Kaustubh Prashant Sadekar

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Education

Ph.D. Computer Science, Portland State University — *June 2022 - Present*

Department of Computer Science

- Research: Time-of-flight sensing using single photon cameras in resource-constrained conditions

B.Tech. Electrical Engineering, Pandit Deendayal Petroleum University — *August 2014 - May 2018*

School Of Technology Department of Electrical Engineering

- Robotics club president, IEEE student chapter representative, Motor controller team lead for prototype electric car project

Skills

Languages and libraries : Python, C++, OpenCV, libcamera, Open3D, PCL, PyTorch, PyTorch3D

Platforms : Blender, Mitsuba3, Meshroom, ROS, Meshlab, Shining 3D, FARO Scene, Visual Studio, MATLAB, Arduino IDE

Hardware : Intel Realsense D345i, OAK-D, FARO Focus, EinScan Pro, NVIDIA Jetson Nano, ARM-STM32f4, Arduino, Raspberry-Pi

Experience

Portland State University — *June 2022 - Ongoing*

Graduate Research Assistant At Computational Imaging Lab — *Advisor: Prof. Atul Ingle*

- Resource efficient representations for single photon 3D cameras. GPU-accelerated, vectorized SPAD-LiDAR dataset generation pipeline

Indian Institute of Technology Gandhinagar — *August 2020 - March 2022*

Research Fellow At The Computer Vision Imaging and Graphics Lab — *PI: Prof. Shanmuganathan Raman*

- 3D reconstruction of cultural heritage sites using FARO terrestrial scanner and EinScan structured light scanner. Proposals for research grants
- Point cloud and mesh post-processing pipelines for structured light 3D scans. Custom photogrammetry pipeline for 3D reconstruction

Indian Institute of Technology Bombay — *May 2019 - August 2020*

Research Associate At The Autonomous Robots and Multi-robot Systems (ARMS) Lab — *PI: Prof. Leena Vachhani*

- Streaming and surveillance system for spherical robots using fisheye camera. Created OmniCV - library for omnidirectional cameras Read Docs

Publications and Patents

Single-Photon 3D Imaging with Equi-Depth Photon Histograms — *ECCV 2024*

Kaustubh Sadekar, David Maier, Atul Ingle | *Project Page*

3D Sensing with Single-Photon Cameras for Resource-Constrained Applications — *CCD Workshop CVPR 2024*

Kaustubh Sadekar, David Maier, Atul Ingle | *Poster*

Methods for scaling a spherical robot (Patent number 507996) — *Indian Patents 2024*

Leena Vachhani, Vaibhav Nandkumar Kadam, Abhishek Gupta, Kaustubh Sadekar, Animesh Singhal

A robot system with an upwards-facing camera (Patent number 462647) — *Indian Patents 2023*

Leena Vachhani, Kaustubh Sadekar, Vaibhav Nandkumar Kadam, Animesh Singhal, Abhishek Gupta

Shadow Art Revisited: A Differentiable Rendering Based Approach — *WACV 2022*

Kaustubh Sadekar, Ashish Tiwari, Shanmuganathan Raman | *Project Page* *Paper*

LS-HDIB: A Large Scale Handwritten Document Image Binarization Dataset — *ICPR 2022*

Kaustubh Sadekar, Ashish Tiwari, Prajwal Singh, Shanmuganathan Raman | *Project Page* *Paper*

TreeGCN-ED: Encoding Point Cloud using a Tree-Structured Graph Network — *Pacific Graphics 2023*

Prajwal Singh, Kaustubh Sadekar, Shanmuganathan Raman | *Paper*

Major Projects

Lensless Imaging: Replacing a Camera Lens with Scotch Tape! (CS 510: Computational Imaging Project)

Project Page

- Developed a low-cost diffuser-based lensless camera, its calibration and reconstruction pipeline, and synthetic dataset generation with Blender.

Simulating Single Photon Cameras for Supervised Depth Estimation

To Be Open Sourced *Project Page*

- Physics-based modeling of SPAD sensor measurements simulating the effect of photon randomness, laser characteristics, and ambient light

Affordable Stereo Camera

To Be Open Sourced *Project Page*

- Stereo camera with USB webcams. Supporting software for stereo calibration, multiple depth estimation algorithms, and RGB-D data processing

OmniCV - Library for omnidirectional cameras

Open Sourced Code And Documentation Available On GitHub *Read Docs* *Code*

- ROS compatible library with different models of omnidirectional cameras (C++ and Python support). CI-CD workflow using GitHub actions