

Curriculum Vitae: Kalyan Shankar Bhattacharjee

CONTACT INFORMATION

Industrial Research Intern, Canon Information Research Systems Australia (CiSRA), Sydney, NSW.

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Profiles: [GitHub](#), [LinkedIn](#), [Google Scholar](#)

CAREER SUMMARY I am currently on a program leave from being a postgraduate researcher with the *School of Engineering and Information Technology, University of New South Wales (UNSW), Canberra* to pursue an industrial research internship for six months with the Canon Information Systems Research Australia (CiSRA) in collaboration with Australian Mathematical Sciences Institute (AMSI) on Image and Video Understanding using Machine Learning. Since september 2014, I am a part of the Multidisciplinary Design Optimization Group ([WWW: MDO Webpage](#)) at UNSW Canberra. I obtained my B.Tech (Hons.) in 2012, M.Tech in 2013 from *Indian Institute of Technology (IIT), Kharagpur, India* in Ocean Engineering and Naval Architecture. Between 2013 and 2014, I worked with an e-learning start-up in India (*Unbound Learning Networkx*) for 4 months. As a research associate in IIT Khargpur, I worked on a project in collaboration with Naval Science & Technological Laboratory (NSTL), Visakhapatnam for 8 months. I currently hold a **permanent residency** in Australia.

CAREER INTERESTS

My primary focus lies in the area of theoretical and applied machine learning and multidisciplinary optimization, with a deeper understanding of computationally expensive optimization and artificial Intelligence. I am in continuously development of novel, practical and efficient algorithms for the solution of computationally expensive optimization problems in the field of machine learning and big data. Such problems are commonly encountered in virtually all fields of science and engineering, such as in multidisciplinary product design, video understanding, image detection, biochemical pathway modeling, therapy planning, optimal management of natural resources etc.

EDUCATION

- **Ph.D.**, University of New South Wales (UNSW), Canberra, Ongoing (Expected to finish by March, 2018).
- **M.Tech.**, Indian Institute of Technology, Kharagpur, India, August 2013, CGPA: 8.91/10
- **B.Tech.(Hons.)**, Indian Institute of Technology, Kharagpur, India, August 2012, CGPA: 8.96/10

EXPERIENCE

- **Industrial Research Intern:** Development of deep learning for image and video understanding at **Canon Information Systems Research Australia (CiSRA)**, Sydney in collaboration with the **Australian Mathematical Sciences Institute (AMSI)**. September, 2017 to March, 2018.
Understanding and Skills: Image & video understanding, Convolutional neural network (CNN), Recurrent neural network (RNN): Long short term memory (LSTM), Deep learning, Python, TensorFlow, Keras, Sonnet, Theano, CUDA, GPU.
- **Tutor:** Engineering Practice and Design: CATIA (ZEIT 1501), First Year Undergraduate Course in S2-2016. **University of New South Wales, Canberra**, July, 2016 to November, 2016.
Understanding and Skills: CATIA, Health and safety, Product design.
- **Research Assistant:** Development of optimization techniques to tackle computationally expensive problems at **University of New South Wales, Canberra**, July, 2015 to March, 2017. Algorithms developed during this phase are being used in several professional and academic organisation on a regular basis.
Understanding and Skills: Heuristics and meta-heuristics, Surrogate assisted optimization, Multifidelity optimization, Multi-and many-objective optimization, SVM, Decision Making, Classification, Clustering, Constraint handling, MATLAB, C++, Microsoft Office, LaTeX.
- **Research Assistant:** Hydrodynamic Design & Development of Trimaran & Delta Hull Forms (Project Code: TDHF), **Naval Science & Technological Laboratory (NSTL)**, Visakhapatnam, India, Dec, 2013–Aug, 2014.
Understanding and Skills: Ship design, Hydrodynamics, ShipFlow, MAXSURF, NAPA, AutoCAD.
- **Visiting Researcher:** Development of continuum damage model for high impact load using Element Free Galerkin Method, funded by **Centre for Advanced Composite Materials (CACM)** at the **University of Auckland**. May, 2012 to Jul, 2012.
Understanding and Skills: Damage modelling, thermomechanical modelling, Composites,

MATLAB, Fortran.

- **Honorary Research Intern:** Development of transient elasto-plastic model for welding using Element Free Galerkin Method, at the **University of Auckland**. May, 2011 to Jun, 2011.
Understanding and Skills: Transient thermomechanical modelling, Finite Element Method, ANSYS, MATLAB, Fortran.
- **Research Assistant:** Maritime Safety Modeling using Fuzzy Logic, **Indian Institute of Technology, Kharagpur, India**, July, 2010 to Nov, 2010.
Understanding and Skills: Fuzzy logic, MATLAB.
- **Research Assistant:** Automated Oceanographic feature extraction from satellite remote sensing data using Neural Network architecture, **Indian Institute of Technology, Kharagpur, India**, Dec, 2010 to Feb, 2011.
Understanding and Skills: Neural networks, MATLAB.

CERTIFICATION

- Machine Learning by Andrew Ng in Coursera, Ongoing.
- Certificate of Merit in Graduate Teaching Training Programme (GTTP'16).
- Certificate of Merit in Lab Supervisor Training (LABSUP'16).
- Certificate of Merit in Health and Safety for Lab based supervisor, 2016.
- Certificate from Jatiya Vijnan Parishad (Indian Science Congress Association)), 2005.

AWARDS AND HONORS

- Partner investigator in **Australia-Germany Joint Cooperation Grant** (Singh, Bhattacharjee, Ray, Mostaghim, Moritz) on "Identification of solutions of interest to aid evolutionary multi-objective optimization and decision-making" awarded by **Universities Australia and DAAD** for 2017-2018 (23.5K AUD).
- One out of three recipients (worldwide) of 2016 **IEEE CIS Graduate Student Research Grant** on "Decomposition based evolutionary algorithm with a dual set of reference vectors" (2.6K USD).
- Recipient of the **Postgraduate Research Student Support** (PRSS) from UNSW (2.2K AUD).
- UNSW TFS Scholarship and Australian Research Council (ARC) funded scholarship from Associate Professor Tapabrata Ray, 2014, University of New South Wales (UNSW), Canberra.
- Merit-cum-Means (MCM) Scholarship, 2008–2012, Indian Institute of Technology, Kharagpur, India.
- Centre for Advanced Composite Materials (CACM) Scholarship, 2012, University of Auckland, New Zealand (4K NZD).
- University of Auckland IIT Internship Scholarship, 2011, University of Auckland, New Zealand (5K NZD).

PROFESSIONAL SERVICE

- **Member of the Program Committee** of a number of premier conferences in the field e.g. The Second Australian Conference on Artificial Life and Computational Intelligence (ACALCI'16), The 20th Asia-Pacific Symposium on Intelligent and Evolutionary Systems (IES'16) and The Australian Society for Operations Research National Conference (ASOR'16).
- **Regular Reviewer** of top journals in the field: IEEE Transactions on Evolutionary Computation, IEEE Transactions on Cybernetics, Reliability Engineering and System Safety and International Journal of Engineering Science and Technology.

PROFESSIONAL MEMBERSHIPS

- **Student Member** IEEE Young Professionals
- **Student Member** IEEE Computational Intelligence Society (Membership: 93404718)
- **Student Member** International Society for Structural and Multidisciplinary Optimization (ISSMO)
- **Affiliate Member**, Institution of Mechanical Engineers (IMechE)
- **Student Member**, Royal Institute of Naval Architect (RINA).

PUBLICATIONS

I have authored/co-authored **1** Book chapter, **7** Journal paper, **5** Lecture notes, **3** Conference papers and **1** abstract in Conference.

Book Chapter

1. **Bhattacharjee, K. S.**, Isaacs, A., and Ray, T., "Multi-objective optimization using an evolutionary algorithm embedded with multiple spatially distributed surrogates," *Multi-objective Optimization: Techniques and Applications in Chemical Engineering*, World Scientific, 2017.

Journal Article

1. **Bhattacharjee, K. S.**, Singh, H. K., and Ray, T., “Bridging the gap: many objective optimization and informed decision making,” *IEEE Transactions on Evolutionary Computation*, vol. 21, issue 5, pp. 813–820, 2017 (ERA A*).
2. **Bhattacharjee, K. S.**, Singh, H. K., and Ray, T., “A novel decomposition based evolutionary algorithm for engineering design optimization,” *Journal of Mechanical Design*, vol. 139, issue 4, pp. 041403-041403-11, 2017 (ERA A*).
3. Branke, J., Asafuddoula, M., **Bhattacharjee, K. S.**, and Ray, T., “Efficient use of partially converged simulations in evolutionary optimization,” *IEEE Transactions on Evolutionary Computation*, vol. 21, issue 1, pp. 52–64, 2017 (ERA A*).
4. **Bhattacharjee, K. S.**, Singh, H. K., and Ray, T., “An approach to generate comprehensive piecewise linear interpolation of Pareto outcomes to aid decision making,” *Journal of Global Optimization*, vol. 68, issue 1, pp. 71–93, 2017 (ERA A).
5. **Bhattacharjee, K. S.**, Singh, H. K., and Ray, T., “Multi-objective optimization with multiple spatially distributed surrogates,” *Journal of Mechanical Design*, vol. 138, issue 9, pp. 091401-091401-10, 2016 (ERA A*).
6. Singh, H. K., **Bhattacharjee, K. S.**, and Ray, T., “A projection based approach for constructing piecewise linear Pareto front approximations,” *Journal of Mechanical Design*, vol. 138, issue 9, pp. 091404-091404-12, 2016 (ERA A*).
7. Das, R., **Bhattacharjee, K. S.**, and Rao, S., “Welding heat transfer analysis using Element Free Galerkin Method,” *Advanced Materials Research*, vol. 410, pp. 298–301, 2012.

Lecture Notes: Journals (ERA-2012)

1. **Bhattacharjee, K.S.**, Singh, H.K. and Ray, T., “Enhanced Pareto interpolation method to aid decision making for discontinuous Pareto optimal fronts,” in *Proceedings of the Australian Joint Conference on Artificial Intelligence (AI)*, Lecture Notes in Computer Science, pp. 93–105, Springer, 2017.
2. Milowski, J., **Bhattacharjee, K. S.**, Singh, H.K. and Ray, T., “Electric vehicles for Australia: A cost-benefit analysis,” in *Proceedings of 24th National Conference of the Australian Society for Operations Research (ASOR)*, Data and Decision Sciences in Action, Lecture Notes in Management and Industrial Engineering, pp. 163–173, Springer, 2016.
3. **Bhattacharjee, K.S.**, Singh, H.K. and Ray, T., “A study on performance metrics to identify solutions of interest from a trade-off set,” in *Proceedings of the Australasian Conference on Artificial Life and Computational Intelligence (ACALCI)*, Canberra, Australia, vol. 9592 of *Lecture Notes in Artificial Intelligence*, pp. 66–77, Springer, 2016.
4. **Bhattacharjee, K.S.**, Singh, H.K. and Ray, T., “An evolutionary algorithm with classifier guided constraint evaluation strategy for computationally expensive optimization problems,” in *Proceedings of the Australian Joint Conference on Artificial Intelligence (AI)*, Canberra, Australia, vol. 9457 of *Lecture Notes in Artificial Intelligence*, pp. 49–62, Springer, 2015.
5. **Bhattacharjee, K.S.**, Singh, H.K. and Ray, T., “Cost to evaluate versus Cost to learn ? Performance of selective evaluation strategies in multiobjective optimization,” in *Proceedings of the Australian Joint Conference on Artificial Intelligence (AI)*, Canberra, Australia, vol. 9457 of *Lecture Notes in Artificial Intelligence*, pp. 63–75, Springer, 2015.

Full Refereed Conference Papers

1. **Bhattacharjee, K. S.**, Singh, H. K., Ray, T., and Zhang, Q., “Decomposition based evolutionary algorithm with a dual set of reference vectors,” in *Proceedings of IEEE Congress on Evolutionary Computation (CEC)*, Available online, San Sebastian, Spain, 2017.
2. **Bhattacharjee, K. S.**, Singh, H. K., Ray, T., and Branke, J., “Multiple surrogate assisted multiobjective optimization using improved pre-selection,” in *Proceedings of IEEE Congress on Evolutionary Computation (CEC)*, Vancouver, Canada, pp. 4328-4335, 2016.
3. **Bhattacharjee, K. S.** and Ray, T., “Selective evaluation in multiobjective optimization: A less explored avenue,” in *Proceedings of IEEE Congress on Evolutionary Computation (CEC)*, Sendai, Japan, pp. 1893-1899, 2015.

Abstract/Extended Abstract Refereed Conference Papers

1. **Bhattacharjee, K. S.**, and Ray, T., “Selective constraint evaluation in multidisciplinary design optimization,” in *Proceedings of World Congress of Structural and Multidisciplinary Optimization (WCSMO)*, Sydney, Australia, 2015.

LIST OF REFEREES

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