CURRICULUM VITAE

A. General

- Full name: Richard Charles Wilson
- Employer: Dept. of Computer Science, University of York
- Date of Appointment: October 1995
- Position: Professor

Previous posts:
Research Associate, Dept. of Computer Science, University of York, 1995–1998 (Grade II 1997, Open Contract 1998).

EPSRC Advanced Research Fellow, Dept. of Computer Science, University of York, 1998–2003 (Grade III 2002).

Lecturer, Dept. of Computer Science, University of York, 2003–2004.

Reader, Dept. of Computer Science, University of York, 2004–2010.

Qualifications:
First degree: BA First Class (Honours) in Physics, St. John's College, Oxford University 1992
Higher degree: PhD in computer vision, University of York 1996.

B. Research and Scholarship

My research is in the area of relational models for pattern recognition (and in particular graphs). This is part of the field of Structural Pattern Recognition. Relational models are very important as they describe many interesting types of data, for example visual scenes, protein structures, networks, chemical structures and many more. Statistical pattern recognition is a well understood field, with powerful tools available for many problems. In contrast, structural pattern recognition is more difficult, since the patterns do not have a simple representation. The long-term goal of my research is elevate structural pattern recognition to the same level as the statistical area. My contributions to this field are a) Probabilistic algorithms for efficiently matching relational models to each other, b) The development of a spectral theory for graph features, and c) The development of generative models for graphs. In the long term, this research may be able to shed some light on two important problems in Computer Science; what is the most efficient algorithm for finding the similarity between to graphs, and what is the complexity of the graph isomorphism problem? My research also has important practical applications, and I am currently pursuing work in the areas of protein alignment and chemical structure generation.

1. Publications, compositions, patents, exhibitions and commissions

(i) Books

Edwin R. Hancock, Richard C. Wilson, Terry Windeatt, Ilkay Ulusoy, Francisco Escolano (Eds.): Structural, Syntactic, and Statistical Pattern Recognition, Joint IAPR International Workshop, SSPR&SPR 2010, Cesme, Izmir, Turkey, August 18-20, 2010. LNCS 6218, Springer 2010

(iii) Journal Articles

1. R. C. Wilson, A. N. Evans and E. R. Hancock, "Relational Matching by Discrete Relaxation", *Image and Vision Computing*, **13** , pp. 411–422, 1995.
2. R.C. Wilson and E.R. Hancock, "A Bayesian Compatibility Model for Graph Matching", *Pattern Recognition Letters*, **17**, pp. 263–276, 1996.
3. M. L. Williams, R. C. Wilson, and E. R. Hancock, "Multiple Graph Matching with Bayesian Inference", *Pattern Recognition Letters*, **18**, pp. 1275–1281, 1997.
4. R.C. Wilson and E.R. Hancock, "Structural Matching by Discrete Relaxation", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, **19**, No.6, pp. 634-648, 1997.
5. A.D.J. Cross, R.C. Wilson and E.R. Hancock, "Genetic Search for Structural Matching", *Pattern Recognition*, **30**, pp. 953-970, 1997.
6. A.M. Finch, R.C. Wilson and E.R. Hancock, "Matching Delaunay Graphs", *Pattern Recognition*, **30**, pp. 123–140, 1997.
7. A.M. Finch, R.C. Wilson and E.R. Hancock, "Symbolic Graph Matching with the EM Algorithm", *Pattern Recognition*, **31**, pp. 1777–1790, 1998.
8. R.C. Wilson, A.D.J. Cross and E.R. Hancock, "Structural Matching with Active Triangulations", *Computer Vision and Image Understanding*, **72**, pp. 21–38, 1998.
9. A.M. Finch, R.C. Wilson and E.R. Hancock, "A continuation framework for graph matching", *Neural Computation*, **10**, pp. 1873–1894, 1998.
10. R. C. Wilson and E. R. Hancock, "Graph matching with hierarchical discrete relaxation", *Pattern Recognition Letters*, **20**, pp. 1041-1052, 1999.
11. R. C. Wilson and E.R. Hancock, "Consistent Topographic Surface Labelling", *Pattern Recognition*, **32**, pp. 1211-1223, 1999.
12. M. L. Williams and R. C. Wilson and E.R. Hancock, "Deterministic Search For Relational Graph Matching", *Pattern Recognition*, **32**, pp. 1255-1271, 1999.

13. S. Moss and Richard C Wilson and E. R Hancock, "A mixture model of pose clustering", *Pattern Recognition Letters*, **20**, pp. 1093-1101, 1999.

14. R Myers, R.C. Wilson and E.R. Hancock, "Bayesian Graph Edit Distance", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, **22**, pp. 628-635, 2000.

15. R.C. Wilson and E.R. Hancock, "Bias Variance Analysis for Controlling Adaptive Surface Meshes", *Computer Vision and Image Understanding* **77**, pp. 25-47, 2000.

16. R.C. Wilson and E.R.Hancock, "Storage Capacity of the Exponential Correlation Associative Memory", *Neural Processing Letters*, **13**, pp. 71-80, 2001.

17. B. Luo, R.C. Wilson, and E.R. Hancock, "Eigenspaces for graphs", *International Journal of Image and Graphics*, **2**, pp. 247–268, 2002.

18. A. G. Bors, R. C. Wilson and E. R. Hancock, "Terrain Analysis using Radar Imagery", *IEEE Transactions on Pattern Analysis and Machine Intelligence*,**25** pp. 954–992, 2003

19. R. C. Wilson and E. R. Hancock, "A Study of Pattern Recovery in Recurrent Correlation Associative Memories", *IEEE Transactions on Neural Networks*, **14(3)** pp. 506–519 2003

20. N. Lüdtke and R. C. Wilson, "A Mixture Model for Population Codes of Gabor Filters", *IEEE Transactions on Neural Networks*, **14**, pp. 794–803, 2003

21. B. Luo, R.C. Wilson, and E.R. Hancock, "Spectral Embedding of Graphs", *Pattern Recognition*, **36(10)** pp. 2213–2223, 2003.

22. R. C. Wilson and E. R. Hancock, "Pattern Vectors from Algebraic Graph Theory", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, **27(7)** pp. 1112–1124, 2005.

23. S. L. Braunstein, S. Ghosh, T. Mansour, S. Severini and R. C. Wilson, "Some families of density matrices for which separability is easily tested", *Physical Review A*, 73(1) 2006

24. D. Emms, E.R. Hancock, S. Severini and R.C. Wilson, "A matrix representation of graphs and its spectrum as a graph invariant", *Electronic Journal of Combinatorics*, 13, Art. No. R34 APR 4, 2006

25. B. Luo, R.C. Wilson and E.R. Hancock, "A spectral approach to learning structural variations in graphs", *Pattern Recognition* , 39, pp. 1188-1198, 2006.

26. P. Zhu and R. C. Wilson, "A study of graph spectra for comparing graphs and trees", *Pattern Recognition* , 41(9), pp. 2833-2841, 2008

27. D. Emms, R. C. Wilson and E. R. Hancock, "Graph embedding using Quantum Commute Time", *Quantum Information and Computation*, **9**, pp. 231–254, 2009.

28. D. Emms, S. Severini, E. R. Hancock and R. C. Wilson, "Coined Quantum Walks Lift the Cospectrality of Graphs and Trees", *Pattern Recognition*, **42**(9) pp. 1988–2002, 2009.

29. D. Emms, R. C. Wilson and E. R. Hancock, "Graph matching using the interference of continuous-time quantum walks", *Pattern Recognition*, **42**(9), pp. 985–1002, 2009

30. D. Emms, R. C. Wilson and E. R. Hancock, "Graph Matching using the Interference of Discrete-time Quantum Walks", *Image and Vision Computing*, **27**(7) pp. 934–949, 2009.

31. Bai Xiao, R. C. Wilson and E. R. Hancock, "Graph Characteristics from the Heat Kernel Trace", *Pattern Recognition*, **42**(11) pp. 2589–2606, 2009.

32. Bai Xiao, R. C. Wilson and E. R. Hancock, "A Generative Model for Graph Matching and Embedding", *Computer Vision and Image Understanding*, **113**(7) pp. 777–789, 2009.

33. J. Rocha, J. Segura, R. C. Wilson and S. Dasgupta, "Flexible Structural Protein Alignment by a Sequence of Local Transformations", *Bioinformatics*, **25**(13) pp. 1625–1631, 2009.

34. Bai Xiao, R.C. Wilson and E.R. Hancock, "Geometric Characterization and Clustering of Graphs using Heat Kernel Embeddings", *Image and Vision Computing*, **28**, pp. 1003-1021, 2010.

35. Peng Ren, T. Aleksic, R. C. Wilson and E. R. Hancock "A Polynomial Characterization of Hypergraphs Using The Ihara Zeta Function", *Pattern Recognition*, accepted subject to minor revision, 2010.

36. D. White and R. C. Wilson, "Generative Models for Chemical Structures", *Journal of Chemical Information and Modeling*, **50(7)**, pp. 1257–1274, 2010

(iv) Refereed Conference Papers

1. R. C. Wilson and E. R. Hancock, "Relaxation matching of features in aerial images using topological constraints", *Proceedings SPIE*, **Volume 2059**, pp. 444-456, 1993.

2. R. C. Wilson and E. R. Hancock, "A Topological Constraint Corruption Process for Hierarchical Graph Matching", *Proceedings of the Czech Pattern Recognition Workshop*, pp. 18-25, 1993.

3. W. H. Lau, E. R. Hancock and R. C. Wilson, "Hierarchical relaxation", *Proceedings of the Fifth University of New Brunswick AI Symposium*, pp. 111-121, 1993.

4. R. C. Wilson and E. R. Hancock, "Matching Features in Aerial Images by Relaxation Labelling", *Progress in Image Analysis and Processing III: Edited by S Impedovo, World Scientific*, pp. 209-217, 1994.

5. R. C. Wilson and E. R. Hancock, "Compatibility Modelling for Graph Matching", *Aspects of Visual Form Processing: Edited by E. C. Arcelli, L. P. Cordella and E. G. Sanniti di Baja, World Scientific*, pp. 574-584, 1994.

6. R. C. Wilson and E. R. Hancock, "Graph Matching by Discrete Relaxation" *Pattern Recognition in Practice IV: Edited by E. S. Gelsema and L. N. Kanal, North Holland*, pp. 165-176, 1994.

7. E. R. Hancock and R. C. Wilson, "A Bayesian Framework for Hierarchical Relaxation" *Proceedings of the 12th International Conference on Pattern Recognition, IEEE Computer Society Press*, pp. 7-12, 1994

8. R. C. Wilson and E. R. Hancock, "Graph Matching by Configurational Relaxation" *Proceedings of the 12th International Conference on Pattern Recognition, IEEE Computer Society Press*, pp. 563-566, 1994.

9. R. C. Wilson, A. N. Evans and E. R. Hancock, "Relational Matching by Discrete Relaxation" *Proceedings of the Fifth British Machine Vision Conference: Edited by E. R. Hancock*, pp. 43- 54, 1994.

10. E. R. Hancock, A. N. Evans and R. C. Wilson, "Segmenting and Matching SAR Images by Relaxation Labelling", *Workshop on SAR Image Segmentation: Edited by D Blacknell* pp. 30-37, 1994.

11. A.N. Evans, R.C. Wilson and E.R. Hancock, "Matching SAR Images using a Hierarchical Constraint Process", *Proceedings of the Fifth IEE International Conference on Image Processing and Applications*, pp. 60–64, 1995.

12. R.C.Wilson and E.R. Hancock, "Relational Matching with Dynamic Graph Structures", *Proceedings of the Fifth International Conference on computer Vision, IEEE Computer Society Press*, pp. 450–456, 1995.

13. A.D.J. Cross, R.C. Wilson and E.R. Hancock, "Discrete Relaxation on a Boltzmann Machine", *Proceedings of the 1995 International Conference on Artificial Neural Networks*, pp. 491–496, 1995.

14. R. C. Wilson and E. R. Hancock, "Inexact Graph Matching Criteria", *Shape, Structure and Pattern Recognition: Edited by D. Dori and A. Bruckstein, World Scientific*, pp. 251–260, 1995.

15. R.C. Wilson and E.R. Hancock, "An Integrated Approach to Grouping and Matching", *Image Analysis and Processing, Edited by C. Bracini et al, Lecture Notes in Computer Science, Springer-Verlag*, **974**, pp. 62–67, 1995.

16. R.C. Wilson and E.R. Hancock, "Relational Matching with Active Graphs", *Computer Analysis of Images and Patterns, Edited by V. Hlavac and R. Sara, Lecture Notes in Computer Science, Springer-Verlag*, **970**, pp. 334–341, 1995.

17. A.M. Finch, R.C. Wilson and E.R. Hancock, "Matching Delaunay Triangulations by Probabilistic Relaxation", *Computer Analysis of Images and Patterns, Edited by V. Hlavac and R. Sara, Lecture Notes in Computer Science, Springer-Verlag*, **970**, pp. 350–358, 1995.

18. E.R. Hancock and R.C. Wilson, "Rectifying Structural Matching Errors", *Recent Developments in Computer Vision, Edited by S. Li et al, Lecture Notes in Computer Science, Springer-Verlag*, **1035**, pp. 353-362, 1995.

19. R.C.Wilson and E.R. Hancock, "Gauging Relational Consistency. and Correcting Structural Errors", *IEEE Computer Society Computer Vision and Pattern Recognition Conference, IEEE Computer Society Press*, pp. 47–54, 1996

20. A.D.J. Cross, R.C. Wilson and E.R. Hancock, "Genetic Search for Structural Matching", *Proceedings of the Fourth European Conference on Computer Vision, Edited by B. Buxton and R. Cipolla, Lecture Notes in Computer Science*, **1064**, pp. 514–525, 1996.

21. R.C. Wilson, A.D.J. Cross and E.R. Hancock, "Sensitivity Analysis for Structural Matching", *Proceedings of the Thirteenth International Conference on Pattern Recognition, Volume A, IEEE Computer Society Press*, pp. 62–66, 1996.

22. A.M. Finch, R.C. Wilson and E.R. Hancock, "Relational Matching with Mean Field Annealing", *Proceedings of the Thirteenth International Conference on Pattern Recognition, Volume B, IEEE Computer Society Press*, pp. 359–363, 1996.

23. R.C. Wilson and E.R. Hancock, "Hierarchical Discrete Relaxation", *Advances in Structural and Syntactic Pattern Recognition, Edited by P. Perner, P. Wang and A. Rosenfeld, in Lecture Notes in Computer Science, Springer-Verlag*, **1121**, pp. 120–129, 1996.

24. R.C.Wilson and E.R. Hancock, "A Minimum Variance Surface Mesh", *IEEE Computer Society Computer Vision and Pattern Recognition Conference, IEEE Computer Society Press*, pp. 634–639, 1997.

25. A.M. Finch, R.C. Wilson and E.R. Hancock, "Softening Discrete Relaxation", *Advances in Neural Information Processing Systems 9, Edited by M. Mozer, M. Jordan and T. Petsche, MIT Press*, pp. 438-444, 1997

26. R. C. Wilson, and E. R. Hancock, "Refining Surface Curvature with Relaxation Labeling", *Image Analysis and Processing, Edited by A DelBimbo, Lecture Notes in Computer Science*, **1310**, pp. 150–157, Springer, 1997.

27. M. L. Williams, R. C. Wilson, and E. R. Hancock, "Multi-sensor Fusion with Bayesian Inference", *Computer Analysis of Images and Patterns, Edited by G. Sommer, Lecture Notes in Computer Science*, **1296**, pp. 25-32, Springer, 1997.

28. A. M. Finch, R. C. Wilson, and E. R. Hancock, "An Expectation-Maximisation Approach to Graph Matching" Lecture Notes in Computer Science, 1223, Springer, pp. 425–440, 1997.

29. M. L. Williams, R. C. Wilson, and E. R. Hancock, "Deterministic Search Strategies for Relational Graph Matching", Lecture Notes in Computer Science, 1223, Springer, pp. 261–278, 1997.

30. R.C. Wilson, Edwin R. Hancock, "Surface Reconstruction using a Variance Controlled Adaptive Mesh", *Advances in Visual Form Analysis*, Edited by C. Arcelli, L.P. Cordella and G. Sanniti di Baja, World Scientific Press, pp. 646–655, 1997.

31. R.C. Wilson and E.R. Hancock, "Graph Matching with Hierarchical Discrete Relaxation", *Advances in Neural Information Processing Systems 10, Edited by M. Kearns, M. Jordan and S. Solla, MIT Press*, pp. 689–695, 1998.

32. R.C. Wilson and E.R. Hancock, "Bias-Variance Tradeoff for Adaptive Surface Meshes", *Proceedings of the Fifth European Conference on Computer Vision*, Springer, Lecture Notes in Computer Science, 1407, pp. 449–465, 1998.

33. R.C. Wilson and E.R. Hancock, "Terrain Reconstruction with an adaptive surface mesh", *Proceedings of the Fourteenth International Conference on Pattern Recognition*, IEEE Computer Society Press, pp. 1401–1404, 1998.

34. R.O. Myers, R.C. Wilson and E.R. Hancock, "Efficient Relational Matching with Local Edit Distance" *Proceedings of the Fourteenth International Conference on Pattern Recognition*, IEEE Computer Society Press, pp. 1711–1714, 1998.

35. R.C. Wilson, A.D.J. Cross and E.R. Hancock, "Edge Segmentation using Electrostatic Region attractors" *Proceedings on the 1998 International Conference on Image Processing*, IEEE Computer Society Press, pp. 535–539, 1998.

36. R. C. Wilson and E. R. Hancock, "A Radar Reflectance Model for Terrain Analysis using Shape-from-Shading", *10th International Conference on Image Analysis and Processing*, IEEE Computer Society Press, Venice, pp 868-873, 1999.

37. R. C. Wilson and E.R. Hancock, "A Reflectance Model for Radar Shape from Shading", *Proceedings of the 10th British Machine Vision Conference*, T Pridmore and D Elliman eds., British Machine Vision Association, Nottingham, pp 153-162, 1999.

38. A. R. Myers R.C. Wilson and E.R. Hancock, "Bayesian Graph Edit Distance", *10th International Conference on Image Analysis and Processing (ICIAP),IEEE Computer Society Press*, Venice, pp. 1166-1171, 1999.

39. R.C. Wilson and E.R. Hancock, "Storage Capacity of the Exponential Correlation Associative Memory", *Foundations and Tools for Neural Modelling, Springer Lecture Notes in Computer Science*, **1606**, Jose Mira and Juan V Sanchez-Andres eds.,pp. 301-310, 1999.

40. A.Bors, R.C.Wilson and E.R.Hancock, "Terrain Feature Identification by Modelling Radar Image Statistics", *IEEE International Conference on Image Processing, IEEE Computer Society Press*, MP06.13, 2000.

41. A.Bors, and E.R.Hancock and R.Wilson, "Terrain Feature Classification in SAR Imagery", *Proceedings of the Xth European Signal Processing Conference*, **IV**, pp. 2169-2172, 2000.

42. R.Wilson and E.R.Hancock, "Optimising Pattern Recovery in Recurrent Correlation Associative Memories", *Proceedings of the Fifteenth International Conference on Pattern Recognition, IEEE Computer Society Press*, **2**, pp. 1009-1013, 2000.

43. R.Wilson and E.R.Hancock, "Storage Capacity of the Exponential Correlation Associative Memory", *Proceedings of the Fifteenth International Conference on Pattern Recognition, IEEE Computer Society Press*, **2**, pp. 660-663, 2000.

44. A.Bors, E.R.Hancock and R.Wilson, "Terrain Modelling in Synthetic Aperture Radar Images using Shape-from-Shading", *Proceedings of the Fifteenth International Conference on Pattern Recognition, IEEE Computer Society Press*, **1**, pp. 798-801, 2000.

45. N.Ludtke and R.Wilson, "Decoding Population Codes", *Proceedings of the Fifteenth International Conference on Pattern Recognition, IEEE Computer Society Press*, **2**, pp. 137-140, 2000.

46. N.Ludtke, R.Wilson and E.R.Hancock, "Population Codes for Orientation Estimation", *Proceedings of the Fifteenth International Conference on Pattern Recognition, IEEE Computer Society Press*, **1**, pp. 238-241, 2000.

47. A.G.Bors and E.R.Hancock and R.C. Wilson, "3-D Terrain from Synthetic Aperture Radar Images", *IEEE Workshop on Computer Vision Beyond the Visible Spectrum*, pp. 63-72, 2000.

48. A.Bors and E.R.Hancock and R.C. Wilson, "A Bayesian Framework for Radar Shape-from-Shading", *IEEE Computer Society Conference on Computer Vision and Pattern Recognition, IEEE Computer Society Press*, **I**, pp. 262-268, 2000.

49. N. Ludtke, R.C.Wilson and E.R. Hancock, "Tangent Fields from Population Codes", *Springer Lecture Notes in Computer Science*, **1811**, Edited by W-H Lee, H.H. Bulthoff and T.Poggio, pp. 584-593, 2000.

50. B. Luo, A. Robles-Kelly, A. Torsello, R.C. Wilson and E.R. Hancock, "Clustering Shock Trees", *3rd IAPR-TC15 Workshop on Graph-based Representations in Pattern Recognition*, pp. 217-226, 2001

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59. B. Luo, R. C. Wilson, and E. R. Hancock, "Eigenspaces for graphs from spectral features", In *Second International Conference on Image and Graphics*, vol 4875, pp. 772–779, SPIE, 2002.

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61. B. Luo, R. C. Wilson, and E. R. Hancock, "Spectral embedding of graphs", In *Proceedings Winter Workshop on Computer Vision*, 2002.

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65. A. Hughes and R. C. Wilson, "A Spectral Analysis of Perceptual Shape Variation", in 12^{th} *International Conference on Image Analysis and Processing*, pp. 38–43, 2003

66. R. C. Wilson and E. R. Hancock, "Pattern Spaces from Graph Polynomials", in 12^{th} *International Conference on Image Analysis and Processing*, pp. 480–485, 2003

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80. D. Emms, S. Severini, R.C. Wilson and E.R. Hancock "Towards Unitary Representations for Graph Matching", 5^{th} *IAPR International Workshop*

GbPRP 2005, Springer Lecture Notes in Computer Science, **3434**, pp. 153–161, 2005.

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95. D. Emms, R.C. Wilson and E.R. Hancock, "Graph Similarity using Interfering Quantum Walks", *Computer Analysis of Images and Patterns*, LNCS, **4673**, pp. 823,–831, 2007.

96. T. S. F. Haines and R. C. Wilson "Belief Propagation with Directional Statistics for solving the Shape-from-Shading problem", ECCV 2008, pp. 780–791

97. D. Emms, R. C. Wilson and E. R. Hancock, "Graph Edit Distance without Correspondence from Continuous-Time Quantum Walks", SSPR 2008, Lecture Notes in Computer Science, **5342**, pp. 5–14, 2008.

98. Bai Xiao, R. C. Wilson and E. R. Hancock, "Quantitative Evaluation on Heat Kernel Permutation Invariants", SSPR 2008, Lecture Notes in Computer Science, **5342**, pp. 217–226. 2008.

99. Peng Ren, R. C. Wilson and E. R. Hancock, "Graph Characteristics from the Ihara Zeta Function", SSPR 2008, Lecture Notes in Computer Science, **5342**, pp. 256–266, 2008.

100. Peng Ren, R. C. Wilson and Edwin R. Hancock, "Spectral Embedding of Feature Hypergraphs", SSPR 2008, Lecture Notes in Computer Science, **5342**, pp. 308–317, 2008.

101. T. S. F Haines and R. C. Wilson, "Combining Shape-From-Shading and Stereo Using Gaussian-Markov Random Fields", ICPR pp. 1064–1067 2008

102. Peng Ren, R. C. Wilson and E. R. Hancock, "Pattern Vectors from the Ihara Zeta Function", ICPR pp. 2495–2498 2008

103. D. H. White and R. C. Wilson, "Parts Based Generative Models for Graphs", ICPR pp. 3318-3321 2008

104. Bai Xiao, R. C. Wilson and E. R. Hancock, "Object Recognition Using Graph Spectral Invariants", ICPR 2008

105. B. Ziolko, S. Manandhar, R. C. Wilson and M. Ziolko, "LogitBoost Weka Classifier Speech Segmentation", *IEEE International Conference on Multimedia and Expo*, pp. 1297–1300, 2008.

106. B. Ziolko, S. Manandhar, R. C. Wilson, M. Ziolko and J. Galka, "Application of HTK to the Polish Language", *International Conference on Audio, Language and Image Processing*, pp. 1759–1764, 2008.

107. Peng Ren, R. C. Wilson and E. R. Hancock, "Characteristic Polynomial Analysis on Matrix Representations of Graphs", Graph Based Representations in Pattern Recognition, LNCS 5534, pp. 243-252, 2009

108. Peng Ren, T. Aleksic, R. C. Wilson, and E. R. Hancock, "Hypergraphs, Characteristic Polynomials and The Ihara Zeta Function", 13th International Conference on Computer Analysis of Images and Patterns, 2009

109. Peng Ren, R. C. Wilson, and E. R. Hancock, "Weighted Graph Characteristics from Oriented Line Graph Polynomials", ICCV 2009

110. R. C. Wilson and E.R. Hancock, "Spherical Embedding and Classification", S+SSPR 2010, LNCS 6218, pp589–599.

111. W. Xu, R. C. Wilson and E. R. Hancock, "Regularisng the Ricci Flow Embedding", S+SSPR 2010, LNCS 6218, pp579–588.

112. P. Ren, T. Aleksic, R. C. Wilson and E.R. Hancock, "Ihara Coefficients: A Flexible Tool for Higher Order Learning", S+SSPR 2010, LNCS 6218, pp670–679.

113. W. Xu, R. C. Wilson and E. R. Hancock, "Rectifying Non-Euclidean Similarity Data using Ricci Flow Embedding", ICPR 2010.

114. L. Han, R. C. Wilson and E. R. Hancock, "A Supergraph-based Generative Model", ICPR 2010.

115. T. Gillam, R. C. Wilson and J. A. Clark, "Scribe Identification in Medieval English Manuscripts", ICPR 2010.

116. R. C. Wilson, E. R. Hancock, E. Pękalska and R. Duin, "Spherical Embeddings for non-Euclidean Dissimilarities", CVPR 2010.

(v) Editorial Duties

1999-2010 Associate Editor of Pattern Recognition Journal 2010-present Editorial board of Pattern Recognition Journal

(vii) Other works

Invited papers:

1. E.R. Hancock and R.C. Wilson, ''Matching Corrupted Relational Graphs by Relaxation Labelling", *Proceedings of the Second Asian Conference on Computer Vision - invited paper*, pp. 146–151, 1995.

2. E.R.Hancock and R.C.Wilson, contribution to the discussion of the paper by Mardia and Glasbey, *Journal of the Royal Statistical Society*, Series-B, **63**, pp. 492–514, 2001.

Meetings:

1. N. Ludtke, E. R. Hancock, and R. C. Wilson, "Population Coding and the Detection of Visual Stimuli with Multiple Orientation", *Annual Computational Neuroscience Meeting*, 2002.

Thesis:

1. R. C. Wilson, "Inexact Graph Matching Using Symbolic Constraints", PhD Thesis, University of York 1996.

2. Research Funding

i. Grants

1998 'Extentions of Relational graph matching', EPSRC, £136,000
Principal investigator (EPSRC Advanced Fellowship) – rated 4

1998 'Relational models for Recognition and Learning', EPSRC, £154,000
Co-investigator – rated outstanding(5)

1999 'Graph Clustering', DERA, £75,000
Co-investigator

2001 'Spectral Retrieval from large structural databases', EPSRC, £205,982
Co-investigator – rated outstanding(5)

2002 'Surface Reconstruction from Gauss Maps', EPSRC, £182,138
Co-investigator – rated outstanding(5)

2002 'Learning Motion Behaviour', QinetiQ, £100,000
Co-investigator

2003 'Quantum Algorithms for Inexact Graph Matching', EPSRC, £196,333
Principal Investigator

2008 SIMBAD, EU Framework Programme 7, €2,255,360
Co-investigator

3. Research Students

(i) Supervision

Niklas Lüdtke 1998-2001	'Population codes for Computer Vision' completed(PhD).
Alex Hughes 2001-2004	'Shape representation' completed(PhD)
Ping Zhu 2004-2005	'Spectral methods for graphs' completed(MSc)
Bartosz Ziolko 2005-2009	'Models for speech recognition' completed(PhD)
David White 2005-2009	'Generative models for Graphs' completed(PhD)
Tom Haines 2005-2009	'Stereo and Shape from Shading' completed(PhD)
Jing Kan 2006-present	'Reconstruction of MEG Data' currently registered(PhD)
Tara Gilliam 2007-present	'Scribe Identification for Medieval Manuscripts' currently registered(PhD)
Lin Han 2008-present	'Generative Models of Graphs' currently registered(PhD)
Weiping Xu 2008-present	'Similarity-based Pattern Recognition' currently registered(PhD)
Touqeer Ahmad 2009-present	'Combining Shape-from-Shading with Facial Shape Models' currently registered(MSc)

(ii) Examining

University of Southampton	2009
Cem Direkoglu	PhD: "Feature Extraction via Heat Flow Analogy"
Australian National University	2010
Quang Nguyen	PhD: "Advanced Methods and Extensions for Kernel-Based Object Tracking"

I have conducted over 15 PhD examinations as internal examiner.

4. Other research activities and distinctions

ii. Best Paper Awards:

1998 Pattern Recognition Journal Outstanding Paper Award
Awarded annually for the best 3-4 papers to appear in the Pattern Recognition Journal

2002 ACCV Best paper award
Awarded to the best paper in the Asian Computer Vision Conference

iii. Competitions and Awards

1988 Member of the British Physics Olympiad team and bronze medal winner, International Physics Olympiad, Poland
1995 K. M. Stott prize for best thesis, University of York
1996 Member of winning University of York team, BCS programming competition
2010 Fellowship of the IAPR

iv. Visiting Positions

2007 Visiting Fellow, "Analysis on Graphs", Isaac Newton Institute, Cambridge University

v. Program Committees

2010 Programme Chair, International Workshop on Structural and Syntactic Pattern Recognition

2003 Technical Program Committee, International Conference on Image Processing
2003 Technical Program Committee, International Conference on Acoustics, Speech and Signal Processing
2004 Technical Program Committee, International Conference on Pattern Recognition
2004 Technical Program Committee, British Machine Vision Conference
2004 Technical Program Committee, International Conference on Image Processing
2005 Technical Program Committee, EMMCVPR
2006 Technical Program Committee, International Conference on Pattern Recognition
Technical Program Committee, European Conference on Computer Vision
2008 Technical Program Committee, International Conference on Pattern Recognition
Technical Program Committee, International Conference on Image Processing

vi. External reviewing

2001-2005 Member EPSRC Peer Review College

I review papers for the following journals:

IEEE Transactions on Pattern Analysis and Machine Intelligence

IEEE Transactions on Neural Networks

Pattern Recognition

Image and Vision Computing

Computer Vision and Image Understanding

Pattern Recognition Letters

IEEE Transactions on Evolutionary Computation

IEEE Transactions on Visualization and Computer Graphics

vii. Invited lectures

2008 BMVA symposium on Machine Learning, BCS London
2009 University Ca'Foscari, Venice
2009 Visual computing group, Swansea
2009 ETH, Zurich
2009 Instituto Superior Tcnico, Lisbon

C. Teaching and the Promotion of Learning

In total I have developed and delivered three new courses for the Computer Science Department at York. These include a wide variety of different teaching methods including 'chalk-and-talk' lectures, overhead slides, problem classes, lab practicals and programming projects. In particular, the PAT course has innovative interactive practicals which are praised by the students. These practicals make use of the Maple interactive document system to bring algorithm description, discussion and implementation in one place. In addition, I have also organised a Masters-level team project in conjunction with industrial sponsors.

Taught courses:

2003–	*Pattern recognition and Neural Networks* Year 3 Undergraduate Fundamentals of pattern recognition, machine learning applied to classification and clustering, neural networks
2001–2008	*Computer Vision* Year 3 Undergraduate Cameras, images, techniques in image processing and filtering
2009–2010	*Mathematics for Computer Scientists* Year 1 Undergraduate First year course in continuous mathematics and probability
2004–2007	*MEng Group Project* Year 4 integrated Masters Organising, setting and marking of an industrially-sponsored group project simulating a software development project
2011–	*Numerical Analysis* Year 1 Undergraduate First year course in numerical algorithms

D. Administration, Leadership and Management

Currently I have two main administration responsibilities; firstly as chair of the Research Studies Committee (RSC), and secondly I have a significant role in the running of the Computer Vision and Pattern Recognition Group.

2003–2007	Department teaching committee, staff representative
2002–2007	Member Department Graduate Studies Committee
2007–	Chair, Research Studies Committee