Arun Asokan Nair

Ph.D. Candidate

Department of Electrical and Computer Engineering

Johns Hopkins University

Baltimore, USA

anair8@jhu.edu | arunnair411.github.io | arunnair411 | arunnair411 | Arun Asokan Nair

Professional Summary

- Researcher with 5+ years experience tackling problems in **artificial intelligence** (**deep learning**, **signal processing**, **computer vision**, **speech enhancement**) and **ultrasound imaging** in both academia and industry.
- Excellent oral and written communication skills as demonstrated by 11 peer-reviewed scientific publications, multiple conference posters and presentations, and a **best paper award**.
- Multidisciplinary, enthusiastic, and versatile problem solver looking for **research scientist positions** in industry.

Education

Johns Hopkins University — *Baltimore, USA*

Ph.D. in Electrical and Computer Engineering — *August 2015 - Present*

Indian Institute of Technology Madras — *Chennai, India*

B.Tech. (Honors) in Electrical Engineering & M.Tech. in Communications Engineering — *August 2010 - May 2015*

GPA: 9.31/10; Rank: 1 of 71 Dual Degree B.Tech. + M.Tech. students

Skills and Courses

- **Programming Languages**: Python, MATLAB, C++.
- **Libraries and Tools**: PyTorch, Tensorflow, Keras.
- **Courses**: Computer Vision, Sparse Recovery and Compressed Sensing, Random Signal Analysis (Graduate Probability), Matrix Analysis, Information Theory, Optimization, Machine Learning.

Industry Experience

Microsoft — *Redmond, USA*

Part-Time Researcher — *September 2020 - December 2020*

Developing innovative signal processing and machine learning algorithms in the areas of computer vision and audio/speech.

Microsoft — *Redmond, USA*

Research Intern — *May 2020 - August 2020*

Implemented a deep learning based speech enhancer for the Applied Sciences Group at Microsoft.

Snapchat — *New York City, USA*

Research Intern — *May 2018 - August 2018*

Built novel audiovisual algorithms and product prototypes with the Snapchat Research team in NYC.

Publications

Deep Learning to Obtain Simultaneous Ultrasound Image and Segmentation Outputs from a Single Input of Raw Ultrasound Channel Data — *Baltimore, USA*

August 2017 - April 2020

- The project aimed to replace the inherently flawed beamforming step in ultrasound imaging with deep learning.
- Formulating beamforming as a segmentation problem, I demonstrated a fully convolutional neural network (FCNN) can create images of superior quality from raw, unbeamformed ultrasound data with results published in **IEEE ICASSP 2018**
- Creating the dataset for training the network involved writing a code base on the Hopkins MARCC supercomputer to generate data at large scale, requiring over 80,000 hours of compute per dataset.
- Follow up works showed generalization to phantom data and robotic integration (**IEEE IUS 2018**), incorporated adversarial training using a Generative Adversarial Network (GAN) (**IEEE CISS 2019**), and achieved generalization of networks trained on simulated data to *in-vivo* breast data (**IEEE IUS 2019**).
- A journal paper summarizing the findings of the project is published in the **IEEE TUFFC** journal.

Audiovisual Zooming: What You See Is What You Hear [BEST PAPER AWARD] *New York City, USA*

May 2018 - August 2018

- As part of a research internship at Snapchat NYC, formulated a novel beamformer that enhances audio corresponding to a camera's field of view, while suppressing audio from outside the field of view. This explicitly links the audio and visual fields of view of a captured video, ensuring what you see is what you hear. Results published in **ACM Multimedia 2019. Best paper award winner**.

Reconstruction-Free Deep Convolutional Neural Networks for Partially Observed Images *Baltimore, USA*

December 2017 - February 2018

- Studied convolutional neural network (CNN) performance on partially observed images where only a small fraction of image pixels (10 %) are available, demonstrating success in classification and object detection tasks. Results published in **IEEE GlobalSIP 2018**.

Robust Short-Lag Spatial Coherence Ultrasound Imaging *Baltimore, USA*

November 2016 - July 2017

- Improved the Short Lag Spatial Coherence (SLSC) algorithm to exploit the low rank structure of the images at different lags using robust principal component analysis. Work presented at the 2017 **UITC symposium** and published in the journal **IEEE TUFFC.**

The UltraSound ToolBox *Baltimore, USA*

May 2017 - July 2017

- Assisted in testing and documenting the ultrasound toolbox, a new ultrasound simulator aimed to facilitate easy dissemination and use of state-of-the-art algorithms in the ultrasound community. Work published in **IEEE IUS 2017** and **IEEE IUS 2018**.

Landmark Detection and Tracking in Ultrasound using a CNN-RNN Framework *Baltimore, USA*

August 2016 - November 2016

- Helped design a CNN-RNN architecture to track liver lesions in ultrasound image sequences. Work was accepted and exhibited at the **3D Deep Learning Workshop at NIPS 2016**.

Cueing Motion Blur for Registration of Inclined Planar Scenes (Master's Thesis) *Chennai, India*

July 2014 - May 2015

- Researched using the motion kernel estimated through blind deconvolution to predict the orientation of planar scenes. Results published in **SPIE Defense + Security 2015.**

Presence Detection, Identification and Tracking in Smart Homes Utilizing Bluetooth Enabled Smartphones *Darmstadt, Germany*

May 2013 - July 2013

- Worked on creating a non-obtrusive system for person detection, identification and tracking using Bluetooth-enabled Android phones at the KOM Lab in TU Darmstadt, as part of their Smart Homes project. Results published in **IEEE LCN 2014**

Honors & Awards

2019	**Best Paper Award,** ACM Multimedia Conference	*Nice, France*
2015	**Fellowship Award,** Johns Hopkins ECE Gregory Fellowship	*Baltimore, U.S.A*
2015	**Philips India Prize,** Best academic record among EE Dual Degree (DD) students at IIT Madras	*Chennai, India*
2014	**D Anand Subramaniam Memorial Award,** Best academic record in the 4th year among EE DD Com. students	*Chennai, India*
2013	**DAAD WISE scholarship,** Summer research internship at TU Darmstadt	*Germany*

Leadership & Service

Johns Hopkins University *Baltimore, USA*

Teaching Assistant *August 2016 - Present*

- Led the organization and teaching of recitations and lecture hours for 4 courses.
- Assisted in formulating and evaluating exams and assignments.
- Conducted office hours to aid students in understanding the material.
- Mentored student research projects and a visiting summer research student.

Johns Hopkins University *Baltimore, USA*

Peer Reviewer *August 2018 - Present*

- Served as a peer reviewer for the IEEE Transactions on Image Processing and the IEEE ICASSP conference.

Johns Hopkins University *Baltimore, USA*

ECE Graduate Representative *September 2017 - August 2018*

- Represented the ECE department as its graduate representative in the student organization (GRO).
- Responsible for voting on motions for GRO fund allocation and determining the official stance of the student body.