

DR. R. BALASUBRAMANIAN

BOYSCAST FELLOW

My Erdős number: 04, Google Scholar *h*-index: 27

Professor, Department of Computer Science and Engineering, IIT Roorkee, Roorkee 247 667, India,
Tel: +91 1332 285852, email: balarfcs@iitr.ac.in, balaiitr@ieee.org

EDUCATION

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| Indian Institute of Technology Madras, Chennai, India
Ph.D (Mathematics and Computer Science
under Dr. K. Swaminathan and Prof. Sukhendu Das) | <i>July 2001</i> |
| Madras Christian College, University of Madras
M. Sc (Mathematics)
89.81% (Gold Medalist) | <i>July 1996</i> |
| A.M. Jain College, University of Madras
B. Sc (Mathematics)
91.8% | <i>July 1994</i> |

WORK EXPERIENCE

- **Professor**, Department of Computer Science and Engineering, Indian Institute of Technology Roorkee, Roorkee, Uttarakhand, 247 667, INDIA (Dec'18 - Ongoing)
- **Associate Professor**, Department of Computer Science and Engineering, Indian Institute of Technology Roorkee, Roorkee, Uttarakhand, 247 667, INDIA (Sep'13 - Dec'18)
- **Visiting Researcher** with Prof. V. Vetrivel, Department of Mathematics, Indian Institute of Technology Madras, Chennai 600 036, INDIA (Dec'17 and Dec'18)
- **Visiting Researcher** with Prof. Umapada Pal, Computer Vision and Pattern Recognition Unit, Indian Statistical Institute, Kolkata, INDIA (June'18)
- **Visiting Researcher** with Dr. Andrea Kutics, Department of Natural Sciences, International Christian University, Tokyo, JAPAN (June'18)
- **Visiting Researcher** with Dr. Masakazu Iwamura, Dept. of Computer Science and Intelligent Systems, Graduate School of Engineering, Osaka Prefecture University, Osaka, JAPAN (June'18)
- **Visiting Researcher** with Dr. Pradeep Atrey, Department of Computer Science, University at Albany - State University of New York (SUNY), NY, USA (Dec'14)
- **Visiting Researcher** with Prof. Mohan S. Kankanhalli, Department of Computer Science, School of Computing as well as SeSaMe Research Centre, National University of Singapore, SINGAPORE (Jul'13 and Jul'14)
- **Visiting Researcher** with Prof. C. Eswaran, Faculty of Computing and Informatics, Multimedia University, Cyberjaya Campus, MALAYSIA (Jun'12 and Jul'14)
- **Associate Professor**, Department of Mathematics, Indian Institute of Technology Roorkee, Roorkee, Uttarakhand, 247 667, INDIA (Oct'12 - Sep'13)

- **Visiting Researcher** with Dr. Ibrahim Venkat, School of Computer Sciences, Universiti Sains Malaysia, Pulau Pinang, MALAYSIA (Jun'12 and Jul'13)
- **Assistant Professor**, Department of Mathematics, Indian Institute of Technology Roorkee, Roorkee, Uttarakhand, 247 667, INDIA (Feb' 06 - Oct'12)
- **Visiting Scientist** with Dr. K. Swaminathan, Department of Mathematics, Indian Institute of Technology Madras, Chennai 600 036, INDIA (Oct' 11 and Dec'11)
- **Visiting Professor** (under BOYSCAST fellowship) with Dr. Jonathan Wu, Department of Electrical and Computer Engineering, University of Windsor, Windsor, Ontario, ON, N9B 3P4 CANADA (May' 09 - Aug' 09)
- **Assistant Professor** (On Contract), Department of Mathematics, Indian Institute of Technology Roorkee, Roorkee, Uttarakhand, 247 667, INDIA (Jan'06 - Feb' 06)
- **Lecturer** (On Contract), Department of Mathematics, Indian Institute of Technology Roorkee, Roorkee, Uttarakhand, 247 667, INDIA (Sep' 04 - Dec'05)
- **Lecturer**, Department of Computer Science and Information Systems, IPCU Group, Birla Institute of Technology and Science, Pilani, Rajasthan 333 031, INDIA (Sep' 03 - Sep' 04)
- **Post Doctoral Associate** with Prof. Deborah Silver, Department of Electrical and Computer Engineering, Rutgers, The State University of New Jersey, USA (July'02 - Apr'03)
- **Post Doctoral Fellow** with Prof. Pascal Matsakis, Computer Engineering and Computer Science Department, University of Missouri, Columbia, USA (Oct'01 - June' 02)
- **Guest Scientist**, International Center for Theoretical Physics (ICTP) Trieste, ITALY (Sep' 01, Sep' 00)

THESIS SUPERVISED

Ph.D	17 completed, 01 submitted and 15 ongoing
M.Tech/M.Sc/M.C.A	119 completed
B. Tech /Int. M.Sc	26 completed

COMPLETED PH.D STUDENTS

1. **Dr. Sanjeev Kumar (Jul 2004 - Mar 2008):** *Reconstruction of 3D Objects from 2D views: Simulation, Applications and Error Analysis* (with Prof. N. Sukavanam, Awarded Ph.D in Nov. 2008 and **presently working as an Associate Professor in the Department of Mathematics at IIT Roorkee from Apr. 2016**. He was a Post Doctoral Fellow in the Department of Mathematics and Computer Science, The Artificial Vision and Real-Time Systems (AVIRES) Laboratory, University of Udine, **ITALY** from Mar. 2008 to Nov. 2010).
2. **Dr. Gaurav Bhatnagar (Jul 2006 - Sep 2009):** *Emphasized Digital Watermarking on Singular Value Decomposition in Frequency Domain* (Awarded Ph.D in Nov. 2010 and **presently working as an Associate Professor in the Department of Mathematics and Statistics at IIT Jodhpur from Mar. 2019**. He was a Post Doctoral Fellow in the Dept. of Electrical and Computer Engineering, University of Windsor, **CANADA** from October 2009 to August 2013).
3. **Dr. Nidhi Taneja (Jan 2007 - May 2010):** *Security Solutions for Still Visual Data* (with Dr. Indra Gupta, Awarded Ph.D in Nov. 2010 and **presently working as an Associate Professor in the Dept. of Electronics and Communication Engineering at Indira Gandhi Delhi Technical University for Women**).

4. **Dr. Manoj Kumar (Jul 2006 - Dec 2010):** *Reconstruction of 3-D Objects using Shape From Shading Algorithms* (with Prof. Rama Bhargava, Awarded Ph.D in Nov. 2011 and Presently working as an Assistant Professor in the Department of Computer Science, Babasaheb Bhimrao Ambedkar Central University, Lucknow).
5. **Dr. Sanjay Rawat (Jan 2008 - June 2011):** *Digital Watermarking for Copyright Protection and Authentication* (Awarded Ph.D in Nov. 2012 and presently working as an Assistant Professor in the Department of Mathematics, THDC Institute of Hydropower Engineering and Technology, Bhagirathipuram, Tehri Garhwal).
6. **Dr. Anil Balaji Gonde (Jul 2007-Aug 2011):** *Local and Global Descriptors using Wavelet based features for Image Retrieval* (with Prof. R. P. Maheshwari, Awarded Ph.D in Nov. 2012 and presently working as an Associate Professor in the Department of Electronics and Tele communication Engineering, Shri Guru Gobind Singhji Institute of Engineering and Technology, Nanded).
7. **Dr. Subrahmanyam Murala (Aug 2009-Apr 2012):** *Design and Integration of Feature Descriptors for Content Based Image Retrieval* (with Prof. R. P. Maheshwari, Defended his thesis on 05/11/2012 and **presently working as an Assistant Professor in the Department of Electrical Engineering at IIT Ropar**. He was in the Dept. of Electrical and Computer Engineering, University of Windsor, **CANADA** as a Post Doctoral Fellow from July 2012 to June 2014).
8. **Dr. Sanoj Kumar (Jul 2008 - Dec 2012):** *Robust Estimation of Optical Flow and Disparity map from Image Sequences* (with Prof. N. Sukavanam, Defended his thesis on 23/05/2013 and he was in the Department of Computer Science, The Artificial Vision and Real-Time Systems (AVIRES) Laboratory, University of Udine, **ITALY** as a Post Doctoral Fellow from October 2013 to September 2014).
9. **Dr. Mohit Srivastava (Jan 2009 - July 2013):** *Quantitative Approaches for Object Based Image Analysis of Satellite Data* (with Prof. Manoj Arora, Defended his thesis on 27/12/2013).
10. **Dr. Himanshu Agarwal (July 2009 - July 2014):** *Multipurpose Invisible and Visible Digital Image Watermarking Schemes* (Defended his thesis on 23/02/2015 and presently working as an Assistant Professor in the Department of Mathematics, Jaypee Institute of Information Technology, Sector-62, Noida, Uttar Pradesh, India. He was an Exchange Ph.D student under Dr. Pradeep Atrey in the Applied Computer Science Department, The University of Winnipeg, MB, **CANADA** under the Canadian Commonwealth Scholarship Program, for Six months from September 1, 2012 to February 28, 2013).
11. **Dr. Prabhu Natarajan (Jul 2010- Oct 2014):** *Study of Some Information Extraction Techniques for Hyperspectral Imaging* (with Prof. Manoj Arora, Defended his thesis on 06/04/2015).
12. **Dr. Manisha Verma (Jul 2012- Dec 2015):** *New Feature Descriptors for Image Retrieval, Object Tracking and Shot Detection* (Defended her thesis on 06/04/2016, worked as a Post Doctoral Fellow in the Department of Computer Science and Engineering at IIT Gandhinagar from August 1, 2016 to July 31, 2017. Presently she is a Post Doctoral fellow, Graduate School of Engineering Science, Osaka University, **JAPAN** from August 2018).
13. **Dr. Tasneem Ahmed (Jan 2012 - Jan 2016):** *Development of Land Surface Monitoring Algorithms for Satellite Images* (with Prof. Dharmendra Singh, Defended his thesis on 11/05/2016).
14. **Dr. Pushpendra Kumar (Jul 2011 - Jul 2016):** *Some Efficient Algorithms for Optical Flow Estimation* (with Dr. Sanjeev Kumar, Defended his thesis on 27/01/2017 and **presently in the Department of Mathematics, NIT Bhopal as an Assistant Professor from January 2019**).

15. **Dr. Bhavik R Patel (Jul 2013 - Dec 2016):** *Face Image Analysis for Soft Biometric Classification* (with Prof. R. P. Maheshwari, Defended his thesis on 01/05/2017).
16. **Dr. Arun Singh Pundir (Dec 2014 - Mar 2018):** *Multi-Color-Model Video Analysis for Fire and Smoke Detection* (Defended his thesis on 17/08/2018 and **presently in the Department of Computer Science and Engineering as a Guest faculty in NIT Delhi**).
17. **Dr. Rahul Nijhawan (Dec 2014 - May 2018):** *Machine Learning Models for Snow, Glacier Terrain and Hazard Mapping* (with Prof. Josodhir Das, Defended his thesis on 11/09/2018).
18. **Anjali Gautam (Jul 2015 - Jan 2019):** *Brain Lesion Delineation and Classification* (Submitted her thesis on 31/01/2019).

POST DOCTORAL RESEARCH ASSOCIATES

Dr. Asha Rani (30th June 2011 - 31st March 2014): Under **CSIR Project** entitled “Digital Watermarking for Rightful Ownership and Copyright Protection”.

Dr. Asha Rani (October 2014- October 2017) under **DST WOS-A Project** entitled “Multimodal Biometric based person Authentication and Identification System”.

Dr. Priyanka Singh (Jan 2016- Jan 2017) under **DeitY Project** in “Multimedia Security” and worked as a Post Doctoral Fellow in the Department of Computer Science at Dartmouth College, New Hampshire, USA with **Prof. Hany Farid**.

Dr. Debanjan Sadhya (July 2017 - Feb 2019) under **Institute Post Doctoral Fellow** in “Privacy Preserving Data Deduplication in Cloud”.

Dr. Nidhi Saxena (Feb 2019 - Till date) under **Institute Post Doctoral Fellow** in “Privacy Preservation while Removing Data Redundancies”.

PROJECT FELLOWS

1. **Dr. Asha Rani** (ISRO Project, June 2007 to December 2007)
2. **Dr. Gaurav Gupta** (ISRO Project, October 2007 to August 2010)
3. **Mr. Deepak Murugan** (ISRO Project, April 2013 to February 2015)
4. **Mr. Ankit Sharma** (Samsung Project, January 2019 to Till date)

MAJOR AWARDS

- **BOYSCAST Fellowship (2008-09)** (Fellowship of US \$3000 per month + perks) in Mathematical Sciences awarded by Department of Science and Technology (DST), Government of India to visit **University of Windsor, CANADA** for the duration of THREE months for conducting advanced training/research in the area of Computational aspects of Geometry and Algebra under the mentorship of **Prof. Jonathan Wu**, Canada Research Chair, Department of Electrical and Computer Engineering, University of Windsor, CANADA.
- **Outstanding Teacher Award**, awarded by Indian Institute of Technology Roorkee, 2010 (**On Teachers’ Day**).

INDUSTRY INTERACTION

- Microsoft R & D, Bangalore
- Sarnoff Innovative Tech. Ltd., Bangalore
- JFWTC, GE India, Bangalore
- IBM India

- iLink Systems, Seattle, USA
- Samsung, Noida, India
- Intel, Bangalore, India
- Facebook Inc., USA
- Facebook AI Research and Applied Machine Learning, USA
- Honeywell, Bangalore, India

SPONSORED RESEARCH PROJECTS

S. No	Title of the Project	Sponsoring Agency	Grant Sanctioned (in Rs.)	Investigator	Status
1	Nearest neighbor vector based Palmprint verification	IIT Roorkee, Scheme A	1.0 lac	Principal Investigator	Completed (2006-07)
2	Reconstruction of 3D curves and surfaces from arbitrary Perspective views	MHRD, IIT Roorkee, Scheme B	3.14 lacs	Principal Investigator	Completed (2007-10)
3	Face Recognition: A Neural Network Approach	DST, New Delhi	2.88 lacs	Principal Investigator	Completed (2007-10)
4	Reconstruction of 3D objects from Stereo space Imagery for Development of city models	ISRO, SAC Ahmedabad	11.5 lacs	Co-PI, PI: Prof. Rama Bhargava	Completed (Apr 2007 to August 2010)
5	Digital Watermarking for Rightful Ownership & Copyright Protection	CSIR, New Delhi	10.92 lacs	Principal Investigator	Completed (2011-14)
6	3D Reconstruction and Software Development for City Model Generation from Satellite Images	ISRO, SAC Ahmedabad	7.73 lacs	Principal Investigator	Completed (2012-15)
7	Multimodal Biometric based person Authentication and Identification System	DST, New Delhi	23.52667 lacs	Mentor, PI: Dr. Asha Rani (under WOS-A)	Completed (2014-17)
8	Information Security Education and Awareness (ISEA) Project phase II	DeitY, New Delhi	137.7 lacs	Co-PI, PI: Prof. Manoj Misra (Former Head, CSE)	Ongoing (2014-19)
9	Development and Real-time Implementation of Filters to Remove Noise and Blur Effect	Instruments Research & Development Establishment (IRDE), Dehradun	18.50 lacs	Co-PI, PI: Dr. B. K. Kaushik	Completed (2016-18)

10	Multi-oriented Indic text recognition in natural scene and video images	Science & Engineering Research Board, New Delhi	17.8871 lacs	Co-PI, PI: Dr. Partha Pratim Roy	Ongoing (2016-20)
11	NVIDIA Hardware Grant, Titan X {non-Pascal} GPU	NVIDIA Corporation	1.5 lacs	Principal Investigator	Completed (2016-17)
12	Thermal Imager with Calibrator for Bad Weather and Night Vision	SMILE, IIT Roorkee	43 lacs	Co-PI, PI: Dr. B. K. Kaushik	Completed (2017-18)
13	End-to-End Emotional Speech Synthesis	Samsung	24.204 lacs (including Instruments)	Principal Investigator	Ongoing (2018-19)
14	Brain Computer Interface for Neuro and Cognitive Research	SMILE, IIT Roorkee	75 lacs	Co-PI, PI: Dr. Partha Pratim Roy	Ongoing (2018-19)
15	Urban and Regional Inequality Modelling as Story-Telling: Using Simulation Models as Narrative	SPARC, A Government of India Initiative	94.46 lacs	Co-PI, PI: Dr. Arindam Biswas and Prof. Tetsuo Kidokoro (Japan)	Ongoing (2019-21)

CONSULTANCY PROJECTS

S. No	Title of the Project	Sponsoring Agency	Grant Sanctioned (in Rs.)	Investigator	Status
1	Development of feature reduction and classification algorithms for Hyperspectral data processing	Defence Electronics Applications Laboratory (DEAL), Dehradun	9.3755 lacs	Principal Investigator	Completed (Nov 2010 to Mar 2012)

2	Anomaly Detection and Sub-pixel Classification Algorithms for Hyperspectral Imaging	Defence Electronics Applications Laboratory (DEAL), Dehradun	19.854 lacs	Investigator, PI: Prof. Manoj Arora	Completed (Nov 2010 to Mar 2012)
3	Study of Heat Shimmer Removal Techniques for Long Range Imaging Systems	Instruments Research & Development Establishment (IRDE), Dehradun	8.98 lacs	Co-PI, PI: Dr. B. K. Kaushik	Completed (2013-15)
4	Investigating and Analyzing the Program and Course Structure with respect to its Conformance with the International Standards and Research & Industry needs	Govt. of US Yemen	\$8423.00	Investigator, PI: Dr. Sandeep Kumar Garg	Completed (2014-15)
5	Development of Restoration Techniques for Weather Degraded Images	Instruments Research & Development Establishment (IRDE), Dehradun	9.70 lacs	Co-PI, PI: Dr. B. K. Kaushik	Completed (2015-17)

TEACHING

- So far I have taught **Computer Applications (MA 550)**, **Computer Programming and Numerical Analysis (MA 739)**, **Fundamentals of Object Oriented Programming (CSN-103)**, **Data Structures (CS 102/ MA 106/ MA 568/CA 506/MA 302)**, **Mathematical Aspects of Computer Graphics (IMA 17/ MA 634)**, **Unix Network Programming (CA 602)**, **Image Processing (CA/MA 625)**, **Data Base Management System (MA 635/ MA 303)**, **Artificial Intelligence (CA 701)**, **Computer Aided Design (CA 633/CA 717/ MA 632)**, **Computer Systems and Programming (EC 101 A)**, **Object Oriented Programming Languages (CA 503)**, **Graph Theory (MA 631)**, **Object Oriented Analysis and Design (CS-291)**, **Discrete Structures (CSN-106)**, **Machine Learning (CSN 382)**, **Operating Systems (CSN-232)** and **Basic Engineering Mathematics (MA 101, MA 102 and MA 201)** courses for UG and PG students (B.Tech, M.Sc and M. Tech) in the Dept. of Computer Science and Engineering and Dept. of Mathematics, IIT Roorkee, INDIA.

COURSE DEVELOPMENT

- Computer Vision, Image Processing, Computer Graphics, Data Structures, Design Analysis of Algorithms, and DBMS (for FIVE year M.Sc Integrated Programme)
- Data Structures, Image Processing, Computer Graphics, Computer Aided Design, Theory of Computation, Object Oriented Programming Languages and DBMS (for M.C.A.)

- Elective Courses for B. Tech Computer Science and Engineering: Computer Vision, Image Processing, Probability and Statistics for Engineers, Computational Geometry, Advanced Graph Theory and Multimedia Technologies

EXPERTISE

- **Computer Vision** Vision Geometry, Shape from Shading and Optical Flow Problems
- **Graphics** Visualization and Volume Graphics
- **Image Processing** Fractional Transform Theory, Wavelet Analysis, Multimedia Security: Encrypted Domain Processing of Big Multimedia Data over Cloud, Biometrics, Content Based Video Retrieval, Video Skimming and Summarization, Medical Imaging, Long-Range Imaging, Hyper-spectral Imaging, Machine Learning, Pattern Recognition, Multilingual Text Recognition, EEG based Pattern Analysis.

PUBLICATIONS SUMMARY

Category	Published/ Accepted	Under Review/ Revision
Refereed Journal Papers	91	10
Refereed Conference Papers	52	06
International Book Chapters	07	00
Total	150	16

LIST OF REPRESENTATIVE PUBLICATIONS

A. Refereed International Journal Papers: Q1

1. Debanjan Sadhya, Kanjar De, **Balasubramanian Raman** and Partha Pratim Roy, Development of a clustering based fusion framework for locating the most consistent IrisCodes bits, *Information Sciences (Elsevier)*, **Vol. 491**, pp. 1-15, 2019.
2. Debanjan Sadhya and **Balasubramanian Raman**, Generation of Cancelable Iris Templates via Randomized Bit Sampling, Accepted for Publication in *IEEE Transactions on Information Forensics and Security*, 2019.
3. Priyanka Singh, Nishant Agarwal and **Balasubramanian Raman**, Secure Data Deduplication using Secret Sharing Schemes over Cloud, *Future Generation Computer Systems (Elsevier)*, **Vol. 88**, pp. 156-167, 2018.
4. Rajkumar Saini, Barjinder Kaur, Priyanka Singh, Pradeep Kumar, Partha Pratim Roy, **Balasubramanian Raman** and Dinesh Singh, Dont Just Sign Use Brain Too: A Novel Multimodal Approach for User Identification and Verification, *Information Sciences (Elsevier)*, **Vols. 430-431**, pp. 163-178, 2018.
5. Priyanka Singh and **Balasubramanian Raman**, Reversible Data Hiding Based on Shamir's Secret Sharing for Color Images over Cloud, *Information Sciences (Elsevier)*, **Vol. 422**, pp. 77-97, 2018.
6. Priyanka Singh, **Balasubramanian Raman** and Manoj Misra, A (n, n) Threshold Non-expansible XOR based Visual Cryptography with Unique Meaningful Shares, *Signal Processing (Elsevier)*, **Vol. 142**, pp. 301-319, 2018.

7. Priyanka Singh, **Balasubramanian Raman** and Nishant Agarwal, Towards Encrypted Video Tampering Detection and Localization Based on POB Number System Over Cloud, *IEEE Transactions on Circuits and Systems for Video Technology*, Vol.28, no.9, pp.2116 - 2130, 2018.
8. Priyanka Singh, **Balasubramanian Raman**, Nishant Agarwal and Pradeep Atrey, Secure Cloud based Image Tampering Detection and Localization using POB Number System, *ACM Transactions on Multimedia Computing Communications and Applications*, Vol. 13, No. 3, Article 23, 2017.
9. Himaanshu Gauba, Pradeep Kumar, Partha Pratim Roy, Priyanka Singh, Debi Prosad Dogra and **Balasubramanian Raman**, Prediction of Advertisement Preference by Fusing EEG Response and Sentiment Analysis, *Neural Networks (Elsevier)*, Vol. 92, pp. 77-88, 2017.
10. Bhavik Patel, R.P. Maheshwari and **Balasubramanian Raman**, Compass local binary patterns for gender recognition of facial photographs and sketches, *Neurocomputing (Elsevier)*, Vol. 218, pp. 203-215, 2016.
11. Manisha Verma, **Balasubramanian Raman** and Subrahmanyam Murala, Local Extrema Co-occurrence Pattern for Color and Texture Image Retrieval, *Neurocomputing (Elsevier)*, Vol. 165, pp 255-269, 2015.
12. Sanoj Kumar, Sanjeev Kumar, N. Sukavanam and **Balasubramanian Raman**, Dual Tree Fractional Quaternion Wavelet Transform for Disparity Estimation, *ISA Transactions (Elsevier)*, Vol. 53, No. 2, pp 547-559, 2014.
13. Gaurav Bhatnagar, Jonathan Wu and **Balasubramanian Raman**, Discrete Fractional Wavelet Transform and its Application to Multiple Encryption, *Information Sciences (Elsevier)*, Vol. 223, No. 2013, pp. 297-316, 2013.
14. Subrahmanyam Murala, R. P. Maheshwari and **R. Balasubramanian**, Local Tetra Patterns: A New Feature Descriptor for Content Based Image Retrieval, *IEEE Transactions on Image Processing*, Vol. 21, No. 5, pp. 2874-2886, 2012.
15. Sanjay Rawat and **Balasubramanian Raman**, A blind watermarking algorithm based on fractional Fourier transform and visual cryptography, *Signal Processing (Elsevier)*, Vol. 92, No. 6, pp. 1480-1491, 2012.
16. Subrahmanyam Murala, R. P. Maheshwari and **R. Balasubramanian**, Local Maximum Edge Binary Patterns: A New Descriptor for Image Retrieval and Object Tracking, *Signal Processing (Elsevier)*, Vol. 92, No. 6, pp. 1467-1479, 2012.
17. Subrahmanyam Murala, R. P. Maheshwari and **R. Balasubramanian**, Expert System Design Using Wavelet and Color Vocabulary Trees for Image Retrieval, *Expert Systems With Applications (Elsevier)*, Vol. 39, No. 5, pp. 5104-5114, 2012.
18. Gaurav Bhatnagar, Jonathan Wu and **Balasubramanian Raman**, Fractional Dual Tree Complex Wavelet Transform and its Application to Biometric Security during Communication and Transmission, *Future Generation Computer Systems (Elsevier)*, Vol. 28, No. 1, pp. 254-267, 2012.
19. Gaurav Bhatnagar, Q.M. Jonathan Wu and **Balasubramanian Raman**, A new Fractional Random Wavelet Transform for Fingerprint Security, *IEEE Transactions on Systems, Man and Cybernetics Part-A: Systems and Humans*, Vol. 42, No. 1, pp. 262-275, 2012.

B. Refereed International Journal Papers: Q2

20. Pradeep Kumar, Partha Pratim Roy, Anshul Mittal, **Balasubramanian Raman** and Bidyut B. Chaudhuri, A Modified-LSTM Model for Continuous Sign Language Recognition using Leap motion, Accepted for publication in *IEEE Sensors Journal*, 2019.

21. Priyanka Singh, **Balasubramanian Raman** and Manoj Misra, A Secure Image Sharing Scheme based on SVD and Fractional Fourier Transform, *Signal Processing: Image Communication* (*Elsevier*), **Vol. 57**, pp. 46-59, 2017.
22. Bhavik Patel, R.P. Maheshwari and **Balasubramanian Raman**, Evaluation of periocular features for kinship verification in the wild, *Computer Vision and Image Understanding* (*Elsevier*), **Vol. 160**, pp. 24-35, 2017.
23. Priyanka Singh and **Balasubramanian Raman**, Reversible Data Hiding for Rightful Ownership Assertion in Encrypted Domain over Cloud, *AEÜ - International Journal of Electronics and Communications* (*Elsevier*), **Vol. 76**, pp. 18-35, 2017.
24. Anshul Mittal, Partha Pratim Roy, Priyanka Singh and **Balasubramanian Raman**, Rotation and Script Independent Text Detection from Video Frames using Sub Pixel Mapping, *Journal of Visual Communication and Image Representation* (*Elsevier*), **Vol. 46**, pp. 187-198, 2017.
25. Manisha Verma and **Balasubramanian Raman**, Local Tri-Directional Patterns: A New Texture Feature Descriptor for Image Retrieval, *Digital Signal Processing* (*Elsevier*), **Vol. 51**, pp. 62-72, 2016.
26. Manisha Verma and **Balasubramanian Raman**, Center Symmetric Local Binary Co-occurrence Pattern for Texture, Face and Bio-medical Image Retrieval, *Journal of Visual Communication and Image Representation* (*Elsevier*), **Vol. 32**, pp. 224-236, 2015.
27. Sanoj Kumar, Sanjeev Kumar, N. Sukavanam and **Balasubramanian Raman**, Human Visual System and Segment-Based Disparity Estimation, *AEÜ - International Journal of Electronics and Communications* (*Elsevier*), **Vol. 67**, No. 5, pp. 372-381, 2013.
28. Anil Balaji Gonde, R. P. Maheshwari and **R. Balasubramanian**, Modified Curvelet Transform with Vocabulary Tree for Content Based Image Retrieval, *Digital Signal Processing* (*Elsevier*), **Vol. 23**, No. 1, pp. 142-150, 2013.
29. Sanjay Rawat and **Balasubramanian Raman**, A publicly verifiable lossless watermarking scheme for copyright protection and ownership assertion, *AEÜ - International Journal of Electronics and Communications* (*Elsevier*), **Vol. 66**, No. 11, pp. 955-962, 2012.
30. Sanjay Rawat and **Balasubramanian Raman**, Best tree wavelet packet transform based copyright protection scheme for digital images, *Optics Communications* (*Elsevier*), **Vol. 285**, No. 10-11, pp. 2563-2574, 2012.
31. Gaurav Bhatnagar, Jonathan Wu and **Balasubramanian Raman**, A new Robust Adjustable Logo Watermarking Scheme, *Computers & Security* (*Elsevier*), **Vol. 31**, No. 1, pp. 40-58, 2012.
32. Sanjay Rawat and **Balasubramanian Raman**, A chaotic system based fragile watermarking scheme for image tamper detection, *AEÜ - International Journal of Electronics and Communications* (*Elsevier*), **Vol. 65**, No. 10, pp. 840-847, 2011.
33. Nidhi Taneja, **Balasubramanian Raman**, and Indra Gupta, Selective Image Encryption in Fractional Wavelet Domain, *AEÜ - International Journal of Electronics and Communications* (*Elsevier*), **Vol. 65**, No. 4, pp. 338-344, 2011.
34. Yatharth Saraf, **Balasubramanian Raman** and Krishnan Swaminathan, Computing the Curve-Skeletons of Images, *International Journal of Computer Mathematics* (*Taylor and Francis*), **Vol. 85**, No. 2, pp.253-270, 2008.
35. N. Sukavanam, **R. Balasubramanian** and Sanjeev Kumar, Error estimation in reconstruction of quadratic curves in 3-D space, *International Journal of Computer Mathematics* (*Taylor and Francis*), **Vol. 84**, No. 1, pp. 121-132, 2007.

36. Yatharth Saraf, **R. Balasubramanian** and K. Swaminathan, A classical approach for thinning of binary images using divergence of the potential field, *International Journal of Computer Mathematics (Taylor and Francis)*, **Vol. 82**, No.6, pp. 673-684, 2005.
37. **R. Balasubramanian**, Sukhendu Das and K. Swaminathan, Simulation studies for the performance analysis of the reconstruction of a line in 3-D from two arbitrary perspective views using two plane intersection method, *International Journal of Computer Mathematics (Taylor and Francis)*, **Vol. 80**, No.5, pp. 559-571, 2003.
38. **R. Balasubramanian**, Sukhendu Das, S. Udayabaskaran and K. Swaminathan, Quantization error in stereo imaging systems, *International Journal of Computer Mathematics (Taylor and Francis)*, **Vol. 79**, No.6, pp. 671-691, 2002.
39. **R. Balasubramanian**, Sukhendu Das and K. Swaminathan, Error Analysis in reconstruction of a line in 3-D space from two arbitrary perspective views, *International Journal of Computer Mathematics (Taylor and Francis)*, **Vol. 78**, No.2, pp. 191-212, 2001.

C. Refereed International Journal Papers: Q2 and Q3

40. Rahul Nijhawan, Josodhir Das and **Balasubramanian Raman**, A Hybrid of Deep Learning and Hand-Crafted Features based Approach for Snow Cover Mapping, *International Journal of Remote Sensing (Taylor & Francis)*, Available online 20 September 2018, <https://doi.org/10.1080/01431161.2018.1519277>, 2018.
41. Debashis Sen, Samyak Dutta and **Balasubramanian Raman**, Facial Emotion Classification using Concatenated Geometric and Textural Features, *Multimedia Tools and Applications (Springer)*, Available online 5 September 2018, pp. 1-37, <https://doi.org/10.1007/s11042-018-6537-9>, 2018.
42. Vishesh Tanwar, Himanshu Buckchash, **Balasubramanian Raman** and Rama Bhargava, Dense Motion Analysis of German Finger Spellings, *Multimedia Tools and Applications (Springer)*, Available online 24 August 2018, pp 1-26, <https://doi.org/10.1007/s11042-018-6533-0>, 2018.
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41. Gaurav Bhatnagar, **R. Balasubramanian** and K. Swaminathan, DWT-SVD based Dual Watermarking Scheme, Proceedings of *1st IEEE International Conference on the Applications of Digital Information and Web Technologies (IEEE-ICADIWT 2008)*, pp. 526-531, August 4-6, 2008, VSB-Technical University of Ostrava, CZECH REPUBLIC.
42. Hitesh Shah, Prakash C, Balamanohar Paluri, Nalin Pradeep S, **Balasubramanian Raman**, Automated Stroke Classification in Tennis, Lecture Notes in Computer Science, Vol. 4633, Kamel, Mohamed; Campilho, Aurlio (Eds.), pp. 1128-1137, *International Conference on Image Analysis and Recognition (ICIAR 2007)*, August 22-24, 2007, Montreal, CANADA (Acceptance Rate 44.06
43. Aishwarya Ramachandran, **R. Balasubramanian**, K. Swaminathan, and Sukhendu Das, Analysis of Difference in Orientations and Focal Lengths of Two Arbitrary Perspective Viewing Cameras, Proceedings of the *SPIE Vision Geometry XV, IS&T/SPIE International Symposium on Electronic Imaging - 2007*, Vol. 6499, pp. 649904[1-12], 28th January-1st February 2007, San Jose, CA, USA.
44. Mayur D Jain, Nalin Pradeep S, Prakash C and **R. Balasubramanian**, Binary tree based linear time fingerprint matching, Proceedings of *13th IEEE International Conference on Image Processing (IEEE-ICIP 2006)*, pp. 309-312, October 8-11, 2006, Atlanta, Georgia, USA.

45. Nalin Pradeep S, Mayur D Jain, Prakash C and **R. Balasubramanian**, Palmprint Recognition: Two level Structure Matching, Proceedings of *IEEE International Joint Conference on Neural Networks (IEEE-IJCNN 2006)*, pp. 664-669, July 16-21, 2006, Vancouver, British Columbia, CANADA.
46. Mayur D. Jain, Nalin Pradeep, **R. Balasubramanian** and Rama Bhargava, Local and Global Tree Graph Structures for Fingerprint Verification, Proceedings of *Third IASTED International Conference on Signal Processing, Pattern Recognition and Applications*, pp. 287-293, Feb 15-17, 2006, Innsbruck, AUSTRIA.
47. Sanjeev Kumar, N. Sukavanam and **R. Balasubramanian**, Reconstruction of Quadratic Curves in 3-D from Two or more Arbitrary Perspective Views: Simulation Studies, Proceedings of the *SPIE Vision Geometry XIV, IS&T/SPIE International Symposium on Electronic Imaging - 2006*, Vol. 6066, pp. 6066M1-6066M11 (180-190), Jan 15-19, 2006, San Jose, California, USA.
48. Mayur D. Jain, Nalin Pradeep and **R. Balasubramanian**, Nearest neighbor vector based Palmprint verification, Proceedings of the *fifth IASTED International Conference on Visualization, Imaging & Image Processing, VIIP-2005*, pp. 536-539, Sep. 7-9, 2005, Benidorm, SPAIN.
49. Ashutosh Shukla, Abhinav Saxena, Bhavesh Neekra, **R. Balasubramanian** and K. Swaminathan, Error analysis in the reconstruction of a 3D parabola from two arbitrary perspective views, Proceedings of the *SPIE Vision Geometry XIII, IS&T/SPIE International Symposium on Electronic Imaging - 2005*, Vol. 5675, pp. 41-50, Jan 16-20, 2005, San Jose, California, USA.
50. K. Swaminathan, Sukhendu Das and **R. Balasubramanian**, Simulation studies for the reconstruction of a straight line in 3D from two arbitrary perspective views using epipolar line method, Proceedings of the *SPIE Image Processing: Algorithms and Systems, SPIE International Symposium on Electronic Imaging - 2002*, Vol. 4667, pp. 418-428, 19-25 January 2002, San Jose, California, USA.
51. **R. Balasubramanian**, Sukhendu Das and K. Swaminathan, Simulation studies for the performance analysis of the reconstruction of a line using stereoscopic projections, Proceedings of the *Second Indian conference on Computer vision, Graphics and Image Processing (ICVGIP-2000)*, pp. 338-344, Dec 20-22, 2000, IISc, Bangalore, INDIA.
52. **R. Balasubramanian**, Sukhendu Das and K. Swaminathan, Reconstruction of 3-D Quadratic Curves From Arbitrary Perspective Views, Proceedings of the *International Conference on Communications, Computers and Devices*, **Vol. 2.** , pp. 477-480, Dec 14-16, 2000, IIT Kharagpur, INDIA.

HONORS, AWARDS AND RECOGNITION

- I Rank holder in B. Sc. Examinations, A.M. Jain College, 1994.
- Gold Medalist in M. Sc. Examinations, Madras Christian College, 1996.
- DST travel award (Rs. 30,000) to attend *Vision Geometry XIII, IS&T/SPIE International Symposium on Electronic Imaging 2005*, San Jose, California, USA, January 2005.
- SPIE travel and registration award (\$525) to attend *Vision Geometry XIII, IS&T/SPIE International Symposium on Electronic Imaging 2005*, San Jose, California, USA, January 2005.
- Best paper award for a research paper in “*International Conference of Cognition and Recognition (ICCR-08)*”, April 10-12, 2008, Mysore, INDIA, 2008.
- **DST Young Scientist** travel and Registration award (Rs. 1,05,559) to attend *Wavelet Applications in Industrial Processing VI, 21st IS&T/SPIE International Symposium on Electronic Imaging 2009*, 18-22, Jan 2009, San Jose, California, USA.

- CSIR travel award (50% of Airfare) to attend *IEEE Symposium on Industrial Electronics & Applications (ISIEA 2011)*, September 25-28, 2011, Langkawi Island, MALAYSIA.
- Science and Engineering Research Board (A Statutory body under Department of Science & Technology) travel award (Rs. 84,240) to attend and present a paper in **IS&T/SPIE symposium on Electronics Imaging, Conference On Video Surveillance and Transportation Imaging Applications 2014**, held in **San Francisco, California, USA** from 2nd February 2014 to 6th February 2014.
- Best Paper Award for a research paper in “*IEEE International Conference on Signal and Image Processing Applications (ICSIPA’2015)*”, Kuala Lumpur, MALAYSIA.
- CSIR travel award (50% of Airfare) to attend *IEEE TENCON 2016*, November 22-25, 2016, Singapore, SINGAPORE.
- **One of the jury members** of 6th IDRBT Doctoral Colloquium held in Institute for Development and Research in Banking Technology (IDRBT), Hyderabad during 8-9, December 2016. High quality papers from ISI Kolkata, IISc Bangalore, IIT Kharagpur, IIT Madras, IIT Hyderabad, IIT Guwahati, IIIT Hyderabad, IIIT Bangalore and IIM Lucknow were presented and top 3 papers have got cash prizes.
- **Attended** Intel India Research Colloquium to represent Department of Computer Science and Engineering, IIT Roorkee during 9th October 2017 at Bangalore, INDIA.
- **Top 15 contenders of Outstanding Teachers’ Award** for the year 2018 for Under Graduate Category at IIT Roorkee.
- **Guest Editor** in the Special issue on Blockchain-as-a-Service for Industrial Internet of Things and Big Data Applications (Baas-iot-big-data), **Future Generation Computer Systems**, The International Journal of eScience.

ABROAD VISITS

- Participated as one of the fifty scientific researchers in the world, who was invited by **International Center for Theoretical Physics, Trieste, ITALY**, under UNESCO fellowship for three weeks course on “*School on Mathematical Problems in Image Processing* during 4th September 2000 to 22nd September 2000.
- Participated as one of the fifty scientific researchers in the world, who was invited by **International Center for Theoretical Physics, Trieste, ITALY**, under UNESCO fellowship for four weeks course on “*Summer School on Mathematical Control Theory* during 3rd September 2001 to 28th September 2001.
- Worked as a Post Doctoral Fellow in the **Computer Engineering and Computer Science Department, University of Missouri Columbia, Missouri -65211, USA** from 1st October 2001 to 30th June 2002.
- Worked as a Post Doctoral Associate in the **Department of Electrical and Computer Engineering, Rutgers, The State University of New Jersey, NJ -08855, USA** from 1st July 2002 to 28th April 2003.
- Presented a paper “Error analysis in the reconstruction of a 3D parabola from two arbitrary perspective views in **Vision Geometry XIII, IS&T/SPIE International Symposium on Electronic Imaging - 2005**, held in **San Jose, California, USA** from 16th January 2005 to 21st January 2005.
- Delivered an invited talk entitled “Applications of Image Processing in health care in **the Indo-German Workshop on Clean Room Technology, part of 5th World Congress on Bio-Mechanics**, held in **Munich, GERMANY** from 29th July 2006 to 4th August 2006.

- Presented a paper Automated Stroke Classification in Tennis in **International Conference on Image Analysis and Recognition (ICIAR 2007)**, held in **Montreal, CANADA** from 22nd August 2007 to 24th August 2007.
- Presented a paper “Multipurpose Watermarking Scheme using Essentially Non-Oscillatory Point-Value Decomposition in **Wavelet Applications in Industrial Processing VI, 21st IS&T/SPIE International Symposium on Electronic Imaging 2009** held in **San Jose, California, USA** from 18th January 2009 to 24th January 2009.
- Worked as a **Visiting Professor** under **BOYSCAST Fellowship (2008-09)** (Fellowship of US \$3000 per month + perks, awarded by DST) at **University of Windsor, CANADA** from 18th May 2009 to 17th August 2009 (duration of THREE months) for conducting advanced training/research in area of Computational aspects of Geometry and Algebra under the mentorship of **Prof. Jonathan Wu**, Canada Research Chair, Department of Electrical and Computer Engineering, University of **Windsor, CANADA**.
- Presented a paper “Human Action Recognition in a Wide and Complex Environment in **Real-Time Image and Video Processing 2011, part of IS&T/SPIE Electronic Imaging 2011**, held in **San Francisco, California, USA** from 23rd January 2011 to 27th January 2011.
- Presented a paper “Navigation and Surveillance using Night Vision and Image Fusion”, in **IEEE Symposium on Industrial Electronics & Applications (ISIEA 2011)**, held in **Langkawi Island, MALAYSIA** from 25th September to 28th September 2011.
- Presented a paper “Recognizing Human Gestures Using a Novel SVM Tree in **IS&T/SPIE symposium on Electronics Imaging, Conference On Image Processing: Machine Vision Application V, 2012**, held in **San Francisco, California, USA** from 22nd January 2012 to 26th January 2012.
- **Visited Stanford University, California, USA** to have a technical discussion with **Dr. Daniel L. Rubin, MD, MS**, Assistant Professor of Radiology and Medicine (Biomedical Informatics) in the problem of “Content Based Image Retrieval (CBIR) for Decision Support” on 26th January 2012.
- Delivered an invited talk entitled “Human Action Recognition in a Wide and Complex Environment” in the **School of Computer Sciences, Universiti Sains Malaysia, Pulau Pinang, MALAYSIA** on 7th June 2012.
- Conducted a workshop on “Advanced Algorithms in Computer Vision and Imaging using MATLAB” in the **School of Computer Sciences, Universiti Sains Malaysia, Pulau Pinang, MALAYSIA** during June 08-09, 2012.
- Delivered two invited talks on “Digital Image Watermarking using Mathematical Transformations and SVD” and “Recognizing Human Gesture Using a Novel SVM Tree” in the **Faculty of Computer Science and Information Technology, Universiti Putra Malaysia, Serdang, Selangor, MALAYISA** on 12th June 2012.
- Conducted a workshop and Seminar on “Content Based Image Retrieval and Computer Vision” in the **Centre for Visual Computing, Multimedia University, Cyberjaya, MALAYISA** on 13th June 2012.
- Delivered an invited talk on “Mathematics and its Applications in Real Life” in **Linton University College, Mantin, Negeri Sembilan, MALAYSIA** on 15th June 2012.
- Presented a paper “Joint Histogram Between Color and Local Extrema Patterns for Object Tracking in **IS&T/SPIE symposium on Electronics Imaging, Conference On Video Surveillance and Transportation Imaging Applications 2013**, held in **San Francisco, California, USA** from 3rd February 2013 to 7th February 2013.

- Visited **National University of Singapore, SINGAPORE** to have a technical discussion with **Prof. Mohan S. Kankanhalli, Department of Computer Science, School of Computing**, in the areas of Visual Saliency in watermarking, Affective Video Analysis and Retrieval and Multimedia Security during July 01-06, 2013.
- Conducted a workshop on “Advanced Algorithms in Computer Vision and Imaging using MATLAB” in the **School of Computer Sciences, Universiti Sains Malaysia, Pulau Pinang, MALAYSIA** during July 08-09, 2013.
- Presented a paper “Development of a multispectral active stereo vision system for video surveillance applications in **IS&T/SPIE symposium on Electronics Imaging, Conference On Video Surveillance and Transportation Imaging Applications 2014**, held in **San Francisco, California, USA** from 2nd February 2014 to 6th February 2014.
- Visited **SeSaMe Research Centre at National University of Singapore, SINGAPORE** to have a technical discussion with **Prof. Mohan S. Kankanhalli, Department of Computer Science, School of Computing**, in the areas of Visual Saliency in watermarking, Multi-camera/Multi-sensor surveillance, Multi-agent systems and PTZ camera networks during July 02-07, 2014.
- Conducted a workshop on “Digital Image Watermarking and Optical flow problems” and have a technical discussion with **Prof. C. Eswaran, Faculty of Computing and Informatics, Multimedia University, Cyberjaya Campus, MALAYSIA** in the area of Multimedia Security during July 08-10, 2014.
- Visited **iLink Systems at Seattle, Washington, USA** to have a technical discussion in the areas of Data Science and Machine learning during 27/11/2014 to 3/12/2014.
- Visited **University at Albany - State University of New York (SUNY), NY, USA** to have a technical discussion with **Dr. Pradeep Atrey’s** research group and Delivered an invited talk on “Applications of Fractional and Multi-resolution Transforms in Information Security, Optical flow Problems and Content Based Image Retrieval” in the **Department of Computer Science** during 4/12/2014 to 6/12/2014.
- Visited **MIMOS Berhad, Technology Park Malaysia, Kuala Lumpur, MALAYSIA** to have a technical discussion with **Prof. Arichandran’s** R&D group and delivered an invited talk on “Machine Learning in Vision, Information Security and Content Based Image Retrieval” during 31/5/2015 to 3/6/2015.
- Visited **Telekom Malaysia, Kuala Lumpur, MALAYSIA** to have a technical discussion with **Dr. Ettikan Kandasamy Karuppiyah’s** R&D group and delivered an invited talk on “Applications of Soft Computing in Vision, Information Security and Content Based Video Retrieval” during 4/6/2015 to 7/6/2015.
- Presented a paper “Fusion of Submanifold and Local Texture Features for Palmprint Authentication” in **IEEE International Conference on Visual Communications and Image Processing (VCIP’2015)**, held in **NTU, Singapore, SINGAPORE** during 13-16, December 2015.
- Presented a paper “A Reversible Robust Watermarking Scheme Based on Two out of Two Visual Cryptography Approach” in **IEEE TENCON 2016** held in **Singapore, SINGAPORE** during 22-25 November 2016.
- Attended The **IEEE International Conference on Multimedia & Expo (ICME)** held in **Hong Kong** during 10-14 July 2017.
- Attended The **4th Asian Conference on Pattern Recognition (ACPR 2017)** held in **Nanjing, CHINA** during 26-29 November, 2017.

- IIT Roorkee team named **Triangulation**, Vaibhav Gosain, Adarsh Kumar, Saharsh Luthra and myself as coach has bagged 56th position & 68th rank in the World and 2nd among Indian teams in the World Finals of 42nd ACM International Collegiate Programming Contest (ICPC World Finals) held at Peking University, Beijing, **CHINA** between 15-20 April 2018. IIT-R is one amongst 8 teams that have been selected from India and 140 teams from all over the world.
- Visited Department of Computer Science and Intelligent Systems, **Osaka Prefecture University, Osaka, JAPAN** under Japan Science and Technology Sakura Science Plan and delivered an invited talk on “Machine Learning in Imaging and Vision” during 7/6/2018 to 14/6/2018.
- Visited Department of Natural Sciences, **International Christian University, Tokyo, JAPAN** to have a technical discussion with Dr. Andrea Kutics and delivered an invited talk on “Machine Intelligence and its Applications” during 10/6/2018 to 11/6/2018.
- IIT Roorkee team named **Hold right there Sparky!!**, Devanshu Agarwal, Samarth Joshi, Abhishek Kanhar and myself as coach has bagged 41st position & 49th rank in the World and 2nd among Indian teams in the World Finals of 43rd International Collegiate Programming Contest (ICPC World Finals) held at Porto, **PORTUGAL** between 31st March - 5th April 2019. IIT-R is one amongst 8 teams that have been selected from India and 135 teams from all over the world.
- **USA**, B1/B2 (Visiting/Business) visa holder for 10 years (December 2004 to December 2014).
- Visited **MALAYSIA** (January 2005), **AUSTRIA** (August 2006), **USA** (June, July 2009), **SINGAPORE** (February 2013, January 2014) and **FRANCE** (March 2019).

INVITED TALKS/LECTURES

1. Delivered a talk on “Computing the Curve-Skeletons of General 3D Objects”, in *Center for Advanced Information Processing (CAIP), Department of Electrical and Computer Engineering, Rutgers, the State University of New Jersey, USA*, April 2003.
2. Delivered an invited talk on “Computing the Curve-Skeletons of General 3D Objects”, *Center for Artificial Intelligence and Robotics (CAIR)-DRDO, Bangalore*, June 2003.
3. Invited as a guest speaker in the mini symposium on *Methods for Image Understanding at JFWTC, GE India Technology Center, Bangalore* (organized by *Imaging Technologies group*) and delivered a talk on “Computing the Curve-skeletons of general 2D/3D objects by Generalized potential field” along with 6 faculty of top-rated schools in India and USA, July 2004.
4. Delivered an invited talk on “Digital Watermarking using Mathematical Transformations and SVD” in a *CEP course on Emerging Techniques for Image Processing, Defence Electronics Applications Laboratory - DRDO, Dehradun*, 4-8 October 2010.
5. Delivered Series of expert lectures on “Advanced Algorithms in Digital Watermarking and CBIR” in the *“Faculty Development Programme on Computer Vision, Pattern Recognition and Image Processing”* conducted by Department of Computer Science and Engineering, *NIT Delhi* from 18-22 June 2013.
6. Delivered Series of expert lectures (1) “Watermarking Algorithms Based on Fractional Transformations and Visual Cryptography”, (2) “Chaos Based Cryptosystem for Still Visual Data” and (3) “Information Security in Multi-resolution Transformations” in the *Workshop on “Cryptography and Information Security”* conducted by Department of Electronics and Communication Engineering, *NIT Calicut* from 23-25 January 2015.
7. Delivered series of invited lectures on (1) “Multimedia Security over cloud” and (2) “Machine Learning in Imaging and Vision” in the Department of Computer Science and Engineering at *IIT Ropar* on 04/11/2017.

8. Delivered an invited talk on “Machine Learning and its Applications” in the Department of Computer Science and Engineering at **MNIT Jaipur** on 19/01/2018.
9. Delivered an expert talk on “Machine Learning in Imaging and Vision” in E&ICT academy for a faculty development programme, **IOT with Machine Learning & Artificial Intelligence** during January 20-24, 2018 at **MNIT Jaipur**.
10. Delivered an invited talk on “Machine Learning and its Applications” in the Department of Computer Science and Engineering at **IIIT-DM Jabalpur** on 24/02/2018.
11. Delivered an invited talk on “Machine Learning in Imaging and Video Analytics” in the Department of Information Technology at **IIIT Allahabad** on 03/04/2018.
12. Delivered an invited talk on “Machine Vision” in the Department of Computer Science and Engineering at **MNNIT Allahabad** on 04/04/2018.
13. Delivered an invited talk on “Challenges in Video Analytics” in the Department of Computer Science and Engineering at **NIT Manipur** on 24/05/2018.
14. Delivered an invited talk on “Encrypted Domain Processing” in Computer Vision and Pattern Recognition Unit, **Indian Statistical Institute, Kolkata** on 22/06/2018.
15. Delivered series of expert lectures on (1) Human Action Recognition (2) Mathematical Elements of Machine Learning in Two Week National Workshop & Summer School on Advances in Deep Architectures For Signal, Image & Vision Applications (ADASIVA’18) in the Department of Information Technology at **IIIT Allahabad** during 15-17 July, 2018.
16. Delivered an invited talk on “AI and its Applications in Imaging and Vision” in the Department of Computer Science and Engineering at **IIT (BHU), Varanasi** on 15/11/2018.
17. Delivered an invited lecture on “Video Analytics Applications” at **Honeywell, Bangalore** on 28/11/2018.
18. Delivered a keynote on “AI and its Applications” in 13th IEEE International Conference on Industrial and Information Systems (IEEE ICIIIS’18) at **IIT Ropar** during 01-02 December 2018.
19. Delivered series of expert lectures on (1) Machine Learning and Its Applications and (2) Medical Imaging in a workshop on “Signal and Image Processing for Medical Applications (SIPMA’19) in the Department of Electronics and Communication Engineering at **VNIT Nagpur** during 20-24 February, 2019.
20. Delivered an invited talk on “Machine Learning and its Applications in Imaging and Vision” **IIITM Gwalior** on 06/03/2019.

PROFESSIONAL ACTIVITIES

1. Reviewer of Several top International Journals and Conferences
2. Technical, Advisory and International Program Committee member for various conferences.
3. Coordinated Nine QIP Short term courses at IIT Roorkee
 - Vision, Graphics and Image Processing (2007)
 - Robotic Vision and Image Processing (2008)
 - Vision, Graphics, Robotics and their Applications (2009)
 - Robotic Vision and Image Processing (2011)
 - Image Processing and Computer Graphics for Scientific Visualization (2012)

- Image Processing with Multidisciplinary Applications (2014)
 - Mathematical Modelling and Numerical Computation Using Matlab (2015)
 - Vision, Graphics and their Applications (2016)
 - Machine Learning and Its Applications (2018)
4. Instructor, Finishing School Programme, Continuing Education, IIT Roorkee, 2007 and 2008.
 5. Established Computer Vision, Graphics and Image Processing Laboratory at Department of Mathematics, IIT Roorkee under MHRD, DST and ISRO Projects, 2007-08.
 6. Under my coach, the team *“the 65th Bit”*, comprises of Sharat Ibrahimpur, Dipit Grover and Tarun Goyal from IIT Roorkee grabbed 61st rank in the *37th Annual World Finals of the ACM International Collegiate Programming (ACM ICPC) Contest* held in **Saint Petersburg, Russia** in 2013. The team secured 25th position among Asian teams and 1st among other Indian Teams.
 7. Served as an Examiner for many Ph.D theses of IIT Bombay, IIT Dhanbad, IIT Mandi, MNIT Jaipur, MNIT Allhabad, NIT Trichy and Anna University.
 8. Served as a Foreign Examiner for five Ph.D theses of Faculty of Computing and Informatics, Multimedia University, MALAYSIA.
 9. Delivered Invited Talks (more than 100), many places in India and Nine in abroad.
 10. Selection Committee member for **Department of Computer Science and Engineering, NIT Uttarakhand**, May 2014.
 11. Attended Preliminary Design Review (PDR part 1) Committee meeting as a member to evaluate a project entitled “Design and Development of Submarine Periscope” at **Instrumentation Research and Development Establishment (IRDE), DRDO, Dehradun**, February 2015.
 12. Conducted a Ph.D viva (through Video conferencing) of Dr. Sreeramula Sankariah, **Faculty of Information and Communication Engineering, Multimedia University, Cyberjaya Campus, Malaysia** on “Performance Optimization of Real-Time Video Processing Multicore Architecture” in April 2015.
 13. Attended Preliminary Design Review (PDR part 2) Committee Meeting as a member to evaluate a project entitled “Design & Development of Submarine Periscope” at **Instrumentation Research and Development Establishment (IRDE), DRDO, Dehradun** on 18th August 2015.
 14. Attended Design Review Committee Meeting as a member to evaluate a project at **Instrumentation Research and Development Establishment (IRDE), DRDO, Dehradun** on 5th October 2015.
 15. **Convener, International Conference on Computer Vision and Image Processing (CVIP 2016), IIT Roorkee, February 26-28, 2016.**
 16. Selection Committee member for **Department of Computer Science and Engineering, NIT Uttarakhand**, April 2016.
 17. **Organizing Chair, Second International Conference on Computer Vision and Image Processing and Workshop on Multimedia (CVIP-WM 2017), IIT Roorkee, September 9-12, 2017.**
 18. One of the Course coordinators in **Analysis and Applications of Document Image Processing**, A Global Initiative of Academic Networks (**GIAN**) course, IIT Roorkee, December 4-8, 2017. (other Course coordinators: Dr. Partha Pratim Roy, IIT Roorkee and Josep Llads, Computer Vision Center, Universitat Autnoma de Barcelona, SPAIN).

19. One of the Course coordinators in **Machine Learning & its Applications**, E&ICT Academy course, IIT Roorkee, February 01-05, 2018 (other Course coordinator: Dr. Partha Pratim Roy, IIT Roorkee).
20. One of the Expert members of Two days Curriculum Development Workshop in **the Department of Computer Science and Engineering, NIT Uttarakhand** during February 17-18, 2018.
21. One of the coordinators in the **Workshop on Computer Vision and Image Processing**, (Sponsored by E&ICT Academy course and Mathworks), IIT Roorkee, March 09-11, 2018 (other coordinator: Dr. Partha Pratim Roy, IIT Roorkee).
22. One of the coordinators in the **Workshop on Machine Learning and Its Applications**, (Sponsored by Institute Computer Centre), IIT Roorkee, April 18-20, 2018 (other coordinators: Dr. Navneet Kumar Gupta and Dr. Partha Pratim Roy, IIT Roorkee).
23. Served as an External Expert for Thesis Proposal Seminar of a PhD student at **IIT Ropar** on 20th August 2018.
24. One of the Course coordinators in **Document Image Processing and its Applications**, E&ICT Academy course, IIT Roorkee, September 04-08, 2018 (other Course coordinator: Dr. Partha Pratim Roy, IIT Roorkee).
25. **Organizing Chair, Third International Conference on Computer Vision and Image Processing (CVIP 2018), IIIT-DM Jabalpur, September 29-October 01, 2018.**
26. One of the Course coordinators in **Imaging Application through MATLAB**, E&ICT Academy course, IIT Roorkee, October 09-13, 2018 (other Course coordinator: Dr. Partha Pratim Roy, IIT Roorkee).
27. One of the Course coordinators in **Machine Learning & Its Applications**, E&ICT Academy course, IIT Roorkee, October 27-31, 2018 (other Course coordinator: Dr. Partha Pratim Roy, IIT Roorkee).
28. Represented IIT Roorkee for the **National Conference of Directors of Computer Centres in Central Universities, IITs, IIMs, IISERs, and NITs** during November 15-17, 2018 held at Banaras Hindu University, Varanasi.
29. Conducted a Workshop on **Human Behavior Analysis based on Video Analytics and Deep Learning** as a part of *15th IEEE International Conference on Advanced Video and Signal-based Surveillance (AVSS'18)*, 27-30 November 2018, Auckland, New Zealand (Other Workshop Coordinator: Dr. Maheshkumar H. Kolekar, IIT Patna).
30. Selection Committee member for **Department of Computer Science and Engineering, NIT Delhi**, 13th December 2018.
31. One of the Course coordinators in **Winter Course on Artificial Intelligence and Machine Learning**, E&ICT Academy course through NKN, IIT Roorkee, IIT Guwahati, IIITDM Jabalpur, NIT Patna and MNIT Jaipur with 943 participants during December 17-21, 2018 (other Course coordinator: Dr. Partha Pratim Roy, IIT Roorkee).
32. Represented IIT Roorkee in a high level meeting in the **Ministry of Home Affairs (Internal Security - I Division), New Delhi** to discuss about the high-tech products required by security agencies of the country, 26th December 2018.
33. Attended Research Advisory Committee Meeting as a member of Electronics and ICT Academy at **IIIT-DM, Jabalpur** on 14th February 2019.
34. Attended Academic Committee Meeting as a special invitee of Electronics and ICT Academy, **IIIT-DM, Jabalpur** on 14th February 2019.

35. One of the Course coordinators in **Digital Image Processing using MATLAB**, E&ICT Academy course, IIT Roorkee, February 18-22, 2019 (other Course coordinator: Dr. Partha Pratim Roy, IIT Roorkee).
36. Acted as a Single Point of Contact (SPOC) and conducted Grand Finale of **Smart India Hackathon, Software Edition** at the nodal Centre, IIT Roorkee where the event happened in 48 centres across the country during March 2-3, 2019.
37. Served as an External Expert for Thesis Proposal Seminar of a PhD student at **IIT Ropar** on 8th March 2019 (through Skype).
38. One of the Course coordinators in **Image Processing using VLSI Architectures**, E&ICT Academy course, IIT Roorkee, March 26-30, 2019 (other Course coordinators: Dr. Brajesh Kumar Kaushik and Dr. Partha Pratim Roy, IIT Roorkee).

ADMINISTRATIVE RESPONSIBILITIES (DEPARTMENT AND INSTITUTE)

1. Deputy Superintend of Examinations, Nov. 2004.
2. Department Research Committee (DRC) Member, 2006-08, 2012-13 (Dept. of Mathematics), 2013-15 (Dept. of Computer Science and Engineering)
3. Academic Programme Committee (DRC (APC), MCA Programme) Member, 2006 to 2015.
4. Secretary, Department Faculty Board (DFB), January 2007 - June 2009.
5. Course Coordinator, MCA II year, 2007-08, 2009-10, 2010-11 and 2011-12.
6. Course Coordinator, MCA I year, 2008-09, 2011-12, 2012-13 and 2013-14.
7. Department Academic Committee Member (Formerly Under Graduate Committee), 2008-10 and 2010-12.
8. Deputy Coordinator, Mathematics I (MA 101), B. Tech, 2007-08, 2009-10.
9. Coordinator, Summer Term Course Mathematics I (MA 101), B. Tech, 2007-08.
10. O.C. Garden, Dept. of Mathematics, IIT Roorkee, July 2009 to April 2012.
11. Faculty Advisor, Cognizance 2010 and 2011 (Technical Festival), Dept. of Mathematics, IIT Roorkee.
12. Joint Secretary, IEEE Uttarakhand Subsection, July 2010 to March 2013.
13. Member, Board of SRIC, IIT Roorkee, March 2011 to December 2016.
14. Chairman, Department Website Committee, IIT Roorkee, March 2011 to September 2013.
15. Coordinator, Summer Term Course Computer Systems and Programming (EC-101 A), B.Tech 2010-11 and 2011-12.
16. Coordinator, MCA III year, Industrial Project, IIT Roorkee, 2011-12.
17. Department FIST, DST committee member, IIT Roorkee, 2011-12
18. O.C. Training and Placement, Dept. of Mathematics, IIT Roorkee, April 2012 to Sep 2013.
19. Department Anti Ragging Committee member, IIT Roorkee, 2012-13.
20. Presiding Officer, SAC Elections, Azad Bhawan, IIT Roorkee, 2012-13.
21. Institute Strategy Committee member, IIT Roorkee, January 2013 to December 2016.
22. Course Coordinator, M.Sc Final year, IIT Roorkee, 2012-13.

23. Secretary, IEEE Uttarakhand Subsection, March 2013 to January 2018.
24. Course Coordinator, MCA III year, 2012-13
25. Institute Research Committee member, Department of Computer Science and Engineering, October 2013 to October 2015.
26. Faculty Coordinator, CodeChef, IIT Roorkee Chapter.
27. Faculty Coordinator, B. Tech II Year, 2014-15.
28. Institute Panel of Chairpersons for Screening and Selection committees for the recruitment of Project/Research staff under Sponsored Research and Consultancy Projects, January 2015 to December 2015.
29. **Head, Institute Computer Centre, IIT Roorkee, February 2015 onwards**
30. Chairman, Department Purchase Committee, February 2015 onwards.
31. O.C. Seminar, Dept. of Computer Science and Engineering, IIT Roorkee, February 2015 to January 2017.
32. **Faculty In-charge, Communications, IIT Roorkee, May 2016 onwards**
33. Chairman, Department Research Committee, October 2016 to October 2018.
34. O.C. Research Scholar, Department Research Committee, November 2016 to May 2018.

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