

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, Scientific Computing and Imaging (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, multi-field representations, 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 Gündükay, 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-compact data structures.
- Researched acceleration structures for ray tracing by leveraging cache-efficient, bitwise XOR-compact 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

Explored vector field compression via Gaussian mixture models which evaluated loss over Clebsch or Helmholtz representations.

2025

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. Panta, A. Sahistan, X. Huang, A. A. Gooch, G. Scorzelli, H. Torres, P. Klein, G. A. Ovando-Montejo, P. Lindstrom, and V. Pascucci (2026). Expanding Access to Science Participation: A FAIR Framework for Petascale Data Visualization and Analytics. *IEEE Transactions on Visualization and Computer Graphics* (to appear).
2. A. Sahistan, S. Zellmann, H. Miao, N. Morrical, I. Wald, and V. Pascucci (2026). Materializing Inter-Channel Relationships with Multi-Density Woodcock Tracking. *IEEE Transactions on Visualization and Computer Graphics*, 1–14.
3. A. Sahistan, S. Zellmann, N. Morrical, V. Pascucci, and I. Wald (2025). Multi-Density Woodcock Tracking: Efficient High-Quality Rendering for Multi-Channel Volumes. In: *Eurographics Symposium on Parallel Graphics and Visualization*.
4. A. Sahistan, S. Demirci, I. Wald, S. Zellmann, J. Barbosa, N. Morrical, and U. Güdükbay (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.
5. 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*.
6. 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)*.
7. 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)*.
8. 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*.
9. 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 <i>Eurographics Symposium on Parallel Graphics and Visualization (EGPGV)</i>	2025
Best Paper Honorable Mention <i>IEEE Visualization Conference(VIS)</i>	2022

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*.
2. A. Sahistan, N. Morrical, P. Lindstrom, and V. Pascucci (2023). Building a portable, scalable, performant ZFP backend using oneAPI and SYCL to advance exascale computing: a developer perspective. In: *oneAPI DevSummit for AI and HPC 2023*.

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
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