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Education

1992 PhD in Computer Science, University of Karlsruhe, Advisor: Hans-Hellmut Nagel
1989 MSE in Computer Science, University of Karlsruhe.
1986 Diploma in Electrical Engineering, National Technical University of Athens.

Positions held

2012 - **Associate Dean for Graduate Education**, Penn Engineering,
2009 - **Professor**, Computer and Information Science, University of Pennsylvania.
2008 - 2013 **Director** of the GRASP Laboratory
2003 - 2009 **Associate Professor**,, Computer and Information Science, University of Pennsylvania.
1998 - 2003 **Assistant Professor**, Computer and Information Science, University of Pennsylvania.
1997 Service at the Greek Army (Mechanized Infantry).
1993 - 1997 **Assistant Professor** (non-tenure-track), Computer Science Institute, Kiel University.
1989 - 1992 **Graduate Research/Teaching Assistant**, Computer Science, University of Karlsruhe.

Honors

2012 IEEE Fellow
2001 Ford Motor Company Award for Best Faculty Advising in Penn Engineering.

Research interests

Computer vision and robotics with specialization on 3D object and shape-based recognition, image matching, visual odometry and motion analysis, and omnidirectional vision.

Google Scholar h-index = 38 as of 09/2013

Refereed Journal Articles

[1] J. Butzke, K. Daniilidis, A. Kushleyev, D. Lee, M. Likhachev, C. Phillips, and M. Phillips, "The university of pennsylvania magic 2010 multi-robot unmanned vehicle system," *Journal of Field Robotics*, 2012.

[2] O. Naroditsky, X. Zhou, J. Gallier, S. Roumeliotis, and K. Daniilidis, "Two efficient solutions for visual odometry using directional correspondence," *IEEE Trans. Patterns Analysis Machine Intelligence*, 2012.

[3] A. Toshev, B. Taskar, and K. Daniilidis, "Shape-based object detection via boundary structure segmentation," *Int. Journal of Computer Vision*, 2012.

[4] A. Makadia and K. Daniilidis, "Spherical correlation of visual representations for 3d model retrieval," *Int. Journal of Computer Vision*, 2010.

[5] G. Mariottini, F. Morbidi, D. Prattichizzo, N. V. Val, N. Michael, G. Pappas, and K. Daniilidis, "Vision-based localization of leader-follower formations," *IEEE Trans. Robotics*, 2009.

[6] N. Moshtagh, N. Michael, A. Jadbabaie, and K. Daniilidis, "Vision-based, distributed control laws for motion coordination of nonholonomic robots," *IEEE Transactions on Robotics*, 2009.

[7] A. Makadia, C. Geyer, and K. Daniilidis, "Correspondenceless structure from motion," *Int. Journal of Computer Vision*, vol. 75, pp. 311–327, 2007.

[8] R. Hicks, M. Millstone, and K. Daniilidis, "Realizing any central projection with a folded catadioptric sensor," *Applied Optics*, vol. 45, pp. 7205–7210, 2006.

[9] A. Makadia and K. Daniilidis, "Rotation estimation from spherical images," *IEEE Trans. Patterns Analysis Machine Intelligence*, vol. 28, pp. 1170–1175, 2006.

[10] W. Yu, G. Sommer, K. Daniilidis, and J. S. Duncan, "Using skew gabor filter in source signal separation and local spectral orientation analysis," *Image and Vision Computing*, vol. 23, pp. 377–392, 2005.

[11] K. Daniilidis and N. Papanikolopoulos, "Special issue on panoramic robotics," *IEEE Robotics and Automation magazine*, 2004.

[12] I. Isler, S. Kannan, K. Daniilidis, and P. Valtr, "VC-dimension of exterior visibility," *IEEE Trans. Patterns Analysis Machine Intelligence*, vol. 26, pp. 667–671, 2004.

[13] J. Mulligan, N. Kelshikar, X. Zabulis, and K. Daniilidis, "Stereo-based environment scanning for immersive telepresence," *IEEE Trans. Circuits and Systems for Video Technology*, vol. 14, pp. 304–320, 2004.

[14] A. Ansar and K. Daniilidis, "Linear pose estimation from points and lines," *IEEE Trans. Patterns Analysis Machine Intelligence*, vol. 25, pp. 578–589, 2003.

[15] C. Geyer and K. Daniilidis, "Omnidirectional video," *Visual Computer*, vol. 19, pp. 405–416, 2003.

[16] W. Yu, G. Sommer, and K. Daniilidis, "3d-orientation signatures with conic kernel filtering for multiple motion analysis," *Image and Vision Computing*, vol. 21, pp. 447–458, 2003.

[17] ——, "Multiple motion analysis: in spatial domain or in spectral domain?," *Computer Vision Image Understanding*, vol. 90, pp. 129–152, 2003.

[18] C. Geyer and K. Daniilidis, "Para-cata-dioptric calibration," *IEEE Trans. Pattern Analysis Machine Intelligence*, vol. 24, pp. 687–695, 2002.

[19] J. Mulligan, V. Isler, and K. Daniilidis, "Trinocular stereo: a new algorithm and its evaluation," *Int. Journal of Computer Vision*, vol. 47, pp. 51–61, 2002.

[20] W. Yu, G. Sommer, S. Beauchemin, and K. Daniilidis, "Oriented structure of the occlusion distortion: is it reliable?," *IEEE Trans. Patterns Analysis Machine Intelligence*, vol. 24, pp. 1286–1290, 2002.

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[22] C. Geyer and K. Daniilidis, "Catadioptric projective geometry," *Int. Journal of Computer Vision*, vol. 43, pp. 223–243, 2001.

[23] W. Y. K. D. G. Sommer, "Approximate orientation steerability based on angular gaussians," *IEEE Trans. Image Processing*, vol. 10, pp. 193–205, 2001.

[24] E. Bayro-Corrochano, K. Daniilidis, and G. Sommer, "Motor-algebra for 3d kinematics," *Journal of Mathematical Imaging and Vision*, pp. 79–100, 2000.

[25] R. Hicks, D. Pettey, K. Daniilidis, and R. Bajcsy, "Complex analysis for reconstruction of controlled motion," *Journal of Mathematical Imaging and Vision*, vol. 13, pp. 57–70, 2000.

[26] K. Daniilidis, "Hand-eye calibration using dual quaternions," *International Journal of Robotics Research*, vol. 18, pp. 286–298, 1999.

[27] K. Daniilidis, C. Krauss, M. Hansen, and G. Sommer, "Real-time tracking of moving objects with an active camera," *Journal of Real Time Imaging*, vol. 4, pp. 3–20, 1998.

[28] K. Daniilidis, "Fixation simplifies 3d motion estimation," *Computer Vision Image Understanding*, vol. 68, pp. 158–169, 1997.

[29] ——, "Attentive visual motion processing: computations in the log-polar plane," *Computing*, vol. 11, pp. 1–20, 1996.

[30] K. Daniilidis and J. Ernst, "Active intrinsic calibration using vanishing points," *Pattern Recognition Letters*, vol. 17, pp. 1179–1189, 1996.

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Refereed Conference Articles

[1] N. Atanasov, B. Sankaran, J. L. Ny, T. Koletschka, G. Pappas, and K. Daniilidis, "Hypothesis testing framework for active object detection," in *IEEE Int. Conf. Robotics and Automation*, 2013.

[2] M. Bansal and K. Daniilidis, "Joint spectral correspondence for disparate image matching," in *IEEE Conf. Computer Vision Pattern Recognition*, 2013.

[3] R. Anati, D. Scaramuzza, K. Derpanis, and K. Daniilidis, "Robot localization using soft object detection," in *IEEE Int. Conf. Robotics and Automation*, 2012.

[4] M. Bansal, K. Daniilidis, and H. Sawhney, "Ultra-wide baseline facade matching for geo-localization," in *ECCV Workshop on Visual Analysis and Geo-Localization of Large-Scale Imagery, A. Fusiello et al. (Eds.): ECCV 2012 Ws/Demos, Part I, LNCS 7583, pp. 175-186*, 2012.

[5] K. Derpanis, M. Lecce, K. Daniilidis, and R. Wildes, "Dynamic scene understanding: the role of orientation features in space and time in scene classification," in *Computer Vision and Pattern Recognition (IEEE Conf. Computer Vision Pattern Recognition), 2012 IEEE Conference on*, IEEE, 2012, pp. 1306–1313.

[6] R. Kennedy, K. Daniilidis, O. Naroditsky, and C. Taylor, "Identifying maximal rigid components in bearing-based localization," in *IEEE Intelligent Robots and Systems*, 2012.

[7] M. Bansal, H. Sawhney, H. Cheng, and K. Daniilidis, "Geo-localization of street views with aerial image databases," in *Proceedings of the 19th ACM international conference on Multimedia*, ACM, 2011, pp. 1125–1128.

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[9] K. D. D. Scaramuzza A. Censi, "Exploiting motion priors in visual odometry for vehicle-mounted cameras with non-holonomic constraints," in *IEEE Intelligent Robots and Systems*, 2011.

[10] O. Naroditsky and K. Daniilidis, "Optimizing polynomial solvers for minimal geometry problems," in *IEEE Int. Conf.Computer Vision*, 2011.

[11] O. Naroditsky, A. Patterson, and K. Daniilidis, "Automatic alignment of a camera with a line scan lidar system," in *IEEE Int. Conf. Robotics and Automation*, 2011.

[12] A. Toshev, B. Taskar, and K. Daniilidis, "Object detection via boundary structure segmentation," in *IEEE Comp. Vision Pattern Recognition*, 2010.

[13] R. Anati and K. Daniilidis, "Constructing topological maps using markov random fields and loop-closure detection," in *Neural Information Processing Systems (NIPS) Conference*, 2009.

[14] A. Toshev, A. Makadia, and K. Daniilidis, "Shape-based detection of moving objects in videos," in *IEEE Comp. Vision Pattern Recognition*, 2009.

[15] A. Kumar, J. Tardif, R. Anati, and K. Daniilidis, "Experiments on loop closing," in *IEEE Workshop on Visual Localization*, 2008.

[16] Y. Ling, I. Cheng, and K. Daniilidis, "A curvature-driven probabilistic strategy for transmission of arbitrary 3d meshes over unreliable networks," in *IEEE Symposium on 3D Data Processing, Visualization, and Transmission*, 2008.

[17] N. Moshtagh, N. Michael, A. Jadbabaie, and K. Daniilidis, "Distributed, bearing-only control laws for circular formations of ground robots," in *Robotics: Science and Systems*, MIT Press, 2008.

[18] A. Patterson, P. Mordohai, and K. Daniilidis, "Object detection from large-scale 3d datasets using bottom-up and top-down descriptors," in *The 10th European Conference on Computer Vision*, 2008.

[19] J. Tardif, Y. Pavlidis, and K. Daniilidis, "Monocular visual odometry in urban environments using an omdirectional camera," in *IEEE International Conference on Intelligent Robots and Systems*, 2008.

[20] P. Hansen, P. Corke, W. Boles, and K. Daniilidis, "Scale-invariant features on the sphere," in *IEEE Int. Conf. Computer Vision*, 2007.

[21] ——, "Scale-invariant features on wide-angle images," in *IEEE Int. Robotics Symposium*, 2007.

[22] G. Mariottini, F. Morbidi, D. Prattichizzo, G. Pappas, and K. Daniilidis, "Leader-follower formations: uncalibrated vision-based localization and control," in *IEEE Int. Conf. Robotics and Automation*, 2007.

[23] R. Molana and K. Daniilidis, "A single-perspective novel panoramic view from radially distorted non-central images," in *British Machine Vision Conference*, 2007.

[24] N Moshtagh, A. Jadbabaie, and K. Daniilidis, "Distributed coordination control of rigid body formations," in *IEEE Conference on Decision and Control*, 2007.

[25] A. Toshev, J. Shi, and K. Daniilidis, "Image matching via salient region correspondence," in *IEEE Conf. Computer Vision Pattern Recognition*, 2007.

[26] J. Barreto and K. Daniilidis, "Epipolar geometry of central projection systems using veronese maps," in *IEEE Conf. Computer Vision Pattern Recognition*, 2006.

[27] R. Carceroni, A. Kumar, and K. Daniilidis, "Structure from motion with known camera positions," in *IEEE Conf. Computer Vision Pattern Recognition*, 2006.

[28] A. Makadia, A. Patterson, and K. Daniilidis, "Fully automatic registration of 3d point clouds," in *IEEE Conf. Computer Vision Pattern Recognition*, 2006.

[29] N Moshtagh, A. Jadbabaie, and K. Daniilidis, "Vision-based control laws for distributed flocking of nonholonomic agents," in *IEEE Int. Conf. Robotics and Automation*, 2006.

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[35] N Moshtagh, A. Jadbabaie, and K. Daniilidis, "Distributed geodesic control laws for flocking of multi-agent systems," in *44th IEEE Conference on Decision and Control*, 2005.

[36] X. Zabulis, A. Patterson, and K. Daniilidis, "Digitizing archaeological excavations from multiple monocular views," in *5th International Conference on 3-D Digital Imaging and Modeling*, 2005.

[37] J. Barreto and K. Daniilidis, "Unifying image plane liftings for central catadioptric and dioptric cameras," in *Workshop on Omnidirectional Vision and Camera Networks*, 2004.

[38] ——, "Wide area multiple camera calibration and estimation of radial distortion," in *Workshop on Omnidirectional Vision and Camera Networks*, 2004.

[39] D. Gupta and K. Daniilidis, "Planar motion of a parabolic catadioptric camera," in *Proceedings of the 17th International Conference on Pattern Recognition*, vol. 4, 2004, pp. 68–71.

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[47] X. Zabulis and K. Daniilidis, "Multi-camera reconstruction based on surface normal estimation and best viewpoint selection," in *2nd International Symposium on 3D Data Processing, Visualization and Transmission*, 2004, pp. 733–740.

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[49] ——, "Mirrors in motion: epipolar geometry and motion estimation," in *International Conference on Computer Vision*, 2003, pp. 766–773.

[50] V. Isler, S. Kannan, and K. Daniilidis, "Local exploration algorithms: competitive analysis and probabilistic framework," in *IEEE Int. Conf. Robotics and Automation*, 2003.

[51] N. Kelshikar, X. Zabulis, J. Mulligan, K. Daniilidis, K. Daniilidis, V. Sawant, S. Sinha, T. Sparks, S. Larsen, H. Towles, K. Mayer-Patel, H. Fuchs, J. Urbanic, K. Benninger, R. Reddy, and G. Huntoon, "Stereo-based environment scanning for immersive telepresence," in *Computational Science - ICCS 2003, Terascale Performance Analysis Workshop*, 2003, pp. 33–41.

[52] A. Makadia and K. Daniilidis, "Direct 3d-rotation estimation from spherical images via a generalized shift theorem," in *IEEE Conf. Computer Vision Pattern Recognition*, 2003.

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[82] J. Mendelsohn, K. Daniilidis, and R. Bajcsy, "Constrained self-calibration for augmented reality," in *IEEE Workshop on Augmented Reality*, 1998, pp. 201–208.

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Books, Book Chapters, Thesis, and Non-refereed Papers

[1] K. Daniilidis and J.-O. Eklundh, "3d vision and recognition," in *Handbook of Robotics*, O. Khatib and B. Siciliano, Eds., Springer Verlag, 2008.

[2] K. Daniilidis and R. Klette, Eds., *Imaging Beyond the Pinhole Model*. Kluwer Academic Publishers, 2006.

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[10] K. Daniilidis and M. Spetsakis, "Understanding noise sensitivity in structure from motion," in *Visual Navigation*, Y. Aloimonos, Ed., Lawrence Erlbaum Associates, Hillsdale, NJ, 1996, pp. 61–88.

Patents

- US Patent 6,982,743: K. Daniilidis, E. Angelopoulou, V. Kumar, Multispectral Omnidirectional Sensor.

Research Grants as Principal Investigator

Period	Agency/Industry	Title	Penn's budget
2013 - 2015	ARO	STTR: Bio-Inspired Visual Navigation: From Landmarks via Bearing to Controls, Phase I and II, subcontract to IAI	$ 200K
2013 - 2015	NSF	NRI: Small: Collaborative Research: Active Sensing for Robotic Cameramen	$ 450K
2012 - 2013	DARPA	Team TROOPER, LM-UPenn-RPI participation at the Robotics Challenge	∼$600K
2012 - 2013	NSF	I-Corps: BlindNav: Indoor Navigation for the Visually Impaired	$ 50K
2011 - 2012	ARO	R-MASTIF (Robotic Mobile Autonomous System for Threat Interrogation and Object Fetch)	$ 200K
2010 - 2015	NSF	IGERT: Complex Scene Perception; PI	$2.4M/5yrs
2010 - 2014	NSF	CDI-Type II: Collaborative Research: Perception of Scene Layout by Machines and Visually Impaired Users; single PI from Penn	$325K/4yrs
2010 - 2015	ARL	Robotics Collaborative Technology Alliance; PI leading a team of 12 Penn coPIs	$9.8M/5yrs
2009 - 2013	NSF	CDI-Type II: Cyber enhancement of spatial cognition for the visually impaired; single PI from Penn (lead);	$112,500/yr
2009 - 2010	DARPA	STTR: Labeling buildings by video activities; single PI, sub to A. Hoogs (Kitware)	$40,000/yr
2007 - 2009	ARL	Navigation based on a snapshot graph; single PI	$150,000/yr
2007 - 2010	NSF	Bio-inspired visual navigation; single PI	$75,000/yr
2004 - 2007	NSF	SEIII: Computing and Retrieving 3D-Archaeological Structures from Subsurface Surveying, PI with J. Shi and G. Biros; F. Limp (U. of Arkansas)	$350,000/yr
2003-2008	NSF	ITR: Multirobot Emergency Response; Penn PI with G. Pappas; N. Papanikolopoulos (U. Minnesota, lead), J. Burdick (Caltech)	$110,000/yr

2001-2004	NSF	ITR:Real-time long distance terascale computation for full bandwidth tele-immersion, single Penn PI with H. Fuchs and G. Waelch (lead, UNC)	$310,000/yr
2001-2002	DARPA	3D-Tele-immersion for the Next Generation Internet, single Penn PI with H. Fuchs (lead, UNC).	$146,000/yr
2001-2002	NSF	Advanced Surgical Training with High-Fidelity Tele-immersion, single Penn PI with H. Fuchs (lead, UNC)	$430,988/yr
2000-2003	NSF	Omnidirectional Vision, single PI	$90,000 /yr
2000-2001	Penn RF	Adding the Sense of Touch to Telepresence, PI	$15,000 /yr
1999-2000	ANS Inc.	Scene acquisition for teleimmersion, PI	$200,000 /yr
1999-2000	Penn RF	Augmented Reality Goes Outdoors, PI	$15,000 /yr

As Co-principal investigator:

Period	Agency	Title	Penn's budget
2013 - 2017	ONR	Planning and Perception for Deck Operations;co-Pi with Topcu	
2012 - 2013	KLA-Tencor	Accurate mapping of construction sites in progress	$ 54K gift
2010 - 2011	DARPA	Autonomous Robotic Manipulation ; co-PI with Vijay Kumar	
2008 - 2013	ARL	MAST CTA Autonomous multifunctional mobile microsystems; co-PI with Vijay Kumar (PI) among 17 coPIs from six institutions	$2,200,000/yr
2007 - 2008	NSF	I/UCRC Safety, Security and Rescue research Center; coPI with Vijay Kumar (PI) and U. of Minnesota coPIs	$70,000/yr
2007-2008	DARPA	Object Recognition via Brain-Inspired Technology ; coPI with Taskar as PI and Shi as coPI, sub to Lockheed Martin ATL	$520,000/yr
2004 - 2005	NSF	RR:MACNet: Mobile Ad-hoc Camera Networks; co-PI with J. Shi (PI) and V. Kumar coPI	$ 200,000/yr
2002-2005	ARO	ACCLIMATE: Adaptive Coordinated ControL of Intelligent Multi-Agent Teams, co-PI with V. Kumar (site PI) and S. Sastry (UC Berkeley, lead PI), et al.	$275,000/yr

1998-2000	ARO	Algorithmics of motion, co-PI with V. Kumar (PI) and five more from Penn; Latombe from Stanford	$500,000 /yr
1998-1999	DARPA	Omnidirectional Vision for Surveillance, Tracking, and Navigation, co-PI with V. Kumar (PI), et al.	$450,000 /yr

Teaching

Undergraduate Courses at the University of Pennsylvania

CSE 121 Introduction to Programming Languages, Spring 2007, Spring 2008, Fall 2008, Fall 2009, Fall 2010, Fall 2011, Fall 2012.

CSE 399 Computer Vision, Spring 2005.

CSE 390 Robotics, Fall 2004, Fall 2003, Fall 2002, Spring 2002.

CSE 240 Introduction to Computer Architecture, Fall 2000, Fall 1999, Fall 1998.

Graduate Courses at the University of Pennsylvania

MEAM 620 Advanced Robotics, Spring 2013.

CIS 580 Machine Perception, Fall 2006, Fall 2007, Spring 2009, Spring 2010, Spring 2011, Spring 2012, Spring 2013, Fall 2013.

EMTM 695 Robotics and Automation, Fall 2007, Fall 2008, Fall 2009, Winter 2010, Winter 2011, Winter 2012.

CIS 700 Special Topics in Machine Perception (with J. Gallier), Spring 2004.

CIS 680 Advanced Topics in Machine Perception, Spring 2003.

CIS 700 Special Topics in Machine Perception, Spring 2001.

CIS 680 Advanced Topics in Machine Perception, Spring 2000, Spring 1999.

Research supervision

Current PhD students

1. Alexander Patterson (2004-)
2. Roy Anati (2006-)
3. Cody Phillips (2009-)
4. Mayank Bansal (2010-)
5. Mathieu Lecce (2010-)
6. Jason Owens (2010-)
7. Menglong Zhu (2011-)
8. Mabel Zhang (2011-)

9. Spyros Leonardos (2012-)
10. Christine Allen-Blanchette (2012-)

Graduated PhD students

1. Weichuan Yu (co-advised with G. Sommer at U.of Kiel), 2000, since 2006 faculty at Hong-Kong UST.
2. Adnan Ansar, 2001, since then with NASA/JPL.
3. Christopher Geyer, 2002, since 2008 with iRobot.
4. Volkan Isler (co-advised with Sampath Kannan), 2004, since 2008 faculty at University of Minnesota.
5. Ameesh Makadia, 2006, since then with Google Research, NYC.
6. Nima Moshtagh, (co-advised with Ali Jadbabaie), 2008, now with Lockheed Martin.
7. Ankita Kumar, 2008, Oracle.
8. Alexander Toshev (co-advised with Taskar and Shi)(2005-2010), Google Research, Mountain View.
9. Oleg Naroditsky (2008-2012), Ogmento.

PhD Thesis Committees

1. David Weiss, Enabling More Accurate and Efficient Structured Prediction, 2013
2. Katerina Fragkiadaki, Multi-granularity steering for human interactions: pose, motion and intention, 2013
3. Jeffrey Byrne, Shape Representations using Nested Descriptors, 2013
4. Benjamin Sapp, Human pose estimation, 2012.
5. Babak Shirmohammadi, Self-Localizing Smart Cameras, 2011
6. Elena Bernardis, Finding Dots in Microscopic Images, 2011.
7. Praveen Srinivasan, Holistic Shape-Based Object Recognition Using Bottom-up Image Structures, 2011.
8. Qihui Zhu, Shape Detection by Packing Contours and Regions, 2010.
9. Timothee Cour, Weakly Supervised Learning from Multiple Modalities: Exploiting Video, Audio and Text for Video Understanding, 2009.
10. Sujit Kuthirummal, Flexible Imaging for Capturing Depth and Controlling Field of View and Depth of Field, 2009.
11. Arvindh Bhusnurmath, Optimization methods in computer vision, 2008.

12. Albert Montillo, Automated volumetric model construction and dynamic segmentation of the heart ventricles in tagged MRI, 2004.
13. Aaron Bloomfield, TRACE: Tactor Reach Access and Constraint Environment, 2004.
14. Koji Ashida, Adaptive Isosurfacing with Unorganized Oriented Points, April 2003.
15. Shih-Schon Lin, True central omnidirectional cone shaped mirror camera, April 2003.
16. Diana Xu, Incremental Algorithms for the Design of Triangular Spline-Based Surfaces, November 2002.
17. David Jelinek, Novel View Synthesis Using Quasi-Sparse Depth Maps, November 2001.
18. Geffrey Egnal, View Synthesis Using Stereo Vision and Silhouettes, June 2002.
19. Jangwoo Shin, State-Space Tool: Understanding Concurrent Programs Through State-Space, November 2001.

Postdoctoral research supervision

1. Luis Puig (2013 -).
2. Konstantinos Derpanis (2010-2012), Ryerson University.
3. Davide Scaramuzza (2011-2012), University of Zurich.
4. Jean-Philippe Tardif (2007-2008), Researcher at NREC, Carnegie Mellon University.
5. Philippos Mordohai, co-advised with Taskar and Shi (2007-2008), now faculty at Stevens Institute of Technology.
6. Irene Cheng (2006-2008), now faculty at University of Alberta.
7. Gian-Luca Mariottini (2007), now faculty at UT Alington.
8. Rodrigo Carceroni (2005-), now at Google, Mountain View.
9. Thomas Buelow (2000-2002), now at Philips Research.
10. Xenophon Zampoulis (2002-2003), now Senior Researcher at FORTH, Greece.
11. Joao Pedro Barreto (2003), now faculty at University of Coimbra, Portugal.
12. Jane Mulligan (1998-2001), now Research Assistant Professor at the University of Colorado at Boulder.

Research associates' supervision

1. Nikhil Kelshikar, (2001-2003), now at Cisco.

Masters' Research Supervision in US

1. Jonas Cleveland (2013), Indoor visual odometry.

2. Thomas Koletschka (2013)
3. Sanchit Aurora (2013)
4. Rajeev Kumar (2013
5. Teyvonia Thomas (2012), Automatic lecture note taking from blackboard.
6. Jason Liu (2009), Visual localization.
7. Allison Mathis (2008), Detection of doors and floors for indoor navigation.
8. Ming-Hsieng Yang (2003-2004) Surface reconstruction from multiple scans by combining segmentation with RBF-approximation.
9. Ting-Chung Hung (2003-2004) Reconstructing texture mapped 3D models from laser scanned range images.
10. Dinkar Gupta (2002-2004) Planar ego-motion from omnidirectional images.
11. Rana Molana (2000-2003), Geometry of non-central cameras.
12. Oleg Naroditski (2000-2003), Spatiotemporal Orientation Simplifies 3D Reconstruction, now at Sarnoff Labs.
13. Daniel Rudoy (2001-2002), Integral Transforms on the Sphere, now at MIT Lincoln Laboratories.
14. Andrew Trister (2001-2002),, Structured Light Reconstruction, now MD/PhD student at the University of Pennsylvania.

Masters Thesis Supervision in Germany

1. T. Torhalsson, Dynamic model fitting in monocular image sequences, 1992.
2. M. Hirt, Systematic analysis of optical flow computation methods, 1993.
3. U. Garbe, Design of steerable filters in the spatiotemporal volume, 1994.
4. V. Krüger, Optical flow estimation in the complex logarithmic plane, 1995.
5. Ch. Krauss, Video-rate detection of moving objects with an active camera and implementation on a pipeline-architecture, 1996.
6. J. Ernst, Intrinsic parameter calibration of an active camera, 1996.
7. D. Buck, Projective depth representation recovery from partially calibrated stereo, 1996.
8. W. Yu, Implementation of a 3D-steerability approach for optical flow estimation, 1997.
9. S. Willemsen, Multiresolution methods for the detection and tracking of fast articulated movements in sports image sequences, 1997.

Senior Design - Independent Study - Intern Undergraduate Students

Three of my students, **Christopher Geyer**, 1999. **Daniel Rudoy**, 2002, and **David Siegel**, 2008 received the Atwater Kent Prize in Electrical Engineering, awarded each year to that member of the senior class in the Moore School who, during his or her junior and senior year has, in the opinion of the faculty of the Moore School, shown the greatest progress in judgement and in the general grasp of the broad principles of electrical engineering and development in personality and who shows the greatest promise of success in this field.

Daniel Araujo and Jorge Trujillo won the Grand Prize for the 2003 school-wide best Senior Design Project on Real Time Facial Tracking.

Zereyacob Girma, Nii Ayite, and Aung Naing won the best Senior Design in Electrical Engineering Prize in 2005.

1. Christopher Geyer on Calibration of a fish-eye camera
2. David Schmid on the Real-time stereo for teleimmersion
3. Jenni Marquiss on Demonstration of catadioptric transformations
4. Bjorn Lindgren on Quicktime-VR interface for a catadioptric camera
5. Evan Witt on VRML-modelling of stereo reconstructions
6. Laura Hornbeck on Audio-based speaker localization
7. Juan Ahues on Real-time low-level image processing for tele-immersion
8. Oleg Naroditski on Tracking in omnidirectional video
9. Raj Arya on Stereoscopic Tele-immersion Displays
10. Desiree Kilburn on Modeling of Head Tracking in Immersive Environments
11. Andrew Trister on Calibration for optical head tracking for teleimmersion
12. Kalpesh Vakharia on Optotrak interface for Teleimmersion
13. Adam Lee on TCP/IP vs UDP in Tele-Immersion
14. Daniel Rudoy on Real-time Background Subtraction
15. Andrew Ganim on Calibration of Camera Clusters and Large Environment Reconstruction
16. Christi Electris on Panoramic Stereo.
17. Daniel Rudoy on Local Spherical Harmonic Representation
18. Ravi Goyal on Local Spherical Harmonic Representation
19. Vernon Balanza on Interfaces for Calibration in Archaeology
20. Theo Paulakis on Pocket-PC Omnidirectional Vision.
21. Jonathan Gouler, NSF-SUNFEST program.

22. Daniel Araujo and Jorge Trujillo, Real Time Facial Tracking
23. Zereyacob Girma, Nii Ayite, and Aung Naing, Double Vision Television
24. Imo Oudome, Kevin Quach, Oye Adetoyese, Structured Light Shape Recovery.
25. Michelle Alleonge, Visual place recognition.
26. David Siegel, GnomeDo.
27. Eugene Yarovoi, Dynamic Programming for Stereo.
28. Avantika Agrawal, Blending images with 3D earth models.
29. Kevin Xu, Stereo on the GPU.
30. Victor Jamney, Tracking in Biology.
31. Tyler Brown, Shape Descriptors.

Visiting Scholars

1. Luis Puig, University of Zaragoza, 2009 and 2011.
2. Yannis Pavlidis, Aristotle University of Thessaloniki, 2008.
3. Peter Hansen, CSIRO, 2008.
4. Gian-Luca Mariottini, University of Sienna, 2005.
5. Lorenzo Sorgi, University of Rome III, 2002.
6. Mark Menem, Ecole Polytechnique, 2002.
7. Cidy Sisse, Ecole Polytechnique, 2002.
8. Geraud de Bonnafos, Ecole Polytechnique, 2001.
9. Alexandre Chibane, Ecole Polytechnique, 2001.
10. Markus Middendorf, University of Karlsruhe, 1998.

Administrative Responsibilities

- 2012- Associate Dean for Graduate Education, Penn Engineering,
- 2008- GRASP Laboratory Director
- 2008-2011 Director of the Robotics Masters Program
- 2008-2010 Engineering Honors Committee
- 2007 Department Chair Search Committee
- 2007-2008 CIS Graduate Admission Chair
- 2001 SEAS Committee on Academic Performance

Professional Activities

2010	Program Cochair of ECCV 2010
2008	Short Courses Organizer for IEEE CVPR 2007
2003 - 2007	**Associate Editor of the IEEE Transaction on Pattern Analysis and Machine Intellige**
2006	with Marc Pollefeys, Conference Chair of 3rd International
	Symposium on 3D Data Processing, Visualization, and Transmission, IEEE Press
2000 - 2006	Co-Chair of the Computer and Robot Vision TC
	of the IEEE Robotics and Automation Society
2000	Chair of the First IEEE Workshop on Omnidirectional Vision

Guest Editorships

2004	IEEE Robotics and Automation Magazine (December 2004)
	Special Issue on Panoramic Robotics

Tutorials

2003	3D modeling and reconstruction of dynamic visual scenes at IEEE ICRA,
	with S. Soatto, J, Kosecka, Y. Ma, and S. Sastry,
	International Conference on Robotics and Automation
1999	Penn Undergraduate Workshop in Cognitive Science
2002	Penn Undergraduate Workshop in Cogntive Science
2000	Tutorial for Structure from Motion at IEEE ICRA
	with Y. Ma, C. Tomasi, CJ Taylor, S. Sastry, J. Kosecka,
	International Conference on Robotics and Automation.

Area Chair at a Conference

2011	Area Chair at IEEE Int. Conf. on Computer Vision
2007	Area Chair at IEEE Int. Conf. on Computer Vision
2006	Area Chair at IEEE Computer Vision Pattern Recognition
2005	Area Chair at IEEE Computer Vision Pattern Recognition
2004	Area Chair at European Conf. on Computer Vision
2004	Area Chair at IEEE Computer Vision Pattern Recognition

Proposal or Project Reviewer

2002 -	European Commission
2000 -	National Science Foundation
2001	National Institutes of Health
2002, 2010	Israel Science Foundation
1997-1999	Greek Ministry of Education

Journal Reviewer

IEEE Trans. Pattern Analysis Machine Intelligence
IEEE Trans. Robotics and Automation
IEEE Trans. Image Processing
Int. Journal of Computer Vision
Int. Journal of Robotics Research
Journal of the Optical Society of America
Computer Vision and Image Understanding
Biological Cybernetics
Pattern Recognition Letters
Graphical Models and Image Processing
Image and Vision Computing
Robotics and Autonomous Systems
Machine Vision and Applications

Invited Presentations

Invited talks at conferences and workshops

1. From appearance to geometry: Place and 3D object recognition, Workshop in honor of Professor Sommer's retirement, June 2012.
2. From appearance to geometry: Place and 3D object recognition, Workshop in honor of Professor Eklundh's 70th birthday, July 2009.
3. Pure vision based SLAM in large urban environments, ARL Vehicle Directorate Review Meeting, June 3, 2008.
4. Pure vision based SLAM in large urban environments, ARL/NSF Workshop on Future directions for visual navigation, Pasadena, May 19, 2008.
5. Pure visual metric and topological mapping, ARL CTA Colloquium, March 9, 2008
6. Visual Navigatioon for Humanoids, Invited presentation at the Workshop for Active Vision for Humanoids, November 29, 2007.
7. Visual registration without matching, ERCIM Spring Meetings, Memorial session for Stelios Orphanoudakis, Budapest, May 30, 2006.
8. Structure from motion without correspondence, Computer Vision and Pattern Recognition Colloquium, Technical University of Prague, April 6, 2006.
9. Localization without correspondence, Post-AC meeting, Courant Institute, NYU, Feb 27, 2006.
10. Localization as a Filtering Problem, York Symposium on Computational Vision, York University, June 18, 2005.
11. Geometry and Signal Analysis Beyond the Projective Plane, Colloquium, Technical University of Prague, January 14, 2004.
12. Navigation without correspondence, IROS Workshop on Visual Servoing, Sept. 30, 2004.
13. Visual navigation based on filtering instead of correspondences,ICRA 2004 - Workshop, Multi-robot Search and Rescue: Current Challenges and Future Directions, April 27, 2004.
14. Immersive Sensing, Visualization and Visual Modeling Workshop VMV 2002, Erlangen, November 22, 2002.
15. Structure from Motion from Omnidirectional Views, ICAR-Workshop on Omnidirectional Vision, Budapest, August 22, 2001.
16. Catadioptric mappings, *Workshop on shape and surface geometry, American Mathematical Society Meeting*, April 28, 2001.
17. A Unifying Theory of Imaging Systems, *Workshop on Theoretical Foundations of Computer Vision*, Schloß Dagstuhl, Mar. 18, 2000.
18. Ego-motion perception and disortion of perceptual space, Symposium Gehirn und Gestalt, Institute for Advanced Studies, Delmenhorst, June 3, 1999.

19. Attentive visual motion processing, *Workshop on Preattentive and Attentive Visual Processing, PAP*, MPI fuer biophysikalische Chemie, Göttingen, Oct. 5, 1994.

20. Issues on attentive visual motion processing, *Workshop on Theoretical Foundations of Computer Vision*, Schloss Dahstuhl, Mar. 13, 1994.

21. Modeling 3D-transformations with dual quaternions: The case of hand-eye calibration, *Workshop on Theoretical Foundations of Computer Vision*, Schloß Dagstuhl, Mar. 18, 1996.

22. Ortsvariantes Bewegungssehen, Workshop *Kognitive Robotik*, Zentrum für Kognitionswissenschaften, Universität Bremen, Mar. 2, 1995.

23. On the relation between instability in motion estimation and critical surfaces,
ESPRIT BRA Insight Meeting, Nice, France, June 19-21, 1991.

24. On error sensitivity of motion estimation from two views,
The 1989 Stockholm Workshop on Computational Vision, Stockholm, Sweden, Aug. 7-10, 1989.

Colloquia and Seminars

1. Object based localization, United Technologies Research Center, September 25, 2012.

2. 3D Object Recognition in Images and Videos, Engineering Colloquium, Lehigh University, October 17, 2011

3. 3D Object Recognition in Images and Videos, Engineering Colloquium, Harvard University, October 15, 2010

4. Shape-based recognition in point clouds, video, and single pictures, Georgia Tech RIM Colloquium, April 4, 2010.

5. Shape-based recognition in point clouds, video, and single pictures, Departmental Colloquium, Temple University, February 26, 2010.

6. 3D object recognition, CS Seminar, University of Illinois at Chicago, November 2, 2009.

7. Image Matching: Appearance, Geometry, Shape, Computer Vision Seminar, Columbia University, January 13, 2009.

8. Image Matching: Harmonic Analysis and Graph Spectral Techniques, RPI Computer Science Seminar, September 28, 2007.

9. Image Matching: Harmonic Analysis and Graph Spectral Techniques, UCLA Computer Science Colloquium, April 23, 2007.

10. Image Matching, Drexel Math Colloquium, March 20, 2007.

11. Image Mathing Beyond Correspondence, Johns Hopkins Center for Imaging, February 13, 2007.

12. Visual localization and registration without matching, Institute of Computer Science, FORTH, Heraclion, Crete, May 11, 2006.

13. 3D beyond graphics, Athens Institute of Technology, April 28, 2006.

14. Localization as a Filtering Problem, University of Delaware, November 29, 2004.

15. Geometry and Signal Analysis Beyond the Projective Plane, Computer Science Department, Aristotle University of Thessaloniki, September 9, 2003.

16. Geometry and Signal Analysis Beyond the Projective Plane, Center for Automation Research, University of Maryland at College Park, February 14, 2003.

17. Signal Analysis and Geometry of Immersive Sensing, Computer Science Colloquium, Johns Hopkins University, October 24, 2002.

18. Signal Analysis and Geometry of Immersive Sensing, AI-Robotics-Vision Seminar, UC Berkeley, September 26, 2002.

19. The Geometry of Omnidirectional Views, ECE Graduate Colloquium, University of Illinois at Urbana-Champaign, September 5, 2002.

20. Multiple Omnidirectional Views, University of Washington, Graphics Seminar, February 10, 2002.

21. The Geometry of Omnidirectional Views, Columbia University, November 28, 2001.

22. Catadioptric Mappings, Stevens Institute of Technology, November 7, 2001.

23. Image Processing in the Catadioptric Plane, Third Workshop on Omnidirectional Vision, Copenhagen, June 3, 2001.

24. Omnidirectional Vision and Catadioptric Mappings, Vision Interface Conference, Ottawa, June 7, 2001.

25. Omnidirectional Vision: Theory and Algorithms, International Conference for Pattern Recognition, Barcelona, Spain, Sep. 1, 2000.

26. Omnidirectional Vision and Tele-presence, *Department of Computer Science, University of Erlangen*, October 6, 2000.

27. Omnidirectional Vision for Immersive Environments, *School of Computing*, University of Utah, July 6, 2000.

28. Omnidirectional Vision for Immersive Environments, *Center for Automation Research Seminar*, University of Maryland at College Park, May 19, 2000.

29. View-independent Scene Acquisition for Tele-immersion, *NTII-Day, Graphics Laboratory, Computer Science Department, University of North Carolina*, May 9, 2000.

30. Omnidirectional Vision for Immersive Environments, *CMU Robotics Institute Seminar*, April 21, 2000.

31. Omnidirectional Vision for Immersive Environments, *MIT AI Lab Colloquium*, April 20, 2000.

32. Catadioptric Geometry, Vision Seminar, EECS Department UC Berkeley, Aug. 16, 1999

33. Autocalibration and 3D-Reconstruction for Augmented Reality and Teleimmersion, IEEE Signal Processing Society, Philadelphia Section, June 21, 1999

34. Autocalibration and 3D-Reconstruction for Augmented Reality and Teleimmersion, Joint Heidelberg-Mannheim Vision Seminar, University of Mannheim, June 1, 1999

35. Catadioptric Visual Systems, Informatics-Colloquium, Kiel University, May 28, 1999

36. Minimally Calibrated Reconstruction for Augmented Reality, Vision Lunch Series, Computer Science Department, Yale University, Jan. 22, 1999.

37. Minimally Calibrated Reconstruction for Teleimmersion and Augmented Reality, Siemens Research Corporation, Sep. 03, 1998.

38. Dual Quaternions for Hand-Eye Calibration, Robotics Group Seminar, Computer Science Department, Stanford University, Aug. 19, 1998

39. Efficient Represenations for Calibration Tasks, Robotics Seminar, EECS Department UC Berkeley, Aug. 17, 1998.

40. We move, therefore we see, Neuroinformatik-Kolloquium, Universität Ulm, Jan. 8, 1998.

41. Active visual motion analysis, Colloquium of the Computer Science Institue, FORTH, Heraclion, Crete, Jul. 22, 1997

42. Ortsvariantes aktives Bewegungssehen, Daimler-Benz, Forschungszentrum Ulm, Apr. 22, 1997.

43. We move, therefore we see, Colloquium, Department of Computer and Information Science, University of Pennsylvania, Mar. 4, 1997

44. 3D-motion estimation with active and space-variant systems, CVAP and Center for Autonomous Systems Seminars, KTH, Stockholm, Nov. 19, 1996

45. Advantages of active and space-variant sensing with respect to motion estimation, Workshop for Alternative Camera Technology ALCATECH96, Sjaellands Odde, Denmark, July 25, 1996

46. A new solution for the hand-eye calibration problem, INRIA Rocquencourt, June 28, 1996.

47. Neuere Entwicklungen in der Berechnung der 3D-Bewegung aus monokularen Bildfolgen, Fachbereich Mathematik und Informatik der Friedrich-Schiller-Universität Jena, May 15, 1996

48. Berechnung des optischen Flusses und der 3D-Bewegung in der komplex-logarithmischen Ebene, Freitagskolloquium, Max-Planck Instituts für Biologische Kybernetik, June 9, 1995.

49. Motion computations on the log-polar plane, *Computer Science Colloquium*, Computer and Information Science Department, University of Pennsylvania, Oct. 25, 1994.

50. Motion computations on the log-polar plane, *Computer Vision Laboratory Seminar*, University of Maryland at College Park, Oct. 21, 1994.

51. On error sensitivity and ambiguity of motion estimation from monocular image sequences, *Colloquium of the Computer Science Department, Technical University of Berlin*, Berlin, Germany, Jan. 19, 1993.

52. Three-dimensional motion estimation from monocular image sequences,
Colloquium of the Research Institute for Applied Knowledge Based Systems (FAW), Ulm, Germany, Dec. 17, 1992.

Media Coverage

I appeared in the Discovery Channel feature "Debunked", premiered on June 17, 2004.

My research on tele-immersion or archaeology reconstruction has been featured in the following media:

Periodicals

- Scientific American (04/01),
- Pennsylvania Current (02/15/01),
- IEEE Computer (01/01),
- Computer Graphics World (01/01),
- Washington Post (11/27/00),
- New Scientist (10/21/00), and
- MIT Technology Review (8/00).

Newspapers

- Daily Pennsylvanian (01/22/01),
- Clarin (01/27/01),
- The Inquirer (01/01/01),

Web News

- PennNews (01/06/05),
- Science Daily and PennNews, (11/02)
- HPCwire (01/05/01),
- PennNews (12/14/00),
- Navigator Online (11/00),

Radio Channels

- AAAS Science Update NPR (01/25/01),
- All things considered, NPR/WHYY (01/09/01),