Mr David Pycock C.Eng.

Senior Lecturer

School of Electronic, Electrical and Computer Engineering

Contact details

Telephone +44 (0) 121 414 4330 (tel:+44 121 414 4330)

Fax +44 (0) 121 414 4291

Email d.pycock@bham.ac.uk (mailto:d.pycock@bham.ac.uk)

School of Electronic, Electrical and Computer Engineering
University of Birmingham
Edgbaston
Birmingham, B15 2TT

Skype UofBEECEMScDirector (skype:UofBEECEMScDirector?call) , please email to arrange a time.

About

David Pycock has been responsible for the development of M.Sc. programmes in the School for many years. He introduced Industrial Placements, a novel development for taught postgraduate training that has been much appreciated by students and employers. The success of this scheme is marked by the fact that all students on placements have been offered a job by the host company.

On graduating in 1972 David joined EMI Research Laboratories where he worked on the development of CT X-Ray scanners.

In 1977 he moved to the University of Manchester as a founding member of the Wolfson Image Analysis (now Imaging Science and Biomedical Engineering) and worked on Cell Image Analysis, Chromosome Analysis, Asbestos Fibre Counting and Industrial Inspection systems.

In December 1989 he joined The University of Birmingham and continued his research on image interpretation.

In his research he has collaborated with a wide range of companies including most of the major automotive manufacturers and many other companies.

Qualifications

Senior Lecturer Electronic, Electrical and Computer Engineering:
• Chartered member of the IET
• B.Sc. in Electronic Engineering Science, Bangor, North Wales.

Biography

At EMI he was responsible for the design of electronic positioning systems, digital control systems, X-ray collimators, system maintenance and evaluation during clinical trials. He worked under the supervision of Godfrey Hounsfield.

In 1977 he moved to the University of Manchester as a founding member of the Wolfson Image Analysis (now Imaging Science and Biomedical Engineering) and worked on Cell Image Analysis, Chromosome Analysis, Asbestos Fibre Counting and Industrial Inspection systems.

In December 1989 he joined The University of Birmingham and continued his research on image interpretation. He has presented papers at international conferences and published on a wide range of subjects in journals.

In his research he has collaborated with a wide range of companies including most of the major automotive manufacturers, Jaguar Cars, Ford, Qinetiq, Federal Mogul, and the Health and Safety Executive.

He has reviewed papers grant applications and papers for journals and conferences and has been a member of the programme committee from many conferences in Computer Vision.

Teaching

Teaching Programmes
• Computer Vision
• Embedded Digital Signal Processing

In the past he has lectured on:
• Multimodal Interaction
• C programming
• Semi-formal procedural software design methods
• UML and Object-Oriented Design
• Computer Graphics

Postgraduate supervision

He currently has PhD students working on:
• Reasoning by Analogy in Computer Vision
• Resolution of Range-Velocity Ambiguity in FMCW Radar

Topics that he is seeking PhD students to research:
• Model-Based Methods of Image Interpretation
• Counting Tree Canopies: Colour morphology operators
• Graffiti Identification

For a full list of available Doctoral Research opportunities, please visit our Doctoral Research programme listings

Research

RESEARCH THEMES

- Model Based Image and Signal Interpretation
- Colour Scene Interpretation
- Grey-level Medial Axis computation
- Medical Image Analysis
- Bandwidth Management for Medical Image Transmission
- Novel Heterogeneous Computer Architectures

RESEARCH ACTIVITY

Model-Based Image Interpretation

An important development that is in hand is a new Model-Based Scheme that offers much greater flexibility in image interpretation. In this new scheme it is possible to use the same model and programme to recognise long thin and compact objects or objects with sharp corners. This was a development of work on cell image interpretation described below.

In model-based image interpretation David developed methods of interpretation that allow model-based schemes to be applied to be applied to images of biological cells which were more varied in appearance than could be handled by existing procedures. The scheme developed allowed multiple models to be compared and selected between during the process of interpretation. Current research into reasoning about analogy in computer vision is a natural development of this work.

A further activity is the development of model-based image interpretation is to automate the identification of graffiti.

Model-Based Signal Interpretation

In signal interpretation David has taken methods developed for image interpretation and applied them to match or exceed the performance of matched hardware filters. This offers considerable potential for systems that can be adapted to interpret new and unexpected signals.

This work also resulted in the development of a novel edge detection scheme with a high tolerance of noise and systematic artefacts. Ironically the presence of some noise is essential for this method to work correctly. In practice this is not a problem but in evaluation with synthetic data it posed a challenge at first.

With a colleague he developed a model-based scheme for identifying periodic events in short duration signals in the presence of high noise levels.

Colour Image Interpretation

The interpretation of colour in images is a complex task. Many well understood procedures in image analysis rely on having a scalar image description as in a grey level image. This means that magnitude comparisons can easily be made. However, the value of each pixel in a colour image is a vector quantity. This means that operations to find discontinuities or edges need to consider the direction of the vector as well as its magnitude. This has been done. It is more difficult to understand what is meant by the largest value of a vector quantity. Here lays the key focus of David's research on this topic.

Symmetry Computation

There are situations in which the computation of symmetry prior to image segmentation can help determine what strategy should be used to interpret an image. Research with a student developed a method that was more noise resilient and precise in generating axes of symmetry.

Heterogeneous Computer Architectures

In this research David was able to demonstrate how super-linear speed up can be achieved when tasks are distributed across a network of computers. This is almost as extreme as a claim to have invented perpetual motion but is possible. The methods used involved a dynamic negotiation of task allocation.

Automated Chromosome Karyotyping

The work on automated Chromosome Karyotyping led to the first commercial automated system. David was responsible for the work to find well spread chromosomes.

Other activities

David is a Lay Reader in the Church of England and has for many years been an Assistant Warden of Readers.

Publications

R. Jackson, D. Pycock, M. Xu, M. Salous, M. Knowles and S. Harman, "Event detection and period extraction using multi-scale symmetry and entropy", Signal Processing, 85, 3, pp 591-605, Elsevier, 2005.

Sun, Y and Pycock D, Iconic representation for progressive transmission of medical images, in Proc., 17th Int Congress and Exhib. Computer Assisted Radiology and Surgery (CARS 2003), Ed. Lemke, HU, Vannier MW, Inamura K, Farman AG, Doi K and Reber JHC, pp 292-8, 2003

Luo, B and Pycock D, Unified Multi-Scale Corner Detection, Update to the paper presented at the 4th IASTED International Conference on Visualisation, Imaging and Image Processing (Ed. Villanueva, JJ), Sept. 2004.

Salous MN, Pycock D and Cruickshank GS, CBIT – Context Based Image Transmission, in IEEE Trans., Technol. and Biomed., 5, 2, pp 159-70, June 2001

Pycock D, Pammu S and Goode AJ, Robust Model-Based Signal Analysis and Identification, Int J. Patt. Recogn. 34, 11, pp 2181-99, 2001.

Pycock D, Pammu S and Goode AJ, Robust Model-Based Signal Analysis and Identification, IEE Colloquia on Applied Statistical Pattern Recognition, 20 April, 1999.