KALYANMOY DEB, PhD, FIEEE, FASME, FNA, FASc, FNAE
Koenig Endowed Chair Professor
Department of Electrical and Computer Engineering
Department of Computer Science and Engineering
Department of Mechanical Engineering
Michigan State University
428 S. Shaw Lane, Room 2120 Engg. Building
East Lansing, MI 48824, USA
Tel: 517 432 2144 (office), 517 930 0846 (cell)
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Research Interests: Optimization, Computational intelligence, Evolutionary computation, Machine learning, Soft computing, Modeling, Multi-criterion decision analysis, Data Analytics, Knowledge Discovery, Deep Learning

Teaching Interests: Computational Optimization, Evolutionary Computation, Computational Intelligence Methodologies, Multi-Criterion Optimization and decision making, Programming and Numerical Methods, Mathematics for Engineers, software engineering, search algorithms, Design Methodologies, Electrical Circuits and Systems

Education:

DOCTOR OF PHILOSOPHY in Engineering Mechanics, University of Alabama, Tuscaloosa, USA, May 1991
'Boolean and floating-point function optimization using messy genetic algorithms'

MASTER OF SCIENCE in Engineering Mechanics, University of Alabama, Tuscaloosa, USA May 1989
'Multi-modal function optimization using genetic algorithms'

BACHELOR OF TECHNOLOGY in Mechanical Engineering
Indian Institute of Technology Kharagpur, India
May 1985

Work Experience:

PROFESSOR AND KOENIG ENDOWED CHAIR, Department of Electrical and Computer Engineering, Michigan State University, East Lansing, USA (2011 to present)

PROFESSOR, Department of Computer Science and Engineering, Michigan State University, East Lansing, USA (2011 to present)

PROFESSOR, Department of Mechanical Engineering, Michigan State University, East Lansing, USA (2011 to present)

INTERNATIONAL VISITING PROFESSOR, Department of Mechanical Engineering and Department of Computer Science and Engineering, Indian Institute of Technology Kharagpur, India (2015 to present)

VISITING DISTINGUISHED PROFESSOR, Department of Information and Service Economy, Aalto University School of Business, Helsinki, Finland (2017 to present)

VISITING PROFESSOR, Department of Automation Engineering, University of Skövde, Sweden (2009 to present)

PROFESSOR, Department of Mechanical Engineering, IIT Kanpur, India
December 1999 to July 2013

ASSOCIATE PROFESSOR, Department of Mechanical Engineering, IIT Kanpur, India
June 1997 to November 1999

ASSISTANT PROFESSOR, Department of Mechanical Engineering, IIT Kanpur, India
January 1993 to May 1997

VISITING RESEARCH ASSISTANT PROFESSOR, Department of General Engineering
University of Illinois at Urbana-Champaign, USA
April 1991 to November 1992

ASSISTANT ENGINEER, Engineers India Limited, New Delhi
June 1985 to July 1987

Significant Other Positions/Associations:

CIS REPRESENTATIVE TO IEEE-USA GOVERNMENT RELATIONS POLICY COMMITTEE ON ENERGY, April 2018 to Present

MIDLAND RESEARCH INSTITUTE FOR VALUE CHAIN CREATION (MRIVCC), Midland, Michigan
August 2015 to to date

DISTINGUISHED FELLOW, Institute for Development and Research in Banking Technology, Hyderabad, India, (in process)

FINLAND DISTINGUISHED PROFESSOR (FIDIPRO), Helsinki School of Economics, Finland
June 2007 to May 2009
Supported by Academy of Finland

VISITING CHAIR PROFESSOR OF APPLIED COMPUTING, University of Birmingham, United Kingdom
May 2007 to June 2008

VISITING PROFESSOR, Nanyang Technological University, Singapore
May 2006 to July 2007
Supported by a Collaborative A-Star Project

FREDRICK WILHELM BESSEL AWARD PROFESSOR, University of Karlsruhe, Germany
June 2003 to November 2003
Supported by Alexander von Humboldt Foundation

VISITING PROFESSOR, University of Birmingham, United Kingdom
May 2002 to July 2002

VISITING PROFESSOR, ETH, Zurich, Switzerland
February 2001 to July 2001
Supported by ETH, Zurich

HUMBOLDT FELLOW, University of Dortmund, Germany
June 1998 to July 1999
Supported by Alexander von Humboldt Foundation

Major Awards/Honors:

IEEE CIS Evolutionary Computation Pioneer Award, Computational Intelligence Society, IEEE, 2018

Lifetime Achievement Award, Clarivate Analytics, 2017

Highly Cited Researcher, Clarivate Analytics, 2017

Outstanding Researcher Award, Soft Computing Research Society (SCRS), 2017

IEEE Transactions on Evolutionary Computation Outstanding Paper Award, Computational Intelligence Society, IEEE, 2016

SIGEVO Impact Award, Special Interest Group on Evolutionary Computation, ACM, 2016

Best Paper Award, Genetic Algorithms Track at Genetic and Evolutionary Computation Conference (GECCO-2016)

JC Bose Memorial Lecture Award, Indian National Science Academy (INSA). 2016

Eminent Engineer Award, Tripura State Centre for The Institution of Engineers (India), 2015

Honorary Life Member of the Soft Computing Research Society, 2015

Distinguished Professor Visitation Program, Mexican Academy of Sciences (AMC) and United States-Mexico Foundation for Science (FUMEC), 2014-15

ASME Fellow, American Society of Mechanical Engineers, 2014

IEEE CIS Distinguished Lecturer Award, IEEE Computational Intelligence Society, 2014–2016

Honorary Doctorate Degree, Faculty of Information Technology, University of Jyväskylä, Finland, 2013

Wiley Practice Prize, International Society on Multi-Criterion Decision Making (MCDM), 2013

TWAS Prize in Engineering Sciences, Third World Academy of Sciences (TWAS), Italy, 2012

Infosys Prize, Infosys Science Foundation, Bangalore, India, 2011

J. C. Bose National Fellowship, Department of Science and Technology, Ministry of Science and Technology, Government of India, New Delhi, India, 2011

Cajastur Mamdani Prize, European Centre for Soft Computing, Spain, 2011

Distinguished Alumnus Award, Indian Institute of Technology Kharagpur, 2011

VELUX Foundation Guest Professorship at Technical University of Denmark (DTU), 2011–2012

MCDM Edgeworth-Pareto Award
by International Society on Multiple Criteria Decision Making (MCDM), 2008

Thomson Citation Laureate Award in Computer Science,

Thomson Reuters, 2006

SHANTI SWARUP BHATNAGAR PRIZE in Engineering Sciences,
Council for Scientific and Industrial Research (CSIR), Government of India, 2005

DEVA RAJ ENDOWED CHAIR PROFESSOR at Indian Institute of Technology Kanpur, India,
2007–2010

GURMUKH AND VEENA MEHTA ENDOWED CHAIR PROFESSOR at Indian Institute of Technology Kanpur, India, 2011–2013

FINLAND DISTINGUISHED PROFESSOR (FIDIPRO) at Helsinki School of Economics, Academy
of Finland, 2007-2009

FELLOW, Institute of Electrical and Electronics Engineers (IEEE), 2012

FELLOW, Indian National Science Academy (INSA), 2011

FELLOW, Indian Academy of Sciences (IASc), 2006

FELLOW, Indian National Academy of Engineering (INAE), 2004

FELLOW, International Society for Genetic and Evolutionary Algorithms (ISGEC), 2003

FRIEDRICH WILHELM BESSEL RESEARCH AWARD,
Alexander von Humboldt Foundation, Germany, 2002

HUMBOLDT FELLOW, Alexander von Humboldt Foundation, Germany
June 1998–July 1999

IEEE CIS TEACHING AWARD, IEEE Computational Intelligence Society, 2009

MOST HIGHLY CITED AND CURRENT CLASSIC PAPER: 2002 IEEE TEC paper on NSGA-II
Essential Science Indicators, Thomson Reuters, 2010

FAST BREAKING PAPER AWARD IN ENGINEERING: 2002 IEEE TEC paper on NSGA-II
ISI Web of Science's Essential Science Indicators (ESI), Feb 2004

BEST PAPER AWARD, 'Multi-Criterion Decision Making (MCDM-2011)' Conference, Jyväskylä,
Finland, 2011

BEST PAPER AWARD, 'Evolution Artificielle' Conference, Marseille, France, 2003

SENIOR MEMBER, IEEE, since 2002

AREA EDITOR, Journal of Multi-Criteria Decision Analysis, Wiley, 2009

ASSOCIATE EDITOR, IEEE Transaction on Evolutionary Computation. IEEE Press,
1999-2016

ASSOCIATE EDITOR, Applied Soft Computing, Elsevier
Since 2009

ASSOCIATE EDITOR, Pacific Journal of Optimization, Yokohama Publishers, Since 2010

ADVISORY BOARD MEMBER, Evolutionary Computation Journal, MIT Press,
Since 2002

EDITORIAL BOARD MEMBER, Journal of Optimization, Hindawi Publishing Corporation,

2013

EDITORIAL BOARD MEMBER, Journal of Smart Grid Frontier (SGF), American V-King Scientific Publishing (AVS), 2013

EDITORIAL BOARD MEMBER, Handbook of Natural Computing, Springer, 2012

EDITORIAL BOARD MEMBER, Environment, Systems, and Decisions, Springer, 2012

EDITORIAL BOARD MEMBER, European Journal of Operations Research, Elsevier, 2008

EDITORIAL ADVISORY BOARD MEMBER, Recent Patents on Computer Science, Bentham Science Publishers, Since 2007

EDITORIAL BOARD MEMBER, Operations Research Perspectives (ORP), Elsevier, Since 2013

EDITORIAL BOARD MEMBER, Studies in Engineering and Technology, Redfame Publishing Inc., Since 2013

EDITORIAL BOARD MEMBER, The Scientific World Journal, Hindawi Publishing Corporation, Since 2013

EDITORIAL BOARD MEMBER, Swarm and Evolutionary Computation, Elsevier, Since 2010

EDITORIAL BOARD MEMBER, Journal of The Franklin Institute, Elsevier, Since 2010

EDITORIAL BOARD MEMBER, Smart Grid and Renewable Energy, Scientific Research Publishing, Inc. USA, Since 2010

EDITORIAL BOARD MEMBER, Journal of Industrial and Management Optimization (JIMO), American Institute of Mathematical Sciences, Since 2008

EDITORIAL BOARD MEMBER, International Journal of Systems, Signals, Control and Engineering Applications, Medwell Journals, Since 2008

EDITORIAL BOARD MEMBER, International Journal of Soft Computing and Bioinformatics, Scientific International Publisher, Since 2008

EDITORIAL ADVISORY BOARD MEMBER, International Journal for Simulation, Multidisciplinary Design Optimization, EDP Sciences, Since 2007

EDITORIAL BOARD MEMBER, Engineering Optimization Journal, Tailor and Francis, Since 2003

EDITORIAL BOARD MEMBER, Genetic Programming and Evolvable Machines, Springer, Since 2003

EDITORIAL BOARD MEMBER, Journal of Evolutionary Optimization, Polish Academy of Sciences, Since 1998

EDITORIAL BOARD MEMBER, Human Systems Management, IOS Press, Since 2006

EDITORIAL BOARD MEMBER, Journal of Memetic Computing, Springer, Since 2007

SIGEVO EXECUTIVE COMMITTEE MEMBER, ACM Special Interest Group on Evolutionary Computation, 2007–2013

EXECUTIVE COUNCIL MEMBER, International Society on Genetic and Evolutionary Algorithms (ISGEC) (one of 15 members worldwide and alone from India), Since 1999

INAE YOUNG ENGINEER AWARD, Indian National Academy of Engineering, 1996

AICTE CAREER AWARD FOR YOUNG TEACHERS, All India Council for Technical Education, 1996-97

DST YOUNG SCIENTIST PROJECT AWARD, Department of Science and Technology, India, June 1994

GRADUATE RESEARCH COUNCIL FELLOWSHIP, University of Alabama, Tuscaloosa, USA August 1989 - May 1991 (2 consecutive years)

JEFFERSON GOBLET STUDENT AWARD (April 1990)
31t Structures, Structural Dynamics, and Materials Conference
AIAA/ASME/ASCE/ASC/AHS, Long Beach, California

OUTSTANDING GRADUATE RESEARCH ASSISTANT
Department of Engineering Mechanics, University of Alabama, Tuscaloosa, USA
1989-1990, 1990-1991

OUTSTANDING MASTER'S THESIS AWARD (1989-1990)
College of Engineering and Department of Engineering Mechanics
University of Alabama, Tuscaloosa, USA

First prize in ALL INDIA STUDENTS DESIGN COMPETITION (August, 1995)
Institution of Engineers, India
'Design a machine to drill polygonal (square, hexagonal) holes'

BEST STUDENT in Mechanical Engineering (Amlan Sen Memorial Award) (1985)
BEST STUDENT in Industrial Management Program (1985)
Indian Institute of Technology Kharagpur

Citations and Journal Records:

GOOGLE SCHOLAR CITATIONS (14 September, 2019): **137,633**, H-INDEX: **115**
GOOGLE SCHOLAR RANKINGS:
   HIGHEST CITED RESEARCHER in 'Evolutionary Computation'
   HIGHEST CITED RESEARCHER in 'Multi-objective Optimization'

IEEE TRANSACTIONS ON EVOLUTIONARY COMPUTATION (IF: 8.508): Rank 1 and Rank 2 Popular Papers of the journal (2002 NSGA-II paper and 2014 NSGA-III paper)

EVOLUTIONARY COMPUTATION JOURNAL, MIT PRESS (IF: 3.469):
Two Highest Cited Papers of the journal (1994 NSGA paper and 2000 ZDT paper)
Three (#1, #2, #8) of the top 10 Most Cited papers of the journal

Research Achievements:

- Written **two** text books on optimization:
  1. **Deb, K.** (2001). *Multi-objective optimization using evolutionary algorithms.* Chichester, London: Wiley, (**Third Print**, 517 pages). Also available as a Wiley Singapore Edition in India. (**17,086** GS Citations)
  2. **Deb, K.** (1995). *Optimization for engineering design: Algorithms and examples.* New Delhi: Prentice-Hall, (**Seventh Print**, 382 pages). (**1,599** GS Citations)

- Published **225** international journal papers and **320** international conference papers (total **545** articles) to to date.

- Published **21** edited books. Also written one Encyclopedia article on genetic algorithms.

- Thomson Citation Laureate Award for having the highest ISI Web of Science citation counts in Computer Science category from India during 1996–2005

- Invited to deliver **98** keynote/plenary lectures in major international conferences and symposia in the past 15 years. (See page 53).

- Presented **31** invited tutorials and numerous invited lectures on 'evolutionary algorithms' and related topics.

- Funded Research Projects with foreign universities (partial list, not updated):
  - Governmental projects from DARPA and NSF.
  - Industry projects from ArcelorMittal, IBS Software Services, Siemens, Dow Chemical Company, Volvo Car Corporation Sweden, General Motors Company, Ford Motor Company, General Electric, Honda R&D Japan, STMicroelectronics Italy, Orelogy, Australia. Other collaborations: Tata Steel Jamshedpur, Tata Engg. and Locomotive Company Pune, Hindustan Aeronautics Limited Bangalore etc.
  - Alexander von Humboldt Foundation project on 'Real-parameter evolutionary optimization' with Hans-Paul Schwefel, University of Dortmund, Germany, 1998-1999
  - Asia-ITC funded MSc. Programme in Natural Computation at the computer science department with Xin Yao, University of Birmingham, UK (2001-02)
  - Alexander von Humboldt Foundation funded Bessel Research Award project on 'Evolutionary multi-criterion optimization' with Juergen Branke and Hartmut Schmeck, University of Karlsruhe, Germany, May-November, 2003
  - A-STAR project entitled 'Evolutionary optimization in data-mining' with P. N. Suganthan, Nanyang Technological University, Singapore, 2005-2007
  - Indo-Portuguese S&T Bilateral Govt. project with Carlos Fonseca, University Algarve, 2003–2006
  - Indo-Swiss S&T Bilateral Govt. project with Eckart Zitzler and Lothar Thiele, ETH Zurich, Switzerland, 2006–2008
  - Academy of Finland funded 'Finland Distinguished Professor (FiDiPro)' project with Kaisa Miettinen, Helsinki School of Economics, Finland, 2007-2009
  - Indo-Portuguese S&T Bilateral Govt. project with Gaspar Cunha, University Minho, 2010–2012
  - VINNOVA funded project on 'Simulation based Innovization of Production Systems (SIPS)' with Amos Ng, University of Sköde, Sweden, 2009–2012
  - Academy of Finland project on 'Automated Innovization' with Pekka Korhonen, Aalto University School of Economics, Finland, 2010-2012
  - Danish Council for Strategic Research project entitled 'REWIND: Knowledge based engineering for improved reliability of critical wind turbine components' with Jesper Hattel, Technical University of Denmark (DTU), 2011–2016

- Recipient of commendation certificates for excellence in teaching in various courses at IIT Kanpur from the Director of the institute.

Further details can be found in my web site `http://www.egr.msu.edu/~kdeb`.

<div align="right">Kalyanmoy Deb</div>

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Publication Record

Total Google Scholar Citation is **137,633** with a h-index of **115** (25 January, 2020):

Journal Papers:	225
Conference Papers:	320
Total Refereed Publications:	545
Text Books:	2
Edited Books:	18

Books

1. **Deb, K.** (2001). *Multi-objective optimization using evolutionary algorithms.* Chichester, London: Wiley, (**Third Print**, 517 pages). Also available as a Wiley Singapore Edition in India.

2. **Deb, K.** (1995). *Optimization for engineering design: Algorithms and examples.* New Delhi: Prentice-Hall, (**Seventh Print**, 382 pages).

Papers in Journals (PUBLISHED)

1. Gaur, A., Talukder, K., **Deb**, K., Tiwari, S., Xu, S., and Jones, D. (2020). Unconventional Optimization for Achieving Well-Informed Design Solutions for an Automobile Industry. *Engineering Optimization, 52*(9). 1542–1560.

2. Sinha, A., Lu, Z., **Deb, K.**, and Malo. P. (2020). Bilevel Optimization based on Iterative Approximation of Multiple Mappings. *Journal of Heuristics, 26.* 151–185.

3. Rahnamayan, S., Mahdavi, S., **Deb, K.**, and Bidgoli, A. A. B. (2020). Ranking multi-metric scientific achievements using a concept of Pareto optimality. *Mathematics, 8*(6). 956.

4. Talukder, A. K. A. and **Deb, K.** (2020). PaletteViz: A Visualization Method for Functional Understanding of High-Dimensional Pareto-Optimal Data-Sets to Aid Multi-Criteria Decision Making, *IEEE Computational Intelligence Magazine, 15*(2), 36–48.

5. Chen, L., **Deb, K.**, Liu, H.-L. (2019). Explicit Control of Implicit Parallelism in Decomposition Based Evolutionary Many-Objective Optimization Algorithms. *Computational Intelligence Magazine, 14*(4), 52–64.

6. Ryerkerk, M., Averill, R., **Deb, K.**, and Goodman, E. (2019). A Survey of Evolutionary Algorithms using Metameric Representations. *Genetic Programming and Evolvable Machines, 20,* 441–478.

7. Li, H., **Deb, K.**, and Zhang, Q. (2019). Variable-length Pareto Optimization via Decomposition-based Evolutionary Multiobjective Algorithm. *IEEE Transactions on Evolutionary Computation, 23*(6), 987–999.

8. Seada, H., Abouhawwash, M. and **Deb, K.** (2019). Multi-Phase Balance of Diversity and Convergence in Multiobjective Optimization. *IEEE Transactions on Evolutionary Computation, 23*(3), 503–513.

9. Roy, P. C., Guber, A., Abouali, M., Nejadhashemi, A. P., **Deb, K.**, and Smucker, A. J. M. (2019). Crop Yield Simulation Optimization Using Precision Irrigation and Subsurface Water Retention Technology. *Environmental Modelling and Software, 119*, 433–444.

10. **Deb, K.**, Hussein, R., Roy, P. and Toscano, G. (2019). A Taxonomy for Metamodeling Frameworks for Evolutionary Multi-Objective Optimization. *IEEE Transactions on Evolutionary Computation,23*(1), 104–116.

11. Roy, P. C., **Deb, K.**, Islam, M. (2019). An Efficient Non-dominated Sorting Algorithm for Large Number of Fronts. *IEEE Transactions on Cybernetics, 49*(3). 859–869.

12. Lu, Z., **Deb, K.**, and Sinha, A. (2018). Uncertainty Handling in Bilevel Optimization for Robust and Reliable Solutions. *International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems, 26*(2), 1–24.

13. Sinha, A., Soun, T., and **Deb, K.** (2019). Using Karush-Kuhn-Tucker Proximity Measure for Solving Bilevel Optimization Problems. *Swarm and Evolutionary Computation, 44*, 496–510.

14. Fan, Z., Li, W., Cai, X., Li, H., Wei, C., Zhang, Q., **Deb, K.**, and Goodman, E. D. (2019). Push and Pull Search for Solving Constrained Multi-objective Optimization Problems. *Swarm and Evolutionary Computation, 44*, 665–679.

15. Gandomi, A, H., **Deb, K.**, Averill, R. C., Rahnamayan, S., and Omidvar, M. N. (2019). Using Semi-independent Variables to Enhance Optimization Search, *Expert Systems With Applications, 120*, 279–297.

16. Li, K., **Deb, K.**, and Yao, X. (2018). R-Metric: Evaluating the Performance of Preference-Based Evolutionary Multi-Objective Optimization Using Reference Points. *IEEE Transactions on Evolutionary Computation, 22*(6). 821–835.

17. **Deb, K.**, Zhu, L., Kulkarni, S. (2018). Handling Multiple Scenarios in Evolutionary Multi-Objective Numerical Optimization. *IEEE Transactions on Evolutionary Computation, 22*(6). 920–933.

18. Ahrari, A. and **Deb, K.** (2018). A Novel Class of Test Problems for Performance Evaluation of Niching Methods. *IEEE Transactions on Evolutionary Computation, 22*(6). 909–919.

19. Mahdavia, S., Rahnamayanan, S., and **Deb, K.** (2018). Opposition based learning: A literature review. *Swarm and Evolutionary Computation, 39*, 1–23.

20. Liu, H.-L., Chen, L., Zhang, Q., and **Deb, K.** (2018). Adaptively Allocating Search Effort in Challenging Many-Objective Optimization Problems. *IEEE Transactions on Evolutionary Computation, 22*(3). 433–448.

21. Sinha, A., Malo, P., and **Deb, K.** (2018). A Review on Bilevel Optimization: From Classical to Evolutionary Approaches and Applications. *IEEE Transactions on Evolutionary Computation, 22*(2), 276–295.

22. Hernandez-Suarez, J. S., Nejadhashemi, A. P., Kropp, I. M., Abouali, M., Zjang, Z., and **Deb, K.** (2018). Evaluation of the impacts of hydrologic model calibration methods on predictability of ecologically-relevant hydrologic indices. *Journal of Hydrology, 564*, 758–772.

23. Myburgh, C. and **Deb, K.** (2018). Derived Heuristics Based Consistent Optimization of Material Flow in a Gold Processing Plant. *Engineering optimization, 50*(1), 1–18.

24. Chen, Y., Lu, D., Luo, L., Pokhrel, Y., **Deb, K.**, Huang, J., and Ran, Y. (2018). Detecting irrigation extent, frequency, and timing in a heterogeneous arid agricultural region using MODIS time series, Landsat imagery, and ancillary data. *Remote Sensing of Environment, 204*, 197–211.

25. Ng, A. H. C., Siegmund, F., and **Deb, K.** (2018). Reference Point Based Evolutionary Multi-Objective Optimization with Dynamic Resampling for Production Systems Improvement. *Journal of Systems and Information Technology, 20*(4), 489–512.

26. Schwaab, J., **Deb, K.**, Goodman, E., Lautenbach, S., van Striene, M. J., Grêt-Regamey, A. (2018). Improving the Performance of Genetic Algorithms for Land-Use Allocation Problems. *International Journal of Geographical Information Science, 32*(5), 907-930.

27. **Deb, K.**, Abouhawwash, M. and Seada, H. (2017). A Computationally Fast Convergence Measure and Implementation for Single, Multiple and Many-Objective Optimization. *IEEE Transactions on Emerging Topics in Computational Intelligence, 1*(4), 280–293.

28. **Deb, K.** and Myburgh, C. (2017). A Population-Based Fast Algorithm for a Billion-Dimensional Resource Allocation Problem with Integer Variables. *European Journal of Operational Research, 261*(2), 460–474.

29. Mansoor, U., Kessentini, M., Ouni, A., Wimmer. M. and **Deb, K.** (2017). Detection of High-level Model Changes Using Multi-Objective Search-Based Software Engineering. *Empirical Software Engineering, 22*(2), 670–715.

30. Ryerkerk, M., Averill, R. C. **Deb, K.**, and Goodman, E. D. (2017). Solving Metameric Variable-Length Optimization Problems using Genetic Algorithms. *Genetic Programming and Evolvable Machines, 18*(2), 247–277.

31. Ahrari, A., Lei, H., Sharif, M., **Deb, K.**, and Tan, X. (2017). Reliable underwater dipole source characterization in three-dimensional space by an optimally designed artificial lateral line system. *Bioinspiration & Biomimetics, 12*(3), 036010.

32. Ahrari, A., **Deb, K.**, and Pruess, M. (2017). Multimodal Optimization by Covariance Matrix Self-Adaptation Evolution Strategy with Repelling Subpopulations. *Evolutionary Computation Journal, 25*(3), 439–471.

33. Li, K., **Deb, K.**, Zhang, Q. (2017). Efficient Non-domination Level Update Method for Steady-State Evolutionary Multi-objective Optimization. *IEEE Transactions on Cybernetics, 47*(9), 2838–2849.

34. Liu, H.-L., Chen, L., **Deb, K.**, Goodman, E. D. (2017). Investigating the Effect of Imbalance Between Convergence and Diversity in Evolutionary Multi-objective Algorithms. *IEEE Transactions on Evolutionary Computation, 21*(3). 408–425.

35. Ravi, V., Dadabada, P. and **Deb, K.** (2017). Financial Time Series Prediction using Hybrids of Chaos Theory, Multi-Layer Perceptron and Multi-objective Evolutionary Algorithms. *Swarm and Evolutionary Computation,36*, 136–149.

36. Li, X., Epitropakis, M. G., **Deb, K.**, and Engelbrecht, A. (2017). Seeking Multiple Solutions: An Updated Survey on Niching Methods and Their Applications. *IEEE Transactions on Evolutionary Computation, 21*(4), 518–538.

37. Hirvonen, J., Rehman, H., **Deb, K.**, and Sirén, K. (2017). Neural network Metamodeling in multi-objective optimization of a high latitude solar community. *Solar Energy, 155,* 323–335.

38. Mejía, J. A. H. and Schütze, O., Cuate,O., Lara, A. and **Deb, K.** (2017). RDS-NSGA-II: A memetic algorithm for reference point based multi-objective optimization. *Engineering Optimization, 49*(5). 825–845.

39. Schwaab, J., **Deb, K.**, Goodman, E., Lautenbach, S., van Striene, M., and Grêt-Regamey, A. (2017). Reducing the Loss of Agricultural Productivity due to Compact Urban Development in Municipalities of Switzerland. *Computers, Environment and Urban Systems, 65,* 162–177.

40. Ouni, A, Kessentini, M., Ó Cinnéide, M., Sahraoui, H., **Deb, K.**, and Inoue, K. (2017). MORE: A multi-objective refactoring recommendation approach to introducing design patterns and fixing code smells. *Journal of Software: Evolution and Process, 29*(5), 1–26.

41. Li, X. and **Deb, K.** (2017). A derived heuristics based multi-objective optimization procedure for micro-grid scheduling. *Engineering Optimization, 49*(6), 1078–1096.

42. Seada, H., Abouhawwash, M., and **Deb, K.** (2017). Towards Faster Convergence of Evolutionary Multi-Criterion Optimization Algorithms using Karush-Kuhn-Tucker Optimality Based Local Search. *Computers & Operations Research, 79,* 331–346.

43. Ahrari, A., Hong, L., Montassar, A. S., **Deb, K.**, and Tan, X. (2017). Design Optimization of an Artificial Lateral Line System Incorporating Flow and Sensor Uncertainties. *Engineering Optimization, 49*(2), 328–344.

44. Sinha, A. , Malo, P., and **Deb, K.** (2017). Approximated Set-valued Mapping Approach for Handling Multiobjective Bilevel Problems. *Computers & Operations Research, 77,* 194–209.

45. Sinha, A., Malo, P., and **Deb, K.** (2017). Evolutionary Algorithm for Bilevel Optimization using Approximations of the Lower Level Optimal Solution Mapping. *European Journal of Operational Research, 257*(2), 395–411.

46. Bandaru, S., Ng, A. H. C., and **Deb, K.** (2017). Data Mining Methods for Knowledge Discovery in Multi-Objective Optimization: Part A – Survey. *Expert Systems With Applications, 70,* 139–159.

47. Bandaru, S., Ng, A. H. C., and **Deb, K.** (2017). Data Mining Methods for Knowledge Discovery in Multi-Objective Optimization: Part B – New Developments and Applications. *Expert Systems With Applications, 70,* 119–138.

48. **Deb, K.** and Abouhawwash, M. (2016). An Optimality Theory Based Proximity Measure for Set Based Multi-Objective Optimization. *IEEE Transactions on Evolutionary Computation, 20*(4), 515–528.

49. Sinha, A., Malo, P., **Deb, K.**, Korhonen, P., and Wallenius, J. (2016). Solving Bilevel Multi-criterion Optimization Problems with Lower Level Decision Uncertainty. *IEEE Transactions on Evolutionary Computation, 20*(2), 199–217.

50. Seada, H. and **Deb, K.** (2016). A Unified Evolutionary Optimization Procedure for Single, Multiple, and Many Objectives. *IEEE Transactions on Evolutionary Computation, 20*(3), 358–369.

51. Altinoz, T. O. and **Deb, K.** (2016). Late Parallelization and Feedback Approaches for Distributed Computation of Evolutionary Multiobjective Optimization Algorithms. *Neural Computing and Applications.* Springer. DOI: 10.1007/s00521-016-2573-4.

52. Datta, R. and **Deb, K.** (2016). Uniform Adaptive Scaling of Equality and Inequality Constraints Within Hybrid Evolutionary-cum-Classical Optimization. *Soft Computing Journal, 20*(6), 2367–2382.

53. Mkaouer, W., Kessentini, M., Bechikh, S., and Cinnéide, M. Ó, and **Deb, K.** (2016). On the Use of Many Quality Attributes for Software Refactoring: A Many-Objective Search-Based Software Engineering Approach. *Empirical Software Engineering, 21*(6), 2503–2545.

54. Ouni, A., Kessentini, M., Sahraoui, H., Inoue, K., and **Deb, K.** (2016). Multi-criteria Code Refactoring using Search-Based Software Engineering: An Industrial Case Study. *ACM Transactions on Software Engineering and Methodology (TOSEM), 25*(3), 23:1–23:53 (DOI: 10.1145/2932631).

55. Ahrari, A. and **Deb, K.** (2016). An Improved Fully Stressed Design Evolution Strategy for Layout Optimization of Truss Structures. *Computers and Structures, 164*, 127–144.

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2. Mittal, S., Saxena, D. K. and **Deb, K.** (in press). A Running Performance Metric and Termination Criterion for Evaluating Evolutionary Multi- and Many-objective Optimization Algorithms. *Proceedings of Congress on Evolutionary Computation (CEC-2020)*, Piscataway, NJ: IEEE Press.

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Keynote/Plenary Lectures on Genetic and Evolutionary Algorithms

1. 26 April, 2000: **Keynote lecture** at the Advanced Computation in Design and Manufacturing Conference (ACDM-2000) in the University of Plymouth, UK entitled 'Multi-objective evolutionary optimization: Past, present, and future'.

2. 16 January, 2003: **Keynote lecture** on 'Evolutionary Algorithms for Single and Multiple Objective Optimization' during the Symposium on Evolutionary Algorithms at Doshisha University, Kyoto, Japan.

3. 17 September, 2003: **Plenary lecture** on 'Recent Advances on Evolutionary Multi-Objective Optimization' during EUROGEN-2003 conference in Barcelona, Spain.

4. 8 December, 2003: **Keynote lecture** during 'CEC-2003' conference entitled 'Multi-Objective Evolutionary Optimization' in Canberra, Australia.

5. 23 June, 2004: **Keynote lecture** during 'Hydroinformatics' Conference entitled 'Single and Multi-Objective Optimization Using Evolutionary Algorithms' held in Singapore.

6. 7 August, 2004: **Premier Plenary Lecture** entitled 'Evolutionary Multi-Criterion Optimization' during the 17h International Conference on Multiple Criteria Decision Analysis held in Whistler, British Columbia, Canada.

7. 12 December, 2005: **Keynote lecture** at GM Symposium entitled 'Practical Optimization Methods' held in Bangalore, India.

8. 12 January, 2006: **Plenary lecture** at International workshop on Neural Networks and Genetic Algorithms in Materials Science and Engineering entitled 'Practical Optimization Methods in Engineering Design' held in Kolkata, India.

9. 3 August, 2006: **Keynote lecture** at Second South-Asia Altair CAE Users Conference-2006 entitled 'Deciphering Innovative Design Principles Through Optimization' to be held in Bangalore, India.

10. 18 September, 2006: **Plenary lecture** at Bio-inspired Computing: Theory and Applications (BIC-TA)' entitled 'Evolutionary Multi-Objective Optimization (EMO): An Emerging Field of Computing for Practical Problem-Solving' to be held in Wuhan, China.

11. 3 November, 2006: **Keynote lecture** at the 2006 International Conference on Computational Intelligence and Security (CIS) entitled 'Evolutionary Optimization for Practical Problem-Solving' to be held in Guangzhou, China.

12. 12 February, 2007: **Keynote lecture** at the Water Resources Workshop at the University of Adelaide, Australia entitled 'Evolutionary optimization for engineering systems'.

13. 23 February, 2007: **Keynote lecture** at the Conference on Current Trends in Computing & Bioinformatics at CSJM University, Kanpur entitled 'Soft Computing Methodologies and Their Potential in Science and Technology'.

14. 24 February, 2007: **Vision talk** at the Indo-US Workshop on Soft, Quantum and Nano Computing (SQUAN-2007) at Dayalbagh University, Agra entitled 'Evolutionary Computing for Practical Optimization'.

15. 23 March, 2007: **Keynote lecture** at Global Conference on Production and Industrial Engineering at National Institute of Technology, Jalandhar entitled 'Computational optimization: An indespensible companion to scientists and practitioners'.

16. 17 April, 2007: **Keynote lecture** at the First international Conference Multidisciplinary Design Optimization and Applications entitled 'Evolutionary Multi-Objective Optimization and Applications' held in Besanon, France.

17. 30 August, 2007: **Plenary Talk** on the 'Research Day' at Helsinki School of Economics, Finland, entitled 'Multi-Criterion Optimization and Decision-Making Using Darwinian Evolutionary Principles: Research and Practices of the Past Decade'.

18. 21 September, 2007: **Keynote lecture** at Symposium on Intelligence Computation and Applications (ISICA 2007) to be held in Wuhan, China.

19. 12 December, 2007: **Plenary talk** at 7th International Conference on Optimization: Techniques and Applications (ICOTA-07) held in Kobe, Japan entitled 'Evolutionary Multiobjective Optimization and Decision Making'.

20. 09 January, 2008: **Keynote lecture** at 19th International Conference on Multiple Criteria Decision Making (MCDM) held in Auckland, New Zealand entitled 'Evolution's Niche in Multi-Criterion Optimization'.

21. 30 September, 2008: **Keynote lecture** at Rolls-Royce Aerodynamic Design optimization Seminar (RR-ADOS) to be held in Rolls-Royce in Derby, UK entitled 'Evolutionary Optimization for Practical Problem Solving'.

22. 13 October, 2008: **Keynote lecture** at the 3rd International Conference on Bioinspired Optimization Methods and their Applications (BIOMA-2008) to be held in Ljubliana, Slovenia entitled 'Evolutionary Multi-Objective Optimization and Decision Making'.

23. 07 December, 2008: **Keynote lecture** at the Seventh International Conference on Simulated Evolution And Learning (SEAL'08) to be held in Melbourne, Australia entitled 'Evolutionary Multi-Objective Optimization and Decision Making'.

24. 12 February, 2009: **Keynote lecture** at the Sixth Spanish Conference on Metaheuristics entitled 'Evolutionary Multi-objective Optimization'.

25. 19 May, 2009: **Keynote lecture** at the IEEE Congress on Evolutionary Computation (CEC-2009) to be held in Trondheim, Norway entitled 'Evolution's Niche in Applied Optimization and Informatics'.

26. 4 June, 2009: **Keynote lecture** at Papermaking Research Symposium in Kuopio, Finland entitled 'Evolutionary Optimization in Practice'.

27. 24 April, 2010: **Keynote lecture** at a workshop on 'The Art and Science of Product Development' at General Motors, Bangalore entitled 'Innovization and its application in product design and development'.

28. 15 September, 2010: **Keynote lecture** at 15th FIRA Robot World Cup and Congress at Bangalore, India entitled 'Evolutionary Multi-Objective Optimization and Applications in Games and Robotics'.

29. 16 December, 2010: **Keynote lecture** at International conference on Swarm, Evolutionary and Memetic Computing (SEMCCO 2010) in Chennai, India, entitled 'Evolutionary Multi-Objective Optimization'.

30. 23 March, 2011: **Keynote lecture** at the National Conference on Operations Research Applications in G. L. Bajaj Institute of Technology and Management, Greater Noida, India, entitled 'Evolutionary Optimization in Operations Research'.

31. 14 September 2011: **Plenary lecture** at the International Conference on Evolutionary and Deterministic Methods for Design, Optimization and Control with Applications to Industrial and Societal Problems (EUROGEN-2011), Italian Aerospace Research Center (CIRA), Capua, Italy, entitled 'Multi-Objective Optimization for Engineering Design'.

32. 04 November, 2011: **Plenary lecture** at the Optimization Seminar organized by Vanderplatts Inc. in Detroit, USA entitled 'Evolutionary optimization and its scope in practical problem solving'.

33. 09 November, 2011: **Plenary lecture** at Users' group meeting of ModeFrontier at Detroit, USA entitled 'Innovization: Revealing innovative design principles through multi-objective optimization'.

34. 25 January, 2012: **Keynote lecture** at Dagstuhl Seminar on "Practical Multi-objective Optimization" entitled 'Innovization: Learning Problem Knowledge Through Multi-Objective Optimization' held at Schloss Dagstuhl, Saarbrucken, Germany.

35. 26 February, 2012: **Guest of Honor Lecture** at Central Mechanical and Electrical Research Institute (CMERI), Durgapur, India on 'An Introduction to Evolutionary Multi-objective Optimization'.

36. 17 March, 2012: **Keynote lecture** at the Students Conference on Engineering and Systems (SCES-2012) held at MNNIT, Allahabad, India entitled 'Niches of Evolutionary Optimization in Practice'.

37. 10 July, 2012: **Keynote lecture** at the 14th IPMU conference (International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems) at Catania, Italy on 'Evolutionary Multi-Objective Optimization'.

38. 29 September, 2012: **Keynote lecture** at Fourth Symposium on Search Based Software Engineering (SSBSE 2012) in Riva del Garda, Italy entitled 'Recent Advancements in Evolutionary Multi-objective Optimization'.

39. 20 March, 2013: **Keynote lecture** at Seventh International Conference on Evolutionary Multi-Criterion Optimization (EMO-13) held at University of Sheffield, UK entitled 'Many-Objective Evolutionary Optimization'.

40. 11 January 2014: **Keynote Lecture** at University of Pune, India entitled 'Applied optimization with single and multiple conflicting criteria'.

41. 29 May 2014: **Keynote Lecture** at International Workshop on Optimization in Engineering held at Bankura, India entitled 'Role of optimization in engineering problem solving'.

42. 1 July 2014: **Keynote Lecture** at International Conference on EVOLVE held in Beijing, China entitled 'Uncertainty handling using evolutionary multi-objective optimization'.

43. 8 July 2014: **Invited Lecture** at World Congress on Computational Intelligence (WCCI-2014) held at Beijing, China entitled 'Evolutionary Multi-objective optimization: Two eventful decades and beyond'.

44. 24 September 2014: **Keynote Lecture** at Numerical and Evolutionary Optimization (NEO-2014) Conference held at Mexico City, Mexico entitled 'How Useful Theoretical Optimality Conditions Are in Assessing Numerical and Evolutionary Optimization Algorithms?'.

45. 3 October 2014: **Keynote Lecture** at INFORMS Southeast Michigan Symposium held at Kellogg Center, East Lansing, USA entitled 'Evolutionary multi-criterion optimization and decision-making'.

46. 15 October 2014: **Keynote Lecture** at 'Optimize This!' – Red Cedar Technology Software User's group meeting to be held at Detroit, USA entitled 'Recent developments in evolutionary multi-objective optimization'.

47. 10 December 2014: **Keynote Lecture** at Third International Conference on the Theory and Practice of Natural Computing (TPNC 2014) to be held at Granada, Spain entitled 'Evolutionary multi-criterion optimization and decision-making'.

48. 12 December 2014: **IEEE Distinguished Lecture** at IIT Kanpur, India entitled 'Evolutionary multi-criterion optimization: Introduction to Theories and Applications'.

49. 26 February 2015: **Keynote Lecture** at North American Search Based Software Engineering Symposium (NasBASE-2015) entitled 'Recent Advancement and Applications of Evolutionary Multi-Criterion Optimization in SBSE'.

50. 18 June 2015: **Keynote Lecture** at EVOLVE Conference at Iasi, Romania entitled 'Evolutionary Multi-Objective Optimization and Its Applications'.

51. 22 July 2015: **Institute Lecture** at Indian Institute of Technology Kharagpur, India entitled 'Evolutionary Optimization for Engineering Problem Solving'.

52. 24 July 2015: **Keynote Lecture** at 30th National Convention of Production Engineers and organized by Tripura State Centre of The Institution of Engineers (India) at National Institute of Technology Agartala, India entitled 'Nature's Niche in Applied Problem Solving'.

53. 7 August 2015: **Infosys Lecture** at Indraprastha Institute of Information Technology (IIIT-D), Delhi entitled 'Nature's Niche in Multi-criterion Design and Optimization'.

54. 18 September 2015: **Invited** Lecture during Big Data Analytics conference entitled 'A Dynamic Optimization Framework for Practical Problem Solving' organized by Quicken Loan and Title Source.

55. 25 September 2015: **Ezra Roundtable Systems Engineering Lecture** at Cornell University entitled 'Nature's Niche in Multi-criterion Design and Optimization'.

56. 23 November 2015: **IEEE Distinguished Lecture** at City University of Hong Kong entitled 'Recent Advances in Evolutionary Many-Criterion Optimization'.

57. 24 November 2015: **Keynote Lecture** at Second International Conference on Soft Computing & Machine Intelligence (ISCMI-2015) entitled 'Evolutionary Optimization for Practical Problem Solving'.

58. 26 November 2015: **IEEE Distinguished Lecture** at USTC, Heifei, China entitled 'Advances in Evolutionary Multi-Criterion Optimization and Decision-Making'.

59. 4 February 2016: **Keynote Lecture** at ACALCI, organized by University of New South Wales, Canberra, Australia entitled 'A Theoretical Convergence Measure for Multi-Objective Optimization Algorithms'.

60. 5 February 2016: **Keynote Lecture** at Computational Optimization in Engineering Design Workshop at University of New South Wales, Canberra, Auatralia entitled 'Evolutionary Advances in Evolutionary Many-objective Optimization Methods'.

61. 29 February 2016: **This Weeks Discoveries Series Lecture** at Leiden University entitled 'Breaking the Billion Variable Barrier in Real-World Optimization'.

62. 01 April, 2016: **Beacon Lecture'** at NSF-Beacon Center at MSU entitled 'Breaking the Billion Variable Barrier in Real-World Optimization'.

63. 24 September, 2016: **Keynote Lecture** at IEEE International Conference on Research in Computational Intelligence and Communication Networks (ICRCICN 2016) held at Kolkata, India entitled 'Multi-objective optimization for Computational Intelligence'.

64. 23 September, 2016: **JC Bose Memorial Award Lecture** at Indian Statistical Institute, Kolkata, India entitled 'Optimization via Nature: Principles, Performances, and Promises'.

65. 26 September, 2016: **Institute Lecture** at Indian Institute of Technology Guwahati, India entitled 'Nature Inspired Methods for Optimization'.

66. 12 October 2016: **Keynote Lecture** at 'Optimize This!' Heeds Users Conference entitled 'Visualizing Many-Objective Optimal Solutions for an Informed Decision-Making'.

67. 23 November 2016: **IEEE Distinguished Lecture** at RMIT, Australia and University of Melbourne entitled 'Niches of Population-Based Optimization Algorithms in Practice'.

68. 23 December, 2017: **Keynote Lecture** at 7th International Conference Soft Computing for Problem Solving (SocProS-2017) at IIT Bhubaneswar, India entitled 'Nature's Niche in Optimization Problem Solving'.

69. 9 July, 2018: **Plenary Lecture** at 2018 World Congress on Computational Intelligence (WCCI-2018) held at Rio de Janeiro, Brazil entitled 'The Rise of Evolutionary Multi-Criterion Optimization: Directed or Destined'.

70. 26 July, 2018: **Keynote Lecture** at International Seminar on Intelligent Computing (ISIC-2018) conference at RCC Institute of Information Technology, Kolkata, India entitled 'Rise of Evolutionary Multi-Objective Optimization: Past 25 Years of Research and Application'.

71. 27 July, 2018: **Keynote Lecture** at Second International Conference on Computational Intelligence, Communications, and Business Analytics (CICBA-2018) held at University of Kalyani, India, entitled 'Customized Optimization for Practical Problem Solving.

72. 26 September, 2018: **Keynote Lecture** at Numerical and Evolutionary Optimization (NEO-2018) held at Mexico City, Mexico entitled 'Extreme-Scale Evolutionary Optimization: A Case Study on a Billion-Variable Resource Allocation Problem'.

73. 20 November 2018: **IEEE CIS Disntiguished Lecture** at Indian Institute of Science, Bangalore, India entitled 'Rise of Evolutionary Multi-Criterion Optimization: A 25-Year Perspective'.

74. 20 November, 2018: **Plenary Lecture** at Symposium Series of Computational Intelligence (SSCI-2018) held at Bangalore, India entitled 'Customized Optimization for Practical Problem Solving'.

75. 14 January, 2019: **Invited Lecture** at BioSense Institute, Serbia entitled 'Multi-objective Optimization and Its Application in Precision Irrigation Systems'.

76. 21 March, 2019: **Invited Lecture** at King Mongkut's University (KMUTT), Bangkok, Thailand entitled 'Introduction to Genetic Algorithms and Evolutionary Computing'.

77. 21 March, 2019: **Invited Lecture** at King Mongkut's University (KMUTT), Bangkok, Thailand entitled 'Trends in Multi-Objective Optimization'.

78. 24 March, 2019: **Keynote Lecture** at ISMSI-2019 conference in Male, Maldives entitled 'Customized Metaheuristics for Intelligent System Design'.

79. 25 March, 2019: **Infosys Lecture** at M S Ramaiah University of Applied sciences, Bangalore, India entitled 'Customized Optimization for Practical Problem Solving'.

80. 18 June, 2019: **Keynote Lecture** at Numerical Computations – Theory and Algorithms (NUMTA-2019) Conference at Crotone, Italy entitled 'Karush-Kuhn-Tucker Proximity Measure for Convergence of Real-parameter Single and Multi-objective Optimization'.

81. 21 June, 2019: **IEEE CIS Distinguished Lecture** at Genova, Italy entitled 'Customized Optimization for Practical Problem Solving'.

82. 10 July, 2019: **Invited Lecture** at Department of Mathematics, Indian Institute of Technology Roorkee entitled 'A Theoretical Proximity Measure for Convergence of Single and Multi-Criterion Evolutionary Optimization'.

83. 23 July, 2019: **Institute Lecture** at Indian Institute of Technology Roorkee, India entitled 'Optimization: Scope, Methods, Challenges, and Directions for Practical Problem Solving'.

84. 15 August, 2019: **Invited Lecture** at ASSAR Technology Park Workshop organized at University of Skovde, Sweden entitled 'Large Scale Optimization For Real-World Applications'.

85. 25 September, 2019: **Keynote Lecture** at IPDO Conference in Tianjin, China entitled 'Customized Optimization for Practical Problem Solving'.

86. 16 October, 2019: **Keynote Lecture** at 15th International Congress Technological Trends in Computing (CTTC-2019) in Mexico City entitled 'Advances in Multi-objective Optimization'.

87. 01 November 2019: **Plenary Lecture** Lecture at ICETET-SIM-2019 Conference at G. H. Raisoni College of Engineering, Nagpur, India entitled 'Customized Optimization for Practical Problem Solving'.

88. 15 November 2019: **Invited Lecture** at Workshop on "Emergent Optimization Methods and Applications" at IIT Roorkee Extension, Greater Noida, India entitled 'Engine Design for Six Objectives'.

89. 20 November 2019: **Keynote Lecture** at Internatioonal Conference on Artificial Intelligence and Applications held at College of Engineering Roorkee, India entitled 'Evolutionary Computation and Machine Learning Reinforce Each Other'.

90. 12 December 2019: **Keynote Lecture** at SOM-2019 Conference at IIT Kanpur, India entitled 'Heuristics and Metaheuristics: Applications and Future'.

91. 29 June 2020: **Keynote Lecture** at Deep Learning and Artificial Intelligence Summer School 2020 (DLAI3) at Bangkok, Thailand entitled 'Recent Advances in Evolutionary Multi-Criterion Optimization and Future ¿ Studies' (online).

92. 10 July, 2020: **Keynote Lecture** at GECCO-2020 Conference at Cancun, Mexico entitled 'Evolutionary Computation's Niche for Solving Multi-Criterion Optimization Problems' (online).

93. 5 August, 2020: **Plenary Lecture** at International Conference on Modeling, Simulations and Optimizations (CoMSO-2020) at Silchar, India entitled 'Nature's Niche in Solving Multi-Criterion Optimization' (online).

94. 5 September, 2020: **Keynote Lecture** at International Conference on Recent Advances in Computational and Experimental Mechanics (ICRACEM) at IIT Kharagpur entitled 'Advances in Optimization Methods for Engineering Problem Solving' (online).

95. 02 November, 2020: **Keynote Lectue** at The 12th International Joint Conference on Computational Intelligence (IJCCI-2020) at Budapest, Hungary entitled 'Nature-Inspired Multi-Objective Optimization' (online).

96. 18 November, 2020: **Keynote Lecture** at Numerical and Evolutionary Optimization (NEO-2020) Conference at Oaxaca , Mexico entitled 'Evolutionary Multi-Criterion Optimization: Three Decades of Research and Applications' (online).

97. 11 December, 2020: **Keynote Lecture** at International Conference on Computational Intelligence, Security & IoT (ICCISIoT-2020) Conference at NIT Agartala, India entitled 'Advances in Computational Intelligence Techniques in Practical Problem Solving' (online).

98. 23 June, 2021: **Plenary Lecture** at International Conference on Theoretical and Applicable Optimization and Control-2021 (TAOC-2021) at Baku, Azerbaijan entitld 'Applied Optimization Through Customized Algorithms'.

Invited Tutorials/Workshops on Multi-Objective Optimization (July'98 – Present)

1. 26 September 1998: Parallel Problem Solving from Nature-98, Amsterdam, The Netherlands

2. 6 April 1999: International Conference on Artificial Neural Networks and Genetic Algorithms (ICANNGA-99), Portoroz, Slovenia

3. 15 April 1999: ACDM/EvoDES Workshop, University of Bath, United Kingdom

4. 3 May 1999: French JET (Journees Evolutionaires Trimestrielles), University of Paris, France

5. 2 June 1999: EUROGEN Workshop, 'Evolutionary Algorithms for Multi-Criterion Optimization in Engineering Design', University of Jyväskylä, Finland

6. 13 July 1999: Workshop at Genetic and Evolutionary Computation Conference (GECCO), Omni Rosen Hotel, Orlando, USA

7. 14 July 1999: 'Messy Genetic Algorithms and Linkage Learning', Genetic and Evolutionary Computation Conference, Orlando, USA

8. 10 April 2001: An invited lecture at the Colloquium organized by the Biology-Inspired Computation Group, ETH, Zürich, Switzerland entitled 'An Introduction on Evolutionary Multi-Criterion Optimization'.

9. 27 May 2001: An invited tutorial given at the 'International Conference on Multi-Criterion Decision Making' held in Cairo, Egypt entitled 'An Introduction to Evolutionary Multi-Objective Optimization'.

10. 8 July 2001: An invited tutorial given at the GECCO-2001 Conference held in San Fransisco, USA in July 2001 entitled 'Multi-Criterion Optimization'.

11. 10 July 2002: Invited to present a tutorial during CEC-2002 Conference held in Honolulu, USA entitled 'Recent Trends in Evolutionary Multi-Criterion Optimization'.

12. 18 November, 2002: Invited to present a tutorial during SEAL-2002 Conference to be held in Singapore entitled 'Multi-Criterion Evolutionary Optimization'.

13. 17 August, 2003: Invited to present a tutorial during 'Multi-disciplinary International Scheduling Conference (MISTA)' under the theme 'Tutorials in Modern Optimization Methods' at the University of Nottingham, UK.

14. 26 June, 2004: Invited to deliver a tutorial on Evolutionary Multi-Objective Optimization during Genetic and Evolutionary Computation Conference (GECCO) 2004 conference held in Seattle, USA.

15. 8 November, 2004: A tutorial entitled 'Evolutionary Multi-objective Optimization' at Schloss Dagstuhl, Germany.

16. 7 February 2005: Workshop on 'Evolutionary Optimization Techniques' at GE's John F. Welch Technology Centre, Bangalore.

17. 10 January, 2006: Tutorial entitled 'An Introduction to Genetic Algorithms' held in Bengal Engineering and Science College, Kolkata, India.

18. 2-15 July, 2006: Tutorial entitled 'Evolutionary Methods to Multi-Criterion Optimization' at the 2006 MCDM Summer School held in Kainan University of Taiwan.

19. 9 July, 2006: Tutorial entitled 'Evolutionary Practical Optimization' at the 2006 Genetic and Evolutionary Computation Conference (GECCO-2006) held in Seattle, USA.

20. 16 July, 2006: Tutorial entitled 'Evolutionary Multi-Objective Optimization' at the World Congress on Computational Intelligence (WCCI-2006) held in Vancouver, Canada.

21. 18 July, 2006: Organizer of the Panel Discussion on 'Evolutionary Multi-Objective Optimization' held during WCCI Conference in Vancouver, Canada.

22. 7 July, 2007: Tutorial at GECCO-2007 in University College London entitled 'Evolutionary Practical Optimization'

23. 8 July, 2007: Tutorial at GECCO-2007 in University College London entitled 'Evolutionary Multi-Criterion Optimization' (along with Eckart Zitzler)

24. 20 September, 2007: Tutorial delivered at the Seventh International Conference on Evolvable Systems – From Biology to Hardware (ICES 2007) held in Wuhan, China entitled 'Evolutionary Multi-Objective Optimization (EMO)'.

25. 25 September, 2007: Tutorial delivered entitled 'Evolutionary Multi-Criterion Optimization (EMO): Fundamentals, State-of-the-art Methodologies and Future Challenges' during Congress on Evolutionary Computation (CEC-2007) in Singapore.

26. 12 July, 2008: Tutorial delivered at GECCO-2008 in Renaissance Atlanta Hotel, USA, entitled 'Evolutionary Multi-Criterion Optimization' (along with Eckart Zitzler).

27. 13 July, 2008: Tutorial delivered at GECCO-2008 in Renaissance Atlanta Hotel, USA, entitled 'Evolutionary Practical Optimization'.

28. 07 December, 2008: Tutorial delivered at SEAL-2008 Conference in Melbourne, Australia entitled 'Evolutionary Multi-Objective Optimization (EMO)'.

29. 18 May, 2009: Tutorial delivered at CEC-2009 Conference in Trondheim, Norway entitled 'Recent Challenges to Evolutionary Multi-Criterion Optimization (EMO)'.

30. 12 June, 2009: Tutorial delivered at ACM SIGEVO sponsored Genetic and Evolutionary Computation (GEC-Summit) in Shanghai, China entitled 'Evolutionary Multi-Objective Optimization: Current Approaches and Future Directions'.

31. 21 June, 2009: Tutorial at Multiple Criterion Decision Making (MCDM) Conference in Chengdu, China entitled 'Evolutionary Multi-Criterion Optimization and Its Applications'.

32. 14 September, 2009: CSIRO Multiobjective Optimisation Workshop entitled 'Introduction to Multi-Objective Optimization' and 'Introduction to NSGA-II' at CSIRO, New Castle, Australia.

33. 8 July, 2010: Tutorial delivered at GECCO-2010 Conference in Portland, USA entitled 'Evolutionary Multi-Criterion Optimization'.

34. 10 June, 2012: Tutorial delivered at WCCI-2012 conference in Brisbane, Australia entitled 'Evolutionary Multi-Criterion Optimization'.

35. 20 June, 2013: Tutorial delivered at CEC-13 conference in Cancun, Mexico entitled 'Evolutionary Multi-Criterion Optimization'.

36. 14 July, 2014: Tutorial delivered at GECCO-2014 conference in Vancouver, Canada entitled 'Evolutionary Bilevel Optimization'.

37. 20 September 2014: Tutorial delivered at School for Advanced Studies in Automation and Control, 20-21 September 2014, Belo Horizonte, Brazil entitled 'Introduction to evolutionary optimization'.

38. 20 September 2014: Tutorial delivered at School for Advanced Studies in Automation and Control, 20-21 September 2014, Belo Horizonte, Brazil entitled 'Evolutionary Optimization for Multi-Objective Optimization and Knowledge Creation'.

39. 25 May, 2015: Tutorial delivered at Congress on Evolutionary Computation (CEC-2015) at Sendai, Japan entitled 'Evolutionary Bilevel Optimization'.

40. 5 June, 2017: Tutorial delivered at Congress on Evolutionary Computation (CEC-2017) at San Sebastian, Spain entitled 'Evolutionary Bilevel Optimization' (with Ankur Sinha).

41. 16 July, 2017: Tutorial delivered at Genetic and Evolutionary Computation Conference (GECCO-2017) at Berlin, Germany entitled 'Recent Advances in Evolutionary Multi-Criterion Optimization'.

42. 27 November, 2017: Tutorial delivered at Symposium Series on Computational Intelligence (SSCI-2017) in Honolulu, USA entitled 'Recent Advances in Evolutionary Multi-Criterion Optimization'.

43. 8 July 2018: Tutorial delivered at World Congress on COmputational Intelligence (WCCI-2018) in Rio de Janiero, Brazil entitled 'Dynamic Multi-objective Optimization: Challenges, Applications and Future Directions'.

44. 9 July 2018: Tutorial delivered at World Congress on COmputational Intelligence (WCCI-2018) in Rio de Janiero, Brazil entitled 'Evolutionary Bilevel Optimization: Applications and Methods'.

45. 18 November 2018: Tutorial delivered at Symposium Series on Computational Intelligence (SSCI-2018) in Bangalore, India entitled 'Recent Advances in Evolutionary Multi-Criterion Optimization'.

Invited Talks on Genetic and Evolutionary Algorithms (Since Jan'98)

1. 12 January 1998: 'An Introduction to Genetic Algorithms', International Workshop on Soft Computing and Intelligent Systems, Indian Statistical Institute, Calcutta, India

2. 4 May 1998: 'An Introduction to Genetic Algorithms', National Remote Sensing Agency, Hyderabad, India

3. 15 July 1998: 'An Introduction to Genetic Algorithms', University of Braga, Portugal

4. 15 July 1998: 'Multi-Objective Optimization Using Genetic Algorithms', University of Braga, Portugal

5. 16 July 1998: 'Messy Genetic Algorithms: An Introduction', University of Braga, Portugal

6. 17 July 1998: 'An Introduction to Genetic Algorithms', University of Porto, Portugal

7. 20 July 1998: 'An Introduction to Multi-Objective Optimization Using Genetic Algorithms', University of Coimbra, Portugal

8. 26 October 1998: 'Real-parameter Genetic Algorithms Using Simulated Binary Crossover', University of Dortmund, Germany

9. 28 October 1998: 'An Overview of Genetic Algorithms', Swiss Federal Institute of Technology, ETH, Zürich, Switzerland

10. 12 November 1998: 'Genetic Algorithms in Engineering Design', University of Mainz, Germany

11. 20 November 1998: 'Real-Parameter Genetic Algorithms with Simulated Binary Crossover', Technical University of Berlin, Germany

12. 1 December 1998: 'Multi-Objective Genetic Algorithms with Non-Dominated Sorting', Centrum voor Wiskunde en Informatica (CWI), Amsterdam, The Netherlands

13. 17 March 1999: 'Real-parameter Genetic Algorithms for Engineering Design', GMD, St. Augustin, Bonn, Germany

14. 8 April 1999: 'Multi-Objective Genetic Algorithms', University of Ljubljana, Slovenia

15. 9 April 1999: 'Introduction to Genetic Algorithms and Multi-Objective Optimization', University of Trieste, Italy

16. 16 April 1999: 'Self-Adaptation in Real-Parameter Genetic Algorithms', Plymouth Engineering Design Centre, University of Plymouth, United Kingdom

17. 3 May 1999: 'An Overview of Multi-Objective Genetic Algorithms', University of Paris, France

18. 22 May 1999: 'Multi-Criterion Optimization Using Evolutionary Algorithms', University of Karlsruhe, Germany

19. 31 May 1999: 'Real-Parameter Genetic Algorithms in Engineering Design', EUROGEN-99, University of Jyväskylä, Finland

20. 9 July 1999: 'An Introduction to Multi-Objective Evolutionary Algorithms', Department of Computer Science, University of Missouri at St. Louis, USA

21. 12 July 1999: 'Multi-Objective Genetic Algorithms', Air Force Institute of Technology, Wright-Patterson Research Laboratory, Ohio, USA

22. 16 February 2000: 'Real-Coded Genetic Algorithms', Dagstuhl Seminar, at Schloss Dagstuhl, Saarbrücken, Germany.

23. 22 September 2000: 'An Introduction to Genetic Algorithms', ABB Heidelberg, Germany.

24. 9 December 2000: 'Non-dominated Sorting Genetic Algorithms for Multi-Objective Optimization', Tenth NASAS Conference, IIT Kanpur.

25. 6 July 2001: 'Evolutionary Multi-Objective Optimization' at National Institute for Standards and Technology (NIST), Gaithersburg, USA.

26. 14 January 2002: 'Test Problem Design for Multi-Objective Evolutionary Algorithms', Dagstuhl Seminar, at Schloss Dagstuhl, Saarbrücken, Germany.

27. 25 February 2002: Invited to present a lecture on 'An Introduction to Evolutionary Multi-Criterion Optimization' at Vikram Sarabhai Space Research Centre, Trivandram, India.

28. 17 June, 2002: 'An Introduction to Multi-objective Evolutionary Algorithms' at University of Essex, UK.

29. 21 June, 2002: 'Real-Parameter Genetic Algorithms' at University of Birmingham, UK.

30. 24 June, 2002: 'An Introduction to Multi-Objective Evolutionary Algorithms' at the University of West of England, UK.

31. 21 November, 2002: 'Evolutionary Multi-Objective Optimization' delivered at National University of Singapore (NUS).

32. 4 December, 2002: 'Evolutionary Algorithms Pattern Recognition and Image Processing', CIMPA (International Center for Pure and Applied Mathematics, France) School on Soft computing approach to pattern recognition and image processing at Indian Statistical Institute, Kolkata, India.

33. 14 January, 2003: 'Evolutionary Multi-Objective Optimization' at Osaka Prefecture University, Japan.

34. 24 June, 2004: 'Advances on Evolutionary Multi-Objective Optimization' at Nang Yang Technological University (NTU) in Singapore.

35. 6 August, 2004: 'Single and Multi-Objective Evolutionary Optimization' at Simon Fraser University, Surrey Campus in Vancouver, Canada.

36. 17 May, 2005: 'Single and Multi-Objective Evolutionary Optimization for Engineering Problem Solving' at University of Pavia, Italy.

37. 18 May, 2005: 'Evolutionary Multi-Objective Optimization: A Decade of Research and Applications' at University of Pavia, Italy.

38. 27 July, 2005: 'Innovization: Innovative Designs Through Optimization' at University of Algarve, Portugal.

39. 5 September, 2005: 'Innovization: Innovating Design Principles Through Optimization' at University of Aalborg, Denmark.

40. 3 October, 2005: 'Optimization: A Indespensible Companion to Engineers and Scientists', N. Rama Rao Distinguished Lecture at CSE, IIT Kanpur.

41. 13 December, 2005: 'Multi-Objective Optimization Using Evolutionary Methods' at Post-SAROD Conference in IISc, Bangalore.

42. 9 January, 2006: 'Practical Methods of Optimization' at Tata Steel, Jamshedpur, India.

43. 7 February, 2006: 'Functional Decomposition of NSGA-II for Various Problem Solving Tasks', Schloss Dagstuhl, Germany.

44. 11 February, 2006: 'Hans-Paul, Predator-Prey and Multi-Objective Optimization', Colloquium at University of Dortmund, Germany.

45. 14 February, 2006: 'Practical Optimization Using Evolutionary Optimization', General Motors, Warren, USA.

46. 15 February, 2006: 'Discovering Important Design Principles Using Multi-Objective Optimization', Clemson University, USA.

47. 28 February, 2006: 'Evolutionary Optimization for Problem Solving and Knowledge Discovery', CNR Rao Distinguished Lecture, IIT Kanpur.

48. 24 May, 2006: 'Unveiling Innovative Design Principles Using Multi-Objective Optimization', Department of Electrical and Computer Engineering, National University of Singapore (NUS).

49. 8 June, 2006: 'Innovization: Innovating Design Principles Through Optimization', School of Electrical and Electronic Engineering, Nanyang Technological University (NTU), Singapore.

50. 4 August, 2006: Invited lecture entitled 'Evolutionary Practical Optimization' during Altair CAE User's Conference held in Bangalore.

51. 6 January, 2007: 'Non-linear Multi-Objective Optimization using Evolutionary Algorithms', IIT Kharagpur during ORSI Convention.

52. 8 February, 2007: 'Optimization Research at IIT Kanpur', during Indo-US Workshop on Computational Optimization and Analysis of Systems (COSA-2007)' at IIT Kanpur.

53. 06 July 2007: 'Innovization: Unveiling Design Principles Using Optimization' at the Department of Mechanical Engineering, Helsinki University of Technology, Espoo, Finland.

54. 06 September 2007: 'Evolutionary Practical Optimization' at the Systems Analysis Laboratory, Helsinki University of Technology, Espoo, Finland.

55. 14 September 2007: 'Introduction to Evolutionary Optimization' at Department of Business Technology, Helsinki School of Economics.

56. 18 September 2007: 'Introduction to Evolutionary Optimization' at the Department of Mathematical Information Technology, University of Jyvskyl

57. 24 October 2007: 'Evolutionary Optimization for Practical Problem Solving' at Nokia, Espoo, Finland.

58. 8 November 2007: 'Evolutionary Optimization for Practical Problem Solving' at the Department of Physics, University of Kuopio

59. 22 November 2007: 'Evolutionary Optimization: Introduction and Applications' at the Department of Mechanical Engineering, University of Turku

60. 05 December, 2007: 'Evolutionary Computing for Applied Single and Multi-Criterion Optimization' – an invited lecture at University of Skovde, Sweden

61. 31 January 2008: 'Evolutionary computation for applied single and multi-criterion optimization' at University of Nantes, France.

62. 10-12 February 2008: Short course on 'Evolutionary Computation' delivered for PhD students at University of Carlos III, Madrid, Spain.

63. 12 March 2008: 'Higher Education in India' at the Doctoral Studies Centre, Helsinki School of Economics, Finland.

64. 19 March 2008: 'Practical Optimization Using Evolutionary Methods' at KONE, Espoo, Finland.

65. 28 March 2008: 'Innovization: Innovation through Multi-Criterion Optimization' at the Department of Mathematical Information Technology, University of Jyvskyl

66. 4 April 2008: 'Evolutionary Practical Optimization' at the Ship Laboratory, Helsinki University of Technology, Espoo, Finland

67. 9-11 April 2008: Master's Course on 'Evolutionary Computation' delivered at University of Pavia, Italy.

68. 07 May 2008: 'Computational Optimization for Innovative Knowledge Discovery' at MASI Technology programme, Finnish Funding Agency for Technology and Innovation (TEKES), Finland

69. 22 May 2008: 'Knowledge Discovery Through Multi-Criterion Optimization', Invited Boat Seminar organized by Helsinki School of Economics

Invited talks after 22 May 2008 are not updated.