

Ritesh Sharma, PhD

<https://sharmrit.github.io/Homepage>

Research Interests

Path & Motion planning, Computer Graphics & Vision, AI/ML, Deep learning, Geometry Processing, Robotics, Computer Animation and Visualization

Education

Ph.D. in Electrical Engineering & Computer Science (CGPA 4.0/4.0) December, 2023
Thesis: Navigation Structures for Flows, Formations and Decision Making
University of California, Merced, California

M.S. in Electrical Engineering & Computer Science (CGPA 3.45/4.0) March, 2017
Thesis: Interactive Design and Transition Point Analysis of 3D Linear Symmetric Tensor Fields
Oregon State University, Corvallis, Oregon

B. Tech. in Computer Science and Engineering (CGPA 8.45/10) August, 2010
West Bengal University of Technology, India

Professional Experience

Postdoctoral Research Fellow, *Missouri University of Science & Technology, United States* Jan 24 - Present

- Investigating SLAM with object localization for autonomous navigation and 3D scene reconstruction techniques for AI/ML-driven digital twin development in infrastructure asset management.

Applied Scientist II Co-op, *Amazon Robotics, United States* May 23 - Dec 23

- Investigated scalable AI path planning for warehouse robots and evaluated existing planners.

Research Intern, *PARC, part of SRI (formerly part of Xerox), United States* May 21 - Aug 21 & Dec 21- Jan 22

- Analyzed mesh geometry to detect interior features and reconstruct clutter-free models and floor plans.
- Resulted in 2 conference paper and 1 patent.

Visual Coding Intern, *Dolby Laboratories, United States* May 22 - Aug 22

- Investigated replacing neural networks with traditional machine learning for scene understanding and representation in novel view synthesis.

PhD Researcher(Intern), *Hasso-Plattner-Institut, Potsdam, Germany* May 20 - Aug 20

- Investigated on topics related to geometry interaction for laser cutting (resulted in 1 conference paper).

Senior Graphics Programmer, *Passur Aerospace Inc., United States* May 17 - August 18

- Developed GUI to visualize shape files for Passur's flight tracking system, wrote server-side code for database communication, and built core functionalities and React/Redux integration for the company's product used globally by major airlines and airports.

Intern (Mathematica Algorithm R&D), *Wolfram Research Inc., United States* Apr 16 - Aug 16

- Developed interface between Wolfram's Mathematica with Pixar's Renderman, tested for geometry primitives and plot functions used in 3D printing.

Research Assistant, *Indian Institute of Technology Bombay, India* Oct, 10 - Dec, 13

- Developed an accurate, reliable and autodidactic web-based virtual laboratory for Urban Transportation System Planning Course.
- Resulted in a poster and conference paper.

Publications

Peer-Reviewed Journal Articles

[J6] **Sharma, R.**, Weiss, T., Kallmann, M., *Formation-Aware Planning and Navigation with Corridor based Shortest Path Maps*, *Computer Graphics Forum*, Vol. 43, Issue 1, 2024.

- [J5] **Sharma, R.**, Kallmann, M., *Computing and Analyzing Decision Boundaries from Shortest Path Maps*, *Computer & Graphics*, Vol 117, pp. 73-84, 2023.
- [J4] **Sharma, R.**, Kallmann, M., *Spatially Distributed Lane Planning for Navigation in 3D Environments*, Vol 34, Issue 3-4, e2162, *Computer Animation and Virtual Worlds 2023 (Appeared at CASA 2023)*.
- [J3] Jenny, B., Stephen, D. M., Muehlenhaus, I., Marston, B. E., **Sharma, R.**, Zhang, E., Jenny, H, *Design Principles for Origin-destination Flow Maps*, *Cartography and Geographic Information Science (CaGIS)*, 45.1 (2018): pp. 62-75.
- [J2] Jenny, B., Stephen, D. M., Muehlenhaus, I., Marston, B. E., **Sharma, R.**, Zhang, E., Jenny, H, *Force-directed layout of origin-destination flow maps*, *International Journal of Geographic Information Science (IJGIS)*, 2017, 31(8), pp. 1521-1540.
- [J1] Zhang, E., Palacios, J., Yeh, H., Wang, W., Zhang, Y., Laramée, B., **Sharma, R.**, Schultz, T., *Feature Surfaces in Symmetric Tensor Fields Based on Eigenvalue Manifold*, *IEEE TVCG*, Issue 99, pp.1248-1260, March 1, 2016. (Appeared at **ACM SIGGRAPH ASIA 2016** and **IEEEVIS 2016**).

Peer-Reviewed Conference Articles

- [C8] **Sharma, R.**, Bier, E., Nelson, L., Bhandari, M S., Kunwar, N, *Automatic Digitization and Orientation of Scanned Mesh Data for Floor Plan and 3D Model Generation*, *Advances in Computer Graphics (Computer Graphics International 2023)*, *Lecture Notes in Computer Science*, vol 14496. Springer.
- [C7] Bier, E; Brito, A., Mostafavi, S., Nelson, L. D., **Sharma, R.**, Bhandari, M S., Kunwar, N, Li, S., *Sensorium: commissioning abundant sensors with augmented reality and QR codes*, *18th International IBPSA conference and Exhibition, Building Simulation 2023*.
- [C6] Roumen, T., Apel, I., Kern, T., Taraz, M., **Sharma, R.**, Schlueter, O., Johnson, j., Meier, D., Lempert, C. and Baudisch, P., *Structure-Preserving Editing of Plates and Volumes for Laser Cutting*, *SCF '22: Proceedings of the 7th Annual ACM Symposium on Computational Fabrication, October 2022, Article 20, Pages 1-12*.
- [C5] **Sharma, R.**, Weiss, T., Kallmann, M., *Plane-Based Local Behaviors for Multi-Agent 3D Simulations with Position-Based Dynamics*, *2020 IEEE International Conference on Artificial Intelligence and Virtual Reality (AIVR)*, Utrecht, Netherlands, 2020, p. 214-217.
- [C4] **Sharma, R.**, Weiss, T., Kallmann, M., *3D Behaviors for Multi-Agent Simulations with Position-Based Dynamics*, *ACM SIGGRAPH Symposium of Interactive 3D Graphics and Games(I3D) 2020*, poster paper, San Francisco, United States, 14th-18th September, 2020.
- [C3] **Sharma, R.**, Tomson, A., Lobato, E., Kallmann, M., Padilla, L., *Data Driven Multi-Hazard Risk Visualization*, *EuroVis 2020-poster, Extended Abstract, Norrkoping, Sweden, May 25th-29th, 2020*.
- [C2] **Sharma, R.**, Farias, R., Kallmann, M., *Integrating Local Collision Avoidance with Shortest Path Maps*, *EuroGraphics 2020, Poster paper, Norrkoping, Sweden, May 25th-29th, 2020*.
- [C1] **Sharma, R.**, Jadhav, S., Tripathy, D., Sardar, V. H., Patil, G. R., *Virtual Laboratory: An alternative approach to Urban Transportation Systems Planning Lab*, *Transportation Research Board, 93rd Annual Meeting, Washington, D.C, USA, 2014*.

Peer-Reviewed Book Chapter

- [B1] Zhang, Y., Roy, L., **Sharma, R.**, Zhang, E. *Maximum Number of Transition Points in 3D Linear Symmetry Tensor Fields*, *Topological Methods in Data Analysis and Visualization V*, 2020, pp. 237–250 (Appeared in the conference proceedings of *TopoInVis 2017*, Tokyo, Japan, Feb 27th-28th, 2017).

Patent

- [1] *System and Method for Automatic Floorplan Generation*
 Inventors: Eric A Bier and **Ritesh Sharma**
 US Patent App. 18/297,506

Technical Skills

- **Programming and Scripting Languages:** *C(Proficient), C++(Proficient), Python(Fluent), GLSL, PHP, HTML, CSS, Javascript, JQuery, Wolfram Language*
- **Frameworks and Platforms:** *wxWidgets, QT, OpenGL, OpenCV, OpenMP, OpenCL, EmberJS, React, Redux, GitHub, BitBucket, GitLab, Scikit-learn, Keras, Tensorflow, PyTorch, Robot Operating System (ROS & ROS2) & Microsoft Hololens, IntelliJ, Microsoft Visual Studio, Amazon Web Services (AWS).*
- **Software:** *Microsoft Visual Studio, Matlab, Renderman, Mathematica, Unity3D, Unreal Engine 4.0*

Peer Reviewed Conference/Journal Reviewer

- *IEEE Transactions: TVCG (2023 & 2024)*
- *IEEE VIS (2021, 2022, & 2023)*
- *EuroVIS (2022, 2023, & 2024)*
- *CASA (2019, 2020, & 2023)*
- *IEEE PACIFIC VIS (2022, & 2024)*
- *Robotics: Science and Systems (2020 & 2024)*
- *ACM MIG (2019, 2020, & 2021)*
- *SCA 2021*
- *ICAPS 2019*

Research Talks

- *Spatial Reasoning: Enhancing Flows, Formations, Modeling and Decision Making at Oakland University, Rochester, MI, June 2024*
- *Advancements and Emerging Trends in 3D Reconstruction Techniques at Center for Intelligent Infrastructure, April 2024.*
- *Navigation Structures for Flows, Formations and Decision Making at*
 - *Center for Intelligent Infrastructure, March 2024.*
 - *Amazon Robotics, July 2023.*
 - *Lawrence Livermore National Lab, Feb 2023.*
 - *University of California Merced, May 2022.*

Teaching Experience

Teaching Assistant, University of California Merced Aug, 18 - Dec, 22

- *Intro to Computing I: Java (Spring 20)*
- *Advanced Programming: C++ (Spring 22)*
- *Data Structures (Fall 18, Spring 19)*
- *Algorithm Design & Analysis: C++ (Fall 21)*
- *Intro to OOPS: C++ (Spring 21, Spring 23)*
- *Computer Graphics: C++ (Fall 19, & 22)*

Graduate Teaching Assistant, Oregon State University Jan, 14 - March, 17

- *Analysis of Algorithm (Winter 16)*
- *Intro to Databases (Spring 14 & 15, Summer 15)*
- *CS 344: Operating Systems I (Winter 17)*
- *CS 480: Translators (Winter 14)*

Teaching Assistant, Summer Geometry Institute 2021 August, 21
Organized by Geometry Group at Massachusetts Institute of Technology (MIT)

Online Course Highlights

- *Generative AI for Everyone (DeepLearning.AI)*
- *Neural Networks and Deep Learning (DeepLearning.AI)*
- *Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization (DeepLearning.AI)*
- *Python for Computer Vision with OpenCV and Deep Learning (Udemy.com)*
- *ROS Tutorials for Beginners (Udemy.com)*
- *IBM AI Engineering Professional Certificate covering courses in machine learning, deep learning, computer vision, Tensor flow and PyTorch (Coursera.com)*

Awards

- *UC Merced EECS USAP Travel Fellowship 2023*
- *UC Merced GRAD EXCEL Peer Mentorship Award: 2020-2021 & 2021-2022*
- *UC Merced EECS Bobcat Travel Fellowship: 2019 & 2020*
- *Travel award for NSF sponsored SOCG 2019, Portland, Oregon*
- *UC Merced EECS Bobcat Summer Fellowship 2019*
- *Graduate Assistantship (Full tuition & Stipend) at University of California Merced (2018 - 2023)*
- *Graduate Assistantship (Full tuition & Stipend) at Oregon State University (2014-2017)*
- *Received Honorary Citizenship of Corvallis, Oregon for contributions and achievements at Oregon State University by the mayor of city of Corvallis, Oregon, United States*

Services

- *Peer mentor for nine first year PhD students under UC Merced GRAD-EXCEL Peer Mentor Program for the academic year 2020-2021 & 2021-2022.*
- *Served as the Secretary of the Merced Indian Graduate Student Association (MIGSA) at University of California Merced for the academic year 2019-2020, California, USA*
- *Served as Student Volunteer at ACM SIGGRAPH 2019 held at Los Angeles, July 28th - August 1st, 2019*
- *Mentored a senior undergraduate student under Research Experience for Undergraduate (REU) Program during Summer 2015, funded by National Science Foundation (NSF).*

References

Available on request.