

Kaustubh Prashant Sadekar

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Education

Ph.D. Computer Science, Portland State University

June 2022 - Present

Department of Computer Science

- Research interests: Time-of-flight (ToF) 3D sensing, single-photon cameras, low-power 3D computer vision and robotics

B.Tech. Electrical Engineering, Pandit Deendayal Petroleum University

August 2014 - May 2018

School Of Technology Department of Electrical Engineering

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

Graduate Research Assistant At Computational Imaging Lab

June 2022 - Ongoing

🏢 Portland State University

Advisor: Prof. Atul Ingle

- Designed an on-sensor compression algorithm for ToF cameras. Achieved 36x speedup with GPU-accelerated, vectorized SPAD-LiDAR simulator
- Published research at ECCV 2024, CVPR 2024 CCD workshop, IMSI computational imaging workshop 2024

Research Fellow At The Computer Vision Imaging and Graphics Lab

August 2020 - March 2022

🏢 Indian Institute of Technology Gandhinagar

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

Research Associate At The Autonomous Robots and Multi-robot Systems (ARMS) Lab

May 2019 - August 2020

🏢 Indian Institute of Technology Bombay

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: Final Project)

Key-words: Computational Imaging, PSF, lensless camera, Blender 📄 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

Key-words: Computational imaging, single-photon cameras, depthsensing, time-of-flight cameras 📄 Project Page

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

Affordable Stereo Camera

Key-words: Stereo vision, 3D computer vision, RGBD cameras, low-cost 3D sensing 📄 Project Page

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

Implementation of Kinect Fusion Algorithm For 3D Reconstruction

Key-words: 3D reconstruction, TSDF fusion, ICP, PyTorch, RGBD-SLAM, RGBD-visual odometry 📄 Project Page

- Achieved 30x speedup with vectorized, GPU-accelerated implementation of Iterative Closest Point (ICP) algorithm and TSDF Fusion algorithm

OmniCV - Library for omnidirectional cameras

Key-words: fisheye lens, wide-lens cameras, camera models, open sourced code 📄 Read Docs 📄 Code

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