

# BMVA News

The Newsletter of the British Machine Vision Association and  
Society for Pattern Recognition

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**Editor:** Dr Philip McLauchlan  
Department of Engineering Science  
University of Oxford  
Oxford OX1 3PJ  
Tel: (01865) 273127  
Fax: (01865) 273908  
Email: pm@robots.oxford.ac.uk

**BMVA** News<sup>1</sup> is published every three months. Contributions on any activity related to machine vision or pattern recognition are eagerly sought. These could include reports on technical activities such as conferences, workshops or other meetings. Items of timely or topical interest are also particularly welcome; these might include details of funding initiatives, programmatic reports from ongoing projects and standards activities. Items for the next edition should reach the editor by 31st January 1994.

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<sup>1</sup>The British Machine Vision Association and Society for Pattern Recognition is a Company limited by guarantee, No. 2543446, registered in England and Wales. Registered Office: Granta Lodge, 71 Graham Road, Malvern, WR14 2JS. The Association is a non-profit-making body and is registered as charity No. 1002307.

Texture Classification .....

Image Analysis at Silsoe Research Institute.....

## Editorial

What is the point of having conference submission deadlines? It used to be that you could keep working at your paper right up to the deadline, not quite manage it on time, and the conference organisers would normally give you a few days grace. In practice it seems that every good conference Chair makes sure that the extra delay won't matter. As Chair of ICCV '95, Eric Grimson has broken with this tradition by extending the deadline a full *nine days* before the original deadline was set to expire. How does he think the extra two weeks are going to be spent? Some supremely self-confident people will no doubt add a few finishing touches and mail their paper with a week to spare, but is that the right way to do research? I have already used the extra time to add several fundamental improvements to my algorithm, and I'm just about to implement another. Then I'll have to generate some more data, write the new stuff up, remove some existing text because the paper will be too long, and I should be ready to courier mail it the day before the new deadline. Of course I may not quite make it, in which case... are you reading this Eric, I mean, Professor Grimson, sir?

You may notice a new feature in this edition, pictures! Yes indeed the BMVA is slowly catching up with the rest of the world. Of course pixel people (nice one Kevin) see loads of pictures every day, but not many are as amusing as the cartoons drawn for BMVA News by Manuel Trucco of Heriot-Watt University. We've got some real images too, of things.

## Outgoing Chairman's Address

First the good news; as Members who attended the Annual General meeting of the Association at York on 14 September will know, I have retired as Chairman. My successor is Dr John Illingworth who was selected at the first meeting of the new Executive Committee on Wednesday 19 October. John is a Senior member of the large and powerful vision, speech and signal processing group in the Department of Electronic and Electrical Engineering at Surrey and has served for several years on the Association's Executive Committee. The latter included two years as Secretary from 1990 to 1992, during the second of which he suffered me as the then new Chairman. John is thus extremely well qualified for the post and I wish him and the Association all the best for the future.

A list of members of the Executive Committee and Officers is given below. This includes several co-opted members such as Tim Ellis who continues to be responsible for the Association's one-day meetings programme but, this year, will be assisted in this onerous task by Roy Davies, one of the newly elected members of the Executive Committee as reported in the last issue of the News.

But what of the past, in particular the last year of the Association's activities? Details are given in the accompanying report on the Association's Annual General Meeting, but I am particularly pleased to note that the annual Conference at York was, once again, very successful. There were as usual many papers of high quality, but this year the Conference was attended by some 150 delegates, an increase of approximately 20 over the two preceding years. Our thanks therefore go to Edwin Hancock who Chaired the Conference and to his band of assistants who helped ensure that everything ran smoothly. The onus is now on David Pycoc and his colleagues at Birmingham to see if this upward trend can be sustained at the next conference from 11th to 14th of September 1995.

Other notable items are the special rates now being offered to Members of the Association for subscriptions to *Image and Vision Computing*, the UK Journal edited by Professor Keith Baker of the University of Reading, and to *Image Processing* the popular magazine containing features on new aspects of image processing and machine vision, news and views of events, initiatives and activities, reports on new applications and products, surveys, letters and correspondence from readers. Certainly, current readers of *Image Processing* will be well aware of the debate in its columns, principally between me and several

leading members of the UK Industrial Vision Association, about the EPSRC Integrated Machine Vision programme, for which the call for full proposals passed in the middle of September. It will be interesting in the light of this debate and the new responsibility placed on the EPSRC to sponsor research that will lead to improved industrial performance and wealth generation in the UK to see how the IMV turns out and what results it produces.

However, the debate with the UKIVA is friendly. Both Associations share the objective of promoting the successful application of machine vision and both are seeking ways of bringing industry and academe together in order to promote the rapid transfer of research results and expertise. The idea of a joint industry/academe forum was floated by the UKIVA at the reception they hosted at York during the BMVC and ways of co-operating in such an event are being explored by the Committee. In fact, promoting co-operation between academe and industry was one of the themes I took up on becoming Chairman of the Association three years ago and it is pleasing to see this aspect of our activities back in the limelight.

However, as in any other endeavour, there is always more to be done and the Committee needs the help and support of the Membership in organising activities, events and in carrying new initiatives successfully through to completion. I therefore appeal to all our readers to help the new Committee and Chairman in every way possible. As Chairman, I was fortunate to have the help and support of John Illingworth and Adrian Clark as Secretaries, of Geoff Sullivan and Margaret Varga as Treasurers, and, not least, of Andrew Sleight and, recently, Geoff Sullivan as Company Secretaries, responsible for ensuring that the Association meets its legal obligations as a Company limited by guarantee and as a registered charity. In addition, Andrew, with the assistance of Chris Taylor and Mick Brown was responsible for establishing the Association when the BPRA and Alvey Vision Club merged in January 1990. My thanks and appreciation go to them all.

Bernard Buxton  
 Department of Computer Science  
 University College London  
 22 October 1994

## Incoming Chairmans Address

Whilst not wanting to appear unduly modest, it was with great hesitation that I agreed to take on the responsibility of Chairman of BMVA. This was particularly so because I am acutely aware of the great contributions that both previous Chairmen, Chris Taylor and Bernard Buxton, have made to advance the status and activities of Association. Through their leadership and the efforts of colleagues on the Executive Committee we now have one of the largest member Associations of the IAPR, a vigorous programme of regular activities and a healthy financial structure.

In particular, during his three year Chairmanship, Bernard Buxton has initiated numerous new initiatives. Many of these are clearly documented in the outgoing Chairmans address and the report (again provided by Bernard!) of this years AGM. I hope I speak on behalf of all members of the Association when I congratulate him and heartily thank him for his efforts during his period of office. Fortunately, his experience and judgement will not be lost to the Association as he will continue to have a voice on the Committee in his co-opted role as General Chairman of the forthcoming European Conference on Computer Vision which will be held in Cambridge in 1996.

Looking towards the coming two years it is clear that there are many good things to build on. The report on the AGM distinguishes ten major areas where BMVA has significant activities. My twin aims will be to maintain and extend these activities. As time goes by and my thoughts crystallise, I hope to keep in touch with Association members through occasional reports in BMVA News. However, for the moment I would just like to express my thanks to everyone for their support in electing me to the post. I shall endeavor to fulfill its duties with as much verve and vigor as our past Chairmen! We live in interesting times and I hope that we can make the best of them!

Dr. J. Illingworth  
V.S.S.P. Group,  
Dept of Electronic and Electrical Eng,  
University of Surrey.  
Email: [J.Illingworth@ee.surrey.ac.uk](mailto:J.Illingworth@ee.surrey.ac.uk)

The following people have been co-opted onto the BMVA committee: Roberto Cipolla and Bernard Buxton as organisers of ECCV, Dave Pycock as Chair of BMVC '95, Bill Adaway to strengthen the industrial participation and Ian Todd to improve liaison with the DTI. The other BMVA officers are as follows:

Chairman	John Illingworth
Secretary	Adrian Clark
Treasurer	Margaret Varga
Company Secretary	Geoff Sullivan
Meetings Officer	Tim Ellis
Publicity Officer	Neil Thacker
Mailshots	Tim Trew
Newsletter Editor	Phil McLauchlan
IAPR Representatives	Josef Kittler & Chris Taylor

Phil McLauchlan

## BMVA Annual General Meeting

**University of York, 20.45–23.00, Wednesday, 14 September 1994**

The Annual General Meeting of the Association held during BMVC94 at the University of York was attended by approximately 30 members of the Association and of the Executive Committee.

### Chairman's report

After a brief summary of the aims and objectives of the BMVA and of its Company and charitable status, the retiring Chairman, Bernard Buxton, reviewed the main areas of the Association's activity during 1993/94 as follows:

- (i) *Conference activity*: especially the successful bid for ECCV'96 which will be held at the University of Cambridge from 15–19 April, 1996 (Chairman B F Buxton, Local Arrangements, R Cipolla), and the new bid for ICPR'98 to be held in Brighton. Unfortunately, it has since turned out that the bid for ICPR'98 was lost to a rival tender from Australia.
- (ii) *Educational activities*: including the programme of one-day technical meetings held at the BIR in London reviewed in greater detail by the meetings Officer, T J Ellis, and the new EPSRC sponsored summer school on machine vision which is planned to be held at the University of Surrey from 27 to 31 March 1995. The Summer School is chaired by John Illingworth with the curriculum under the direction of Professor Josef Kittler.
- (iii) *Membership of the Association*: especially the new benefits available to members, including reduced subscription rates to Image Processing, Image and Vision Computing and, via the

Association's affiliation to IAPR, Machine Vision Applications, and production of a revised and updated BMVA video. Numbers remain similar to previous years with the Association having some 400-450 members, approximately 150 of whom work in industry, whilst the academic contingent includes approximately 75 student members.

- (iv) *Publishing*: Since the preceding Conference at Surrey, the BMVA has itself been publishing and marketing the proceedings under the auspices of the BMVA Press which was established by John Illingworth with the requisite ISBN etc. Publishing and selling the BMVC proceedings by BMVA Press in this way has been a success with no fall in sales and greater control and flexibility available to the Association.
- (v) *Publicity*: The Association has mounted stands and exhibited at several major conferences and exhibitions during the year, including: IPOT, AUTOMAN, the UKIT Forum, and the IoP Congress.
- (vi) *Teaching of Machine Vision*: A working party on the teaching of machine vision set up under the Chairmanship of Tim Ellis had carried out a survey of machine vision teaching in the Higher Educational Institutions and had planned a workshop during the summer. Unfortunately, the workshop had been disrupted by the rail strikes, but efforts are being made to hold it later this year.
- (vii) *Tutorials*: The increasing success of the Tutorials held immediately before the annual conference was noted. This year's tutorials were attended by approximately 90 delegates.
- (viii) *Affiliations*: The relationship of the Association to affiliated bodies such as the BCS was briefly reported. It was also noted that MIAS, the Mammographic Image Analysis Society had been affiliated to the BMVA as a newly established special interest group.
- (ix) *Relationships with government*: The Chairman included a personal review of the effect of the changes at EPSRC on the funding of machine vision research and the need for the Association to press, on the community's behalf, for a continuing stream of initiatives such as the Integrated Machine Vision programme. Such initiatives are needed not only to stimulate continuing academic research, over and above the "normal" responsive grants (which seem set

to decrease), but also to encourage links with industry by way of co-operative programmes. However, it was stressed that such initiatives could only go part way towards the successful transfer of research to industry and that additional programmes were necessary to enable collaborative work with industry to take place in which technology is transferred and application specific research carried out.

Co-operative research programmes such as the IMV, together with normal, responsive mode grants, lie within the remit of the EPSRC, whereas collaborative work with industry used to lie within the remit of the DTI. However, the reduced level of government support over recent years has made such collaborative work increasingly difficult. Reductions in support for military R & D have further exacerbated the situation as has the reduction in industrial spending on its own R & D. Evidence for this rather gloomy picture was unfortunately, all too conveniently to hand in statistics in the Save British Science Autumn Newsletter that had been provided in delegates' registration packs.

- (x) *Relationship with industry*: The Chairman concluded with the approach by the UK Industrial Vision Association, an Association of approximately twenty of the machine vision equipment suppliers in the UK, for co-operative activities and collaboration in a number of areas, such as sharing of databases, holding a forum to create links between suppliers and academic researchers and, most importantly, presenting together a coherent case for increased government support for industrial R & D in the field and for application specific research in machine vision.

In particular, the Chairman expressed his view that it is essential in order to help industry rapidly to take up the benefits of the exciting machine vision research now being carried out in the UK (of which BMVC'94 itself provided several excellent examples) that direct financial support is available to industry to help defray the risks involved. This is especially important in machine vision where many of the suppliers are relatively new, small companies (or SMEs in European jargon).

The approach from the UKIVA was thus welcomed and it was noted that two routes for establishing links between the two Associations could be readily identified: (a) by members of

UKIVA becoming Corporate Members of the BMVA and, (b) by UKIVA itself being affiliated to the BMVA as a Special Interest Group. These possibilities are being explored by the new Executive Committee.

### Treasurer's report

As the Treasurer, Dr Margaret Varga was unable to attend the meeting, her report, based on the accounts submitted to Companies House, was delivered by Geoff Sullivan, the BMVA Company Secretary. He briefly reviewed the main items of income and expenditure, noting the following:

- (i) The period covered by the accounts was for fifteen months rather than the usual twelve, which resulted in income appearing to be rather high due to receipts from both BMVC'92 and BMVC'93. Nevertheless, the financial position continues to be healthy with the Association having substantial reserves.
- (ii) The one-day technical meetings and the regular mailshots are major items of expense.
- (iii) The major unusual item was purchase of a machine for mounting the PEIPA image processing and machine vision database at the University of Essex. However, the University had been able to more than double the Association's investment in this valuable electronic facility by winning support from the EC etc.
- (iv) Detailed arrangements for the extent to which ECCV'96 would be underwritten by the BMVA and by the EVS (European Vision Society) had yet to be worked out, but an advance of £1500 had already been made by the Association in order to secure reservation of facilities at the University of Cambridge. It had already been established at the EVS meeting in Stockholm during ECCV'94, when the BMVA bid for ECCV'96 was accepted, that the extent to which the BMVA underwrites ECCV'96 with its own resources will be an important factor in determining the proportion of any profits the Association would expect to retain. This is particularly important in considering the much larger financial exposure the conference will be subject to as April 1996 approaches.

Questions on these items and a number of other points of detail were taken from members present at the meeting.

### Meetings report

T J Ellis, the Meetings Officer, gave a brief review of the one-day technical meeting programme for 1993/94. He indicated that arrangements for meetings in 1994/95, especially for those to be held in the new year, had yet to be made, although facilities at the BIR had been reserved for the expected schedule of meetings.

The main issue, however, was concern at the generally low attendance ( $\sim 20 - 30$ ) at the one-day meetings over the past two years, except on occasions when the meeting was related to medical image processing or to "sexy" topics such as neural networks or data fusion. Since, as noted in the Treasurer's report, the one-day meetings are quite expensive and consume a considerable amount of the organiser's and Meetings Officer's time, the Committee was seeking ways to improve them and boost attendance. Suggestions from the floor for exciting topics and volunteers to help organise them were therefore welcomed by the Committee.

A number of suggestions were forthcoming, both for ways as to how the meetings might be improved and for specific topics for future meetings. These were further discussed under other business at the end of the AGM as noted below.

### Executive Committee Elections

On this occasion the number of candidates standing had been exactly equal to the number of vacancies to be filled. A ballot had thus not been necessary and the Chairman noted the results as posted in the last issue of the News.

The Chairman also noted his own retirement, the fact that some members previously co-opted to the Committee were now elected, and that Roy Davies had been elected as a new member. Prior to his election Roy had already been helping the Association's working party on the teaching of machine vision. The retirement of Tim Ellis who had put in a great deal of effort over the last few years as Meeting's Officer was also noted, as was that of John Anderson of BAe.

One of the first jobs for the new Committee would, it was noted, be to appoint the Association's Officers and make the necessary changes to the register of Company Directors.

### Other business

The main items of discussion at the end of the AGM were:

- (i) *Technical Meetings*: There were a number of suggestions from the floor as to how the one-day technical meetings programme might be improved. There was agreement that these meetings are an important part of the Association's activities and it was suggested that improvements might be made by having written papers and some tutorial talks, for example by the organiser who is often a recognised expert. There were also suggestions that the relationship between natural and machine vision should be emphasised more and that new topics might include the use of photogrammetric techniques in machine vision and the role of machine vision in multimedia applications. Volunteers stepped forward to help with all three of these: Stone, Buxton and Siebert, and Baker respectively.

Advertisement of the one-day meetings and the benefits of co-sponsorship, e.g. with the IEE and AVA, were also discussed, but it was felt that the Association already had these pretty well in hand.

- (ii) *Relationships with industry*: The members present felt that co-operation with the UKIVA should be encouraged wherever appropriate and it was suggested that the Committee should explore the possibility of joint workshops and take up the UKIVA proposal to hold a machine vision forum to encourage links between academe and the industrial suppliers.
- (iii) *The Association's status*: There was a request from academic members that the Association try to obtain greater recognition of its status as representing the British machine vision community so that, for example, academics would be encouraged to attend BMVA meetings rather than discouraged as was currently the message received from heads of department in a few cases. This led on to discussion of the need for the Association to ensure that the appropriate machine vision and pattern recognition journals and conferences would be included in the HEFC evaluation.
- (iv) *Future R & D*: The meeting closed with further discussion of the need, in the current funding climate, for the Association and members of the community themselves continually to lobby for new programmes etc, especially those that might include industrial participation and would help industrialist to reduce the risk of technology transfer and help defray the cost of

new application specific R & D.

Bernard Buxton

23 October 1994, adapted from the minutes of 16 September 1994.

## Financial Report

### October 92 – December 93

	15 months to 31.12.93
<b>TURNOVER</b>	<b>£</b>
Subscriptions	4,781
Meeting Receipts	2,705
Leaflet Distribution	2,100
Publication Sales	1,597
Pattern Recognition Letters	500
	<hr/>
	11,683
<b>OTHER INCOME</b>	
1992 BMVC surplus	4,122
1993 BMVC surplus	5,986
Bank deposit interest	1,901
	<hr/>
	23,696
	=====
Mailshot preparation	2,286
Mailshot Postage	1,643
Newsletter Printing	229
Meeting Expenses	5,590
Subscriptions	708
Secretary's Expenses	1,175
Travel Expenses	1,816
Postage and Stationary	885
Equipment Assistance: Essex Univ.	(3,189)
Insurance	100
Prize and Bursaries	1,350
Bank charges and Interest	109
Auditor's Remuneration	438
Sundry Expenses	438
	<hr/>
	16,888
	<hr/>
<b>NET SURPLUS</b>	<b>6,804</b>
	=====

The above is the summary of the audited BMVA financial report for the period ending December 1993.



Overall, the financial status continues to be healthy with the Association having substantial reserves.

Margaret Varga, DRA  
BMVA Treasurer

## Image and Vision Computing

FOR BRITISH MACHINE VISION ASSOCIATION (BMVA) MEMBERS ONLY! SPECIAL 1995 SUBSCRIPTION RATE: £60.00 - REPRESENTING A SAVING OF MORE THAN 80% ON THE REGULAR LIST PRICE

Image and Vision Computing, the internationally accredited journal, featuring key developments in computer vision and image processing, is available at a specially reduced price for BMVA members in 1995.

Coverage in the journal is comprehensive, incorporating: computer vision, theory, architecture and applications; image sensing, perception and understanding; active vision, robotics and autonomous systems; surveillance and monitoring; image databases and document handling systems; interdisciplinary aspects of imaging and cognition. Papers are supplemented with diagrams, images and

full colour illustrations of the highest technical quality.

NEW sections recently introduced include EVALUATION and PROMISING RESEARCH TRACK. These supplement the established main sections: Short Communications; Regular Research Contributions; Algorithms and Performance; Application Notes. Special issues are also published intermittently, providing more extensive exploration of specialist topics, such as the British Machine Vision Series (BMVS), presenting key conference papers. The subjects of surveillance and perceptual organization are scheduled for additional coverage in the near future.

Subscriptions to this leading journal at the exceptionally low BMVA members discount rate of £60.00 must be prepaid from personal funds and submitted on a special order form available from the publisher as follows:

Elsevier Science B.V.  
Attn: Ursula van Dijk  
P.O. Box 103, 1000 AC Amsterdam,  
The Netherlands  
Email: [d.dijk@elsevier.nl](mailto:d.dijk@elsevier.nl)  
Fax: +31 20 485 2616  
Tel: +31 20 485 2608

Please also confirm if you require an inspection copy of the journal.

## Software Environment

**A Common Software Environment for Machine Vision**  
Cosener's House Workshop, Abingdon,  
27th & 28th October 1994

A study by Manchester's Wolfson Image Analysis Unit has suggested that the maintenance of the in-house vision systems that various research groups around the country use involves 40-80 man-years per year. A common software environment might not only significantly reduce this maintenance load and combine the design experiences of many groups to produce a better system. It might also make collaboration and the exchange of algorithms considerably easier.

Following a questionnaire covering about 30% of an estimated 900 vision researchers in this country,

a consultation meeting was organised to study the feasibility and requirements of a unified software environment. The meeting, hosted by the EPSRC and the Manchester group, turned out to be a lively and enjoyable affair. The evening of the 27th was an introduction. First, we were given a description of the EPSRC "since Monday" and then a report on the questionnaire results. This was then followed by a description of two currently available environments, Khoros and 3D-Images, which were generally agreed to have some useful features, but to be too limited to be of general use to the vision community.

We were also given a description of the common environment being developed in the USA under ARPA, the IUE (Image Understanding Environment). This has been under development for two years now and should be at demonstration stage by the end of next year. Much of the following discussion, in the Pub and throughout the next day, was on whether this could meet our needs. The 28th consisted of many meetings, in groups and full session, to deal with the technicalities. It was generally agreed that though there are many problems with the IUE, a comprehensive environment was possible and the IUE could yet become such a system. It was therefore decided to continue to liaise with Amerinex, who are developing the IUE and who seem very open to suggestions, and the European consortium who also hope to influence its development. Amongst the (numerous) concerns to be dealt with are lack of consideration in the proposed C++ structures for motion, scale-space and uncertainty. There was also concern that, under the current proposal, the IUE might not compile small, fast applications for real-time demonstrations, or run on PCs to allow effective technology transfer.

When the core code is available, a number of sites in the UK will test its usefulness. If necessary the UK could take what they liked from the development and create a UK Core environment, but hopefully international co-operation will prove as effective as this meeting was.

A full description of the meeting should be available within the next month. For those of you who would like to know more about the IUE there is a WWW site at <http://www.aai.com/AAI/IUE/IUE.html#Topics>.

Jonathan Lawn  
Dept. of Engineering,  
Cambridge University.

## BMVA publicity

The standard BMVA booklet, which we hand out at exhibitions and send to all potential applicants for membership, is now getting quite old and some of the descriptions of research activities are almost certainly out of date. This material and the associated wall posters are probably the first information that people see when they find out about the BMVA and it is often the only exposure that industry has to our activities. It is thus important that it is capable of attracting new membership.

We will be updating this information in the near future and require contact names in any research groups who would be keen to provide materials (images + text). Following a similar advert to this three months ago we have so far received no contributions. We would like to point out that this is a valuable way of promoting your work to potential collaborative partners. Given the current funding climate this represents an opportunity that should not be missed. Those interested should please send names, email address and telephone numbers of responsible contacts to [n.thacker@sheffield.ac.uk](mailto:n.thacker@sheffield.ac.uk) or phone me on 0742 825177. These people will then be contacted in the near future regarding specific contributions.

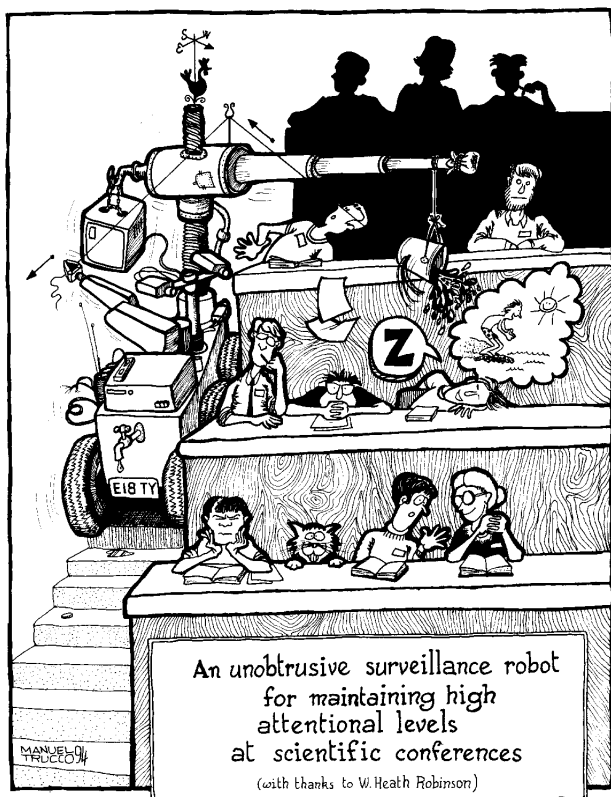
Neil Thacker (BMVA Publicity Officer)  
Silicon Vision Group,  
Dept. EEE.  
University of Sheffield.  
Mappin Street.  
S10 3JD

## BMVC '94

### Guitars, VW Golfs and Point Distribution Models

Reading, Glastonbury, Woodstock, been there, seen that, done that, (probably). I was beginning to think that the summer had passed without the hint of a three day party when what should drop through my door but my registration information for the BMVC 94.. Well ok, so it is unlikely that Nirvana were going to be making an appearance but it got me out of the lab, out of Sheffield and more importantly every evening out of my face! Now I come to think of it, its very unlikely that Nirvana, without the use of a spiritual medium, will ever make an appearance anywhere. Anyway, bright and early Tuesday morning,





three other Ph.D. students and I leaped into an under powered A-reg VW Golf and sped hastily in a Southerly direction. One hour later and after applying a 90 degree affine transform to the map, swapping navigators, (you would think at 25 he'd grown out of sulking) and buying another three quid of petrol we continued our journey in a Northerly direction.

Despite the delay we managed to arrive in time for the tutorial given by Josef Kittler and Chris Taylor on 'Statistical Methods in Machine Vision', well worth the effort. After a short coach ride back to the University followed by a medium sized period of time spent standing around some tables whilst people confirmed that my University had managed to send the cheque late it was time for food, European football action and more importantly copious quantities of beer.

I hate it when rooms spin. I think research should be done into anti-rotational rooms. However if a room is going to spin it could at least have the decency to be as impressive as the Jack Lyons Concert Hall at York, the setting for the oral presentations. To kick off with we had Jan Koenderink giving an invited lecture for an hour, (was that all?) followed by a series of presentations under the heading 'Recognition and Matching'. Notably in this section a couple

of very professionally presented papers from Manchester. After a light lunch, no beer, there were papers on 'Texture and Features' and after tea 'Statistical Methods in Vision'. In between sessions an exhibition was held where companies like Vista Vision and Roke Manor demonstrated camera equipment and the like. I would like to take this opportunity to apologise to the man from Vista Vision after I placed a used teabag in his lens box and then, when he gave me a dirty look, inquired as to whether or not he really wanted to throw his lenses away.

Thursday started with breakfast. Cereal masked by the flavour of sweet and sour sauce. An invited lecture by Kazuhiko Yamamoto followed by a session on 'Active and Deformable Shape Models' was next. It may have been the beer but I was becoming aware of a new Mancunian trend, 'Point Distribution Models'. After lunch was a section on 'Illumination and Colour', which I must confess I missed in order to visit the Jorvic Viking centre in the city. The days presentations ended with 'Calibration and Geometry'. A notable paper here given by Armstrong from Oxford who was suffering, quite ironically, from a dislocated shoulder. Next came the second poster session, i.e. more wine, and the conference dinner, i.e. funny shaped starter, expensive looking desert, wine and speeches.

The last day for me was marred by the fact that I had to give a paper. I therefore missed the first section on 'Symmetry' which contained both the joint winning scientific prize papers from Cambridge. 'Motion and Tracking' was next ("your on kid!") with a nice paper on some excellent work from Neil Maitland of Roke Manor. Finally was 'Architectures for Vision' of which only one paper from Richard Lane seemed really to concern itself with the computer architectural issues, perhaps 'Systems for Vision' would have been a more appropriate title. This session also included the industrial prize winning paper from Hunter of Manchester.

And so having said our goodbyes it was time to leave. You may well have seen a small blue A-reg VW Golf on the road from York to Sheffield on that Friday, but it wasn't us. No, for some reason we were on the York to Hull road.

Tony Lacey  
University of Sheffield

## Texture Classification

### IEE Colloquium on Texture Classification: Theory and Applications, 7-10-94

As the portraits of Ampere, Faraday, Kelvin, and Ohm, amongst others, looked on, the IEE Colloquium on Texture Classification: Theory & Applications commenced on the morning of 7th Oct. 1994. This was also a day on which the London Underground was on strike. The good turn-out at this colloquium was either due to a lot of dedication on the part of the fifty participants or the fact that the strike was more theory than application!

There were a total of nine papers presented, with those in the morning being in the main from the academia and covering primarily theoretical (and work-in-progress) aspects of texture classification, and those in the afternoon providing a more applied view of work carried out in academic and industrial collaborations.

The proceedings began with a presentation by R Wilson on their work at Warwick University on Scale and Frequency in Texture Analysis which attempted to generalise conventional models of texture based on the notion of affine transforms. They used a multi-resolution Fourier transform which has the right representation of spectral and scale information and has the interpolation properties necessary for estimating continuous affine parameters from the discrete lattice structure of the image. Following suitably in these footsteps, M Petrou of Surrey University continued with their work entitled Multi-resolution Texture Segmentation which consists of successive wavelet transformations of the image to produce lower resolution descriptions which allows dynamic focussing on the important regions of the frequency domain for the particular image texture. Next, T N Tan of Reading University presented a discussion of texture classification approaches whose performances are not affected by changes in scale and orientation. S Craske of Bristol University discussed, rather nervously, the use of co-occurrence matrices to form multi-resolution texture descriptors at each pixel, which were subsequently subjected to Canny edge detection and perceptual grouping for edge-map extraction. This was applied to natural textures in outdoor scenes. The final paper of the morning session, Texture Segmentation Using Fuzzy Clustering, was presented by J Oakley from University College of London. This consisted of a comparative study of unsupervised classification of texture between a fuzzy clustering approach and a crisp clustering algorithm. Some of the advantages of the fuzzy tech-

nique were that it was more capable in conditions of cluster overlap, in determining the appropriate number of clusters that best describe the sample data, and in general it was more stable and robust.

The afternoon session was kicked off by M J Chantler of Heriot-Watt University who discussed his paper Towards Illuminant Invariant Texture Classification. This work was carried out to reduce classification errors that may arise due to an illuminant's angle of tilt between training and classification sessions during a texture segmentation process. Next, D Blacknell of DRA Malvern showed the use of multi-variate probability density functions in detecting features of interest or anomalies in a homogeneous region, e.g. the detection of a military target or pollutants in an expanse of water. L Hepplewhite of Brunel University, in conjunction with IBM UK, followed with a very practical and effective co-occurrence matrix based method for the detection of defects on magnetic disk surfaces. The last of the day was D R Carmichel from DRA Bincleaves, in conjunction with Heriot-Watt University, whose paper was entitled Seabed Texture Classification and Object Detection. They used a maximum likelihood supervised classification system to analyse the frequency distributions of image gray-levels.

Finally, some major issues were discussed during the panel session, notably the point was raised that none of the theoretical techniques presented during the morning session, such as multi-resolution, invariance, or fuzzy clustering approaches, were used in the practical applications presented in the afternoon, which mainly relied on tested and tried traditional approaches. Furthermore, despite the many theoretical or practical techniques presented, little was heard about evaluation, implementation and benchmarking. Another interesting issue which came to the fore was the need for a new texture image library, in place of the Brodatz album, which would include more demanding, practical, and better documented examples. For instance, it could include images with variant illumination of the same texture for work on invariant illumination analysis!

Majid Mirmehdi  
Surrey University

## Image Analysis at Silsoe Research Institute

Silsoe Research Institute is one of the institutes supported by the Biological and Biotechnological Sciences Research Council (BBSRC) formerly the Agriculture and Food Research Council. The institute is situated in the village of Silsoe, Bedfordshire approximately 10 miles North of Luton. It carries out research on all aspects of engineering for the biological sciences. The Image Analysis and Control Group is one of the 4 groups in the Bio-Engineering Division. It employs 9 staff from different scientific disciplines, physicists, mathematicians, electronic and mechanical engineers. Members of the group work on aspects of image capture and interpretation, to allow automatic decision making for guiding robotics, making grading decisions and monitoring animals. Biological objects are variable, they are often found in unstructured environments and the decision making may be subjective. The institute's research addresses these problems by looking for generic solutions to various applications.

The problem of variability in the shape of objects is being tackled using snakes and point distribution models. As part of a project to measure the conformation of livestock, the group is using these flexible models of shape and surface shading to locate animals in scenes. Measuring characteristic shape changes gives behavioural information whilst tracking allows the progress of piglets at farrowing time to be monitored. Active contour models are being used to locate key points on animal boundaries to give accurate measurements for meat quality assessment. In work associated with the detection of blemishes on fruit and vegetables, neural networks model the subjective decision making that is characteristic of a lot of grading operations.

The analysis of grey level landscapes for topographical features such as ridges, valleys, hills and saddle points has been applied to the problem of sizing Scottish farmed salmon in off shore fish farms. In the low contrast images obtained from underwater cameras, fish can be distinguished by the ridges they form. The length of these ridges can be used as a measure of the size of the fish. Other work on object tracking is used to measure the response of fish to environmental stimuli.

With funding from the EPSRC / BBSRC's Clean Technology Programme, the group is working jointly with the University of Oxford in the area of selective field operations. The goal is to distinguish between plants, weeds and soil to allow accurate targeting of

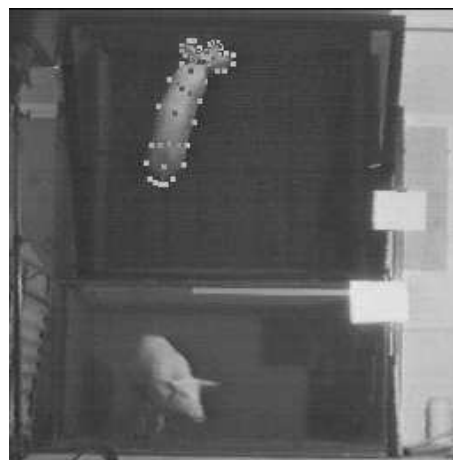


Figure 1: Modelling flexible objects using point distribution models

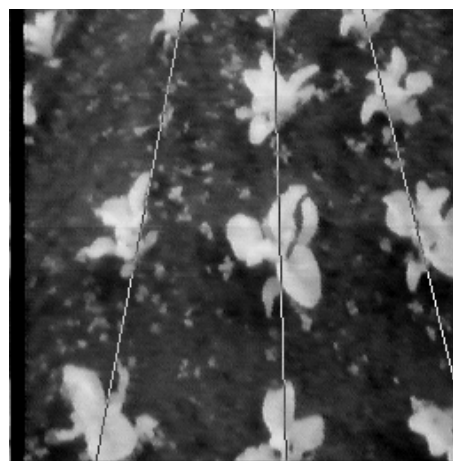


Figure 2: Row detection in field crops using robust estimators

chemicals and to track rows of plants and guide an automatic vehicle. The project tackles the issues of image capture, image segmentation and object tracking. Images are formed using the wave lengths and optical configurations that give the best results for subsequent analysis. Images are then divided into areas of plant, weed and soil. Robust estimators track rows of plants in sequences of images and the output is used to guide a vehicle.

The institute will be holding a BMVA technical meeting in 1995 on image analysis for biologically based applications. The aim is to highlight current research activities in the area and to promote discussion on techniques for the analysis of images of biological objects.