

# Jongwoo Lim

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## RESEARCH INTEREST

- Geometric scene understanding for intelligent robots and smart vehicles.
  - reconstruct scene geometry together with its semantic meaning from visual and other inputs.
  - design intelligent behaviors of robots and vehicles using the understandings of the environment.
- Visual tracking and scene understanding.
  - track target objects in input videos and reason the subjects' activities and interactions.
- \* research area : computer vision, machine learning, and robotics.

## EDUCATION

### **University of Illinois, Urbana Champaign**, Urbana, IL, USA

Ph.D. in Computer Science, Dec. 2005  
Thesis: On Clustering Images of Objects  
Advisor: Prof. David J. Kriegman  
Aug. 2000 - Dec. 2005 (MS/PhD GPA: 4.0/4.0)

### **University of Illinois, Urbana Champaign**, Urbana, IL, USA

M.S. in Computer Science, Dec. 2003  
Thesis: Tracking Humans Using Prior and Learned Representations of Shape and Appearance  
Advisor: Prof. David J. Kriegman

### **Seoul National University**, Seoul, Korea

B.S. in Computer Science, Feb. 1997  
*summa cum laude* (GPA 4.01/4.3)

## EXPERIENCE

**Assistant Professor**, Hanyang University, Seoul, Korea, Feb. 2012 - Present  
Division of Computer Science & Engineering

**Software Engineer**, Google, inc., Mountain View, CA, USA, Feb. 2011 - Feb. 2012  
worked in Street View team, developing new algorithms for geometric environment modeling.

**Senior Scientist**, Honda Research Institute USA, inc., Mountain View, CA, Jul. 2005 - Feb. 2011  
worked in computer vision, robotics and machine learning research for humanoid robots and intelligent vehicles.

**Summer Intern**, University of California, San Diego, La Jolla, CA, USA, Jun. 2004 - Aug. 2004  
conducted research on multi-camera people tracking systems.

**Summer Intern**, Honda Research Institute, Mountain View, CA, USA, May. 2003 - Aug. 2003  
developed the human face tracking and recognition system.

**Research Assistant**, University of Illinois, Urbana Champaign, Jan. 2001 - May. 2005  
developed human tracking modules in the Active Space project (<http://devius.cs.uiuc.edu/gaia>).

**Senior Programmer/Engineer**, Triton Tech inc., Seoul, Korea, Jan. 1997 - Aug. 2000  
designed and developed the CLUE system (content-based text auto-categorization system).  
developed a Metadesk enterprise document management system.

## SCHOLARSHIPS AND HONORS

Best Paper Award for “Visual Robot Localization and Map Building”  
in Honda Research Institute Global Workshop, May 2010

Most Valuable Performance Award for 2007-2008  
awarded extra \$50,000 research budget by Honda Research Institute USA inc., Apr 2008

Doctoral Study Abroad Scholarship  
Korea Foundation for Advanced Studies, Aug. 2000 - Jul. 2005

College Student Scholarship  
Korea Foundation for Advanced Studies, Mar. 1995 - Feb. 1997

Undergraduate Student Scholarship  
Dongwon Education Foundation, Mar. 1996 - Feb. 1997

Honorary Scholarship  
Seoul National University, Sep. 1993 - Feb. 1996

## PUBLICATIONS

**Ph.D. Thesis**, *On Clustering Images of Objects*, University of Illinois at Urbana-Champaign, 2005

**M.S. Thesis**, *Tracking Humans Using Prior and Learned Representations of Shape and Appearance*,  
University of Illinois at Urbana-Champaign, 2003

### Journal Publications

1. David Ross, **Jongwoo Lim**, Ruei-Sung Lin, Ming-Hsuan Yang, “*Incremental Learning for Robust Visual Tracking*”, International Journal of Computer Vision (Special Issue: Learning for Vision), Vol. 77, No. 1-3, Pg. 125-141, May 2008 [ 778 citations<sup>1</sup> ]
  2. Vivek Pradeep, **Jongwoo Lim**, “*Egomotion Estimation Using Assorted Features*”, International Journal of Computer Vision, Vol. 98, Issue 2, Page 202-216, June 2012
  3. **Jongwoo Lim**, Jan-Michael Frahm, Marc Pollefeys, “*Online Environment Mapping using Metric-topological Maps*”, The International Journal of Robotics Research, Volume 31, Issue 12, Page 1394-1408, October 2012
- Jongwoo Lim, “*Optimized Projection Patterns for Stereo Systems*”, submitted to Image and Vision Computing, under revision.

### Conference Publications

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<sup>1</sup>All citation counts are based on Google Scholar search results on Mar., 2014.

4. Jeffrey Ho, Ming-Hsuan Yang, **Jongwoo Lim**, Kuang-Chih Lee, David Kriegman, “*Clustering Appearances of Objects Under Varying Illumination Conditions*”, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2003, vol. 1, pp. 11-18  
[ oral presentation, acceptance rate 6.6%, 198 citations ]
5. **Jongwoo Lim**, Jeffrey Ho, Ming-Hsuan Yang, Kuang-Chih Lee, David Kriegman, “*Image Clustering with Metric, Local Linear Structure and Affinity Symmetry*”, The 8th European Conference on Computer Vision (ECCV), 2004, vol 1, pp. 456-468 [ acceptance rate 34.2% ]
6. David Ross, **Jongwoo Lim**, Ming-Hsuan Yang, “*Adaptive Probabilistic Visual Tracking with Incremental Subspace Update*”, The 8th European Conference on Computer Vision (ECCV), 2004, vol 2, pp. 470-482 [ acceptance rate 34.2%, 125 citations ]
7. **Jongwoo Lim**, David Kriegman, “*Tracking Humans Using Prior and Learned Representations of Shape and Appearance*”, The 6th International Conference on Automatic Face and Gesture Recognition (FG), 2004, pp. 869-874
8. Ruei-Sung Lin, David Ross, **Jongwoo Lim**, Ming-Hsuan Yang, “*Adaptive Discriminative Generative Model and Its Applications*”, The 18th Annual Conference on Neural Information Processing Systems (NIPS), 2004, pp. 801-808 [ acceptance rate ~30%, 80 citations ]
9. **Jongwoo Lim**, David Ross, Ruei-Sung Lin, Ming-Hsuan Yang, “*Incremental Learning for Visual Tracking*”, The 18th Annual Conference on Neural Information Processing Systems (NIPS), 2004, pp. 793-800 [ acceptance rate ~30%, 239 citations ]
10. Sameer Agarwal, **Jongwoo Lim**, Lihi Zelnik-Manor, Pietro Perona, David Kriegman, Serge Belongie, “*Beyond Pairwise Clustering*”, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2005, vol. 2, pp. 838-845 [ oral presentation, acceptance rate 6.5%, 97 citations ]
11. **Jongwoo Lim**, Ming-Hsuan Yang, “*A Direct Method for Modeling Non-rigid Motion with Thin Plate Spline*”, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2005, vol. 1, pp. 1196-1202 [ acceptance rate 28.1%, 52 citations ]
12. **Jongwoo Lim**, Jeffrey Ho, Ming-hsuan Yang, David Kriegman, “*Passive Photometric Stereo from Motion*”, 10th IEEE International Conference on Computer Vision (ICCV), 2005, vol. 2, pp. 1635-1642 [ acceptance rate 19.9%, 73 citations ]
13. Jeffrey Ho, **Jongwoo Lim**, Ming-hsuan Yang, David Kriegman, “*Integrating Surface Normal Vectors Using Fast Marching Method*”, The 9th European Conference on Computer Vision (ECCV), 2006, part. 3, pp. 239-250 [ acceptance rate 21.4% ]
14. Benjamin Laxton, **Jongwoo Lim**, David Kriegman, “*Leveraging Temporal, Contextual and Ordering Constraints for Recognizing Complex Activities In Video*”, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2007, pp. 1-8 [ acceptance rate 27.5%, 75 citations ]
15. Victor Ng-Thow-Hing, Thor List, Kris Thorisson, **Jongwoo Lim**, Joel Wormer, “*Design and Evaluation of Communication Middleware in a Humanoid Robot Architecture*”, IROS 2007 Workshop on Measures and Procedures for the Evaluation of Robot Architectures and Middleware, Oct. 29, 2007, San Diego, CA, 2007
16. Victor Ng-Thow-Hing, **Jongwoo Lim**, Joel Wormer, Ravi Kiran Sarvadevabhatla, Carlos Rocha, Kikuo Fujimura, Yoshiaki Sakagami, “*The memory game: Creating a human-robot interactive scenario for ASIMO*”, The 2008 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2008, pp. 779-786
17. **Jongwoo Lim**, “*Optimized Projection Pattern Supplementing Stereo Systems*”, 2009 IEEE International Conference on Robotics and Automation (ICRA), 2009, pp. 2823 - 2829

18. Manmohan K. Chandraker, **Jongwoo Lim**, David J. Kriegman, “*Moving in Stereo: Efficient Structure and Motion Using Lines*”, 12th IEEE International Conference on Computer Vision (ICCV), 2009, pp 1741 - 1748 [ acceptance rate ~24%, 29 citations ]
19. Brian Clipp, Christopher Zach, **Jongwoo Lim**, Jan-Michael Frahm, Marc Pollefeys, “*Adaptive, Real-Time Visual Simultaneous Localization and Mapping*”, IEEE Workshop on Applications of Computer Vision (WACV), 2009, pp. 1-8
20. Vivek Pradeep, **Jongwoo Lim**, “*Egomotion using Assorted Features*”, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2010, pp. 1514 - 1521 [ acceptance rate 26.8% ]
21. Brian Clipp, **Jongwoo Lim**, Jan-Michael Frahm, Marc Pollefeys, “*Parallel, Real-Time Visual SLAM*”, 2010 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2010
22. **Jongwoo Lim**, Jan-Michael Frahm, Marc Pollefeys, “*Online Environment Mapping*”, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2011 [ acceptance rate 26.4% ]
23. Ananth Ranganathan, **Jongwoo Lim**, “*Visual Place Categorization in Maps*”, 2011 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2011
24. Christian Häne, Christopher Zach, **Jongwoo Lim**, Ananth Ranganathan, Marc Pollefeys, “*Stereo Depth Map Fusion for Robot Navigation*”, 2011 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2011
25. Mark Colbert, Jean-Yves Bouguet, Jeff Beis, Spudde Childs, Daniel Filip, Luc Vincent, **Jongwoo Lim**, Scott Satkin, “*Building indoor multi-panorama experiences at scale*”, ACM SIGGRAPH 2012 Talks, Article No. 24, 2012
26. Jin Han Lee, Guoxuan Zhang, **Jongwoo Lim**, Il Hong Suh, “*Place Recognition using Straight Lines for Vision-Based SLAM*”, 2013 IEEE International Conference on Robotics and Automation
27. Yi Wu, **Jongwoo Lim**, Ming-Hsuan Yang “*Online Object Tracking: A Benchmark*”, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2013 [ acceptance rate 28.4%, 30 citations ]
28. Hyon Lim, **Jongwoo Lim**, H. Jin Kim, “*Real-Time 6-DOF Monocular Visual SLAM in Large-Scale Environments*”, 2014 IEEE International Conference on Robotics and Automation, 2014 (accepted)
29. Jin Han Lee, Sehyung Lee, Guoxuan Zhang, **Jongwoo Lim**, Wan Kyun Chung, Il Hong Suh, “*Outdoor Place Recognition in Urban Environments Using Straight Lines*”, 2014 IEEE International Conference on Robotics and Automation, 2014 (accepted)

## PATENTS

1. Jeffrey Ho, **Jongwoo Lim**, Ming-hsuan Yang, “*Image clustering with metric, local linear structure, and affine symmetry*”, [7,248,738] Jul 2007, [10/989,967] Nov 2004
2. Ming-hsuan Yang, **Jongwoo Lim**, David Ross, Ruei-sung Lin, “*Adaptive probabilistic visual tracking with incremental subspace update*”, [7,463,754] Dec 2008, [10/989,966] Nov 2004
3. Ming-hsuan Yang, **Jongwoo Lim**, David Ross, Takahiro Ohashi, “*Method, apparatus and program for detecting an object*”, [7,224,831] May 2007, [10/858,878] Jun 2004
4. Ming-hsuan Yang, **Jongwoo Lim**, David Ross, Takahiro Ohashi, “*Face recognition system*”, [7,430,315] Sep 2008, [10/858,930] Jun 2004

5. Ming-hsuan Yang, Ruei-sung Lin, **Jongwoo Lim**, David Ross, “*Adaptive discriminative generative model and application to visual tracking*”, [7,369,682] May 2008, [11/179,881] Jul 2005
6. **Jongwoo Lim**, Ming-hsuan Yang, “*Direct method for modeling non-rigid motion with thin plate spline transformation*”, [7,623,731] Nov 2009, [11/450,045] Jun 2006
7. **Jongwoo Lim**, Benjamin Laxton, “*Leveraging Temporal, Contextual and Ordering Constraints for Recognizing Complex Activities in Video*”, [8,165,405] Apr 2012, [11/876,724] Oct 2007
8. **Jongwoo Lim**, “*Camera-Projector Duality: Multi- Projector 3D Reconstruction*”, [8,172,407] May 2012, [12/121,056] May 2008
9. **Jongwoo Lim**, “*Optimized Projection Pattern for Long-Range Depth Sensing*”, [8,142,023] Mar 2012, [12/337,391] Dec 2008
10. Manmohan Chandraker, **Jongwoo Lim**, “*Structure and Motion with Stereo Using Lines*”, [8,401,241] Mar 2013, [12/506,560] Jul 2009
11. **Jongwoo Lim**, Vivek Pradeep, “*Egomotion Using Assorted Features*”, [13/219,184] Aug 2011
12. Rakesh Gupta, Ananth Ranganathan, **Jongwoo Lim**, “*Road Departure Warning System*”, [13/221,132] Aug 2011
13. **Jongwoo Lim**, Jan-Michael Frahm, Marc Pollefeys, “*Online Environment Mapping*”, [13/487,122] May 2012

#### PROFESSIONAL ACTIVITIES

\* Area chair of ACCV 2014, Singapore.

\* Co-organizer and lecturer of the tutorial on ‘RGBD Image Processing for 3D Modeling and Texturing’ at IICIP 2013, Melbourne, Australia.

\* Local chair of ACCV 2012, Daejeon, Korea.

**Conference reviewer** : NIPS, CVPR, ECCV, ICCV, ACCV, ICRA, IROS and others.

**Journal reviewer** : IEEE Transaction of Pattern Recognition and Machine Intelligence, International Journal of Computer Vision, Computer Vision and Image Understanding, Image and Vision Computing, Pattern Recognition Letters, IEEE Transaction of Multimedia.