

## Kang Li

Microsoft Corporation

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## Education

- Ph.D., Electrical and Computer Engineering*, Carnegie Mellon University, Pittsburgh, PA 09/2004–05/2009  
Adviser: Prof. Takeo Kanade  
GPA: 4.0/4.0
- M.S., Electrical and Computer Engineering*, University of Iowa, Iowa City, IA 08/2002–08/2004  
Adviser: Prof. Milan Sonka  
GPA: 4.2/4.0
- B.S., Electrical Engineering*, Nanjing University, Nanjing, China 09/1998–07/2002  
GPA: 3.6/4.0 (Top 3%)

## Industrial Experience

- Research Software Design Engineer*, Microsoft Bing Core Search Team, Bellevue, WA 05/2009–Present
- Developed techniques for optimizing web search index coverage and relevance
  - Designed and implemented document understanding algorithms for improving web search caption quality
- Intel/CMU Summer Fellow*, Intel Research Pittsburgh, Pittsburgh, PA 06/2008–08/2008
- Developed algorithms for stem cell behavior recognition and motion tracking
  - Design and parallel implementation of numerical optimization algorithms for microscopy image “preconditioning”
- Research Intern*, Siemens Corporate Research, Princeton, NJ 05/2007–08/2007
- Developed methods to detect and segment liver tumors in 3-D CT images
  - Contributed algorithms to OncoCare – a software product for general lesion segmentation and measurement
  - Supervised by Dr. Marie-Pierre Jolly

## Academic Experience

- Research Assistant*, Carnegie Mellon University 2004–Present
- Developed the world’s first large-scale tracking system that can simultaneously track behaviors (motion, division and death) of *thousands* of stem cells in expanding cell populations (C++, Java, C#)
  - Lead multidisciplinary research group for the *Cell Image Analysis Consortium*
  - Coauthored three funded grant proposals (PITA, NIH, and Intel)
- Teaching Internship*, Carnegie Mellon University 2005–2006
- Gave lectures, prepared homework and exam problems for 18-798 Image and Video Processing (graduate level) and 18-396 Signals and Systems (undergraduate level).
- Research Assistant*, College of Engineering Imaging Group, University of Iowa 2002–2004
- Developed patent-pending algorithms for multi-dimensional image segmentation; licensed to multiple companies, including Carl Zeiss, Inc, VIDA Diagnostics, Inc., etc.
  - Developed software for bone/cartilage segmentation in 3-D CT images; commercialized by Medical Imaging Applications LLC. (C++, Python, OpenGL)
  - Developed multidimensional image analysis software libraries/tools used by the entire group (C++, Python)
- Research Assistant*, State Key Lab of Modern Acoustics, Nanjing University 2000–2002
- Implemented software for a real-time ultrasound cardiac imaging system (C++, DirectX, Assembly)
  - Developed digital image processing courseware with plug-in support (C++, MFC)

## Publications

### Theses

- Kang Li.** *Large-scale stem cell population tracking in phase contrast and DIC microscopy image sequences.* PhD thesis, Carnegie Mellon University, Pittsburgh, PA, May 2009.
- Kang Li.** *Efficient optimal net surface detection for image segmentation - from theory to practice.* Master’s thesis, University of Iowa, Iowa City, IA, December 2003.

## Journal Papers

**Kang Li**, Mei Chen, and Takeo Kanade. Cell population tracking and lineage construction with spatiotemporal context. *Medical Image Analysis*, 12(5):546–566, October 2008. **(23 citations)**.

**Kang Li**, Xiaodong Wu, Danny Z. Chen, and Milan Sonka. Optimal surface segmentation in volumetric images – a graph-theoretic approach. *IEEE Trans. Pattern Anal. Machine Intell.*, 28(1):119–134, January 2006. **(59 citations)**.

Xiaodong Wu, Danny Z. Chen, **Kang Li**, and Milan Sonka. The layered net surface problems in discrete geometry and medical image segmentation. *International Journal of Computational Geometry and Applications*, 17(3):261–296, June 2007. **(4 citations)**.

## Refereed Conference Papers

An-An Liu, **Kang Li**, and Takeo Kanade. Mitosis sequence detection using hidden conditional random fields. In *Proc. IEEE Int. Symposium on Biomedical Imaging (ISBI)*, Rotterdam, The Netherlands, April 2010. In press.

**Kang Li** and Takeo Kanade. Nonnegative mixed-norm preconditioning for microscopy image segmentation. In J.L. Prince, D.L. Pham, and K.J. Myers, editors, *Proc. Int. Conf. Information Processing in Medical Imaging (IPMI)*, LNCS 5636, Williamsburg, VA, July 2009. Oral presentation **(2 citations)**.

Ryoma Bise, **Kang Li**, and Takeo Kanade. Reliably tracking partially overlapping neural stem cells in dic microscopy image sequences. In *Proc. Optical Tissue Image analysis in Microscopy, Histopathology and Endoscopy (OPTIMHisE)*, pages 67–77, London, UK, September 2009.

**Kang Li**, Eric D. Miller, Mei Chen, Takeo Kanade, Lee E. Weiss, and Phil G. Campbell. Computer vision tracking of stemness. In *Proc. IEEE Int. Symposium on Biomedical Imaging (ISBI)*, May 2008. Oral presentation **(4 citations)**.

**Kang Li** and Marie-Pierre Jolly. Simultaneous detection of multiple elastic surfaces with application to tumor segmentation in CT images. In Joseph M. Reinhardt and Josien P. W. Pluim, editors, *Proc. SPIE International Symposium on Medical Imaging: Image Processing*, volume 6914, March 2008. Poster presentation **(3 citations)**.

**Kang Li**, Mei Chen, and Takeo Kanade. Cell population tracking and lineage construction with spatiotemporal context. In *Proc. Medical Image Computing and Comp.-Assisted Intervention*, October 2007. MICCAI Young Scientist Award **(23 citations)**.

**Kang Li** and Takeo Kanade. Cell population tracking and lineage construction using multiple-model dynamics filters and spatiotemporal optimization. In *Proc. Int. Workshop Microscopic Image Analysis with Applications in Biology (MIAAB)*, September 2007. Oral presentation **(8 citations)**.

**Kang Li**, Eric D. Miller, Lee E. Weiss, Phil G. Campbell, and Takeo Kanade. Online tracking of migrating and proliferating cells imaged with phase-contrast microscopy. In *Proc. IEEE Conf. Comp. Vision and Patt. Recog. Workshop (CVPRW)*, June 2006. Oral presentation **(29 citations)**.

**Kang Li**, Steven Millington, Xiaodong Wu, Danny Z. Chen, and Milan Sonka. Simultaneous segmentation of multiple closed surfaces using optimal graph searching. In *Proc. Int. Conf. Information Processing in Medical Imaging (IPMI)*, LNCS 3565, July 2005. Oral presentation **(21 citations)**.

Xiaodong Wu, Danny Z. Chen, **Kang Li**, and Milan Sonka. The layered net surface problems in discrete geometry and medical image segmentation. In *Proc. International Symposium on Algorithms and Computation (ISAAC)*, LNCS 3827, pages 17–27, December 2005. Best Paper Award nominee **(2 citations)**.

**Kang Li**, Xiaodong Wu, Danny Z. Chen, and Milan Sonka. Globally optimal segmentation of interacting surfaces with geometric constraints. In *Proc. IEEE Conf. Comp. Vision and Patt. Recog. (CVPR)*, pages 394–399, June 2004. Student Travel Grant Award **(3 citations)**.

**Kang Li**, Xiaodong Wu, Danny Z. Chen, and Milan Sonka. Efficient optimal surface detection: Theory, implementation and experimental validation. In *Proc. SPIE International Symposium on Medical Imaging: Image Processing*, pages 620–627, May 2004. Oral presentation **(9 citations)**.

## Conference Presentations

**Kang Li**, An-An Liu, and Takeo Kanade. Interference contrast microscopy image preconditioning for quantitative stem cell behavior analysis. In *Biomedical Engineering Society Annual Fall Meeting (BMES)*, Pittsburgh, PA, October 2009. Poster.

Ryoma Bise, **Kang Li**, and Takeo Kanade. Automated stem cell tracking through long-term partial overlap. In *Biomedical Engineering Society Annual Fall Meeting (BMES)*, Pittsburgh, PA, October 2009. Oral.

Sungeun Eom, **Kang Li**, Elmer Ker, Mei Chen, Takeo Kanade, Lee Weiss, and Phil Campbell. Hematopoietic stem cell detection in phase contrast microscopy images for quantitative cell behavior analysis. In *Biomedical Engineering Society Annual Fall Meeting (BMES)*, Pittsburgh, PA, October 2009. Poster.

An-An Liu, **Kang Li**, and Takeo Kanade. Spatiotemporal mitosis event detection in time-lapse phase contrast microscopy image sequences. In *Biomedical Engineering Society Annual Fall Meeting (BMES)*, Pittsburgh, PA, October 2009. Poster.

**Kang Li**, Eric Miller, Takeo Kanade, Lee Weiss, and Phil Campbell. Automated visual-tracking of stem cell populations in time-lapse microscopy video. In *Biomedical Engineering Society Annual Fall Meeting (BMES)*, St. Louis, MO, October 2008. Poster.

Eric Miller, **Kang Li**, Gregory Fisher, Lee Weiss, Lynn Walker, Takeo Kanade, and Phil Campbell. Directing and quantifying cell migration with engineered concentration gradients of FGF-2. In *Endocrine Society Annual Meeting*, Toronto, ON, June 2006. Oral.

Eric Miller, **Kang Li**, Julie Jadlowiec, Gregory Fisher, Lee Weiss, Lynn Walker, Takeo Kanade, Johnny Huard, Alan Waggoner, and Phil Campbell. Engineering cell fate using inkjet printed growth factor patterns. In *Society for Biomaterials Annual Meeting*, Pittsburgh, PA, April 2006. Oral.

Eric Miller, **Kang Li**, Julie Jadlowiec, Gregory Fisher, Lee Weiss, Lynn Walker, Takeo Kanade, Johnny Huard, Alan Waggoner, and Phil Campbell. Engineering cell fate using inkjet printed growth factor patterns. In *World Congress on Tissue Engineering and Regenerative Medicine*, Pittsburgh, PA, April 2006. Oral.

Eric Miller, **Kang Li**, Julie Jadlowiec, Gregory Fisher, Lee Weiss, Lynn Walker, Takeo Kanade, Johnny Huard, Alan Waggoner, and Phil Campbell. Engineering cell fate using inkjet printed growth factor patterns. In *Graduate Biomedical Engineering Society Graduate Student Symposium*, Pittsburgh, PA, April 2006. Oral.

Eric Miller, Julie Jadlowiec, **Kang Li**, Gregory Fisher, Lee Weiss, Lynn Walker, Takeo Kanade, Johnny Huard, and Phil Campbell. Engineering cell fate using inkjet printed growth factor patterns. In *McGowan Institute for Regenerative Medicine Scientific Retreat*, Pittsburgh, PA, March 2006. Poster.

Takeo Kanade and **Kang Li**. Tracking of migrating and proliferating cells in phase-contrast microscopy imagery for tissue engineering. In *Int. Workshop on Computer Vision for Biomedical Image Applications (CVBIA)*, Beijing, China, October 2005. Invited Talk.

Eric Miller, **Kang Li**, Gregory Fisher, Lee Weiss, Lynn Walker, Takeo Kanade, and Phil Campbell. Concentration modulated 2D spatial patterns of FGF-2 immobilized on fibrin direct cell growth. In *Biomedical Engineering Society Annual Fall Meeting (BMES)*, Baltimore, MD, September 2005. Oral.

Eric Miller, Gregory Fisher, **Kang Li**, Gregory Fisher, Lee Weiss, Lynn Walker, Takeo Kanade, and Phil Campbell. Directing cell migration and proliferation with engineered two-dimensional spatial patterns of FGF-2. In *American Society for Cell Biology Annual Meeting*, San Francisco, CA, December 2005. Poster.

Eric Miller, Julie Jadlowiec, **Kang Li**, Gregory Fisher, Lee Weiss, Lynn Walker, Takeo Kanade, Johnny Huard, Alan Waggoner, and Phil Campbell. Engineering cell fate using inkjet printed growth factor patterns. In *American Society for Cell Biology Annual Meeting*, San Francisco, CA, December 2005. Invited Talk.

## Patents/Invention Disclosures

U.S. Patent 20070058865: *System and Methods for Image Segmentation in N-Dimensional Space*

Provisional Patent: *Real-Time Computer-Vision-Based Tracking of Stemness*

## Selected Honors/Awards

Biography Listed in <i>Marquis Who's Who in America</i> (2009 ed.)	2009
Intel/CMU Summer Fellowship	2008
<b>MICCAI Young Scientist Award (AU \$500)</b>	2007
Doctorate Research Fellowship, Carnegie Mellon University	2004–Present
<b>Student Travel Grant (US \$500)</b> , IEEE Conf. Computer Vision and Pattern Recognition	2004

## Professional Skills

*Programming/Scripting:* C/C++, Python, PHP(6 yrs.), MATLAB, C#, Java, Perl

*Cross-Platform Software Development:* Qt, Silverlight, .NET Framework, STL, Boost, OpenGL, Coin, OpenCV, VTK, ITK

*Parallel/Distributed/GPGPU Computing:* Hadoop, Map/Reduce, Maui/Torque, OpenMP, Intel TBB, CUDA

*Language:* English (fluent), Mandarin Chinese (native), Cantonese

## **Professional Activities**

*Reviewer* for Medical Image Analysis, IEEE Transactions on Medical Imaging, IEEE Transactions on Biomedical Engineering, International Journal of Computer Vision, Pattern Recognition Letters, Image and Vision Computing, IEEE International Conference on Multimedia & Expo, International Conference on Medical Image Computing and Computer Assisted Intervention, International Workshop on Microscopic Image Analysis with Applications in Biology

*Program Committee*, International Workshop on Microscopic Image Analysis with Applications in Biology, 2009

*Organizer*, 19th International Conference on Information Processing in Medical Imaging, 2005

*Member*, IEEE