VIJAY RENGARAJAN

WORK AND RESEARCH AREAS	Computational photography, image processing, computer vision, biometric authentication, and machine learning.

WORK EXPERIENCE

Reality Labs, Meta/Facebook, Bay Area, USA   September 2021 – now
Research Scientist

Carnegie Mellon University, Pittsburgh, USA   December 2017 – September 2021
Research Scientist at ECE

EDUCATION

Indian Institute of Technology Madras, Chennai, India   August 2011 – November 2017
Ph.D., Electrical Engineering
Thesis: *Rolling Shutter Imaging: Registration and Rectification*

PSG College of Technology, Coimbatore, India   August 2004 – May 2008
Bachelor of Engineering, Electronics and Communication Engineering

PRODUCT WORKS at Meta Reality Labs

On-Device AI for Camera Pipeline in Wearables.
- Developed machine learning models for Local Tone Mapping and 3D Color Look-up Table modules in the camera pipeline.
- Worked on machine learning models for RAW Pixel Desaturation/Hallucination.

Biometric Authentication for Wearables.
- Worked on machine learning model development of FaceID-like periocular authentication for Head-Mounted Devices (HMDs).
- Developed cross-modal capabilities (HMD and mobile phone), and worked on synthetic data generation for biometric authentication.
- Worked on an exploratory work for the hand/palm-based biometric authentication system for smartglasses.

Immersive 360-image Generation for VR Devices.
- Developed a LoRA-based generative-AI model to generate 360-images based on text for immersive experiences in virtual reality (VR) devices.

PROJECT WORKS at CMU

Computational High-speed Videography.
- Developed a machine learning model to computationally render high speed video from pre-designed low-speed short-long exposure captures.

Fruit Freshness using Structured Illumination.
- Mentored and worked with an undergrad student to develop a strawberry freshness prediction model using subsurface scattering.

Deep Intermodal Video Analytics.
- Developed a surprise activity detection system which detects unknown activities in unknown capture environments using only a few query example activities revealed at run-time as a surprise.

PUBLICATIONS

1. [CVPR2023] Ziyu Wan, Christian Richardt, Aljaz Bozic, Chao Li, *Vijay Rengarajan*, Seonghyeon Nam, Xiaoyu Xiang, Tuotuo Li, Bo Zhu, Rakesh Ranjan, and Jing Liao. "Learning Neural Duplex Radiance Fields for Real-Time View Synthesis" in International Conference on Computer Vision and Pattern Recognition (**CVPR**), 2023.

2. [ICCP2023] Vishwanath Saragadam, *Vijay Rengarajan*, Ryuichi Tadano, Tuo Zhuang, Hideki Oyaizu, Jun Murayama and Aswin C. Sankaranarayanan. "Programmable Spectral Filter Arrays using Phase Spatial Light Modulators" in International Conference on Computational Photography (**ICCP**) 2023.

3. [ECCV2022] Xiaoyu Xiang, Yapeng Tian, *Vijay Rengarajan*, Lucas Young, Bo Zhu, and Rakesh Ranjan. "Learning Spatio-Temporal Downsampling for Effective Video Upscaling" in European Conference on Computer Vision (**ECCV**) 2022.

4. [ICCVW2021] Jeremy Klotz, *Vijay Rengarajan*, and Aswin C. Sankaranarayanan. "Fine-Grain Prediction of Strawberry Freshness using Subsurface Scattering" in Large-Scale Fine-Grained Food Analysis Workshop at ICCV 2021.

5. [CVPRW2020] *Vijay Rengarajan*, Shuo Zhao, Ruiwen Zhen, John Glotzbach, Hamid Sheikh, and Aswin C. Sankaranarayanan. "Photosequencing of Motion Blur using Short and Long Exposures," in New Trends in Image Restoration and Enhancement workshop at CVPR 2020 (oral presentation).

6. [ICIP2018] Nimisha T M, *Vijay Rengarajan*, and A.N. Rajagopalan. "Semi-supervised Learning of Camera Motion from a Blurred Image," in International Conference on Image Processing (**ICIP**), October 2018 (oral presentation).

7. [CVPR2017] *Vijay Rengarajan*, Yogesh Balaji, and A.N. Rajagopalan. "Unrolling the Shutter: CNN to Correct Motion Distortions," in International Conference on Computer Vision and Pattern Recognition (**CVPR**), July 2017 (oral presentation).

8. [TPAMI2017] *Vijay Rengarajan*, A.N. Rajagopalan, R. Aravind, and Guna Seetharaman. "Image Registration and Change Detection under Rolling Shutter Motion Blur," IEEE Transactions on Pattern Analysis and Machine Intelligence (**PAMI**), November 2016.

9. [ICIP2016] *Vijay Rengarajan*, Abhijith Punnappurath, and A.N. Rajagopalan. "Rolling Shutter Super-resolution in Burst Mode," in International Conference on Image Processing (**ICIP**), September 2016.

10. [CVPR2016] *Vijay Rengarajan*, A.N. Rajagopalan, and R. Aravind. "From Bows to Arrows: Single Image Rolling Shutter Rectification," in International Conference on Computer Vision and Pattern Recognition (**CVPR**), June 2016.

11. [ICCV2015] Abhijith Punnappurath, *Vijay Rengarajan*, and A.N. Rajagopalan. "Rolling Shutter Super-resolution," in the Proceedings of IEEE International Conference on Computer Vision (**ICCV**), December 2015.

12. [SPIE2015] *Vijay Rengarajan*, Sheetal B. Gupta, A.N. Rajagopalan, and Guna Seetharaman. "Illumination Robust Change Detection with CMOS Imaging Sensors," in **SPIE** Defense + Security Symposium, International Society for Optics and Photonics, April 2015 (oral presentation).

13. [ECCV2014] *Vijay Rengarajan*, A.N. Rajagopalan, and R. Aravind. "Change Detection in the Presence of Motion Blur and Rolling Shutter Effect," in European Conference on Computer Vision (**ECCV**), Springer International Publishing, September 2014.

14. [ICPR2014] *Vijay Rengarajan*, A.N. Rajagopalan, and R. Aravind. "Motion Estimation and Classification in Compressive Sensing from Dynamic Measurements," in the Proceedings of IEEE International Conference on Pattern Recognition (**ICPR**), August 2014 (oral presentation).

15. [CVPRW2014] *Vijay Rengarajan*, Abhijith Punnappurath, A.N. Rajagopalan, and Guna Seetharaman. "Efficient Change Detection for Very Large Motion Blurred Images," in the Proceedings of IEEE Conference on Computer Vision and Pattern Recognition Workshop on Registration of Very Large Images, June 2014 (oral presentation).