

Konstantinos Derpanis, Ph.D.

Assistant Professor
Ryerson University
Department of Computer Science
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EDUCATION

Ph.D. in Computer Science (2010)

Department of Computer Science and Engineering, York University, Toronto, Canada.
Dissertation Title: "*The Role of Representation in the Analysis of Visual Spacetime*"
Advisor: Dr. Richard Wildes

M.Sc. in Computer Science (2003)

Department of Computer Science and Engineering, York University, Toronto, Canada.
Thesis Title: "*Vision Based Gesture Recognition within a Linguistics Framework*"
Advisors: Dr. John Tsotsos and Dr. Richard Wildes

Honours B.Sc. in Computer Science and Minor in Mathematics (2000)

Department of Computer Science, University of Toronto, Toronto, Canada.

PAST RESEARCH POSITIONS

Post-Doctoral Research Fellow

University of Pennsylvania, GRASP Laboratory and Department of Computer and Information Science, Philadelphia, U.S.A.

Projects:

- United States Army Research Laboratory (ARL) funded project "Robotics Collaborative Technology Alliance (RCTA)", focusing on (i) action detection and understanding and (ii) object classification, detection and reasoning.
(Principal Investigators: K. Daniilidis, J. Shi and B. Taskar)
- Defense Advanced Research Projects Agency (DARPA) funded project "Autonomous Robotic Manipulation (ARM)", focusing on the development of software that enables autonomous robotic visual perception, grasping and manipulation of objects.
(Principal Investigators: K. Daniilidis and V. Kumar)

HONOURS and AWARDS

- Eshrat Arjomandi Award for Outstanding Ph.D. Dissertation, York University, 2010.
- Canadian Image Processing and Pattern Recognition Society (CIPPRS) Doctoral Dissertation Honourable Mention 2011.
- NSERC Industrial R&D Fellowship, \$40,000, 2011-2012. (preapproved)
- NSERC Industrial R&D Fellowship, \$40,000, 2010-2011. (preapproved)
- Precarn scholarship, \$7,500, 2007-2008.

- Ontario Graduate Student (OGS) Scholarship, \$15,000, 2006-2007.
- Ontario Graduate Student (OGS) Scholarship, \$15,000, 2005-2006.
- Institute of Robotics and Intelligent Systems (IRIS) Student Fellowship, \$4,000, 2005.
- Joseph Liu M.Sc. Thesis Award, Department of Computer Science, York University, 2003.
- Natural Sciences and Engineering Research Council of Canada (NSERC) Post Graduate Scholarship (PGS B), \$21,000 (per year), 2003-2005.
- Ontario Graduate Student (OGS) Scholarship, \$15,000, 2003-2004 (declined in favor of NSERC).
- Institute of Robotics and Intelligent Systems (IRIS) Student Fellowship, \$8,000, 2002.

RESEARCH INTERESTS

Computer vision: motion analysis, perception for robotics, human-computer interaction

PUBLICATIONS

Journal Articles

Remark: PAMI is the premier journal in engineering and artificial intelligence with an impact factor of 5.96.

- **Derpanis, K.G.**, Sizintsev, M., Cannons, K., and Wildes, R.P., *Action Spotting and Recognition Based on a Spatiotemporal Orientation Analysis*, IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI), Vol. 35(3), 2013.
- **Derpanis, K.G.**, Wildes, R.P., *Spacetime Texture Representation and Recognition Based on a Spatiotemporal Orientation Analysis*, IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI), Vol. 34(6), 2012.
- **Derpanis, K.G.**, Wildes, R.P., *The Structure of Multiplicative Motions in Natural Imagery*, IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI), 2(7), pp. 1310-1316.
- **Derpanis, K.G.**, Wildes, R.P. and Tsotsos, J.K., *Definition and Recovery of Kinematic Features for Recognition of American Sign Language Movements*, Journal Image and Vision Computing (IVC), Vol. 26(12), pp. 1650-1662, 2008.
- Herpers R., **Derpanis, K.**, MacLean, W.J., Verghese, G., Jenkin, M., Milios, E., Jepson, A., Tsotsos, J.K., *SAVI: An Actively Controlled Teleconferencing System*. Journal Image and Vision Computing, (IVC), Vol. 19(11), pp. 793-804, 2001.

Conference Proceedings

Remark: CVPR and ECCV are top ranked conferences in computer vision. The typical acceptance rate is approximately 25%.

- **Derpanis, K.G.**, Lecce, M., Daniilidis, K. and Wildes, R.P., *Dynamic Scene Understanding: The Role of Orientation Features in Space and Time in Scene Classification*, IEEE International Conference on Computer Vision and Pattern Recognition (CVPR), 2012.
- Anati, R., Scaramuzza, D., **Derpanis, K.G.** and Daniilidis, K., *Robot Localization using Soft Object Detection*, IEEE International Conference on Robotics and Automation (ICRA), 2012.
- Phillips, C.J., **Derpanis, K.G.**, and Daniilidis, K., *A Novel Stereoscopic Cue for Figure-Ground Segregation of Semi-Transparent Objects*, IEEE Workshop on Challenges and Opportunities in Robot Perception, 2011.
- **Derpanis, K.G.** and Wildes, R.P., *Classification of Traffic Video Based on a Spatiotemporal Orientation Analysis*. IEEE Workshop on Applications of Computer Vision (WACV), 2011.
- **Derpanis, K.G.**, Sizintsev, M., Cannons, K. and Wildes, R.P., *Efficient Action Spotting based on a Spacetime Oriented Structure Representation*, IEEE International Conference on Computer Vision and Pattern Recognition (CVPR), 2010.
- **Derpanis, K.G.** and Wildes, R.P., *Dynamic Texture Recognition based on Distributions of Spacetime Oriented Structure*, IEEE International Conference on Computer Vision and Pattern Recognition (CVPR), 2010.
- **Derpanis, K.G.** and Wildes, R.P., *Detecting Spatiotemporal Structure Boundaries: Beyond Motion Discontinuities*, Asian Conference on Computer Vision (ACCV), 2009.
- **Derpanis, K.G.** and Wildes, R.P., *Early Spatiotemporal Grouping with a Distributed Oriented Energy Representation*, IEEE International Conference on Computer Vision and Pattern Recognition (CVPR), 2009.
- Sizintsev*, M., **Derpanis***, **K.G.**, and Hogue, A., *Histogram-Based Search: A Comparative Study*, IEEE International Conference on Computer Vision and Pattern Recognition (CVPR), 2008. (* equal contribution, all authors students)
- **Derpanis, K.G.**, Leung E.T.H., and Sizintsev, M., *Fast Scale-Space Feature Representations by Generalized Integral Images*, IEEE International Conference on Image Processing (ICIP), Vol. 4, 521-524, 2007. (all authors students)
- **Derpanis, K.G.** and Chang, P., *Closed-form Linear Solution to Motion Estimation in Disparity Space*, IEEE Intelligent Vehicle Symposium, pp. 268-275, 2006.

- Mekuz, N., **Derpanis, K.G.** and Tsotsos, J.K., *Adaptive Step Size Window Matching*, International Conference on Pattern Recognition (ICPR), pp. 259-262, 2006.
- **Derpanis, K.G.** and Gryn, J.M., *Three-Dimensional n th Derivative Gaussian Separable Steerable Filters*, IEEE International Conference on Image Processing (ICIP), Vol. 3, pp. 553-556, 2005. (all authors students)
- **Derpanis, K.G.**, Wildes, R.P. and Tsotsos, J.K., *Hand Gesture Recognition within a Linguistics-Based Framework*. European Conference on Computer Vision (ECCV), pp. 282-296, 2004.
- Maclean, J., Herpers, R., Pantofaru, C., Wood, L., **Derpanis, K.**, Topalovic, D. and Tsotsos, J.K., *Fast Hand Gesture Recognition for Real-Time Teleconferencing Applications*, IEEE International Workshop on Recognition, Analysis and Tracking of Faces and Gestures in Real-time Systems (RATFG), pp. 133-144, 2001.
- Herpers, R., **Derpanis, K.**, Topalovic, D., MacLean, J., Jepson, A. and Tsotsos, J., *Active Visual Control by Stereo Active Vision Interface SAVI*, Workshop Dynamische Perzeption, pp. 81-86., 2000.
- Herpers, R., Verghese, G., **Derpanis, K.**, McCready, R., Maclean, W.J., Levin, A., Topalovic, D., Wood, L., Jepson, A. and Tsotsos, J.K., *Detection and Tracking of Faces in Real Environments*, International Workshop on Recognition, Analysis and Tracking of Faces and Gestures in Real-Time Systems (RATFG), pp. 96-104, 1999.
- Herpers, R., Verghese, G., Chang, L., Darcourt, K., **Derpanis, K.**, Kaufman, J., Jenkin, M., Milios, E., Jepson, A. and Tsotsos, J.K., *An Active Stereo Vision System for Recognition of Faces and Related Hand Gestures*, Second International Conference on Audio and Video-based Biometric Person Authentication (AVBPA), pp. 211-216, 1999.

Technical reports

- **Derpanis, K.G.**, Leung E.T.H., and Sizintsev, M., *Fast Scale-Space Feature Representations by Generalized Integral Images*, Technical Report CSE-2007-01 Department of Computer Science, York University, Toronto, Canada, 2007.
- **Derpanis, K.G.**, *Characterizing Image Motion*, Technical Report CSE-2006-06 Department of Computer Science, York University, Toronto, Canada, 2006.
- **Derpanis, K.G.** and Gryn, J.M., *Three-Dimensional n th Derivative Gaussian Separable Steerable Filters*, Technical Report CS-2004-05 Department of Computer Science, York University, Toronto, Canada, 2004.
- **Derpanis, K.G.**, Wildes, R.P., and Tsotsos, J.K., *Vision Based Gesture Recognition within a Linguistics Framework*, Technical Report CS-2004-02 Department of Computer Science, York University, Toronto, Canada, 2004.

Dissertations

- Derpanis, K.G., *The Role of Representation in the Analysis of Visual Spacetime*, Ph.D. Dissertation, Department of Computer Science, York University, Toronto, Canada, 2010
Advisor: Richard P. Wildes
- (Nominated for the university-wide best dissertation award, decision pending, Eshrat Arjomandi Award for Outstanding Ph.D. Dissertation, Department of Computer Science)
- Derpanis, K.G., *Vision Based Gesture Recognition within a Linguistics Framework*, M.Sc. Thesis, Department of Computer Science, York University, Toronto, Canada, 2003, Advisors: John K. Tsotsos and Richard P. Wildes.
(Nominated for the university-wide best dissertation award, Joseph Liu Thesis Award, Department of Computer Science)

INVITED TALKS and DEMONSTRATIONS

- *On the Role of Spacetime Orientation for Representing and Analyzing Dynamic Visual Imagery with Applications*, University of Pennsylvania, GRASP seminar, December 2009 (invited talk).
- *Automated Gesture Recognition within a Linguistics-Based Framework*, University of Toronto, Department of Computer Science, April 2004 (invited talk).
- *Exploiting a Linguistics Decomposition for Gesture Recognition*, IEEE Workshop on Applications in Computer Vision, 2002 (invited demonstration).

ADDITIONAL RESEARCH EXPERIENCE

Technical Staff

Sarnoff Corporation, Princeton, New Jersey, U.S.A.

2005
Summer
Internship

Project Goal: Apply computer vision technologies to improve car safety.

Specifically, develop a real-time stereo vision based collision sensing system, which detects imminent and unavoidable collisions with other cars.

Personal Role: Conducted vision-based research on motion estimation from real-time stereo cameras.

Supervisors: Dr. Peng Chang and Jayan Eledath

Research Assistant

York University, Toronto, Ontario, Canada

2001-2004

Project Title: GestureCam

Project Goal: Develop a gesture-based control language for distance learning applications. This system is to be used by both the speaker and audience to enable multiple sites to benefit from a central lecturer and the active participation of multiple audiences without a human camera

operator.

Personal Role: Conducted research on a vision-based hand gesture recognition system based on color and motion cues.

Supervisors: Dr. John Tsotsos and Dr. Richard Wildes

Research Assistant

York University, Toronto, Ontario, Canada

2001

Project Title: Content-based image retrieval

Project Goal: Optimize normalized grey-scale correlation pyramid search for content-based image retrieval.

Personal Role: Reimplement the initial proof of concept in C++/MFC for live demonstration purposes. Extend the approach to color images.

Supervisors: Dr. John Tsotsos and Dr. James MacLean

Research Assistant

York University, Toronto, Ontario, Canada

2000

Project Title: Stereo Active Vision Interface (SAVI)

Project Goal: Detect frontal faces in real-world environments and perform particular active control tasks dependent on the hand gestures given by the person that the system is attending.

Personal Role: Conducted research in computer vision directed towards real-time hand gesture recognition. Technical coordinator of the SAVI project.

Supervisors: Dr. John Tsotsos and Dr. James MacLean

Research Assistant

University of Toronto, Toronto, Ontario, Canada

1998-1999

Project Title: Stereo Active Vision Interface (SAVI)

Project Goal: Detect frontal faces in real world and environments and perform particular active control tasks dependent on the hand gestures given by the person being attended to by the system.

Personal Role: Conducted research in computer vision directed towards real-time color-based face and hand tracking. Technical coordinator of the SAVI project.

Supervisors: Dr. John Tsotsos and Dr. Rainer Herpers

TEACHING EXPERIENCE

2012

Guest Lecturer

University of Pennsylvania, Philadelphia, PA, USA

Course: Machine Perception

2008

Guest Lecturer

York University, Toronto, Ontario, Canada

Course: Introduction to Computer Vision

- Teaching Assistant**
2000-2009 **York University, Toronto, Ontario, Canada**
Courses: Introduction to Programming, Robotics, Data Structures and Analysis, Computer Graphics
- Teaching Assistant**
1999 **University of Toronto, Toronto, Ontario, Canada**
Course: Introduction to Programming

ACADEMIC SERVICE

Reviewer

- 2012 IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)
2010 – present International Journal of Computer Vision (IJCV)
2004 – present Image and Vision Computing (IVC)
2003 – present Computer Vision and Image Understanding (CVIU)
2004 – present IEEE International Conference on Computer Vision (ICCV)
2004 – present IEEE Conference on Computer Vision and Pattern Recognition (CVPR)
2012 European Conference on Computer Vision (ECCV)
2006 International Conference on Artificial Neural Networks (ICANN)
2005 International Joint Conference on Artificial Intelligence (IJCAI)