

## Prof. Ajit Rajwade

### Present Address

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### Occupation

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- Associate Professor, (August 2019 onwards) in the Department of Computer Science and Engineering, IIT Bombay
- Assistant Professor, (July 2013 to July 2019) in the Department of Computer Science and Engineering, IIT Bombay

### Work Experience after Ph.D.

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- Post-doctoral researcher, Dept. of Electrical and Computer Engineering (ECE), Duke University (Feb 2011 to June 2012)  
Worked on Bayesian methods for compressive sensing and dictionary learning with application to reconstruction of hyperspectral images and video data from coded compressive measurements.
- Assistant Professor, Dhirubhai Ambani Institute of Information and Communication Technology (DAIICT), Gandhinagar, July 2012 to June 2013

### Education

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- University of Florida, Gainesville, Florida, USA.  
Ph.D. in Computer Science, Jan. 2005 to Oct. 2010, GPA: 3.87  
*Advisors:* Anand Rangarajan, Arunava Banerjee.  
*Thesis title:* Probabilistic Approaches to Image Registration and Denoising.
- McGill University, Montreal, Quebec, Canada.  
M.Sc. in Computer Science, Aug. 2002 to Dec. 2004, GPA: 3.72  
*Master's thesis title:* Facial Pose Estimation and Face Recognition from 3D Data.
- Government College of Engineering, Pune (University of Pune), India.  
B.E., Aug. 2001, Computer Engineering (*First class with distinction in every semester*).

### Current Areas of Research Interest

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- Compressed sensing: theoretical bounds, algorithms, applications
- Group Testing: theoretical bounds, algorithms, applications
- Image/video restoration: denoising, deblurring, inpainting, underwater imaging, video stabilization
- Image Reconstruction: Computed tomography; Cryo-EM Reconstruction in MRI, CT, diffusion MRI/HARDI; NMR Spectroscopy Reconstruction
- Image and video compression using machine learning and sparse representations
- Probability Density Estimation
- Graph Signal Processing

## Awards/ Honors

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- Received the Prof. S. P. Sukhatme Award for Excellence in Teaching for the year 2024 (an institute-wide award based on cumulative teaching scores over the past ten years)
- February 2020: Senior Member, IEEE
- September 2019: Received Departmental Award for Excellence in Teaching (2019)
- Travel grant from Google to PhD student Jerin Geo James for attending ICCV 2019
- My Ph.D. student Jerin Geo James was one of the 8 recipients of the Qualcomm Innovation Fellowship (India) from a total of 95 teams from IIT-B/D/M/Ka/Kh, IISc and IIIT-H.
- Young Faculty Award from IIT Bombay, 2013.
- Best Scientific Paper Award at the International Conference on Pattern Recognition (ICPR), 2008, Tampa, Florida.
- Selection with full funding at Summer School on Image Processing at the Park City Math Institute/Institute for Advanced Study (IAS), Park City, Utah in June/July 2010, [declined].
- Travel Grants from the Department of CISE at the University of Florida to present papers at the *Workshop on Energy Minimization Methods in Computer Vision and Pattern Recognition (EMMCVPR)*, Bonn, Germany (Summer 2009), and from the Department of CISE and the Student Government at the University of Florida to present my paper at the *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, New York (Summer 2006).
- Tuition Fee Waiver for Summer 2003, McGill University (awarded to two international students out of 100 in the year 2003-2004, in recognition of academic excellence).
- Rank 8 in Computer Engineering at the University of Pune (out of 800 students) in the year 1999-2000.

## Sponsored Research Projects

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- PI, 'Algorithms for efficient high-dimensional near-neighbor search', funded by Amazon India (Rs 5 lakhs), December 2023 till December 2025
- PI, 'Data Science Algorithms for Radiation Reduction in Longitudinal CT Scanning', funded by Koita Center for Digital Health, ongoing, Rs 15.25 lakhs
- co-PI (PI Prof. Ruchi Anand, co-PI Prof. Sandip Kaledhonkar) 'Acquisition of state-of-the-art cryo-Electron Microscopy Instrument for developing National Facility at IIT Bombay Mumbai', ongoing, Rs 40 crores
- PI, 'Pooled Testing for COVID-19 Samples using Compressed Sensing', grant from WRCB (IITB) and DST-Rakshak, Rs 10 lakhs each, along with Prof. Manoj Gopalkrishnan (co-PI)
- PI, 'Theoretical Analysis of Sparse Recovery for Imaging under Realistic Noise Models', SERB Matrics Grant, PI, Rs 6 lakhs
- PI, 'Underwater Image Restoration', grant from Qualcomm Inc. as part of the Qualcomm India Innovation Fellowship, 2018 to 2020, Rs 10 lakhs; PI
- PI, 'Algorithms for Radiation Reduction in Longitudinal Computed Tomography', from Tata Memorial Hospital, Jan 2019 till Jan 2021; PI
- co-PI, 'Algorithms for Histopathology Image Analysis', from Aditya Imaging Technologies Pvt. Ltd. (now named Aira Matrix), July 2014 till July 2018; co-PI (PI: Prof. Suyash Awate)
- PI, 'Applications involving Source separation', Seed grant from IRCC, IIT Bombay, from 2014 to 2019, Rs 14 lakhs; PI

## Postdoc Guidance

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I am currently guiding the following post-doctoral scholars:

1. Azhar Tantry, Research area: Applications of cone-adapted shearlets; Inference of orthonormal sparsifying transforms

## Student Guidance

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I am currently guiding the following students (I am the main guide except when specified otherwise):

1. Shuvayan Banerjee, (Ph.D. student), Thesis topic: Group testing using sparse regression, Co-advised with Prof. Radhendushka Srivastava (IITB, Department of Mathematics) and Prof. James Saunderson, Department of ECE, Monash University
2. Ashutosh Vaish (Ph.D. student at IIIT-Delhi), main guide: Prof. Anubha Gupta from IIIT-Delhi, thesis topic: Diffusion Tensor Imaging, started July 2018
3. Kaishva Shah, IDDDP CMiNDS, Thesis topic: Cryo-electron microscopy
4. Nikita, MTech, thesis topic: Group testing and neural network pruning for image moderation
5. Vivek Pawar, MTech, thesis topic: Restoration of analog videos with jitter artefacts
6. Sai Vivek Mulukuri, MS (CMiNDS), thesis topic: Video defencing.
7. Agnipratim Nag (co-advised with Prof. Varun Bhalerao), BTech, thesis topic: Compressive NMR Image Reconstruction
8. Parth Pujari (co-advised with Prof. Radhendushka Srivastava), BTech, thesis topic: Compressive Sensing under LogNormal Noise
9. Arya Vishe (co-advised with Prof. Amit Sethi), BTech, thesis topic: Near Neighbor Search using Group Testing, 2025
10. Shreyas Grampurohit (co-advised with Prof. Satish Mulleti), BTech, Cryo-electron microscopy

I have finished guiding the following students at IIT Bombay:

1. Sabyasachi Ghosh, **PhD**, thesis topic: 'Compressed Sensing: Novel Applications, Challenges, and Techniques', defended thesis in May 2024
2. Bhumika Khetan, (co-advised with Prof. Satish Mulleti), M. Tech., Thesis topic: Unpaired image restoration, graduating in July 2024
3. Jaimin Chauhan, M. Tech., Thesis topic: Compressive NMR reconstruction, graduating in July 2024
4. Piyush Sawarkar, M. Tech., Thesis topic: Graph learning using suitable signal priors, graduating in July 2024
5. Garweet Sresth, IDDDP CMiNDS, (co-advised with Prof. Satish Mulleti), Thesis topic: Unlabelled Sensing, graduating in July 2024
6. Harsh Shah, BTech, Thesis topic: High-D Nearest Neighbor Search using Group Testing, graduated in May 2024
7. Ojaswi Jain, BTech, Thesis topic: Model selection in compressed sensing and diffusion MRI, graduated in May 2024
8. Dhananjay Kejriwal, BTech, Thesis topic: High-D density estimation under noise
9. Amol Girish Shah (co-advised with Prof. Nikhil Karamchandani, EE), DDP, Thesis topic: Signal Compression using Machine Learning and Anomaly Detection, graduated in July 2023
10. Anmol Namdev, M. Tech., Thesis topic: Radiation reduction algorithms in longitudinal CT, graduated in July 2023
11. Kashish Mittal, M. Tech., Thesis topic: Compressed sensing: debiasing and retrieval applications, graduated in July 2023
12. Anuj Fulari, M. Tech., (co-advised with Prof. Satish Mulleti) M. Tech., Thesis topic: Video deflickering and deblotching, graduated in July 2023

13. Sumeet Kumar Mishra, B. Tech., (co-advised with Prof. Nikhil Karamchandani, EE), Thesis topic: Signal Compression using Machine Learning and Anomaly Detection, graduated in July 2023
14. Sheel Shah, B. Tech., (co-advised with Prof. Rajbabu Velmurugan), Thesis topic: Cryo-EM reconstruction from a sampling theory perspective, graduated in May 2023
15. Sudhansh Peddabomma, B. Tech., Thesis topic: Group Testing and Unlabeled Sensing, graduated in May 2023
16. Richeek Das, RnD Project., Topic: Analyzing LASSO for the noise model in compressive RT-PCR, graduated in May 2023
17. Jerin Geo James, (PhD, thesis topic: Application Specific Visual Motion Estimation: Novel Computational Techniques, graduated Jan 2023
18. Rajershi Gupta, M. Tech student, Thesis topic: Pooling Matrix Design and Prior-Based Sparse Reconstruction for Group Testing in COVID-19, graduated July 2022
19. Nitish Gangwar (co-advised with Prof. Sandip Kaledhonkar), M. Tech student, Thesis topic: Machine Learning for Particle Picking and Denoising in Cryo-electron Microscopy, graduated July 2022
20. Sarvesh Pandey, M. Tech student, Thesis topic: Restoration of Images of Crumpled Documents, graduated July 2022
21. Shaan ul Haque, BTech RnD project student, topic: High dimensional density estimation using tensor decomposition and sparse coding, graduated May 2022
22. Nimay Gupta, BTech student, Thesis topic: Compressed sensing for sensor networks (co-advised with Prof. Nikhil Karamchandani, EE), graduated May 2022
23. Yadnyesh Patil, MTech student, Thesis topic: Tomographic reconstruction with template priors, graduated July 2021
24. Ritesh Goenka, Project staff (after CSE, BTech), Project staff: Group testing using compressed sensing with side information
25. Rishav Chatterjee, M. Sc. in Statistics, (co-advised with Prof. Radhendushka Srivastava, Thesis topic: Reconstruction of Sparse Signals under the influence of Multiplicative Log-Normal Noise using L1-regularization, graduated July 2021
26. Jian Vora, BTech student, thesis topic: Tensors for probability density estimation, graduated June 2021
27. Denil Mehta, BTech student, thesis topic: Denoising of cryo-electron microscopy images, graduated June 2021
28. Ameya Anjarlekar, BTech student, thesis topic: Compressed Sensing Matrix Design, graduated June 2021
29. Krunal Parmar, (M. Tech student), thesis topic: Bird species recognition from image data, graduated June 2020
30. Shuvayan Banerjee, (M. Tech student), thesis topic: Compressed sensing under Poisson noise with outliers, graduated June 2020, co-advised with Prof. Radhendushka Srivastava
31. R. Sudarsanan, (B. Tech student), thesis topic: Poisson-Gaussian inverse problems, graduated June 2020
32. Parthasarathi Khirwadkar, (B. Tech student), thesis topic: Topics in motion estimation, graduated June 2020
33. Rupesh, B. Tech. student, thesis topic: Topics in cryo-EM, graduated June 2020
34. Maitrey Gramopadhye, B. Tech. student, thesis topic: Topics in cryo-EM, graduated June 2020
35. Preeti Gopal, PhD, thesis topic: 'Tomographic Reconstruction: A Radiation Reduction Approach', co-advised with Prof. Sharat Chandran (IITB, CSE) and Prof. Imants Svalbe (Monash University), defended PhD thesis on 31st January 2020

36. Avinash Modi, (M. Tech. student), thesis topic: Compressive Inversion under Poisson and Poisson-Gaussian noise with tight analytical bounds and regularization parameter selection, graduated July 2019
37. Khursheed Ali, (M. Tech. student), thesis topic: Particle-picking and Reconstruction in cryo-em, graduated in June 2019
38. Kalpesh Dusane, (M. Tech. student), thesis topic: Underwater image processing, graduated in June 2019
39. Rudrajit Das, BTech RnD project, topic: Non-linear blind compressed sensing, graduated in June 2019
40. Dhruv Shah, (B. Tech student), thesis topic: Designing sensing matrices for compressive tasks, co-advised with Prof. Rajbabu Velmurugan, graduated in June 2019
41. Chinmay Talegaonkar, (B. Tech student), thesis topic: Phase retrieval, co-advised with Prof. Subhasis Chaudhuri, graduated in June 2019
42. Arunabh Ghosh, (B. Tech student), thesis topic: Tomography under unknown angles, co-advised with Prof. Subhasis Chaudhuri, graduated in June 2019
43. Arijit Pramanik, (B. Tech student), thesis topic: Topics in Raman Spectroscopic Imaging, graduated in June 2019
44. Udayan Joshi, (B. Tech student), thesis topic: Greedy techniques for sparse non-linear regression, co-advised with Dr. Karthik Gurumoorthy (ICTS-TIFR), graduated in June 2019
45. Pakshal Bohra (Dual degree student), thesis topic: Inverse problems under Poisson noise, graduated in July 2018
46. Himanshu Pandotra (Dual degree student), thesis topic: Handling perturbations in compressed sensing: mismatch in measurement matrix, representation matrix and object pose, graduated in July 2018
47. Ritwick Kumar (B.Tech. student), thesis topic: graduated in June 2018
48. Eeshan Malhotra (3 year M. Tech. student), thesis topic: Tomographic Reconstruction without knowledge of angles, graduated in July 2017
49. Sania Qamar (3 year M. Tech. student), thesis topic: Transformation invariant dictionary learning, co-advised with Prof. Suyash Awate, graduated in July 2017
50. Deepak Garg (2 year Mtech student), thesis topic: Poisson Compressive Sensing, started: graduates in July 2017
51. Alankar Kotwal (Dual degree student), thesis topic: Design of Sensing Matrices in Compressive Sensing, graduated in July 2017
52. Vishal Agrawal (B. Tech. student), thesis topic: Image-based CAPTCHAs, graduated in May 2016
53. Sukanya Patil (Dual Degree Student), thesis topic: Image Reconstruction under Poisson Noise, co-advised with Prof. Rajbabu Velmurugan, started: June 2015, graduated in July 2016
54. Souvik Sinha Deb (M. Tech. student), thesis topic: Music Transcription using Image Analysis, started: June 2015, graduated in July 2016
55. Deepak Babu Sam (M. Tech. student), thesis topic: Video Compressive Sensing using Bayesian Models, graduated in July 2015
56. Hc Lalduhbera (M. Tech. student), thesis topic: Image-based CAPTCHAs, started: June 2014, graduated in July 2015
57. Yellamraju Tarun (B. Tech. student), thesis topic: Video Compression using Coded Snapshots, co-advised with Prof. Subhasis Chaudhuri, graduated in July 2015

## Research/ Publications

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**DBLP Records:** here and here, **Google Scholar Page:** here

**Web-link:** Publications link on webpage

### • Patents

1. Ajit Rajwade, Vishal Agarwal, Hc Lalduhbera and Venkatakrishnan Ramaswamy, *Method and electronic device for providing image-based CAPTCHA challenge*, US Patent #20190303555A1, Granted in March 2021.
2. M Gopalkrishnan, S Ghosh, AV Rajwade, D Palakodeti, S Krishna, *Methods and systems for determining viruses in biological samples using a single round based pooling*, US Patent Application (filed) 17/535,998

### • Book Chapters

1. Ajit Rajwade, Nir Shlezinger and Yonina Eldar, *AI for Pooled Testing of COVID-19 Samples*, invited chapter in the book 'Artificial Intelligence for COVID-19', published by Springer Nature

### • Journal Papers

1. (\*) Shuvayan Banerjee (#), Sudhansh Peddabomma (#), Radhendushka Srivastava and Ajit Rajwade, "A Likelihood Based Method for Compressive Signal Recovery under Gaussian and Saturation Noise", *Signal Processing (Elsevier)*, 2024 [(#) = first authors with equal contribution]
2. Richeek Das, Aaron Jerry Ninan, Adithya Bhaskar and Ajit Rajwade, *Performance Bounds for LASSO under Multiplicative Lognormal Noise: Applications to Pooled RT-PCR Testing*, *Signal Processing (Elsevier)*, 2023
3. Shu-Jie Cao, Ritesh Goenka, Chau-Wai Wong, Ajit Rajwade, Dror Baron, 'Group Testing With Side Information via Generalized Approximate Message Passing', *IEEE Trans. Signal Process.* 71: 2366-2375 (2023)
4. Ashutosh Vaish, Anubha Gupta and Ajit Rajwade, *CSR-PERT: Joint Framework for MRI and HARDI Data Reconstruction using Perturbed Radial Trajectory Estimated from Compressively Sensed Measurements*, *Computers in Biology and Medicine (Elsevier)*, September 2022.
5. Preeti Gopal, Sharat Chandran, Imants Svalbe and Ajit Rajwade, *Mitigating prior-bias from sparse-projection tomographic reconstructions*, *IEEE Transactions on Computational Imaging*, 2022
6. Ashutosh Vaish, Ajit Rajwade and Anubha Gupta, *TL-HARDI: Transform Learning based Accelerated Reconstruction of HARDI data*, *Computers in Biology and Medicine (Elsevier)*, April 2022.
7. Ajit Rajwade and Karthik S. Gurumoorthy, *Two Penalized Estimators based on Variance Stabilization Transforms for Sparse Compressive Recovery with Poisson Measurement Noise*, *Signal Processing (Elsevier)*, 2021
8. Sabyasachi Ghosh, Rishi Agarwal, Mohammad Ali Rehan, Shreya Pathak, Pratyush Agarwal, Yash Gupta, Sarthak Consul, Nimay Gupta, Ritika Goyal, Ajit Rajwade, Manoj Gopalkrishnan, *A Compressed Sensing Approach to Group-testing for COVID-19 Detection*, *IEEE Open Journal on Signal Processing (IEEE OJSP)*
9. R. Sudarsanan and Ajit Rajwade, *Analyzing Cross-validation in Compressed Sensing with Poisson Noise*, *Signal Processing (Elsevier)*, 2021
10. Preeti Gopal, Sharat Chandran, Imants Svalbe and Ajit Rajwade, *Low radiation tomographic reconstruction with and without template information*, *Signal Processing (Elsevier)*, 2020
11. Himanshu Pandotra, Eeshan Malhotra, Ajit Rajwade and Karthik S. Gurumoorthy, *Dealing with Frequency Perturbations in Compressive Reconstructions with Fourier Sensing Matrices*, *Signal Processing (Elsevier)*, 2019

12. Pakshal Bohra, Deepak Garg, Karthik S. Gurumoorthy and Ajit Rajwade, *Variance Stabilization Based Compressive Inversion under Poisson or Poisson-Gaussian Noise with Analytical Bounds*, Inverse Problems (IOP), 2019
13. Sukanya Patil, Karthik S. Gurumoorthy and Ajit Rajwade, *Using an Information Theoretic Metric for Compressive Recovery under Poisson Noise*, Signal Processing (Elsevier), 2019, acceptance rate: 17 percent over the last three years, <https://journalinsights.elsevier.com/journals/0165-1684>
14. Ajit Rajwade, David Kittle, Tsung-Han Tsai, David Brady and Lawrence Carin, *Coded Hyperspectral Imaging and Blind Compressive Sensing*, SIAM Journal on Imaging Sciences, 6(2): 782-812 (2013).
15. Ajit Rajwade, Anand Rangarajan and Arunava Banerjee, *Image denoising using the higher order singular value decomposition*, IEEE Transactions on Pattern Analysis and Machine Intelligence, 35(4): 849-862 (2013)
16. Karthik Gurumoorthy, Ajit Rajwade, Arunava Banerjee and Anand Rangarajan, *A Method for Compact Image Representation using Sparse Matrix and Tensor Projections onto Exemplar Orthonormal Bases*, IEEE Transactions on Image Processing (TIP), Volume 10, Issue 2, Feb. 2010, pp. 322-344.
17. Ajit Rajwade, Arunava Banerjee and Anand Rangarajan, *Probability Density Estimation using Isocontours and Isosurfaces: Applications to Information Theoretic Image Registration*, IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI), Volume 31, Issue 3, March 2009, pp. 475-491. (This work has been cited by various research groups in computer vision, visualization and medical imaging, and in two recent books: 'Information Theory in Computer Vision and Pattern Recognition' by F. Escolano, S. Pablo and B. Bonev, (September 2009) and 'Image Fusion Theories, Techniques and Applications' by H. Mitchell (March 2010), both published by Springer Verlag)
18. Ajit Rajwade and Martin Levine, *Facial Pose from 3D Data*, Image and Vision Computing, Volume 24, Issue 1, August 2006, pp. 849-856.

#### • Conference Papers

1. Harsh Shah, Kashish Mittal and Ajit Rajwade, 'Group Testing for Accurate and Efficient Range-Based Near Neighbor Search for Plagiarism Detection', ECCV 2024
2. Garweet Sresth, Ajit Rajwade and Satish Mulleti, 'Unlabeled Sensing with Priors: Algorithms and Bounds', IEEE ICASSP 2024
3. Anuj Fulari, Satish Mulleti and Ajit Rajwade, 'Unsupervised Model-based Learning for Simultaneous Video Deflickering and Deblotching', IEEE WACV 2024
4. Ashutosh Vaish, Mihir Chaturvedi, Anubha Gupta, Ajit Rajwade, *FOREST: White Matter Fiber Orientation Estimation using Deep Learning in Diffusion MRI*, IEEE International Workshop on Machine Learning for Signal Processing, 2023.
5. Pranava Singhal, Waqar Mirza, Ajit Rajwade and Karthik S. Gurumoorthy, *Estimating Joint Probability Distribution With Low-Rank Tensor Decomposition, Radon Transforms and Dictionaries*, EUSIPCO 2023.
6. Jerin Geo James, Devansh Jain and Ajit Rajwade, *GFlowNet: Video Stabilization using Deep Distilled Global Motion Estimates*, IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), 2023.
7. Shaan ul Haque, Ajit Rajwade and Karthik Gurumoorthy, *Joint Probability Estimation Using Tensor Decomposition and Dictionaries*, European Signal Processing Conference (EUSIPCO), 2022.
8. Jian Vora, Karthik S. Gurumoorthy and Ajit Rajwade, *Recovery of Joint Probability Distribution from One-Way Marginals: Low Rank Tensors and Random Projections*, IEEE Statistical Signal Processing Workshop (IEEE SSP), 2021.
9. Shuvayan Banerjee, Radhendushka Srivastava and Ajit Rajwade, *Reconstruction of Sparse Signals using Likelihood Maximization from Compressive Measurements with Gaussian and Saturation Noise*, European Signal Processing Conference (EUSIPCO), 2021

10. Chinmay Gurjarpadhye(\*), Shubhang Bhatnagar(\*) and Ajit Rajwade, *Analyzing cross-validation in compressed sensing with mixed Gaussian and impulse measurement noise with L1 errors*, European Signal Processing Conference (EUSIPCO), 2021
11. Ritesh Goenka, Shu-Jie Cao, Chau-Wai Wong, Ajit Rajwade, Dror Baron, *Contact Tracing Enhances the Efficiency of COVID-19 Group Testing*, IEEE ICASSP 2021 (accepted to Special session on "Data Science Methods for COVID-19"). Arxiv version available; part of this work also presented at CISS 2021 as an invited paper.
12. Jian Vora and Ajit Rajwade, *Compressed Sensing Recovery under Sensing Matrix Errors Combined with Unknown Measurement Gains*, IEEE ICASSP 2021
13. Tobias Doecker, Pranay Reddy Samala, Pranshu Negi, Ajit Rajwade and Thomas Kuerner, *Angle of Arrival and Angle of Departure Estimation Using Compressed Sensing for Terahertz Communications*, European Conference on Antennas and Propagation (EuCAP) 2021
14. Ashutosh Vaish, Anubha Gupta and Ajit Rajwade, *MSR-HARDI: Accelerated Reconstruction of HARDI Data Using Multiple Sparsity Regularizers*, International Conference on Image Processing (IEEE ICIP), 2020
15. Jerin Geo James and Ajit Rajwade, *Fourier-based pre-processing for seeing through water*, IEEE Winter Conference on Applications of Computer Vision (IEEE WACV), 2020 (oral and poster presentation, accepted in first submission round), [pdf], supplemental material
16. Jerin Geo James, Pranay Agrawal and Ajit Rajwade, *Restoration of Non-rigidly Distorted Underwater Images using a Combination of Compressive Sensing and Local Polynomial Image Representations*, International Conference on Computer Vision (ICCV) 2019 (oral presentation: acceptance rate 4.3%)
17. Chinmay Talegaonkar, Parthasarathi Khirwadkar, Ajit Rajwade, *Compressive Phase Retrieval under Poisson Noise*, International Conference on Image Processing (IEEE ICIP), 2019
18. Rudrajit Das and Ajit Rajwade, *Nonlinear blind compressed sensing under signal dependent noise*, International Conference on Image Processing (IEEE ICIP), 2019
19. Dhruv Shah and Ajit Rajwade, *Projection design for compressive source separation using mean errors and cross-validation*, International Conference on Image Processing (IEEE ICIP), 2019
20. Arunabh Ghosh, Ritwick Chaudhry, Ajit Rajwade, *Ab initio tomography with object heterogeneity and unknown viewing parameters*, International Conference on Image Processing (IEEE ICIP), 2019
21. Chinmay Talegaonkar and Ajit Rajwade, *Performance Bounds for Tractable Poisson Denoisers with Principled Parameter Tuning*, GlobalSIP 2018
22. Pakshal Bohra and Ajit Rajwade, *Poisson Low-rank Matrix Recovery using the Anscombe Transform*, GlobalSIP 2018 (oral presentation), [pdf].
23. Himanshu Pandotra, Rajbabu Velmurugan, Karthik S. Gurumoorthy and Ajit Rajwade, *Perturbed Compressed Sensing Based Single Snapshot DOA estimation*, GlobalSIP 2018 (oral presentation) [pdf].
24. Himanshu Pandotra, Eeshan Malhotra, Ajit Rajwade and Karthik S. Gurumoorthy, *Signal recovery in Perturbed Fourier Compressed Sensing*, GlobalSIP 2018, [pdf].
25. Dhruv Shah, Alankar Kotwal and Ajit Rajwade, *Designing constrained projections for compressed sensing: mean errors and anomalies with coherence*, GlobalSIP 2018, [pdf].
26. Preeti Gopal, Ritwick Chaudhry, Sharat Chandran, Imants Svalbe and Ajit Rajwade, *Tomographic Reconstruction using Global Statistical Priors*, DICTA 2017, [pdf]
27. Deepak Garg and Ajit Rajwade, *Performance Bounds for Poisson Compressed Sensing using Variance Stabilization Transforms*, Accepted to ICASSP 2017, [pdf].



28. Eeshan Malhotra, Karthik S. Gurumoorthy and Ajit Rajwade, *Stronger Recovery Guarantees for Sparse Signals Exploiting Coherence Structure in Dictionaries*, Accepted to ICASSP 2017
29. Eeshan Malhotra and Ajit Rajwade, *Tomographic reconstruction from projections with unknown view angles exploiting moment-based relationships*, International Conference on Image Processing (ICIP), 2016
30. Sukanya Patil and Ajit Rajwade, *Poisson noise removal for image demosaicing*, Accepted to British Machine Vision Conference (BMVC), 2016
31. Sukanya Patil, Rajbabu Velmurugan and Ajit Rajwade, *Dictionary learning for Poisson compressed sensing*, IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2016, .pdf
32. Preeti Gopal, Sharat Chandran, Imants Svalbe and Ajit Rajwade, *Multi-slice Tomographic Projection: To Couple or not to Couple*, Accepted to Indian Conference on Vision, Graphics and Image Processing, 2016 (oral presentation, 12% acceptance rate for oral presentation), [pdf]
33. Souvik Sinha Deb and Ajit Rajwade, *An Image Analysis Approach for Transcription of Music Played on Keyboard-like Instruments*, Accepted to Indian Conference on Vision, Graphics and Image Processing (ICVGIP), 2016 (oral presentation, 12% acceptance rate for oral presentation), [pdf], supplemental.
34. Chandrajit Chaudhuri, Yellamraju Tarun, Ajit Rajwade and Subhasis Chaudhuri, *Low Bit-rate Compression of Video and Light-field Data using Coded Snapshots and Learned Dictionaries*, Accepted to IEEE International Workshop on Multimedia Methods in Signal Processing (MMSP), 2015 (oral presentation, acceptance rate 17% for oral presentation)
35. Preeti Gopal, Ajit Rajwade, Sharat Chandran, Imants D. Svalbe, *A Comparison of Some Methods for Direct 2D Reconstruction from Discrete Projected Views*, DGCI (Discrete Geometry in Computer Imagery), 2016, 117-128
36. Yu-Tseh Chi, Mohsen Ali, Ajit Rajwade and Jeffrey Ho, *Block and Group Regularized Sparse Modeling for Dictionary Learning*, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2013.
37. Ajit Rajwade, Anand Rangarajan and Arunava Banerjee, *Video denoising using the higher order singular value decomposition*, International Conference on Energy Minimization Methods in Computer Vision and Pattern Recognition (EMMCVPR), July 2011, Leningrad, Russia.
38. Ajit Rajwade, Anand Rangarajan and Arunava Banerjee, *Automated Filter Parameter Selection using Measures of Noisiness*, Canadian Robot Vision Conference, June 2010, Ottawa (Canada).
39. Ajit Rajwade, Arunava Banerjee and Anand Rangarajan, *Image Filtering Driven by Level Curves*, International Conference on Energy Minimization Methods in Computer Vision and Pattern Recognition (EMMCVPR), Aug 2009, Bonn (Germany). [Oral Presentation]
40. Xin Hou, Karthik S. Gurumoorthy, Ajit Rajwade: *Color Image Compression Using a Learned Dictionary of Pairs of Orthonormal Bases*. DCC 2011: 458
41. Karthik Gurumoorthy, Ajit Rajwade, Arunava Banerjee and Anand Rangarajan, *Beyond SVD: Sparse Projections Onto Exemplar Orthonormal Bases for Compact Image Representation*, International Conference on Pattern Recognition (ICPR), Dec 2008, Tampa (USA). **Best Scientific Paper Award**.
42. Ajit Rajwade, Arunava Banerjee and Anand Rangarajan, *A New Method of Probability Density Estimation with Application to Mutual Information Based Image Registration*, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), June 2006, New York (USA) [Oral presentation, acceptance rate 6 %].
43. Ajit Rajwade, Arunava Banerjee and Anand Rangarajan, *Continuous Image Representations solve the Histogram Binning Problem in Mutual Information Based Image Registration*, International Symposium on Biomedical Imaging (ISBI), April 2006, Arlington, VA (USA).

44. Masoumeh Tabaeh Izadi, Ajit Rajwade and Doina Precup, *Using core beliefs for point-based value iteration*, International Joint Conference on Artificial Intelligence (IJCAI), August 2005, Edinburgh (UK).

## Previous Research Work and Employment History

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- **Research assistant at the University of Florida** Work on probability density estimation of image intensity values (applied to information theoretic image registration), image compression and image denoising (January 2005 to present).
- **Research assistant at McGill University** Department of Computer Science, working on Partially Observable Markov Decision Processes (POMDPs) (Fall 2005).
- **Research assistant at McGill University** Department of Agriculture, applied machine learning techniques to determining nitrogen content from hyperspectral features of soil (Fall 2005).
- **Thesis on 3D face recognition at McGill University** (Summer 2003 to Fall 2004).
- **Associate Software Engineer** at Veritas Software India Ltd., now part of Symantec Corp. (August 2001 to August 2002).

## Teaching Experience

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Served as course instructor for:

- Newly designed elective course on Advanced Image Processing (CS 754; a course on compressed sensing, tomography, sparse representations and low rank matrix recovery) at IIT Bombay, Spring 2017-2024
- Course on undergraduate statistics at IIT Bombay, Fall 2015-2023
- Courses on Image Processing, Computer Vision and Mathematical Methods in Visual Computing at IIT Bombay since July 2013
- A course on Data Structure and Algorithms for masters students at DAIICT in Winter 2013
- A course on Image Representation and Analysis for masters and PhD students at DAIICT in Autumn 2012 ([http://intranet.daiict.ac.in/~ajit\\_r/IT530\\_Autumn2012.html](http://intranet.daiict.ac.in/~ajit_r/IT530_Autumn2012.html), this course has been cited on the renowned Compressive Sensing Blog called Nuit Blanche, and is one of the earliest and few courses in India that teach compressive sensing and matrix completion)
- A course on Applications of Discrete Structures at the University of Florida (Dept. of CISE), for a class of 110 undergraduate students.
- A course on Calculus instructor for a class of 20 students, as part of the University of Florida STEPUP program for smooth transitioning of minority high school students into university life.

## Talks

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- May 2021: Invited talk on compressed sensing during the annual EECS Divisional Symposium, IISc
- June/July 2020: Talks on compressed sensing for COVID-19 pooled testing at Weizmann Institute (group of Prof. Yonina Eldar), at Information Theory Group (organized by Profs. Dror Baron from NCSU and Chandra Murthy from IISc), and for FUSS (Faculty Unplugged Seminar Series), CSE department, IITB
- Invited tutorial speaker for PReMI 2019, held at Tezpur University
- Invited as a speaker for ACM India Summer School on Algorithmic and Theoretical Aspects of Machine Learning, IIIT Bangalore to be held in June 2019 <http://tfocs.iiitb.ac.in/>
- Three talks at IEEE GlobalSIP, Anaheim, CA in November 2018

- April 2018, Faculty Unplugged Seminar Series (FUSS) at CSE, IITB, two talks, one on introduction to compressed sensing, and a research talk on 'Dealing with Perturbations in Compressed Sensing'
- March 2018, Institute Seminar at IIIT Delhi, on 'Dealing with Perturbations in Compressed Sensing'
- January 2018, Talk on introduction to compressed sensing, at Xavier College of Engineering, Mumbai
- One-day workshop (part of STTP series) at VNIT Nagpur, on Optimization in Signal and Image Processing
- Talk at IEEE MMSP in Xiamen (China), as part of MMSP 2015
- 'Bayesian Methods for Compressive Reconstruction of Hyperspectral Images and Video' at NASCOVIP 2012 (Rajkot, September 2012), Siemens Research (Bangalore, September 2012), IIT Delhi (November 2012), IIT Madras (March 2013), IIIT Hyderabad (May 2013)
- 'Patch-based Methods for Image Denoising' at IISc Bangalore (January 2013), IIT Bombay (January 2013), IIT Madras (November 2012), IIIT Delhi (August 2011), DAIICT (August 2011)
- 'A New Method of Probability Density Estimation with Application to Mutual Information Based Image Registration', at CVPR 2006 (New York)
- 'Probability Density Estimation using Isocontours and Isosurfaces: Applications to Information Theoretic Image Registration', at UF Landmines Seminar (October 2008)
- 'Image Filtering Driven by Level Curves' at EMMCVPR 2009, Bonn, Germany

## Professional Service

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1. Associate Editor for IEEE Open Journal on Signal Processing (IEEE), December 2023 till present
2. Associate Editor for Signal Processing (Elsevier) Journal, August 2021 till present
3. Organizer of special session on 'Data Science Methods for COVID-19' at ICASSP 2021, along with Prof. Yonina Eldar
4. Delivered tutorial on 'Signal processing techniques for mass testing in fighting a pandemic: a sampling theory perspective' (along with Profs. Weiyu Xu, Chandra Murthy, Jonathan Scarlett)
5. Tutorial co-chair for International Symposium on Biomedical Imaging (ISBI), 2022
6. Area Chair for ICVGIP 2016, 2018, 2021, 2023
7. Area Chair for the International Conference on Pattern Recognition (ICPR) to be held in Kolkata in December 2024
8. Reviewer for following journals:
  - Nature Scientific Reports
  - IEEE Transactions on Pattern Analysis and Machine Intelligence
  - IEEE Transactions on Image Processing
  - IEEE Transactions on Multimedia
  - IEEE Transactions on Signal Processing
  - IEEE Transactions on Vehicular Technology
  - IEEE Transactions on Neural Networks and Learning Systems
  - IEEE Transactions on Computational Imaging
  - IEEE Access
  - Proceedings of National Academy of Sciences, India
  - IEEE Transactions on Biomedical Engineering

- IEEE Transactions on Medical Imaging
- IEEE Signal Processing Letters
- Machine Vision and Applications
- Computer Vision and Image Understanding
- Pattern Recognition Letters
- SIAM Journal on Imaging Sciences, 2012
- Elsevier Signal Processing
- IOP Inverse Problems
- Applied Optics
- Information Sciences

9. Reviewer for following conferences/workshops:

- WACV 2022, 2023, 2024
- ICVGIP 2014, 2016
- NCC 2016-2018
- ICCV 2011-2019.
- CVPR, 2009, 2011-2020.
- MICCAI, 2008.
- EMMCVPR 2005
- Medimage Workshop (in conjunction with ICVGIP) in 2016 and 2018, Frontiers in Algorithmics (2016)
- ISBI 2019

10. Member of IEEE since 2005, senior member since Feb 2020 .

## Skills

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- **Languages** C (expert), C++ (advanced), MATLAB (expert), Java (basic).
- **Operating Systems** Linux, Windows.
- **Packages** GNU Scientific Library (GSL), Visualization Toolkit (VTK) and Insight Toolkit (ITK).

## Hobbies

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- Writing English poetry
- Learning languages (German, French) besides English, Hindi and Marathi.
- Hindustani classical music (vocal)
- President of the UF chapter of SPICMACAY (Society for Promotion of Indian Classical Music and Culture Amongst Youth), Summer 2009 to Summer 2010.
- Member of magazine committee at the Government College of Engineering in the year 1998-1999.