shanescott

algorithms, geometry, software, mathematics

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skills

algorithm design and optimization
mathematical visualization
technical communication
clean code development
computational geometry
image processing
machine learning

education

Ph.D. in Mathematics 2018
Georgia Institute of Technology
thesis in surface topology, 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++ CMake conan VTK HPCC-ECL **Python** Pandas Open3D Tensorflow Keras **Linux** Ubuntu Bash MATLAB LaTeX

technical experience

3D Printing Toolpath Control
Jan 2023 - Dec 2023
Software Engineer at UltiMaker
Developed control algorithms (slicer) for the Method line of FDM printers. Ported printers to CURA slicer. Implemented features improving print quality and efficiency. Cross functional work from C++ build engineering, Python prototyping, printer maintenance, print quality testing.

Geometry-as-Keyword Search Engine
2021 - 2023
SDE3 Computation Geometry at Physna
Led R&D for geometric search and comparison for CAD and mesh models. Designed, implemented, and maintained a 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 Metal 3D Printing
2019 - 2021
Software Engineer at Divergent3D
Developed FEA geometry kernel for automating design via topology optimization, print segmentation, and print packing. Tech lead on optimization schemes for part segmentation and 3D printer packing. Collaboration on internal tools for structural engineers, CAD designers, and additive manufacturers.

Predicting Traffic Accidents from Driver GPS Data
2018 - 2019
Statistical Modeler at LexisNexis Risk
Physical models for GPS driver safety rating. Led research on adversarial neural net approach to GPS anomaly detection. Large data manipulation with high performance computing cluster. Rating driver risk and AI driver recognition using GPS data from many device types.

Calculating Surface Symmetries
2013 - 2018
Graduate Student Researcher at Georgia Institute of Technology
Research in abstract geometry and topology. Reconstruction problems in symmetries of surfaces. Algorithms in computing novel 3-manifold invariants using hyperbolic triangulation.

Vascular Geometry Segmentation Bloodflow Simulation
June - Aug 2017
Computation Intern at Lawrence Livermore National Lab
Created geometry based computational load balancing for HARVEY, human blood flow simulation. Implemented algorithms automating decomposition of scanned human vascular structure.

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

Topologists Outside Academia July 2022
Topology Students Workshop, School of Mathematics, Georgia Institute of Technology

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