

Alper Sahistan,

Ph.D. Student

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Research Interests

Ph.D. student with expertise in *ray tracing*, *volume rendering*, *scientific visualization*, *computer graphics*, and *data compression*. I am also interested in high-performance computing and computational geometry.

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 Experience

University of Utah

- Pursuing a Ph.D. under the advisement of Prof. Valerio Pascucci, focusing on scientific visualization, including large-scale volume rendering, and data compression.
- Collaborating with Dr. Ingo Wald (NVIDIA), Dr. Stefan Zellmann (Univ. of Cologne), and Nate Morrical (NVIDIA) on GPU ray tracing, Woodcock tracking, and data-parallel rendering projects.
- Contributing to the **Intel Center of Excellence** at the University of Utah and working with **Lawrence Livermore National Laboratory** to implement the DPC++/SYCL version of [zfp](#), an open-source, error-bounded compression library for multidimensional scientific data.

Bilkent University

- Completed an M.Sc. under the advisement of Prof. Uğur Gündükbay, with a research focus on ray tracing and scientific visualization techniques.
- Developed a data-parallel visualization framework capable of rendering and compositing non-convex unstructured meshes with elements such as tetrahedra, wedges, and pyramids using XOR-compacted data structures.
- Researched acceleration structures for ray tracing by leveraging cache-efficient, bitwise XOR-compacted tetrahedral meshes, and 2D projections to optimize traversal.
- The research was supported by **The Scientific and Technological Research Council of Turkey** (TÜBİTAK).

Industry Experience

Lawrence 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

Technical Skills

Programming Languages: C++, C, CUDA, DPC++/SYCL, GLSL, Python, LaTeX

Frameworks & Libraries: OptiX, [OWL](#), oneAPI, OpenGL, WebGL, OSPRay

Publications

Full Papers

1. A. Sahistan, S. Demirci, I. Wald, S. Zellmann, J. Barbosa, N. Morrical, and U. Gdkbay (2024). Visualization of Large Non-Trivially Partitioned Unstructured Data with Native Distribution on High-Performance Computing Systems. *IEEE Transactions on Visualization and Computer Graphics*, 1–14.
2. S. Zellmann, Q. Wu, A. Sahistan, K.-L. Ma, and I. Wald (2024). Beyond ExaBricks: GPU Volume Path Tracing of AMR Data. *Computer Graphics Forum*.
3. 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)*.
4. N. Morrical, A. Sahistan, U. Gdkbay, 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)*.
5. S. Zellmann, I. Wald, J. Barbosa, S. Demirci, A. Sahistan, and U. Gdkbay (2022). Hybrid Image-/Data-Parallel Rendering Using Island Parallelism. In: *The 12th IEEE Symposium on Large Data Analysis and Visualization*.
6. 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. Gdkbay (2021). Ray-traced Shell Traversal of Tetrahedral Meshes for Direct Volume Visualization. In: *2021 IEEE Visualization Conference (VIS) Short Papers*.

Presentations

1. A. Gooch, A. Panta, A. Sahistan, X. Huang, M. Taufer, J. Marquez, G. Scorzelli, and V. Pascucci (2024). Enabling Scientific Discovery: A Tutorial for Harnessing the Power of the National Science Data Fabric for Large-Scale Data Analysis. In: *2024 IEEE Visualization Conference (VIS) Tutorials*.

Honors & Rewards

Best Paper Honorable Mention <i>IEEE Visualization Conference(VIS)</i>	2022
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Teaching Experience

Bilkent University Teaching Assistant	Grading assignments for Programming Languages course taught by Dr. H. Altay Gvenir. Tutoring and grading Computer Organisation course labs by Dr. zcan ztrk	2019–2022
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