

Dr. Rajarshi Pal

Assistant Professor

Institute for Development and Research in Banking Technology (IDRBT)

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Date of Birth: November 5, 1982

Research Interests: Image Processing, Biometrics, Cyber Security

Courses Taught: Image Processing, Soft Computing, Database Management System, Information Security, Cyber Security, Web Technologies

Organized Executive Development Programs (for Banks) on: Cyber Defence, Website Security, Secure Web Application Development, Banking Technology, Robotic Process Automation

Educational Qualification:

- B. Tech. (Information Technology), Kalyani Govt. Engineering College (Affiliated to University of Kalyani), India (2004).
- M. E. (Software Engineering), Jadavpur University, Kolkata, India (2006).
- Ph. D. (Computer Science and Engineering), Indian Institute of Technology, Kharagpur, India (2011). Ph. D. Thesis, “Modeling and Application of Visual Saliency” (Supervisors: Prof. Jayanta Mukhopadhyay and Prof. Pabitra Mitra)

Professional Experience:

- Research Associate, Center for Soft Computing Research, Indian Statistical Institute, Kolkata, India (December 2010 – August 2011)
- Assistant Professor, Institute for Development and Research in Banking Technology, Hyderabad, India (August 2011 – till date)

Externally Funded Project:

Project Title: Hardware Trojan Detection in PCBs Using X-Ray Images

Funding Agency: Defence Research and Development Organization, Government of India

Duration: 3 Years [December, 2019 – December, 2022]

Principal Investigator: Dr. Rajarshi Pal, Assistant Professor, Institute for Development and Research in Banking Technology (IDRBT), Hyderabad, India

Co-Investigator: Prof. Ashish Ghosh, Professor & Head, Machine Intelligence Unit, Indian Statistical Institute, Kolkata, India

Sanctioned Budget: 63.38 Lakhs INR

Consultancy Activities:

- Bank of Maharashtra (May 2017, - June, 2018): [Responsibility: Review of IT and Cyber Security activities of the Bank]
- Karur Vysya Bank (January, 2018 – February, 2018): [Responsibility: Helping the bank in SOC sizing and providing use cases]
- Allahabad Bank (July, 2018 – June, 2019): [Responsibility: Review of IT and Cyber Security activities of the Bank]
- Karur Vysya Bank (September, 2018 – November, 2018): [Responsibility: Review of Information Security control environment at the Bank]
- SREI Equipment Finance Ltd (November, 2019 – December, 2019): [Responsibility: Review of Information Technology Policy and Information Security Policy of the bank]
- Telangana Grameena Bank (May, 2020 – till date): [Responsibility: Review of IT and Cyber Security activities of the Bank]

Professional Activities:

- Reviewer of following Journals:
 - IEEE Transactions on Information Forensics and Security
 - IEEE Access
 - IEEE Geoscience and Remote Sensing Letters
 - Pattern Recognition Letters (Elsevier)
 - Journal of Visual Communication and Image Representation (Elsevier)
 - Journal of Information Security and Applications (Elsevier)
 - Multimedia Tools and Applications (Springer)
 - Soft Computing (Springer)
 - IET Computer Vision

- IET Image Processing
 - IETE Technical Review
 - Sadhana (Indian Academy of Sciences)
- Advisory Committee Member for
 - 6th International Trade Fair and Conference on Banking Technology, Equipment & Services (IBEX 2018) held at Mumbai, India on February 2018.
 - Sixth International Conference on Mining Intelligence and Knowledge Exploration (MIKE 2018) held at Cluj-Napoca, Romania on December, 2018.
 - 7th International Trade Fair and Conference on Banking Technology, Equipment & Services (IBEX 2019) held at Mumbai, India on January 2019.
 - Seventh International Conference on Mining Intelligence and Knowledge Exploration (MIKE 2019) held at Goa, India on December, 2019.
- Technical Program Committee Member for
 - 5th International Conference on Pattern Recognition and Machine Intelligence (PReMI 2013) held at Indian Statistical Institute, Kolkata on December 2013.
 - 1st International Conference on Mining Intelligence and Knowledge Exploration (MIKE 2013) held at Virudhnagar, Tamilnadu, India on December 2013.
 - 2nd International Conference on Advanced Computing, Networking and Informatics (ICACNI 2014) held at Kolkata, India on June 2014.
 - 2nd International Conference on Mining Intelligence and Knowledge Exploration (MIKE 2014) held at Cork, Ireland on December 2014.
 - Special Track on Bio-Inspired Machine Vision at 8th International Conference on Bio-Inspired Information and Communication Technologies (BICT 2014) held at Boston, Massachusetts, United States on December 2014.
 - Eighth International Conference on Advances in Pattern Recognition (ICAPR 2015) held at Indian Statistical Institute, Kolkata on January 2015.
 - 3rd International Conference on Advanced Computing, Networking and Informatics (ICACNI 2015) held at Bhubaneswar, India on June 2015.
 - 4th International Conference on Advances in Computing, Communications and Informatics (ICACCI 2015) held at Kochi, India on August 2015.
 - 3rd International Conference on Mining Intelligence and Knowledge Exploration (MIKE 2015) held at Hyderabad, India on December, 2015.
 - 12th IEEE India International Conference (Indicon 2015) held at New Delhi, India on December, 2015.
 - International Conference on Computer Vision and Image Processing (CVIP 2016) held at IIT Roorkee, India on February 2016.
 - 5th International Conference on Advances in Computing, Communications and Informatics (ICACCI 2016) held at Jaipur, India on September 2016.

- 3rd International Conference on Next Generation Computing Technologies (NGCT 2017) held at Dehradun, India on October 2017.
 - 7th International Conference on Advances in Computing, Communications, and Informatics (ICACCI 2018) held at Bangalore, India on September, 2018.
 - Fourth International Conference on Signal Processing and Intelligent Recognition Systems (SIRS 2018) held at Bangalore, India on September, 2018.
 - 10th International Conference on Advances in Information Technology (IAIT 2018) held at Bangkok, Thailand on December, 2018.
 - IEEE International Conference on Advanced Networks and Telecommunications Systems (IEEE ANTS 2018), held at Indore, India on December, 2018.
 - 11th Indian Conference on Computer Vision, Graphics, and Image Processing (ICVGIP 2018) held at Hyderabad, India on December, 2018.
 - Sixth International Conference on Mining Intelligence and Knowledge Exploration (MIKE 2018) held at Cluj-Napoca, Romania on December, 2018.
 - Second International Conference on Advanced Computational and Communication Paradigms (ICACCP 2019) held at Sikkim, India on February, 2019.
 - 8th International Conference on Pattern Recognition and Machine Intelligence (PREMI 2019) held at Tezpur, India on December, 2019.
 - 11th International Conference on Advances in Information Technology (IAIT 2020) to be held at Bangkok, Thailand on July 2020.
- Also reviewer of articles for
 - 5th IEEE International Congress on Image and Signal Processing held in Chongqing, China on October, 2012.
 - 4th International Conference on Intelligent Human Computer Interaction held at Indian Institute of Technology, Kharagpur on December, 2012.
 - 9th Indian Conference on Computer Vision, Graphics, and Image Processing (ICVGIP 2014) held at Indian Institute of Science, Bangalore on December, 2014.
 - 10th Indian Conference on Computer Vision, Graphics, and Image Processing (ICVGIP 2016) held at Indian Institute of Technology, Guwahati on December, 2016.
 - 7th International Conference on Pattern Recognition and Machine Intelligence (PREMI 2017) held at Indian Statistical Institute, Kolkata on December 2017.
 - Workshop on Advances in Image Processing, Computer Vision, Pattern Recognition and Machine Intelligence (ICPM 2018) held at Bangalore, India on September, 2018.
 - Twenty Fifth National Conference on Communications (NCC 2019) held at IISc Bangalore, India, February 20-23, 2019.
 - Publication Chair/Publication Committee Member for
 - 10th International Conference on Information Systems Security (ICISS 2014) held at IDRBT, Hyderabad, India on December 2014.

- Second International Conference on Computer Vision & Image Processing & Workshop on Multimedia (CVIP-WM 2017) held at Noida, India on September 2017.
- Organizing Chair/Organizing Committee Member for
 - 5th International Conference on Fuzzy and Neural Computing (FANCCO 2015) held at IDRBT, Hyderabad, India on December 2015.
 - 5th International Conference on Mining Intelligence and Knowledge Exploration (MIKE 2017) to be held at IDRBT, Hyderabad on December, 2017

Publications:

Edited Book

- R. Pal, “Innovative Research in Attention Modeling and Computer Vision Applications”, IGI Global, October 2015.

Peer-reviewed Book Chapters

- R. Pal, “Applications of visual attention in image processing, computer vision, and graphics”, Innovative Research in Attention Modeling and Computer Vision Applications (R. Pal eds.), IGI Global, pages 45-68, October 2015.
- R. Pal and P. C. Tripathi, “Content-aware image retargeting: a survey”, Innovative Research in Attention Modeling and Computer Vision Applications (R. Pal eds.), IGI Global, pages 115-131, October 2015.
- R. Pal, “Computational models of visual attention: a survey”, Recent Advances in Computer Vision and Image Processing: Methodologies and Applications (R. Srivastava, S. K. Singh, and K. K. Shukla eds.), IGI Global, pages 54-76, September 2013.
- R. Pal, S. K. Pal, and A. Ghosh “Video summarization and significant of content: a review”, In: Handbook on Soft Computing for Video Surveillance (S. K. Pal, A. Petrosino, L. Maddalena eds.), Chapman & Hall/CRC, pages 79-107, January 2012.

Peer-reviewed Journals

- P. Dansena, R. Pal and S. Bag, “Quantitative Assessment of Capabilities of Colour Models for Pen Ink Discrimination in Handwritten Documents”, IET Image Processing, vol. 14, issue 8, pages 1594-1604, June 2020.
- R. Uyyala, R. Pal and M. V. N. K. Prasad, “Reversible data hiding using b-tree triangular decomposition based prediction”, IET Image Processing, vol. 13, issue 11, pages 1986-1997, October 2019.

- R. Pal, A. Mukherjee, P. Mitra and J. Mukherjee, “Modelling visual saliency using degree centrality, IET Computer Vision, vol. 4, issue 3, pages 218-229, September 2010.

Conference Papers:

- R. Uyyala and R. Pal, “Reversible Data Hiding with Selected Directional Context Based Prediction Using 8-Neighborhood”, In: Proc. of 6th International Conference on Electronics, Computing, and Communication Technologies, Bangalore, India (to be held in July 2020).
- A. Bhandari, S. Sharma, R. Uyyala, R. Pal, and M. Verma, “Reversible Data Hiding Using Multi-Layer Perceptron Based Pixel Prediction”, In: Proc. of 11th International Conference on Advances in Information Technology, Bangkok, Thailand (to be held in July 2020).
- R. Uyyala and R. Pal, “Reversible data hiding using improved gradient based prediction and adaptive histogram bin shifting”, In: Proc. of 7th International Conference on Signal Processing and Integrated Networks, pages 720-726, Noida, India, February 2020.
- S. Ahmad, R. Pal, and A. Ganivada, “Rank level fusion of multimodal biometrics based on cross-entropy monte-carlo method”, In: Proc. of Fifth International Conference on Signal Processing and Intelligent Recognition Systems, Trivandrum, India, December 2019.
- P. Dansena, R. Pramanik, S. Bag, and R. Pal, “Ink analysis using CNN-based transfer learning to detect alteration in handwritten words”, In: Proc. of Fourth International Conference on Computer Vision and Image Processing, pages 223-232, Jaipur, India, September 2019.
- K. Suresh, R. Pal, and S. R. Balasundaram, “Fingerprint based cryptographic key generation” In: Proc. of International Conference on Intelligent Data Communication Technologies and Internet of Things, pages 704-713, Coimbatore, India, August 2019.
- A. Tiwari and R. Pal, “Gaze-based graphical password using webcam”, In: Proc. of 14th International Conference on Information Systems Security (ICISS 2018), pages 448-461, Bangalore, India, December 2018.
- R. Pal and N. Chowdary, “Statistical profiling of n-grams for payload based anomaly detection for HTTP web traffic”, In: Proc. of IEEE International Conference on Advanced Networks and Telecommunications Systems (IEEE ANTS 2018), pages 1-6, Indore, India, December 2018.
- S. Ahmad, L. M. Sangavarapu, R. Pal and Y. R. Reddy, “Rank aggregation approach for identifying critical information infrastructure”, In: Proc. of 7th International Conference on Advances in Computing, Communications, and Informatics (ICACCI 2018), pages 1328-1333, Bangalore, India, September 2018.
- R. Uyyala and R. Pal, “Reversible data hiding based on the random distribution of reference pixels”, In: Proc. of IEEE Region Ten Symposium (TenSymp 2018), Sydney, Australia, July 2018.

- P. Dansena, S. Bag and R. Pal, “Differentiating pen inks in hand-written bank cheques using multi-layer perceptron”, In: Proc. of 7th International Conference on Pattern Recognition and Machine Intelligence (PReMI 2017), pages 65-663, Kolkata, India, December 2017. (Received the Springer Student Award for this Paper)
- A. Prabhakaran and R. Pal, “Image pixel prediction from neighborhood pixels using multi-layer perceptron”, In: Proc. of 7th International Conference on Soft Computing for Problem Solving, vol. 2, pages 221-230, Bhubaneswar, India, December 2017. (Received the Best Student Paper Award)
- D. Roy and R. Pal, “Enhancing saliency of a target object through color modification of every object using genetic algorithm”, In: Proc. of 7th International Conference on Soft Computing for Problem Solving, vol. 2, pages 771-779, Bhubaneswar, India, December 2017.
- R. Pal and D. Roy, “Enhancing Saliency of an Object Using Genetic Algorithm”, In: Proc. Of 14th Conference on Computer and Robot Vision, Edmonton, Canada, May 2017.
- P. C. Tripathi and R. Pal, “Content-Aware Image Retargeting with Controlled Distortion for Small Displays”, In: Proc. of 5th International Conference on Advances in Computing, Communications, and Informatics, Jaipur, India, September 2016.
- A. Gorai, R. Pal, and P. Gupta, “Document fraud detection by ink analysis using texture features and histogram matching”, In: Proc. of International Joint Conference on Neural Networks, Vancouver, Canada, July 2016.
- R. Uyyala, M. V. N. K. Prasad, and R. Pal, “Selected context dependent prediction for reversible watermarking with optimal embedding”, In: Proc. of International Conference on Computer Vision and Image Processing, Roorkee, India, February 2016.
- R. Uyyala, R. Pal, and M. V. N. K. Prasad, “Gradient dependent reversible watermarking with low embedding impact”, In: Proc. of 3rd International Conference on Signal Processing and Integrated Networks, Noida, India, February 2016.
- A. Ali and R. Pal, “Detection and extraction of pantograph region from bank cheque images”, In: Proc. of 3rd International Conference on Signal Processing and Integrated Networks, Noida, India, February 2016.
- R. K. Kumar and R. Pal, “Constrained maximization of saliency of intended objects for guiding attention”, In: Proc. of Annual IEEE India Conference (IEEE INDICON), pages 1-6, New Delhi, India, December 2015.
- P. Dansena, K. P. Kumar, and R. Pal, “Line based extraction of important regions from a cheque image”, In: Proc. of Eighth International Conference on Contemporary Computing, pages 183-189, Noida, India, August 2015.

- R. P. Sharma and R. Pal, "Saliency based image steganography with varying base SDS and multi-objective genetic algorithm", In: Proc. of 4th International Conference on Advances in Computing, Communications, and Informatics, pages 1966-1974, Kochi, India, August 2015.
- M. Tejawat and R. Pal, "Detecting tampered cheque images using difference expansion based watermarking with intelligent pairing of pixels", In: Proc. of 3rd International Conference on Advanced Computing, Networking and Informatics, pages 631-641, Bhubaneswar, India, June 2015.
- K. Rakesh and R. Pal, "Detecting background line as a pre-processing for offline signature verification", Proc. of 2nd International Conference on Mining Intelligence and Knowledge Exploration, LNCS – 8891, pages 164-171, Cork, Ireland, December 2014.
- S. Kota and R. Pal, "Detecting tampered cheque images in cheque truncation system using difference expansion based watermarking", Proc. of 4th IEEE International Advance Computing Conference, pages 1041-1047, Gurgaon, India, February 2014.
- M. Rajender and R. Pal, "Detection of manipulated cheque images in cheque truncation system using mismatch in pixels", Proc. of 2nd International Conference on Business and Information Management, pages 30-35, Durgapur, India, January 2014.
- C. Balakrishna, V. Naveenchandra, and R. Pal, "Image steganography using single digit sum with varying base", Proc. of IEEE International Conference on Electronics, Computing and Communication Technologies, pages 1-5, Bangalore, India, January 2014.
- C. Balakrishna, V. Naveenchandra, and R. Pal, "Image steganography using generalized base single digit sum (GB-SDS)", Proc. of IEEE INDICON, pages 1-4, Mumbai, India, December 2013.
- R. Pal, J. Mukherjee, and P. Mitra, "How do warm colors affect visual attention?", Proc. of ICVGIP, Mumbai, India, December 2012.
- R. Pal, P. Mitra, and J. Mukherjee, "Image retargeting using controlled shrinkage", Proc. of ICVGIP, Mumbai, India, December 2012. • R. Pal, P. Mitra, and J. Mukhopadhyay, "Generation of groundtruth data for visual saliency experiments using image segmentation", In: Proc. of 5th IEEE International Congress on Image and Signal Processing, pages 889-893, Chongqing, China, October 2012.
- R. Pal, P. Mitra, and J. Mukhopadhyay, "Suitable features for visual saliency computation in monochrome images", In: Proc. of 4th IEEE International Congress on Image and Signal Processing, pages 1457-1460, Sanghai, China, October 2011.

- R. Pal, J. Mukhopadhyay, and P. Mitra, “Image retargeting through constrained growth of important rectangular partitions”, Proc. of 4th International Conference on Pattern Recognition and Machine Intelligence, LNCS – 6744, pages 104-109, Moscow, Russia, June 2011.
- R. Pal, S. Mazumder, and S. Chattopadhyay, “DIMM: framework for interoperability of datacentric mobile middlewares”, Proc. of IEEE 2nd International Advance Computing Conference, pages 236-239, Patiala, India, February 2010.
- R. Pal, P. Mitra, and J. Mukherjee, “Visual saliency and node centrality measures”, Proc. of National Conference on Computer Vision, Pattern Recognition, Image Processing and Graphics, Jaipur, India, January 2010.
- A. Sur, S. S. Sagar, R. Pal, P. Mitra, and J. Mukhopadhyay, “A new image watermarking scheme using saliency based visual attention model”, Proc. of IEEE Indicon, pages 1-4, Gandhinagar, India, December 2009.
- R. Pal, J. Mukherjee, and P. Mitra, “An approach for preparing groundtruth data and evaluating visual saliency models”, Proc. of 3rd International Conference on Pattern Recognition and Machine Intelligence, LNCS – 5909, pages 279-284, New Delhi, India, December 2009.
- R. Pal, P. Mitra, and J. Mukhopadhyay, “ICam: maximizes viewers attention on intended objects”, Proc. of Pacific Rim Conference on Multimedia, LNCS – 5353, pages 821-824, Tainan, Taiwan, December 2008.
- R. Pal, P. Mitra, and J. Mukherjee, “Visual saliency-based theme and aspect ratio preserving image cropping for small displays”, In: Proc. of National Conference on Computer Vision, Pattern Recognition, Image Processing and Graphics, pages 89-92, Gandhinagar, India, January 2008.

Other Articles:

- R. Pal and V. Naveenchandra, “A framework of digital cheque: a prospect in payment system in India”, The Indian Banker, vol. I, issue 5, pages 28-32, December 2013.