics*. I am also interested in high-performance computing and computational geometry.

Research Experience

University of Utah

- Prof. Valerio Pascucci is advising my Ph.D., which focuses on scientific visualization methods, including woodcock tracking, large-scale visualization, and data compression.

- Also collaborating with Dr. Ingo Wald, Dr. Stefan Zellmann, and Nate Morrical on scientific visualization and volume rendering projects.

- Working under the Center of Excellence at the University of Utah to finalize the SYCL implementation of the zfp library.

Bilkent University

- Conducted research with Prof. Güdükbay of Bilkent University, exploring various rendering-related topics. We have remotely collaborated with Dr. Ingo Wald, Dr. Stefan Zellmann, and Nate Morrical for multiple publications.

- Developed a data-parallel scientific visualization framework that allows non-compact unstructured mesh boundaries to be rendered and composited in the correct ordering. In the same work, we also presented an XOR-based compression scheme for mesh elements like tetrahedra, pyramids, and wedges.

- Researched cache-friendly compact tetrahedral mesh representations and their efficient traversal schemes as an acceleration structure for ray tracing. We used bitwise XOR masks to compress tetrahedra and projections to 2D space to reduce the number of operations.

- Our research during my M.Sc. was funded by The Scientific and Technological Research Council of Turkey(TUBITAK).

Industry Experience

Lawrance Livermore National Laboratory Graduate Computing Intern	Worked on profiling and optimizing floating-point compression library zfp. Started porting zfp to SYCL.	2023
TaleWorlds Entertainment Engine Programming Intern	Worked at the internal 3D rendering engine of strategy/action RPG video game *Mount&Blade II:BannerLord*	2018

Publications

Full Papers

1. N. Morrical, S. Zellmann, A. Sahistan, P. Shriwise, and V. Pascucci (2023). Attribute-Aware RBFs: Interactive Visualization of Time Series Particle Volumes Using RT Core Range Queries. In: *2023 IEEE Visualization Conference (VIS)*.

2. S. Zellmann, Q. Wu, A. Sahistan, K.-L. Ma, and I. Wald (2023). *Beyond ExaBricks: GPU Volume Path Tracing of AMR Data*. arXiv: 2211.09997 [cs.GR].

3. N. Morrical, A. Sahistan, U. Güdükbay, I. Wald, and V. Pascucci (2022). Quick Clusters: A GPU-Parallel Partitioning for Efficient Path Tracing of Unstructured Volumetric Grids. In: *2022 IEEE Visualization Conference (VIS)*.

4. S. Zellmann, I. Wald, J. Barbosa, S. Demirci, A. Sahistan, and U. Güdükbay (2022). Hybrid Image-/Data-Parallel Rendering Using Island Parallelism. In: *The 12th IEEE Symposium on Large Data Analysis and Visualization*.

5. S. Zellmann, I. Wald, A. Sahistan, M. Hellmann, and W. Usher (2022). Design and Evaluation of a GPU Streaming Framework for Visualizing Time-Varying AMR Data. In: *Eurographics Symposium on Parallel Graphics and Visualization*.

Short Papers

1. A. Sahistan, S. Demirci, N. Morrical, S. Zellmann, A. Aman, I. Wald, and U. Güdükbay (2021). Ray-traced Shell Traversal of Tetrahedral Meshes for Direct Volume Visualization. In: *2021 IEEE Visualization Conference (VIS) Short Papers*.

Honors& Rewards

Best Paper Honorable Mention *IEEE Visualization Conference(VIS)*   2022

Teaching Experience

Bilkent University Teaching Assistant	Grading assignments for Programming Languages course taught by Dr. H. Altay Güvenir. Tutoring and grading Computer Organisation course labs by Dr. Özcan Öztürk	2019–2022