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., Laramee, 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

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.*

Advancements and Emerging Trends in 3D Reconstruction Techniques at

- *Center for Intelligent Infrastructure, April 2024.*

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 Massachussets 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.