

# Arindam Bose

PHD STUDENT · SIGNAL PROCESSING RESEARCHER

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## Research Interests

Signal processing and optimization theory, active sensing, computer vision, and machine learning.

## Education

### University of Illinois at Chicago

PHD IN ELECTRICAL ENGINEERING

- Thesis topic: Efficient design and analysis of structured signals (Advisor: Dr. Mojtaba Soltanalian)
- Current GPA 3.7/4.0

Chicago, USA

2014 - Expecting 2019

### West Bengal University of Technology

B.TECH IN ELECTRONICS AND COMMUNICATION ENGINEERING

- Thesis topic: Efficient algorithms for digital watermarking (Advisor: Dr. Somnath Maiti)
- GPA 8.7/10.0

Kolkata, India

2008 - 2012

## Skills

<b>Programming Language</b>	C, C++, C#, Java, MATLAB, Python, Octave
<b>Libraries</b>	OpenCV, OpenNI, Theano
<b>Web Designing</b>	JavaScript, CSS 3, HTML 5, JSP, JQuery, PHP
<b>Database Management System</b>	MyAccess, MySQL, PL/SQL, SQLite
<b>Language</b>	English, Hindi, Bengali

## Work Experience

### University of Illinois at Chicago

RESEARCH ASSISTANT, WAVEOPT LAB, DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

- Developing convex and non-convex optimization algorithms for structured signal design
- Assisting and collaborating with Dr. M. Soltanalian in signal processing and optimization theory research and working towards PhD thesis

Chicago, USA

Jul. 2016 - PRESENT

TEACHING ASSISTANT, DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING AND DEPARTMENT OF PHYSICS

- 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 answers
- Graded papers, conducted lab sessions, and proctored examinations

Aug. 2015 - PRESENT

RESEARCH ASSISTANT, MACHINE VISION LAB, DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

- 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 efficiency 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

Jan. 2015 - Jun. 2016

### Cognizant Technology Solutions Pvt. Ltd.

PROGRAMMER ANALYST, HEALTH CARE PRACTICE

- 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
- Maintained PI and other health related client data in complex Oracle databases
- 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

Kolkata, India

Aug. 2014 - Apr. 2016

# Publications

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## JOURNAL PAPERS

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

A. BOSE, M. SOLTANALIAN

- Submitted in IEEE Transactions on Signal Processing

2018

### Robust Data Hiding Technique in Wavelet Domain Using Saliency Map

S. MAITI, C. AGARWAL, A. BOSE, S. K. SARKAR

- Published in International Journal of Advances in Engineering and Technology (IJAET), Volume 6, Issue 4, August – September 2013

2013

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

S. MAITI, A. BOSE, C. AGARWAL, S. K. SARKAR, N. ISLAM

- Published in International Journal of Computer Science and Technology (IJCST), Volume 4, Issue 1, January – March 2013

2013

### Face Detection and Tracking System

S. SARKAR, A. BOSE

- Published in International Journal of Scientific and Engineering Research (IJSER), Volume 3, Issue 10, October – 2012.

2012

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

A. BOSE, S. SARKAR, S. DAS

- Published in International Journal of Scientific and Engineering Research (IJSER), Volume 3, Issue 10, October – 2012

2012

### Mathematical Time Domain Study of Negative Feedback System Using Limiting Progression

A. BOSE

- Published in International Journal of Scientific and Engineering Research (IJSER), Volume 3, Issue 9, September – 2012

2012

## CONFERENCE PRESENTATIONS

### Low-Rank Matrix Recovery from One-Bit Comparison Information

A. BOSE, A. AMERI, M. KLUG, M. SOLTANALIAN

- Presenting in 43rd IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), April 2018

Calgary, Canada

Apr. 2018

### Designing Signals with Good Correlation and Distribution Properties

A. BOSE, N. MOHAMMADI, M. SOLTANALIAN

- Presenting in 43rd IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), April 2018

Calgary, Canada

Apr. 2018

### Efficient Construction of Polyphase Sequences With Optimal Peak Sidelobe Level Growth

A. BOSE, M. SOLTANALIAN

- Presented in 5th IEEE Global Conference on Signal and Information Processing (GlobalSIP), Nov 2017

Montreal, Canada

Nov. 2017

### Non-Convex Shredded Signal Reconstruction via Sparsity Enhancement

A. BOSE, M. SOLTANALIAN

- Presented in 42nd IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), March 2017

New Orleans, USA

Mar. 2017

### Enhanced Data Hiding Method Using DWT Based on Saliency Model

C. AGARWAL, A. BOSE, S. MAITI, N. ISLAM, S. K. SARKAR

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

Solan, India

Sep. 2013

## BOOK CHAPTER

### Deep Learning Neural Networks Design and Case Studies

AUTHOR: DANIEL GRAUPE

- Contribution: "Case study – Activity Recognition" appeared in chapter 8 and appendices
- Published by World Scientific Publishing Company, 2016

2016

# Major Projects

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### Efficient Design and Analysis of Structured Signals

PHD THESIS: STRUCTURED SIGNAL PROCESSING

- Designing and analysing algorithms for non-convex shredded signal reconstruction, image stitching, image mosaicking
- Designing signals for interference reduction, efficient design of correlation and distribution profile
- Developing algorithms for structured matrix recovery using one-bit measurements
- Tools used: cvx toolbox, MATLAB

Chicago, USA

2016 - PRESENT

## Optimal Path Control Planning and Obstacle Avoidance for Multi-link Robotic Manipulators

Chicago, USA

OPTIMAL CONTROL

2017

- Investigates the problem of robotic arm control with the goal of achieving given performance requirements by solving for the optimal joint trajectories and corresponding controls for tasks, such as point-to-point positioning
- Implementation of pseudo-spectral methods to solve the optimal path planning problem for a system of multi-link, double-degree of freedom robotic arms.
- Tools used: MATLAB

## Human Activity Recognition (HAR)

Chicago, USA

COMPUTER AND MACHINE VISION

2014 - 2016

- Implemented multidimensional indexing algorithms using Recognition based on Indexing and Sequencing (RISq)
- Presented a qualitative comparison between Convolutional Neural Network (CNN) and Large Scale Memory Storage and Retrieval Neural Network (LAMSTAR) for HAR
- Tools used: MATLAB, Python

## Optical Character Recognition (OCR)

Chicago, USA

NEURAL NETWORK AND COMPUTER VISION

2015

- Developed various Neural Network algorithms such as Back Propagation Network, Hopfield Network, Counter Propagation Network, Convolutional Neural Network, LAMSTAR
- Tools used: MATLAB

## Algorithms for Face Detection and Recognition

Chicago, USA

COMPUTER AND MACHINE VISION

2015

- Implemented the Fisher Linear Discriminant (FLD) based algorithm and Karhunen-Loeve (KL) transform after the approach of Moghaddam and Pentland for face detection and recognition
- Tools used: MATLAB

## Real Time Motion Controlling using Gesture Recognition

Kolkata, India

COMPUTER-HUMAN INTERACTION

2013

- Developed color detection based algorithms to detect and recognize hand gestures to complete different tasks
- Presented in Science and Engineering Fair organized by Birla Industrial and Technological Museum, India
- Tools used: MATLAB

## Honors & Awards

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2014	<b>Associate of the Month</b> , Cognizant Technology Solutions	Kolkata, India
2011	<b>Winner</b> , The Telegraph Knowhow Innovation Hub, INFOCOM 10-11	Kolkata, India
2010-2013	<b>Special Prize</b> , Science and Engineering Fair	Kolkata, India
2008-2012	<b>Educational Scholarship</b> , Central Government of India	Kolkata, India

## Program Committees

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2016-2017	<b>Vice President</b> , UIC ECE Journal Club	Chicago, USA
2013	<b>Project Mentor</b> , Science and Engineering Fair 2013, Future Institute of Engineering and Management team	Kolkata, India
2011-2012	<b>Staff Member</b> , Future Alumni Association Society (FAAS)	Kolkata, India
2010-2011	<b>Chief Robotics Coordinator</b> , Future Institute of Engineering and Management	Kolkata, India