

Dr. Prerana Mukherjee

CONTACT INFORMATION

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EMPLOYMENT

Assistant Professor, School of Engineering, Dept. of Computer Science, Apr, 2020-Ongoing.

- **Jawaharlal Nehru University**, Delhi, India.

Assistant Professor, Dept. of Computer Science, Nov, 2018-Mar, 2020.

- **Indian Institute of Information Technology, Sri City**, Andhra Pradesh, India.

EDUCATION

Ph.D., Computer Vision, 2018, (CGPA 8.467/10).

- **Indian Institute of Technology Delhi**, New Delhi, India.
- Thesis title: *Saliency and feature based visual object characterization for segmentation and localization*
- Advisor: Dr. Brejesh Lall, Professor
- Coursework: Computer Vision, Soft Computing, Multimedia Systems, Image Processing

M.Tech, Information Systems, 2013 (CGPA 8.8/10)

- **Delhi Technological University**, Delhi, India
- Thesis topic: *Multimodal Personal Authentication Using Gaussian Mixture Model and Support Vector Machine*
- Advisor: Dr. Anil Singh Parihar

B.Tech, Computer Science and Engineering, 2011 (81.54%)

- Guru Gobind Singh Indraprastha University

12th, CBSE, 2007 (88.2%)

- DL DAV MODEL School, Delhi

10th, CBSE, 2005 (91.2%)

- DL DAV MODEL School, Delhi

CURRENT RESEARCH ACTIVITIES

- Design of robust object features for multiclass object classification: with Dr. Brejesh Lall, IIT Delhi. In this respect, we have developed a novel set of features namely using a combination of KAZE and SIFT keypoints termed as SIKA features (**SIFT-KAZE**). We have shown the efficacy of this feature set for object classification. SIKA features were designed to effectively characterize the objects. This is achieved by SIKA because these features serve as a good combination for boundary (KAZE) and saliency (SIFT) information. We have also shown that SIFT and KAZE are complementary features.

- Robust segmentation framework using saliency and object features: with Dr. Brejesh Lall, IIT Delhi. As, saliency map alone cannot always give the best segmentation because at times some background regions can be marked as salient. Also, the segmentation should closely fit the object contours to get neat segmentation. To overcome these issues, the technique is based on saliency and image features (Scale Invariant Feature Transform (SIFT), KAZE etc.) for characterization of objects and subsequent segmentation.
- Object localization: with Dr. Brejesh Lall, IIT Delhi. We are working on the improvement of the object localization capability of the existing algorithms based on saliency and object features.
- Road Safety Video Analytics & Temporal air quality forecasting & Women Safety: with Dr. Brejesh Lall, IIT Delhi and Dr. Aakanksha Chowdhery (2012 Marconi Society Young Scholar and currently affiliated with Google AI). In 2017, we worked on increasing road safety by using video analytics from network of cameras mounted on vehicle dashboards in a more complex and chaotic environment like Indian roads particularly Delhi. In 2018, project expanded to air quality assessment in Delhi. In 2019, we are working towards women safety and air pollution menaces. Role: Celestini Project India Director. The project page is: **CELESTINI PROJECT INDIA**
- Projective Desktop Varnamala Trainer for interactive learning: with Dr. Brejesh Lall and Dr. Saha (Mechanical Department, IIT Delhi). We would be working on an interactive platform designed to improve the learning by children through an interactive audio visual feedback system. This device uses a projector to render a virtual display, which permits production of large interactive displays.
- Mattress Detection: with Dr. Siddharth Srivastava (CDAC Noida). We would be working on creating an automated solution for mattress detection on a conveyor belt. Using camera and distance sensor the size of the mattress L,B,H (object resolution) is to be estimated.
- AI for social good: with Dr. Anupama Ray (IBM Research Labs), Dr. Ritu Garg (Intel India), Dr. Ayesha Chowdhary (JNU, Delhi): We are working on distress analysis in interview videos using multimodal inputs, aggressive behaviour detection in videos, road segmentation in chaotic conditions.

PROJECT
SANCTIONED

- IIITS Seed Grant Accepted on Human Behaviour Understanding in Videos-5 Lac
- Project Proposal submitted for CCBT Call-MEITY on Smart Transportation, 1.5 Cr.

REFEREED
JOURNAL
PUBLICATIONS

1. Srivastava, S., Mukherjee, P., and Lall, B., **“Characterizing objects with SIKA features for multiclass classification”**, *Applied Soft Computing, Elsevier*, 2015 (Impact Factor:4.873).
2. Mukherjee, P., and Lall, B., **“Saliency and KAZE features assisted object segmentation”**, *Image and Vision Computing, Elsevier*, 2017 (Impact Factor: 2.747).
3. Chandra Sekhar Vorugunti , Viswanath Pulabaigari , Prerana Mukherjee , Abhishek Sharma, **“DeepFuseOSV: Online Signature Verification Using Hybrid Feature Fusion and Hybrid Depthwise Separable Convolution Neural Network Architecture”**, *IET Biometrics*, 2020 (Impact Factor: 2.092).
4. Mukherjee, P., and Lall, B., **“Conditional Random Field based salient proposal set generation and its application in content aware seam carving”**, *Signal Processing: Image Communication, Elsevier*, 2020 (Impact Factor: 2.814).
5. Chandra Sekhar Vorugunti, Viswanath Pulabaigiri, Rama Krishna Sai Subrahmanyam Gorthi, Prerana Mukherjee, **“OSVFuseNet: Online Signature Verification**

by Feature Fusion and Depth-wise Separable Convolution Based Deep Learning.”, *Neurocomputing*, 2020 (Impact Factor: 4.072).

CONFERENCE
PUBLICATIONS

1. Niloofar Safi, Parth Patwa, Srinivas PYKL, **Prerana Mukherjee**, Amitava Das and Thamar Solorio, “Aggression and Misogyny Detection using BERT: A Multi-Task Approach”, *European Language Resources Association (ELRA), Proceedings of the Second Workshop on Trolling, Aggression and Cyberbullying (TRAC-2020)*, Marseille, France, 2020.
2. Chandra Sekhar Vorugunti, **Prerana Mukherjee**, Viswanath Pulabaigari, “Online Signature Profiling using Generative Adversarial Networks”, *International Conference on COMMunication Systems NETWORKS (COMSNETS)*, Bangalore, January 2020.
3. Abhijit Mohanta, **Prerana Mukherjee**, Vinay Mittal, “Prosody Features Characterization of Autism Speech for Automated Detection and Classification”, *National Conference on Communications IIT Kharagpur*, February 2020.
4. Ajit Jadhav, **Prerana Mukherjee**, Vinay Kaushik and Brejesh Lall, “Aerial Multi-Object Tracking by Detection Using Deep Association Networks”, *National Conference on Communications IIT Kharagpur*, February 2020.
5. Shilpi Gupta, **Prerana Mukherjee**, Santanu Chaudhury and Brejesh Lall, “U-RME: Underwater Refined Motion Estimation in hazy, cluttered and dynamic environments”, *7TH NATIONAL CONFERENCE ON COMPUTER VISION, PATTERN RECOGNITION, IMAGE PROCESSING AND GRAPHICS (NCVPRIPG 2019)*, Hubli, Bangalore, India, December 2019.
6. Divyam Madaan, Radhika Dua, **Prerana Mukherjee** and Brejesh Lall, “VayuAnukulani: Adaptive Memory Networks for Air Pollution Forecasting”, *Global Conference on Signal and Information Processing (GlobalSIP) 2019*, Ottawa, Ontario, Canada, December 2019.
7. Anupama Ray, Siddharth Kumar, Rutvik Reddy, **Prerana Mukherjee** and Ritu Garg, “Multi-level attention network using text, audio and video for Depression Prediction”, in *Proceedings of the 9th International Workshop on Audio/Visual Emotion Challenge, AVEC 2019, ACM Multimedia Workshop*, Nice, France, October 2019.
8. Ajit Jadhav, **Prerana Mukherjee**, Vinay Kaushik and Brejesh Lall, “IITD_DeepSort”, in *Technical Report of Vision Meets Drones: A Challenge (MOT Challenge), 2019, ICCV Workshop*, Seoul, Korea, October 2019.
9. Sekhar Chandra, V., Anoushka Doctor **Mukherjee, P.**, and Pulabaigiri, V., “A Light weight and Hybrid Deep Learning Model based Online Signature Verification”, in *ICDAR-WML: The 2nd International Workshop on Machine Learning 2019*, University of Technology Sydney (UTS), Australia, September 2019.
10. Sekhar Chandra, V., **Mukherjee, P.**, Guru D.S. and Pulabaigiri, V., “Online Signature Verification Based on Writer Specific Feature Selection and Fuzzy Similarity Measure”, in *Applications of Computer Vision and Pattern Recognition to Media Forensics, CVPRW, 2019*, Long Beach California, USA.
11. Sekhar Chandra, V., **Mukherjee, P.**, Guru D.S. and Pulabaigiri, V., “OSVNet: Convolutional Siamese Network for Writer Independent Online Signature Verification”, in *ICDAR, 2019*, University of Technology Sydney (UTS), Australia.

12. Kaushik, V., **Mukherjee, P.** and Lall, B., "Nriyantar: Pose oblivious Indian classical dance sequence classification system", in *IUPRAI ICVGIP, 2018*, IIIT, Hyderabad (India).
13. **Mukherjee, P.**, Lall, B. and Lattupally S., "Object cosegmentation using deep Siamese network", in *IEEE ICPRAI, 2018*, Montreal, Canada.
14. Srivastava, S., **Mukherjee, P.**, Jaiswal K. and Lall, B., "Object Classification using Ensemble of Local and Deep Features.", in *IAPR ICAPR, 2017*, IISc Bangalore (India).
15. Garg, N., Janveja, I., Malhotra, D., Chawla, C., Gupta, P., Bansal, H., Chowdhery, A., **Mukherjee, P.** and Lall, B., "DRIZY: Collaborative Driver Assistance Over Wireless Networks", in *MobiCom, 2017*, Snowbird, Utah, USA.
16. **Mukherjee, P.**, Lall, B. and Tandon S., "SalProp: Salient object proposals via aggregated edge cues", *accepted in ICIP, 2017*, Beijing, China.
17. **Mukherjee, P.**, Srivastava, S. and Lall, B., "Salient Keypoint Selection for Object Representation", *accepted in Twenty Second National Conference on Communication (NCC), pp. 1-6, 2016*, IIT Guwahati (India).
18. Srivastava, S., **Mukherjee, P.**, and Lall, B., "Adaptive Image Compression Using Saliency and KAZE Features", *International Conference on Signal Processing and Communications (SPCOM), pp. 1-5, 2016*, IISc Bangalore (India).
19. **Mukherjee, P.**, Lall, B., and Shah, A., "Saliency map based improved segmentation", *International Conference on Image Processing (ICIP), Quebec (Canada)*, pp. 1290–1294, 2015.
20. **Mukherjee, P.**, Srivastava, S., Lall, B., Asolkar, S. and Pai, M., "Adaptive Crypto-Steganosystem for videos based on Information Content and Visual Perception", *National Conference on Computer Vision, Pattern Recognition, Image Processing and Graphics (NCVPRIPG), pp. 1-4, IIT Patna (India)*, 2015.
21. Qazi, T., **Mukherjee, P.**, Srivastava, S., Lall, B., and Chauhan, N. R., "Automated ball tracking in tennis videos.", *International Conference on Image Information Processing (ICIIP), JUIT, Shimla (India)*, pp. 236-240, 2015.
22. Yadav, H., Srivastava, S., **Mukherjee, P.**, and Lall, B., "A real-time ball trajectory follower using Robot Operating System.", *International Conference on Image Information Processing (ICIIP), JUIT, Shimla (India)*, pp. 511-515, 2015.
23. Srivastava, S., **Mukherjee, P.**, and Lall, B., "imPlag: Detecting image plagiarism using hierarchical near duplicate retrieval.", *INDICON, Delhi (India)*, pp. 1-6, 2015.
24. Parihar, A. S., Kumar, A., Verma, O. P., Gupta, A., **Mukherjee, P.**, and Vatsa, D., "Point based features for contact-less palmprint images.", *International Conference on Technologies for Homeland Security (HST), Waltham, Massachusetts*, pp. 165-170, 2013.

BOOK CHAPTERS

1. Agrawal, A., **Mukherjee, P.**, Srivastava, S. and Lall B., "Enhanced Characterness for Text Detection in the Wild", *accepted in CVIP-WM, 2017*, Springer, IIT Roorkee (India).
2. **Mukherjee, P.** and Lall, B., "What is the relation between Artificial Intelligence and Pattern Recognition?", *accepted in book series on "Language Processing, Pattern Recognition, and Intelligent Systems"* by World Scientific, 2019.

	<p>3. Mukherjee, P. and Malik, S., "AI based Covid-19 analysis-A pragmatic approach", <i>Big Data Analytics and Artificial Intelligence against COVID-19: Innovation Vision and Approach</i> by Springer, 2020.</p>
DOCTORAL SYMPOSIUM	<p>1. Mukherjee, P., and Lall, B. , "Object Characterization using saliency and object features", Extended Abstract accepted for Doctoral Symposium, ICVGIP 2016, IIT Guwahati (India).</p>
AWARDS	<ul style="list-style-type: none"> • Qualified UGC NET in December, 2012. Qualified GATE in February, 2011. • Received IEEE SPS Travel Grant for ICIP 2015 and ICIP 2017 Conference. • Received scholarship for securing second position during M.Tech. (Information Systems). • Received GATE (Graduate Aptitude Test in Engineering) scholarship [2011 - 2013]. • Received IIT-Delhi (MHRD) institute fellowship [2013-2018]. • Got 3rd position in tech quiz in college fest-CORONA(BPIT), 2nd position technical sloganeering in Fervour(BVP), 2nd position c++ showdown in Fervour(BVP). • Received Travel Grant from IIT Guwahati for presenting work at ICVGIP 2016 Conference. • Received IIT Delhi IRD Travel Grant of 1Lac for ICIP 2017 Conference. • 2nd position in ICPRAI 2018 conference competition. • Selected for MLSS 2018, Spain (150/500 candidates worldwide selected). • Shortlisted for NASA Frontier Development Lab 2018 Challenge. • Letter of Appreciation from Google for conducting TensorFlow Dev Summit Watch Party, 2019 at IIIT Sri City. • Winner Audio Visual Emotion Challenge (AVEC) 2019, ACM Multimedia Workshop, Nice France. • VisDrone MOT challenge 2019, ICCV Workshop, 8th Rank across the world on leaderboard. • VisDrone DET challenge 2019, ICCV Workshop, 38th Rank across the world on leaderboard. • Attended BRICS Young Scientist Conclave. Was shortlisted amongst 20 scientists over 450. applicants with a DST senior scientist representing INDIA globally. • Shortlisted for Final Round on Infosys Aarohan Social Innovation Awards to be held in Bangalore on 16th Jan, 2020.
PROFESSIONAL SOCIETIES	<ul style="list-style-type: none"> • Member of IACSIT (International association of computer science and information technology), Indian Unit for Pattern Recognition and Artificial Intelligence (IUPRAI) Life Member, Computer Vision Foundation (CVF) member, INSTICC member, ACM Professional member and IEEE SPS Professional member. • Offered membership by Machine Intelligence and Research (MIR) Labs, Greater Seattle Area, Washington, U.S.
ACADEMIC SERVICES	<ul style="list-style-type: none"> • Media coverage in IITD Press Release on IoT Lab Establishment and Navbharat Times on IoT Lab. • Media coverage for Celestini Project India 2018 Award Ceremony by top media houses BusinessWire, Financial Express, Hindustan Times, Business Standard, India Today and FirstPost. • Media coverage for Workshop on Information Security 2019 held at IIIT Sri City by The Hans India, The New India Express. • Media coverage for TensorFlow Dev Summit 2019 and Women's Day Celebrations held at IIIT Sri City by Deccan Express. • Research guidance to B.Tech.(19). and M.Tech.(5) students for internships and thesis projects in domain areas of image processing, computer vision and IoT.

	<ul style="list-style-type: none"> • Actively involved in guiding and assisting many B.Tech. and M.Tech. students in domain areas of image processing, computer vision and IoT during PhD. • Reviewer for IndiCon 2015, Pattern Recognition, Image and Vision Computing, IET Image Processing, IEEE Transactions of Multimedia (TMM), WIML 2018 (NIPS Workshop), IEEE Access, CV4GC (CVPR Workshop) 2019, PREMI 2019, INDICON 2019, NCVPRIPG 2019, BigMM 2020. • Drafting research grant proposals. • Director Celestini Project India 2017 & 2018. Guided and mentored student teams, organized the final award ceremony, and assisted in design of the problem statement and datasets for student teams. Recognition by Marconi Society. • Lead, Organizing team for Celestini Project India, 2017 competition Award Ceremony held at 10 Nov, 2017 at Bharti School of Telecom Technology and Management, IIT Delhi. • Master of Ceremony for 5G Awareness Workshop held at 15 June, 2018 at Bharti School of Telecom Technology and Management, IIT Delhi. • Master of Ceremony & Lead, Organizing Team for Celestini Project India, 2018 competition Award Ceremony held at 1 Nov, 2018 at Amar Nath and Sashi Khosla School of IT, IIT Delhi. • Faculty In-Charge (Coordinator) for Workshop on Information Security, 2019 held on 5-6 Jan, 2019 at IIIT Sri City with industry participation from IBM Security, HCL Technologies and Wipro. • Faculty In-Charge (Coordinator) for Leadership Development Programme (LEAP), 2019 held on 11-16 Feb, 2019 at IIIT Sri City with faculty participation from 15 other leading institutions (NITs, Central Universities) in the country. • Faculty Mentor of Student Team, IIITS for Smart India Hackathon held on 2-3 March, 2019. 2nd Runner Up at final Round at Girijananda Chowdhury Institute Of Management And Technology (GIMT), Guwahati. Problem Statement: Preparation of Dashboard for National Accounts, Ministry of Statistics PI • Lead-Faculty Organizer TensorFlow Dev Summit'19 Livestream watch party hosted at IIIT Sri City and Technical Talks organized on the Women's Day Celebrations from 6-8 March, 2019. • Organizing Team in National Workshop on Socially Relevant Technical Education - Exploring Cooperation Oriented Actions from 6-7 December, 2019 at NITTTR, Chennai. • Global Mentor in ITU AI/ML in 5G challenge organized by CISCO and ITU-T in June-Dec'20.
POSITION OF RESPONSIBILITY	<ul style="list-style-type: none"> • Board Member, Academic Disciplinary Committee, IIIT Sri City, AP. • Committee Member, Design and Innovation Center (DIC), IIIT Sri City, AP. • Faculty Mentor, IOTA Programming Club, IIIT Sri City, AP. • Presiding Member, Internal Complaints Committee, IIIT Sri City, AP. • Technical Program Committee, PREMI, 2019 and NCVPRIPG 2019.
TALK/SEMINARS	<ul style="list-style-type: none"> • BRICS Young Scientist Conclave-Talk on Cybersecurity in Rio de Janeiro, Brazil from 6-8 November, 2019. • Talk on 1 week Faculty Development Program on AI and Deep Learning-Topic: CNN and Autoencoders at Vignan University, Guntur, AP from 22th-26th November, 2019.
PUBLICATIONS IN PREPARATION	<ul style="list-style-type: none"> • "Real time video analytics on dashcams to track pedestrians in chaotic traffic conditions.", Prerana Mukherjee, Aakanksha Chowdhery and Brejesh Lall (Conference paper).
WORKSHOPS	

	<ul style="list-style-type: none"> • Attended Deep Learning Institute workshop organized by NVIDIA at IIT Delhi, 28 Nov, 2017. • Attended "Deep Learning Summer School for Computer Vision (SSDLCV) 2016" at IIIT Hyderabad. • Attended MATLAB, Digital Image and Video Processing workshop organized by GRAD at DELHI TECHNOLOGICAL UNIVERSITY, 15-16 Oct, 2011. • Attended Machine Learning Summer School (MLSS 2018) in Spain from Aug 27, 2018-Sept 7 2018.
INDUSTRIAL TRAINING	<ul style="list-style-type: none"> • Completed 6 week Industrial Summer training at CMC Limited, 2008. • Completed 6 week Industrial Summer training at Almate Info Tech Private Limited, 2009. • Completed 2 month Summer Training at ISSA, DRDO, May 2010-June 2010.
AREAS OF INTEREST	Image Processing, Computer Vision, Biometrics, Machine Learning, Pattern Recognition, Data Mining.
SKILLS	Software Packages and Programming Languages MATLAB, OpenCV, Python, C, C++, C#, Java, CUDA (for GPU platforms), TensorFlow, Torch, Caffe, NVIDIA Jetson Tx2, OpenGL, VRML, Scipy, Numpy, Anaconda, Spider, WEKA, PHP, CSS3, HTML5, ASP, MySQL, MongoDB, ORACLE, iPython, Microsoft Visual Studio.NET, Eclipse, MS Office, Latex, ffmpeg, OpenGL.
TEACHING AND RESEARCH EXPERIENCE	Teaching <ul style="list-style-type: none"> • Database Management System and Data Structures Spring 2020 SoE, Dept. of CSE JNU Role: Course Instructor. • Data Structures and Algorithms -I Spring 2020 Dept. of CSE, Computer Vision Group IIIT Sri City Role: Course Instructor. • Programming in C Fall 2019 Dept. of CSE, Computer Vision Group IIIT Sri City Role: Course Coordinator. • Computer Graphics and Multimedia Fall 2019 Dept. of CSE, Computer Vision Group IIIT Sri City Role: Course Instructor. • Database Management Systems Spring 2019 Fall 2019 Dept. of CSE, Computer Vision Group IIIT Sri City Role: Course Instructor. Research Scholar July 2013-2018 Dept. of Electrical Engineering, Computer Technology Group Indian Institute of Technology Delhi Supervisor: Dr. Brejesh Lall.
	Teaching Assistant <ul style="list-style-type: none"> • Digital Image Processing Spring, 2015 and Spring, 2014 Indian Institute of Technology Delhi Instructor: Dr. Brejesh Lall.

- Computer Vision Fall, 2016
Indian Institute of Technology Delhi
Instructor: Dr. Brejesh Lall.
- Data Structures Fall, 2012
Delhi Technological University
Instructor: Ms. Ritu Agarwal.
- Computer Networks Spring, 2012
Delhi Technological University
Instructor: Ms. Anamika Chauhan.