

Khiem Vuong

Robotics Institute, School of Computer Science
Carnegie Mellon University, Pittsburgh, PA, USA 15213

🏠 khiemvuong.com 🎓 [Google Scholar](#) ✉ kvuong@andrew.cmu.edu

EDUCATION

Carnegie Mellon University, Robotics Institute

Ph.D. in Robotics

Advisors: Prof. Deva Ramanan & Prof. Srinivasa Narasimhan

Pittsburgh, PA

2023 - present

Carnegie Mellon University, Robotics Institute

M.S. in Robotics (GPA: 4.17/4.33)

Advisor: Prof. Srinivasa Narasimhan

Pittsburgh, PA

2021 - 2023

University of Minnesota, Twin Cities

B.S. in Computer Science (with high distinction) (GPA: 4.0/4.0)

Advisors: Prof. Stergios Roumeliotis & Prof. Hyun Soo Park

Minneapolis, MN

2017 - 2021

RESEARCH EXPERIENCE

City-scale 3D Reconstruction & Rendering from Varying-altitude Images

Nov. 2023 - current

- Working towards scalable 3D reconstruction and navigable walkthroughs from diverse varying-altitude unconstrained data sources: handheld, drone, and satellite images.
- Developed a scalable data generation framework combining mesh renderings and real images to improve 3D reconstruction across extreme aerial-ground viewpoints.
- Publications: [CVPR'25]

Amodal 2D/3D Object Reconstruction under Occlusion for Urban Scenes

Oct. 2021 - Nov. 2023

- Developed a scalable framework using street-level imagery to precisely calibrate in-the-wild traffic cameras.
- Created a novel framework for automatically synthesizing realistic training data (e.g., pseudo-labels) from time-lapse images to reconstruct dynamic objects under occlusion.
- Publications: [WACV'24], [CVPR'24 (Oral)].

Objects Reconstruction from unscripted Inertial-RGB-D Egocentric Data

May. 2021 - Jun. 2022

- Created a device to collect a large scale egocentric IMU-RGB-D data.
- Reconstructed camera poses, scene layouts, and objects' shapes and poses from large scale IMU-RGB-D data.
- Project website: [IDEO]

Robust Scene Understanding using Spatial Rectifier

Sep. 2019 - May. 2021

- Designed a *spatial rectifier* to improve a surface normal estimation network's performance under extreme viewpoint discrepancies, between a hand-held (training) and body/robot-mounted (testing) images.
- Proposed an extension for egocentric data (depth & surface normal estimation) via *multimodal spatial rectifier*.
- Publications: [ECCV'20 (Spotlight)], [CVPR'22 (Oral)].

Dense Depth Estimation/Completion from Visual-Inertial SLAM

Sep. 2019 - Nov. 2020

- Designed a deep neural network to predict a dense depth from a VI-SLAM point cloud, which is noisy and sparse, by leveraging constraints between depth and surface normal on indoor planar surfaces.
- Designed an iterative neural network to refine a dense depth and its uncertainty of an indoor scene from a dense optical flow and triangulation.
- Publications: [IROS'20], [ICRA'21].

PUBLICATIONS

Conference Publications

* - equal contribution/advising

[1] **AerialMegaDepth: Learning Aerial-Ground Reconstruction and View Synthesis**

Khiem Vuong, Anurag Ghosh, Deva Ramanan*, Srinivasa Narasimhan*, and Shubham Tulsiani*

IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2025

- [2] **ROADWork: A Dataset and Benchmark for Learning to Recognize, Observe, Analyze and Drive Through Work Zones**
Anurag Ghosh, Robert Tamburo, Shen Zheng, **Khiem Vuong**, Juan Rodolfo Alvarez Padilla, Hailiang Zhu, Nicholas Dunn, Michael Cardei, Christoph Mertz, and Srinivasa Narasimhan
Under Review
- [3] **WALT3D: Generating Realistic Training Data from Time-Lapse Imagery for Reconstructing Dynamic Objects under Occlusion**
Khiem Vuong*, N Dinesh Reddy*, Robert Tamburo, and Srinivasa G. Narasimhan
IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2024 (Oral, Top 0.8%)
- [4] **Toward Planet-Wide Traffic Camera Calibration**
Khiem Vuong, Robert Tamburo, and Srinivasa G. Narasimhan
IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), 2024
- [5] **Egocentric Scene Understanding via Multimodal Spatial Rectifier**
Tien Do, **Khiem Vuong**, and Hyun Soo Park
IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2022 (Oral, Top 4.2%)
- [6] **Deep Multi-view Depth Estimation with Predicted Uncertainty**
Tong Ke, Tien Do, **Khiem Vuong**, Kouros Sartipi, and Stergios I. Roumeliotis
International Conference on Robotics and Automation (ICRA), 2021
- [7] **Surface Normal Estimation of Tilted Images via Spatial Rectifier**
Tien Do, **Khiem Vuong**, Stergios I. Roumeliotis, and Hyun Soo Park
European Conference on Computer Vision (ECCV), 2020 (Spotlight, Top 3%)
- [8] **Deep Depth Estimation from Visual-Inertial SLAM**
Kouros Sartipi, Tien Do, Tong Ke, **Khiem Vuong**, and Stergios I. Roumeliotis
International Conference on Intelligent Robots and Systems (IROS), 2020

Theses

- [9] **Scaling up Camera Calibration and Amodal 3D Object Reconstruction for Smart Cities**
Master's Thesis, Robotics Institute, Carnegie Mellon University, 2021 - 2023

PROFESSIONAL EXPERIENCE

Imaging Lab, Carnegie Mellon University
Graduate Research Assistant

Pittsburgh, PA
Aug. 2021 - current

MARS Lab, University of Minnesota, Twin Cities
Undergraduate Research Assistant

Minneapolis, MN
Aug. 2019 - Aug. 2021

Enfusion Systems
Software Development Intern

Chicago, IL
Jun. 2019 - Aug. 2019

Worked on improving JUnit testing framework and data transfer pipeline for Portfolio Management Systems (PMS).

PROFESSIONAL RESPONSIBILITIES

- *Reviewer:* CVPR (2023, 2024, 2025), ICCV (2023, 2025), ECCV (2024), WACV (2024, 2025), ICLR (2025), IROS (2024), AAI (2025).

SELECTED COURSEWORK

- **Carnegie Mellon University:** Computer Vision, Geometry-based Vision, Machine Learning, Convex Optimization, Robot Localization and Mapping, Robot Learning, Kinematics and Dynamic Systems and Control.
- **University of Minnesota:** Machine Learning/Deep Learning, Linear Optimization, Computer Graphics, Linear Algebra, Data Structures and Algorithms, Operating Systems.