Rakesh Sharma

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Summary

Multimodal AI researcher with a strong background in bioengineering, medical imaging, and healthcare product development. Passionate about building clinically deployable multimodal learning systems, with a focus on gastrointestinal disorders and post-surgical complication prediction through the integration of imaging, clinical, and structured data. Brings extensive industry experience in developing, validating, and deploying healthcare technologies within clinical workflows. LinkedIn profile.

Education

2024 – present PhD in **Bioengineering**, **University of Pennsylvania** (GPA: 4.0/4.0)
Advisors: Prof. Walter R. T. Witschey and Prof. Victoria M. Gershuni
Research: Multi-agent multi-modal systems; clinically-aware LLM-as-a-judge; Post-operative outcome prediction.

2008 – 2013 B.Tech and M.Tech in **Bioengineering**, **IIT (BHU) Varanasi** (GPA: 8.57/10)
Advisors: Prof. Neeraj Sharma and Prof. Nira Misra
Research: Digital signal processing; biomedical image analysis; biosensor fabrication.

Work Experience

Data Scientist, Eli Lilly and Company, Bengaluru, India 2020 – 2024

- Built and deployed end-to-end data science solutions across multiple product lines.
- Automated product research and development workflows to improve efficiency and scalability.
- Applied data science methodologies to support innovation in drug-delivery device design and evaluation.
- Developed imaging pipelines and algorithms for semi-automated and automated device failure analysis.

CTO and Co-founder, Comofi Medtech Pvt Ltd, Bengaluru, India 2017 – 2020

- Directed full-cycle development of a surgical robotic platform, including system architecture, integration, and validation.
- Developed advanced medical imaging algorithms for automated segmentation and deformable image registration.
- Led fundraising initiatives, authored grant proposals, and established manufacturing workflows during COVID-19 supply-chain disruptions.

Scientist, Achira Labs Pvt Ltd, Bengaluru, India 2015 – 2017

- Developed microfluidics-based in-vitro diagnostic platforms, including assay design and device integration.

Engineer (CTO Office), Wipro Technologies, Bengaluru, India 2013 – 2015

- Built computer vision–enabled solutions for financial products and automation pipelines.

Skills

Programming	Python, PyTorch, R, NumPy, SciPy, Pandas, Git
Medical imaging	CT/MRI processing, segmentation, registration, radiomics, SimpleITK, MONAI, nnU-Net, PyRadiomics
Machine learning	Deep learning, large language models, multi-agent AI, computer vision, vision–language models, transformer architectures
Workflow	HPC (SLURM/LSF), data engineering, project management

Publications

Oral Presentations

Lee, K., **Sharma, R.**, E. Bouche, C. Quy, V. Gershuni, and W. Witschey (2025). *Body Composition Analysis of Weight Loss Induced by GLP1 Receptor Agonists*. Korean College of Radiologists Annual Meeting. Oral Presentation.

Sharma, R., S. Vasisht, G. M. Vargas, R. Damani, J. Duda, J. C. Gee, C. M. Vollmer, W. Witschey, and V. Gershuni (2025). *Automated CT-Based Volumetric Body Composition Analysis Predicts Post-Operative Complications Following Pancreaticoduodenectomy: A Retrospective Study*. CLINICCAI (MICCAI). Oral Presentation.

Vasisht, S., **Sharma, R.**, G. M. Vargas, R. Damani, J. C. Gee, W. Witschey, C. M. Vollmer, and V. M. Gershuni (2025). *Muscle Quality on Preoperative Imaging is Associated with Postoperative Pancreatic Fistula Risk*. American College of Surgeons Annual Meeting. Oral Presentation.

Poster Presentations

Aleixo, G., L. Paruzzo, **Sharma, R.**, W. Witchey, M. Ruella, D. Landsburg, S. Barta, J. Svoboda, S. Schuster, E. Chong, P. Munshi, S. Susanibar, and S. S. Nasta (2025). *Trends in muscle and fat metrics and their association with outcomes following CAR T-cell therapy in older adults with non Hodgkin lymphoma.* ASH Annual Meeting. Poster.

Damani, R., **Sharma, R.**, S. Vasisht, G. M. Vargas, J. Duda, G. Wu, J. C. Gee, W. Witschey, and V. Gershuni (2025). *Volumetric Body Composition Analysis on Preoperative CT Scans Improves Risk Prediction in Colorectal Surgery Patients*. RSNA Annual Meeting. Poster.

Zaki, R., **Sharma, R.**, P. Goswami, H. Yang, J. C. Gee, C. E. Kahn, J. B. Kneeland, A. Borthakur, and W. Witschey (2025). *Enhancing Diagnostic Concordance and Quality Assurance Through Automated MRI and Arthroscopy Report Comparison Using Large Language Models*. RSNA Annual Meeting. Poster.

Patent Applications

Desai, H., M. Kawiecki, **Sharma, R.**, A. Tiwari, and J. Venderley (Mar. 2023). *WO2023044089A1 – Methods and Apparatuses for Detecting Anomalies When Filling a Container with Fluid*. US Patent App. PCT/US2022/043937. Patent.

Gururaj, K. B., S. Kalme, S. K. Raghunath, and **Sharma, R.** (Jan. 2022). *System for Renal Puncturing Assistance*. US Patent App. 17/294,009. Patent.

Sharma, R. and M. Madhusudhanan (Dec. 2015). *Image Processing Method of Enabling Financial Transaction and an Image Processing System Thereof*. US Patent App. 14/459,428. Patent.

Journal Papers

Beeche, C., J. Kim, H. Tavolinejad, B. Zhao, **Sharma, R.**, J. Duda, J. Gee, F. Dako, A. Verma, and C. Morse (2025). "A Pan-Organ Vision-Language Model for Generalizable 3D CT Representations". In: *medRxiv*.

Dang, X., H. Shih, **Sharma, R.**, D. T. Angwin-Kaerner, K. Lin, S. Kapur, N. R. Thyagarajapuram, G. H. Shi, and D. S. Collins (2024). "Clinical Investigation of Large Volume Subcutaneous Delivery up to 25 mL for Lean and Non-Lean Subjects". In: *Pharmaceutical Research* 41.4, pp. 751–763.

Montoya, G., J. V. Teli, C. Kadamus, K. Lin, K. Eddy, E. Curry, K. Blankenship, N. Anumba, **Sharma, R.**, and V. K. Sharma (2024). "Computational Modeling and Simulation of the Cerebrospinal Flow and Drug Delivery". In: *Alzheimer's & Dementia* 20, e094612.

Goyal, S., P. Bist, and **Sharma, R.** (2020). "Optimal Sample Pooling: An Efficient Tool Against SARS-CoV-2". In: *medRxiv*.

Sharma, R., G. Kapusetti, S. Y. Bhong, P. Roy, S. K. Singh, S. Singh, C. K. Balavigneswaran, K. K. Mahato, B. Ray, and P. Maiti (2017). "Osteoconductive Amine-Functionalized Graphene–Poly(methyl methacrylate) Bone Cement Composite with Controlled Exothermic Polymerization". In: *Bioconjugate Chemistry* 28.9, pp. 2254–2265.

Conference Proceedings

Chen, H., R. Shukla, R. Wu, S. Yang, D. Duong-Tran, D. M. H. Nguyen, M. Niepert, C. Beeche, J. Gee, J. Duda, **Sharma, R.**, C. Davatzikos, W. Witschey, B. Hou, and L. Shen (2025). "Adapting Vision-Language Models for 3D CT/MRI Understanding on PMBB via Slice Selection and Explanation Analysis". In: *Proceedings of the IEEE/CVF International Conference on Computer Vision*, pp. 2273–2282.

Pai, J., M. Azad, B. Goyal, R. Nair, **Sharma, R.**, and D. Dendukuri (2019). "A Point-of-Care Immunoassay Platform for Thyroid Function Based on Hydrogel Sensors Embedded Inside a Microfluidic Device". In: *23rd International Conference on Miniaturized Systems for Chemistry and Life Sciences (MicroTAS)*. CBMS, pp. 102–103.