Prasan Shedligeri

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PhD candidate

Department of Electrical Engineering, IIT Madras

Web:asprasan.github.io

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 25th 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] 2016, attempted by over 150,000 students.

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[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

Academic Projects

Post-capture aperture and focus control for videos
- *IIT Madras*   Sep 2020 –

  Dr. Kaushik Mitra
  - Stereo cameras effectively capture the geometry in the scene.
  - Devised an unsupervised algorithm for light field video reconstruction from stereo video.

Data driven compressive 3D display using a hogel basis screen
- *Northwestern University*   Aug 2019 – Aug 2020

  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.
  - Dimensionality reduction by 100x was demonstrated.

Coded-2-Bucket sensors for compressive video sensing
- *IIT Madras*   Aug 2019 – Oct 2020

  Anupama S, Abhishek Pal, Dr. Kaushik Mitra
  - Learning based algorithms have demonstrated reasonable results for video from a single blurred image.
  - An additional input from a coded exposure sensor can assist the blurred image to resolve motion ambiguity
  - We propose a deep-learning framework that can exploit complementary information from coded and blurred image pairs. The coded-blurred image pair is acquired using the multi-bucket sensors such as Coded-2-Bucket sensor.
  - We show that C2B has a significant advantage to recover the video only for largely static scenes.

High frame-rate optical flow from event sensors
- *IIT Madras*   Mar 2019 – Mar 2020

  Dr. Kaushik Mitra
  - Brightness constancy constraint, widely used in optical flow estimation cannot be used directly on the event sensor data.
  - A recurrent neural network based learning algorithm is proposed for joint estimation of intensity images and optical flow from event sensor data.

Improving acquisition speed for X-ray ptychography
- *Northwestern University*   Sep 2019 – Jan 2020

  Dr. Oliver Cossairt, Dr. Aggelos Katsaggelos
  - Phase retrieval algorithm used for ptychographic imaging requires oversampled measurements for obtaining unique solution, slowing down the acquisition process.
  - Phase retrieval can be made well-posed even for undersampled measurements by constraining the solution with appropriate priors.
  - With the proposed phase retrieval algorithm we can speed up the acquisition by 4-9x.

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.

Code Design 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.