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EDUCATION:

1974	Ph.D. Computer Science, University of Iowa
1972	M.S. Computer Science, University of Iowa
1970	B.S. with highest distinction in Mathematics and Computer Science, University of Illinois

HONORS:

Alpha Lambda Delta
Phi Beta Kappa
University of Illinois Bronze Tablet Scholar
Pattern Recognition Society Best Paper, 1984
Pattern Recognition Society Honorable Mention, 1985
Pattern Recognition Society Honorable Mention, 1987
Pattern Recognition Society Best Paper, 1989
Pattern Recognition Society Best Paper, 1995
Fellow of the IEEE, 1996
Pattern Recognition Society Honorable Mention, 1999
Fellow of the IAPR, 2000
MICCAI Workshop on Medical CBIR Best Paper 2012

PROFESSIONAL EXPERIENCE:

2001-	Adjunct Professor of Biomedical Informatics and Medical Education
1990-	Professor Department of Computer Science and Engineering and Department of Electrical Engineering
1989	Professor
1986-89	Associate Professor Department of Electrical Engineering Adjunct Associate Professor Department of Computer Science University of Washington Seattle, WA 98195

1984-1986	Director of Intelligent Systems Machine Vision International Ann Arbor, MI
1981-1984	Associate Professor
1979-1981	Assistant Professor Department of Computer Science Virginia Polytechnic Institute and State University Blacksburg, Virginia 24061
1978	Visiting Assistant Professor Department of Computer Science University of Kansas Lawrence, Kansas 66044
1974-1978	Assistant Professor Department of Computer Science Kansas State University Manhattan, Kansas 66506

PROFESSIONAL SOCIETY MEMBERSHIPS:

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Pattern Recognition Society
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COURSES TAUGHT:

UNDERGRADUATE	GRADUATE
Introduction to Computer Science	Theory of Parsing
Data Structures	Discrete Structures
Computer Organization and Programming	Artificial Intelligence
Computer Graphics	Operating Systems
Programming Languages	Computer Vision
Discrete Mathematical Structures	Medical Image Analysis
Introduction to Database Systems	Information Storage and Retrieval
Computer Vision	Computer Models of
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RESEARCH INTERESTS:

Computer Vision	Medical Image Analysis
Artificial Intelligence	Biomedical Informatics
Pattern Recognition	Content-Based Image Retrieval

PUBLICATIONS APPEARING IN REFEREED JOURNALS:

1. W. Wu, B. Li, E. Mercan, S. Mehta, J. Bartlett, D. L. Weaver, J. G. Elmore, L. G. Shapiro, "MLCD: A Unified Software Package for Cancer Diagnosis,", *Journal of Clinical Oncology: Clinical Cancer informatics*, March 2020.

2. E. Mercan, S. Mehta, J. Bartlett, L. G. Shapiro, D.L. Weaver, J. G. Elmore, "Machine Learning of Breast Pathology Structures for Automated Differentiation of Breast Cancer and High-Risk Proliferative Lesisions," *JAMA Network Open*, August 2019.

3. T. M. Davidson, M. H. Rendi, P. D. Frederick, T. Onega, K. H. Allison, E. mercan, T. T. Bounye, L. G. Shapiro, D. L. Weaver, J. G. Elmore, "Breast Cancer Prognostic Factors in the Digital Era: Comparison of Nottingham Grade using Whole Slide Images and Glass Slides," *Journal of Pathology Informatics*, 2019;10:11.

4. S. Rolfe, S.-I. Lee, L. Shapiro, "Associations Between Genetic Data and Quantitative Assessment of Normal Facial Asymmetry," *Frontiers in Genetics*, 9:659. doi: 10.3389/fgene.2018.-00659, December, 2018.

5. B. Gecer, S. Aksoy, E. Mercan, L. G. Shapiro, D. . Weaver, J. G. Elmore, "Detection and Classification of Cancer in Whole Slide Breast Histopathology Images using Deep Convolutional Networks," *Pattern Recognition*, VOl. 84, 2018, pp. 345-356. PMCID: PMC6342566.

6. L. G. Shapiro, "Computer Vision: the Last Fifty Years," *International Journal of Parallel, Emergent and Distributed Systems*, Published online, doi: 10.1080/17445760.2018.1469018, June 5, 2018, NIHMSID 1512455.

7. E. Mercan, C. S. Morrison, E. Stuhaug, L. G. Shapiro, R. W. Tse, "Novel Computer Vision Analysis of Nasal Shape in Children with Unilateral Cleft Lip," *Journal of Cranio-Maxillofacial Surgery*, Elsevier, ScienceDirect, October 29, 2017.

8. C. Mercan, S. Aksoy, E. Mercan, L. G. Shapiro, D. L. Weaver, J. G. Elmore, "Multi-instance Multi-label Learning for Multi-class Classification of Whole Slide Breast Histopathology Images," *Transactions on Medical Imaging*, Vol. 37, No. 1, 2018, pp. 316-325.

9. E. Mercan, L. G. Shapiro, T. T. Brunye, D. L. Weaver, J. G. Elmore, "Characterizing Diagnostic Search Patterns in Digital Breast Pathology: Scanners and Drillers," *Journal of Digial Imaging*, July, 2017.

10. J. G. Elmore, G. M. Longton, M. S. Pepe, P.A. Carney, H.D. Nelson, K. H. Allison , B. M. Geller, T. Onega, A. N. A. Tosteson, E. Mercan, L. G. ShapiroG, T. Bruny, T. R. Morgan, D. L. Weaver, "A randomized study comparing digital imaging to traditional glass slide microscopy for breast biopsy and cancer diagnosis," *J Pathology Informatics*, Vol. 8, No. 2, 2017.

11. S. Liang, L. Shapiro, R. Tse, "Measuring Symmetry in Children with Cleft Lip. Part 3: Quantifying Nasal Symmetry and Nasal Normalcy Before and After Unilateral Cleft Lip Repair," *Cleft Palate Craniofacial Journal*, 2016.

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132. Kobashi, M. and L. G. Shapiro,"Knowledge-Based Matching for 3D Radiotherapy Planning," *Proceedings of the International Conference on Pattern Recognition: Computer Vision*, August 1992, pp. 293-296.

133. Haralick, R. M., A. K. Somani, C. Wittenbrink, R. Johnson, K. Cooper, L. G. Shapiro, I. T. Phillips, J. N. Hwang, W. Cheung, Y. H. Yao, C.-H Chen, L. Yang, B. Daugherty, B. Lorbeski, K. Loving, T. Miller, L. Parkins, and S. Soos, "Proteus: A Reconfigurable Computational Network for Computer Vision,"*Proceedings of the International Conference on Pattern Recognition*, 1992, pp. D43-54 (Judged among the 6 best papers). Also in *Proc. of the SPIE,* Vol. 1659, 1992, pp. 54-76.

134. Modayur, B. R. and L. G. Shapiro, "Automated Inspection of Machined Parts," *Proceedings of the International Conference on Pattern Recognition: Computer Vision*, August, 1992, pp. 57-60.

135. Modayur, B. R. and L. G. Shapiro, "A CAD-Based System for Automated Inspection of Machined Parts," *International Conference on Intelligent Robots and Systems*, July, 1992, pp. 1231-1238.

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139. Costa, M. S., R. M. Haralick, and L. G. Shapiro, "Optimal Affine-Invariant Matching: Performance Characterization", *SPIE Symposium on Electronic Imaging*, San Jose, CA, February, 1992, pp. 22-31.

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141. Camps, O., L. G. Shapiro, and R. Haralick, "PREMIO: An Overview", *Proceedings of the IEEE Workshop on Advances in Automated CAD-Based Vision*, June, 1991, pp. 11-21.

142. Somani, A. K., C. Wittenbrink, R. Haralick, L. Shapiro, J. Hwang, C. Chen, R. Johnson, and K. Cooper, "Proteus System Architecture and Organization", *5th International Parallel Processing Symposium*, Anaheim, 1991, pp. 287-294.

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145. Henikoff, J. and L. G. Shapiro, "Interesting Patterns for Model-Based Machine Vision", *Proceedings of Northcon '90*, October, 1990, pp. 281-286.

146. Joo, H., R. M. Haralick, and L. G. Shapiro, "Toward the Automatic Generation of Mathematical Morphology Procedures Using Predicate Logic", *Proceedings of Northcon '90*, October, 1990, pp. 287-292.

147. Yi, S., R. M. Haralick, and L. G. Shapiro, "Automatic Sensor and Light Source Positioning for Machine Vision", *Proceedings of the 10th International Conference on Pattern Recognition*, June, 1990, pp. 55-59.

148. Costa, M. S., R. M. Haralick, and L. G. Shapiro, "Optimal Affine-Invariant Point Matching", *Proceedings of the 10th International Conference on Pattern Recognition*, June, 1990, pp. 233-236.

149. Chu, N. T. and L. G. Shapiro, "Experiments in Model–Based Matching Using a Relational Pyramid Representation", *Proceedings of the SPIE Conference on Applications of Artificial Intelligence VIII*, April, 1990, pp. 236-247.

150. Thornton, K. B. and L. G. Shapiro, "Image Matching for View Class Construction", *Proceedings of the Sixth Israeli Conference on Artificial Intelligence, Vision, and Pattern Recognition*, December, 1989, pp. 220-229.

151. Costa, M., R. M. Haralick, and L. G. Shapiro, "Optimal Affine–Invariant Point Matching", *Proceedings of the Sixth Israeli Conference on Artificial Intelligence, Vision, and Pattern Recognition*, December, 1989, pp. 35-61.

152. Lu, H., L. G. Shapiro, and O. I. Camps, "A Relational Pyramid Approach to View Class Determination", *IEEE Workshop on Interpretation of 3D Scenes*, Austin, Texas, November, 1989.

153. Shapiro, L. G., "Knowlege–Based Vision for Object Recognition", *Vision Interface '89*, London, Ontario, June, 1989.

154. Lu, H. and L.G. Shapiro, "Model-Based Vision Using Relational Summaries", *SPIE Conference on Applications of Artificial Intelligence VII*, March, 1989.

155. Costa, M., R. M. Haralick, T. Phillips, and L. Shapiro, "Optimal Affine–Invariant Point Matching", *SPIE Conference on Applications of Artificial Intelligence VII*, March, 1989.

156. Shapiro, L.G. and H. Lu, " The Use of a Relational Pyramid Representation for View Classes in a CAD-to-Vision System", *Proceedings of the Ninth International Conference on Pattern Recognition*, November, 1988, pp. 379-381.

157. Shapiro, L.G., " CAD-Model-Based Vision for Space Applications", *Proceedings of SOAR88 (Space Operations, Automation, and Robotics)*, July, 1988.

158. Shapiro, L.G., " Programming Parallel Vision Algorithms: A Dataflow Approach", *Proceedings of the Second International Conference on Vector and Parallel Computing*, June, 1988, Norway, proceedings to appear.

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161. Shapiro, L.G., R. MacDonald, and S.R. Sternberg, " Shape Recognition with Mathematical Morphology", *Proceedings of the Eighth International Conference on Pattern Recognition*, Paris, October, 1986, pp. 416-418.

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163. Shapiro, L.G., " The Role of Artificial Intelligence in Computer Vision", *Proceedings of the Second IEEE Conference on Artificial Intelligence Applications*, Miami, December, 1985, pp. 76-81.

164. Mulgaonkar, P.G. and L.G. Shapiro, " Hypothesis-Based Geometric Reasoning about Perspective Images", *Proceedings of the Third IEEE Workshop on Computer Vision: Representation and Control*, October, 1985,pp 11-18.

165. Shapiro, L. G., " A Fast Structural Matching Algorithm with Applications in Stereo Vision", *Proceedings of the 4th Scandinavian Conference on Image Analysis,* Trondheim, June 1985.

166. Shapiro, L.G. and T.C. Pong, " The Use of Pattern Recognition to Estimate Three-Dimensional Shape from Topographic Labeling", *Pattern Recognition in Practice II,* North Holland, 1986.

167. Shapiro, L. G., " Relational Matching–Problems, Techniques, and Applications", *Mustererkennung 1984,* Graz Austria, pp. 24-41.

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171. Shapiro, L. G., " Solving Consistent Labeling Problems Having the Separation Property", *Proceedings of the Seventh International Conference on Pattern Recognition,* July, 1984.

172. Pong, T. C., L. G. Shapiro, and R. M. Haralick, " Shape Estimation from Topographic Primal Sketch: An Initial Feasibility Study", *Proceedings of the Seventh International Conference on Pattern Recognition,* July, 1984.

173. Shapiro, L. G. and R. M. Haralick, " A Hierarchical Relational Model for Automated Inspection Tasks", *Proceedings of the First IEEE International Conference on Robotics,* Atlanta, March 1984.

174. Shapiro, L.G., " Using Symbolic Differences to Organize Relational Models", *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition,* Washington, D.C., June, 1983, pp. 377-380.

175. Shapiro, L.G., " Organization of Relational Models", *Proceedings of the International Conference on Pattern Recognition,* Munich, October 1982, pp. 360-365.

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184. Pong, T. C., L. G. Shapiro, and R. M. Haralick, " A Facet Model Region Growing Algorithm", *Proceedings of the IEEE Conference on Pattern Recognition and Image Processing,* Dallas, Aug. 1981, pp. 279-284.

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186. Shapiro, L. G., P. G. Mulgaonkar, J. D. Moriarity, and R. M. Haralick, " Sticks, Plates, and Blobs: A Three-Dimensional Object Representation for Scene Analysis" *Proceedings of the First Annual National Conference on Artificial Intelligence,* Stanford, CA, Aug 1980, pp. 28-30.

187. Shapiro, L.G., J.D. Moriarty, P.G. Mulgaonkar, and R.M. Haralick, " A Generalized Blob Model for Three Dimensional Object Representation", *Proceedings of the Second IEEE Workshop on Data Description and Management,* Asilomar, CA, August 1980, pp. 109-116.

188. Haralick, R.M. and L.G. Shapiro, " A Data Structure for a Spatial Information System", *Proceedings of the International Symposium on Computer Assisted Cartography,* November 1979, pp. 291-303.

189. Shapiro, L. G., " Structural Shape Description and Matching", *Proceedings of the Third IEEE Conference on Pattern Recognition and Image Processing,* August 1979, Chicago, pp. 413-420.

190. Neal, M.C. and L.G. Shapiro, " A Portable Graphics System for Minicomputers", *Proceedings of ACM '78,* December, 1978, 9 pages.

191. Shapiro, L.G. and R.M. Haralick, " The Consistent Labeling Problem and Some Applications", *Proceedings of the Fourth International Joint Conference on Pattern Recognition,* November, 1978, Kyoto, Japan, pp. 616-619.

192. Shapiro, L. G., " Data Structures for Picture Processing", *Proceedings of the Fifth Annual Conference on Computer Graphics and Interactive Techniques,* August, 1978, Atlanta, pp. 140-146.

193. Shapiro, L.G. and R.M. Haralick, " A General Spatial Data Structure", *Proceedings of the Second IEEE Conference on Pattern Recognition and Image Processing,* June 1978, Chicago, pp. 238-249.

194. Haralick, R.M. and L.G. Shapiro, " Decomposition of Polygonal Shapes by Clustering", *Proceedings of the IEEE Conference on Pattern Recognition and Image Processing,* June 1977, Troy, N.Y., pp. 183-190.

195. Curry, J., L.G. Shapiro, and R. Vanderlip, " A Population Simulation Model for Field Crops", *Proceedings of the Eighth Annual Pittsburgh Conference on Modeling and Simulation,* April, 1977, 5 pages.

196. Shapiro, L.G., " Inexact Pattern Matching in ESP", *Proceedings of the Third International Joint Conference on Pattern Recognition,* November, 1976, pp. 759-763.

197. Shapiro, L.G., " ESP3; A High-level Graphics Language", *Proceedings of the Second Annual Conference on Computer Graphics and Interactive Techniques,* June 1975, pp. 70-77.

ORAL PRESENTATIONS

- "Digital Pathology," Workshop on Numerical Methods in Cell Biology, UC San Francisco, March, 2015.
- "3D Craniofacial Image Analysis and Retrieval," University of Texas, Austin, January 2013.
- "3D Craniofacial Image Analysis and Retrieval," University of Michigan, Dearborn, April 2012.
- "3D Craniofacial Image Analysis and Retrieval," University of Washington Dental School, April 2012.

- "3D Shape Analysis for Quantification, Classification and Retrieval," University of Wisconsin, September 2010.
- "Object Recognition for Content-Based Retrieval," Invited talk at *Dagstuhl Seminar on Content-Based Image and Video Retrieval*, January, 2002.
- "Major Technical and Business Challenges for Content-Based Retrieval," Panel Presentation at *IEEE Workshop on Content-Based Access to Image and Video Libraries*, December, 2001.
- "Computer Science at a Large Research University," Center For Talented Youth Colloquium, University of Puget Sound, November, 2000.
- "Surface Modeling and Display from Range and Color Data," Distinguished Lecture at University of Nevada, Reno, November, 1998.
- "Surface Modeling and Display from Range and Color Data," at University of Iowa, May, 1998.
- "Computer Vision: From the 70's to the 90's," at University of Iowa, Celebration of Excellence and Achievement Among Women, May, 1998.
- "Visual Database Systems and Content-based Retrieval," UW Medical School, April, 1997.
- "Relational Indexing for Object Recognition," at Butler University, Indianapolis, Dec 1996.
- "Relational Indexing for Object Recognition," at Purdue University, Dec 1996.
- "Object Recognition using Appearance-Based Features," at Washington State University, Pullman, WA, October 1995.
- "Analysis of Scenes Containing Multiple Nonpolyhedral 3D Objects," invited lecture at the 8th Int'l Conference on Image Analysis and Processing, Sanremo, Italy, Sept, 1995.
- "Fast Parallel Object Recognition," at The University of Pavia, June 1995.
- "Object Recognition using Appearance-Based Features," at The University of Florence and at the University of Rome, May 1995.
- "Model-Based Vision: Research and Reality," Keynote Address at the Swedish Symposium on Image Analysis, March, 1994, Halmstad, Sweden.
- "Model-Based Vision: Research and Reality," at University of Illinois, Urbana, October 1993.
- "A Visual Database System for Computer Vision Research," at University College, London, September, 1993.
- "Overview of the PREMIO Vision System", at Esprit Vision Workshop Week, Crete, September, 1990.
- "Using Ternary Relationships Among Image Line Segments to Represent 2D Patterns", at IAPR Workshop on Structural and Syntactic Pattern Recognition, June, 1990.

- "CAD-Model-Based Machine Vision", at IEEE Seattle Chapter Meeting, Spring, 1990.
- "CAD Model-Based Vision", at NASA Houston SPAGS '88 Workshop, August 1-2, 1988.
- "Perspectives on Computer Vision", invited presentation at the AAAI Workshop on Spatial Reasoning and Sensor Fusion, Chicago, October, 1987.
- "Relational Stereo Matching", invited presentation at the Workshop on Image Matching, University of Stuttgart, September, 1987.
- "Fast Relational Matching", invited Presentation at University of Stuttgart, October, 1986.
- "Computer Vision Systems", invited presentation at Jiao Tong University, Shanghai, Sept. 1985.
- "The Use of Numerical Relational Distance and Symbolic Differences for Organizing Models and for Matching", invited presentation at the Workshop on Sensors and Algorithms for 3-D Machine Perception, Washington, D.C., August 22-23, 1983. Also presented at Oak Ridge National Laboratories, September, 1983, by invitation of Their Robotics Group.
- "Structural Analysis Techniques for Remote Sensing", invited presentation at NASA Workshop on Image Analysis, Texas A and M University, April, 1982.
- "Impact of Pictorial Data Structures on Architecture", invited panel member at the IEEE Workshop on Computer Architecture for Pattern Analyses and Image Database Management, Hot Springs, VA, Nov., 1981.
- "Intelligent Map Data Processing", invited panel member at IEEE Conference on Pattern Recognition and Image Processing, Dallas, Aug, 1981.
- "Grouping of Relational Models", invited lecture at the NSF workshop on Structural and Syntactic Pattern Recognition, Saratoga Springs, NY, June, 1981.
- "A Database of Three-Dimensional Models", invited panel at National Computer Conference, May, 1981, Chicago.
- "Relational Models for Three-Dimensional Object Recogniton", invited lecture at Iowa State University, April, 1981.
- "Structural Shape Description", invited panel member at the Fifth International Joint Conference on Pattern Recognition, Miami, Dec 1980.
- "Consistent Labeling Problems", invited lecture for the British Pattern Recognition Society, London, June, l980.
- "Structural Shape Analysis", invited lecture at the NATO Advanced Study Institute on Image Processing, Bonas, France, June, 1980.
- "Spatial Data Structures and Information Systems", Panel at NATO Advanced Study Institute on Map Data Processing, Maratea, Italy, June, 1979.

- "Spatial Database Systems", Panel on Software Engineering, Fourth Internationa Joint Conference on Pattern Recognition, Nov, 1978, Kyoto, Japan.
- "Shape Recognition", NATO Advanced Study Institute on Image Processing, Bonas, France, June, 1978.
- "Spatial Data Structure", NATO Advanced Study Institute on Image Processing, France, June, 1978.
- "Shape Matching Using Decomposition by Graph-theoretic Clustering", invited lecture at Michigan State University, June, 1978.
- "The Consistent Labeling Problem", Workshop on Pattern Recognition and Artificial Intelligence, Princeton, April, 1978.
- "ESP: A Language for Graphics and Pattern Recognition", invited lecture at University of Maryland, March, 1977.
- "A Graphics Extension to SNOBOL4 for Recognition and Manipulation of Line Drawings", Computer Science Conference, Detroit, 1974.

BOOKS:

- Shapiro, L.G. and G. C. Stockman, *Computer Vision*, Upper Saddle River, NJ: Prentice-Hall, 2001.
- Shapiro, L.G. and A. Rosenfeld, *Computer Vision and Image Processing*, Boston: Academic Press, 1992, edited volume.
- Haralick, R.M. and L.G. Shapiro, *Computer and Robot Vision: Vol. 1 and Vol. 2*, Reading, MA: Addison-Wesley, 1992.
- Baron, R.J. and L.G. Shapiro, *Data Structures and Their Implementation,* New York: Van Nostrand Reinhold, May 1980, 469 pages.

SHORT COURSES

- "Computer Vision" at NASA Houston, April, 1986.
- "Artificial Intelligence and High Level Vision", at Tsinghua University, Beijing, Sept. 1985.
- "Introduction to Artificial Intelligence" at Dahlgren Naval Weapons Training Center, August, 1984.

- "Artificial Intelligence" at Iowa State University, April, 1981.
- "Artificial Intelligence" at North Texas State University", March 24-28, 1980.
- "Artificial Intelligence for Image Processing" at Texas Instruments Corp., March 25,28, 1980.

PH.D. GRADUATES

1. Prasanna G. Mulgaonkar, CS Dept., Virginia Tech, Ph.D. 1984: Analyzing Perspective Line Drawings Using Hypothesis Based Reasoning
2. Adnan Mustafa, ME Dept., University of Washington, Ph.D. 1995: Object Identification with Surface Signatures Using Color Photometric Stereo
3. Octavia I. Camps, EE Dept., University of Washington, Ph.D. 1992: PREMIO: The Use of Prediction in a CAD-Model-Based Vision System
4. Bharath Modayur, EE Dept., University of Washington, Ph.D. 1995: Efficient Parallel Object Recognition
5. James Ahrens, CSE Dept., University of Washington, Ph.D. 1996: Computer-Based Support for Scientific Experiment Management
6. Mauro Costa, EE, Dept., University of Washington, Ph.D. 1997: 3D Object Recognition Using Relational Indexing and Appearance-Based Features
7. Kari Pulli, CSE Dept., University of Washington, Ph.D. 1997: Surface Reconstruction and Display from Range and Color Data
8. Andrew Berman, CSE Dept., University of Washington, Ph.D. 1999: Efficient Content-Based Image Retrieval
9. Yu-Yu Chou, EE Dept., University of Washington, Ph.D. 1999: Hierarchical Multiple Classifier Learning System
10. Pamela Neal, EE Dept., University of Washington, Ph.D. 1999: Finding and Matching Topographic Features in 3D Object Meshes
11. Mark Billinghurst, EE Dept., University of Washington, Ph.D. 2002: Shared Space: Explorations in Collaborative Augmented Reality
12. Ming Ye, EE Dept., University of Washington, Ph.D. 2002: Robust visual motion analysis: piecewise-smooth optical flow and motion-based detection and tracking
13. Salvador Ruiz, EE Dept., University of Washington, Ph.D. 2004: Recognizing Deformable Shapes
14. Yi Li, CSE Dept., University of Washington, Ph.D. 2005: Object and Concept Recognition for Content-Based Image Retrieval

15. Hansang Cho, EE Dept., University of Washington, Ph.D. 2005: Classification of Functional Brain Data for Multimedia Retrieval

16. Habib Abi Rached, EE Dept. University of Washington, Ph.D. 2006: Stereo-Based Hand Gesture Tracking and Recognition in Immersive Stereoscopic Displays

17. Ravensara Travillian, BHI Dept., University of Washington, Ph.D. 2006: Ontology Recapitulates Phylogeny: Design, Implementation and Potential for Usage of a Comparative Anatomy Information System

18. Jill Lin, BHI Dept., University of Washington, Ph.D. 2006: A Shape-Based Image Retrieval System for Assisting Intervention Planning

19. Chia-Chi Teng, EE Dept. University of Washington, Ph.D. 2007: Head and Neck Lymph Node Region Delineation with Automatic Segmentation and Image Registration

20. Gary Yngve, CSE Dept. University of Washington, Ph.D. 2007: Visualization for Biological Models, Simulation, and Ontologies

21. Ashraf Saad, EE Dept. University of Washington, Ph.D. 2008: Vessel Recognition in Color Doppler Ultrasound Imaging

22. Katarzyna Wilamowska, CSE Dept. University of Washington, Ph.D. 2009: Shape-Based Quantification and Classification of 3D Face Data for Craniofacial Research

23. Rosalia Tungaraza, CSE Dept. University of Washington, Ph.D. 2009: A Content-Based Similarity Retrieval System for Multimodal Functional Brain Images

24. Mikhail Gubanov, CSE Dept. University of Washington, Ph.D. 2010: Object-Oriented Data Management for Structured and Unstructured Data

25. Indriyati Atmosukarto, CSE Dept. University of Washington, Ph.D. 2010: 3D Shape Analysis for Quantification, Classification, and Retrieval

26. Natalia Larios Delgado, EE Dept. University of Washington, Ph.D. 2010: Local-Feature Generic Object Recognition with Application to Insect-Species Identification

27. Jiun-Hung Chen, CSE Dept. University of Washington, Ph.D. 2011: 3D Point Correspondence and Groupwise Pose Normalization by Minimum Description Length

28. Dingding Liu, EE Dept. University of Washington, Ph.D. 2011: Intelligent Interactive Image Segmentation Algorithms with Application to Camera Phones

29. Mabel Raza, BIME Dept. University of Washington, Ph.D. 2013: A Proof of Concept Imaging System for Automated Cervical Cancer Screening in Peru

30. Shulin Yang, CSE Dept. University of Washington, Ph.D. 2013: Feature Engineering in Fine-Grained Image Classification

31. Zhiqian Alfred Gui, EE Dept. University of Washington, Ph.D. 2014: Parcellation of Human Inferior Parietal Lobule Based on Diffusion MRI and Resting State Functional MRI

32. Jia Wu, EE Dept. University of Washington, Ph.D. 2014: Analysis of Human Face Shape Abnormalities using Machine Learning

33. Irma Lam, BIME Dept. University of Washington, Ph.D. 2014: Feature Engineering for 3D Medical Image Applications

34. Sara Rolfe, EE Dept. University of Washington, Ph.D. 2014: A New Landmark-Independent Tool for Quantifying and Characterizing Morphologic Variation

35. Bilge Soran, CSE Dept. University of Washington, Ph.D. 2015: Action Recognition and Prediction with Applications to Medical Diagnosis and Daily Living

36. Nicola Dell, CSE Dept. University of Washington, Ph.D. 2015: Mobile Camera-Based Systems for Low-Resource Environments

37. Ezgi Mercan, CSE Dept. University of Washington, Ph.D. 2017: Digital Pathology: Diagnostic Errors, Viewing Behavior and Image Characteristics

38. Po-Shen Lee, EE Dept. University of Washington, Ph.D. 2017: VizioMetrics: Mining the Scientific Visual Literature

39. Shu Liang, CSE Dept. University of Washington, Ph.D. 2018: Data-Driven Approaches for Personalized head Reconstruction

40. Yao Lu, CSE Dept. University of Washington Ph.D. 2018: Building and Accelerating A Declarative Platform for Machine Learning Model Serving

41. Karl Jablonowski, BIME Dept. University of Washington Ph.D. 2019: Data Mining the Electronic Medical Record with Intelligent Agents to Inform Decision Support Systems

42. Kathleen Tuite, CSE Dept. University of Washington Ph.D. 2019: Crowd-Driven Computer Vision

43. Deepali Aneja, CSE Dept. University of Washington Ph.D. 2019: Learning-Based Techniques for Facial Animation

CONTRACTS AND GRANTS

- W81XWH-20-1-0798, "Improving the Diagnosis of Melanoma and Precursor Lesions Among Veterans: Developing AI Techniques and Teledermatopathology," DoD, 8/15/2020-8/14/2023, $483,613, UW PI.

- 1557-G-WC352, "Applying Artificial Intelligence to Assess Histologic Features to Improve Melanoma Diagnosis," Melanoma Research Alliance, 11/19/2019, 3 years, $192,591, UW PI.

- U01CA231782, "A Unified Machine Learning Package for Cancer Diagnosis," NIH/NCI, 9/7/18-8/31/21, $990,187, PI.

- R01CA200690, "Improving Melanoma Pathology Accuracy through Computer Vision Techniques - The IMPACT Study," National Cancer Institute, 8/1/16-7/31/21, $1,947,023, PI: Joann Elmore.

- "Craniofacial Imaging Library," Seattle Children's Research Institute, 12/16/15-6/15/16, $29,538, PI: Richard Hopper, UW PI: Linda Shapiro.

- "Computer-Based Objective Assessment of Cleft Lip Nasal Severity and Treatment Success Using 3D Stereophotogrammetry," Seattle Children's Research Institute, 12/16/2014-9/30/2015, $37,436, PI: Raymond Tse, UW PI: Linda Shapiro.

- U01DE024417, "Ontology-Based Integration, Visualization and Exploration of Craniofacial Data," NIH/NIDCR, $2,001,936, 5/12/14 to 4/30/2019, PI: James Brinkley

- R01 CA172343, "Digital Pathology: Accuracy Viewing Behavior and Image Characterization," NIH/NCI, $3,136,320, 12/12 to 11/17, PI: Joann Elmore.

- "Video Monitoring for Healthcare Applications," Xerox Webster Research Center, $60,000, 9/11 to 8/13.

- RC4-NS073008, "IBIC: Integrated Brain Imaging Center for the University of Washington, NIH-NINDS, Senior Personnel (PI: Thomas Grabowski, Radiology Department), $4,784,830, 9/2010 to 9/2013.

- U01DE020050, "Technology Project: Shape-Based Retrieval of 3D Craniofacial Data," NIH-NIDCR, $1,915,174.00, 9/09 to 8/14; supplement $2,101,610, 9/11 to 8/14.

- 0705765-IIS, "Machine Learning for Robust Recognition of Invertebrate Specimens in Ecological Science," National Science Foundation $800,000 ($238,979 to UW), 10/07 to 9/10, UW PI, PI: Tom Dietterich at OSU.

- CNS-0613550, "SoD-TEAM: Problem-Solving Methodology in Collaborative Design," National Science Foundation $449,642, 8/15/06 to 7/31/10, Senior Personnel, PI Steve Tanimoto.

- DBI-0543631,"Multimedia Information Retrieval for Biological Research," National Science Foundation, $1,198,996, 7/1/06 to 8/31/09, Principal Investigator with co-PIs Brinkley and Suciu.

- "Adaptive Video Processing for Enhanced Object and Event Recognition in UAV Imagery," ARDA through a Boeing Subcontract, Full Grant: $1,870,550, UW Subcontract: $294,000, 10/31/03 to 3/31/06, UW-PI (Boeing PI: Robert Higgins).

- IIS-0326052, "ITR: Pattern Recognition for Ecological Science and Environmental Monitoring," National Science Foundation, $1,730,000, 9/1/03 to 8/31/07?, co-PI with Thomas Dietterich (PI), David Lytle (co-PI), Andrew Moldenke (co-PI), and Robert Paasch (co-PI), subcontract from Oregon State.

- GM068878-01, "High-throughput, Capillary-based protein Crystallography," NIH/NIGMS, $1,061,532, 9/1/03 - 8/31/06, Investigator (PI: Deirdre Meldrum).

- "MRI: The Digital Eye–A Visual Measurement and Processing Facility," National Science Foundation, $499,902, 9/1/03 to 8/31/05, co-PI with Brian Curless (PI), David Salesin, Steven Seitz, and Zoran Popovic.

- NIH grant P20 LM007714,"Interdisciplinary Center for Structural Informatics," National Library of Medicine, $1,868,788, 1/1/03 to 11/30/05, Investigator with James Brinkley(PI), Peter Tarczy-Hornoch (co-PI), Sherri Fuller, Cornelius Rosse, John Gennari, and Ira Kalet.

- IIS0097329, "Object and Concept Recognition for Content-Based Image Retrieval," NSF, $270,000, 9-16-01 to 9-15-04, principal investigator.

- "Structure Based Visual Access to Biomedical Information," National Library of Medicine, $751,378, 5-1-01 to 5-31-03, co-PI with James Brinkley (PI) and Cornelius Rosse.

- "Computer Vision Algorithms for Improving Accuracy in Structured Light 3D Industrial Measurements," Boeing Commercial Airplane Group, $85,000, 12-16-00 to 6-15-02, principal investigator.

- "Foundational Model of Anatomy," National Library of Medicine, $1,589,197, 7-99 to 6-02, co-PI with Cornelius Rosse (PI) and James Brinkley.

- IRI-9711771, "Efficient Content-Based Image Retrieval," National Science Foundation, $247,000, 9-1-97 to 8-31-2000, principal investigator.

- "Learning Patterns for Computer-Aided Diagnosis," Washington Technology Center, $58,862, 7-1-97 to 6/30/99, principal investigator.

- "Learning Patterns for Computer-Aided Diagnosis," Neopath, Inc., $21,000, 7-1-97 to 6/30/99, principal investigator.

- "Structure-Based Visual Access to Biomedical Information," National Library of Medicine, $619,752, 5-1-97 to 4-30-2000, Collaborator (James Brinkley, PI).

- "Integrated Machine Vision for Manufacturing IV: Measurement, Inspection, and OCR Performance Evaluation," Boeing Commercial Airplane Group, $89,000, 9-16-96 to 9-15-98, principal investigator with R. M. Haralick.

- IRI-9520434, "SGER: A Domain-Model Approach to Reconstruction of 3D Environments for Virtual Reality," National Science Foundation, $50,000, 8-15-95 to 7/31/96, principal investigator.

- "From Technical Diagrams to Electronic Documents," Washington Technology Center, $61,000, 7-1-95 to 6/30/97, principal investigator,

- "Integrated Machine Vision for Manufacturing III: Advanced Features," Boeing Commercial Airplane Group, $80,000, 1-1-95 to 9-30-96, principal investigator with R. M. Haralick.

- "Structural Information Framework for Brain Mapping," National Library of Medicine, $243,093, 2/1/94 to 1/30/97, Collaborator, with PI James Brinkley, and co-PIs: Berger, Ojemann, Rosse, Sundsten, Tsuruda.

- 5555-21, "A Visual Database System for Image Analysis on Parallel Computers and its Application to the EOSRAM Project," NASA/CESDIS through Universities Space Research Association, $150,000, 8-1-93 to 7-5-96, principal investigator with Steven Tanimoto.

- "Integrated Machine Vision for Manufacturing II: Software Integration," Boeing Commercial Airplane Group, $80,000, 1-1-93 to 12-1-93, principal investigator with R. M. Haralick.

- 63-1713, "Model-Based Vision for 3D Objects," Washington Technology Center, $80,000, 1993-1995, principal investigator with Patrick Flynn.

- IRI-9116809, "A Visual Database System for Computer Vision Research", National Science Foundation, $250,000, 1992 two years, principal investigator with S. Tanimoto and J. Brinkley.

- TO-795735-0757N, "Integrated Machine Vision for Manufacturing I: Algorithms and Performance Evaluation," Boeing Commercial Airplanes, $99,495, 1-92 to 12-92, principal investigator with R. M. Haralick.

- IRI-9023977, "Automated Model-Based Computer Vision", National Science Foundation, $465,000, 5-91, three years, principal investigator with R. M. Haralick.

- TZ-405393-0957N, "Automated Machine Vision for Manufacturing II", Boeing Commercial Airplanes, $90,001, 1-91 to 12-91, principal investigator with R. M. Haralick.

- "Knowledge–Based Matching for 3D Radiotherapy Planning", Keck Foundation, $45,000, August, 1990 to July 1991, principal investegator with J. Brinkley, R. M. Haralick, and I. Kalet.

- TZ-791549-0957N, "Automated Machine Vision for Manufacturing", Boeing Commercial Airplanes, $126,825, 1-90 to 12-90, principal investigator with R. M. Haralick.

- 62-5060, "Automated Classifier Hardware", U. S. Navy, $393,361, 12-01-89 to 11-30-91, investigator with R. M. Haralick (PI), P. Katz, A. Somani, J. N. Hwang, and T. Phillips.

- 09-1020, "Machine Vision", Washington Technology Center, $150,000, 1991-93, $85,000, 1990-91, $90,000, 1989-90, $64,000, 1988-89, principal investigator with R. M. Haralick.

- TZ-398201-0957N, " Multiple View CAD–Vision with Perspective Projection Expert", Boeing Commercial Airplanes, $116,334, January 1, 1989, one year, principal investigator with Robert M. Haralick.

- DMC-8714809, " An Intelligent Machine Vision System for Automated Inspection Tasks", National Science Foundation, $280,319, September 1, 1988, 2 years, principal investigator with Robert M. Haralick.

- CDA-8806866," Engineering Equipment Grant: High End Computer Graphics Workstation: Focus on Techniques for Scientific Computing", National Science Foundation, $69,208, August 1, 1988, 18 months, co-principal investigator with W. Barfield, S. Iverson, A. DeRose.

- Y-429763-0957N, " CAD Models to Vision Models", Boeing Commercial Airplane Company, $28,525, January 1, 1988, one year, principal investigator.

- Y-429762-0957N, " Development of Algorithms for Vision Guided Robotics", Boeing Commercial Airplane Company, $37,017, January 1, 1988, one year, principal investigator with Robert M. Haralick.

- MVI-6690, " Integrated Computer Vision Research for Space Construction", subcontract of NAS9-17814, the Phase II SBIR Grant to Machine Vision International from NASA, $222,220, August 15, 1987, 2 years, principal investigator with Robert M. Haralick.

- B230354, " Illumination Models for Machine Vision in Electronics Manufacturing", Boeing Electronics Co., $25,000, Sept. 1, 1987, 7 months, principal investigator with Robert M. Haralick.

- DMC-8705418, " Engineering Research Equipment Grant: Machine Vision for Automated Manufacturing", NSF, $100,000, September 1, 1987, 1.5 years, principal investigator with Robert M. Haralick and Yongmin Kim.

- ISI-8560021," Integrated Computer Vision Research for Manufacturing", NSF, $40,000, Feb 1986, six months, principal investigator .

- NAS 9-17580, " Integrated Computer Vision Research for Space Construction", NASA LBJ Space Center, $50,000, Jan. 1986, six months, principal investigator.

- DAAK70-83-K-0102, " Intelligent Feature Detection in FLIR Imagery", U.S. Army / Meradcom, $70,000, August, 1983, one year, co-principal investigator (with R.M. Haralick).

- ECS-8304119, " A Three-Dimensional Digitizer to Aid in Creation of Hierarchic Relational Models for Vision and Robotics", NSF, $7,200, 1983, principal investigator.

- JKTAX-81-C-0152, " A Database System for Case Management: Phase 2", U.S. Department of Justice, Tax Division, $28,650, October 1981, 11 months, co-principal investigator (with R.M. Haralick).

- MCS-8102874, " Structural Matching and Geometric Reasoning for Object Classification", NSF, $186,959, July 1981, three years, principal investigator (with investigator R. M. Haralick).

- ECS-8014641, " Specialized Research Equipment Robot Arm and LSI-11 Controller", NSF, $16,355, 1980, investigator (with R.W. Ehrich and R.M. Haralick).

- JBTAX-80-C-0303, "A Database System for Case Management", U.S. Department of Justice, Tax Division, $9,902.65, July 1980, co-principal investigator (with R.M. Haralick)

- 9-E-21-6267, "Pattern Recognition Experiments to Evaluate Edge Detection Segmentation, and Texture Analysis at Pixel Level", Rome Air Development Corp. (subcontracted from Georgia Tech), $25,650 June, 1980, investigator, (with R.M. Haralick).

- NAS5-26276, "Applicability of the Massive Parallel Processor (MPP) to the Utilization of Ecological and Landuse Models", NASA, $62,731, August 1980, investigator (with R.M. Haralick, R.W. Ehrich, and J.Campbell).

- Cooperative Research in Spatial Information Systems, Digital Equipment Corporation, $111,000, 1980, co-principal investigator (with R.M. Haralick).
- MCS-7907032, Computer Science Equipment Grant, NSF, $96,035, April 1979, investigator, (with R.M. Haralick and R.W. Ehrich).
- Eng-7911384, Engineering Equipment Grant, NSF, $51,450, July 1979, investigato (with R.M. Haralick and R.W. Ehrich).
- MCS-7919741, " Analysis of Scenes Using Two-Dimensional Shape Information", NSF $117,264, July, 1978, 3 years, principal investigator.

NATIONAL AND INTERNATIONAL SERVICE:

Member of the ACM Dissertation Prize Committee (2016)

Member of the Executive Committee of the IEEE PAMI Technical Committee 2014-present
Member of the Computer Vision Foundation Advisory Board 2017 - present
Co-Omsbudsmen of CVPR 2019

Member, International Expert Advisory Panel (IEAP) for the Fusionopolis Cyberace competition 2008

Co-Chair CVPR 2008

Program Committee, IEEE Workshop on Computer Vision for Biomedical Applications, 2005

Program Committee, 12th Int'l Conference on Image Analysis and Processing (ICIAP2003)

Chair, IAPR Education Committee, 2000-2002

Conference Track Chair, Medical and Multimedia Track, ICPR 2002

Co-organizer, Dagstuhl Seminar on Content-Based Image and Video Retrieval, 2002

Chair, IEEE Computer Society Technical Committee on Pattern Analysis and Machine Intelligence, 1993-1995.

Program Co-Chair, IEEE Computer Society Conference on Computer Vision and Pattern Recognition, 1994.
Co-chair, IAPR Technical Committee on Image Understanding, 1992-1996.

Editor of CVGIP: Image Understanding, January, 1990 to July, 1993.

Editor of Computer Vision, Graphics, and Image Processing, 1983 to 1990.

Editorial Board Member, IEEE Transactions on Pattern Analysis and Machine Intelligence, 1993-1996.

Program Committee, Computer Vision and Pattern Recognition, 1999.

Area Chair, Program Committee, Computer Vision and Pattern Recognition, 1998.

Advisory Editor, Pattern Recognition, beginning March 1986 and ongoing.

Editorial Board Member, Computer Vision and Image Understanding, ongoing.

Program Committee, IEEE Workshop on Content-Based Access of Image and Video Libraries, 1997, 1998, 1999, 2000, 2001

Program Committee, Storage and Retrieval for Image and Video Databases VII, 1998.

Program Committee, Computer Architectures for Machine Perception, 1997.

Program Committee, International Conference on Image Analysis and Processing, 1997.

Program Committee, Computer Vision and Pattern Recognition, 1997.

Program Committee, International Conference on Pattern Recognition, 1996.

Program Committee, IAPR Workshop on Structural and Syntactic Pattern Recognition, 1996.

Program Committee, Computer Vision and Pattern Recognition, 1992.

Program Committee, International Conference on Pattern Recognition, 1992.

Chairman, IEEE Workshop on Directions in Automated CAD-Based Vision, June, 1991.

Program Committee, SPIE Conference on Artificial Intelligence Applications, April, 1989.

Program Committee, SPIE Conference on Digital and Optical Shape Representation and Pattern Recognition, SPIE 1988 Technical Symposium, April, 1988.

Program Committee, ACM SIGSMALL Symposium on Small Systems, May, 1988.

Program Committee, AAAI Workshop on Spatial Reasoning and Sensor Fusion, October, 1987.

General Chairman, IEEE Computer Vision and Pattern Recognition, Miami, June 1986.

General Chairman, IEEE Workshop on Computer Vision, October 1985, Shanty Creek, Michi-

gan.

Program Committee, IEEE 2nd Conference on Robotics and Automation, March 1985.

Program Committee, 2nd IEEE Conference on AI Applications, December 1985.

Tutorials Chairman, First IEEE Conference on AI Applications, December, 1984.

Member of the Technical Committee on Syntactical Pattern Recognition Techniques of the International Association of Pattern Recognition, starting December 1982.

Member of the Committee for Publicity and Education of the International Association for Pattern Recognition, beginning November, 1982.

Co-Program Chairman of the IEEE Computer Society Workshop on Computer Vision, August 1982.

Member of the Organizing Committee for the 1982 IEEE Computer Society Conference on Pattern Recognition and Image Processing.

Treasurer for the IEEE Workshop on Image Segmentation, May 1980.

Treasurer for the Third IEEE Conference on Pattern Recognition and Image Processing, August, 1979.