

Bio-Data

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Areas of Research: Digital Image Processing
 Image Watermarking, Fingerprinting and Steganography,
 Medical Image Denoising, Medical Image Segmentation,
 Face Recognition, Invariant Moments and Transforms

Research Metrics (Google scholars):

	Citations	h-index	i10-index
All	104	6	4
Since 2013	104	6	4

Link: <https://scholar.google.co.in/citations?user=ao3yHToAAAAJ&hl=en>

Academic Qualifications:

Sr. No	Degree	Subjects	Session	Board/ University	%age	Division/Rank/ University Position
1.	Matriculation	Math, Science, Social Sciences, Languages	1987-88	Punjab School Education Board, Mohali	76.13	First Division
2.	Senior Secondary (10+2)	Math, Economics, Political Science	1988-90	Punjab School Education Board, Mohali	61.11	First Division
3.	B.A.	Math(Hons) Economics Psychology	1990-93	Punjab University, Chandigarh	73.54	First Division University Medal for First position
4.	M. C. A.	Computer Sciences	1993-96	Guru Nanak Dev University, Amritsar, Punjab	81.24	First Division with Distinction University Medal for First position and scholarship under national Scheme
5.	M. Tech.	Computer Science and Engineering	1996-97	Punjabi University, Patiala, Punjab	80.93	First Division with Distinction First Position in University
6.	NET JRF/Lecturer	Computer Science	June 1997	UGC	-	-

Research Degree:

Sr. No	Degrees	Title	Date of award	University
1.	Ph. D.	Development of Fast and Robust algorithms for watermarking using moments	12 November 2013	Punjabi University, Patiala

Details of Experience:

Sr. No	Name of the Institute/Employer	Position held	Period	Duration	Major Job responsibilities
1.	Department of Computer Science, Punjabi University, Patiala	Lecturer (Ad hoc)	15 Apr 1998 31 Dec 1998	8 ½ months	<ul style="list-style-type: none"> • Teaching, Research and Development • Research work and research guidance in the area of Digital Image Processing • Updation of the course contents • Member of various academic and administrative committees of the Department.
		Lecturer (Ad hoc)	19 Jan 1999 16 Jul 1999	6 months	
		Assistant Professor	31 Jan 2000 30 Jan 2014	14 Years	
		Associate Professor	31 Jan 2014 till date	4 Years	

Papers taught at Undergraduate and Postgraduate Levels:

- Computer Graphics
- System Software
- Operating Systems
- Artificial Intelligence
- Software Engineering

Technical Proficiency:

- Programming Languages: C/C++, Java, PASCAL
- Operating Systems : Windows, Unix, Linux

Membership of Professional organizations:

Reviewer of the Journals:

Digital Signal Processing

Research Publications:

International Journals: 32 **Conferences:** 08
(Refer Appendix I)

Research Guidance:

Ph. D. Completed: 0 Under Guidance: 05
M. Phil. Completed: 07 Under Guidance: nil
M. Tech. Completed: 45 Under Guidance: 05
(Refer Appendix II)

Contribution to Corporate Life and Management Skills:

Administrative and Academic Affiliations: 08
Organizing Chair/member: 09
(Refer Appendix III)

Professional Development Activities:

Invited Talks/Lectures/Presentations: 05
Participation in workshop/Training: 04
(Refer Appendix IV)

Appendix I

Research Publications

IN JOURNALS:

1. Karamjeet Singh, Sukhjeet K. Ranade, Chandan Singh, A hybrid algorithm for speckle noise reduction of ultrasound images, Computer Methods and Programs in Biomedicine, 148 (2017) 55-69 <https://doi.org/10.1016/j.cmpb.2017.06.009>. **Thomson Reuters Impact Factor: 2.50 (SCI Indexed). Publisher: ELSEVIER. ISSN: 0169-2607**
2. Chandan Singh, Ashutosh Aggarwal, Sukhjeet Kaur, A New Convolution Model for the Fast Computation of Zernike Moments, International Journal of Electronics and Communications (AEU), 72 (2017) 104-113 <https://doi.org/10.1016/j.aeue.2016.11.014> **Thomson Reuters Impact Factor: 0.786, Publisher: ELSEVIER. ISSN: 1434-8411**
3. Karamjeet Singh, Sukhjeet K. Ranade, Chandan Singh, Comparative Performance Analysis of Various Wavelet and Nonlocal Means Based Approaches for Image Denoising, Optik 131 (2017) 423-437 <https://doi.org/10.1016/j.ijleo.2016.11.055>. **Thomson Reuters Impact Factor: 0.724 (SCI Indexed). Publisher: ELSEVIER ISSN: 0030-4062**
4. Sukhjeet Kaur Ranade and Harjeet Kaur, A High Dynamic Range image denoising Using NLM filter, Imperial Journal of Interdisciplinary Research, 3(5) (2017) 2093-2096 <https://www.onlinejournal.in/IJIRV3I5/365.pdf>, **ISSN: 2454-1362.**
5. Suman and Sukhjeet Kaur Ranade, A Secure Steganographic Method Using Modified LSB (Least Significant Bit) Substitution, International Journal of Advanced Research in Computer Engineering & Technology, 6(8) (August 2017) 1268-1273 <http://ijarcet.org/wp-content/uploads/IJARCET-VOL-6-ISSUE-8-1268-1273.pdf>, **ISSN: 2278 – 1323**
6. Neha Sharma and Sukhjeet Kaur Ranade, Digital Fingerprinting for Piracy Control, International Journal of Computer Applications, 176 (4) (October 2017)18-23 doi: 10.5120/ijca2017915568 <http://www.ijcaonline.org/archives/volume176/number4/sharma-2017-ijca-915568.pdf>, **ISSN: 0975 – 8887**
7. Yadwinder Kaur and Sukhjeet Kaur Ranade, Image authentication and tamper detection using fragile watermarking in spatial domain, International Journal of Advanced Research in Computer Engineering & Technology, 6(7) (July 2017) <http://ijarcet.org/wp-content/uploads/IJARCET-VOL-6-ISSUE-7-1058-1063.pdf>, **ISSN: 2278 – 1323**
8. Ripnaz Kaur and Sukhjeet Kaur Ranade, Speckle De-Noising of Synthetic Aperture Radar (SAR) Images Using Adaptive Non-Local Means (NLM) Filter, International Journal of Advanced Research in Computer Engineering & Technology, 6(7) (July 2017), <http://ijarcet.org/wp-content/uploads/IJARCET-VOL-6-ISSUE-7-982-985.pdf>, **ISSN: 2278 – 1323**
9. Chandan Singh, Sukhjeet Kaur, Karamjeet Singh, Invariant Moments and Transform-Based Unbiased Nonlocal Means for Denoising of MR Images, Biomedical Signal Processing and Control, 30(2016)13-24, [doi:10.1016/j.bspc.2016.05.007](https://doi.org/10.1016/j.bspc.2016.05.007), **Thomson Reuters Impact Factor: 2.20, Publisher: ELSEVIER. ISSN: 0030-4026.**
10. Amanjot Kaur and Sukhjeet Kaur, Comparative Analysis of various spatial filters for De-speckling Ultra sound Images, Imperial Journal of Interdisciplinary Research, 2(7) (2016) 1459-1467 <https://www.onlinejournal.in/IJIRV2I7/259.pdf>, **ISSN: 2454-1362**
11. Arvinder Kaur and Sukhjeet Kaur Ranade, Analysis of Speckle Reducing Filters in Ultrasound Images, International Journal of Computer Applications, 156(11) (December

2016) 23-30 doi: 10.5120/ijca2016912559
<http://www.ijcaonline.org/archives/volume156/number11/kaur-2016-ijca-912559.pdf>,
ISSN: 0975 – 8887

12. Sukhjeet Kaur Ranade and Amanpreet Kaur Mangat, Facial Expression Recognition based on Local Binary Patterns (LBP), International Journal of Advanced Research in Computer Science, 7(4) (July-August 2016) 85-94 **ISSN: 0976-5697**
13. Arvinder Kaur and Sukhjeet Kaur Ranade, Review of Speckle Noise Reduction Techniques for Ultrasound Imaging, 2(9) (2016) 29-35 <https://www.onlinejournal.in/IJIRV2I9/007.pdf>
ISSN: 2454-1362
14. Sukhjeet Kaur Ranade and Deepak Dhawan, Multi-bit Watermark Embedding using Dither Modulation, International Journal of Computer Science and Technology, 6 (2) (2015) 248-253 <http://www.ijcst.com/vol62/2/50-Deepak-Dhawan.pdf> **ISSN : 0976-8491**
15. Sukhjeet Kaur Ranade and Sukhpreet Kaur, Empirical Analysis of Invariance of Transform Coefficients under Rotation, International Journal of Engineering Research and Development 11(5) (2015) 43-51
<https://www.scribd.com/document/274376276/Empirical-Analysis-of-Invariance-of-Transform-Coefficients-under-Rotation> **e-ISSN: 2278-067X, p-ISSN: 2278-800X**
16. Sukhjeet K. Ranade and Supriya Anand, Empirical Analysis of Rotation Invariance in Moment Coefficients, International Journal of Computer Applications, 119(15) (2015) 19-26
doi: 10.5120/21143-4198
<http://research.ijcaonline.org/volume119/number15/pxc3904198.pdf> **ISSN: 0975–8887**
17. Sukhjeet K. Ranade and Jyotika, Empirical Analysis of Scale Invariance in Transform Coefficients, International Journal of Computer Science and Technology, 6 (2) (2015) 194-199 <http://www.ijcst.com/vol62/2/39-Jyotika.pdf> **ISSN : 0976-8491**
18. Sukhjeet K. Ranade and Navpreet Kaur, Empirical Analysis of Scale Invariance in Moment Coefficients, International Journal of Computer Science and Technology, 6(2) (2015) 237-242 <http://www.ijcst.com/vol62/2/48-Navpreet-Kaur.pdf> **ISSN : 0976-8491**
19. Bhawna and Sukhjeet K. Ranade, Performance Analysis of Filter based Techniques for Image Denoising, International Journal of Computer Science and Technology, 6(2) (2015) 258-262 <http://www.ijcst.com/vol62/3/52-Bhawna.pdf> **ISSN : 0976-8491**
20. Chandan Singh, Sukhjeet Kaur Ranade, Image Adaptive and High-Capacity Watermarking System using Accurate Zernike moments, IET Image Processing, 8(7)(2014) 373-382 (**SCI Indexed**), doi: [10.1049/iet-ipr.2013.0382](https://doi.org/10.1049/iet-ipr.2013.0382), **Thomson Reuters Impact Factor: 0.753. Publisher: IET. ISSN: 1751-9659.**
21. Suinana Verma, Sandeep sood and Sukhjet Kaur Ranade, Relevance of Steganalysis using DIH on LSB Stegnography, International Journal of Advanced Research in Computer Science and Software Engineering, 4(2) (2014) 835-838
<http://ijarcsse.com/Before August 2017/docs/papers/Volume 4/2 February2014/V4I2-0427.pdf> **ISSN: 2277 128X**
22. Ramandeep Kaur and Sukhjeet K. Ranade, Comparative Analysis of Lossless Image Compression Based On Row By Row Classifier and Various Encoding Schemes on Color Images, International Journal of Engineering Research and Applications, 4(8)(3) (2014) 56-60
<https://pdfs.semanticscholar.org/7d2d/e82194815a5843c664046e0fabe7ab544fb4.pdf>
ISSN : 2248-9622
23. Chandan Singh, Sukhjeet Kaur Ranade, A High Capacity Image Adaptive Watermarking Scheme with Radial Harmonic Fourier Moments, Digital Signal Processing, 23(5)(2013)

1470-1482 (SCI Indexed), <https://doi.org/10.1016/j.dsp.2013.05.006>, Thomson Reuters Impact Factor: 1.256. Publisher: ELSEVIER. ISSN: 1051-2004.

24. Chandan Singh, Sukhjeet Kaur Ranade, Geometrically Invariant and High Capacity Image Watermarking Scheme using Accurate Radial Transform, Optics & Laser Technology, 54(2013) 176-184 (SCI Indexed), <https://doi.org/10.1016/j.optlastec.2013.05.016> Thomson Reuters Impact Factor: 1.647. Publisher: ELSEVIER. ISSN: 0030-3992.
25. Chandan Singh, Sukhjeet Kaur Ranade, Rotation Invariant Moments and Transforms for Geometrically Invariant Image Watermarking, Journal of Electronic Imaging, 22(1) 013034-013034 (SCI Indexed), [10.1117/1.JEI.22.1.013034](https://doi.org/10.1117/1.JEI.22.1.013034) Thomson Reuters Impact Factor: 1.061. Publisher: SPIE. ISSN: 1560-229X.
26. Amandeep Kaur, Sukhjeet K. Ranade and Megha Kansal, Collusion Resistant Fingerprinting in DCT domain, International Journal of Engineering Research and Applications, 2(4) (2012) 2282-2287. ISSN: 2248-9622
27. Daljit Singh and Sukhjeet Kaur Ranade, Comparative Analysis of Transform based Lossy Image Compression Techniques, International Journal of Engineering Research and Applications, 2(5) (2012) 1736-1741, ISSN: 2248-9622
28. Meenu Bansal and Sukhjeet Kaur Ranade, A review of fractal image compression, International Journal of Advances in Computing and Information Technology, 1(3) (July 2012) 265-276, ISSN: 2277-9140
29. Megha Kansal, Sukhjeet K. Ranade and Amandeep Kaur, Fragile Watermarking for Image Authentication using a Hierarchical Mechanism, International Journal of Engineering Research and Applications, 2(4) (2012) 1759-1763 ISSN: 2248-9622
30. Navdeep Kaur, Sukhjeet K. Ranade, High Capacity Data Embedding System in DCT domain for Colored Images, International Journal of Computing and Business Research, 3(3) (2012) ISSN: 2229-6166
31. Navdeep Kaur, Sukhjeet K. Ranade, High Capacity Data Embedding System using Projection Quantization, International Journal of Advanced Research in Computer and Communication Engineering, 1(4) (June 2012) 230-233, ISSN: 2278 – 1021
32. Usha Rani and Sukhjeet K. Ranade, Improving Accuracy of Pattern Matching Technique with Polar Harmonic Transform for Poroscopy, International Journal of Advanced Research in Computer and Communication Engineering, 1(5) (July 2012) ISSN: 2278 – 1021

IN CONFERENCE PROCEEDINGS:

1. Karamjeet Singh, Sukhjeet K. Ranade, Chandan Singh, Method Noise Based Two Stage Nonlocal Means Filtering Approach for Gaussian Noise Reduction, Proceedings of Sixth International Conference on Soft Computing for Problem Solving,(2017), https://doi.org/10.1007/978-981-10-3325-4_18 , Advances in Intelligent Systems and Computing 547.
2. Chandan Singh, Sukhjeet K. Ranade, An Effective Image Watermarking System for High Embedding Capacity, International Journal of Computer Applications, International Conference on Recent Advances and Future Trend in IT, Patiala, Punjab, India, March 21-23, 2012. Proceedings published in International Journal of Computer Applications, iRAFIT(4) pp.22-28.
3. Mandeep Singh and Sukhjeet Kaur Ranade, Modified Fast Algorithm to Remove Gaussian Noise for Gray Scale Images, In Proceedings of International Conference on Latest Trends

in IT organized by Computer Science Society of PCTE Group of Institutes, Ludhiana, October 1, 2011

4. Sunaina Verma and Sukhjeet Kaur Ranade, Steganalysis using difference image histogram, In Proceedings of UGC Sponsored National Conference on Emerging Trends in Information Technology, Doaba College Jalandhar, Punjab, India. 28th August 2010 NCETIT-2010 pp. **155-159**
5. Shilpy Ghai and Sukhjeet Kaur Ranade, Fragile Watermarking for Image Authentication in DCT domain, In Proceedings of International Conference on Wireless Networks and Embedded Systems, Department of Electronics and Communication Engineering, Chitkara Institute of Engineering and Technology, Rajpura, Punjab, India, Oct 23-24, 2009, WECAN-2009 pp. 26-28
6. Priyanka Jarial and Sukhjeet Kaur Ranade, Implementation of Robust Watermarking in DCT Domain, In Proceedings of International Conference on Wireless Networks and Embedded Systems, Department of Electronics and Communication Engineering, Chitkara Institute of Engineering and Technology, Rajpura, Punjab, India, Oct 23-24, 2009, WECAN-2009, pp. 29-31
7. Priyanka Jarial and Sukhjeet Kaur Ranade, The Robust Watermarking in DCT Domain, In Proceedings of National Conference cum workshop on Information Security and Networks; ISAN-2009, June 19-20, 2009, pp. 97-99
8. Shilpy Ghai and Sukhjeet Kaur Ranade, Fragile Watermarking for Image Authentication, National Conference cum workshop on Information Security and Networks; ISAN-2009, June 19-20, 2009, pp. 100-102

Appendix II

Research Guidance

Ph. D. Theses guidance/Under guidance: (Completed: 0 Under guidance: 05)

1. Karamjeet Singh, "Development of Efficient and Fast Algorithms for Denoising Medical Images" Date of Registration: 10 September, 2014, Faculty of Computing Sciences. **(Thesis Submitted)**
2. Mandeep Singh, "Development of Fast and Accurate Algorithms for 3d MRI Segmentation to Detect Brain Tumor", Date of Registration: 12 January, 2016, Faculty of Computing Sciences.
3. Supriya Anand, "Design and Development of Fast Algorithm for Color Face Recognition using Moments" Date of Registration: 15 February, 2017 Faculty of Engineering and Technology.
4. Deepak Sharma, "Development of Efficient Algorithms for Object and Scene Image Classification" Date of Registration: 8 August, 2017, Faculty of Computing Sciences.
5. Sandeep Mittal, Date of Enrolment: 31 August, 2016, Faculty of Engineering and Technology

M. Phil. Theses guidance/Under guidance:

1. Amrinder Singh, 2015, Robust Image watermarking based on edge detection and quantization in DWT
2. Sukhdeep Singh, 2016,
3. Simran Kaur, 2016, Speckle reduction for Ultra Sound images using parallel non-local means filtering
4. Darbara Singh, 2016, An adaptive approach for low-dose Computed Tomography (CT) denoising using Non-local means filter
5. Deepak Gill, 2016, MRI denoising using parallel non-local means filtering
6. Satinder Singh, 2017,
7. Amandeep Kaur, 2017,

M. Tech. Theses guidance/Under guidance: (Completed: 45 Under guidance: 05)

1. Prabhjot Kaur, 2006, Regeneration of Noisy Patterns for Automatic Speech Recognition using Artificial Neural Networks
2. Harmandeep Singh, 2006, Handling Acoustic Variability of Speech By Artificial Neural Network Technique
3. Munish Sodhi, 2007, Development of Optimal Neural Network Model for Isolated Digit Recognition
4. Surinder Pal Singh, 2007, Speaker Identification
5. Tanjot Singh Sandhu, 2007, Speech Enhancement In The Presence Of Noise
6. Amit Sharma, 2008, Automated Design and Implementation of ANN using Cascade-Back Propagation Approach
7. Harpal Singh, 2009, Secure Spread Spectrum Watermarking in DCT Domain"

8. Priyanka, 2009, Invisible Informative Watermarking in DCT domain
9. Shilpi Ghai, 2009, Fragile Image Watermarking
10. Deepti, 2010, Comparative Analysis of Various Audio Watermarking Techniques in Wavelet Domain
11. Shivani Khurana, 2010, Video Watermarking in DCT Domain
12. Sunaina, 2010, Steganalysis using Difference Image Histogram method'
13. Usvir Kaur, 2010, Image Fingerprinting in DCT Domain
14. Amandeep Kaur, 2011, Improved LZW Image Compression
15. Mandeep Singh, 2011, Gaussian Noise Reduction for Gray Scale Images
16. Ranjodh Kaur, 2011, Video Compression using Discrete Cosine Transform
17. Amandeep Kaur, 2012, Collusion Resistant Fingerprinting for Images
18. Daljit Singh, 2012, Comparative Analysis of Transform based Lossy Image Compression Techniques
19. Meenu Bansal, 2012, Fast Fractal Image Compression
20. Megha Kansal, 2012, Fragile Watermarking for Image Authentication in Spatial Domain
21. Navdeep Kaur, 2012, High Capacity Data Embedding Systems
22. Usha Rani, 2012, Improving Accuracy of Pattern Matching Technique for Poroscopy using Polar Harmonic Transforms
23. Hatesh Shyan, 2014, Object Localization and Detection using Ant Colony Optimization
24. Gurinderjit Kaur, 2014, Lossy image compression using Fractal Coding Technique
25. Amandeep Kaur, 2014, Steganalysis for spatial domain steganography using Difference Image Histogram method'
26. Kuldeep Kour, 2014, Steganography in Spatial Domain using Back Propagation Neural Network
27. Ramandeep Kaur, 2014, Comparative Analysis of Loseless Image Compression based on Row by Row Classifier and various encoding Schemes
28. Shilpa Rani, 2014, Analysis of Hashing Techniques for Data Integrity Checking in Cloud Environment
29. Jyotika Mittal, 2015, Analysis of Scale invariance in Transform Coefficients
30. Navpreet Kaur, 2015, Analysis of Scale invariance in Moment Coefficients
31. Deepak Dhawan, 2015, Multibit Watermark Embedding using Dither Modulation
32. Supriya Anand, 2015, Analysis of Invariance of moment coefficients under rotation transformation
33. Nitesh Kumar, 2015, Comparative Anlysis of quantization based image watermarking schemes using Zernike moments
34. Sukhpreet Kaur Sidhu, 2015, Analysis of Rotation invariance in Transform Coefficients
35. Karamjeet Singh Virk, 2015, An efficient Algorithm for Edge Detection of Corroded Surface

36. Bhawna, 2015, Comparative Analysis of Filter based Techniques for Image Denoising
37. Shweta Gupta, 2016, Comparative Analysis of Non Local Mean Filters for Denoising Medical Images
38. Arvinder Kaur, 2016, Wavelet based speckle noise removal in ultra sound images
39. Amanpreet Kaur Mangat, 2016, Facial Expression Recognition based on Local Binary Patterns
40. Amanjot Kaur, 2016, Comparative Analysis of various spatial filter based techniques for De-speckling
41. Parminder Kaur, 2016, Comparative Analysis of various spatial filter based techniques for Gaussian Noise Reduction
42. Suman, 2017, A Secure steganographic method using modified LSB substitution
43. Harjeet Kaur, 2017, High Dynamic Range image denoising using NLM filter
44. Ripnaz Kaur, 2017, Speckle denoising of SAR images using Non Local Means filter
45. Yadwinder Kaur, 2017, Image Authentication and Tamper detection using fragile watermarking in spatial domain
46. Neha Sharma, 2017,
47. Mandeep Kaur, 2018,
48. Gurpreet Singh, 2018, Comparison of Different Image denoising algorithms for SAR Images
49. Saurav Singla, 2018, Comparison of Different Image denoising algorithms for medical Images
50. Lakhdeep Singh Jawandha, 2018,

Appendix III

Contribution to Corporate Life and Management Skills

Administrative and Academic Affiliations:

1. Nodal Officer for the preparation of various annual reports, review reports, proposals and presentations including AAR, AQAR, NAAC, NIRF, SAP-DRS and DST-FIST etc. since 2004 till date.
2. Member Academic Council of the Department.
3. Member Board of studies for various graduate and undergraduate courses since 2001
4. Served as Training in-charge, Time Table in charge, Alumni Activity In charge and Student activity in charge from time to time

Organizing Chair/Member:

1. Member Organizing Committee for IPR 2016: National Workshop on IPR Awareness and Plagiarism Detection Tool for Indian Languages organized by Department of Computer Science, Punjabi University, Patiala, held on **May 13, 2016**
2. Member Organizing Committee for regICON 2015: Regional International conference on Natural Language Processing organized by Department of Computer Science, Punjabi University, Patiala on **Sept 18-19, 2015**
3. Organized TechFest 2014 – Department of Computer Science, Punjabi University, Patiala on **April 11th, 2014**
4. Member Organizing Committee NWMLT-2013: UGC Sponsored One Week National Workshop on Multilingual Technologies organized by Department of Computer Science, Punjabi University, Patiala from **November 11-17, 2013**
5. Organizing member for NWDIP – 2012: One Week National Workshop on Digital Image Processing using MATLAB organized by Department of Computer Science, Punjabi University, Patiala from **November 29th to December 5th, 2012**
6. Member, organizing committee for iRAFIT-2012: International Conference on Recent Advances and Future Trends in Information Technology organized by Department of Computer Science, Punjabi University, Patiala from **March 21-23, 2012**
7. Organizing chair for ICISIL – 2011 International Conference on Information System for Indian Languages organized by Department of Computer Science, Punjabi University, Patiala from **March 09-11, 2011**
8. Member Organizing Committee for one day workshop RAFIP Image Processing organized by Department of Computer Science, Punjabi University, Patiala on **March 30, 2010**
9. Member Organizing Committee for RAFIT-2009 National Conference on Recent Advances and Future Trends in Information Technology organized by Department of Computer Science, Punjabi University, Patiala from **April 9-10, 2009**
10. Co-ordinator for TechDisha 2003 – the Punjab Level Techfest organized by Tech. Society, Department of Computer Science and Engineering, Punjabi University, Patiala from **April 17th – 19th, 2003**

Appendix IV

Professional Development Activities

Invited Talks/Lectures/Presentations:

1. Presented paper on Information and Communication Technologies for Women Empowerment in the 7th International conference on Empowering Women, Empowering Humanity held at Punjabi University, Patiala on December 11-12, 2015
2. Lecture delivered on Information Hiding – Watermarking Applications and Research during the 55th Refresher Course in Professional Courses Organized by UGC-Human resource Development Centre, Punjabi University, Patiala
3. Lecture Delivered on Information Security – Threats and Defenses during the 55th Refresher Course in Professional Courses Organized by UGC-Human resource Development Centre, Punjabi University, Patiala
4. Invited talk and Conduct of five Lab session in UGC sponsored One Week National Workshop on Multilingual Technologies organized by Department of Computer Science, Punjabi University, Patiala from **November 11-17, 2013**
5. Delivered lecture on Digital Watermarking – An overview , challenges, Evaluation and techniques in 38th Refresher course in Computer science & Information Technology organized by Academic Staff College, Punjabi University, Patiala in 2013

Participation in workshop/Training:

1. Attended Health Advocate Training for Project CHiC held on Aug 31, 2016
2. Attended one day workshop on Practical Aspects on the Importance of Patents in Research Feb 12, 2013
3. Attended One week UGC sponsored Workshop on Capacity Building of Women Managers in Higher Education organized by Women's Studies Centre, Punjabi University, Patiala from August 23- 27, 2011
4. Attended 3 days workshop on Train the Trainer March 12-14, 2011