Khiem Vuong

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Education

Carnegie Mellon University, Robotics Institute Pittsburgh, PA
Ph.D. in Robotics *2023 - present*
Advisors: Prof. Deva Ramanan & Prof. Srinivasa Narasimhan

Carnegie Mellon University, Robotics Institute Pittsburgh, PA
M.S. in Robotics (GPA: 4.17/4.33) *2021 - 2023*
Advisors: Prof. Srinivasa Narasimhan

University of Minnesota, Twin Cities Minneapolis, MN
B.S. in Computer Science (with high distinction) (GPA: 4.0/4.0) *2017 - 2021*
Advisor: Prof. Stergios Roumeliotis & Prof. Hyun Soo Park

Professional Experience

Imaging Lab, Carnegie Mellon University Pittburgh, PA
Research Assistant *Aug. 2021 - current*

MARS Lab, University of Minnesota, Twin Cities Minneapolis, MN
Undergraduate Research Assistant *Aug. 2019 - Aug. 2021*

Enfusion Systems Chicago, IL
Software Development Intern *Jun. 2019 - Aug. 2019*
Worked on improving JUnit testing framework and data transfer pipeline for Portfolio Management Systems (PMS).

Research Experience

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 constrains 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

6. **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%**)

5. **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*

4. **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%**)

3. **Deep Multi-view Depth Estimation with Predicted Uncertainty**
   Tong Ke, Tien Do, **Khiem Vuong**, Kourosh Sartipi, and Stergios I. Roumeliotis
   *International Conference on Robotics and Automation (**ICRA**), 2021*

2. **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%**)

1. **Deep Depth Estimation from Visual-Inertial SLAM**
   Kourosh Sartipi, Tien Do, Tong Ke, **Khiem Vuong**, and Stergios I. Roumeliotis
   *International Conference on Intelligent Robots and Systems (**IROS**), 2020*

Theses

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

Professional Responsibilities

- *Reviewer:* NeurIPS (2022), CVPR (2023, 2024), ICCV (2023), ECCV (2024), WACV (2024, 2025), IROS (2024), AAAI (2025), ICLR (2025).

Selected Coursework

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