Prasan Shedligeri

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PhD candidate

Department of Electrical Engineering, IIT Madras

EDUCATION

- **Indian Institute of Technology, Madras** — Chennai, India
  Direct PhD in Electrical Engineering; **CGPA**: 9.17/10 — July 2016 – Present
  - Field of Research: **Computational Photography, Computer Vision**
  - Key Courses: *Computational Photography, Machine Learning for Computer Vision, Probability and Random Processes, Linear Algebra, Convex Optimization, Photometry and Geometry based Computer Vision, Image Signal Processing*
- **M.S. Ramaiah Institute of Technology** — Bengaluru, India
  B.E. in Electronics and Communication Engineering; **CGPA**: 9.50/10 — Aug. 2011 – June 2015
  - Key Courses: *Digital Image Processing, Numerical Methods in Mathematics, Object Oriented Programming with C++, Cryptography and Network Security*
  - **Thesis**: Hardware Implementation of a Digital Watermarking System for Video Authentication

Publications

High Frame Rate Optical Flow Estimation from Event Sensors via Intensity Estimation

- *Currently under review at Computer Vision and Image Understanding*
  Authors: Prasan Shedligeri, Kaushik Mitra

A Unified Framework for Compressive Video Recovery from Coded-Exposure Techniques

- *IEEE/CVF Winter Conference on Applications of Computer Vision, 2021*
  Authors: **Prasan Shedligeri**, Anupama S, Kaushik Mitra

Video Reconstruction by Spatio-Temporal Fusion of Blurred-Coded Image Pair

- *IAPR 25^{th} International Conference on Pattern Recognition, 2020*
  Authors: Anupama S, **Prasan Shedligeri**, Abhishek Pal, Kaushik Mitra

Photorealistic Image Reconstruction from Hybrid Intensity and Event based Sensor

- *SPIE Journal of Electronic Imaging 2019*
  Authors: **Prasan Shedligeri**, Kaushik Mitra

Data Driven Coded Aperture Design for Depth Recovery

- *IEEE ICIP 2017, Beijing, China*
  Authors: **Prasan Shedligeri**, Sreyas Mohan, Kaushik Mitra

Scholastic Achievements

- Secured a Research Travel Scholarship of 5000 USD from RBC-DSAI[1], IIT Madras to visit Northwestern University as a short-term visiting scholar.
- One of the 20 finalists out of 95 competing teams across 7 premier Indian institutes in QInF[2] India 2018. The 95 competing teams were from 7 different premier Indian institutes.
- Awarded travel grant of 1000 USD to attend IEEE International Conference on Image Processing 2017 by IEEE Signal Processing Society.
- Ranked 704 in the country in GATE[3], attempted by over 150,000 students.
- Attended Regional Science Congress held in IIT Madras, Chennai in the year 2010. I was one among 250 students from 3 different South Indian states to be attending the 5 day event.
- One among 80 students selected for secondary education at Jawahar Navodaya Vidyalaya[4] among 10000 students.

[1] Robert Bosch Centre for Data-Science and AI https://rbc-dsai.iitm.ac.in
[2] Qualcomm Innovation Fellowship: a one year fellowship with 1 million INR awarded to 7 innovative projects
[3] A nationwide entrance test for postgraduate studies in engineering
[4] A brain child of Late Rajiv Gandhi to provide quality education for talented rural students

Academic Projects

High frame-rate optical flow from event sensors

- *IIT Madras* Mar 2019 – Mar 2020

  Dr. Kaushik Mitra

  - Event sensors provide high temporal resolution data, but do not obey the brightness consistency constraint prevalent in natural videos, making it challenging to estimate optical flow.
  - We propose a novel method to estimate a high dynamic range and high frame rate intensity images from event sensors which is then used to supervise prediction of high-frame rate optical flow.

Improving acquisition speed for X-ray ptychography

- *Northwestern University* Sep 2019 – Jan 2020

  Dr. Oliver Cossairt, Dr. Aggelos Katsaggelos

  - X-ray ptychography is a nanometer resolution imaging technique, which requires oversampled data in order to obtain an unique solution to the ill-posed problem.
  - We proposed a solution to speed up the acquisition process by regularizing the ill-posed object reconstruction problem by imposing image priors.
  - It was empirically shown that we could obtain 4x-9x faster data acquisition with our proposed reconstruction algorithm.

High resolution, extended depth of field imaging for biometrics

- *Northwestern University* Aug 2019 – Dec 2019

  Dr. Oliver Cossairt, Dr. Aggelos Katsaggelos

  - Commercial cameras suffer a trade-off between the diffraction limited resolution and the depth of field of the captured image
  - To overcome this trade-off we designed a focal-sweep system to capture images and then restore them to obtain high-resolution and extended depth of field images

Data driven compressive 3D display using a hogel basis screen

- *Northwestern University* Aug 2019 – Dec 2019

  Dr. Oliver Cossairt, Dr. Aggelos Katsaggelos

  - Designed a learning based algorithm to compress a light field image
  - The learning based compression algorithm was designed to include the hardware constraints imposed by the display hardware
  - A compression ratio of 100x was demonstrated

Intensity image reconstruction for event based sensor

- *IIT Madras* Aug 2018 – Jan 2019

  Dr. Kaushik Mitra

  - Trained a seq2seq based deep neural network to generate intensity frames from event frames with limited training data.

High Speed imaging using hybrid sensors

- *IIT Madras* Aug 2017 – May 2018

  Ketul Shah, Dhruv Kumar, Dr. Kaushik Mitra

  - Combined the advantages of a traditional CMOS sensor and a novel event-based sensor to design algorithm for recovering high spatio-temporal resolution video.
  - Collected a video dataset where a CMOS sensor (DSLR) and the event sensor were co-located using a beam-splitter.

Design code for Coded Aperture Photography

- *IIT Madras* Sep 2016 – Feb 2017

  Sreyas Mohan, Dr. Kaushik Mitra

  - Used the latest data-driven techniques to design an optimal code for recovering depth from coded aperture imaging.

TEACHING EXPERIENCE

- **Signals and Systems for Dr. Deepa Venkitesh** Winter 2017
  IIT Madras
- **Deep Learning for Image Processing for Dr. K. Mitra and Dr. A. N. Rajagopalan** Fall 2017
  IIT Madras
- **Digital Signal Processing for Dr. Kaushik Mitra** Winter 2018
  IIT Madras
- **Lab for Data Analytics for Dr K. Mitra and Dr. V. Ramaiyan** Fall 2018
  IIT Madras
- **Computational Photography for Dr. K. Mitra** Winter 2019
  IIT Madras

WORK EXPERIENCE

- **Graduate Engineer Trainee** Idea Cellular Limited
  Switch Engineer June 2015 – April 2016
  - Worked with a team of 12 people helping them to maintain the core nodes in a cellular network like HLR and MSCs.
  - Took lead in automating various processes like preparing and sending status reports using Excel VBA. Learned SQL programming and basic webpage building skills to set up a system that intimated the concerned parties about any glitches in the network.