Kallol Roy

PhD, Machine Learning

Mixed Signal Design Group
Center for Co-design of Chip, Package System (C3PS)
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Areas of Research Interest

Deep Machine Learning
Large-scale machine learning and High-dimensional Statistics
Distributed optimization and tensor methods
Probabilistic Graphical Models
Deep Reinforcement Learning

Current Appointments

Mar 2018-present **Postdoctoral Research Fellow**, *Georgia Institute of Technology (Georgia Tech), Atlanta*, USA.

Education

2014 **Doctor of Philosophy in Electrical Communication Engineering**, *Indian Institute of Science Bangalore, India*.

2005 **B.Tech. Electrical Engineering**, *Indian Institute of Technology Kanpur, India*.

Previous Appointments

Aug 2015-Dec 2017 **Postdoctoral Research Fellow,**
School of Electrical and Computer Engineering, *Ulsan National Institute of Science and Technology (UNIST)*, South Korea.
Research areas: Finding Symmetry in Big Data, Radio Frequency Machine Learning
Co-advisor: Prof. Ki Jin Han

Apr 2014-July 2015 **Postdoctoral Research Fellow,**
Department of Mathematics, *Indian Institute of Science Bangalore*, India.
Research area: Neuromorphic Architecutre Design with Category Theory
Supervisor: Prof. Govindan Rangarajan

Oct 2013-Mar 2014 **Postdoctoral Research Fellow,**
Division of Theoretical Sciences, *Poonaprajna Institute of Scientific Research*, Bangalore, India.
Research area: Quantum Machine Learning
Supervisor: Dr. Sujit Sarkar

Oct 2012-Dec 2012 **Visiting Research Scholar, Trapped Atoms and Ions Laboratory**,
Indiana University-Purdue University, Indianapolis, USA.
Research area: Quantum Search in Optical Lattice
Supervisor: Prof. Le Luo

Jan 2012-July 2012 **Visiting Research Scholar, Department of Materials Science**,
Indian Association for Cultivation of Science, Kolkata, India.
Supervisor: Prof. Bimalendu Deb

May 2006-July 2006 **Summer Intern, Department of Astrophysics and Cosmology**,
SN Bose National Center for Basic Science, Kolkata, India.
Supervisor: Prof. Archan S. Majumdar

Jan 2005-July 2005 **Research Assistant, Femtosecond Laser Lab**,
Indian Institute of Technology, Kanpur, India.
Supervisor: Prof. Debabrata Goswami

Industrial Projects during Postdoctoral Research

Mar 2018-present **DARPA's Drive to Keep the Microelectronics Revolution at Full Speed: Builds Its Own Momentum**,
at Georgia Tech funded by Center For Advanced Electronics Through Machine Learning (CAEML), Atlanta, USA.
We are creating machine learning enabled new chips to meet specific needs by reusing chiplets and putting them together in modular fashion. The modular design will allow us to pick and choose the components we need for specific applications.

Mar 2018-present **Enable Fast, Accurate Design and Verification of Microelectronic Circuits and Systems**,
at Georgia Tech funded by Defense Advanced Research Projects Agency (DARPA), Atlanta, USA.
Creating machine learning algorithms to derive models used for electronic design automation.

Aug 2015-Nov 2017 **Automatic Fault Detection of Industrial Systems using Scalable Machine Learning**,
at UNIST funded by Korean Government, Ulsan, South Korea.

Aug 2016-Dec 2017 **Automation of Blast Furnace through Deep Neural Networks**,
at UNIST funded by Posco Steel Plant, Ulsan, South Korea.

Academic Experience

2017 **UNIST SPIKE Research Internship Supervisor**, *Student Name: Harshitha Machiraju*, Research Topic: Topological Data Analysis of Neural Networks, Department of Electrical Engineering,
Indian Institute of Technology Hyderabad, India.

2016-2017 **M.Tech Thesis Supervisor**, *Student Name: Alka Patel*,
Research Topic: Bayesian Machine Learning for Cyber Security, School of Electronics (Mobile Computing Technology),
Devi Ahilya Viswavidyalaya (DAVV), Indore, India.

2009 **Teaching Assistant**, *Course: Fiber Optics Communication and Networks*, Electrical Communication Engineering,
Indian Institute of Science Bangalore, India.

2008 **Teaching Assistant**, *Short Term Course on Wireless Security*, Center For Continuing Education,
Indian Institute of Science Bangalore, India.

Awards and Honors

APS-IUSSTF Physics Student Visitation Award, 2012
Microsoft Travel Award
Sterlite Best Paper Award at Photonics 2010, IIT Guwahati
MHRD Scholarship, Government of India 2007
Jawaharlal Nehru Scholarship Steel Authority of India Limited,2000

Books

2015 **Kallol Roy**, Quantum Algorithmic Engineering with Photonic Integrated Circuits, LAP LAMBERT Academic Publishing, Jan 6, 2015.

Publications

2018 **Kallol Roy**, Torun Hakki Mert, and Madhavan Swaminathan, Preliminary Application of Deep Learning to Design Space Exploration, The IEEE Electrical Design of Advanced Packaging and Systems (EDAPS 2018)

2018 Ramesh Patel, **Kallol Roy**, Jaesik Choi, Ki Jin Han, Generative Design of Electromagnetic Structures through Bayesian Learning, IEEE Transactions on Magnetics, vol. 54, no. 3, Mar 2018.

2018 **Kallol Roy**, Ramesh Patel, Kartikeyan Machavaram, and Ki Jin Han, Machine Learning Guided Search for Radiation Symmetry Breaking (in preparation for submission).

2017 **Kallol Roy**, Jaesik Choi, Searching for Local Symmetry with Topological Features in Graphs, The First International Workshop on Machine Learning for Artificial Intelligence Platforms (MLAIP), Nov 2017, Seoul, South Korea.

2017 Ramesh Patel, **Kallol Roy**, Jaesik Choi, Ki Jin Han, Tractable Bayesian Learning for Automated Design of Electromagnetic Structures, 21st International Conference on the Computation of Electromagnetic Fields (Compumag2017), June 18-22, 2017, Daejeon, South Korea.

2016 **Kallol Roy**, Anh Tong, and Jaesik Choi, Searching for Topological Symmetry in Data Haystack, arXiv:1603.03703v1 [cs.LG].

2012 **Kallol Roy**, Biswajit Das, R. Srikanth, Bimalendu Dev, T. Srinivas, Dynamical Decoherence Control of Atomic Spin Ensemble, 23^{rd} International Conference on Atomic Physics (ICAP 2012) Ecole Polytechnique Palaiseau, France.

2011 **Kallol Roy**, R.Srikanth, T.Srinivas, Decoherence Suppression By Parallelism In A Trapped Ion System In Current Developments In Atomic, Molecular, Optical and Nano Physics (CDAMOP 2011), New Delhi, India.

2011 **Kallol Roy**, R.Srikanth, T.Srinivas, Decoherence Suppression By Parallelization Of Quantum Circuits, International Conference on Theoretical and Applied Physics (ICTAP 2011), IIT Kharagpur, India.

2010 **Kallol Roy**, Akshata Shenoy H., R. Srikanth, E. S. Shivaleela, T. Srinivas, Kolmogorov Complexity Approach to Decoy-Based Quantum Cryptography in Photonics 2010, IIT Guwahati, India.

Software Skills

Languages	Java, Python
Platforms	Tensorflow, Keras, AWS
Tools	MATLAB, ANSYS

Affiliations

ACM
IEEE Photonics
APS

References

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