shanescott

geometry, simulation, meshing, mathematics

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skills

algorithm design and optimization
computational geometry
mathematical visualization
physical simulation
machine learning
image processing

education

Ph.D. in Mathematics 2018
Georgia Institute of Technology
thesis in surface geometry, minor in quantum computation

Dual B.S. in Physics and Mathematics 2012
Kansas State University
thesis in wavelet analysis, GPA 4.0, year at University of Hyderabad, India

programming

C++ VTK Polygonica CMake conan **Python** Open3D Tensorflow Keras Pandas **Linux** Ubuntu Bash **JavaScript MATLAB LaTeX**

technical experience

Geometric Search Engine 2021 - Present
SDE3 Computation Geometry at Physna
led R&D for geometric search and comparison of CAD and mesh models; designed, implemented, and maintained C++ geometry processing library for CAD tessellation and mesh analysis; implemented and optimized shape retrieval algorithms for multi-million model geometric search index Thangs

Automating Design and Print Preparation for 3D Metal Manufacturing 2019 - 2021
Software Engineer at Divergent3D
developed finite element geometry kernel used in automating design, topology optimization, and print preparation; integrated third party geometry processing libraries with workflow specific tools; led research on novel optimization schemes for part segmentation and 3D printer packing; close collaboration to build tools directly meeting needs of our structural engineers, CAD designers, and additive manufacturers

Predicting Traffic Accident Rates from Driver GPS Data 2018 - 2019
Statistical Modeler at LexisNexis Risk
physical models for GPS driver rating; led research on adversarial neural net approach to GPS anomaly detection; large data manipulation with high performance computing cluster; projects in driver risk rating and AI driver recognition using GPS data from disparate device types

Surface Geometry and Topology 2013 - 2018
Graduate Student Researcher at Georgia Institute of Technology
reconstruction problems in symmetries of surfaces; algorithms in computing novel 3-manifold invariants using hyperbolic triangulation

Vascular Parametrizaiton for Bloodflow Simulation June - Aug 2017
Computation Intern at Lawrence Livermore National Lab
created novel geometry based computational load balancing for HARVEY, human blood flow simulation; implemented algorithms automated tubular parameterization and cylindrical decomposition of human vascular structure

Wavelet Applications to Digital Imaging 2011 - 2012
Undergraduate Researcher at Kansas State University I-Center for Mathematics
research in wavelet analysis applications to low-loss streamable data compression of digital signals

Attosecond Optics and Atomic Dynamics 2008 - 2010
Undergraduate Researcher at James R. Macdonald Lab, Kansas State University
simulated experimental data for electron dynamics in ultra high frequency optics

peer-reviewed publications

Combinatorial models for surface and free group symmetries. PhD diss., Georgia Institute of Technology, 2018, hdl.handle.net/1853/60722.

Exact computation of the n-loop invariants of knots. Experimental Mathematics. 25. 2 (2016). Garoufalidis, Sabo, and Scott.

Computing the partial word avoidability indices of ternary patterns. Combinatorial Algorithms. IWOCA (2012). Lecture Notes in Computer Science, vol 7643. Springer, Berlin, Heidelberg. Blanchet-Sadri, Lohr, and Scott.

Computing the partial word avoidability indices of binary patterns. Journal of Discrete Mathematics 23 (2013). Blanchet-Sadri, Lohr, and Scott.

Delay control in attosecond pump-probe experiments. Optical Express 17.24 (2009). Chini, Mashiko, Wang, Chen, Yun, Scott, Gilbertson, and Chang.

conference presentations

Presenting with Inkscape and Sozi July 2016
Topology Students Workshop, School of Mathematics, Georgia Institute of Technology

Avoiding Patterns in Partial Words July 2012
23rd International Workshop on Discrete Algorithms, Tamil Nadu, India

Ternary Patterns in Partial Words April 2012
American Mathematical Society Spring Sectional Meeting, University of Kansas

teaching experience

Graduate Student Instructor 2012 - 2018
Georgia Institute of Technology
taught courses ranging from 20 to 120 students; managed teams of 2 to 5 teaching assistants; award winning instruction; subjects include calculus, differential equations, linear algebra, combinatorics, and algorithms

Georgia High School Mathematics Competition Organizer 2016 - 2017
Georgia Institute of Technology
coordinated annual statewide math competition of 400 students; managed team to design competition materials and activities; designed optical mark recognition automatic grading system

achievements

Access Ally Award 2017
Georgia Institute of Technology Office of Disability Services
awarded for impact on hearing-impaired student success, accessibility, and advocacy

Outstanding Graduate Teaching Assistant 2016
Georgia Institute of Technology School of Mathematics
chosen by the department to represent school for superior instruction

School of Mathematics Graduate Representative 2016 - 2017
Georgia Institute of Technology
represented graduate student body on the faculty graduate committee and the graduate student council; founding member of the graduate student chapter of the American Mathematical Society

Eagle Scout and Community Service Award 2007
Boy Scouts of America and Survivors of the Dodge City Mexican Village
awarded for the design and erection of a historical marker for the Mexican Village in Dodge City, KS