PRATEEK CHENNURI

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RESEARCH BACKGROUND

Computational imaging and vision, with expertise in alternative sensors (single-photon detectors, event cameras), high-speed and low-bit-depth imaging, and 3D reconstruction. In addition to novel sensors, I am also interested in advancing imaging with conventional sensors, with a forward-looking focus on power-efficient computational imaging solutions for real-time perception.

EDUCATION

Ph.D. in Electrical and Computer Engineering   Grade: 4.0 / 4.0
Purdue University, West Lafayette, IN   2022 - 2026 *(expected)*

B.Tech - M.Tech Dual Degree in Electrical Engineering   Grade: 9.75 / 10.0
Indian Institute of Technology (IIT) Gandhinagar, India   2016 - 2021

INTERNSHIPS

Hybrid Bit-Depth Video Super-Resolution   May 2025 - Aug 2025
Meta Reality Labs   Washington, USA

- Designed a power-efficient video capture pipeline for Meta wearable devices (e.g., Ray-Ban Meta Glasses) using hybrid bit-depth acquisition, enabling high-quality video with significant power savings in both capture and wireless transmission.
- Developed an algorithm to reconstruct high-bit RGB, high-resolution video from hybrid bit-depth, hybrid-color, low-resolution inputs, achieving 93% performance recovery on synthetic and real datasets compared to state-of-the-art high-bit video super-resolution methods.

Imaging Beyond CMOS using Single Photon Detectors and Generative AI   May 2024 - Aug 2024
Dolby Laboratories   California, USA

- Proposed a physics-based conditional diffusion approach that restores extremely noisy single photon detector frames by fusing a physics-based quanta image simulator to the iterative restoration process.
- Experiments on synthetic and real data show that my algorithm outperforms state-of-the-art quanta restoration algorithm with 1.5dB improvement in PSNR along with significant improvement in perceptual quality.

Edge aware interpolation of terrestrial 3-dimensional maps   Aug 2021 - July 2022
Indian Institute of Science   Bangalore, India

- Collaborated on an ISRO-funded project to interpolate 3D elevation maps (DEMs) from irregular, non-uniform grids to regularly spaced grids, ensuring preservation of high-frequency details like edges.
- Implemented DEM interpolation using polyharmonic splines and preconditioned conjugate gradient for real-time performance.
- Developed a custom continuous convolution module to project irregularly sampled data onto a regular grid.

PUBLICATIONS

Quanta Diffusion. *IEEE ICIP*, 2025.
(Spotlight Oral and Best Paper Award)
Prateek Chennuri, Dongdong Fu, Stanley H. Chan.

Generative Photography: Scene-Consistent Camera Control for Realistic Text-to-Image Synthesis. *CVPR*, 2025.
(Highlight: Top 2.98% of all submissions)
Yu Yuan, Xijun Wang, Yichen Sheng, Prateek Chennuri, Xingguang Zhang, Stanley H. Chan.

Generative Personalized Blind Face Restoration Enhanced by Physical Identity. *IEEE ICIP*, 2025.
Xijun Wang, Xingguang Zhang, Yu Yuan, Bole Ma, Prateek Chennuri, Stanley H. Chan.

Quanta Video Restoration. *ECCV*, 2024.
Prateek Chennuri, Yiheng Chi, Enze Jiang, Dilshan Godaliyadda, Abhiram Gnanasambandam, Hamid R. Sheikh, Istvan Gyongy, Stanley H. Chan.

Parametric Modeling and Estimation of Photon Registrations for 3D Imaging. *MMSP* 2024.
Weijian Zhang, Hashan K Weerasooriya, Prateek Chennuri, Stanley H. Chan.

Single Photon LiDAR Compression: An Overview. *MWSCAS*, 2023.
Abdullah H. Al-Shabili, Hashan K Weerasooriya, Harshana Weligampola, Prateek Chennuri, Pamela Abshire, Stanley H. Chan.

In-Orbit Lunar Satellite Image Super Resolution for Selective Data Transmission. *SMOPS* 2023.
Prateek Chennuri*, Atal Tewari*, Nitin Khanna.

MANUSCRIPTS

Real-Time Markov Modeling for Single-Photon LiDAR: $1000\times$ **Acceleration and Convergence Analysis**. *(Under Review)*
Weijian Zhang, Hashan Kavinga Weerasooriya, <u>Prateek Chennuri</u>, Stanley H. Chan.

Real-Time Scene-Adaptive Compression for Single-Photon LiDAR. *(Under Review)*
Hashan Kavinga Weerasooriya, <u>Prateek Chennuri</u>, Weijian Zhang, Stanley H. Chan.

Markov-Renewal Single-Photon LiDAR Simulator. *(Under Review)*
Weijian Zhang, <u>Prateek Chennuri</u>, Hashan Kavinga Weerasooriya, Bole Ma, Stanley H. Chan.

Joint Depth and Reflectivity Estimation using Single Photon LiDAR. *(Under Review)*
Hashan Kavinga Weerasooriya, <u>Prateek Chennuri</u>, Weijian Zhang, Istvan Gyongy, Stanley H. Chan.

Personalized Generative Low-light Image Denoising and Enhancement. *(Under Review)*
Xijun Wang, <u>Prateek Chennuri</u>, Yu Yuan, Bole Ma, Xingguang Zhang, Stanley H. Chan.

PATENTS

System and Method for video restoration for high-speed low bit-depth images. 2025. US, filed.
Visual Data Restoration using Quanta Diffusion. 2025. US, filed.
Image Capture Enhancement through CMOS and SPAD Sensor Fusion. 2025. US, to be filed.

PROJECTS

Reference-based Image Restoration using Generative AI Apr 2024 - *Present*
Mentor: Prof. Stanley H. Chan Purdue University

- *Goal*: Develop robust generative frameworks for image and video restoration using personalized reference galleries.
- Introduced the *Personalized Generative Denoising (PGD)* framework, leveraging user-specific photo galleries and an identity-consistent physical buffer for low-light image enhancement. Achieved superior performance compared to existing state-of-the-art methods in empirical evaluations.

Enhanced Visual Perception using Single Photon Detectors Jan 2023 - *Present*
Mentor: Prof. Stanley H. Chan Purdue University

- *Goal*: Expanding the boundaries of visual perception beyond traditional CMOS sensors through the use of single photon detectors.
- Developed an end-to-end, trainable video restoration network that reconstructs low bit-depth, high-frame-rate videos captured in extremely low-light conditions. Empirical evaluations demonstrate proposed method outperforms existing state-of-the-art approaches.
- Pioneered the first technique capable of simultaneously estimating both depth and reflectivity solely from timestamps measured by Single-Photon LiDAR.
- *(Ongoing)* Developing a lightweight, one-time trained framework optimized for single-photon detectors, delivering real-time, state-of-the-art restoration performance across diverse illumination levels.

Kalorimate: Food Calorie Counter Android Application Jan - Apr 2019
Mentor: Prof. Nipun Batra IIT Gandhinagar

- *Goal*: To create a single-image-based food calorie counter android application for mess food at IIT Gandhinagar.
- Collected and annotated a real-time dataset of 1500 images of the mess food using the label-img software.
- Acquired a pixel-area:food-volume relationship for quantitative measurement of food.
- Implemented the object detection using Faster RCNN. Completed the task of image segmentation on multiple food items in an image using the Simple Linear Iterative Clustering (SLIC) algorithm and acquired 82% accuracy in determining the calories of multiple food items simultaneously.

TECHNICAL SKILLS

Languages: Python, C, PHP
Softwares/Tools Git, PyTorch, Tensorflow, Keras, Jupyter, Spyder, MATLAB, Simulink, Arduino, OpenCV, LaTeX, HTML
Operating Systems: Linux, Windows.

SERVICES

Reviewer for prominent A* conferences/journals such as CVPR, IEEE ICASSP, CVPRW, IEEE Signal Processing Letters, IEEE TPAMI, IEEE TIP, IEEE ICIP.
Peer-assisted Mentor at IIT Gandhinagar, helping undergraduate freshmen who found it difficult to cope with their academic workload.