

# MINH P. VO

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## RESEARCH INTEREST

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I am very interested in various aspects of 3D vision and physics-based vision (e.g., shape, motion, reflectance, and illumination). The goal is to develop holistic and end-to-end machine learning systems that understand and recreate virtual environments that are perceptually indistinguishable from reality.

## AWARD

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Qualcomm Innovation Fellowship (2017)

Measurement Technology and Science Outstanding Paper Award (2014)

## RESEARCH EXPERIENCE

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### Facebook Reality Lab

*Research Scientist - Mentor: Carsten Stoll*

Sausalito, CA

*Sep. 2018 - Present*

- Human motion and behavior analysis
- Learning an inverse renderer for human body

### The Robotics Institute, Carnegie Mellon University

*Research Associate - Mentors: Srinivasa Narasimhan and Yaser Sheikh*

Pittsburgh, PA

*Oct. 2012 - Aug. 2019*

- 4D event browsing: Novel method for image-based browsing of dynamic event from multiple views.
- Self-supervised scene adaptive human appearance descriptor: Develop a novel framework to associate and track multiple people in highly chaotic scenes.
- ShapeFusion: Develop a novel generic framework for accurate 3D tracking and structured keypoint detection for rigid objects such as car.
- Spatiotemporal calibration for dynamic 3D reconstruction: Develop a novel spatiotemporal bundle adjustment algorithm for multiple uncalibrated and unsynchronized smart phone videos in the wild.
- Structured light on highly textured object: Develop a novel texture-illumination separation algorithm enabling single-shot structured light systems to produce dense 3D shape of highly textured objects.
- Passive tomography of turbulence strength: Develop a novel and inexpensive method to estimate the turbulence strength using multiple off-the-shelf-cameras.
- Panoptic studio: Develop an accurate and automatic geometric calibration algorithm for a virtualization studio consisting of more than 500 cameras and 6 projectors.

### Adobe Research

*Research Intern - Mentors: Sunil Hadap, Kalyan Sunkavalli, Ersin Yumer*

San Jose, CA

*May. 2017 - Aug. 2017*

- Spatiotemporal human tracking from multiple video cameras in the wild.

### Microsoft Research

*Research Intern - Mentors: Neel Joshi and Sudipta Sinha*

Redmond, WA

*May. 2016 - Aug. 2016*

- Direct simultaneous camera calibration and depth estimation for small baseline videos.

### Mechanical Dept., Catholic University of America

*Research Associate - Mentor: Zhaoyang Wang*

Washington, DC

*Nov. 2009 - Aug. 2012*

- Structure light calibration: Develop an accurate, fast, and flexible geometric calibration approach. Real time measurement of 0.005% relative accuracy a 10fps was achieved.

- 2D-3D Digital Image Correlation (DIC): Develop an accurate image matching algorithm for strain/stress measurement of deforming structure. Our synthetic tests reveal that the developed algorithm can estimate the particle displacement at 5000 point/sec with relative accuracy better 0.001%.
- Camera calibration: Develop an inexpensive and accurate geometric camera calibration algorithm. The calibration error is several times smaller than other widely-used packages (i.e., OpenCV, Caltech Calib).

## EDUCATION

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### **Carnegie Mellon University, Pittsburgh, PA**

*Sep. 2012 - Aug. 2019*

Ph.D. in Robotics

Advisors: Srinivasa Narasimhan and Yaser Sheikh

Thesis: Exploiting Point Motion, Shape Deformation, and Semantic Priors for Dynamic 3D Reconstruction in the Wild.

### **Carnegie Mellon University, Pittsburgh, PA**

*Sep. 2012 - Dec. 2015*

M.Sc. in Robotics

Advisors: Srinivasa Narasimhan and Yaser Sheikh

Thesis: Texture and Illumination Separation for Single-shot Structured Light Reconstruction.

### **Catholic University of America, Washington, D.C**

*Sep. 2009 - May 2012*

B.E. in Electrical Engineering

Summa Cum Laude

Advisor: Zhaoyang Wang

Thesis: High accuracy camera calibration and its application.

## PUBLICATION

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### **Refereed Journal Publications**

1. **M. Vo**, K. Sunkavalli, E. Yumer, S. Hadap, Y. Sheikh, S.G. Narasimhan, ‘Self-supervised Multi-view Person Association and Its Applications,’ IEEE Trans. PAMI 2019 (in submission).
2. **M. Vo**, Y. Sheikh, S.G. Narasimhan, ‘Spatiotemporal Bundle Adjustment for Dynamic 3D Human Reconstruction in the Wild,’ IEEE Trans. PAMI 2019 (in submission).
3. **M. Vo**, S. G. Narasimhan, and Y. Sheikh, ‘Texture illumination separation for single shot structured light reconstruction,’ IEEE Trans. PAMI 2015
4. Z. Wang, **M. Vo**, H. Kieu, T. Pan, ‘Automated Fast Initial Guess in Digital Image Correlation,’ Strain, 2014.
5. H. Kieu, T. Pan, Z. Wang, M. Le, H. Nguyen, **M. Vo**, ‘Accurate 3D shape measurement of multiple separate objects with stereo vision,’ Measurement Science and Technology, 2014.
6. T. Nguyen, H. Nguyen, **M. Vo**, Z. Wang, L. Luu, and J. Ramella-Roman, ‘Three-dimensional phantoms for curvature correction in spatial frequency domain imaging,’ Biomedical Optics Express, 2012.
7. **M. Vo**, Z. Wang, B. Pan, and T. Pan, ‘Hyper-accurate flexible calibration technique for fringe-projection-based three-dimensional imaging,’ Optics Express, 2012.
8. **M. Vo**, Z. Wang, L. Luu, and J. Ma, ‘Advanced geometric camera calibration for machine vision,’ Optical Engineering, 2011.
9. L. Luu, Z. Wang, **M. Vo**, T. Hoang, and J. Ma, ‘Accuracy enhancement of digital image correlation with B-spline interpolation,’ Optics Letters, 2011.
10. T. Hoang, Z. Wang, **M. Vo**, J. Ma, L. Luu and B. Pan, ‘Phase extraction from optical interferograms in presence of intensity nonlinearity and arbitrary phase shifts,’ Applied Physics Letters, 2011.
11. **M. Vo**, Z. Wang, T. Hoang, and D. Nguyen, ‘Flexible calibration technique for fringe-projection-based three-dimensional imaging,’ Optics Letters, 2010.

## Refereed Conference Publications

1. D. Reddy, **M. Vo**, S.G. Narasimhan, ‘Occlusion-Net: 2D/3D occluded keypoint localization using graph networks ,’ CVPR, 2019.
2. D. Reddy, **M. Vo**, S.G. Narasimhan, ‘CarFusion: Combining Point Tracking and Part Detection for Dynamic 3D Reconstruction of Vehicles,’ CVPR, 2018.
3. **M. Vo**, S.G. Narasimhan, Y. Sheikh, ‘Spatiotemporal Bundle Adjustment for Dynamic 3D Reconstruction,’ CVPR, 2016.
4. M. Alterman, Y.Y.Schechner, **M. Vo**, S. G. Narasimhan, ‘Passive tomography of turbulence strength,’ ECCV, 2014.
5. **M. Vo**, S. G. Narasimhan, and Y. Sheikh, ‘Separating Texture and Illumination for Single-Shot Structured Light Reconstruction,’ CVPRW, 2014.

## PROFESSIONAL ACTIVITY

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Reviewer: CVPR, ICCV, ECCV, TPAMI

## TEACHING ACTIVITY

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- The Robotics Institute: Computer Vision (16-720), Spring 2014.
- Catholic University of America: Electronics Network, Spring 2012.
- Catholic University of America: Intro. to Programming, Fall 2011.

## SELECTED COURSEWORK

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Computer Vision, Geometry-based Vision, Learning-based Vision, Compressive Sensing and Sparse Optimization, Statistical Methods for Robotics, Machine Learning.

## SKILL

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Programming Languages: C/C++, Matlab, Python.  
Others: OpenCV, Pytorch, Caffe, OpenGL, PCL.