

Andrew Neil Stein

OBJECTIVE

Exciting career involving applications of computer vision, image processing, machine learning, and/or robotics, especially those enabling environmental/sustainability work, computer graphics, fundamental scientific research, space exploration, or personal assistive technologies.

EDUCATION

Carnegie Mellon University

Pittsburgh, PA

Ph.D. Robotics

February, 2008

M.S. Robotics

GPA: 3.96

August, 2004

Thesis:

Occlusion Boundaries: Low-Level Detection to High-Level Reasoning

Committee: Martial Hebert (chair), Alexei (Alyosha) Efros, Rahul Sukthankar, David Fleet

Fellowships:

National Science Foundation Graduate Fellow

National Defense Science & Engineering Graduate Fellow

Coursework:

Computer Vision, Machine Learning, Advanced Perception, Artificial Intelligence, Statistical Methods, Kinematics/ Dynamics/ Control

Teaching assistant for graduate course in Computer Vision (16-720), Fall 2003

Georgia Institute of Technology

Atlanta, GA

M.S. Electrical & Computer Engineering

GPA: 4.0

August, 2002

B.S. Electrical Engineering, *with Highest Honor*

GPA: 4.0

December, 2001

Scholarships:

Georgia Tech President's Scholarship, Georgia Governor's Scholarship, Robert C. Byrd Scholarship, Georgia Mining Scholarship, HOPE Scholarship

Awards & Honors:

Phi Kappa Phi Scholarship Cup – *most outstanding scholastic record of entire 2001 graduating class*, ECE Outstanding Senior Award, Henry Ford II Engineering Scholar, Golden Key Honor Society, Order of the Engineer

Coursework:

Computer Vision, Signal/Image Processing, Embedded Microcontrollers, Probability & Random Signals, Systems & Controls, Microelectronics, VLSI & Digital Logic, Circuit Analysis

RESEARCH AND WORK EXPERIENCE

Anki, Inc.

May 2013 - Present

Computer Vision Engineer

San Francisco, CA

Researching and developing computer vision algorithms for Anki's consumer robotics and artificial intelligence products.

Tandent Vision Science, Inc. March 2008 - Present
Computer Vision Scientist (*Consultant since May 2013*) Pittsburgh, PA

Researched and developed computer vision and machine learning algorithms related to intrinsic imaging, object recognition, gradient domain editing, image enhancement, edge detection/classification, and face detection/recognition. World's first intrinsic *video* results exhibited at SIGGRAPH 2012.

Spearheaded design and development of two Software Development Kits (used directly by external customers and internally as core libraries for final products) as well as the company's research platform.

Pushed for and guided development of an automated testing harness to measure quantitative impact of company's core technology on subsequent computer vision processing.

Co-designed and implemented a suite of interchangeable linear system solvers for convex optimization.

Presented company technology to customers at technical sales meetings and conferences. Traveled on-site to support deployed software. Served as one of 2-3 main technical presenters of company technology.

ChemImage Corporation Summer 2007
Summer Intern Reporting To: C. Anderson, W. Hutchison Pittsburgh, PA

Applied image processing and machine learning techniques to hyper-spectral, multi-modal pharmaceutical / medical imagery for auto-targeting and prostate cancer diagnosis.

NASA, Jet Propulsion Laboratory Summer 2005
Summer Intern Supervisor: L. Matthies Pasadena, CA

Developed improved sub-pixel stereo disparity estimation approach.

Implemented and evaluated performance of a Belief Propagation Symmetric Stereo algorithm.

Intel Research Pittsburgh Summer 2004
Summer Intern Mentors: J. Campbell, R. Sukthankar Pittsburgh, PA

Implemented online structure from motion (SFM) system in Matlab to reconstruct camera motion and environment structure from video data.

Georgia Tech Electrical Engineering Dept. Sept. 2000 - Aug. 2002
Graduate Research Assistant Advisor: A. Tannenbaum Atlanta, GA

Designed, implemented, and tested real-time (109 fps) Bayesian segmentation and tracking algorithm for Air Force's Airborne Laser (ABL) missile defense system.

Investigated segmentation and tracking using active contours, level set methods, and Bayesian adaptive thresholding techniques.

Developed multi-target visual tracker for automated insect research (with T. Balch).

Princeton Summer Institute Summer 2000
Research Intern Advisor: P. Ramadge Princeton, NJ

Applied gradient vector flow active contour methods to track Naval airplane landings from low quality, noisy video footage.

Georgia Tech IEEE Robotics Team Sept. 1998 - Dec. 2000
Team Leader, 1999-2000 Advisor: Whit Smith Atlanta, GA

Design of an autonomous robot for annual regional competition.

Project planning and organization, team management, and budgeting.

Experience with stepper and DC motors, servo control, analog and digital filters, various sensors, and embedded micro-controllers (MicroChip and Motorola)

Clipper Automation Corporation May 1994 - Aug. 1997
CAD Manager Cartersville, GA

Designed layout of automated sorting and conveying equipment using AutoCAD.

Developed software to calculate project costs directly from AutoCAD drawing files.

Traveled to industry trade shows and clients' installations.

SKILLS & INTERESTS

Programming Experience:

Expertise with Matlab (including MEX, GUI development, and OO techniques), particularly in rapid prototyping and visualization for computer vision, image processing, and machine learning.

Also proficient in C/C++ (and OpenCV), with focus on object-oriented, modular design.

Communication:

Excellent skills in visual presentation, speaking, and writing, with a strong belief in the critical importance of all company communication, internal and external. Mastery of PowerPoint & Keynote.

Other Interests:

Tennis, photography, acoustic guitar, travel, skiing, hiking, SCUBA diving, foreign languages.

PEER-REVIEWED PUBLICATIONS

Stein and Hebert, "Occlusion Boundaries from Motion: Low-Level Detection and Mid-Level Reasoning," *International Journal of Computer Vision (IJCV)*, 2009.

Stein, "Occlusion Boundaries: Low-Level Detection to High-Level Reasoning," *Doctoral Dissertation, Technical Report CMU-RI-TR-08-06, Robotics Institute, Carnegie Mellon University*, 2008.

Stein, Stepleton, and Hebert, "Towards Unsupervised Whole-Object Segmentation: Combining Automated Matting with Boundary Detection," *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2008. [Poster]

Stein, Hoiem, and Hebert, "Learning to Find Object Boundaries Using Motion Cues," *IEEE International Conference on Computer Vision (ICCV)*, 2007. [Oral]

Hoiem, Stein, Efros, and Hebert, "Recovering Occlusion Boundaries from a Single Image," *IEEE International Conference on Computer Vision (ICCV)*, 2007. [Oral]

Stein and Hebert, "Combining Local Appearance and Motion Cues for Occlusion Boundary Detection," *British Machine Vision Conference (BMVC)*, 2007. [Oral]

Matthies, Maimone, Johnson, Cheng, Willson, Villalpando, Goldberg, Huertas, Stein, and Angelova, "Computer Vision on Mars," *International Journal of Computer Vision (IJCV)*, 2007.

Stein and Hebert, "Local Detection of Occlusion Boundaries in Video," *British Machine Vision Conference (BMVC)*, 2006. [Oral]

Stein and Hebert, "Using Spatio-Temporal Patches for Simultaneous Estimation of Edge Strength, Orientation and Motion," *Beyond Patches Workshop at IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2006. [Oral]

Balch, Dellaert, Feldman, Guillory, Isbell, Khan, Pratt, Stein, and Wilde, "How Multi-Robot Systems Research will Accelerate our Understanding of Social Animal Behavior," *Proceedings of the IEEE*, 2006.

Stein, Huertas, and Matthies, "Attenuating Stereo Pixel-Locking via Affine Window Adaptation," *IEEE International Conference on Robotics and Automation (ICRA)*, 2006. [Oral, Finalist: Best Vision Paper]

Stein and Hebert, "Incorporating Background Invariance into Feature-Based Object Recognition," *Workshop on Applications of Computer Vision (WACV)*, 2005. [Oral]

Niethammer, Stein, Kalies, Mischaikow, Pilarczyk, and Tannenbaum, "Analysis of blood vessel topology by cubical homology," *International Conference on Image Processing (ICIP)*, 2002. [Poster]

Stein, "Adaptive Image Segmentation and Tracking: A Bayesian Approach," Masters Thesis, Georgia Institute of Technology, 2002.

ISSUED PATENTS

- Stein, Nabbe, Smith, Bagnell, and Tolliver, "Method and System for Learning a Same-Material Constraint in an Image," *U.S. patent application 12/584,910*, filed Sept. 15, 2009. Issued patent: US8311338, Nov. 13, 2012.
- Stein, Kwak, Smith, Maxwell, Tolliver, and Bagnell, "Test Bed for Optimizing an Image Segregation," *U.S. patent application 12/315,669*, filed Dec. 5, 2008. Issued patent: US8260050, Sept. 4, 2012.
- Alldrin, Garg, Stein, Dana, Maxwell, Smith, Yoon, and Abidi, "Image Segregation System with Method for Handling Textures," *U.S. Patent application 12/655,930*, filed Jan. 11, 2010. Issued patent: US8260050, Sept. 4, 2012.
- Maxwell, Smith, Tolliver, Bagnell, Stein, Kwak, Dana, Bushell, Rodgers, Nabbe, Diebel, and Friedhoff, "Constraint Generation for use in Image Segregation," *U.S. patent application 12/315,643*, filed Dec. 5, 2008. Issued patent: US8139850, Mar. 20, 2012.
- Maxwell, Smith, Tolliver, Bagnell, Stein, Kwak, Dana, Bushell, Rodgers, Nabbe, Diebel, and Friedhoff, "Image Segregation System Architecture," *U.S. patent application 12/315,642*, filed Dec. 5, 2008. Issued patent: US8139867, Mar. 20, 2012.

PATENT APPLICATIONS

- Stein and Lalonde, "Oriented, Spatio-spectral Illumination Constraints for use in an Image Process," *U.S. patent application 13/606,644*, filed Sept. 7, 2012.
- Lalonde, Buehler, Maxwell, Smith, Stein, and Friedhoff, "Log-chromaticity Clustering Pipeline for use in and Image Process," *U.S. patent application 13/588,667*, filed Aug. 17, 2012.
- Smith, Stein, Maxwell, and Friedhoff, "Method for processing multiple images of a same scene," *U.S. patent application 13/162,192*, filed Jun. 16, 2012.
- Stein, "Automatic Processing Scale Estimation for use in an Image Process," *U.S. patent application 13/488,799*, filed June 5, 2012.
- Stein and Garg, "A Classifier for use in Generating a Diffuse Image," *U.S. patent application 13/200,204*, filed Sept. 27, 2011.
- Smith, Stein, Maxwell, and Friedhoff, "Method for Processing Multiple Images of a Same Scene," *U.S. patent application 13/162,192*, filed June 16, 2011.
- Stein and Smith, "Method and System for Generating Intrinsic Images using a Smooth Illumination Constraint," *U.S. patent application 12/927,245*, filed Nov. 10, 2010.
- Stein, Alldrin, and Garg, "Pipeline for Generating an Intrinsic Image," *U.S. patent application 12/661,052*, filed March 10, 2010.
- Smith, Stein, and Alldrin, "Method and System for Factoring an Illumination Image," *U.S. patent application 12/653,846*, filed Dec. 18, 2009.
- Tolliver, Dana, Stein, and Alldrin, "Multi-resolution Analysis in Image Segregation," *U.S. patent application 12/454,926*, filed May 26, 2009.
- Tolliver, Bagnell, and Stein, "Solver for Image Segregation," *U.S. patent application 12/315,664*, filed Dec. 5, 2008.