

# Dennis W. Strelow

## Curriculum Vitae, Winter 2005-2006

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## IN BRIEF

Spring 2005 – Present	Senior research scientist, Honeywell Advanced Technology Laboratory
Fall 1998 – Fall 2004	Ph.D. in computer science expected late fall 2004, Carnegie Mellon U.
Summer 2001 – Summer 2004	NASA Graduate Student Research Fellowship (GSRP) fellowship recipient
Fall 1996 - Summer 1998	Software engineer, K <sup>2</sup> T Inc.
Fall 1994 - Summer 1996	M.S. in computer science, University of Illinois at Urbana-Champaign
Spring 1996 - Summer 1996	Research assistant, National Center for Supercomputing Applications
Summer 1995	Graduate research assistant, Los Alamos National Laboratory
Summer 1994	Summer research assistant, National Solar Observatory
Fall 1990 - Spring 1994	B.S. in computer science and mathematics, U. of Wisconsin-Madison
Summer 1993	NSF Research Experience for Undergraduates student, U. of Nebraska-Lincoln

## RESEARCH, EDUCATION, AND EMPLOYMENT

Spring 2005 to Present **Honeywell Advanced Technology Laboratory**, Minneapolis, Minnesota

I am a research scientist at Honeywell's Advanced Technology Laboratory in the Integrated Security Technology (IST) section, which emphasizes computer vision for video surveillance. My projects at Honeywell include the development of an algorithm for propagating the detail from one dataset to a second, degraded dataset of a different modality. Potential applications of this method include improving the resolution of CT scans using MRI scans, and improving the resolution of terrain elevation data using aerial photos. Beside my work in the IST section, I work with the laboratory's navigation and control section on vision-aided navigation for unmanned air vehicles.

Fall 1998 to Fall 2004 **Carnegie Mellon University**, Pittsburgh, Pennsylvania

I completed my Ph.D. in Carnegie Mellon's Computer Science Department, where my advisor was Dr. Sanjiv Singh. My thesis research focused on making image-based, six degree of freedom motion estimation robust for autonomous vehicle and modeling applications. Specifically, my research investigated the fusion of image measurements and measurements from inexpensive inertial sensors for motion estimation; the potential advantages of omnidirectional cameras for motion estimation; robust image feature tracking; and mechanisms for automatically closing the loop in motion estimation from long image sequences. This work was partially supported by a NASA Graduate Student Researcher Program (GSRP) fellowship from Summer 2001 to Summer 2004.

Fall 1996 to  
Summer 1998

**K<sup>2</sup>T, Inc.**, Pittsburgh, Pennsylvania

Before coming to Carnegie Mellon as a student I was a software engineer in the visual modeling group at CMU spin-off K<sup>2</sup>T, Inc. (K<sup>2</sup>T is now Quantapoint, Inc.) My work at K<sup>2</sup>T included the commercialization of Carnegie Mellon's factorization algorithms for three-dimensional modeling from video and the development of algorithms for modeling architecture from still photos.

Fall 1994 to  
Summer 1996

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

I received my M.S. from the University of Illinois Department of Computer Science. My thesis research was performed with the biological imaging group at the National Center for Supercomputing Applications (NCSA). This research developed a new algorithm for constructing polyhedral surface models from volumetric data (e.g., cortex models from MRI data) and the visualization and manipulation of these models in NCSA's CAVE virtual reality environment.

Summer 1995

**Los Alamos National Laboratory**, Los Alamos, New Mexico

As a graduate research assistant with the image analysis group, I focused on document and medical image analysis. Among other algorithms, this work resulted in a robust method for delineating rib cage volumes in computed tomography (CT) images.

Summer 1994

**National Solar Observatory**, Sunspot, New Mexico

As a research assistant at the observatory, I developed algorithms for automatically tracking erratic sunspot motion in solar images and for measuring the intensity of solar flares.

Fall 1990 to  
Spring 1994

**University of Wisconsin-Madison**, Madison, Wisconsin

I received my B.S. in computer science and mathematics from the University of Wisconsin. My advanced courses in computer science included artificial intelligence, compilers, computer architecture, and theoretical computer science. In mathematics my advanced courses included numerical analysis, numerical linear algebra, advanced calculus, differential equations, abstract algebra, and symbolic logic.

Summer 1993

**University of Nebraska-Lincoln**, Lincoln, Nebraska

At Nebraska I took classes in image processing and computer vision and investigated AVHRR image restoration as part of an NSF Research Experience for Undergraduates (REU) program. My investigation showed that the effective accuracy of AVHRR image restoration with small convolution kernels depends on the mechanism used to display the restored images.

## TEACHING EXPERIENCE

- Fall 1994 and Spring 1995 Teaching assistant, Introduction to Computer Science for Engineering Students, University of Illinois Department of Computer Science
- Fall 1995 Teaching assistant, Introduction to Artificial Intelligence, University of Illinois Department of Computer Science
- Fall 1999 Teaching assistant, Introduction to Data Structures, Carnegie Mellon University Computer Science Department
- Spring 2000 Teaching assistant, Computer Vision, Carnegie Mellon University Computer Science Department

## PUBLICATIONS

- Dennis Strelow and Yunqian Ma. A Gibbs sampler for propagating high-resolution detail between datasets of different modalities. Submitted to the *IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2006)*.
- Dennis Strelow and Sanjiv Singh. Motion estimation from image and inertial measurements. Accepted for publication in *The International Journal of Robotics Research*.
- Dennis Strelow and Sanjiv Singh. Online motion estimation from image and inertial measurements. *Workshop on the Integration of Vision and Inertial Sensors (INERVIS 2003)*, Coimbra, Portugal, June 2003.
- Dennis Strelow and Sanjiv Singh. Reckless motion estimation from omnidirectional image and inertial measurements. *IEEE Workshop on Omnidirectional Vision and Camera Networks (OMNIVIS 2003)*, Madison, Wisconsin, June 2003.
- Dennis Strelow and Sanjiv Singh. Optimal motion estimation from visual and inertial measurements. *IEEE Workshop on Applications of Computer Vision (WACV 2002)*, Orlando, Florida, December 2002.
- Henele Adams, Sanjiv Singh and Dennis Strelow. An empirical comparison of methods for image-based motion estimation. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2002)*, Lausanne, Switzerland, October 2002.
- Sanjiv Singh, George Kantor and Dennis Strelow. Recent results in extensions to simultaneous localization and mapping. *International Symposium on Experimental Robotics (ISER 2002)*, Sant'Angelo d'Ischia, Italy, July 2002.
- Dennis Strelow, Jeffrey Mishler, David Koes and Sanjiv Singh. Precise omnidirectional camera calibration. *IEEE Computer Vision and Pattern Recognition (CVPR 2001)*, Kauai, Hawaii, December 2001.
- Dennis Strelow, Jeff Mishler, Sanjiv Singh and Herman Herman. Extending shape-from-motion to noncentral omnidirectional cameras. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2001)*, Maui, Hawaii, October 2001.
- Dan Foygel and Dennis Strelow. Reducing web latency with hierarchical cache-based prefetching. *IEEE Workshop on Scalable Web Services (SWS 2000)*, Toronto, Canada, June 2000.

Nathaniel Daw, Seth Goldstein and Dennis Strelow. Embedded compilation for multimedia applications (abstract). *IEEE Symposium on Field-Programmable Custom Computing Machines (FCCM 2000)*, Napa Valley, California, May 2000.

Dennis Strelow, Warren Gardner, Regis Hoffman, Jeff Mishler and Fred Persi. A shape and motion engine for parameterized models. *Proceedings of the 1998 DARPA Image Understanding Workshop*, Monterey, California, November 1998.

Dennis Strelow, Clinton S. Potter and Paul C. Lauterbur. A virtual environment for the visualization of functional MRI data (abstract). *Current progress in functional brain mapping: science and applications*, T. Yuasa, J.W. Prichard and S. Ogawa, editors, Nishumira/Smith-Gordon, November 1998.

Dennis W. Strelow, Clinton S. Potter and Paul C. Lauterbur. The construction and visualization of surfaces from MRI data. NCSA Technical Report 036, August 1996.

E. Reiger, D.F. Neidig, D.W. Engfer and D. Strelow. The role of high-energy protons and electrons in powering the solar white light flare emissions. *Solar Physics*, 167:307-320, 1996.

S. Reichenbach, D. Koehler and D. Strelow. Restoration and reconstruction of AVHRR images. *IEEE Transactions on Geoscience and Remote Sensing*, 33(4):997-1007, May 1995.

## TALKS

*These talks are in addition to the conference talks for the SWS 2000, IROS 2001, WACV 2002, OMNIVIS 2003, and INVERVIS 2003 papers listed above.*

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| August 2004    | Motion estimation from image and inertial measurements. Northrop Grumman, Pittsburgh, Pennsylvania.                                 |
| December 2003  | Motion estimation from image and inertial measurements. University of Wisconsin-Madison Department of Computer Sciences.            |
| October 2003   | Motion estimation from image and inertial measurements. NASA Ames Research Center.  |
| July 2003      | Visual odometry and visualization. Carnegie Mellon Life in the Atacama Project Workshop.  |
| December 2001  | Extending shape-from-motion to noncentral omnidirectional cameras. University of Wisconsin-Madison Department of Computer Sciences. |
| November 2001  | Extending shape-from-motion to noncentral omnidirectional cameras. Carnegie Mellon School of Computer Science Student Seminar.      |
| October 2000   | Reducing web latency with hierarchical, cache-based prefetching. Carnegie Mellon School of Computer Science Student Seminar.        |
| September 1997 | Three-dimensional models from video. University of Wisconsin-Madison Department of Computer Sciences.                               |
| September 1997 | Three-dimensional models from video. University of Illinois at Urbana-Champaign.  |

## **ADDITIONAL**

- Winter 2005-2006      Application filed for U.S. patent "Method and Apparatus for Propagating High Resolution Detail Between Multi-Modal Data Sets"
- Summer 2001  
to Present              NASA Graduate Student Researchers Program (GSRP) fellowship
- Spring 1995  
and Fall 1995         Excellent Teaching Assistant award, University of Illinois Department of Computer Science
- Spring 1994             Graduation with distinction, University of Wisconsin-Madison