Akash Sharma

Email | Website | Github | Google Scholar | LinkedIn

Education

- **The Robotics Institute, Carnegie Mellon University** **4.11/4.33**
  Ph.D. in Robotics; *Advisor: Prof. Michael Kaess* 2021 – Present
- **The Robotics Institute, Carnegie Mellon University** **4.26/4.33**
  M.S in Robotics; *Advisor: Prof. Michael Kaess* 2019 – 2021
- **Sri Jayachamarajendra College of Engineering** **9.61/10.00**
  B.E in Electronics and Communication; *Advisor: Prof. Sudharshan Patil Kulkarni* 2013 – 2017

Relevant Experience

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

  Learned Object Priors for Semantic SLAM: Proposing algorithms to learn object shape priors for a large number of object categories, to be used as measurements 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.

- **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 the trajectory of augmented reality glasses.

  Helped implement a library for training general-purpose transformers for multi-modal learning tasks.

- **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 undergraduate students in the optical line system team.

Relevant Publications

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

[2] Ming-Fang Chang, **Akash Sharma**, Michael Kaess, Simon Lucey. "Neural Radiance Fields with LiDAR Maps" `[In Submission]`

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

[4] Lihong Jin, **Akash Sharma**, Michael Kaess. "Self-supervised Registration of Aerial Images across Seasons" [`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** Fall 2020, Fall 2022
  on algorithms for Dense SLAM in Robot Localization and Mapping course (16-833)
- **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**: *RA-L 2023, IROS 2022, ICRA 2022 - 2021*
- **MS Thesis Committee**:
  Vivek Roy [Now @ Apple]
- **Mentor**:
  Lihong Jin (Masters in Robotics)
  CMU AI Mentoring Program 2020
  RI Peer Mentoring Program 2020
- **Admissions Committee**: MS in Robotics 2021
- **Robotics Mentor** | *IEEE - SJCE Robotics Workshop* | **Prof. S. B. Rudraswamy** 2016