Akash Sharma

✉ Email | ⌂ Website | Github | 𝔾 Google Scholar | in LinkedIn

EDUCATION

- **The Robotics Institute, Carnegie Mellon University** — Pittsburgh, PA
  Doctor of Philosophy in Robotics — *2021 – Present*
  Advisor: Prof. Michael Kaess — *CGPA: 4.21/4.33*
- **Carnegie Mellon University** — Pittsburgh, PA
  Master of Science in Robotics — *2019 – 2021*
  Advisor: Prof. Michael Kaess — *CGPA: 4.26/4.33*
- **Sri Jayachamarajendra College of Engineering** — Mysore, India
  Bachelor of Engineering in Electronics and Communication — *2013 – 2017*
  Advisor: Prof. Sudharshan Patil Kulkarni — *CGPA: 9.61/10.00*

RELEVANT EXPERIENCE

- **Meta Reality Labs Research** — Redmond, WA
  Research Scientist Intern, Surreal Vision — *May 2022 – Aug 2022*
  Mentors: Tianwei Shen and Julian Straub

  Representation Learning for robust odometry: Proposed an end-to-end transformer network that learns a 3D representation from a stream of multimodal data (vision and IMU) to predict odometry. Predicted odometry was auto-regressively composed to estimate trajectory of augmented reality glasses.

- **The Robotics Institute, Carnegie Mellon University** — Pittsburgh, PA
  Graduate Research Assistant — *Jan 2020 – Present*
  Advisor: Michael Kaess and Shubham Tulsiani

  Dense Object Priors for Semantic SLAM: Proposing algorithms to learn a object shape prior for large number of object categories, such that they can be used jointly in a SLAM system.
  Semantic SLAM with Object Landmarks [1]: Proposed a semantic SLAM system that reconstructs an environment as a collection of semantic objects. The system fuses sensor data from RGB-D cameras, object detection and segmentation networks in a non-linear optimization framework to estimate object shape and color, 6DoF pose and camera poses.

- **Fyusion, Inc.** — San Francisco, CA
  Research Intern — *May 2021 – Aug 2021*

  Free viewpoint view synthesis for car interiors: Developed a neural radiance field representation based novel view synthesis method tuned for free viewpoint synthesis specific for 360° outward facing cameras. I experimented with multiple different methods in both Image based rendering as well as Physically based rendering.

- **OpenCV (GSoC)** — Virtual/Pittsburgh, PA
  Student Developer — *May 2020 – Aug 2020*

  3D Spatial Hashing for Large scale dense reconstruction: Implemented and extended Kinect Fusion using spatial hashing and submap based mapping for reconstruction of large scale environments. blog
  Reviewed extension of my implementation to real-time (40 FPS) on GPU.

- **Infinera** — Bangalore, India
  Software Engineer — *Jul 2017 – Jul 2019*

  Configurable Optical Device Infrastructure: Developed a configurable system infrastructure software for optical amplifier devices to monitor faults and performance.
  Faster Optical traffic startup: Bypassed an auto-discovery mechanism in the optical amplifier hardware for improved laser power control and faster optical power startup
  Mentored incoming graduate students in the optical line system team.

Relevant Publications

[1] **Compositional Scalable Object SLAM** | 🔗 paper | 🔗 code
Akash Sharma, Wei Dong, Michael Kaess
In Proc. IEEE Intl. Conf. on Robotics and Automation (**ICRA**) 2021

[2] **Learned Depth Estimation of 3D Image Radar for Indoor Mapping** | 🔗 paper
Ruoyang Xu, Wei Dong, **Akash Sharma**, Michael Kaess
In Proc. IEEE/RSJ Intl. Conf. on Intelligent Robots and Systems (**IROS**) 2022

[3] **Self-supervised Registration of Aerial Images across Seasons**
Lihong Jin*, **Akash Sharma***, Michael Kaess
[Under Preparation]

Relevant Projects

- **Code-NeRF** | 🔗 code | *python, pytorch*   Jan 2022

  Unofficial implementation of a Conditional-NeRF network, that can be used for test-time optimization of shape across instances of an object category

- **iNeRF** | 🔗 code | *python, pytorch*   Jan 2021

  Unofficial implementation of test-time optimization of a trained Neural radiance field network for camera pose optimization

- **SuperGlue** | 🔗 code | *python, pytorch*   Aug 2020

  Unofficial implementation of Superglue: Learning feature matching with Graph neural networks training code in pytorch.

- **Simple SLAM** | 🔗 code | *python*   Nov 2019

  Implementation of sparse feature based simple visual odometry using `g2o` for graph-based non-linear least squares optimization.

Teaching

- **Guest lecture** on algorithms for Dense SLAM in Robot Localization and Mapping course (16-833)   Fall 2020
- **Teaching Assistant**

  10708 - Probabilistic Graphical Models | **Prof. Andrej Risteski** | Fall 2022
  16822 - Geometry based methods for Computer Vision | **Prof. Michael Kaess** | Fall 2021
  16833 - Robot Localization and Mapping | **Prof. Michael Kaess** | Fall 2020

Service

- **Reviewer**   December 2020

  Intl. Conf. on Robots and Systems (IROS) 2022
  Intl. Conf. on Robotics and Automation (ICRA) 2022
  Intl. Conf. on Robotics and Automation (ICRA) 2021

- **MS Thesis Committee**

  Vivek Roy

- **Mentor** | *Robotics Institute - CMU*

  Lihong Jin (Masters in Robotics)
  CMU AI Mentoring Program 2020
  RI Peer Mentoring Program 2020

- **Robotics Mentor** | *IEEE - SJCE Robotics Workshop* | **Prof. S. B. Rudraswamy**   2016