

# 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

<b>University of Utah, Scientific Computing and Imaging (SCI) Institute</b> Ph.D Student	2022–current
<b>Bilkent University Department of Computer Engineering</b> M.Sc. in Computer Science	2019–2022
<b>Bilkent University Department of Computer Engineering</b> 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 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

<b>Lawrence Livermore National Laboratory</b> Graduate Computing Intern	Explored vector field compression via Gaussian mixture models which evaluated loss over Clebsch or Helmholtz representations.	2025
<b>Lawrence Livermore National Laboratory</b> Graduate Computing Intern	Worked on profiling and optimizing floating-point compression library <a href="#">zfp</a> . Started porting zfp to SYCL.	2023
<b>TaleWorlds Entertainment</b> Engine Programming Intern	Worked at the internal 3D rendering engine of strategy/action RPG video game <i>Mount&amp;Blade II: Bannerlord</i>	2018

## Technical Skills

**Programming Languages:** C++, C, CUDA, DPC++/SYCL, GLSL, Python, LaTeX  
**Frameworks & Libraries:** OptiX, [OWL](#), oneAPI, OpenGL, WebGL, OSPRay

## Publications

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### 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. 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.
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. 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)*.
8. 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*.
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. Gdkbay (2021). Ray-traced Shell Traversal of Tetrahedral Meshes for Direct Volume Visualization. In: *2021 IEEE Visualization Conference (VIS) Short Papers*.

## Honors & Rewards

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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

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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

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<b>Bilkent University</b> 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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