

Bio-Data

Name: Dr. Sudipta Mukhopadhyay

Date of Birth: July 7, 1967

Present Address:

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Present Position:

Associate Professor
Department of Electronics and Electrical Communication Engineering
Indian Institute of Technology, Kharagpur- 721302, India.

Academic Qualifications:

1. Passed Madhyamik Examinations in 1982 from West Bengal Board of Secondary Education (School: R. K. M. Vidyapith, Purulia) with 76.3 % marks.
2. Passed Higher Secondary (10+2) in 1984 from West Bengal Council for Higher Secondary Education. Subjects: Science (College: R. K. M. Vidyamandir, Belur). Percentage of marks: 72.8 %
3. B. Tech. in Electrical Engineering from Jadavpur University, Calcutta in 1988. Percentage of marks: 79.8 %.
4. M. Tech. in Electrical Engineering (Specialization in Signal Processing) from I.I.T., Kanpur in 1991. CGPA 8.00 out of 10.
5. Ph.D. in Electrical Engineering (from I.I.T., Kanpur (submitted in 1995) in 1996. Topic: "Parametric Modeling of Non-Stationary Signals by Time-Dependent Linear Processes".

Teaching/ Research/ Industry Experience:

1. Worked in CESC Ltd., Calcutta as a Trainee Engineer during 01st August 1988 to 30th June 1989. Field of Work: Substation maintenance.
2. Worked as Post Doc. researcher in department of Electrical Engineering IIT Kanpur during 01st March 1995 to 31st August 1995.
3. Worked in TCS Calcutta as Systems Engineers and Sr. Systems Engineer during 26th October 1995 to 14th February 1997.
4. Worked in Satyam Computer Services, Bangalore as Systems Engineers and Sr. Systems Engineer during 17th February 1997 to 12th March 1999.
5. Worked in Silicon Automation Systems Ltd., Bangalore as Project Lead during 15th March 1999 to 13th October 2000.

6. Worked in GE India Technology Centre, Bangalore as Research Lead during 16th October 2000 to 15th October 2004.
7. Worked in Philips Medical Systems, Philips Software Centre, Bangalore as Sr. Architect during 29th October 2004 to 10th November 2005.
8. Worked in Department of Electronics & Communication Engineering, IIT Kharagpur, as Asst. Professor during 14th November 2005 to 24th February 2013
9. Joined in Department of Electronics & Communication Engineering, IIT Kharagpur, as Associate Professor on 24th February 2013 and working.

Awards/ Distinctions:

1. National Scholarship by Govt. of India on the basis of Madhyamik results, 1982
2. GATE in Electrical Engineering, 1988 (Percentile: 99.2)
3. Awarded UGC Fellowship based on merit on 1993
4. Who's Who in the World in 16th Edition of *Marquis Who's Who*, 1999
5. Patent award in GE India Technology Centre, Bangalore, 2002
6. Management award for contribution to product of GE Medical Systems, 2002
7. Best paper award in NCIP 2005, Bangalore March 22-25, 2005
8. Fellow of Systems Society of India (www.sysi.org), 2006
9. SICI Partnership Development Grant , 2012
10. Our research work " Super-resolution reconstruction and speckle reduction for enhancement of ultrasound image " selected as one of the Top 50 Innovators in the 2015 DST - Lockheed Martin India Innovation Growth Programme
11. Our research work " Real Time Fog Removal from Video in Application to Safety and Surveillance" ranked 5th in the list of Top 50 Innovators in the 2016 DST - Lockheed Martin India Innovation Growth Programme

Doctoral Guidance:

Completed: 6 completed + One submitted
Ongoing: 7 Research scholars.

M. S. Thesis Guidance:

Completed: Two
Ongoing: Two

Master's Thesis Guidance:

Completed: 60 MTech. students
Ongoing: 6 MTech. Students,

Books/ Reviewed Papers Published/ Accepted:

Books/Chapters: 3, Journal: 40; Conference: 50. Please see list of publications in Annexure A

Patents Filed:

US Patent: 7 (1 approved). Indian Patent 6 (with 5 PCT filing); Please see list of patents in Annexure B

Sponsored Projects/ Consultancies:

Completed: 10; In Progress: 3. Please see list of Projects in Annexure C

Professional Activities:

1. Senior Member, Institute of Electrical and Electronic Engineers (IEEE), USA
2. Member of Signal Processing Society, IEEE, USA
3. Corresponding Member of Radiological Society of North America (RSNA), USA
4. Member of SPIE
5. Editorial Board Member and Chair Person of International Journal of Electrical and Electronics Engineering Research (IJEEER) under Transstellar Journal Publications & Research Consultancy Pvt. Ltd. (from 2011)
6. Honourable Advisory & Editorial Board Members : International Journal of BioSciences and Technology, Published by IJBST and its associated Journals (from 2008)
7. Editorial Board Member for IETE Technical Review, a journal from The Institution of Electronics and Telecommunication Engineers, India (from 2014)
8. Reviewer of IEEE Transactions on Medical Imaging
9. Reviewer of Image and Vision Computing Journal from Elsevier
10. Reviewer of Annals of Biomedical Engineering, a referred Journal from Springer
11. Reviewer of Signal Image and Video Processing from Springer

Annexure A : List of Publications:

Books/Chapters:

1. Sudipta Mukhopadhyay, Amod Gupta, and Reema Bansal "Needs/Requirements and Design of Retinal Imaging and Image Processing Methods for Diabetic Retinopathy in the Indian Context", 7th Chapter of the book "OPHTHALMOLOGICAL IMAGING AND APPLICATIONS" Edited by E. Y. K. NgU. Rajendra AcharyaRangaraj M. RangayyanJasjit S. Suri, CRC Press, Taylor and Francis Group, First Edition 2014.
2. Sudipta Mukhopadhyay and Abhishek Kumar Tripathi, "Combating Bad Weather Part I: Rain Removal from Video", Morgan & Claypool Publishers (January 1, 2015)

3. Sudipta Mukhopadhyay and Abhishek Kumar Tripathi, "Combating Bad Weather Part II: Fog Removal from Image and Video", Morgan & Claypool Publishers (January 1, 2015)

Journal:

1. Ashis Kumar Dhara, Sudipta Mukhopadhyay, Satrajit Chakrabarty, Man-deep Garg, and Niranjana Khandelwal, "Quantitative Evaluation of Margin Sharpness of Pulmonary Nodules in Lung CT Images," IET Image Processing (Accepted on March, 2016).
2. Jatindra Kumar Dash, Sudipta Mukhopadhyay, Rahul Das Gupta, "Multiple classifier system using classification confidence for texture classification", Multimedia Tools Application, Online on January 2016.
3. Ashis Kumar Dhara, Sudipta Mukhopadhyay, Anirvan Dutta, Mandeep Garg, and Niranjana Khandelwal, "A Combination of Shape and Texture Features for Classification of Pulmonary Nodules in Lung CT Images", Journal of Digital Imaging, Accepted, December 2015.
4. Ashis Kumar Dhara, Sudipta Mukhopadhyay, Pramit Saha, Mandeep Garg, and Niranjana Khandelwal, "Differential Geometry-based Techniques for Characterization of Boundary Roughness of Pulmonary Nodules in CT Images", International Journal of Computer Assisted Radiology and Surgery, Springer, Vol 11, No. 3, pp. 337-349, 2016.
5. Pradip Sircar, Mukesh K Dutta and Sudipta Mukhopadhyay, "Signal parameter estimation of complex exponentials using fourth order statistics: additive Gaussian noise environment" Springer Plus, Springer Open Journal (2015) 4:360, DOI 10.1186/s40064-015-1131-3
6. Ashis Kumar Dhara, Sudipta Mukhopadhyay, Rahul Das Gupta, Mandeep Garg and Niranjana Khandelwal, "A Segmentation Framework of Pulmonary Nodules in Lung CT Images", Journal of Digital Imaging, Volume 29, Issue 1, pp 86-103, January 2016; DOI: 10.1007/s10278-015-9801-9 .
7. Jatindra Kumar Dash, Sudipta Mukhopadhyay, Rahul Das Gupta, "Content-based image retrieval using fuzzy class membership and rules based on classifier confidence", IET Image Processing, Volume 9, Issue 9, pp 836-848, September 2015, doi: 10.1049/iet-ipr.2014.0299
8. Satyam Raikwar, V.K. Tewari, S. Mukhopadhyay, Cmde. R.B. Verma, M. Sreenivasulu Rao, "Simulation of components of a power shuttle transmission system for an agricultural tractor", Computers and Electronics in Agriculture, No. 114, pp 114–124, July 2015
9. Jayasree Chakraborty, Abhishek Midya, Sudipta Mukhopadhyay, Rangaraj M. Rangayyan, Anup Sadhu, Veenu Singla, Niranjana Khandelwal, Pinakpani Bhattacharyya, Paulo M. Azevedo-Marques, "Detection of the nipple in mammograms with Gabor filters and the Radon transform", Biomedical Signal Processing and Control (Elsevier), Pages 80–89, Volume 15, January 2015
10. Rajat Kumar Das, Sudipta Mukhopadhyay and Puranjay Bhattacharya, "User Authentication Based on Keystroke Dynamics", IETE Journal Of Research, pages 229-239, Volume 60, Issue 3, 2014
11. Faraz Oloumi, Ashis K. Dhara, Rangaraj M. Rangayyan, Sudipta Mukhopadhyay, "Detection of Blood Vessels in Retinal Fundus Images", Computer Science Journal of Moldova, pp155-185, vol.22, no.2(65), 2014

12. Rahul DasGupta , Jatindra K. Dash , Sudipta Mukhopadhyay, "Rotation invariant textural feature extraction for image retrieval using eigen value analysis of intensity gradients and multi-resolution analysis", Pattern Recognition, Vol. 46(12), pages 3256–3267, June 2013
13. S Dutta, S K Pal, S Mukhopadhyay, R Sen, "Application of Digital Image Processing in Tool Condition Monitoring: A Review", CIRP Journal of Manufacturing Science and Technology, Volume 6, Issue 3, Pages 212–232, 2013
14. Sudipta Mukhopadhyay, Jatindra Kumar Dash, Rahul Das Gupta, "Content-based texture image retrieval using fuzzy class membership", Pattern Recognition Letters, Volume 34, Issue 6, 15 April 2013, Pages 646-654, ISSN 0167-8655, 10.1016/j.patrec.2013.01.001.(<http://www.sciencedirect.com/science/article/pii/S0167865513000056>)
15. M. Jas, S. Mukhopadhyay & J. Chakraborty, N. Sadhu & N. Khandelwal "A Heuristic Approach to Automated Nipple Detection in Digital Mammograms" Journal of Digital Imaging. Volume 26, Issue 5, pp 932-940, October 2013.
16. A. K. Tripathi and S. Mukhopadhyay, "Meteorological Approach for Detection and Removal of Rain from Videos", IET Computer vision, Volume 7, Issue 1, February 2013, p. 36 – 47, DOI: 10.1049/iet-cvi.2011.0032
17. Rangaraj M. Rangayyan, Shantanu Banik, Jayasree Chakraborty, Sudipta Mukhopadhyay, and J. E. Leo Desautels, "Measures of Divergence of Oriented Patterns for the Detection of Architectural Distortion in Prior Mammograms" International Journal of Computer Assisted Radiology and Surgery, Vol. 8, No. 4, pp: 527-545, 2013.
18. A. K. Tripathi and S. Mukhopadhyay, "Efficient fog removal from video", Signal image and video processing (Springer), published online, pp 1-9, Thu, 14 Sep 2012, DOI: 10.1007/s11760-012-0377-2
19. Ashis Kumar Dhara, Chanukya Krishna Chama, Sudipta Mukhopadhyay, Niranjan Khandelwal, "Content-Based Image Retrieval System for Differential Diagnosis of Lung Cancer", Indian Journal of Medical Informatics (IJMI), Vol 5, No 2, 2012
20. A. K. Tripathi and S. Mukhopadhyay, "Single Image Fog Removal Using Anisotropic Diffusion", IET Image processing, Volume 6, issue7, pp. 966 – 975, October 2012,
21. A. K. Tripathi and S. Mukhopadhyay, "Removal of rain from videos: A review", Signal image and video processing (Springer), September 2012.
22. Jayasree Chakraborty, Rangaraj M. Rangayyan, Shantanu Banik, Sudipta Mukhopadhyay, and J. E. Leo Desautels, "Statistical Measures of Orientation of Texture for the Detection of Architectural Distortion in Prior Mammograms of Interval Cancer", Journal of Electronic Imaging (SPIE), vol. 21, no. 3, Aug. 2012
23. Samik Dutta, Anurup Datta, Surjya K Pal, Ranjan Sen, Sudipta Mukhopadhyay, "Detection of Tool Condition from the Turned Surface Images using an Accurate Grey Level Co-occurrence Technique," Precision Engineering: Journal of the International Societies for Precision Engineering and Nanotechnology. doi:10.1016/j.precisioneng.2012.02.004, (*accepted in February 2012*)
24. Ashis Kumar Dhara, Sudipta Mukhopadhyay and Niranjan Khandelwal , "Computer Aided Detection and Analysis of Pulmonary Nodule from CT Images: A Survey", IETE Journal of Technical Review, Vol. 29, No. 4, pp. 165-175, July-August 2012.

25. A. K. Tripathi and S. Mukhopadhyay, "Removal of fog from images: A review", IETE Technical Review., pp 148 -156, vol. 29, Issue 2, March-April, 2012
26. Rajat Kumar Das, Sudipta Mukhopadhyay and Puranjoy Bhattacharya "Continuous multimodal biometric authentication for PC and handheld devices", IETE Journal of Education, pp 59-69 vol. 52, Issue 2, July-December 2011
27. Debashis Nandi, Sudipta Mukhopadhyay "Super-resolution on Data Acquired in Polar Format", International Journal of Computational Intelligence and Healthcare Informatics, Vol. 4, No. 2, pp. 63-73, July-December 2011, Published by Serials Publications, ISSN: 0973-7413
28. Debashis Nandi, Sudipta Mukhopadhyay "Performance of the SR algorithm for scan lines embedded in noise", International Journal of Biomedical Engineering and Consumer Health Informatics, Volume 3, Number 2, pp. 61-71, July-December 2011, Published by Serials Publications, ISSN: 0973-6727
29. Anurup Datta, Samik Dutta, Surjya K Pal, Ranjan Sen, Sudipta Mukhopadhyay, "Texture Analysis of Turned Surface Images using Grey Level Co-occurrence Technique", Advanced Materials Research Vol. 365, pp 38-43, 2012. (*accepted in September 2011*)
30. A. K. Tripathi and S. Mukhopadhyay, "Video Post Processing: Low Latency Spatiotemporal Approach for Detection and Removal of Rain", IET Image Processing Vol. 6, No. 2, pp. 181-196, 2012
31. Jayasree Chakraborty, Sudipta Mukhopadhyay, Veenu Singla, Niranjan Khandelwal, Pinakpani Bhattacharyya, "Automatic Detection of Pectoral Muscle Using Average Gradient and Shape Based Feature", Journal of Digital Imaging J Digit Imaging, Vol. 25, no 3, pp: 387-399, Jun 2012.
32. Abhishek Kumar Tripathi, Umesh Ghanekar, Sudipta Mukhopadhyay, "Switching Median Filter: Advanced Boundary Discriminative Noise Detection Algorithm", IET Image Processing, Vol. 5, No. 7, pp. 598-610, 2011.
33. Abhishek Kumar Tripathi, Sudipta Mukhopadhyay "A Probabilistic Approach for Detection and Removal of Rain from Videos" IETE Journal of Research, Pages :82-91, Issue No. 1, Volume : 57, Jan-Feb 2011.
34. Pranati Das and Sudipta Mukhopadhyay , "Cervical spine image retrieval with semantic shape features" (Reference number: IJCVR 01020X), International Journal of Computational Vision and Robotics (IJCVR), Inderscience Publishers. Pages: 136 – 146, Volume 1, Number 2, 2010
35. Pranati Das and Sudipta Mukhopadhyay , "New Contour Point Model for Retrieval of Cervical Spine Images", (Reference number: IJMEI-0409-04) , International Journal of Medical Engineering and Informatics (IJMEI), Inderscience Publishers. Pages:343 - 354, Volume 2, Number 4, 2010
36. Sudipta Mukhopadhyay & G. C. Ray, "A New Interpretation of Non-linear Energy Operator and Its Efficacy in Spike Detection", IEEE Trans. on Biomedical Engineering, Vol. 45, No 2, pp. 180-187, Feb 1998
37. Sudipta Mukhopadhyay & Pradip Sircar, "Parametric Modelling of Non-stationary signals by AR Process with Time-varying Gain", IETE Journal of Research, Vol. 43, No.5, pp. 351-358, Sept-Oct 1997

38. Sudipta Mukhopadhyay & Pradip Sircar, "Parametric Modelling of Non-stationary signals : A Unified Approach", *Signal Processing Journal*, Elsevier Science, Vol. 60, No 2, pp. 231-243, 1997
39. Sudipta Mukhopadhyay & Pradip Sircar, "Parametric Modelling of ECG Signals", *Medical & Biological Engineering & Computing*, Vol. 34, No. 2, pp. 171-174, March 1996
40. Pradip Sircar & Sudipta Mukhopadhyay, "Accumulated Moment Method for Estimating Parameters of the Complex Exponential Signal Models in Noise", *Signal Processing Journal*, Elsevier Science, Vol. 45, No 2, pp. 231-243, 1995

Conference:

1. Ashis Kumar Dhara, Sudipta Mukhopadhyay, Anirvan Dutta, Mandeep Garg, and Niranjana Khandelwal, "Classification of Pulmonary Nodules in Lung CT Images using Shape and Texture Features", *Proc. SPIE 9785, Medical Imaging 2016*, San Diego, USA , 27 February - 03 March, 2016.
2. Shrikant A. Mehre, Sudipta Mukhopadhyay, Anirvan Dutta, Nagam Chaithan Harsha, Ashis Kumar Dhara, and Niranjana Khandelwal, "An automated lung nodule detection system for CT images using synthetic minority oversampling", *Proc. SPIE 9785, Medical Imaging 2016*, San Diego, USA , 27 February - 03 March, 2016.
3. Avijit Dasgupta, Sudipta Mukhopadhyay, Shrikant A. Mehre and Parthasarathi Bhattacharyya, "Morphological Geodesic Active Contour based Automatic Aorta Segmentation in Thoracic CT Images", *International Conference on Computer Vision and Image Processing*, February 26-28, 2016, Roorkee, India.
4. M. Chakraborty, S. Mukhopadhyay, A. Dasgupta, S. Banerjee, S. Mukhopadhyay, S. Patsa, J. Ray, and K. Chaudhuri, "A new paradigm of oral cancer detection using digital infrared thermal imaging", *Proc. SPIE 9785, Medical Imaging 2016*, San Diego, USA , 27 February - 03 March, 2016.
5. Mandar Kale, Sudipta Mukhopadhyay, Jatindra K. Dash, Mandeep Garg, and Niranjana Khandelwal, " Differentiation of several interstitial lung disease patterns in HRCT images using support vector machine : role of databases on performance", *Proc. SPIE 9785, Medical Imaging 2016*, San Diego, USA , 27 February - 03 March, 2016.
6. Rahul Das Gupta, Sudipta Mukhopadhyay, Jatindra Kumar Dash, "Content Based Retrieval of Interstitial Lung Disease Patterns using Spatial Distribution of Intensity, Gradient Magnitude and Gradient Direction", *Proc. International Conference on Systems in Medicine and Biology 2016*, IIT Kharagpur, India , 04 January - 07 January, 2016.
7. Jatindra Kumar Dash, Vaddepalli Madhavi, Sudipta Mukhopadhyay, Niranjana Khandelwal and Prafulla Kumar, "Segmentation of Interstitial Lung Disease Patterns in HRCT images", presented in *SPIE Medical Imaging*, 21-26 February 2015, Orlando, FL, USA.

8. Ashis Kumar Dhara, Sudipta Mukhopadhyay, Mayur Joseph Bency, Rangaraj M. Rangayyan, Reema Bansal and Amod Gupta, "Development of A Screening Tool for Staging of Diabetic Retinopathy in Fundus Images", presented in SPIE Medical Imaging, 21-26 February 2015, Orlando, FL, USA.
9. Jatindra Kumar Dash, Sudipta Mukhopadhyay, Mandeep Kumar Garg, Nidhi Prabhakar, Niranjana Khandelwal, "Multi classifier framework for lung tissue classification", Proc. IEEE Students' Technology Symposium (IEEE TechSym 2014), 28 February - 2 March, 2014, Indian Institute of Technology Kharagpur, India
10. Jatindra Kumar Dash, Sudipta Mukhopadhyay, Mandeep Kumar Garg, Nidhi Prabhakar, Niranjana Khandelwal, "Wavelet based rotation invariant texture feature for lung tissue classification and retrieval", Proc. SPIE 9035, Medical Imaging 2014: Computer-Aided Diagnosis, 15-20 February, 2014
11. Jatindra Kumar Dash, Sudipta Mukhopadhyay, Niranjana Khandelwal, "Complementary Cumulative Precision Distribution: A new graphical metric for medical image retrieval system", Proc. SPIE 9037, Medical Imaging 2014: Image Perception, Observer Performance, and Technology Assessment, 15-20 February, 2014
12. Raunak Tibrewal, Rohan Jain Ashis Kumar Dhara, Sudipta Mukhopadhyay and Niranjana Khandelwal, "Automated Detection of Solitary Pulmonary Nodule from Lung CT Images using Rule Based Classifier", in the proceedings of International Conference on VLSI and Signal Processing 2014, 10-12 January, IIT Kharagpur
13. J. Chakraborty, A. Midya, S. Mukhopadhyay, and A. Sadhu, "Automatic Characterization of Masses in Mammograms", 6th International Conference on Bio-Medical Engineering and Informatics, Hangzhou, China, 16-18 December, 2013
14. Ashis K. Dhara, Rangaraj M. Rangayyan, Faraz Oloumi, Sudipta Mukhopadhyay, "Methods for the Detection of Blood Vessels in Retinal Fundus Images and Reduction of False-Positive Pixels Around the Optic Nerve Head", 4th IEEE International Conference on E-Health and Bioengineering - EHB 2013, Iasi, Romania, November 21-23, 2013
15. Ashis Kumar Dhara, Sudipta Mukhopadhyay, Naved Alam and Niranjana Khandelwal, "Measurement of Spiculation Index in 3D for Solitary Pulmonary Nodules in Volumetric Lung CT Images", SPIE Medical Imaging, 9 - 14 February 2013, Florida, USA, Vol. 8670.
16. Ashis Kumar Dhara, Sudipta Mukhopadhyay and Niranjana Khandelwal "3D texture analysis of solitary pulmonary nodules using co-concurrence matrix from volumetric lung CT images", SPIE Medical Imaging, 9 - 14 February 2013, Florida, USA, Vol. 8670.
17. Chanukya Krishna Chama, Sudipta Mukhopadhyay, Prabir Kumar Biswas, Ashis Kumar Dhara, Niranjana Khandelwal and Mahendra Kumar, "Automated Lung Field Segmentation in CT images using Mean Shift Clustering and Geometrical

- Features”, SPIE Medical Imaging, 9 - 14 February 2013, Florida, USA, Vol. 8670.
18. J. Chakraborty, S. Mukhopadhyay, R. M. Rangayyan, A. Sadhu, and P. M. Azevedo-Marques, “Automatic localization of the nipple in mammograms using Gabor filters and the Radon transform ,” in Proceedings of SPIE Medical Imaging, 9 - 14 February 2013, Florida, USA, Vol. 8670.
 19. Jatindra K. Dash, Sudipta Mukhopadhyay, Nidhi Prabhakar, Mandeep Garg, Niranjana Khandelwal, “Content-based image retrieval for interstitial lung diseases using classification confidence”. SPIE Medical Imaging, 9 - 14 February 2013, Orlando, Florida, USA, Vol. 8670.
 20. Rangaraj Rangayyan, Jayasree Chakraborty, Shantanu Banik, Sudipta Mukhopadhyay and Leo Desautels, “Detection of Architectural Distortion Using Coherence in Relation to the Expected Orientation of Breast Tissue”, 20-22 June, 2012, Rome, CBMS 2012
 21. Jayasree Chakraborty, Sudipta Mukhopadhyay, Veenu Singla, Niranjana Khandelwal and Rangaraj Rangayyan. “Detection of Masses in Mammograms Using Region Growing Controlled by Multilevel Thresholding”, 20-22 June, 2012, Rome, CBMS 2012
 22. Mainak Jas, Jayasree Chakraborty, Sudipta Mukhopadhyay, "An Atlas Based Approach to Segmenting MLO View Mammograms", ICIEV12, 18-19 May, 2012, Dhaka, Bangladesh
 23. Jatindra Kumar Dash, Rahul Das Gupta, Sudipta Mukhopadhyay, Niranjana Khandelwal, Pinakpani Bhattacharya, Mandeep Garg, “Content Based Image Retrieval for Interstitial Lung Diseases”, IEEE International Conference on Signal Processing, Computing and Control 2012, Jaypee University of Information Technology, Waknaghat, India, 15-18th March 2012,
 24. A. K. Tripathi, S. Mukhopadhyay, “Single Image Fog Removal Using Bilateral Filter”, IEEE International Conference on Signal Processing, Computing and Control 2012, Jaypee University of Information Technology, Waknaghat, India, 15-18th March 2012,
 25. Jatindra Kumar Dash, Rahul Das Gupta, Sudipta Mukhopadhyay, Niranjana Khandelwal, Mandeep Garg and Pinakpani Bhattacharya, "Content-Based Image Retrieval System for Interstitial Lung Diseases", NCMi2012, 3-5 February 2012, AIIMS, Delhi.
 26. Ashis Kumar Dhara, Chanukya Krishna Chama, Sudipta Mukhopadhyay and Niranjana Khandelwal, “Content-Based Image Retrieval System for Differential Diagnosis of Lung Cancer” , NCMi2012, 3-5 February 2012, AIIMS, Delhi.
 27. Debashis Nandi and Sudipta Mukhopadhyay, “Super-resolution reconstruction and speckle reduction for enhancement of ultrasound images”, Industry Academia Linkages: India R&D 2011, November 2-3, 2011, India Habitat Centre, New Delhi.
 28. Asish Dutta, Sudipta Mukhopadhyaya and PSR Srinivasa Sastry, "An approach to accelerate deformable image registration by FPGA based Mutual Information calculation and Pattern Search optimization", Annual IEEE India Conference (INDICON) ,16 Dec - 18 Dec 2011, Hyderabad, India

29. Jayasree Chakraborty, Rangaraj M. Rangayyan, Shantanu Banik, Sudipta Mukhopadhyaya, and J. E. Leo Desautelsb, "Detection of Architectural Distortion in Prior Mammograms Using Statistical Measures of Orientation of Texture", poster presentation, SPIE Medical Imaging, 4-9 February 2012, San Diego, California.
30. Ashis Kumar Dhara and Sudipta Mukhopadhyay, "A hybrid preprocessing method using geometry based diffusion and selective enhancement filtering for pulmonary nodule detection", poster presentation, SPIE Medical Imaging, 4-9 February 2012, San Diego, California.
31. A. K. Tripathi, S. Mukhopadhyay and Ashis Kr. Dhara, "Performance metrics for image contrast", International Conference on Image Information Processing (ICIIP), Shimla, Himachal Pradesh, India, 3-5 Nov. 2011.
32. Datta, A., Dutta, S., Pal, S. K., Sen, R. and Mukhopadhyay, S., "Texture Analysis of Turned Surface Images using Grey Level Co-occurrence Technique", International Conference on Future Materials Engineering and Industry Application (ICFMEIA 2011), paper id 23, 4-5 August, 2011, Bali Island, Indonesia.
33. Arnab Sengupta, Sudipta Mukhopadhyay, "A Robust Algorithm for Fingerprint Core-point Detection", IEEE Techsym 2011, January 14 to 16, 2011, IIT Kharagpur.
34. Subhendu Seth, Sudipta Mukhopadhyay, "Multi-level Thresholding-based Breast Segmentation in Mammograms", International Conference on Communication, Computers and devices (ICCCD-2010), 10-12 December, 2010, IIT Kharagpur, India
35. J. Chakraborty, and S. Mukhopadhyay, "A robust co-operative multi-robot path-planning in noisy environment," in 5th International Conference on Industrial and Information systems, Surathkal, India, 29th July-1st August 2010, pp. 626-631.
36. A. K. Tripathi and S. Mukhopadhyay, "Rain Rendering in Videos", 4th International Conference On Computer Applications in Electrical Engineering Recent Advances, IIT Roorkee, India, Feb. 2010.
37. Ayan Acharya, Sharad Banka, Sudipta Mukhopadhyay, "Dimension Acquisition and 3D Reconstruction by Stereo Imaging and Analysis of Errors in Measurement", International Conference on Cognition and Recognition 2008, Mandya, Karnataka. INDIA, April 10-12, 2008
38. Koka Venkata Krishna, Sudipta Mukhopadhyay, "Orientation detection of cervical spine images", International Conference on Advanced Computing and Communications, ICACC 2007, Madurai, India, pp.421-423, February 9-10, 2007
39. Viswanath K, Jayanta Mukherjee, Sudipta Mukhopadhyay, Ranendra Nath Pal, "Transcoding: JPEG2000 To JPEG", International Conference on Advanced Computing and Communications, ICACC 2007, Madurai, India, pp.355-358, February 9-10, 2007

40. Vishram Nandedkar, Sudipta Mukhopadhyay, S. V. Bharath Kumar, "Lossless Volumetric Medical Image Compression with Progressive Multi-Planar Reformatting using 3-D DPCM", NCIP 2005, Bangalore, March 2005
41. S. V. Bharath Kumar, Sudipta Mukhopadhyay, Vishram Nandedkar, "A Novel Progressive Thick Slab Paradigm for Volumetric Medical Image Compression and Navigation", ICIP 2004, Singapore, 24-27 October 2004
42. Arunoday Thammineni, Sudipta Mukhopadhyay, Vidya Kamath, "Segment based CT Image Compression", SPIE Medical Imaging Conference, San Diego, February 2004
43. Sudipta Mukhopadhyay, S. V. Bharath Kumar, Vishram Nandedkar, Animesh Raparia, David Hou, David Xu, "3D Loss-less Multi-resolution Image Compression for Medical Images", RSNA 2003 infoRAD Session, Chicago, IL, November 30th - December 5th 2003
44. T G Lohith, S Mukhopadhyay and R M Manjeshwar, "Lesion Detectability in Simulated I-124 and F-18 PET Images using Model Observers", The Society of Nuclear Medicine 50th Annual Meeting, June 21 – 25, 2003
45. Nithin Nagaraj, Sudipta Mukhopadhyay, Frederick Wheeler, Ricardo Avila, "Region of Interest and Windowing Based Progressive Medical Image Delivery using JPEG2000", Medical Imaging 2003, San Diego, CA, SPIE sponsored, February 2003
46. S.V. Bharath Kumar, Nithin Nagaraj, Sudipta Mukhopadhyay, Xiaofeng Xu, "Block Based Conditional Entropy Coding for Medical Image Compression", Medical Imaging 2003, San Diego, CA, SPIE sponsored, February 2003
47. Sudipta Mukhopadhyay, Nithin Nagaraj, David Xu, Fred Wheeler, Saad Sirohey, Robert Sigal (M.D.), Somasekhar Dhavala, Jan De Vaan & Nirmala Bhat, "TruRez : A Fast Wavelet based Multi-resolution Image Compression Scheme for Medical Images", RSNA 2002 infoRAD Session, Chicago, IL., December 2002
48. Sudipta Mukhopadhyay & Pradip Sircar, "Modelling of Speech Phonemes by ARMA Model with Time-Varying Gain", Conference on Signal Processing and Communication, IISc Bangalore, August 1995
49. Sudipta Mukhopadhyay & Pradip Sircar, "ECG Signal Synthesis by Exponential AM Model", IEEE-EMBS Regional Conference, New Delhi, pp. SPC7-8, February 1995
50. Pradip Sircar & Sudipta Mukhopadhyay, "Parameter Estimation of Transient Signals in Non-Gaussian Noise", IEEE TENCON-91, New Delhi, pp. 236-243, August 1991

Invited Lectures

1. Delivered lecture on “Lung CAD” in TEQIP-II Sponsored Short Term Course on “Image Processing, Security and Communication” on 8th June 2016
2. Delivered keynote address in International Conference on Signal Processing, Communication and Computational Research (ICSPCCR-16) on 18th May 2016 in VVIET, Mysore
3. Delivered lecture on "Fog removal from images " on 15th July in FDP Recent Technological Innovations Optical Engineering 14-18 July 2014, organized by E&C Dept., Malnad College of Engineering , Hassan, Karnataka
4. Delivered a lecture on the topic “Detection and Removal of Rain from Videos using Temporal and Spatiotemporal Properties” in the Short Term Course on CVPR-2014 organized by Dept of IT, NIT Durgapur
5. Delivered invited lecture in AICTE sponsored seminar on ”Soft Computing Approach in Medical Image Processing” Department of Information Technology, Kalyani Govt Engg College on 24th December 2013
6. Delivered invited lecture in Short Term Course on " Digital Image Processing and Multimedia Security" conducted by Department of Information Technology, National Institute of Technology, Durgapur-713209 on 3rd January 2014
7. Delivered lecture in Faculty Development Program titled as “Signal Processing and Image Processing using Scilab” conducted by Computer Science Department, NITTR Chandigarh on 16th July 2013
8. Delivered lecture on “Content-based Image Retrieval for CT & HRCT Lung Images” on February 10, 2012 at 3D Imaging Lab, James H. Clark Center, Stanford University, USA
9. Delivered lecture on “Video Rain Removal Algorithms” on June 14, 2011 at Department of Electrical and Computer Engineering, University of Calgary, Canada
10. Delivered lecture on “ Introduction to Medical Imaging”, on National Workshop on Image and Signal Processing (WISP-2011), organized by Dept. of ETCE, Silicon Institute of Technology, Bhubaneswar, 29-30th January 2011
11. Delivered lecture on “DSP application in US image enhancement”, on “Radar and Sonar Signal Processing” at NSTL, Visakhapatnam during 20-24 SEP 2010
12. Delivered lecture on “Wavelet Transform”, International Conference on Statistical Paradigms - Recent Advances and Reconciliations: ICSPRAR2008, ISI Kolkata, January 1-4, 2008

Annexure B: Patents

PATENTS FILED IN IIT KHARAGPUR

1. Sudipta Mukhopadhyay , Rahul Arora, "A Keystroke dynamics based system for synthesis of imposter data and normalization of energy level for user authentication and method thereof", Patent Application: 837/KOL/2014 dated 08-Aug-2014 (Full specification filed in Aug-2015).
2. Sudipta Mukhopadhyay, Abhishek Kr. Tripathi, "A method and systems for removal of fog from the images and videos", Patent Application: 1029/KOL/2011, PCT filing No. PCT/IN2012/000077 dated 02-02-2012
3. Sudipta Mukhopadhyay, Subhendu Seth, "Method or apparatus to detect the microcalcifications in X-Ray Images using Nonlinear Energy Operator“, patent application no.1372/KOL/2010, PTC application No. PCT/IN2011/000824 dated 05-Dec-2011
4. Debasish Nandi, Sudipta Mukhopadhyay, "An improved ultrasound imaging method/technique for speckle reduction/suppression in an improved ultra sound imaging system” patent application no 1296/KOL/2010, PTC application no. PTC/IN2011/000789, dated 14-Nov-2011.
5. Abhishek Kumar Tripathi, Sudipta Mukhopadhyay, "Method and apparatus for detection and removal of rain from video using temporal and spatiotemporal properties”, Patent application No: 1284/KOL/2010, PTC application no. PCT/IN2011/000778 dated 11-Nov-2011
6. Sudipta Mukhopadhyay, Abhishek Kumar Tripathi, "Method and apparatus for detecting the bad pixels in sensor array and concealing the error", Patent application No: 1279/KOL/2010 dated 12-11-2010, PTC application no. PCT/IN2011/000775 dated 11-Nov-2011
7. Sudipta Mukhopadhyay, Debasish Nandi, "Super-resolution on Polar Domain Data", Patent application No: 636/KOL/2010 dated 11-Jun-2010

PATENTS FILED IN GE

1. Saad A. Sirohey, Robert D. Barnes, Jan de Vaan, Sudipta Mukhopadhyay, Fred Wheeler "Image Tessellation for Region-Specific Coefficient Access” US7421136 B2, *granted on September 2, 2008.*
2. Saad A. Sirohey, Robert D. Barnes, Jan de Vaan, Sudipta Mukhopadhyay, Fred Wheeler "Region of interest high resolution reconstruction for display purposes and a novel book marking capability”US20020044696 A, Filed on November 21,2001
3. Sudipta Mukhopadhyay, Soma Sekhar Dhavala, Lalitha EM, "Data Compression of Image/Video Using the Span of Interest of the signal”, USPTO (Serial No. 10/064,620, filing date July 31,2002)
4. Soma Sekhar Dhavala, Fred Wheeler, Sudipta Mukhopadhyay and Nithin Nagaraj "Position Coding System And Method”, November 27, 2002, USPTO, Pub. No.: US 2004/0101205 A1, Pub. Date: May 27, 2004

5. Pinaki Ghosh, Praveen Kumar, Amit Saxena, Sudipta Mukhopadhyay "Fast Algorithm for Content based Medical Image Retrieval (CBMIR) using morphological granulometry" - docket no: 16IN-C0157 filed in Japan on 27th Dec, 2002.
6. Nithin Nagaraj , Sudipta Mukhopadhyay, Frederick Wheeler, "Method and Apparatus for Performing Non-Dyadic Wavelet Transform", January 10, 2003, USPTO
7. Bharath SV Kumar, Sudipta Mukhopadhyay, Vishram Vinayak Nandedkar, "Progressive Medical Image Volume Navigation", November 25, 2003, USPTO

DISCLOSURES WAITING FOR RATING IN GE

1. Sudipta Mukhopadhyay and Vishram Vinayak Nandedkar, "Window Progressive Decoding", December 24, 2003

DISCLOSURE ON HOLD IN SASKEN COMMUNICATIONS LTD.

1. Sudipta Mukhopadhyay, Amit Verma, Kaushik Barman "Clock Recovery in Orthogonal Frequency Division Multiplexing (OFDM) Communication" July 2000.

Annexure C: Sponsored Research and Consultancy Undertaken

Sl. No.	Responsibility	Title of the Project	Sponsoring Agency	Amount	Start	End	Status
1	Co-investigator	Optimal Design and Development of Powered Ankle Prosthetic Device for Human Locomotion	MHRD	Rs.11.50 Lakh	01Apr2016	31Mar 2019	On going
2	Principal Investigator	Development of Prototype of Digital Infrared Thermal and Optical Imaging based System for Early Detection of Oral Cancer	MHRD	Rs.79.00 Lakh	01Apr2014	31Mar 2017	On going
3	Principal Investigator	Checking Border Violation By Civilians Through Technological Solutions: Phase I	BSF	Rs. 3.06 Lakh	01Mar 2014	30Sep 2014	Completed
4	Principal Investigator	Clinical decision support system and self learning tool for radiologists for Lung CT using Content Based Image Retrieval	DIT	Rs. 99.71 Lakh	21Oct 2013	20Oct 2016	On going
5	Principal Investigator	Content based Image Retrieval for Medical Images	DIT	Rs. 29Lakh	20Nov 2009	19Apr 2012	Completed
6	Principal Investigator	Signal Processing and Machine Learning in Progressive Health Care	Intel	Rs. 15 Lakh	01Jan 2010	31Dec 2012	Completed
7	Principal Investigator	Pre-project Title : Image Compression for Satellite Images	ISRO	Rs. 0.50 lakh	01Jan 2007	31Dec 2007	Completed
8	Principal	Content based Image	ISRD	Rs. 3.0	01Jan	31Dec	Completed

	Investigator	Retrieval for medical Images		lakh	2006	c 2008	ed
9	Principal Consultant	Competence Development in Medical Imaging & Medical Informatics	Wipro Technologies	Rs 4.17 lakh	Jan 2006	Mar 2006	Completed
10	Principal Investigator	Temporal Image Subtraction for Chest CR Images	GE Medical Systems IT, USA	\$ 100,000.00	Jan 2004	Oct 2004	Completed
11	Principal Investigator	3D Image Compression for Medical Images	GE Medical Systems IT, USA	\$ 140,000.00	Jan 2003	Dec 2003	Completed
12	Principal Investigator	TruRez III: Proprietary Medical Image Compression Codec	GE Medical Systems IT, USA	\$ 150,000.00	Jan 2002	Oct 2002	Completed
13	Principal Investigator	TruRez II: Proprietary Medical Image Compression Codec	GE Medical Systems IT, USA	\$ 220,000.00	Jan 2001	Dec 2001	Completed