

# Academic Resume of Swagatam Das

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## Summary of Working Experience

- August, 2012 – Present, Assistant Professor (permanent) at Electronics and Communication Sciences Unit, Indian Statistical Institute, Kolkata, India.
- August, 2011 – August, 2012 Assistant Professor (visiting) at Electronics and Communication Sciences Unit, Indian Statistical Institute, Kolkata, India.
- June, 2006 – July, 2011: Assistant Professor at the Dept. of Electronics and Telecommunication Engineering in the Jadavpur University, Kolkata, India.
- July, 2005 – May, 2006: Lecturer in the Netaji Subhash College of Engineering, Garia, Kolkata, India.

## List of Selected Publications

### Research Fields of Interest:

- Evolutionary Computing
- Swarm Intelligence
- Bio-inspired Communications
- Artificial Intelligence and multi-agent systems

### I) Monographs, Edited Volumes and Conference Proceedings:

1. Bijaya K. Panigrahi, Swagatam Das, Ponnuthurai Nagarathnam Suganthan, Pradipta Kumar Nanda (Eds.): Swarm, Evolutionary, and Memetic Computing - Third International

Conference, SEMCCO 2012, Bhubaneswar, India, December 20-22, 2012. Proceedings. Lecture Notes in Computer Science 7677, Springer 2012, isbn 978-3-642-35379-6

2. B. K. Panigrahi, P. N. Suganthan, Swagatam Das, S. C. Satapathy (Eds.): Swarm, Evolutionary, and Memetic Computing - Second International Conference, SEMCCO 2011, Visakhapatnam, Andhra Pradesh, India, December 19-21, 2011, Proceedings, Part I. Lecture Notes in Computer Science 7076, Springer 2011, isbn 978-3-642-27171-7.
3. B. K. Panigrahi, P. N. Suganthan, Swagatam Das, S. C. Satapathy (Eds.): Swarm, Evolutionary, and Memetic Computing - Second International Conference, SEMCCO 2011, Visakhapatnam, Andhra Pradesh, India, December 19-21, 2011, Proceedings, Part II. Lecture Notes in Computer Science 7077, Springer 2011, isbn 978-3-642-27241-7.
4. Kalyanmoy Deb, Varun Aggarwal, Arnab Bhattacharya, Nirupam Chakraborti, Partha Chakroborty, Swagatam Das, Joydeep Dutta, Santosh K. Gupta, and Ashu Jain (Eds.), Proceedings of the *Eighth Simulated Evolution and Learning (SEAL-2010) Conference*, Lecture Notes in Computer Science (LNCS), Springer.
5. Y. Shi, M. H. Lim, B. K. Panigrahi, Swagatam Das, S. S. Dash, and P. N. Suganthan (Eds.), Proceedings of the *First International Conference on Swarm and Evolutionary Computation (SEMCCO 2010)*, Lecture Notes in Computer Science (LNCS), Springer.
6. B. K. Panigrahi, Ajith Abraham, and Swagatam Das (Eds.), *Computational Intelligence in Power Systems*, Studies in Computational Intelligence, Vol. 302, Springer, 2010.
7. Swagatam Das, Ajith Abraham and Amit Konar, *Metaheuristic Clustering*, Studies in Computational Intelligence, Volume 178, Springer Verlag, Germany, 2009.

## II) Refereed International Journal Articles (Accepted/Published):

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1. **Swagatam Das**, Subhodip Biswas, and Souvik Kundu, "Synergizing fitness learning with proximity-based food source selection in artificial bee colony algorithm for numerical optimization", *Applied Soft Computing* (Impact Factor 2.140), Accepted, 2013.
2. Soham Sarkar and **Swagatam Das**, "Multi-level image thresholding based on two-dimensional histogram and maximum tsallis entropy - a differential evolution approach", *IEEE Transactions on Image Processing* (Impact Factor 3.199), Accepted, 2013.
3. **Swagatam Das**, Ankush Mandal, and Rohan Mukherjee, "An adaptive differential evolution algorithm for global optimization in dynamic environments", *IEEE Transactions on Cybernetics* (2011 Impact Factor 3.08), Accepted, 2013.
4. Aniruddha Basak, **Swagatam Das**, and Kay Chen Tan, "Multimodal optimization using a bi-objective differential evolution algorithm enhanced with mean distance based selection", *IEEE Transactions on Evolutionary Computation* (Impact Factor 4.81), 2013 (in Press).
5. Arkabandhu Chowdhury, Arnab Ghosh, **Swagatam Das**, Avishek Ghosh, "A novel genetic algorithm to solve travelling salesman problem and blocking flow shop scheduling problem", *International Journal of Bio-inspired Computing* (Impact Factor 1.315), 2013 (in Press).

6. Aniruddha Basak, Dipankar Maity, and **Swagatam Das**, "A differential invasive weed optimization algorithm for improved global numerical optimization", *Applied Mathematics and Computation* (Impact Factor 1.317), Elsevier, 219(12): 6645-6668 (2013).
7. B. -Y Qu, P. N. Suganthan, and **Swagatam Das**, "A distance-based locally informed particle swarm model for multi-modal optimization", *IEEE Trans on Evolutionary Computation* (Impact Factor 4.81), Vol. 17, No. 3, pp. 387- 402, 2013.
8. Pratyusha Rakshit, Amit Konar, Pavel Bhowmik, **Swagatam Das**, Lakhmi C. Jain, and Atulya K. Nagar, "Realization of an adaptive memetic algorithm using differential evolution and Q-learning: a case study in multi-robot path-planning", *IEEE Transactions on Systems, Man and Cybernetics: Systems* (2011 Impact Factor 2.123), Vol. 43, No. 4, pp. 814 – 831, (Impact Factor 2.123), Jul. 2013.
9. Udit Halder, **Swagatam Das**, and Dipankar Maity, "A cluster-based differential evolution algorithm with external archive for optimization in dynamic environments", *IEEE Transactions on Cybernetics* (2011 Impact Factor 3.08), Vol. 43, No. 3, pp. 881 – 897, 2013.
10. Md. Nasir, **Swagatam Das**, Soumyadip Sengupta, Athanasios V. Vasilakos, and Witold Pedrycz, "An evolutionary multi-objective sleep scheduling scheme for differentiated coverage in wireless sensor networks", *IEEE Transactions on Systems, Man and Cybernetics (SMC) Part – C*, (Impact Factor 2.105), 42(6): 1093-1102, (2012).
11. Pradipta Ghosh, **Swagatam Das**, and Hamim Zafar, "Adaptive differential evolution based design of two-channel quadrature mirror filter banks for sub-band coding and data transmission", *IEEE Transactions on Systems, Man, and Cybernetics, Part - C*, (Impact Factor 2.105) 42(6): 1613-1623 (2012).
12. Soumyadip Sengupta, **Swagatam Das**, Md. Nasir, and B. K. Panigrahi, "Multi-objective node deployment in WSNs: In search of an optimal trade-off among coverage, lifetime, energy consumption, and connectivity", *Engineering Applications of Artificial Intelligence*, (Impact Factor 1.844), 26(1): 405-416 (2013).
13. Soumyadip Sengupta, **Swagatam Das**, Md. Nasir and P. N. Suganthan, "Risk minimization in biometric sensor networks – an evolutionary multi-objective optimization approach", *Soft Computing, Springer*, (Impact Factor 1.880), 17(1): 133-144 (2013).
14. **Swagatam Das**, Rammohan Mallipeddi, and Dipankar Maity, "Adaptive Evolutionary Programming with p-best Mutation Strategy", *Swarm and Evolutionary Computation*, Elsevier, Vol. 9, Pages 58–68, April 2013.
15. Subhrajit Roy, Sk. Minhazul Islam, **Swagatam Das**, Saurav Ghosh, and A. V. Vasilakos, "A simulated weed colony system with sub-regional differential evolution for multimodal optimization", *Engineering Optimization*, (Impact Factor 0.922), Taylor and Francis, Vol. 45, Issue 4, 2013.
16. **Swagatam Das**, Udit Halder, and Dipankar Maity, "Chaotic dynamic characteristics of social foraging swarms – an analysis", *IEEE Transactions on Systems, Man and*

*Cybernetics (SMC) Part – B*(Impact Factor 3.08), Vol 42, No. 4, pp. 1288 - 1293, Aug. 2012.

17. Md. Nasir, D. Maity, **Swagatam Das**, S. Sengupta, U. Haldar, and P. N. Suganthan, "A dynamic neighborhood learning based particle swarm optimizer for global numerical optimization," *Information Sciences*, (Impact Factor 3.643), Vol. 209, 20 Pages 16–36, Nov. 2012.
18. Subhrajit Roy, Sk. Minhazul Islam, **Swagatam Das**, and Saurav Ghosh, "Multimodal optimization by niching weed colonies enhanced with localized group search optimizers", *Applied Soft Computing*, Vol. 13, No. 1, pp. 27 - 46, 2013.
19. Tribeni P. Banerjee and **Swagatam Das**, "A support vector machine based multi-sensor data fusion for motor fault detection", *Information Sciences*, (Impact Factor 3.643), Vol. 217, Pages 96–107, Dec. 2012.
20. Sk. Minhazul Islam, **Swagatam Das**, Saurav Ghosh, Subhrajit Roy, and P. N. Suganthan, "An adaptive differential evolution algorithm with novel mutation and crossover strategies for global numerical optimization", *IEEE Transactions on Systems, Man and Cybernetics (SMC) Part – B* (Impact Factor 3.08), 42(2): 482 -500, 2012.
21. Sayan Ghosh, **Swagatam Das**, A. V. Vasilakos, and Kaushik Suresh, "On convergence of differential evolution over a class of continuous functions with unique global optimum", *IEEE Transactions on Systems, Man and Cybernetics (SMC) Part – B*, (Impact Factor 3.08), 42(1): 107-124, 2012.
22. Sayan Ghosh, **Swagatam Das**, Debarati Kundu, Kaushik Suresh, Bijaya K. Panigrahi, Zhihua Cui, "An inertia-adaptive particle swarm system with particle mobility factor for improved global optimization", *Neural Computing and Applications*, (Impact Factor 0.699), Springer, 21(2): 237-250, 2012.
23. Aritra Chowdhury and **Swagatam Das**, "Automatic shape independent clustering inspired by ant dynamics", *Swarm and Evolutionary Computation*, Elsevier, Vol. 3, pp. 33 - 45, April, 2012.
24. **Swagatam Das** and Meng Hiot Lim, "Guest Editorial: Special Issue on Engineering Applications of Memetic Computing", *IEEE Transactions on Systems, Man, and Cybernetics, Part - C*, (Impact Factor 2.105), Vol. 42, No. 1, pp. 609 - 611, Aug. 2012.
25. Ankush Mandal, Hamim Zafar, **Swagatam Das**, and Athanasios V. Vasilakos, "a modified differential evolution algorithm for shaped beam linear array antenna design", *Progress in Electromagnetics Research (PIER)* (Impact Factor 5.298), Vol. 125, page 439-457, 2012.
26. Ankush Mandal and **Swagatam Das**, "Design of dual pattern concentric ring array antenna using differential evolution algorithm with novel evolutionary operators", *Progress in Electromagnetics Research M*, Vol. 22, 163-178, 2012.
27. Saurav Ghosh, **Swagatam Das**, Subhrajit Roy, S. K. Minhazul Islam, and P. N. Suganthan, "A differential covariance matrix adaptation evolutionary algorithm for real parameter optimization", *Information Sciences*(Impact Factor 3.643), 182(1), pp. 199-219, 2012.

28. Sayan Ghosh, **Swagatam Das**, Debarati Kundu, Kaushik Suresh, and Ajith Abraham, "Inter-particle communication and search-dynamics of *lbest* particle swarm optimizers: an analysis", *Information Sciences*(Impact Factor 3.643), 182(1), pp. 156-168, 2012.
29. Abhishek Sinha, **Swagatam Das**, and B. K. Panigrahi, "On some properties of the island biogeography system", *IEEE Transactions on Systems, Man and Cybernetics (SMC), Part – A* (Impact Factor 2.1), Vol. 41, No. 2, pp 331 – 337, 2011.
30. **Swagatam Das**, Arpan Mukhopadhyay, Anwith Roy, Ajith Abraham, and B. K. Panigrahi, "On exploratory power of the harmony search algorithm: analysis and improvements for global numerical optimization", *IEEE Transactions on Systems, Man and Cybernetics (SMC) Part – B* (Impact Factor 3.08), Vol. 41, No. 1, pp. 89 – 106, 2011.
31. **Swagatam Das** and P. N. Suganthan, "Differential evolution – a survey of the state-of-the-art", *IEEE Transactions on Evolutionary Computation* (Impact Factor 3.341), Vol. 15, No. 1, pp. 4 – 31, Feb. 2011.
32. **Swagatam Das**, Ponnuthurai Nagaratnam Suganthan, C. A. Coello Coello, "Guest Editorial - Special Issue on Differential Evolution", *IEEE Trans. Evolutionary Computation*, (Impact Factor 4.81), 15(1), pp. 1-3, 2011.
33. Gourab Ghosh Roy, **Swagatam Das**, Prithwish Chakraborty, and P. N. Suganthan, "Design of non-uniform circular antenna arrays using a modified invasive weed optimization algorithm", *IEEE Transactions on Antenna and Propagation* (Impact Factor 2.331), Vol. 59, No. 1, pp. 110 – 118, Jan. 2011.
34. **Swagatam Das**, Sayan Maity, Bo-Yang Qu, and P. N. Suganthan, "Real-parameter evolutionary multimodal optimization - a survey of the state-of-the-art", *Swarm and Evolutionary Computation*, Elsevier, Vol. 1, No. 2, pp. 71-88, June, 2011.
35. Pradipta Ghosh and **Swagatam Das**, "Synthesis of thinned planar concentric circular antenna arrays - a differential evolutionary approach", *Progress in Electromagnetics Research B*, Vol. 29, 63-82, 2011.
36. S. Roy, Sk. M. Islam, S. Ghosh, **Swagatam Das** and Ajith Abraham, "An adaptive differential evolution algorithm for autonomous deployment and localization of sensor nodes", *Progress In Electromagnetics Research B*, Vol. 29, 289 - 309, 2011.
37. S. Z. Zhao, P. N. Suganthan, **Swagatam Das**, "Self-adaptive differential evolution with multi-trajectory search for large scale optimization", *Soft Computing* (Impact Factor 1.880), Springer, Vol. 15: 2175 – 2185, 2011.
38. Prithwish Chakraborty, **Swagatam Das**, Gourab Ghosh Roy, and Ajith Abraham, "On convergence of the multi-objective particle swarm optimizers", *Information Sciences* (Impact Factor 3.643), Volume 181, Issue 8, 15 April 2011, Pages 1411-1425.
39. Arnob Ghosh, **Swagatam Das**, Aritra Chowdhury, and Ritwik Giri, "Differential Evolution with a Fitness-based Adaptation of Control Parameters", *Information Sciences* (Impact Factor 3.643), Elsevier Science, 181(18), pp. 3749-3765, 2011.

40. Arnob Ghosh, **Swagatam Das**, Aritra Chowdhury, and Ritwik Giri, “An ecologically inspired direct search method for solving optimal control problems with Bézier parameterization”, *Engineering Applications of Artificial Intelligence* (Impact Factor 1.844), Elsevier Science Vol. 24, No. 7, pp. 1195–1203, Oct. 2011.
41. V. Ravikumar Pandi, B. K. Panigrahi, Ramesh C. Bansal, **Swagatam Das**, and Ankita Mohapatra, "Economic load dispatch using hybrid swarm intelligence based harmony search algorithm", *Electric Power Components & Systems* (Impact Factor 0.681), Taylor & Francis, Volume 39, Issue 8, Pages 751 – 767, 2011.
42. Debarati Kundu, Kaushik Suresh, Sayan Ghosh, **Swagatam Das**, B. K. Panigrahi, and Sanjoy Das, “Multi-objective optimization with artificial weed colonies”, *Information Sciences* (Impact Factor 3.64), Elsevier Science, Vol. 181, Issue 12, Pages 2441-2454, June, 2011.
43. Siddharth Pal, **Swagatam Das**, and Aniruddha Basak, “Design of time modulated linear arrays with a multi-objective optimization approach”, *Progress in Electromagnetics Research, PIERB*, 23, page 83-107, 2010.
44. N. R. Samal, Amit Konar, **Swagatam Das**, and A. Nagar, “Parameter selection for a particle swarm optimization dynamics by closed loop stability analysis”, *International Journal of Computing Science and Mathematics*, Vol. 3, No.3 pp. 245 – 274, 2010.
45. V. Ravikumar Pandi, B K Panigrahi, Renu Sharma, **Swagatam Das** and Sanjoy Das, “Multiobjective bacteria foraging algorithm for electrical load dispatch problem”, *Energy Conversion and Management* (Impact Factor 2.775), Elsevier, Vol. 52, Issue 2, pp. 1334-1342, Feb. 2011.
46. V. Ravikumar Pandi, S K Sinha, B. K. Panigrahi, and **Swagatam Das**, “Optimal feature retrieval for classification of non - stationary power quality disturbances”, *International Journal of Artificial Intelligence and Soft Computing (IJASIS)*, Vol. 2, No. 3, pp. 211 – 222, 2010.
47. Siddharth Pal, Anniruddha Basak, and **Swagatam Das**, “Linear antenna array synthesis with modified invasive weed optimization algorithm”, *International Journal of Bio-inspired Computing*, Vol. 3, No.4, pp. 238 - 251, 2010.
48. B. K. Panigrahi, V. Ravikumar Pandi, Sanjoy Das and **Swagatam Das**, “Multi objective fuzzy dominance based bacterial foraging algorithm to solve economic emission dispatch problem”, *Energy* (Impact Factor 3.487), Elsevier Vol. 35, Issue 12, Pages 4761-4770, Dec. 2010.
49. Aritra Chowdhury, Arnob Ghosh, Ritwik Giri, and **Swagatam Das**, “Optimization of antenna configuration with a fitness-adaptive differential evolution algorithm”, *Progress In Electromagnetics Research B*, Vol. 26, 291-319, 2010.
50. Gourab Ghosh Roy, Prithwish Chakraborty, and **Swagatam Das**, “Designing fractional-order  $PI^{\lambda}D^{\mu}$  controller using differential harmony search algorithm”, *International Journal of Bio-inspired Computing* (Impact Factor 1.351), Vol. 2, No. 5, pp. 303-309, Oct. 2010.

51. **Swagatam Das** and Sudeshna Sil, “Kernel-induced Fuzzy Clustering of Image Pixels with an Improved Differential Evolution Algorithm”, *Information Sciences* (Impact Factor 3.64), Elsevier, Vol. 180, 8 1237-1256, Apr. 2010.
52. Siddharth Pal, Q. Boyang, **Swagatam Das**, and P. N. Suganthan, "Optimal synthesis of linear antenna arrays with multi-objective differential evolution", *Progress in Electromagnetics Research, PIERB* 21, 87-111, 2010.
53. Siddharth Pal, **Swagatam Das**, Aniruddha Basak, and P. N. Suganthan, “Synthesis of difference patterns for monopulse antennas with optimal combination of array-size and number of subarrays - a multi-objective optimization approach”, *Progress in Electromagnetics Research, PIERB*, Vol. 21, 257-280, 2010.
54. Arijit Biswas, Sambarta Dasgupta, **Swagatam Das**, and Ajith Abraham, “analysis of the reproduction operator in an artificial bacterial foraging System”, *Applied Mathematics and Computation* (Impact Factor 1.534), Elsevier Science, Vol. 215, No. 9, Pages 3343-3355, January 2010.
55. B. K. Panigrahi, V. Ravikumar Pandi, **Swagatam Das**, and Zhihua Cui, “Dynamic economic load dispatch with wind energy using modified harmony search”, *International Journal of Bio-Inspired Computing*, Vol. 2 Issue 3/4, May 2010.
56. Sayantani Bhattacharya, Amit Konar, **Swagatam Das**, and Sang Yong Han, “A Lyapunov-Based Extension to Particle Swarm Dynamics for Continuous Function Optimization”, *Sensors* (Impact Factor 1.771), 9(12), 9977-9997, 2009.
57. Arijit Biswas, Sambarta Dasgupta, **Swagatam Das**, and Ajith Abraham, “Dynamics of reproduction in artificial bacterial foraging system: modeling and stability analysis”, *Theoretical Computer Science* (Impact Factor 0.838), 411(21), pp. 2127-2139 Elsevier Science, 2010.
58. Prithwish Chakraborty, Gourab Ghosh Roy, **Swagatam Das**, and Ajith Abraham, “An improved harmony search algorithm with differential mutation operator”, *Fundamenta Informaticae* (Impact Factor 0.522), IOS Press 95, 4 (Dec. 2009), 401-426.
59. **Swagatam Das**, Sambarta Dasgupta, Arijit Biswas, Ajith Abraham, and Amit Konar, “On stability of chemotactic dynamics in bacterial foraging optimization algorithm”, *IEEE Transactions on SMC, Part – A* (Impact Factor 2.1), Vol. 39, Issue 3, pp. 670 – 679, 2009.
60. Sambarta Dasgupta, Arijit Biswas, **Swagatam Das** and Ajith Abraham, “Modeling and analysis of the population dynamics of differential evolution algorithm”, *AI Communications - The European Journal on Artificial Intelligence* (Impact Factor 0.837), IOS Press, Netherlands, Vol. 22(1), pp. 1 – 20, 2009.
61. **Swagatam Das** and Amit Konar, “Automatic image pixel clustering with an improved differential evolution”, *Applied Soft Computing* (Impact Factor 2.612), Vol. 9, Issue 1, Jan. 2009, pp. 226 - 236.
62. **Swagatam Das**, Amit Konar, Uday K. Chakraborty, and Ajith Abraham, “Differential evolution with a neighborhood based mutation operator: a comparative study”, *IEEE*

*Transactions on Evolutionary Computation* (Impact Factor 4.81), Vol. 13, Issue 3, Page(s): 526-553, June, 2009.

63. Sambarta Dasgupta, **Swagatam Das**, Ajith Abraham, and Arijit Biswas, “Adaptive computational chemotaxis in bacterial foraging optimization: an analysis”, *IEEE Transactions on Evolutionary Computing* (Impact Factor 4.81), Vol. 13, Issue 4, Page(s): 919 – 941, 2009.
64. Kaushik Suresh, Debarati Kundu, Sayan Ghosh, **Swagatam Das**, and Sang Yong Han, “Multi-objective differential evolution for automatic clustering with application to micro-array data analysis”, *Sensors* (Impact Factor 1.771), 9(5), 3981 – 4004, 2009.
65. Debarati Kundu, Kaushk Suresh, Sayan Ghosh, **Swagatam Das**, and Ajith Abraham, “Clustering using multi-objective differential evolution algorithms – a comparative study”, *Fundamenta Informaticae*(Impact Factor 0.522), IOS Press, 97 (4), pp. 381 - 403, 2009.
66. Sambarta Dasgupta, **Swagatam Das**, Ajith Abraham, and Arijit Biswas, “Automatic circle detection on digital images using an adaptive bacterial foraging algorithm”, *Soft Computing* (Impact Factor 1.512), Springer, Volume 14, Number 11, 1151-1164, 2009.
67. **Swagatam Das**, Arijit Biswas, Ajith Abraham and Sambarta Dasgupta, “Design of fractional order  $PI^{\lambda}D^{\mu}$  controllers with an improved differential evolution”, *Engineering Applications of Artificial Intelligence* (Impact Factor 1.844), Elsevier Science, Vol. 22, Issue 2, Pages 343-350, March 2009.
68. **Swagatam Das**, Ajith Abraham, and Amit Konar, “Automatic clustering using an improved differential evolution algorithm”, *IEEE Transactions on Systems Man and Cybernetics - Part A* (Impact factor 2.1), Vol. 38, No. 1, January 2008, pp. 218 - 237.
69. **Swagatam Das**, Ajith Abraham and Amit Konar, “Automatic kernel clustering with multi-elitist particle swarm optimization algorithm”, *Pattern Recognition Letters* (Impact Factor 1.034), *Elsevier Science*, Volume 29, 2008, pp. 688-699.
70. Arijit Biswas, Sambarta Dasgupta, **Swagatam Das** and Ajith Abraham, “A synergy of differential evolution and bacterial foraging optimization for faster global search”, *International Journal on Neural and Mass-Parallel Computing and Information Systems*, *Neural Network World*, Vol. 17, No. 6, 2007, pp. 607-626.
71. **Swagatam Das** and Amit Konar, “A swarm intelligence approach to the synthesis of two-dimensional IIR filters”, *Engineering Applications of Artificial Intelligence*, (Impact Factor 1.844), Elsevier Science, Vol. 20, Issue 8, 2007, pp.1023-1162.
72. **Swagatam Das** and Amit Konar, “Design of two dimensional IIR filters with modern search heuristics: a comparative study”, *International Journal of Computational Intelligence and Application*, Vol. 6, Issue 3, pp 329 – 355, World Scientific Press, September, 2006.



### III) Refereed International Conferences/Symposiums/Workshops:

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1. Rupam Kundu, Rohan Mukherjee, Swagatam Das, A. V. Vasilakos, "Multi-user detection in multi-carrier cdma wireless broadband system using a binary adaptive differential evolution algorithm", Genetic and Evolutionary Computation Conference (GECCO) 2013, Amsterdam, The Netherlands, July 6 – 10, 2013 (Accepted).
2. Souvik Kundu, Subhodip Biswas, Swagatam Das, P. N. Suganthan, "Locally informed crowding differential evolution with a speciation-based memory archive for dynamic multimodal optimization", Genetic and Evolutionary Computation Conference (GECCO) 2013, Amsterdam, The Netherlands, July 6 – 10, 2013 (Accepted).
3. Subhodip Biswas, Souvik Kundu, Swagatam Das, P. N. Suganthan, "Information sharing in artificial bee colonies for detecting multiple niches in non-stationary environments", Genetic and Evolutionary Computation Conference (GECCO) 2013, Amsterdam, The Netherlands, July 6 – 10, 2013 (Accepted).
4. Subhodip Biswas, Souvik Kundu, Swagatam Das, Ponnuthurai Suganthan, and Bijaya Panigrahi, "Enhancing artificial bee colony algorithm with novel perturbation schemes in multiple swarms and migratory foragers", Swarm Intelligence Symposium (SIS) under IEEE SSCI 2013, Singapore (Accepted).
5. Bagepalli Theja, Anguluri Rajasekhar, D. P. Kothari and Swagatam Das, "Design of PID Controller Based Power System Stabilizer Using a Modified Philip-Heffron's Model: An Artificial Bee Colony Approach", Swarm Intelligence Symposium (SIS) under IEEE SSCI 2013, Singapore (Accepted).
6. Rupam Kundu, Rohan Mukherjee, Swagatam Das and Athanasios Vasilakos, "Adaptive Differential Evolution with Difference Mean Based Perturbation for Dynamic Economic Dispatch Problem", Symposium on Differential Evolution (SDE) under IEEE SSCI 2013, Singapore (Accepted).
7. Anguluri Rajasekhar, Swagatam Das, and Sanjoy Das,  $\mu$ ABC: A Micro Artificial Bee Colony Algorithm for Large Scale Global Optimization, Genetic and Evolutionary Computation Conference (GECCO), Philadelphia, USA, July 7 – 11, 2012.
8. Md. Nasir, Soumyadip Sengupta, Swagatam Das, and Sanjoy Das, Configuration of Sensors on a 3-D Terrain: An Approach Based on Evolutionary Multi-objective Optimization, Genetic and Evolutionary Computation Conference (GECCO), Philadelphia, USA, July 7 – 11, 2012.
9. Soumyadip Sengupta, Swagatam Das, Md. Nasir, Athanasios V. Vasilakos, and Witold Pedrycz, Energy-Efficient Differentiated Coverage of Dynamic Objects using an Improved Evolutionary Multi-objective optimization Algorithm with Fuzzy-Dominance, IEEE Congress on Evolutionary Computation (CEC) under WCCI 2012, Brisbane, Australia, June 10 – 15, 2012.
10. Md. Nasir, Soumyadip Sengupta, Swagatam Das, and P. N. Suganthan, An Improved Multi-objective Optimization Algorithm based on Fuzzy Dominance for Risk Minimization in Biometric Sensor Network, IEEE Congress on Evolutionary Computation (CEC) under WCCI 2012, Brisbane, Australia, June 10 – 15, 2012 (Accepted).
11. Anguluri Rajasekhar, Swagatam Das, and P. N. Suganthan, Design of Fractional Order Controller for a Servohydraulic Positioning System with Micro Artificial Bee Colony

- Algorithm, IEEE Congress on Evolutionary Computation (CEC) under WCCI 2012, Brisbane, Australia, June 10 – 15, 2012.
12. Subhrajit Roy, Sk. Minhazul Islam, Saurav Das, Swagatam Das, and Ajith Abraham, Autonomous Deployment and Localization of Sensor Nodes with An Improved Differential Evolution Algorithm, *Genetic and Evolutionary Computation Conference (GECCO)*, Dublin, Ireland, July 12 – 16, 2011.
  13. Md Nasir, A. K. Mondal, S. Sengupta, and Swagatam Das, An Improved Multiobjective Evolutionary Algorithm based on Decomposition with Fuzzy Dominance, *IEEE Congress on Evolutionary Computation (CEC)*, New Orleans, USA, June 5-8, 2011.
  14. Saurav Ghosh, Subhrajit Roy, Swagatam Das, Ajith Abraham, and Sk. Minhazul Islam, Peak-to-Average Power Ratio Reduction In OFDM Systems Using an Adaptive Differential Evolution Algorithm, *IEEE Congress on Evolutionary Computation (CEC)*, New Orleans, USA, June 5-8, 2011.
  15. Pradipta Ghosh, Hamim Zafar, Swagatam Das, and Ajith Abraham, Hierarchical Dynamic Neighborhood Based Particle Swarm Optimization for Global Optimization, *IEEE Congress on Evolutionary Computation (CEC)*, New Orleans, USA, June 5-8, 2011.
  16. Ankush Mandal, Aveek Kumar Das, Prithwijit Mukherjee, Swagatam Das, and P. N. Suganthan, Modified Differential Evolution with Local Search Algorithm for Real World Optimization, *IEEE Congress on Evolutionary Computation (CEC)*, New Orleans, USA, June 5-8, 2011.
  17. Sk. Minhazul Islam, Saurav Ghosh, Swagatam Das, Ajith Abraham, and Subhrajit Roy, A Modified Discrete Differential Evolution based TDMA Scheduling Scheme for Many to One Communications in Wireless Sensor Networks, *IEEE Congress on Evolutionary Computation (CEC)*, New Orleans, USA, June 5-8, 2011.
  18. Subhrajit Roy, Sk. Minhazul Islam, Saurav Das, Swagatham Das, P. N. Suganthan, “A differential covariance matrix adaptation evolutionary algorithm for global optimization”, 2011 *IEEE Symposium on Differential Evolution* organized in *IEEE Symposium Series in Computational Intelligence*, Paris, France, 11 – 15 April, 2011.
  19. Sayan Maity, Soumen Sardar, Swagatham Das, P. N. Suganthan, “Constrained Real Parameter Optimization with a Gradient Repair based Differential Evolution Algorithm”, 2011 *IEEE Symposium on Differential Evolution* organized in *IEEE Symposium Series in Computational Intelligence*, Paris, France, 11 – 15 April, 2011.
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37. Aritra Chowdhury, Ritwik Giri, Arnob Ghosh, Swagatam Das and Ajith Abraham, Linear Antenna Array Synthesis using Fitness-Adaptive Differential Evolution Algorithm, *IEEE Congress on Evolutionary Computation (CEC) 2010*, WCCI 2010, Barcelona, Spain.
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  60. Kaushik Suresh, Sayan Ghosh, Debarati Kundu, Abhirup Sen, Swagatam Das, and Ajith Abraham, Inertia-adaptive Particle Swarm Optimizer for Improved Global Search, Eighth International Conference on Intelligent System Design and Applications (ISDA) 2008, November 26 – 28, 2008, Kachsiung, Taiwan.
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69. Amit Konar, Alakananda Bhattacharya, Swagatam Das, and Ajith Abraham, Hardware/Software Partitioning Problem in Embedded System Design Using Particle Swarm Optimization Technique, International Conference on Complex, Intelligent and Software Intensive Systems (CISIS 2008), IEEE Computer Society Press, Barcelona, Spain, March 4th-7th, 2008.
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73. Ajith Abraham, Amit Konar, Nayan Samal and Swagatam Das, Stability Analysis of the Ant System Dynamics with Non-uniform Pheromone Deposition Rules, IEEE Congress

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82. Swagatam Das and Amit konar, Modifying Differential Evolution for Noisy Fitness Landscapes, S. K. Pal *et al.* (Eds.) PReMI (Pattern Recognition and Machine Intelligence) 2005, LNCS 3776, pp. 417 – 421, 2005.
83. Swagatam Das, Amit Konar and Uday K. Chakraborty, Two Improved Differential Evolution Schemes for Faster Global Search, published in the ACM-SIGEVO published in the ACM-SIGEVO Proceedings of the 2005 Conference on Genetic and Evolutionary Computation, H. Beyer, Ed. GECCO '05, New York, NY, pp. 991 - 998, Washington DC, USA, June 25 - 29, 2005.
84. Swagatam Das, Amit Konar, and Uday K. Chakraborty, Improving Particle Swarm Optimization by Differentially Perturbed Velocity, published in the ACM-SIGEVO published in the ACM-SIGEVO Proceedings of the 2005 Conference on Genetic and



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89. Swagatam Das, Debangshu Dey, and Amit Konar, Cooperative Task-Driven Robotic Behavior Using Particle Swarm Optimization, published in *Proc. of EISCO – 2005*, International Conference on Emerging Technologies in Intelligent System and Control, Department of Mechanical, Mechatronics & Electrical Engineering, Kumaraguru College of Technology.
90. Swagatam Das, Soumya Kanti Roy Chowdhury and Amit Konar, Application of Migration Based Path Genetic Operators in Adaptive Source Routing for the Internet, International Conference on Communications, Devices And Intelligent Systems, (CODIS 2004) Organized by Electronics and Telecommunication Engineering Department, Jadavpur University, 2004.

#### **IV) Peer Reviewed Book Chapters:**

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1. B. K. Panigrahi, V. Ravikumar Pandi, Swagatam Das, and Ajith Abraham, A Bandwidth-Adaptive Harmony Search Algorithm to Solve Optimal power Flow Problems with Non-smooth Cost Functions, in Z. W. Geem (Ed.), *Recent Advances in Harmony Search Algorithm*, Studies in Computational Intelligence, Springer, pp. 65-75, 2010.
2. Debasish Datta, Amit Konar, Swagatam Das and B. K. Panigrahi, Debasish Datta, Amit Konar, Swagatam Das and B. K. Panigrahi, Gene Regulatory Network Identification from Gene Expression Time Series Data Using Swarm Intelligence, *Handbook of Swarm Intelligence - Adaptation, Learning, and Optimization*, 2010, Volume 8, Part 4, 517-542.
3. Swagatam Das, Ajith Abraham, and B. K. Panigrahi, An Introduction to Computational Intelligence, in U. Maulik, S. Bandyopadhyay and J. T. L. Wang (Eds.) *Computational Intelligence and Pattern Analysis in Biological Informatics*, John Wiley, 2009.

4. Swagatam Das, Arijit Biswas, Sambarta Dasgupta, and Ajith Abraham, The Bacterial Foraging Optimization – Algorithm, Analysis, and Applications, *Foundations on Computational Intelligence*, Aboul-Ella Hassanien and Ajith Abraham Eds., Studies in Computational Intelligence, Springer Verlag, Germany, 2008.
5. Swagatam Das, Ajith Abraham, and Amit Konar, Particle Swarm Optimization and Differential Evolution Algorithms: Technical Analysis, Applications and Hybridization Perspectives, *Advances of Computational Intelligence in Industrial Systems*, Ying Liu *et al.* (Eds.), Studies in Computational Intelligence, Springer Verlag, Germany, 2008.
6. Ajith Abraham, Swagatam Das, and Sandip Roy, Swarm Intelligence Algorithms for Data Clustering, *Soft Computing for Knowledge Discovery and Data Mining*, Oded Maimon and Lior Rokach (Eds.), Springer Verlag, Germany, ISBN 978-0-387-69934-9, pp. 279-313, 2007.
7. Swagatam Das, Ajith Abraham, and Amit Konar, Swarm Intelligence Algorithms in Bioinformatics, *Computational Intelligence in Bioinformatics*, Arpad Kelemen *et al.* (Eds.), Springer Verlag, Germany, 2007.
8. Swagatam Das and Amit Konar, Swarm Intelligence in Production Management and Engineering, *Handbook of Computational Intelligence in Manufacturing and Production Management*, Dipak Laha and Purnendu Mandal Eds, IGI Global, November, 2007.
9. Amit Konar and Swagatam Das, Introduction to Soft Computing, in *Analysis of Biological Data: A Soft Computing Approach*, edited by S. Bandyopadhyay, U. Maulik and J. T. L. Wang, World Scientific Press, 2006.

#### **V) Technical Reports:**

1. S. Das and P. N. Suganthan, Problem Definitions and Evaluation Criteria for CEC 2011 Competition on Testing Evolutionary Algorithms on Real World Optimization Problems, Technical Report, Jadavpur University, India and Nanyang Technological University, Singapore, 2010.

#### **VI) Citation Summary (From 2006):**

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**Total number of Citations (As per Google Scholar): 4400+**

**Total Number of Publications Cited: 100**

**H-Index: 26**

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<b>Invited Talks and Tutorials</b>
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- Keynote lecture on "Third decade of swarm intelligence: Looking beyond Particle Swarms and Ants" at IEEE Symposium Series on Computational Intelligence (SSCI) 2013, in Singapore, April 16-19, 2013.

- “Static and Dynamic Single objective optimization with Differential Evolution”, at National University of Singapore, Jointly organized by IEEE CIS and SMC Chapters, Singapore, 4-th July, 2012.
- “Differential Evolution and Biological Data Mining”, at the 1st Computational Intelligence Colloquium on Computational Biology, organized by IEEE Computational Intelligence Society Chapter, IEEE Hyderabad Section, 17-th Feb., 2012.
- Invited Talk at the AICTE sponsored Staff Development Program at Kalyani Govt. Engineering College, 9-th Feb., 2012.
- Tutorial on “Differential Evolution: Foundation, Perspectives, and Applications”, at IEEE Symposium Series on Computational Intelligence (SSCI) 2011, in Paris, France, April 11-15, 2011.
- Invited Lecture on “Metaheuristic Pattern Clustering”, in UGC Sponsored Staff Development Program on SDP on Computational Intelligence and its applications to data mining, organized by Anil Neerukonda Institute of Technology and Sciences (ANITS), Visakhapatnam, Andhra Pradesh, 2010.
- Invited Talk in National Conference on Advances in Video, Cyber Learning and Electronics (ADVICE 2010), National Institute of Technical Teachers' Training and Research, Chandigarh.
- Invited Lecture on “Differential Evolution: Algorithm, Analysis, and Applications to Pattern Clustering Problems”, in School of Electrical and Electronics Engineering, Nanyang Technological University (NTU), Singapore. Organized by IEEE, NTU and IEEE Computational Intelligence Chapter, Singapore, 2009.
- Invited Lecture on “Computational Swarm Intelligence: A Conceptual Journey from Insects to Robots”, in Graduate School of Computer Science, Chung Ang University, Seoul, Republic of Korea, 2009.
- Invited Lecture in National Conference in Computational Intelligence Applications in Power, Control and Telecom , Silicon Institute of Technology, Bhubaneswar, during March 20 - 22<sup>nd</sup>, 2009.
- Invited Talk in Machine Intelligence Research Day (MIR Day), International Workshop, January 24 - 26, 2009, Nagpur, India.
- Invited Lecture on “Image Filtering, Enhancement, and Segmentation”, in Short term course on Digital Signal Processing (DSP - 2008), IEEE PES (Power Engineering Society), Kolkata Chapter, Dept. of Electrical Engineering, Jadavpur University
- Short term course on Soft Computing, Siliguri Engineering College, West Bengal, August, 2007.
- Invited Talk in International Conference NGMS - 2006, BESU, Shibpur, Jan. 2006
- Winter School on Data Mining, Dept. of Computer Science, NIT Durgapur, January, 2009

- Short-term course in Computational Intelligence, NIT, Durgapur, 2005.
- Winter School in Soft computing, Bengal Engineering and Science University (BESU), Shibpur, Nov. 2005.

<b>Professional Activities</b>
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**1) Editorial Activities:**

- Founding Editor-in-Chief, **Swarm and Evolutionary Computing, an Elsevier Journal.**
- Associate Editor, **IEEE Transactions on Systems, Man, and Cybernetics: Systems**, (2013 - )
- Associate Editor, **IEEE Transactions on Systems, Man, and Cybernetics, Part – A** (2011 - 2012).
- Associate Editor, **Information Sciences Journal, Elsevier** (2010 - ).
- Associate Editor, **Neurocomputing, Elsevier** (2013 - )
- Editor, **Engineering Applications of Artificial Intelligence, Elsevier** (2013 - )
- Editorial Board Member, **Progress in Artificial Intelligence, Springer.**
- Editorial Board Member, **Mathematical Problems in Engineering, Hindawi.**
- Editorial board member of *International Journal of Artificial Intelligence and Soft Computing (IJAISC)*, ISSN (Online): 1755-4969, ISSN (Print): 1755-4950.
- Editorial board member of *International Journal of Autonomous and Adaptive Communications Systems (IJAACS)*, ISSN (Online): 1754- 8640, ISSN (Print): 1754-8632.
- Editorial board member of *International Journal of Swarm Intelligence (IJSI)*, ISSN online: 2049-405X, ISSN Print: 2049-4041.
- Guest Editor, Special Issue of **IEEE Transactions on Evolutionary Computation on Differential Evolution.**
- Guest Editor, Special Issue of **ACM Transactions on Autonomous and Adaptive Systems (TAAS) on Foraging Theory based Optimization Techniques.**

- Guest Editor, Special Issue of **IEEE Transactions on Systems, Man and Cybernetics, Part - C on Engineering Applications of Memetic Computing.**
- Guest Editor, Special Issue of **International Journal of Swarm Intelligence Research (IJSIR)**, IGI Global on **Application of Foraging Theory Based Optimization Algorithms to Power Systems Engineering.**
- Guest Editor, Special Issue of **International Journal of Applied Evolutionary Computation (IJAEC)**, IGI Global on **Computational Swarm Intelligence: Recent Advances and Applications to Control, Communication and Power Systems Engineering.**

## 2) Conference Activities:

- Competitions Chair, **IEEE WCCI (World Congress on Computational Intelligence)** 2014, Beijing, China.
- Publicity Co-Chair, **IEEE CEC (Congress on Evolutionary Computation)** 2013, Mexico.
- Keynote-Tutorial Chair, **SSCI 2013 - 2013 IEEE Symposium Series on Computational Intelligence (SSCI)**, 16 – 19-th April, 2013, Singapore.
- General Co-chair of third **Swarm, Evolutionary, and Memetic Computing Conference (SEMCCO)**, 2012, 20 - 21 Dec, 2012, Bhubaneswar, India.
- Program Co-chair of second **Swarm, Evolutionary, and Memetic Computing Conference (SEMCCO)**, 2011, 18 - 21 Dec, 2011, Vizag, India.
- Program Co-chair, **Symposium on Swarm Intelligence and Differential Evolution in conjunction with INTERNATIONAL CONFERENCE ON ARTIFICIAL INTELLIGENCE AND SOFT COMPUTING**, (ISAISC), Zakopane, Poland, 29 April - 3 May 2012.
- Co-chair of **Symposium on Differential Evolution, under IEEE Symposium Series on Computational Intelligence (SSCI) 2011**, April 11 – 15, 2011 Halle aux Farines, Paris, France.
- Co-chair of Competition on **testing evolutionary algorithms on real world problems**, under **IEEE Congress on Evolutionary Computation (CEC)**, New Orleans, USA, **June 5-8, 2011.**
- Program Co-chair of **Eighth International Conference on Simulated Evolution and Learning (SEAL) 2010**, 1 – 4 Dec., 2010, Indian Institute of technology (IIT), Kanpur.
- Program Co-chair of **International Conference on Swarm, Evolutionary, and Memetic Computing (SEMCCO)**, 2010, 16 – 19 Dec, 2010, Chennai, India.
- Program Co-chair of **International Symposium on Biologically Inspired Computing and Applications (BICA-2009)**, Bhubaneswar, India December 21-22, 2009.

➤ **International Program Committee member:**

- **GECCO 2011**, Dublin, Ireland.
- **IEEE Congress on Evolutionary Computation (CEC)**, New Orleans, USA, 2011
- **ANTS 2010, Seventh International Conference on Swarm Intelligence**, Brussels, Belgium, 2010.
- **IEEE World Congress on Nature & Biologically Inspired Computing (NaBIC 2010)**, Japan.
- **IEEE Congress on Evolutionary Computation (CEC)**, Trondheim, Norway during May 18-21 (Monday - Thursday), 2009.
- **2009 IEEE/WIC/ACM International Joint Conference on Web Intelligence and Intelligent Agent Technology**, Milano, Italy, September 15-18, 2009.
- **8th International Conference on Computer Information Systems and Industrial Management Applications (CISIM 2009) during** December 09-11, 2009 in Coimbatore, India.
- **International Conference on Soft Computing and Pattern Recognition (SoCPaR 2009) during** December 04-07, 2009 in Malacca, Malaysia.
- **IEEE World Congress on Nature & Biologically Inspired Computing (NaBIC 2009), December 9-11, 2009, Coimbatore, INDIA.**
- **International Workshop on Advances in Peer to Peer Technology (IWAP2PT'09), December 9-11, 2009, Bangalore, India.**
- **The Eighth International Conference on Intelligent Systems Design and Applications (ISDA 2008)**, Nov. 26-28, 2008, Taiwan.
- **The Seventh International Conference on Intelligent Systems Design and Applications (ISDA 2007)**, 22-24 October 2007 in Rio de Janeiro, RJ, Brazil.

**3) Regular Reviewer of the following international journals:**

- IEEE/ACM Trans. on Computational Biology and Bioinformatics.
- IEEE Trans. on Evolutionary Computing.
- IEEE Trans. on SMC, Part – A
- IEEE Trans. on SMC, Part – B
- Evolutionary Computation Journal, MIT Press.
- Pattern Recognition Letters, Elsevier.
- Pattern Recognition, Elsevier.

- Engineering Optimization, Taylor and Francis.
- Engg. Appl. of Artificial Intelligence (EAAI), Elsevier.
- Neurocomputing, Elsevier.
- Information Sciences, Elsevier.
- Signal Processing, Elsevier.
- Swarm Intelligence, Springer.

#### 4) Memberships in Professional bodies/Organizations

- Senior Member, IEEE.
- Member, IEEE Computational Intelligence Society.
- Member, Technical Committee for Intelligent Systems Applications, IEEE Computational Intelligence Society.
- Member, Evolutionary Computation Technical Committee, IEEE Computational Intelligence Society.
- Member, IEEE Systems, Man, and Cybernetics (SMC) Society.
- Member, Task Force on Memetic Computing, IEEE Computational Intelligence Society.
- Member, Task Force on Large Scale Optimization, IEEE Computational Intelligence Society.

<b>Awards</b>
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- **Asoke Kumar Sarkar Memorial Award** (Anandabazar Patrika Group), for 4-th Rank in Madhyamik (Secondary Examination) 1997.
- **The Telegraph School awards for Excellence** for highest marks in Science group in Higher Secondary, 1999.
- **Calcutta Police Association Award**, for 2nd rank in all West Bengal in Higher Secondary Exam, 1999.
- **M.H.R.D Scholarship, Govt. of India**, for pursuing M. E. Tel. E course.
- Best Paper Award in the **Sixth IEEE International Conference on Intelligent Systems Design and Applications (ISDA2006)**, Jinan, China.
- Best paper Award in **1st Int. Conf. On Computational Problem-Solving, (ICCP2010)**, Li Jiang, China, Dec 3-5, 2010.

- **IEEE Computational Intelligence Society (CIS) Professional Travel Grant** for attending **IEEE Symposium Series in Computational Intelligence**, Paris, France, 11 – 15 April, 2011.
- **INAE (Indian National Academy of Engineers) Young Engineer Award, 2012.**

### Supervision

**I) Ph. D. Thesis Supervision:** 2 (ongoing), 1 submitted.

**II) Number of M. Eng. Thesis Supervised:** 8.

**III) External Ph. D Thesis Examiner:**

Andhra University, Visakhapatnam, India (2009 and 2012) - External examiner of two Ph.D. theses.

### Teaching

**I) Courses offered:**

**a) Post Graduate level:**

- 1) Computer Graphics
- 2) Pattern Recognition
- 3) Computer Networks
- 4) Artificial Intelligence

**b) Undergraduate Level:**

- 1) Programming Language and Data Structures
- 2) Design and Analysis of Algorithms
- 3) Digital Control Engineering

### Summary of Educational Qualifications

- 94.3% in Secondary Examination, 4<sup>th</sup> in West Bengal (out of 550,000 students) in 1997.
- 95.3% in Higher Secondary Examination, 2<sup>nd</sup> in West Bengal (out of approximately 400,000 students) in 1999.
- 85.2% in B. E. Tel. E (Electronics and Telecommunication Engg.), 2003.
- 89.7% in M. E. Tel. E, 2005 (Specialization: Control Engg. and Cybernetics)  
Master thesis entitled: “**Differential Evolution and Particle Swarms - Comparison, Extensions, and Synergism for Improved Multi-modal and Dynamic Search**”
- Ph.D in Engineering, (submitted 2008, degree awarded 2009)



Dissertation report entitled: “**Pattern Clustering Using Differential Evolution Algorithm**”

<b>Personal Information</b>
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**Date of Birth:** 12<sup>th</sup> July, 1980

**Sex:** Male

**Marital Status:** Married

**References:** Available on request