Vishwanath Saragadam

Postdoctoral Research Associate, Rice University

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My research interests are in the area of computational imaging where I solve challenging problems in computer vision with a co-design optical systems and algorithms to sense, represent, and infer from high dimensional visual signals such as videos, hyperspectral images, and light fields. My research encompasses a broad set of disciplines including optics, meta-materials, algorithms, machine learning, and signal processing.

Research Highlights

Published several journal and conference papers all in top tier venues (IEEE TIP, IEEE TPAMI, ICCP, ICCV, ECCV, OSA Optics Express, and ACM ToG), with a best paper award at 2022 ICCP. My thesis is a recipient of the 2021 A. G. Jordan outstanding thesis award at the ECE department in Carnegie Mellon University.

Teaching Highlights

Extensive experience in teaching with two teaching assistance ship (TA) in undergraduate course, two TAships in graduate courses, and the course instructor for the core undergraduate course (current, Rice U.), ELEC301, and an outstanding teaching award at the ECE department in Carnegie Mellon University.

Education and Employment

Rice University   **2020 -**
- Postdoctoral research associate in the DSP group
- PIs: *Prof. Richard G. Baraniuk* and *Prof. Ashok Veeraraghavan*

Carnegie Mellon University   **2014 - 2020**
- Advised by *Prof. Aswin Sankaranarayanan* (ECE, CMU) and *Prof. Xin Li* (ECE, Duke University)
- Doctorate of Philosophy in Electrical and Computer Engineering, 2014 - 2020
- Thesis title: *Spectrally-Programmable Cameras for Imaging and Inference*
- Master of Sciences in Electrical and Computer Engineering, 2014 - 2016.

Indian Institute of Technology Madras   **2010 - 2014**
- B.Tech (Hons.) in Electrical Engineering with minor degree in Operations Research.
- Recipient of Siemens award for highest GPA in electrical engineering 2014 batch.

Awards / Honors

- Best paper awared at the IEEE International Conference for Computational Photography, 2022.
- Recipient of the A. G. Jordan outstanding thesis award in the ECE department at CMU presented to one ECE graduate every year out of approximately 20.
- Recipient of the Rice university future faculty fellowship, 2020 - 2021.
- ACM SIGGRAPH 2020 thesis fast forward finalist for entry titled, "Spectrally programmable cameras for imaging and inference".
- Recipient of *Prabhu and Poonam Goel Graduate fellowship* for the academic year 2018/19 at CMU awarded to one student every year.
- Recipient of the Outstanding Teaching Assistant award of 2018 in the ECE department at CMU awarded to one or two teaching assistants every year.
- Recipient of Dean's tuition fellowship for graduate studies at CMU.
- Recipient of the *Shri V Rajagopalan Memorial award* and *M Sankaraiah and M Saradah scholarship* for outstanding performance in sophomore year in electrical engineering.

Publications

- **V. Saragadam**, Z. Han, V. Boominathan, L. Huang, S. Tan, J. E. Fröch, K. F. Böhringer, R. G. Baraniuk, A. Majumdar, A. Veeraraghavan, "Foveated Thermal Computational Imaging in the Wild Using All-Silicon Meta-Optics", *under submission*, arXiv preprint arXiv:2212.06345, 2022

- **V. Saragadam**, J. Tan, G. Balakrishnan, R. G. Baraniuk, A. Veeraraghavan, "MINER: Multiscale Implicit Neural Representations", to be published in European Conf. Computer Vision (ECCV), 2022

- **V. Saragadam**, R. Balestriero, A. Veeraraghavan, R. G. Baraniuk, "DeepTensor: Low-Rank Tensor Decomposition with Deep Network Priors", arXiv preprint arXiv:2204.03145, 2022

- B. Ghanekar, **V. Saragadam**, D. Mehra, A. K. Gustavsson, A. C. Sankaranarayanan, A. Veeraraghavan "PS^{2}F: Polarized Spiral Point Spread Function for Single-Shot 3D Sensing", IEEE Trans. Pattern Analysis and Machine Intelligence (PAMI), 2022

- **V. Saragadam**, V. Rengarajan, R. Tadano, T. Zhuang, H. Oyaizu, J. Murayama, A. C. Sankaranarayanan, "Programmable Spectral Filter Arrays using Phase Spatial Light Modulator", arXiv preprint arXiv:2109.14450, 2021

- **V. Saragadam**, A. Dave, R. Baraniuk, A. Veeraraghavan, A. C. Sankaranaryanan, "Thermal Image Processing via Physics-Inspired Deep Networks", to appear in IEEE International Conference on Computer Vision (ICCV) 2nd Workshop on Learning for Computational Imaging, 2021

- **V. Saragadam**, M. DeZeeuw, R. Baraniuk, A. Veeraraghavan, A. C. Sankaranaryanan, "SASSI – Super-Pixelated Adaptive Spatio-Spectral Imaging", to appear in IEEE Trans. Pattern Analysis and Machine Intelligence (PAMI), 2021

- A. Yang, F. Pan, **V. Saragadam**, D. Dao, Z. Hui, J. Rick Chang, A. C. Sankaranarayanan, "SliceNets – A Scalable Approach for Object Detection in 3D CT Scans", IEEE Winter Conf. Applications of Computer Vision, 2021

- **V. Saragadam**, and A. C. Sankaranarayanan, "On Space-Spectrum Uncertainty Analysis for Coded Aperture Systems", OSA Optics Express, 28 (6) 7771 - 7785, 2020

- **V. Saragadam**, A. C. Sankaranarayanan, "Programmable spectrometry – per-pixel material classification using learned spectral filters", IEEE Intl. Conf. Computational Photography (ICCP), 2020

- **V. Saragadam**, J. Wang, M. Gupta, S. Nayar, "Micro-baseline Structured Light", IEEE Intl. Conf. Computer Vision, 2019

- **V. Saragadam**, and A. C. Sankaranarayanan, "KRISM – Krylov subspace-based optical computation of hyperspectral images", ACM Trans. Graphics (ToG), 38 (5), 1 - 14, 2019

- **V. Saragadam**, A. C. Sankaranarayanan, "Wavelet tree parsing with freeform lensing", IEEE Intl. Conf. Computational Photography (ICCP), 2019

- **V. Saragadam**, A. C. Sankaranarayanan, X. Li, "Cross-scale predictive dictionaries", IEEE Trans. Image Processing (TIP), 28 (2) 803 - 814, 2019

- **V. Saragadam**, J. Wang, X. Li, A. C. Sankaranarayanan, "Compressive spectral anomaly detection", IEEE Intl. Conf. Computational Photography (ICCP), 2017

- **V. Saragadam**, A. C. Sankaranarayanan, X. Li, "Cross-scale predictive dictionaries for image and video restoration", IEEE Intl. Conf. Image Processing, 2016

Conferences and Workshops

- Invited talk at Meta Reality Labs (Pittsburgh) on "MINER: Multiscale Implicit Neural Representations", 2022.

- Invited talk at General Electric (GE) Healthcare on "DeepTensor: Low-Rank Tensor Decompositions with Deep Network Priors", 2022.

- Invited talk at Northwestern University on "Spectrally-Programmable Cameras for Imaging and Inference", 2020.

- Invited talk at Asilomar Conference on Signals, Systems, and Computers on "Adaptive Imaging and Spectroscopy", 2019, held in Pacific Grove, California.

- Presented poster on "Micro-Baseline Structured Light" at International Conference on Computer Vision, 2019, held in Seoul, South Korea.

- Presented poster on "Programmable spectrometry – per-pixel material classification using learned spectral filters" at International Conference on Computational Photography, 2019, held in Tokyo, Japan.

- Presented paper on "Wavelet tree parsing with freeform lensing" at International Conference on Computational Photography, 2019, held in Tokyo, Japan.

- Invited talk at Johns Hopkins University, and University of Maryland on "KRISM – Krylov subspace-based optical computing of hyperspectral images", 2018.

- Presented poster on "KRISM – Krylov subspace-based optical computing of hyperspectral images" at ICARS workshop, 2018.
- Presented demo on "KRISM – Krylov subspace-based optical computing of hyperspectral images" at International Conference on Computational Photography, 2018, held in Carnegie Mellon University, Pittsburgh.
- Presented paper on "Compressive spectral anomaly detection" at International Conference on Computational photography, 2017, held in Stanford University, California.
- Invited talk on "Cross-scale predictive dictionaries", Indian Institute of Technology Madras.
- Invited talk at International Institute of Information Technology, Hyderabad, India on "Sparse representations and its applications", 2017.
- Presented paper on "Cross-scale predictive dictionaries for image and video restoration" at International Conference on Image Processing, 2016, held in Phoenix, Arizona.

Professional Activities

- Reviewer: ACM SIGGRAPH, IEEE ISIT, IEEE TIP, IJCV, IEEE ICCP, IEEE CVPR, COMSNET, WACV, BMVC, ACCV, IEEE TPAMI, IEEE TCI, Nature Scientific Reports, OSA Optics Letters, OSA Optica, OSA Photonics, MDPI Remote Sensing, MDPI Applied Sciences.
- Session chair for International Conference on Computational Photography (ICCP) 2022, held in California Institute of Technology.
- Web chair for International Conference on Computational Photography (ICCP) 2018, held in Carnegie Mellon University.
- Volunteer for "Camera workshop" as part of Gelfand Outreach Program at CMU in 2016, 2017 and 2018. I designed experiments involving low cost and easy to build optical systems such as pinhole camera, and cellphone-based microscope. I was in charge of instructing students from middle and high school.

Teaching and Leadership Experience

- Course instructor for "Signals, Systems, and Learning" at Rice University, fall 2022.
- TA for "Signals and Systems" at Carnegie Mellon University under Prof. Grover and Prof. Yu, 2015, 2017.
- TA for "Image and Video Processing" at Carnegie Mellon University under Prof. Sankaranarayanan, 2016, 2018.
- Head of TAs for "Signals and Systems" at Carnegie Mellon University under Prof. Grover and Prof. Yu, 2017. I was in charge of coordinating with other TAs and ensuring timely delivery of high quality homework assignments and recitation material.
- Lab incharge of Image Science's Lab (CMU) from 2017 - 2020. I was tasked with ensuring that resources were distributed based on students requirements and deadlines, maintaining a thorough and up-to-date lab catalog, guidelines and documentation of lab equipment for safe and effective usage, and organization of components and equipments.

Internship

Snap Inc., New York City, New York   May - August 2018
- Worked on Augmented Reality hardware under the guidance of Shree Nayar, and Prof. Mohit Gupta (University of Wisconsin Madison).

Intel corporation, Santa Clara, California   May - August 2015
- Worked on convolutional sparse coding for recognition tasks.

Maschinenfabrik Reinhausen GmbH, Regensburg, Germany   May - July 2013

Sasken Communication Technologies, Chennai, India   May - July 2012