

# Dr. Nimisha T M

Algorithm Development Engg./ Ph.D. -Image Processing and Computer Vision

Chennai, India | +919444370225 | [nimiviswants@gmail.com](mailto:nimiviswants@gmail.com)

[nimiiiit.github.io](https://github.com/nimiiiit)



## Summary

A passionate researcher with 6+ years of experience in Image Processing and Deep Learning with quality publications in top-tier conferences and journals. Expertise and working knowledge in traditional image restoration techniques and current deep learning areas like Adversarial networks, CNNs, and Autoencoders. Enthusiastic towards embracing and exploring new technologies and challenges in Image Processing and Vision-related areas.

## Work experience

Algorithm Development Engineer Jan 2019 - Present

[KLA+](#)

Works on research and development for SEM image quality enhancement aimed for better defect classification and detection accuracy in manufacturing process.

## Education

Doctor of Philosophy (Ph.D.) 2013 - 2019

[Indian Institute of Technology, Madras](#)

**Specialization:** Image Processing

**CGPA:** 9.25/10

**Dissertation:** "MULTI AND SINGLE IMAGE APPROACHES FOR LATENT IMAGE RECOVERY IN HANDHELD CAMERAS" under the supervision of [Prof. A N Rajagopalan](#) and Prof. R Aravind.

Master of Technology (M.Tech) 2011 - 2013

[National Institute of Technology, Calicut](#)

**Specialization:** Signal Processing

**CGPA:** 9.38/10

**Dissertation:** "AN EXPLORATION INTO SPARSE SIGNAL REPRESENTATION AND RECOVERY" under the supervision of [Dr. G Abhilash](#)

Bachelor of Technology (B.Tech) 2007 - 2011

[Amrita Viswa Vidyapeetham](#)

**Branch:** Electronics and Communication

**CGPA:** 9.02/10

## Research Summary

**SEM IMAGE RESTORATION:** Proposed various techniques for improving SEM image quality for throughput gain, metrology, and better detection performances.

- Denoiser:** Existing denoiser in KLA+ tools are slower and requires lots of parameter tuning. Proposed and developed a noise-to-noise DL technique that runs on GPU and is much faster (93% speedup) than the in-house method and works out of the box removing the need for parameter tuning. It improved throughput by 4X in metrology by

## Details

Date of Birth: 30.04.1989

Age: 30

Nationality: Indian

Marital Status: Married

[Google Scholar Page](#)

## Technical Domain

Image Restoration: Deblurring, Denoising and Super-resolution



Inverse problems to recover the salient clean image from multi or single degraded frame

Deep learning



CNN, Autoencoders, UNets, Generative Adversarial Networks (GAN), Classifiers.

Compressed Sensing



Sparse signal recovery from measurements obtained well below Nyquist rate. Methods: OMP, CoSAMP.

## Skills

Python, Torch, C++ (basics), Tensorflow, Pytorch, MATLAB.

## Publication Record

ECCV, ICCV, ICIP, TIP, CVIU, BMVC and ICVGIP

## Awards and Recognition

- Recipient of Institute Research (IR) Award for Even-Semester 2018
- My team (IPCV-team) bagged first, second and third place in track A, B and C, respectively of the [PIRM](#)

maintains accuracy and precision in measurements.

2. **Super-resolver:** Defect analysis is easier at higher resolutions but collecting such images with the SEM tool is time taking. Proposed an SR network (using ESRGAN) that accelerates the throughput of SEM data collection by 4X without reducing image quality.
3. **Image Quality Estimation:** In long inspection runs it is necessary to keep track of image quality variations so as to make informed decisions on the model performance. The existing method of extracting image attributes is difficult and at times would not correlate with human perception. Explored different non-reference quality matrices for this problem and identified a solution based on NIQE metric. NIQE captures a wide range of IQ variations and correlates well with human perception.

### **MULTI AND SINGLE IMAGE APPROACHES FOR LATENT IMAGE RECOVERY IN HANDHELD CAMERAS:**

Handheld imaging being a prevalent practice for acquiring data, the reduction in quality resulting from motion artifacts and sensor size are major concerns to account for. My thesis explores various single/multi image-based deblurring and super-resolution algorithms with tradition and deep learning techniques for image restorations. The proposed methods ([Google Scholar Page](#)) got published in top-tier international conferences and journals.

**AN EXPLORATION INTO SPARSE SIGNAL REPRESENTATION AND RECOVERY:** Signal recovery from a set of measurements far below the sampling rate is termed as Compressed Sensing. Worked on designing a sparsifying basis for a class of signals (speech) using the idea of entropy reduction. The proposed scheme was able to achieve a consistent recovery with just 80% of the measurements.

## **Publications**

### **JOURNALS:**

1. Nimisha T M, A N Rajagopalan, and R Aravind, "Generating High-Quality Pan-Shots from Motion Blurred Videos," Accepted for publication in Computer Vision and Image Understanding (CVIU) Journal 2018.
2. Abhijith P, Nimisha T M, and A N Rajagopalan. "Multi-Image Blind Super-Resolution of 3D Scenes." IEEE Transactions on Image Processing 26.11 (2017): 5337-5352.

### **CONFERENCES:**

1. Nimisha T M, Amitoz D, Raj Kuppa, and Bingxi Li "A Deep Learning (DL)-based SEM Denoiser from Noisy Data Pairs", Global Engineering Conference KLA+ 2020
2. Nimisha T M, Amioz D, and Raj Kuppa, "Learning SEM denoiser from Noisy data pairs", in Neoterix Conference 2019
3. Nimisha T M, Sunil Kumar, and A N Rajagopalan, "Unsupervised Class-Specific Deblurring", in European Conference on Computer Vision (ECCV) 2018.
4. Vasu, Subeesh, Nimisha T M, and A. N. Rajagopalan. "Analyzing perception-distortion tradeoff using enhanced perceptual super-resolution network." Proceedings of the European Conference on Computer Vision (ECCV). 2018.
5. Nimisha T M, Vijay Rengarajan, and A. N. Rajagopalan, "Semi-supervised Learning of Camera Motion from a Blurred Image," Accepted for publication at IEEE International Conference on Image Processing (ICIP), Athens, Greece, October 2018.
6. Nimisha T M, Akash Kumar S and A.N.Rajagopalan, "Blur-Invariant Deep Learning for Blind Deblurring" in International Conference on Computer Vision (ICCV), Venice, Italy 2017.
7. Nimisha T M, M. Arun, and A.N. Rajagopalan, "Dictionary Replacement for Single Image Restoration of 3D Scenes," in British Machine Vision Conference (BMVC), York, UK. September 2016.
8. Nimisha T M, Karthik Seemakurthy, A N Rajagopalan, Narayanaswamy Vedachalam and Ramesh Raju, "Color Restoration in Turbid Medium", In Indian Conference on Computer Vision, Graphics and Image Processing (ICVGIP) 2016.
9. Nimisha T.M., A.N. Rajagopalan, and R. Aravind. "Seamless Change Detection and Mosaicing for Aerial Imagery." In CVPR Workshop on The Computer Vision in Vehicle Technology (CWT) 2015.

**Challenge** (Perceptual Image Restoration and Manipulation) conducted by ECCV 2018.

3. Patent on "**SYSTEM AND METHOD FOR GENERATING PAN SHOTS FROM VIDEOS**" under process
4. Reviewer for NCC 2017, WACV 2018 and SPCOM 2018, SP Letters 2019, Transactions on visualization and computer graphics (TVCG) 2019.
5. Assisted my Professor in reviewing for ICVGIP 2016, NCVPRIPG 2015, ICAPR 2014 and IETE Journal.
6. Won first prize in "Code to Optimize" event conducted in the technical event Shastra 2016, IIT Madras
7. Received travel grant from Microsoft and ACM India to present my work in ICCV 2017
8. At KLA+, I lead the collaboration with IIT Madras in carrying out research and development activities.
9. Invited guest speaker at National Institute of Technology Calicut as a part of IEEE Signal Processing Society (Date 27/12/2019)

## **Courses Completed**

1. Digital Signal Processing
2. Image Signal Processing
3. Digital Video Processing
4. Linear Algebra
5. Probability Theory
6. Detection and Estimation Theory

## **Workshops**

1. Global Engineering Conference by KLA+ 2020
2. Neoterix Conference by KLA+ 2019
3. European Conference on Computer Vision (ECCV) 2018
4. International Conference on Computer Vision (ICCV) 2017
5. Summer School on Deep Learning 2016 conducted by IIIT Hyderabad.
6. The Indian Conference on Computer Vision, Graphics and Image Processing (ICVGIP) 2016/2014.