Arindam **Bose**

Ph.D. · **Radar Signal Processing Researcher**

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Research Summary

Radar Systems Engineer with specialized expertise in imaging radar systems for drone detection and tracking applications. Proven experience in designing, developing, and optimizing radar signal processing algorithms for high-resolution imaging, target classification, and clutter suppression in complex environments. Strong background in MIMO radar, beamforming, Doppler processing, and real-time embedded implementation. Adept at designing and integrating radar hardware with advanced signal processing pipelines to enhance situational awareness in airborne and ground-based surveillance systems. Committed to advancing state-of-the-art drone detection technologies through innovative, reliable, and scalable radar solutions.

Professional Experiences

KMB Telematics Inc.   *Washington DC, USA*

SENIOR RESEARCH ENGINEER, RADAR SIGNAL PROCESSING   *Oct. 2020 – Present*

RESEARCH INTERN, RADAR SIGNAL PROCESSING   *Summer 2019, 2020*

- Developing high-resolution imaging radar capable of detecting and tracking small UAVs, including low-flying or stationary drones, with on-the-move operation to locate launch sites and pursue threats.
- Building a full-stack radar signal processing toolchain, including digital system and FPGA firmware, along with radar data visualization and UI software using Python, Verilog, Rust, and C.

University of Illinois at Chicago   *Chicago, IL, USA*

RESEARCH ASSISTANT, WAVEOPT LAB, DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING   *May 2016 – Dec. 2020*

- Designed and implemented multiple efficient algorithms for transmit waveform synthesis in MIMO radar systems, enhancing overall performance and adaptability.
- Collaborated closely with Prof. M. Soltanalian on research in radar signal processing and optimization theory, contributing to ongoing studies and the development of my Ph.D. thesis.

RESEARCH ASSISTANT, MACHINE VISION LAB, DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING   *Jan. 2015 – Jun. 2016*

- Implemented and analyzed multidimensional indexing algorithms for Human Activity Recognition (HAR) using Recognition based on Indexing and Sequencing (RISq), achieving significantly higher recognition efficiency compared to traditional methods like Dynamic Time Warping (DTW).
- Collaborated with Prof. Jezekiel Ben-Arie on research focused on optimizing activity recognition algorithms using Microsoft Kinect.

TEACHING ASSISTANT, DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING   *Aug. 2015 – May 2020*

TEACHING ASSISTANT, DEPARTMENT OF PHYSICS   *Jan. 2016 – May 2016*

- Courses assisted: Digital signal processing, Statistical signal processing, Image analysis and computer vision, Introductory physics, General physics.

Mitsubishi Electric Research Laboratories   *Cambridge, MA, USA*

RESEARCH INTERN, SIGNAL PROCESSING GROUP   *Summer 2018*

- Developed innovative techniques and efficient imaging algorithms for terahertz (THz) time-domain spectroscopy systems.

Cognizant Technology Solutions Pvt. Ltd.   *Kolkata, India*

PROGRAMMER ANALYST, HEALTH CARE PRACTICE   *Apr. 2013 – Jul. 2014*

- Designed, developed, and maintained multiple Java-based web applications, tailored to meet diverse client requirements and deliver scalable, high-performance solutions.
- Designed and implemented dynamic web services and sophisticated web pages using JSP, HTML, CSS, and JavaScript, ensuring responsive design and seamless user experience.

Education

University of Illinois at Chicago   *Chicago, IL, USA*

PH.D. IN ELECTRICAL ENGINEERING   *2021*

- Ph.D. Thesis: *Waveform Synthesis for Active Sensing with Emerging Applications*
- Committee: Prof. Mojtaba Soltanalian, Prof. Dan Schonfeld, Prof. Daniela Tuninetti, Prof. Rashid Ansari, Dr. Perry Wang

M.S. IN ELECTRICAL ENGINEERING   *2020*

West Bengal University of Technology   *Kolkata, India*

B.TECH. IN ELECTRONICS AND COMMUNICATION ENGINEERING   *2012*

Publications

JOURNAL ARTICLES

J4   **A. Bose**, B. Tang, M. Soltanalian, and J. Li, **Mutual Interference Mitigation for Multiple Connected Automotive Radar Systems**, in *IEEE Transactions on Vehicular Technology*, vol. 70, no. 10. *Oct. 2021*

J3   **A. Bose**, S. Khobahi, and M. Soltanalian, **Efficient Waveform Covariance Matrix Design and Antenna Selection for MIMO Radar**, in *Signal Processing*, vol 183. *Jun. 2021*

J2   A. Ameri, **A. Bose**, J. Li, and M. Soltanalian, **One-Bit Radar Processing With Time-Varying Sampling Thresholds**, in *IEEE Transactions on Signal Processing*, vol. 67, no. 20. *Oct. 2019*

J1   **A. Bose**, M. Soltanalian, **Constructing Binary Sequences With Good Correlation Properties: An Efficient Analytical-Computational Interplay**, in *IEEE Transactions on Signal Processing*, vol. 66, no. 11. *Jun. 2018*

CONFERENCE ARTICLES

C18   Z. Esmaeilbeig, **A. Bose**, and M. Soltanalian, **Ambiguity Function Shaping in FMCW Automotive Radar**, *IEEE Asilomar Conference on Signals, Systems, and Computers 2023*, Pacific Grove, CA. *Nov. 2023*

C17   Z. Esmaeilbeig, **A. Bose**, and M. Soltanalian, **Mutual Interference Mitigation in PMCW Automotive Radar**, *IEEE European Microwave Week 2023*, Berlin, Germany. *Sep. 2023*

C16   S. Khobahi, **A. Bose**, and M. Soltanalian, **Deep One-Bit Compressive Autoencoding**, *IEEE Statistical Signal Processing Workshop 2021*, Rio de Janeiro, Brazil. *Jul. 2021*

C15   **A. Bose**, A. Ghauri, and M. Soltanalian, **Limits of Transmit Beamforming for Massive MIMO Radar**, *IEEE Asilomar Conference on Signals, Systems, and Computers 2020*, Pacific Grove, CA. *Nov. 2020*

C14   C. Agarwal, S. Khobahi, **A. Bose**, M. Soltanalian, and D. Schonfeld, **Deep-URL: A Model-Aware Approach to Blind Deconvolution Based on Deep Unfolded Richardson-Lucy Network**, *IEEE International Conference on Image Processing 2020*, Abu Dhabi, UAE. *Oct. 2020*

C13   S. Khobahi, **A. Bose**, and M. Soltanalian, **Deep Radar Waveform Design for Efficient Automotive Radar Sensing**, *IEEE Sensor Array and Multichannel Signal Processing Workshop 2020*, Hangzhou, China. *Jun. 2020*

C12   **A. Bose**, S. Khobahi, and M. Soltanalian, **Joint Optimization of Waveform Covariance Matrix and Antenna Selection for MIMO Radar**, *IEEE Asilomar Conference on Signals, Systems, and Computers 2019*, Pacific Grove, CA. *Nov. 2019*

C11   **A. Bose**, A. Ameri, and M. Soltanalian, **Waveform Design for One-Bit Radar Systems Under Uncertain Interference Statistics**, *IEEE Asilomar Conference on Signals, Systems, and Computers 2019*, Pacific Grove, CA. *Nov. 2019*

C10   P. Wang, T. Koike-Akino, **A. Bose**, R. Ma, P. Orlik, W. Tsujita, K. Sadamoto, H. Tsutada, and M. Soltanalian, **Learning-Based Shadow Mitigation for Terahertz Multi-Layer Imaging**, *IEEE International Conference on Infrared, Millimeter, and Terahertz Waves 2019*, Paris, France. *Sep. 2019*

C9   **A. Bose**, A. Kadu, H. Mansour, P. Wang, P. Boufounos, P. Orlik, and M. Soltanalian, **THz Multi-Layer Imaging Via Nonlinear Inverse Scattering**, *IEEE International Conference on Infrared, Millimeter, and Terahertz Waves 2019*, Paris, France. *Sep. 2019*

C8   A. Ameri, **A. Bose**, and M. Soltanalian, **Comprehensive Personalized Ranking Using One-Bit Comparison Data**, *IEEE Data Science Workshop 2019*, Minneapolis, MN. *Jun. 2019*

C7   I. A. Arriaga-Trejo, **A. Bose**, A. G. Orozco-Lugo, and M. Soltanalian, **Design of Unimodular Sequence Sets with Good Correlation and Complementary Correlation Properties**, *IEEE Global Conference on Signal and Information Processing 2018*, Anaheim, CA. *Nov. 2018*

C6   **A. Bose**, I. A. Arriaga-Trejo, A. G. Orozco-Lugo, and M. Soltanalian, **Generalized Cyclic Algorithms for Designing Unimodular Sequence Sets with Good (Complementary) Correlation Properties**, *IEEE Sensor Array and Multichannel Signal Processing Workshop 2018*, Sheffield, UK. *Jul. 2018*

C5   **A. Bose**, A. Ameri, M. Klug, and M. Soltanalian, **Low-Rank Matrix Recovery From One-Bit Comparison Information**, *IEEE International Conference on Acoustics, Speech and Signal Processing 2018*, Calgary, Alberta, Canada. *Apr. 2018*

C4   **A. Bose**, N. Mohammadi and M. Soltanalian, **Designing Signals with Good Correlation and Distribution Properties**, *IEEE International Conference on Acoustics, Speech and Signal Processing 2018*, Calgary, Alberta, Canada. *Apr. 2018*

C3   **A. Bose** and M. Soltanalian, **Efficient Construction of Polyphase Sequences With Optimal Peak Sidelobe Level Growth**, *IEEE Global Conference on Signal and Information Processing 2017*, Montreal, Canada. *Nov. 2017*

C2   **A. Bose** and M. Soltanalian, **Non-Convex Shredded Signal Reconstruction via Sparsity Enhancement**, *IEEE International Conference on Acoustics, Speech and Signal Processing 2017*, New Orleans, LA. *Mar. 2017*

C1   C. Agarwal, **A. Bose**, S. Maiti, N. Islam, and S. K. Sarkar, **Enhanced Data Hiding Method Using DWT Based on Saliency Model**, *IEEE International Conference on Signal Processing, Computing and Control 2013*, Solan, India. *Sep. 2013*

Book Chapters

B2 **A. Bose**, J. Li, and M. Soltanalian, **One-Bit Cognitive Radar**, Booktitle: *Next Generation Cognitive Radar Systems*, Editors: K. V. Mishra, B. Shankar, and M. Rangaswamy, IET Press. *2023*

B1 **A. Bose** et al., **Case study – Activity Recognition**, Booktitle: *Deep Learning Neural Networks Design and Case Studies*, Author: Daniel Graupe, World Scientific Publishing Company. *2016*

Patents

P1 P. Wang, T.-K. Akino, P. Orlik, **A. Bose**, **Learning-Based See-Through Sensing Suitable for Factory Automation**, *US Patent and Trademark Office*, Patent ID: US20210064013A1. *2019*

Technical Documents

T6 **A. Bose**, B. Tang, W. Huang, M. Soltanalian, and J. Li, **Waveform Design for Mutual Interference Mitigation in Automotive Radar**, *arXiv preprint* arXiv:2208.04398. *Aug. 2022*

T5 S. Maiti, C. Agarwal, **A. Bose**, S. K. Sarkar, **Robust Data Hiding Technique in Wavelet Domain Using Saliency Map**, International Journal of Advances in Engineering and Technology (IJAET), vol. 6, no. 4. *Aug. – Sep. 2013*

T4 S. Maiti, **A. Bose**, C. Agarwal, S. K. Sarkar, N. Islam, **An Improved Method of Pre-Filter Based Image Watermarking in DWT Domain**, International Journal of Computer Science and Technology (IJCST), vol. 4, no. 1. *Jan. – Mar. 2013*

T3 S. Sarkar, **A. Bose**, **Face Detection and Tracking System**, International Journal of Scientific and Engineering Research (IJSER), vol. 3, no. 10. *Oct. 2012*

T2 **A. Bose**, S. Sarkar, S. Das, **Helianthus - a Low Cost High Efficient Solar Tracking System Using AVR Microcontroller**, International Journal of Scientific and Engineering Research (IJSER), vol. 3, no. 10. *Oct. 2012*

T1 **A. Bose**, **Mathematical Time Domain Study of Negative Feedback System Using Limiting Progression**, International Journal of Scientific and Engineering Research (IJSER), vol. 3, no. 9. *Sep. 2012*

Presentations and Invited Talks

Conference Presentations

2023 IEEE European Microwave Week, *Berlin, Germany* *Sep. 2023*
2020 IEEE Asilomar Conference on Signals, Systems and Computers, *Pacific Grove, CA, USA* *Nov. 2020*
2020 IEEE Sensor Array and Multichannel Signal Processing Workshop, *Hangzhou, China* *Jun. 2020*
2019 IEEE Asilomar Conference on Signals, Systems and Computers, *Pacific Grove, CA, USA* *Nov. 2019*
2019 IEEE Data Science Workshop, *Minneapolis, MN, USA* *Jun. 2019*
2017 IEEE Global Conference on Signal and Information Processing, *Montreal, QC, Canada* *Nov. 2017*

Poster Presentations

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

Teaching Experiences

Guest Lecture, University of Illinois at Chicago

Detection and Estimation Theory, Department of ECE *Fall 2019*

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

Journal Reviewer

IEEE Transactions on Signal Processing *2018 – Present*
IEEE Signal Processing Letters *2018 – Present*
IEEE Transactions on Aerospace and Electronic Systems *2020 – Present*
IEEE Sensors Journal *2022 – Present*
IEEE Transactions on Radar Systems *2023 – Present*
Elsevier Signal Processing *2018 – Present*

Elsevier Digital Signal Processing *2021 – Present*
IET Signal Processing *2020 – Present*
IET Radar, Sonar & Navigation *2022 – Present*

Conference/Workshop Reviewer
IEEE Statistical Signal Processing Workshop 2021, *Rio de Janeiro, Brazil* *Jul. 2021*
IEEE Sensor Array & Multichannel Signal Processing Workshop 2020, *Hangzhou, China* *Jun. 2020*
IEEE European Signal Processing Conference 2019, *A Coruña, Spain* *Sept. 2019*
IEEE Vehicular Technology Conference 2018, *Chicago, USA* *Aug. 2018*

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

Honors & Awards

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