

Peter Kovesi

Computer Vision and Image Processing

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Degrees

Bachelor of Engineering (Hons) in the Department of Mechanical Engineering at The University of Western Australia. Thesis entitled “Sheep Profile Modelling for Automated Shearing”, 1981.

Master of Engineering Science at The University of Western Australia. Thesis entitled “Kinematic Control of High Dexterity Manipulator Arms”, 1983.

PhD at The University of Western Australia. Thesis entitled “Invariant Measures of Image Features From Phase Information”, 1996.

Positions Held

July 1991 to July 2007:

Lecturer and, since 1999, Senior Lecturer in the School of Computer Science & Software Engineering at The University of Western Australia. I now hold an adjunct position with the School.

1984 to July 1991:

Research engineer with the Automated Sheep Shearing Group in the Department of Mechanical Engineering at the University of Western Australia. During this period I was involved in a wide range of robotics research activities, and I was responsible for the group’s vision research. During the latter years of my time with the project I led the group’s software development programme.

Visiting positions

The Stanford Research Institute Robotics Research Group as an International Fellow in 1986.

The Department of Engineering Science, Oxford University with the Robotics Group as a visiting scholar in 1990/91.

INRIA Sophia-Antipolis, France with the ROBOTVIS group under a French Government Fellowship in 1995.

Department of Electrical and Computer Engineering, University of Canterbury, NZ as a visiting academic in 2001.

Department of Systems Engineering, ANU as a visiting academic in 2001 and also 2005.

School of Computer Science, University of Adelaide as a visiting academic in 2005.

Research Interests

My main research area is in Computer Vision with specific interests in:

- Feature detection, description and matching
- Local frequency domain image analysis
- Shape from texture
- Motion
- Projective Geometry
- Image enhancement
- Forensic image processing

Publications

Journal Papers

1. Wirth, M. A. and Kovese, P. "MATLAB as an Introductory Programming Language". *Computer Applications in Engineering Education* Wiley InterScience. Vol. 14, Issue 1, pp 20–30. 2006.
2. Khoh, C. W. and Kovese, P. D. "Rotating the Impossible Rectangle". *Leonardo* MIT Press. Vol. 34, No 3, pp 197–198. 2001.
3. Kovese, P. D., "Phase Congruency: A Low-Level Image Invariant". *Psychological Research Psychologische Forschung*. Springer-Verlag. Volume 64, Number 2, pp 136–148. 2000.
4. Kovese, P. D., "Image Features From Phase Congruency". *Videre: Journal of Computer Vision Research*, MIT Press. Volume 1, Number 3, Summer 1999.
5. C. J. Pudney, M. J. Robins, B. J. Robbins and P. D. Kovese, "Surface Detection in 3D Confocal Microscope Images via Local Energy and Ridge Tracing". *The Journal of Computer Assisted Microscopy*, vol. 8, no. 1, pages 5–20, 1996.
6. Cowan, C. K. and Kovese, P. D., "Automatic Sensor Placement From Vision Task Requirements", *IEEE Transactions on Pattern Analysis and Machine Intelligence*. Vol 10, No 3, May 1988, pp 407–416.
7. Trevelyan, J. P., Kovese, P. D., Ong, M. C. H., and Elford, D. "ET - a Wrist Mechanism Without Singularities", *International Journal of Robotics Research*. MIT Press. Vol 4, No 4, pp. 71–85. 1986.

Refereed Conference Papers

8. Daniel Wedge, Du Huynh, and Peter Kovese. "Motion Guided Video Sequence Synchronization". *Proceedings of ACCV2006 The 7th Asian Conference on Computer Vision* Hyderabad, India 2006.
9. Peter Kovese, "Shapelets Correlated with Surface Normals Produce Surfaces". *10th IEEE International Conference on Computer Vision*. Beijing. pp 994–1001. 2005
10. Daniel Wedge, Peter Kovese, and Du Huynh. "Trajectory Based Video Sequence Synchronization". *The Australian Pattern Recognition Society Conference: DICTA 2005* Cairns,. Electronic Publication, I.E.E.E. Computer Society Press, p C.D. (2005)
11. Wong, T.Y., Kovese, P.D. and Datta, A. "Towards Quantitative Measures of Image Morphing Quality". *The Australian Pattern Recognition Society Conference: DICTA 2005* Cairns,. Electronic Publication, I.E.E.E. Computer Society Press, p C.D. (2005)

12. Daniel Wedge, Du Huynh, and Peter Kovesei. "Tracking Footballs Through Clutter in Broadcast Digital Videos". *Image and Vision Computing New Zealand '04* Akaroa, New Zealand 2004. pp 155–160.
13. Angeline Loh and Peter Kovesei, "Estimation of Surface Normals of a Curved Surface Using Texture". *The Australian Pattern Recognition Society Conference: DICTA 2003*, Sydney. December 2003. pp 155–164.
14. Peter Kovesei, "Phase Congruency Detects Corners and Edges". *The Australian Pattern Recognition Society Conference: DICTA 2003*, Sydney. December 2003. pp 309–318.
15. Peter Kovesei, "Surface Normals to Surfaces via Shapelets". *Proceedings Australia–Japan Advanced Workshop on Computer Vision*, 9–11 September 2003, Adelaide. pp 101–108.
16. Kristin J. McLoughlin, Philip J. Bones, and Peter D. Kovesei. "Connective tissue representation for detection of microcalcifications in digital mammograms," *The SPIE Medical Imaging Conference, San Diego*, 23–28 February 2002.
17. Peter Kovesei, "Edges Are Not Just Steps". *Proceedings of ACCV2002 The Fifth Asian Conference on Computer Vision*, Melbourne Jan 22–25, 2002. pp 822–827.
18. Kristin J. McLoughlin, Philip J. Bones and Peter D. Kovesei, "Detection of microcalcifications in digital mammograms", *Proceedings of Image and Vision Computing '01*, University of Otago, Dunedin, New Zealand, 26–28 November 2001. pp 259–264.
19. Peter Kovesei, "Phase Preserving Denoising of Images". *The Australian Pattern Recognition Society Conference: DICTA '99*. pp 212–217. December 1999.
20. Gian Paolo Lorenzetto and Peter Kovesei, "A Phase Based Image Comparison Technique". *The Australian Pattern Recognition Society Conference: DICTA '99*. pp 52–56. December 1999.
21. Peter Kovesei. "Symmetry and Asymmetry from Local Phase". *10th Australian Joint Conference on Artificial Intelligence*. Poster proceedings, pp 185–190. 2–4th December 1997. Perth.
22. Rajiv Ellepola and Peter Kovesei. "Mobile Robot Navigation Using Recursive Motion Control". *Second EUROMICRO Workshop on Advanced Robotics, EUROBOT'97* 22–24th October 1997. Brescia, Italy.
23. Leigh M. Smith and Peter Kovesei. "A Continuous Time-Frequency Approach to Representing Rhythmic Strata". *Fourth International Conference on Music Perception and Cognition*, pp 197–202. August 1996. Montreal.
24. Rajiv Ellepola and Peter Kovesei. "Mobile Robot Navigation in a Semi-Structured Environment". *Fourth International Conference on Control, Automation, Robotics and Vision*, pp 914–918. December 1996. Singapore.
25. Rajiv Ellepola, Peter Kovesei and Ken Wessen. "Mobile Robot Navigation using Passive Beacons and Active Sensors". *The Australian Pattern Recognition Society Conference: DICTA '95*. pp 679–685. December 1995. Brisbane.
26. Peter Kovesei. "Image Correlation From Local Frequency Information". *The Australian Pattern Recognition Society Conference: DICTA '95*. pp 336–341. December 1995. Brisbane.
27. C. J. Pudney, P. D. Kovesei and B. J. Robbins, "A 3D Local Energy Surface Detector for Confocal Microscope Images". *The Third Australian and New Zealand Conference on Intelligent Information Systems*, pp 7–12. November 1995. Perth, Western Australia. Published by IEEE.
28. C. J. Pudney, P. D. Kovesei and B. J. Robbins, "Feature Detection Using Oriented Local Energy for 3D Confocal Microscope Images". *The International Computer Science Conference, ICSC'95*, pp 274–282. December 1995. Hong Kong. Published by Springer Verlag.

29. Kovese, P. D. and Trevelyan, J. P. "Using Visual Doppler Effects to Deduce Image Motion", *The Australian Pattern Recognition Society, Conference on Digital Image Computing: Techniques and Applications*, Sydney, 8-10 December 1993. pp. 493–500.
30. Kovese, P. D. "A Dimensionless Measure of Edge Significance from Phase Congruency Calculated via Wavelets", *The First New Zealand Conference on Image and Vision Computing*, Auckland, 16-18 August 1993, pp. 87–94.
31. Kovese, P. D. "A Dimensionless Measure of Edge Significance", *The Australian Pattern Recognition Society, Conference on Digital Image Computing: Techniques and Applications*, Melbourne, 4-6 December 1991. pp. 281–288.
32. Kovese, P. D., "Imaginary Kinematics". *The Second International Workshop on Advances in Robot Kinematics*, Linz, Austria, 10-12th September 1990. S.Stifter, J.Lenarcic (eds.), Springer-Verlag 1991. pp. 55–62.
33. Beckley, L., Kovese, P., and Owens, R., "The Use of Imaginary Actuators in Kinematically Redundant Mechanisms for Obstacle Avoidance", *Proc. Third National Conference on Robotics*, Melbourne, 3-6th June 1990.
34. Velletri, P., and Kovese, P. D., "Controlling Robot Manipulators at Motion Limits". *Proc. Third National Conference on Robotics*, Melbourne, 3-6th June 1990.
35. Kovese, P. D., and Walker, G. J., "Vision Generation of Surface Models for Guiding a Sheep Shearing Robot". *Proceedings of The International Symposium and Exposition on Robots*, Sydney, 6-10th November 1988.
36. Trevelyan, J. P., Nelson, M., Kovese, P. D., "Adaptive Motion Sequencing for Process Robots". *4th International Symposium on Robotics Research*, Santa Cruz, USA., September 1987. MIT Press.
37. Cowan, C. K. and Kovese, P. D., "Sensor Placement for Object Visibility", *Proc. 1987 Manufacturing Systems Research Conference*. Ann Arbor, Michigan, October 1987.
38. Kovese, P. D. "Collision Avoidance", *Proceedings of the 2nd International Conference on Advanced Robotics*, Tokyo, 9th-10th September 1985. pp. 51–58.
39. Trevelyan, J. P., Kovese, P. D., and Ong, M. C. H. "Motion Control for a Sheep Shearing Robot", *1st International Conference on Robotics Research*, Ed. J.M. Brady, M.I.T. Press, 1983.
40. Kovese, P. D. "Control of Kinematically Redundant Robots by the use of the Pseudo-inverse", Australian Mathematical Society Applied Mathematics Conference, Perth, February 1983. Awarded the T.M. Cherry prize for the best student paper.

Public Domain Software

48. "MATLAB and Octave Functions for Computer Vision and Image Analysis"

<http://www.csse.uwa.edu.au/~pk/research/matlabfns/>

This website contains approximately 100 MATLAB functions and is widely used in the international computer vision community. It is accessed by approximately 2000 distinct visitors each week.

Patents

49. Trevelyan, J.P., Elford, D., Ong, M.C.H. and Kovese, P.D. "Wrist Mechanism for Robotic Manipulators" U.S. Patent No 4862759 September 5 1989