Arindam **Bose**

Ph.D. · Radar Signal Processing Researcher

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- Currently working as a senior research engineer at KMB Telematics Inc. where we are making automotive and airborne radar sensors
- Finished Ph.D. in Electrical Engineering from University of Illinois at Chicago under guidance of Prof. Mojtaba Soltanalian at WaveOPT lab
- Always interested in devising a better problem-solving method for challenging tasks, and learning new technologies

Research Interests

Radar signal processing, statistical signal processing, optimization theory, active sensing, and machine learning

Work Experiences

KMB Telematics Inc.

Arlington, VA, USA

Senior Research Engineer, Radar Signal Processing — *Oct. 2020 - Present*

Senior Research Intern, Radar Signal Processing — *May 2019 - Aug. 2020*

- Developing the digital design of a high performance automotive MIMO radar system using cutting edge FPGAs, MCUs and MPUs
- Implementing sophisticated algorithms for antenna array designing for automotive MIMO radar
- Experimenting on various systems and algorithms for automotive radar imaging

University of Illinois at Chicago

Chicago, IL, USA

Research Assistant, WaveOPT lab, Department of Electrical and Computer Engineering — *May 2016 - Dec. 2020*

- Developed various non-convex optimization algorithms for waveform synthesis for active sensing systems
- Assisted and collaborated with Dr. M. Soltanalian in signal processing and optimization theory research and working towards PhD thesis

Teaching Assistant, Department of Electrical and Computer Engineering and Department of Physics — *Aug. 2015 - May 2020*

- Courses assisted: Digital signal processing, Statistical signal processing, Image analysis and computer vision, Introductory physics, General physics
- Collaborated with several professors to setup exam questions and solutions
- Graded papers, conducted lab sessions, and proctored examinations

Research Assistant, Machine Vision lab, Department of Electrical and Computer Engineering — *Jan. 2015 - Jun. 2016*

- Implemented and analysed multidimensional indexing algorithms for Human Activity Recognition (HAR) using Recognition based on Indexing and Sequencing (RISq) and produced significant increase in recognition efficieny than other algorithms such as DTW
- Assisted and collaborated with Dr. Jezekiel Ben-Arie in the research of optimization of various algorithms of Activity Recognition using Microsoft Kinect

Mitsubishi Electric Research Laboratories

Cambridge, MA, USA

Summer Intern, Signal Processing Group — *May 2018 - Aug. 2018*

- Developed efficient algorithms for Time-Domain Spectroscopy systems using THz

Cognizant Technology Solutions Pvt. Ltd.

Kolkata, India

Programmer Analyst, Health Care Practice — *Apr. 2013 - Jul. 2014*

- Developed and maintained several Java based web projects according to client requests
- Designed web services and complex web pages in JSP, HTML, CSS, and JavaScript
- Developed and delivered special projects: Log Parser – a log management system for complex bug reports, PBMAid - an android app to track insurance related data for patients

Education

University of Illinois at Chicago

Chicago, IL, USA

PhD in Electrical Engineering — *2021*

MS in Electrical Engineering — *2020*

- Thesis title: Waveform synthesis for active sensing with emerging applications (Advisor: Dr. Mojtaba Soltanalian)

West Bengal University of Technology

Kolkata, India

B.Tech in Electronics and Communication Engineering — *2012*

- Thesis topic: Efficient algorithms for digital watermarking (Advisor: Dr. Somnath Maiti)

Publications

Journal Papers

Waveform Design for Mutual Interference Mitigation in Automotive Radar

A. Bose, B. Tang, W. Huang, M. Soltanalian, and J. Li — *2022*

- arXiv preprint arXiv:2208.04398
- Submitted in IEEE Transactions on Aerospace and Electronic Systems

Mutual Interference Mitigation for Multiple Connected Automotive Radar Systems

A. Bose, B. Tang, M. Soltanalian, and J. Li — *2021*

- Published in IEEE Transactions on Vehicular Technology, vol. 70, no. 10, Oct. 2021

Efficient Waveform Covariance Matrix Design and Antenna Selection for MIMO Radar

A. Bose, S. Khobahi, and M. Soltanalian — *2020*

- Published in Elsevier Journal of Signal Processing, vol. 183, Jun. 2021

One-Bit Radar Processing With Time-Varying Sampling Thresholds

A. Ameri, **A. Bose**, J. Li, and M. Soltanalian — *2019*

- Published in IEEE Transactions on Signal Processing, vol. 67, no. 20, Sep. 2019.
- Appeared on the IEEE TSP Popular Articles list

Constructing Binary Sequences With Good Correlation Properties: An Efficient Analytical-Computational Interplay

A. Bose, M. Soltanalian — *2018*

- Published in IEEE Transactions on Signal Processing, vol. 66, no. 11, Jun. 2018.

Conference Presentations

Deep One-Bit Compressive Autoencoding

Rio de Janeiro, Brazil

S. Khobahi, **A. Bose**, and M. Soltanalian — *Jul. 2021*

- Presented in Statistical Signal Processing Workshop (SSP) 2021

Limits of Transmit Beamforming for Massive MIMO Radar

Pacific Grove, CA, USA

A. Bose, A. Ghauri, and M. Soltanalian — *Nov. 2020*

- Presented in IEEE Asilomar Conference on Signals, Systems, and Computers 2020

Deep-URL: A Model-Aware Approach to Blind Deconvolution Based on Deep Unfolded Richardson-Lucy Network

Abu Dhabi, UAE

C. Agarwal, S. Khobahi, **A. Bose**, M. Soltanalian, and D. Schonfeld — *Oct. 2020*

- Presented in IEEE International Conference on Image Processing (ICIP) 2020

Deep Radar Waveform Design for Efficient Automotive Radar Sensing

Hangzhou, China

S. Khobahi, **A. Bose**, and M. Soltanalian — *Jun. 2020*

- Presented in IEEE Sensor Array and Multichannel Signal Processing Workshop (SAM) 2020

Joint Optimization of Waveform Covariance Matrix and Antenna Selection for MIMO Radar

Pacific Grove, CA, USA

A. Bose, S. Khobahi, and M. Soltanalian — *Nov. 2019*

- Presented in IEEE Asilomar Conference on Signals, Systems, and Computers 2019

Waveform Design for One-Bit Radar Systems Under Uncertain Interference Statistics

Pacific Grove, CA, USA

A. Ameri, **A. Bose**, and M. Soltanalian — *Nov. 2019*

- Presented in IEEE Asilomar Conference on Signals, Systems, and Computers 2019

Learning-Based Shadow Mitigation for Terahertz Multi-Layer Imaging

Paris, France

P. Wang, T. Koike-Akino, **A. Bose**, R. Ma, P. Orlik, W. Tsujita, K. Sadamoto, H. Tsutada, and M. Soltanalian — *Sep. 2019*

- Presented in IEEE International Conference on Infrared, Millimeter, and Terahertz Waves (IRMMW-THz) 2019

THz Multi-Layer Imaging Via Nonlinear Inverse Scattering

Paris, France

A. Bose, A. Kadu, H. Mansour, P. Wang, P. Boufounos, P. Orlik, and M. Soltanalian — *Sep. 2019*

- Presented in IEEE International Conference on Infrared, Millimeter, and Terahertz Waves (IRMMW-THz) 2019

Comprehensive Personalized Ranking Using One-Bit Comparison Data

Minneapolis, MN, USA

A. Ameri, **A. Bose**, and M. Soltanalian — *Jun. 2019*

- Presented in IEEE Data Science Workshop (DSW) 2019

Design of Unimodular Sequence Sets with Good Correlation and Complementary Correlation Properties — *Anaheim, CA, USA*

I. A. Arriaga-Trejo, **A. Bose**, A. G. Orozco-Lugo, and M. Soltanalian — *Nov. 2018*

- Presented in IEEE Global Conference on Signal and Information Processing (GlobalSIP) 2018

Generalized Cyclic Algorithms for Designing Unimodular Sequence Sets with Good (Complementary) Correlation Properties — *Sheffield, UK*

A. Bose, I. A. Arriaga-Trejo, A. G. Orozco-Lugo, and M. Soltanalian — *Jul. 2018*

- Presented in IEEE Sensor Array and Multichannel Signal Processing Workshop (SAM) 2018

Low-Rank Matrix Recovery from One-Bit Comparison Information — *Calgary, AB, Canada*

A. Bose, A. Ameri, M. Klug, M. Soltanalian — *Apr. 2018*

- Presented in IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) 2018

Designing Signals with Good Correlation and Distribution Properties — *Calgary, AB, Canada*

A. Bose, N. Mohammadi, M. Soltanalian — *Apr. 2018*

- Presented in IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) 2018

Efficient Construction of Polyphase Sequences With Optimal Peak Sidelobe Level Growth — *Montreal, QC, Canada*

A. Bose, M. Soltanalian — *Nov. 2017*

- Presented in IEEE Global Conference on Signal and Information Processing (GlobalSIP) 2017

Non-Convex Shredded Signal Reconstruction via Sparsity Enhancement — *New Orleans, LA, USA*

A. Bose, M. Soltanalian — *Mar. 2017*

- Presented in IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) 2017

Enhanced Data Hiding Method Using DWT Based on Saliency Model — *Solan, India*

C. Agarwal, **A. Bose**, S. Maiti, N. Islam, S. K. Sarkar — *Sep. 2013*

- Presented in IEEE International Conference on Signal Processing, Computing and Control (ISPCC) 2013

Technical Documents

Robust Data Hiding Technique in Wavelet Domain Using Saliency Map

S. Maiti, C. Agarwal, **A. Bose**, S. K. Sarkar — *2013*

- Published in International Journal of Advances in Engineering and Technology (IJAET), vol. 6, no. 4, Aug. - Sep. 2013

An Improved Method of Pre-Filter Based Image Watermarking in DWT Domain

S. Maiti, **A. Bose**, C. Agarwal, S. K. Sarkar, N. Islam — *2013*

- Published in International Journal of Computer Science and Technology (IJCST), vol. 4, no. 1, Jan. - Mar. 2013

Face Detection and Tracking System

S. Sarkar, **A. Bose** — *2012*

- Published in nternational Journal of Scientific and Engineering Research (IJSER), vol. 3, no. 10, Oct. 2012

Helianthus - a Low Cost High Efficient Solar Tracking System Using AVR Microcontroller

A. Bose, S. Sarkar, S. Das — *2012*

- Published in International Journal of Scientific and Engineering Research (IJSER), vol. 3, no. 10, Oct. 2012

Mathematical Time Domain Study of Negative Feedback System Using Limiting Progression

A. Bose — *2012*

- Published in International Journal of Scientific and Engineering Research (IJSER), vol. 3, no. 9, Sep. 2012

Book Chapters

One-Bit Cognitive Radar

A. Bose, J. Li, and M. Soltanalian — *2022*

- Book: Next Generation Cognitive Radar Systems
- Editor: K. V. Mishra, B. Shankar, and M. Rangaswamy
- IET Press (In production)

Case study – Activity Recognition

A. Bose — *2016*

- Book: Deep Learning Neural Networks Design and Case Studies
- Author: Daniel Graupe
- Published by World Scientific Publishing Company, 2016

Patents

Learning-Based See-Through Sensing Suitable for Factory Automation

P. Wang, T.-K. Akino, P. Orlik, **A. Bose** *2019*

- US Patent and Trademark Office, Patent ID: 20210064013, Appl. No.: 16/552116

Presentations

Conference Presentations

Nov. 2020	**2020 IEEE Asilomar Conference on Signals, Systems and Computers**	*Pacific Grove, CA, USA*
Jun. 2020	**2020 IEEE Sensor Array and Multichannel Signal Processing Workshop**	*Hangzhou, China*
Nov. 2019	**2019 IEEE Asilomar Conference on Signals, Systems and Computers**	*Pacific Grove, CA, USA*
Jun. 2019	**2019 IEEE Data Science Workshop (DSW)**	*Minneapolis, MN, USA*
Nov. 2017	**2017 IEEE Global Conference on Signal and Information Processing (GlobalSIP)**	*Montreal, QC, Canada*

Poster Presentations

Apr. 2018	**2018 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)**	*Calgary, AB, Canada*
Mar. 2017	**2017 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)**	*New Orleans, LA, USA*

Teaching Experiences

Teaching Assistant, University of Illinois at Chicago

Statistical Signal Processing, Department of ECE	*Spring 2018, 2019, 2020*
Digital Signal Processing II, Department of ECE	*Fall 2016, 2017, 2018*
Digital Signal Processing I, Department of ECE	*Spring 2017*
Image Analysis and Computer vision II, Department of ECE	*Fall 2015*
Introductory Physics II, Department of Physics	*Spring 2016*
General Physics, Department of Physics	*Spring 2016*

Academic Services

2018-Present **Journal Reviewer**,
- IEEE Transactions on Signal Processing
- IEEE Transactions on Aerospace and Electronic Systems
- IEEE Sensors Journal
- Elsevier Signal Processing
- Elsevier Digital Signal Processing
- IET Signal Processing
- IET Radar, Sonar & Navigation
- MDPI Symmetry

2018-Present **Conference Reviewer**,
- IEEE SPS 2021
- IEEE SAM 2020
- EUSIPCO 2019
- IEEE VTC 2018

Nov. 2022	**Technical Program Committee Member**, IEEE 8th World Forum on Internet of Things	*Yokohama, Japan*
Apr. 2019	**YP Chair Chicago Chapter**, IEEE Signal Processing Society	*Chicago, USA*
Aug. 2016	**Vice President**, UIC ECE Journal Club	*Chicago, USA*
2010-2011	**Chief Robotics Coordinator**, Future Institute of Engineering and Management	*Kolkata, India*

Honors & Awards

2019	**Signal Processing Society Chicago Chapter Appreciation**, IEEE	*Chicago, IL, USA*
2014	**Associate of the Month**, Cognizant Technology Solutions	*Kolkata, India*
2011	**Winner**, The Telegraph Knowhow Innovation Hub, INFOCOM 10-11	*Kolkata, India*
2010-2013	**Special Prize**, Science and Engineering Fair	*Kolkata, India*
2008-2012	**Educational Scholarship**, Central Government of India	*Kolkata, India*