

# Avinash Kumar

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## CONTACT INFORMATION

Computer Vision and Robotics Laboratory  
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## EDUCATION

### University of Illinois, Urbana-Champaign

Ph.D. candidate, Electrical and Computer Engineering

**January 2008 - February 2015(expected)**

- Title : *Non-frontal Camera Calibration for Omnidirectional Imaging and Scene Depth Estimation*
- Research Area: Camera calibration, depth from focus/defocus, computational imaging, structure from motion, background subtraction, vision applications to railroad.
- Thesis Committee: Prof. Narendra Ahuja (chair), Prof. Thomas S. Huang, Prof. Minh N. Do, Prof. Stephen E. Levinson

### International Institute Of Information Technology, Hyderabad

Dual Degree (B.Tech. and M.S. by Research), Computer Science

**July 2001 - December 2007**

- M.S. Thesis: *Imaging and Depth Estimation in an Optimization Framework*
- Advisor: Prof. C. V. Jawahar

## RESEARCH EXPERIENCE

**Surefield** (3D Vision based real estate startup), Engineering Intern

**May-August 2014** : Structure from motion for indoor scenes.

**Rambus** (host: Dr. David G. Stork), Research Intern, Computational Imaging Group

**May-August 2012** : Extraction of shadow details in transmissive media using structured light.

**May-August 2013** : Point spread function calibration for a lens-less imaging system.

**University of Illinois at Urbana-Champaign**, Beckman Institute

Visiting Scholar in Computer Vision and Robotics Lab (Prof. Narendra Ahuja)

**January-December 2006**

## HONORS

- IAPR Piero Zamperoni Best Student Paper Award at International Conference on Pattern Recognition (ICPR 2014)
- IAPR Conference Travel Grant to attend International Conference on Pattern Recognition (ICPR 2014)
- UIUC Conference Travel Grant to attend International Conference on Computational Photography (ICCP 2013)
- TA Stewart-Dyer Prize/Frederick Harvey Trevithick Prize 2007 from IMechE for the paper title "Machine vision analysis of the energy efficiency of intermodal freight trains"
- Recipient of National Talent Search Scholarship (NTSE 1998) awarded to top 0.5% of over 150,000 students based on a nationwide test conducted by the NCERT, India for higher studies.
- Secured 1st rank among all students in my district appearing in all India (CBSE 1998) Secondary School Exams for 10th grade.
- Qualified for scholarship from SAIL for scoring highest aggregate in my city in all India (CBSE 1998) Secondary School Exams for 10th grade.
- Received certificate of merit from the Indian government for being in top 0.1% in Maths score in all India (CBSE 1998) Secondary School Exams for 10th grade.

PUBLICATIONS  
(ACCEPTED)

1. **Avinash Kumar** and Narendra Ahuja. Generalized Radial Alignment Constraint for Camera Calibration, International Conference on Pattern Recognition (ICPR), August 2014, Stockholm, Sweden. [Oral] [**Piero Zamperoni Best Student Paper Award**]
2. **Avinash Kumar** and Narendra Ahuja. Non-frontal Camera Calibration using Focal Stack Imagery, International Conference on Pattern Recognition (ICPR), August 2014, Stockholm, Sweden. [Oral]
3. **Avinash Kumar** and Narendra Ahuja. Generalized Pupil-Centric Imaging and Analytical Calibration for a Non-frontal Camera, Computer Vision and Pattern Recognition (CVPR), June 2014, Columbus, Ohio, US.
4. **Avinash Kumar** and Narendra Ahuja. Motion-based Background Subtraction and Panoramic Mosaicing for Freight Train Analysis. International Conference on Image Processing (ICIP), September 2013, Melbourne, Australia.
5. **Avinash Kumar**, Patrick R. Gill, Thomas Vogelsang and David G. Stork. Transmissive Structured Illumination Reveals Target Depth and Cast Shadow Details Obscured by Scattering Media. In OSA Computational Optical Sensing and Imaging (COSI), June 2013, Arlington, Virginia, US. [Oral]
6. **Avinash Kumar** and Narendra Ahuja. A Generative Focus Measure With Application to Omifocus Imaging. International Conference on Computational Photography (ICCP). April 2013, Harvard, Boston, US. [Oral]
7. Tristan G. Rickett, **Avinash Kumar**, John M. Hart, J. R. Edwards, Christopher P Barkan and Narendra Ahuja. Machine Vision Analysis of Intermodal Loading Efficiency on Heavy-Haul Railroads. International Heavy Haul Association Conference (IHHA), June 2011, Calgary, Canada. [Oral]
8. **Avinash Kumar**, Tristan G. Rickett, Anirudh Vemula, John .M. Hart, J. R. Edwards, Narendra Ahuja and Christopher P Barkan. 2011. Aerodynamic Analysis of Intermodal Freight Trains Using Machine Vision. World Congress on Railway Research (WCRR), May 2011, Lille, France.
9. Tristan G. Rickett, John M. Hart, J. R. Edwards, **Avinash Kumar**, Christopher P Barkan and Narendra Ahuja. 2011. Monitoring the Aerodynamic Efficiency of Intermodal Train Loading Using Machine Vision. Transportation Research Board Annual Conference (TRB), January 2011, Washington D.C., US.
10. Qing J. Kong, **Avinash Kumar**, Narendra Ahuja and Yuncai Liu, Robust Segmentation of Freight Containers in Train Monitoring Videos, Workshop on Applications of Computer Vision (WACV), January 2009, Snowbird, Utah, US. [Oral]
11. **Avinash Kumar**, Narendra Ahuja, John M. Hart, U. K. Visesh, P. J. Narayanan, and C. V. Jawahar, A Vision System for Monitoring Intermodal Freight Trains. Workshop on Applications of Computer Vision (WACV), 2007, Austin, Texas, US.
12. Yung-Cheng Lai, Narendra Ahuja, Christopher P Barkan, Joseph Drapa, John M. Hart, C. V. Jawahar, **Avinash Kumar**, Larry Milhon, and P. J. Narayanan, Machine Vision Analysis of the Energy Efficiency of Intermodal Freight Trains, Journal of Rail and Rapid Transit (JRRT), 2006. [**TA Stewart-Dyer Prize/Frederick Harvey Trevithick Prize**].

PUBLICATIONS  
(UNDER REVIEW)

1. **Avinash Kumar** and Narendra Ahuja. *Anonymous*, Computer Vision and Pattern Recognition (CVPR), 2015

TECHNICAL SKILLS **Programming Languages:** C/C++, Matlab  
**Operating Systems:** Linux, Windows

## REFERENCES

Prof. Narendra Ahuja  
Donald Biggar Willet Professor  
Department of Electrical and Computer Engineering,  
University of Illinois, Urbana-Champaign  
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Patrick R. Gill  
Principal Research Scientist  
Rambus  
Sunnyvale, CA  
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Aravind Kalaiah  
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International Institute of Information Technology  
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