Ritesh Sharma

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Education

PhD in Computer Science (CGPA 4.0/4.0) December 2023
University of California, Merced, California

MS in Computer Science (CGPA 3.45/4.0) March 2017
Oregon State University, Corvallis, Oregon

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

Professional Experience

Postdoctoral Research Associate, *The Institute for Robotics and Autonomy, United States* *Dec 24 - Present*
The University of Tulsa

- *Investigating robotic navigation, stability control, perception, and manipulation tasks for assistive robots.*
- *Outcome until now: 1 manuscript in preparation.*

Postdoctoral Research Fellow, *Center for Intelligent Infrastructure, United States* *Jan 24 - Dec 24*
Missouri University of Science & Technology

- *Investigated sensor integration with drones, microscopic object detection, object segmentation, and 3D scene reconstruction techniques (such as Gaussian splatting and Structure-from-Motion) for AI/ML-driven digital twin development in infrastructure asset management.*
- *Resulted in five manuscripts (2 publication, 1 technical report and 2 in preparation).*

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.*
- *Resulted in a prototype which was later developed and tested at Amazon's warehouse.*

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 publications 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.*
- *Resulted in an internal technical report.*

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

- *Investigated topics related to geometry interaction for laser cutting.*
- *Resulted in a conference publication.*

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

- *Developed GUI for Passur's flight tracking system, implemented server-side database communication, and built core features for a globally used product 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 geometry primitives and plot functions for 3D printing.*

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

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

Publications

J=Journal, C=Conference, B=Book Chapter, P=Patent, R=Technical Report, **T=Thesis**

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 (invited for presentation at the ACM SIGGRAPH Conference on Motion, Interaction, and Games 2024).*

[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

[C11] ***Sharma, R.****, Vajedian, S., Shi, Z., Chen, G., 3D Reconstruction of Bridges for Virtual Inspection and Reporting based on RGB and Thermal Imaging. (In preparation)*

[C10] Lai, K., ***Sharma, R.****, Afsharmovahed, M., Shi, Z., Chen, G.,Reconfigurable Machine Learning Tool for Image-based Bridge Inspection and Management, 104th Transportation Research Board Annual Meeting 2025.*

[C9] Taffese, W., ***Sharma, R.****, Afsharmovahed, M.,Manogaran, G., Chen, G., Benchmarking YOLOv8 for Optimal Crack Detection in Civil Infrastructure, 104th Transportation Research Board Annual Meeting 2025.*

[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 Chapters

[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

[P1] System and Method for Automatic Floorplan Generation
Inventors: Eric A Bier and ***Ritesh Sharma***
US Patent App. 18/297,506

Technical Report

[R1] Afsharmovahed, M. H., Lai, K., ***Sharma, R.****, Chen, G., and Qin, R., An Interactive System for Training and Assisting Bridge Inspectors in the Inspection Video Data Analytics, INSPIRE University Transportation Center Report, 2024.*

Thesis

[T2] PhD Thesis: Navigation Structures for Flows, Formations and Decision Making.

[T1] MS Thesis: Interactive Design and Transition Point Analysis of 3D Linear Symmetric Tensor Fields.

Technical Skills

- **Programming and Scripting Languages***: C(Proficient), C++(Proficient), Python(Proficient), GLSL, PHP, HTML, CSS, Javascript, JQuery, Wolfram Language*
- **Frameworks and Platforms***: wxWidgets, QT, OpenGL,OpenCV, OpenMP, OpenCL, EmberJS, React, Redux, GitHub, BitBucket, GitLab, 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*
- **Machine Learning***: Scikit-learn, Keras, Tensorflow, PyTorch, LLM, GAN, CNN, Transformers, Neural network's training and inferences.*
- **Hardware** *Hello Robot's Stretch 3, KUKA robotic manipulator 7/14, Agilex Tracer (AMR), Nvidia's Jetson Orin Nano, ModalAi's Starling Drone, Zed2i Camera, LiDAR (Ouster, Velodyne, Livox) & VOXL2 auto-pilot platform and Raspberry Pi 4.*

Certification Training

- *KUKA College's LBR iiwa (Intelligent Industrial Work Assistant) certificate for completing a 5-day training program on KUKA's robotic manipulator, Shelby Township, Michigan.*

Online Course Highlights

- *Generative AI for Everyone (DeepLearning.AI)*
- *Generative AI with Large Language Models (LLM) (DeepLearning.AI)*
- *Generative Adversarial Networks (GANs) Specialization (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)*

Peer Reviewed Conference/Journal Reviewer

- *Int. Conference of Multimodal Interaction (2025)*
- *IEEE Transactions: TVCG (2023, & 2024)*
- *IEEE VIS (2021, 2022, 2023, & 2025)*
- *EuroVIS (2022, 2023, 2024, & 2025)*
- *CASA (2019, 2020, & 2023)*
- *IEEE PACIFIC VIS (2022, 2024 & 2025)*
- *Robotics: Science and Systems (2020 & 2024)*
- *Journal of Intelligent Robotics & Application (2025)*
- *ACM MIG (2019, 2020, & 2021)*
- *SCA 2021*
- *ICAPS 2019*

Research Talks

- *Spatial Intelligence: Reasoning, Representation and Planning.*

  - *Institute of Robotics & Autonomy Seminar at the University of Tulsa, OK, March 2025.*
  - *University of Southern Mississippi, MS, February 2025.*
  - *Youngstown State University, OH, January 2025.*
- *Spatial Reasoning: Enhancing Flows, Formations, Modeling & Decision Making, Oakland University, 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*
  - *Center for Intelligent Infrastructure at Missouri S&T, 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* *Aug 21*
Organized by Geometry Group at Massachussets Institute of Technology (MIT)

Awards & Honors

- *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.