

Senior Research Scientist.

- 1992-2001 NEC Research Institute,
Research Scientist
- Fall, 1997, 1998 Visiting Member,
Computer Science Department, New York University.
- 1998 Sabbatical Visitor,
KTH (Royal Institute of Technology, Stockholm)
- 1986-1992 Research Assistant, Teaching Assistant,
MIT Artificial Intelligence Laboratory.
- 1989-1990 Consultant,
Chestnut Software.
- Summer, 1989 Software development,
MIT Department of Brain and Cognitive Sciences.
- Summer 1988 Member, Research Group
Thinking Machines Corporation
- 1982-1985 Software Developer
Control Data Corporation

2 Research, Scholarly, and Creative Activities

* Indicates a student or post-doc co-author.

2.1 Chapters in Books

1. David Jacobs, ``Generalizing Invariants for 3-D to 2-D Matching'', *Applications of Invariance in Computer Vision*, edited by J. Mundy, A. Zisserman and D. Forsyth, Springer-Verlag, pp. 415-434, 1994.
2. Zili Liu^{*}, David Jacobs, and Ronen Basri, ``Convexity in Perceptual Completion'', In *Perceptual Organization for Artificial Vision Systems*, edited by K. Boyer and S. Sarkar, Kluwer Academic Publishers, 2002.
3. David Jacobs, ``What Makes Viewpoint Invariant Properties Perceptually Salient?: A Computational Perspective'', In *Perceptual Organization for Artificial Vision Systems*, edited by K. Boyer and S. Sarkar, Kluwer Academic Publishers, 2002.

4. David Jacobs, Jitendra Malik, and Ram Nevatia, "Breakout Session Report: Principles and Methods", In *Perceptual Organization for Artificial Vision Systems*, edited by K. Boyer and S. Sarkar, Kluwer Academic Publishers, 2002.
5. David Jacobs, "Perceptual Organization as Generic Object Recognition", In *From Fragments to Objects: Segmentation and Grouping in Vision*, edited by T. Shipley and P. Kellman, Elsevier, pages 295-329, 2001.
6. David Jacobs, "Perceptual Completion and Memory," In *Perceptual Organization in Vision: Behavioral and Neural Perspectives*, edited by R. Kimchi, M. Behrmann, and C. Olson, Lawrence Erlbaum Associates, 2003, pages 403-430.
7. Ronen Basri and David Jacobs, "Illumination Modeling for Face Recognition," In *Handbook of Face Recognition*, edited by S. Li and A. Jain, Springer-Verlag, 2005.
8. Carlos Castillo* and David Jacobs, "Face Variation," in *Encyclopedia of Biometrics*, edited by S. Li, Springer-Verlag, forthcoming.
9. Haibin Ling and David Jacobs, "Shape Matching for Foliage Database Retrieval," In *Semantic Mining Technologies for Multimedia Databases*, edited by D. Tao, D. Xu, and X. Li, IGI Global, pp. 100-129, 2009.

2.2 Articles in Refereed Journals

1. David Clemens* and David Jacobs, "Space and Time Bounds on Indexing 3D Models from 2D Images", *IEEE Trans. on Pattern Analysis and Machine Intelligence*, **13**(10):1007-1017, 1991.
2. Eric Grimson, Dan Huttenlocher, and David Jacobs, "A Study of Affine Matching with Bounded Sensor Error", *International Journal of Computer Vision*, **13**(1):7-32, 1994.
3. David Jacobs, "The Space Requirements of Indexing Under Perspective Projection", *IEEE Trans. on Pattern Analysis and Machine Intelligence*, **18**(3):330-333, 1996.
4. David Jacobs, "Robust and Efficient Detection of Convex Groups", *IEEE Trans. on Pattern Analysis and Machine Intelligence*, **18**(1):23-37, 1996.
5. David Jacobs, "Matching 3-D Models to 2-D Images", *International Journal of Computer Vision*, **21**(1/2):123-153, 1997.
6. Ronen Basri and David Jacobs, "Constancy and Similarity", *Computer Vision, and Image Understanding*, **65**(3):447-449., (commentary, 1997).
7. Lance Williams* and David Jacobs, "Stochastic Completion Fields: A Neural Model of Illusory Contour Shape and Saliency", *Neural Computation*, **9**:837-858, 1997.

8. Lance Williams* and David Jacobs, "Local Parallel Computation of Stochastic Completion Fields," *Neural Computation*, **9**:859-881, 1997.
9. Ronen Basri and David Jacobs, "Recognition Using Region Correspondences," *International Journal of Computer Vision*, **25**(2):145-166, 1997.
10. Tao Alter* and David Jacobs, "Uncertainty Propagation in Model-Based Recognition," *International Journal of Computer Vision* **27**(2):127-159, 1998.
11. Ronen Basri, Luiz Costa*, Davi Geiger, and David Jacobs, "Determining the Similarity of Deformable Shapes," *Vision Research*, **38**(15/16):2365-2385, 1998.
12. Ronen Basri, Adam Grove, and David Jacobs, "Efficient Determination of Shape from Multiple Images Containing Partial Information," *Pattern Recognition*, **31**(11):1691-1703, 1998.
13. Zili Liu*, David Jacobs, and Ronen Basri, "The Role of Convexity in Perceptual Completion: Beyond Good Continuation," *Vision Research*, **39**:4244-4257, 1999.
14. David Jacobs and Ronen Basri, "3-D to 2-D Pose Determination with Regions," *International Journal of Computer Vision*, **34**(2/3):123-145, 1999.
15. David Jacobs, Daphna Weinshall, and Yoram Gdalyahu*, "Classification with Nonmetric Distances: Image Retrieval and Class Representation," *IEEE Trans. on Pattern Analysis and Machine Intelligence*, **22**(6):583-600, 2000.
16. Ronen Basri and David Jacobs, "Projective Alignment with Regions," *IEEE Trans. on Pattern Analysis and Machine Intelligence*, **23**(5):519-527, 2001.
17. David Jacobs, "Linear Fitting with Missing Data for Structure-From-Motion," *Computer Vision and Image Understanding*, **82**:57-81, 2001.
18. Ronen Basri and David Jacobs, "Lambertian Reflectance and Linear Subspaces," *IEEE Trans. on Pattern Analysis and Machine Intelligence*, **25**(2):218-233, 2003.
19. Tom Funkhouser, Patrick Min*, Michael Kazhdan*, Joyce Chen*, Alex Halderman*, David Dobkin, and David Jacobs, "A Search Engine for 3D Models," *ACM Transactions on Graphics*, **22**(1):83-105, January, 2003.
20. David Jacobs, "What Makes Viewpoint Invariant Properties Perceptually Salient," *Journal of the Optical Society of America A*, **20**(7): 1304-1320, 2003.
21. Gaurav Agarwal*, Peter Belhumeur, Steven Feiner, David Jacobs, W. John Kress, Ravi Ramamoorthi, Norman A. Bourg, Nandan Dixit*, Haibin Ling*, Dhruv

- Mahajan^{*}, Rusty Russell, Sameer Shirdhonkar^{*}, Kalyan Sunkavalli^{*}, Sean White^{*},
“First Steps Toward an Electronic Field Guide for Plants,” *Taxon*, **55**: 597-610, 2006.
22. Ronen Basri, David Jacobs, Ira Kemelmacher^{*}, “Photometric Stereo with General, Unknown Lighting,” *Int’l J. of Computer Vision*. **72**(3): 239-257, 2007.
 23. Margarita Osadchy^{*}, David Jacobs, Michael Lindenbaum, “Surface Dependent Representations for Illumination Insensitive Image Comparison,” *IEEE Trans. on Pattern Analysis and Machine Intelligence*, **29**(1):98-111, 2007.
 24. S. Kevin Zhou^{*}, Gaurav Aggarwal^{*}, Rama Chellappa, David Jacobs, “Appearance Characterization of Linear Lambertian Objects, Generalized Photometric Stereo and Illumination-Invariant Face Recognition,” *IEEE Trans. on Pattern Analysis and Machine Intelligence*, **29**(2):230- 245, 2007.
 25. Haibin Ling^{*}, David Jacobs, “Shape Classification Using the Inner-Distance,” *IEEE Trans. on Pattern Analysis and Machine Intelligence*, **29**(2):286-299, 2007.
 26. Margarita Osadchy^{*}, David Jacobs, Ravi Ramamoorthi, David Tucker^{*}, “Using Specularities in Comparing 3D Models and 2D Image”, *Computer Vision and Image Understanding*, **111**(3):275-294, 2008.
 27. Carlos D. Castillo^{*}, David Jacobs, “Using Stereo Matching with General Epipolar Geometry for 2-D Face Recognition Across Pose”, *IEEE Trans. on Pattern Analysis and Machine Intelligence*, **31**(12):2298-2304, 2009.
 28. Youngmin Kim^{*}, Amitabh Varshney, David Jacobs, and Francois Guimbretiere, “Mesh Saliency and Human Eye Fixations”, *ACM Transactions on Applied Perception*, **7**(2):12:1-12:13, 2009.
 29. Raghuraman Gopalan^{*}, David Jacobs, “Comparing and Combining Lighting Insensitive Approaches for Face Recognition,” *Computer Vision and Image Understanding*, **114**:(1)135-145, 2010.
 30. Haibin Ling^{*}, Stefano. Soatto, Narayanan Ramanathan^{*}, and David Jacobs, “Face Verification Across Age Progression Using Discriminative Methods,” *IEEE Transactions on Information Forensics and Security*, **5**(1):82-91, 2010.
 31. Daozheng Chen^{*}, Mustafa Bilgic^{*}, Lise Getoor, and David Jacobs, “Dynamic Processing Allocation in Video,” *IEEE Trans. on Pattern Analysis and Machine Intelligence*, (accepted for publication).

2.3 Articles in Refereed Conferences

1. David Clemens^{*} and David Jacobs, “Model Group Indexing for Recognition”, *IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*, pp. 4-9, 1991.

2. David Jacobs "Optimal Matching of Planar Models in 3D Scenes", IEEE Conf. on Computer Vision and Pattern Recognition (CVPR), pp. 269-274, 1991.
3. Eric Grimson, Dan Huttenlocher, and David Jacobs, "A Study of Affine Matching with Bounded Sensor Error", European Conference on Computer Vision (ECCV), pp. 291-306, 1992.
4. David Jacobs, "Space Efficient 3D Model Indexing", IEEE Conf. on Computer Vision and Pattern Recognition (CVPR), pp. 439-444, 1992.
5. David Jacobs, "Robust and Efficient Detection of Convex Groups", IEEE Conf. on Computer Vision and Pattern Recognition (CVPR), pp. 770-771, 1993.
6. David Jacobs, "2-D Images of 3-D Oriented Points", IEEE Conf. on Computer Vision and Pattern Recognition (CVPR), pp. 226-232, 1993.
7. Tao Alter* and David Jacobs, "Error Propagation in Full 3D-from-2D Object Recognition", IEEE Conf. on Computer Vision and Pattern Recognition (CVPR), pp. 892-898, 1994.
8. David Jacobs and Chakra Chennubhotla, "Finding Structurally Consistent Motion Correspondences", 12th Int. Conf. on Pattern Recognition(ICPR), pp. 650-653, 1994.
9. Lance Williams* and David Jacobs, "Stochastic Completion Fields: A Neural Model of Illusory Contour Shape and Saliency", Conference of the Association for Research in Vision and Ophthalmology (ARVO), p. S474, 1995, (abstract).
10. Zili Liu*, David Jacobs, and Ronen Basri, "Perceptual Completion: Beyond Good Continuation", Conference of the Association for Research in Vision and Ophthalmology (ARVO), pp. S475, 1995, (abstract).
11. Lance Williams* and David Jacobs, "Stochastic Completion Fields: A Neural Model of Illusory Contour Shape and Saliency", IEEE International Conference on Computer Vision (ICCV), pp. 408-415, 1995.
12. Ronen Basri and David Jacobs, "Recognition Using Region Correspondences", IEEE International Conference on Computer Vision (ICCV), pp. 8-15, 1995.
13. Adam Grove and David Jacobs, "Space/Time Tradeoffs for Associative Memory", International Conference on Pattern Recognition (ICPR), pp. D. 296-302, (August 1996).
14. Ronen Basri, Adam Grove, and David Jacobs, "Efficient Determination of Shape from Multiple Images Containing Partial Information", International Conference on Pattern Recognition (ICPR), pp. A. 268-274, (August 1996).

15. Lance Williams* and David Jacobs, "Local Parallel Computation of Stochastic Completion Fields", IEEE Conference on Computer Vision and Pattern Recognition (CVPR), pp. 161-168, (June 1996).
16. David Jacobs and Ronen Basri, "3-D to 2-D Recognition with Regions", IEEE Conference on Computer Vision and Pattern Recognition (ICPR), pp. 547-553, (June 1997).
17. David Jacobs, "Linear Fitting with Missing Data", IEEE Conference on Computer Vision and Pattern Recognition (CVPR), pp. 206-212, (June 1997).
18. David Jacobs, Daphna Weinshall, and Yoram Gdalyahu*, "Condensing Image Databases when Retrieval is based on Non-Metric Distances", 6th IEEE International Conference on Computer Vision (ICCV), pp. 596-601, (January 1998).
19. Ronen Basri, Dan Roth, and David Jacobs. "Clustering Appearances of 3D Objects", IEEE Conference on Computer Vision and Pattern Recognition (CVPR), pp. 414-420, (June 1998).
20. David Jacobs, Peter Belhumeur and Ronen Basri, "Comparing Images Under Variable Illumination", IEEE Conference on Computer Vision and Pattern Recognition (CVPR), pp. 610-617, (June 1998).
21. Daphna Weinshall, David Jacobs, and Yoram Gdalyahu*, "Classification in Non-Metric Spaces", Neural Information Processing Systems (NIPS) 11, pp. 838-844, (1999).
22. Ronen Basri and David Jacobs, "Projective Alignment with Regions", International Conference on Computer Vision (ICCV), pp. 1158-1164, (September 1999).
23. Hansen Chen*, Peter Belhumeur, and David Jacobs, "In Search of Illumination Invariants," IEEE Conference on Computer Vision and Pattern Recognition (CVPR), pp. 254--261, (June 2000). (Honorable Mention, Best Paper Award).
24. Ronen Basri and David Jacobs, "Lambertian Reflectance and Linear Subspaces," International Conference on Computer Vision (ICCV), pp. II:383-390, (July 2001).
25. David Jacobs, Bas Rokers*, Archi Rudra* and Zili Liu, "Fragment Completion in Humans and Machines," in Advances in Neural Information Processing Systems 14 (NIPS), edited by T. G. Dietterich, S. Becker and Z. Ghahramani, MIT Press, Cambridge, MA, 2002.
26. Ronen Basri and David Jacobs, "Photometric Stereo with General, Unknown Lighting," IEEE Conference on Computer Vision and Pattern Recognition (CVPR), Vol. II: 374-381, 2001.

27. Margarita Osadchy^{*}, David Jacobs, Ravi Ravamoorthi, "Using Specularities for Recognition," IEEE International Conference on Computer Vision (ICCV), Vol. II:1512-1519, 2003.
28. Bongwon Suh^{*}, Haibin Ling^{*}, Ben Bederson, and David Jacobs, "Automatic Thumbnail Cropping and its Effectiveness," ACM Symposium on User Interface Software and Technology (UIST 2003), CHI Letters, 5(2), 95-104 (Best Student Paper Award).
29. Shaohua Zhou^{*}, Rama Chellappa and David Jacobs, "Characterization of human faces under illumination variations using rank, integrability, and symmetry constraints," European Conference on Computer Vision (ECCV), pp. 588-601, 2004.
30. Margarita Osadchy^{*}, Michael Lindenbaum, and David Jacobs, "Whitening for Photometric Comparison of Smooth Surfaces under Varying Illumination," European Conference on Computer Vision (ECCV), pp. 217-228, 2004.
31. Haibin Ling^{*} and David Jacobs, "Using the Inner Distance for Classification of Articulated Shapes," IEEE Conference on Computer Vision and Pattern Recognition (CVPR), Vol. II, pp. 719-726, 2005.
32. Haibin Ling^{*} and David Jacobs, "Deformation Invariant Image Matching," IEEE International Conference on Computer Vision (ICCV), Vol. II, pp. 1466-1473, 2005.
33. Sameer Shirdhonkar^{*} and David Jacobs, "Non-Negative Lighting and Specular Object Recognition," IEEE International Conference on Computer Vision (ICCV), Vol. II, pp. 1323-2330, 2005.
34. Chang Ha Lee^{*}, Amitabh Varshney, and David Jacobs, "Mesh Saliency," ACM Transactions on Graphics (Proceedings of SIGGRAPH 2005) Vol 24, No 3:659-666, 2005.
35. Margarita Osadchy^{*}, David Jacobs and Michael Lindenbaum, "On the Equivalence of Common Approaches to Lighting Insensitive Recognition," IEEE International Conference on Computer Vision (ICCV), Vol. II, pp. 1721-1726, 2005.
36. Carlos D. Castillo^{*} and David Jacobs, "Using Stereo Matching for 2-D Face Recognition Across Pose", IEEE International Conference on Computer Vision and Pattern Recognition (CVPR), 2007.
37. Yi Li^{*} and David Jacobs, "Efficiently Determining Silhouette Consistency," IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2007.
38. Hazem El-Alfy^{*}, David Jacobs, and Larry Davis, "Multi-scale Video Cropping," ACM International Multimedia Conference, pp. 97-206, 2007.

39. Haibin Ling^{*}, Stefano Soatto, Narayanan Ramanathan^{*}, and David Jacobs, "A Study of Face Recognition as People Age," IEEE International Conference on Computer Vision (ICCV), pp. 1-8, 2007.
40. Sameer Shirdhonkar^{*} and David Jacobs, "Approximate earth mover's distance in linear time", IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2008.
41. Peter N. Belhumeur, Daozheng Chen^{*}, Steven Feiner, David Jacobs, W. John Kress, Haibin Ling^{*}, Ida Lopez, Ravi Ramamoorthi, Sameer Sheorey^{*}, Sean White^{*}, and Ling Zhang, "Searching the world's herbaria: a system for visual identification of plant species", European Conference on Computer Vision (ECCV), pp. 116-129 2008.
42. Hazem El-Alfy, David Jacobs, and Larry Davis, "Assigning Cameras to Subjects in Video Surveillance Systems," International Conference on Robotics and Automation (ICRA), 2009.
43. Ronen Basri, Pedro Felzenszwalb, Ross Girshick, David Jacobs, Caroline Klivans, "Visibility Constraints on Features of 3D Objects," IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2009.
44. Xue Mei^{*}, Haibin Ling, David Jacobs, "Sparse Representations of Cast Shadows via l_1 -Regularized Least Squares", IEEE International Conference on Computer Vision (ICCV), 2009.
45. Anne Jorstad^{*}, David Jacobs, "A Deformation and Lighting Insensitive Metric for Face Recognition Based on Dense Correspondence", IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2011.
46. Carlos Castillo^{*}, David Jacobs, "Face Recognition with Large Pose Variation," IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2011.
47. Abhishek Sharma^{*}, David Jacobs, "PLS Based Multi-Modal Face Recognition," IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2011.
48. Peter Belhumeur, David Jacobs, David Kriegman, Neeraj Kumar, "Finding Fiducial Points with Local Detectors and a Consensus of Global Models," IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2011.

2.4 Articles in Refereed Workshops

1. David Jacobs, "GROPER: A Grouping Based Object Recognition System for Two-Dimensional Objects", IEEE Workshop on Computer Vision. pp. 164-169, 1987.

2. David Jacobs, "Opportunistic Recognition", AAAI Workshop on Qualitative Vision, pp. 147-151, 1990 (extended abstract).
3. David Jacobs and Chakra Chennubhotla, "Segmenting Independently Moving, Noisy Points", IEEE Workshop on Motion of Non-Rigid and Articulate Objects, pp. 96-103, 1994.
4. David Jacobs, "Finding Salient Convex Groups", Proc. of the DIMACS Workshop on Partitioning Data Sets, pp. 237-269, 1995.
5. Ronen Basri, Luiz Costa*, Davi Geiger, and David Jacobs, "Determining the Similarity of Deformable Objects", IEEE Workshop on Physics-Based Modeling in Computer Vision, pp. 135-143, 1995.
6. Ronen Basri and David Jacobs, "Matching Convex Polygons and Polyhedra, Allowing for Occlusion", First ACM Workshop on Applied Computational Geometry, pp. 57-66, May 1996.
7. David Jacobs, Peter Belhumeur, and Ian Jermyn*, "Judging Whether Multiple Silhouettes Can Come from the Same Object," International Workshop on Visual Form, pp. 532-541, May 2001.
8. Aniruddha Kembhavi*, Ryan Farrell*, Yuan Cheng Luo*, David Jacobs, Ramani Duraiswami, and Larry Davis. "Tracking Down Under: Following the Satin Bowerbird", Workshop on Applications of Computer Vision, 2008.
9. Daozheng Chen*, Mustafa Bilgic*, Lise Getoor, David Jacobs, Lilyana Mihalkova*, and Tom Yeh*, "Active Inference for Retrieval in Camera Networks," Workshop on Person-Oriented Vision, 2011 (forthcoming).

2.5 Tutorials, Talks, Abstracts, and Other Professional Papers Presented

1. Invited speaker, 1998 Rosenon Workshop on Computational Vision.
2. Invited speaker, 31st Carnegie Symposium on Cognition, 2000.
3. "Recognizing and Reconstructing Objects When the Lighting Changes," February 6, 2004, University of Pennsylvania GRASP Lab.
4. "Recognizing and Reconstructing Objects When the Lighting Changes," February 4, 2005, University of Toronto Department of Computer Science.
5. "Recognizing and Reconstructing Objects When the Lighting Changes," April 20, 2005, Johns Hopkins University, Center for Imaging Science.

6. "Deformation Invariant Image Matching and Plant Species Discovery," February 27, 2006, New York University, Invited Talk, Post-CVPR AC Meeting Workshop.
7. "It's a 3D World," May 24, 2006, Invited Panelist, Workshop on Visual Learning and Recognition, IMA, University of Minnesota
8. "Deformation Invariant Image Matching and Plant Species Discovery," May 24, 2006, Invited Poster Presentation, Workshop on Visual Learning and Recognition, IMA, University of Minnesota.
9. "Comparing Images of 3D Objects," October 15, 2007, Invited Talk, International Workshop on Object Categorization, Rio de Janeiro, Brazil.
10. "Matching Images with Deformations," October 1, 2008, Ecole Normale Supérieure, Paris, Department of Computer Science.
11. "Matching Images with Deformations," November 6, 2008, Ecole Normale Supérieure, Cachan, Center for Mathematics and its Applications.
12. "Matching Images with Deformations," November 6, 2008, Ecole Centrale, Department of Applied Mathematics.
13. "Applications of the Earth Mover's Distance in Computer Vision, with a New Approximate Algorithm," June 30, 2009, Invited Talk, Workshop "Optimal transportation: Theory and applications" Institut Fourier, Grenoble, France.
14. "Matching Images with Deformations," April 16, 2010, York University, Centre for Vision Research, Toronto, Canada.
15. "Matching Images with Deformations," June 18, 2010, Third Workshop on Non-Rigid Shape Analysis and Deformable Image Alignment, San Francisco, CA, (Plenary Talk).
16. "Matching Images with Deformations for Recognition," November 4, 2010, Johns Hopkins University, Center for Imaging Sciences, Baltimore, Maryland.
17. "Segmentation and Shape Matching for Plant Species Identification," April 4, 2010, U.S. Patent and Trademark Office, Alexandria, Virginia.
18. Other invited seminars at: Brown University, Carnegie-Mellon University, Cornell University, David Sarnoff Labs, the Hebrew University, KTH (Royal Institute of Technology, Sweden), MIT, McGill University, New York University, Princeton University, Rutgers University, Stanford University, SUNY Stony Brook, University of California at Berkeley, University of California at Santa Cruz, University of Illinois, University of Maryland, University of Massachusetts, University of

Pennsylvania, University of Minnesota, University of Texas, the Weizmann Institute of Science, Yale University.

2.6 Patents

1. David Jacobs. ``Linear Fitting with Missing Data: Applications to Structure-from-Motion and to Characterizing Intensity Images", US Patent No. 6,009,437.
2. David Jacobs and Ronen Basri. ``Lambertian Reflectance and Linear Subspaces", US Patent No. 6,853,745.
3. Karvel Thornber and David Jacobs. ``Broadened-Specular Reflection and Linear Subspaces for Object Recognition", US Patent No. 7,058,217.
4. Karvel Thornber and David Jacobs. ``Cast Shadows and Linear Subspaces for Object Recognition", US Patent No. 7,006,684.

2.7 Contracts and Grants

Before I joined the University of Maryland, my research at NECI was fully funded internally, by NEC. However, I am coauthor and unpaid collaborator in the following grants.

1. Ronen Basri and David Jacobs. ``Object Recognition, Pose Estimation, and Indexing Using Region Correspondences", United States-Israel Binational Science Foundation Grant #94-00100, \$66,000, 1995-1998.
2. Bernard Chazelle, David Dobkin, Adam Finkelstein, Tom Funkhauser, and David Jacobs. ``ITR/IM:3D Shape-Based Retrieval and Its Applications." National Science Foundation Award #IIS-0121446. \$500,000, 2001-2004.

Since joining the University of Maryland, I have participated in the following grants:

3. Ronen Basri, David Jacobs (co-PI), Eitan Sharon. ``Extraction of Semantic Information from Images using Adaptive Multiscale Techniques," United States-Israel Binational Science Foundation Grant #2002-254, \$120,000. Jacobs received \$30,000, 2003-2007.
4. Peter Belhumeur, Steve Feiner, David Jacobs (co-PI), John Kress, Ravi Ramamoorthi. ``An Electronic Field Guide: Plant Exploration and Discovery in the 21st Century," NSF Medium ITR #0325867. \$2,224,000. Jacobs received \$420,000. 2003-2008.
5. Rama Chellappa, David Jacobs (co-PI), ``Face Recognition'', Horvitz Foundation. \$250,000. Jacobs to receive \$125,000. 2004-2009.

6. James Reggia, Jose Contreras-Vidal, David Jacobs (co-PI), Wassem Naqvi, Malle Tagamets, Scott Weems, Chia-Hung Yang, "The Maryland Large-Scale Neurocognitive Architecture, DARPA, Jacobs received \$25,000. 2005-2006.
7. Amitabh Varshney, David Jacobs (co-PI), NSF #0541120 "Saliency-guided Graphics and Visualization," \$325,000. Jacobs to receive \$162,500. 2006-2009.
8. Larry Davis (PI), et al., (Jacobs, co-PI) "Integrated research on visual surveillance", ARDA, \$1,200,000. Jacobs to receive funds for one graduate student and ½ month of summer support. 2006-2009.
9. Lise Getoor and David Jacobs (co-PI), "Statistical Relational Learning as an Enabling Technology for Data Acquisition and Data Fusion in Heterogeneous Sensor Network," ARO \$50,000, 2007-2008.
10. David Jacobs (PI), "Face Recognition: When Lighting and Pose Vary," Honda Research Initiation Grant, \$50,000, 2007-2008.
11. Rama Chellappa, et al. (Jacobs, co-PI), "Remote Multi-Modal Biometrics for the Maritime Domain", MURI. \$4,500,000, 2008-2011.
12. David Jacobs (PI), "RI: Small: Robust Image Matching with Deformation and Lighting Variation", NSF. \$324,884, 2009-2012.
13. Rama Chellappa, et al. (Jacobs, co-PI) "Robust Methods for Face Recognition in Unconstrained Environments, IARPA. \$1,335,667, 2010.
14. Jennifer Preece, et al. (Jacobs, co-PI) "SoCS: Biotracker – Melding Human and Machine Intelligence to Create Large-Scale Collaborative Systems, NSF. \$749,873, 2010-2013.

2.8 Fellowships, Prizes and Awards

1. Graduated Magna Cum Laude, with Distinction in the Mathematics Major, from Yale College.
2. Awarded graduate fellowship from General Motors, 1986-87.
3. Received the Bergmann Memorial Research Grant award, receiving an additional award of \$5,000, for: "Object Recognition, Pose Estimation, and Indexing Using Region Correspondences", United States-Israel Binational Science Foundation Grant #94-00100, 1994.
4. Honorable mention, best paper award, IEEE Conf. on Computer Vision and Pattern Recognition, 2000. For paper: "In Search of Illumination Invariants," by Hansen Chen*, Peter Belhumeur, and David Jacobs.

5. Co-author of paper awarded best student paper, UIST 2003. For paper: "Automatic Thumbnail Cropping and its Effectiveness," by Bongwon Suh*, Haibin Ling*, Ben Bederson, and David Jacobs.

2.9 Editorial Boards and Reviewing Activities for Learned Publications

1. Associate Editor, IEEE Transactions on Pattern Analysis and Machine Intelligence, 1999-2003.
2. Guest Co-Editor, IEEE Transactions on Pattern Analysis and Machine Intelligence, Special Issue on Perceptual Organization in Computer Vision, 2003.
3. Served as referee for journals in computer vision, human vision and artificial intelligence, including *IEEE Trans. on Pattern Analysis and Machine Intelligence* (PAMI), *Int. Journal of Computer Vision* (IJCV), *Vision Research*, *Perception*, *Comp. Vis., Graphics and Image Processing* (CVGIP), *Artificial Intelligence*, *IE Proc. on Vision, Image and Signal Processing*, *IE Electronics Letters*, *Image and Vision Computing*, the *Journal of Vision*, *ACM Transactions on Perception*, the *Journal of the Optical Society of America*, the *Journal of Math. Imaging and Vision*, and the *SIAM Journal on Scientific Computing*
4. and the conferences *IEEE Conf. on Computer Vision and Pattern Recognition* (CVPR), *IEEE Conf. on Robotics and Automation*, *IAPR Int. Conf. on Pattern Recognition* (ICPR), *IEEE Workshop on Non-Rigid and Articulate Motion*, and *IEEE Workshop on Interpretation of 3D scenes*.

2.10 Research Software and Data Sets

1. Convex Grouping. This code finds convex groups of line segments in images. (<http://www.cs.umd.edu/~djacobs/>).
2. Linear Fitting with Missing Data. This code fills in missing entries of a low rank matrix, and includes methods for applying this to problems of structure from motion. (<http://www.cs.umd.edu/~djacobs/>).
3. Our team has produced the largest publicly available data set of images of leaves with their species identified, containing over 7,000 leaf images. (<http://herbarium.cs.columbia.edu/data.php>).

3. Teaching and Advising

3.1 Courses Taught in the Last Five Years

1. Fall, 2010. CMSC 828b, Recent Advances in Biometrics.
2. Spring, 2010. CMSC 426, Image Understanding.

3. Fall, 2009. CMSC 828, Image Segmentation.
4. Spring, 2009. CMSC 828, Approaches to Representing and Recognizing Objects (18 students).
5. Spring, 2008. CMSC 828, Visual and Auditory Scene Analysis. Co-taught with Prof. Moss' NACS 728X. (12 students).
6. Fall, 2007. CMSC 427, Computer Graphics. (15 students).
7. Spring, 2007. CMSC 427, Computer Graphics. (8 students)
8. Fall, 2006. CMSC 828, Image Segmentation. (7 students)
9. Spring, 2006. CMSC 828, Approaches to Representing and Recognizing Objects. (16 students)
10. Fall, 2005. CMSC 426, Image Processing. (9 students).
11. Spring, 2004. CMSC 427, Computer Graphics. (25 students)
12. Fall, 2004. CMSC 828, Image Segmentation. (19 students).
13. Spring, 2004. CMSC 426, Image Processing. (35 students).
14. Fall 2003. CMSC 828, Approaches to Representing and Recognizing Objects. (16 students)
15. Spring, 2003. CMSC 426, Image Processing. (43 students).

3.2 Course and Curriculum Development

1. Designed new curriculum, extensive new notes, projects and problem sets for CMSC 426 (Image Processing). Supporting class material has been used by other University of Maryland instructors, and faculty at other universities (eg., UC San Diego, Columbia University, Cal Tech). Latest material is at:
http://www.cs.umd.edu/~djacobs/CMSC426/CMSC426_05.htm.
2. Designed new, two-course sequence of graduate vision courses on Image Segmentation, and Visual Classification. Links to these courses at:
<http://www.cs.umd.edu/~djacobs/>.
3. Designed new interdisciplinary graduate course with Prof. Cindy Moss on biological and computational approaches to visual and auditory scene analysis (Links at:
<http://www.cs.umd.edu/~djacobs/>).
4. Volunteered to co-organize *How to do Research* course, 2005.
5. Designed new course, Recent Advances in Biometrics, 2010.

3.3 Advising: Other than Research Directions

Approximately 3 graduate students per year.

3.4 Advising: Research Directions

3.4.1 Undergraduate

- Brett Hutchinson, Spring 2003.
- In Joon Chu, 2003.
- David Tucker, Spring 2004-Fall 2004 (co-author in accepted journal publication).
- Matthew Roberts, Spring 2004.
- Daozheng Chen, Fall 2006, Spring 2007 (currently graduate student, U. of MD College Park).
- Allie Hoch, 2009.

3.4.2 Master's

- Gaurav Agarwal, graduated 2005.

3.4.3 Doctoral co-supervised (completed)

- Tao Alter, MIT, 1998, (now at Intelligent Markets).
- Archi Rudra, New York University, 2001, (now at Lehman Brothers).

3.4.4 Doctoral

- Haibin Ling (graduated, 2006), Asst. Prof. at Temple University.
- Sameer Sheorey (graduated, 2008), Research Assistant Professor, Toyota Technological Institute – Chicago.
- Carlos Castillo (proposed, 2009).
- Daozheng Chen
- Anne Jorstad (AMSC)
- Joao Soares
- Arijit Biswas
- Abhishek Sharma

3.4.5 Postdoctoral co-supervised

- Lance Williams, (1993-1996) now Professor, University of New Mexico.
- Zili Liu, (1993-1995) now Professor, UCLA.
- Sebastien Roy, (2001), now Professor, University of Montreal.
- Mike Langer, (1994-1996) now Professor, McGill University.
- Bosco Tjan, (1998-2000) now Professor, University of Southern California (USC).
- Olga Veksler, (2000-2002) now Professor, University of Western Ontario.
- Rita Osadchy, (2001-2002) now Professor, Haifa University, Israel.
- Daniele Zavagno, (2001-2002) now faculty, Milano University, Italy.

3.4.6 High School

- Andrew Gibiansky, (Summer, 2010), student at Montgomery Blair High School.

3.5 Advising: Ph.D. Committees

- Carlos Castillo, 2011.
- Bhargav Kanagal, 2011.
- Mudit Agrawal, 2011.
- Eunhui Park, 2011 (proposal).
- Nagilla Reddy, 2011 (ECE).
- Kaushik Mitra, 2011 (ECE).
- Daozheng Chen, 2011 (proposal).
- John Karvounis, 2011 (ECE).
- Samah Ramadan, 2011 (proposal).
- Ruonan Li, 2011 (ECE).
- Ryan Farrell, 2011.
- Vlad Morariu, 2010.
- Yi Li, 2010 (ECE).
- Kate McBryan, 2010, (proposal, Aerospace Engineering).
- Mohamed Abdelkader, 2010 (ECE)
- Mustafa Bilgic, 2010
- John Tritschler, 2010 (Proposal, Aerospace Engineering).
- Mahesh Ramachandran, 2010 (ECE).
- Elena Zheleva, 2010 (Proposal)
- David Schug, 2010 (Proposal, Applied Math)
- Aniruddha Kembhavi, 2010
- Konstantinos Bitsakos, 2010.
- Bhargav Kanagal, 2010, proposal.
- Jie Shao, 2009 (ECE).
- Soma Biswas, 2009 (ECE).
- Guangyu Zhu, 2009 (ECE).
- Xue Mei, 2009 (ECE).
- Ryan Farrell, 2009, proposal.
- Thuan Huynh, 2009, proposal.
- William Schwartz, 2009, proposal.
- Mudit Agarwal, 2009, proposal.
- Hao Wu, 2009 (ECE).
- Justin Domke, 2009.
- Prithviraj Sen, 2009.
- Mudit Agrawal, 2009.
- Prashant Athavale, 2009 (Applied Math).
- Hazem El-Alfy, 2009.
- Abhinav Gupta, 2009.
- Zhe Lin, 2009 (ECE).
- Morimichi Nishigaki, 2009, proposal.
- Hyounjune Yi, 2008, proposal.

- Gaurav Aggarwal, 2008.
- Xing Tian, 2008.
- Minkyong Cho, proposal, 2008.
- Xu Liu, proposal, 2008.
- Guilherme Foseca, 2007.
- Justin Domke, 2007, proposal.
- Gutemberg Bezerra Guerra-Filho, 2007.
- Youngmin Kim, proposal, 2007.
- Feng Guo, 2007.
- Hui Ji, 2006.
- Yefeng Zheng, 2005.
- Yang Ran, 2006.
- Sernam Lim, 2006.
- Philip David, 2006.
- Ransom Winder, 2007.
- Kyungnam Kim, 2005.
- Bohyung Han, 2005.
- Chang Ha Lee, 2005.
- Changjiang Yang, 2005.
- Gustavo Rohde, 2005.
- Francisco Estrada (University of Toronto), 2005.
- Bongwon Suh, 2005.
- Abhijit Ogale, 2004.
- Reiner Schulz, 2004.
- Kevin Zhou (ECE), 2004.
- Vasudev Parameswaran, 2004.
- Motilal Agrawal, 2003.
- Eugene Borovikov, 2003
- Patrick Min (Princeton University), 2003.
- Prior to joining the University of Maryland,
 - Bernard Baldwin, New York University.
 - Ian Jermyn, New York University.
 - Hsing-Kuo Pao, New York University.
 - Par Fornland, KTH (Royal Institute of Technology, Sweden).
 - Danny Roobaert (Opponent), KTH (Royal Institute of Technology, Sweden).

3.6 Advising: Master's Committees

- Vinay Shet, 2003.

4 Service

4.1 Professional

4.1.1 Unpaid reviewing activities for agencies

1. Member, NSF Computer Vision Proposal Review Panel,
2. Member, NSF ITR Proposal Review Panel.
3. Member, DOE Project Review Committee, 2008.
4. Member, NSF Review Panel, 2010.

4.1.2 Other Non-University Panels and Positions

1. Program co-Chair, IEEE Conference on Computer Vision and Pattern Recognition, 2010.
2. Area Chair, IEEE Conference on Computer Vision and Pattern Recognition, 2003, 2004, 2006, 2008.
3. Publications Chair, IEEE Conference on Computer Vision and Pattern Recognition, 2004.
6. Member, Program Review Committee, for the University of Illinois' Beckman Institute Human-Computer Intelligent Interaction Program, 2001 and 2005.
7. Co-chair, 3rd IEEE Workshop on Perceptual Organization, 2001.
8. Co-organized four NEC vision workshops.
9. Program Committee IEEE International Conference on Computer Vision, 1999, 2003, 2007, 2009.
10. Program Committee IEEE Conference on Computer Vision and Pattern Recognition, 1997, 98, 99, 2004, 05, 07.
11. Program Committee, European Conference on Computer Vision, 2002, 04, 08.
12. Program Committee IEEE Workshop on Perceptual Organization, 1998, 99, 2004, 2006, 2008.
13. Program Committee, Second International Symposium on 3D Data Processing, Visualization, and Transmission, 2004.
14. Program Committee IEEE Workshop on Applications of Computer Vision, 1998.
15. Program Committee International Conference on Pattern Recognition, 2004.
16. Reviewer, NIPS 2000, 01.
17. Reviewer, SIGGRAPH 2008.

18. Program Committee, IEEE Workshop on Component Analysis, 2007.
19. Program Committee, IEEE International Workshop on Analysis and Modeling of Faces and Gestures (AMFG), 2005, 2007.
20. Program Committee, IEEE Workshop on Photometric Analysis for Computer Vision, 2007.
21. Program Committee, 3rd International Symposium on Visual Computing, 2007.
22. Program Committee, International Conference on Energy Minimization Methods in Computer Vision and Pattern Recognition, 2009.
23. Program Committee, Workshop on Non-Rigid Shape Analysis and Deformable Image Alignment, 2009.

4.2 Departmental Service

- Committee to examine department service courses, 2003.
- Committee on women and minority participation, 2003.
- Teaching evaluation committee, 2003, 2004, 2005, 2009, 2010.
- Committee to examine graduate student requirements, 2006.
- CS graduate school admissions committee, 2006, 2007, 2008, 2010, 2011.
- Bioinformatics faculty search committee, 2007.
- Co-organizer, weekly vision seminar series, 2002-present.
- Graduate Student Review Committee, 2007, 2008.
- Faculty Lunch Committee, 2009.

4.3 Other University Service

- UMIACS newsletter committee, 2005.
- UMIACS Steering Committee, 2005.
- UMIACS APT committee, 2003, 2006.
- Presentations at Maryland Day, 2005, 2007.
- Associate Director, Program in Neuroscience and Cognitive Science (NACS), 2007-2010.
- Executive Committee, Program in Neuroscience and Cognitive Science (NACS), 2007-2012
- NACS graduate program admissions committee, 2005, 2006, 2007, 2008, 2009.
- NACS faculty search committee, 2007.
- CMPS committee to judge the Dorfman prize for undergraduate research, 2008.