BMVA News

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

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BMVA News[1] 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 23rd January 1998.

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Editorial

I was recently reading "The Great Eskimo Vocabulary Hoax" by Geoffrey Pullman; the great title alone was enough to attract my attention while browsing in the library. The book contains a collection of the author's informal, sometimes lighthearted columns from the journal *Natural Language and Linguistic Theory*. He prefaces the book with some complaints that I instantly related to, and in fact that I had already related to you in the last issue of the Newsletter. Describing the difficulty in attracting any contributions, he says,

> ... there was still no sign of any great upsurge in demand for access among linguists wanting to write ... In fact, linguists were disdaining the task in droves. They were lining up behind one another to avoid volunteering their services.

In some ways this might seem strange given our modern preoccupation with publications; most of us are driven to write as many journal articles as possible. However, there appears to be a great divide between "serious" and "light" prose. Pullman suggests there may have been

> ... a disinclination to go in for nonscholarly writing ... hardly anyone seemed to want to publish flippant and inconsequential chitchat in a place where other


WHAT? HUMOUR?
DON'T BE BORING!
TRY ONE OF OUR VISION PRACTICAL JOKES!
WANNA TRY MY TSAI IMPLEMENTATION?
CALIBRATION
DIGITAL PORTRAITS
SQUIRT!
HE'S BEEN TRYING FOR 18 TIMES
GRR!
RATTLE RATTLE
SHAKE SHAKE
TOC TOC TOC TOC
HEY! SOMEBODY HAS DEFACED ALL THE 1,500 IMAGES IN THE DATABASE!
AH! AH!
AGH!
VRRRRRRP
DIG-IT
FACE RECOGNITION
VIRTUAL REALITY TOOLS
NO! LENA!
UH! UH!
WHO INSTALLED A 1 KAmpere-LASER IN THE BODY SCANNER?
THE TRAGIC TRUTH
NO HOPE PAUL!
DO YOU UNDERSTAND?
NO, I THINK IT'S NOT FUNNY.
SWITCH ME OFF
GEE, A NEW TETRIS VERSION...
MANUEL RUCCO '97
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> linguists would see it (as opposed to uttering their views orally over drinks, which they were prepared to do until the small hours of the morning even when begged to desist).

Odd, don't you think. Pullman's personal feelings, on the contrary, were that he did

> ... not find it incongruous to be attempting to elicit mirth from intellectual issues in an academic context. ... Despite their rather arcane field of research, and their ability to remain eminently serious about working on linguistic problems for huge swathes of time, linguists often have a great sense of humor.

At first this struck me as a radical view; linguists often have a great sense of humour? That might also imply that machine vision practitioners (visionaries would be a much neater title) also have a sense of humour. I do remember reading several years back the paper "Ray tracing JELL-O Brand Gelatin", in ACM Computer Graphics, Vol. 21, No. 4, 1987 by Paul S. Heckbert from the Dessert Foods Division of Pixar. And then there was "HINDSIGHT: A futuristic vision system" by the well known team of Jee U.C. Well and Shore I. Du, which unfortunately was rejected by the BMVC committee. I decided to file them away under "Humour". Unfortunately, that scanty folder still only contains these two papers.

So, besides BMVA's very own illustrious illustrator: Manuel Trucco, the prospect for vision humour looks poor. I know that there are some papers that I've considered to be a bit of a joke, but that's another story altogether.

Results of Elections

The results of the recent elections to the BMVA Executive Committee are as follows:

Member	Votes	status
Mr. Addaway	25	
Prof. Davies	29	elected
Dr. Ellis	33	elected
Prof. Fairhurst	21	
Dr. Petrou	30	elected
Prof. Taylor	34	elected
Dr. Varga	28	elected

Report of BMVA Meetings Officer for 1996-7

Apart from the annual conference, which took place in September 1996, the BMVA organised six highly successful meetings during the year. Several of the one-day meetings had quite high attendance, in one case being well over 60 (see numbers in square brackets below).

The 1-day technical meetings that took place were:

- 16 Oct. 1996, "Low level feature extraction", organiser: Paul Rosin [32]
- 11 Dec. 1996, "Building 3D models of objects and environments using computer vision", organiser: John Illingworth [68]
- 15 Jan. 1997, "New approaches to dynamic filtering", organiser: Steve Maybank [19]
- 12 Mar. 1997, "Data visualisation", organiser: Margaret Varga [16]
- 8 May 1997, "Optimisation issues in computer vision", organiser: Majid Mirmehdi [38]

All five meetings were held at the British Institute of Radiology. In addition the following highly successful 2-day meeting took place:

- 7-8 July 1997, "Medical Image Understanding and Analysis '97", Oxford, organisers: Chris Taylor, Mike Brady, Alison Noble [140]; for information including on-line proceedings see `http://www.robots.ox.ac.uk/~mvl/miua97.html`

Finally, the Scottish Chapter has not been idle and has put on two meetings over the past year:

- "Vision in Graphics" organised by the Turing Institute and Department of Computing Science at Glasgow University
- "Recent Research in Biological Perception of Motion and Depth", organised by the Department of Artificial Intelligence, University of Edinburgh.

In the coming year, two interesting meetings are at the final stages of planning:

- 3 Dec. 1997, "Image and video databases", at the BIR, organisers: Tieniu Tan (Reading) and Matthew Wood (Bristol)

- 21 Jan. 1998, "AI methods and data fusion in remote sensing image processing", at the BIR, organisers: Maria Petrou and Paul Rosin (in conjunction with the Remote Sensing Society)

while a good many further topics are being considered in detail and will appear in the 1998 schedule by the time the next issue of *BMVA News* appears:

- Image processing and the built environment
- Image and signal based analysis of pigmented skin lesions
- Motion segmentation
- People and animal watching
- Neural networks
- Visual guidance of robots
- Medical Image Understanding & Analysis 98
- Personal identity verification
- High dimensionality vision

Finally, some mention should be made of BMVC'98: this will be held at the University of Southampton during September 1998, and is to be organised by Mark Nixon.

I am always ready to receive comments on the types of meetings that we should put on, and indeed to hear of proposals for new meetings from potential organisers. You can also write to *BMVA News* with suggestions and comments.

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Sullivan Doctoral Thesis Prize

The Executive Committee has decided to establish a prize fund to commemorate the contribution made by the late Professor Geoff Sullivan to the advancement of the field of Computer Vision in the United Kingdom and his contribution to the operation of the BMVA. The prize (£250) would be considered for award, on an annual basis, to the best doctoral thesis submitted to a UK University in the field of computer vision, including computational studies of natural vision.

Recommendations for the prize will be considered by a Selection Panel appointed by the BMVA Executive Committee. The decision of the Selection Panel will be announced at the end of the following July. Where possible, the presentation will be made at the conference dinner of the British Machine Vision Conference, usually held annually during September. The successful author will be encouraged to publish the thesis on the World Wide Web if copyright permission is granted.

The submission period for the prize covers a full calendar year (1st January – 31st December). Electronic submissions should be sent to the BMVA Secretary to arrive, at the latest, within 2 months (i.e. end of February) of the year following the date on which the University has formally accepted the thesis. Submissions should be supported by signed authorisation from the student, a supporting statement from the research supervisor, and a recommendation from the external examiner. Submission forms and details of the electronic submission format are available from the BMVA Secretary, and will eventually be made available on the BMVA Web page.

Tim Ellis
BMVA Chairman

(BMVA Secretary: Dr. Neil Thacker, can be contacted by email at nat@sv1.smb.man.ac.uk).

Book Review

From Living Eyes to Seeing Machines edited by *M V Srinivasan and S Venkatesh*, ISBN 0 19 8577850, Oxford University Press

Can simple visual systems such as those possessed by insects provide useful principles for the design of novel algorithms in vision and robotics? There have been some well-known prima-facie cases: in the 1950s, lateral inhibition was discovered in the horseshoe crab *Limulus* and was afterwards invoked as a general mechanism for edge enhancement in human vision; also in the 1950s, autocorrelation was found to underlie the optomotor response of the beetle *Chlorophanus Viridis* and was later repeatedly incorporated in models of vertebrate motion detection. The path of the technology transfer is, however, sometimes convoluted; for example, the application

of autocorrelation to human motion vision, first attempted in the 1970s and then again in the 1980s, was certainly based on the earlier invertebrate work in *Chlorophanus*, but parallel formulations were developed (J. Thorson, personal communication, 1997) in radiophysics in the 1940s and earlier (e.g. Briggs *et al.*, 1950; Krautkraemer, 1950). In fact, Krautkraemer's paper was a summary of his doctoral work in Cologne during 1937–1943, which was entirely unconnected with biology.

There are, even so, good reasons for considering vision in insects: the numbers of neurones they have in their brains are several orders-of-magnitude fewer than in humans, their eyes are immobile, and they have fixed-focus optics; yet they have visual systems that are fast, precise, and reliable (consider how a house-fly evades a fast-moving swat, chases another fly, or lands on the edge of a cup). If nothing else, these relatively simple systems demonstrate that solutions to practical problems in pattern recognition, motion detection, and navigation do not necessarily require the massively complex resources of the human visual apparatus. This edited volume sets out some of the experimental and computational evidence supporting this proposition.

In the first contributed chapter, Land and Collett show for the non-zoologist what is on offer from the invertebrate repertoire in active vision. They identify a range of techniques including strategies for dealing with rotational image stabilization, fixating stationary targets or tracking moving ones, distance measurement, exploration, and feature-extraction. The next few chapters deal with particular vision systems. Lehrer considers how depth information is actively acquired by honey-bees using strategies such as altering their flight patterns to detect depth discontinuities and learning landmarks close to the target region. Horridge analyses pattern recognition by honey-bees, which seem able to recall images in an eidetic, "pixel-by-pixel" fashion and to discriminate images on the basis of global geometric properties such as radial, circular, and bilateral symmetry, an ability which has also been investigated in human observers, most notably by Peter Dodwell. Frost and Sun examine how pigeons can use image motion to segregate objects from backgrounds, avoid collisions, and estimate self-motion.

The following chapters are more theoretically oriented. Rind describes a neural network based on the input organisation of neurones in the locust visual system that operate as looming detectors. Cliff, Harvey, and Husbands take a more abstract approach still, and analyse two networks from separate populations, each artificially evolved by genetic algorithms. Wehner concentrates on two mechanisms subserving navigation by bees and ants: one helps to determine the instantaneous direction of motion with respect to the pattern of polarized light from the sky; the other helps to determine distance from home using a rough, path-integration algorithm. Dahmen, Wüst, and Zeil use computational methods to determine the principal limits on the extraction of egomotion parameters from optic flow. Fermüller and Aloimonos address the question of how rigid motion is encoded in the changing images experienced by a moving sensor, namely, a spherical or planar eye. The computational theory they describe leads naturally to direct perception of 3D motion based on detecting invariant patterns in the 2D spatio-temporal image representation, an approach associated with the work of James Gibson.

In the last two chapters, Weber, Venkatesh, and Srinivasan, and Srinivasan, Chahl, Nagle, and Zhang consider some of the short-cuts used by invertebrates to navigate with the aid of low-level, minimum-computation strategies. One short-cut involves computing an equidistant path during motion between obstacles or along a corridor by balancing the speed of image motion on the two eyes; another involves estimating range by a peering motion of the eye in a direction perpendicular to the optical axis. The viability of these principles is demonstrated by their incorporation into the design of navigating robots.

Although Cliff's chapter and some others do touch on the larger theoretical questions—the existence of representations and uniqueness of solutions—the scope of the book is sensibly limited. And it succeeds, providing an accessible introduction to the field, and a salutary reminder of what can be achieved by "simple" visual systems.

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Krautkraemer, J. (1950) Ueber Wanderungserscheinung rascher Feldstaerke-Schwankungen von Ionosphaeren-Echos. Archiv der Electrischen Uebertragung 4: 133-138.

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Benchmarking and Algorithmic Evaluation

Machine Vision Applications has recently responded to a well needed re-focussing of effort in the area of algorithm evaluation and benchmarking by bringing out a special issue on Performance Evaluation (Vol 9. Num 5/6/ 1997). The issue brings together attempts to develop characterisation techniques for a broad range of applications covering topics from feature detection through to texture recognition and determining the fundamental matrix.

Christensen and Forstner give a very powerful argument for a need for increased efforts in this area. The bottom line being that the research area cannot advance without a well founded methodology for evaluation and test. It is not necessary to read between the lines to see that, in their opinion, this methodology is not currently in place and our subject has real problems. Not least the lack of use of much research in practical applications.

This is followed by a group of papers which explore several imaginative, and on the whole new, developments for performance characterisation. These include techniques to evaluate the functional complexity of high dimensional datasets (Vanrell *et al.*), and algorithmic modeling (Courtney *et al.*). There are also some more familiar exercises in comparing estimated parameters with ground truth and repeatability (Masden and Eggert *et al.*). The latter of these manages to demonstrate quite nicely (though probably unintentionally) that algorithms which make equivalent use of the same information will give near identical performance.

The paper on accuracy of determination of the fundamental matrix in compressed images (Torr and Zissermann) is a particularly thorough piece of work, which demonstrates the importance of working with high quality image data while also giving some much needed quantitative measures on expected performance.

The flavour of the whole issue is towards identifying meaningful performance measures as well as reliable and achievable techniques to estimate them. Though there are clearly several questions raised by various aspects of the work, the coming of age of this area as a publishable topic has to be recognised as a step forward. I look forward to seeing more papers in this area at conferences and in other prestige journals.

In the meantime, for those of you who would like to know more about research activities in this area there is now the inevitable web page at: `http:pandora.imag.fr/ECVNet/benchmarking.html` which includes links to a variety of evaluation studies, including image restoration (for the space telescope), optical flow and feature detection.

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A Roundup on BMVC97

German/American Perspective

This year's British Machine Vision Conference at the University of Essex in Colchester, England from September 8 to 11, 1997 afforded an excellent opportunity for the members of the British computer vision community and vision workers from abroad and their students to meet and discuss the state of science and technology in machine vision. The conference offered a forum for the delegates to report on results of their current research. It is particularly important for people coming into the field to personally get to know older and younger colleagues.

The organization of the conference was excellent; it proceeded invisibly without a hitch.

When I saw Paul Rosin, who invited me to do this write-up, at the beginning of the conference, he told me he welcomed my observations, because with the British Machine Vision Conferences, which are essentially inbred affairs, there exists an immanent possibility that the conference looks qualitatively different to outsiders as compared to insiders. I'm not sure if he was fishing for complements or asking for scathing criticism. On the basis of this request, I jotted down my immediate opinions of the talks while I listened to them. (I confess to not including the posters.) My ratings straight from the hip are

Very good	7
Good	16
Okay	11
Poor	6
Total	40

As you might well imagine, these ratings, besides being reflective of my personal interests, were highly influenced by the style of presentation, which is, of course skewed towards talks given at the beginning of

the daily sessions, given by native speakers, containing lots of entertaining visual material, etc. Please treat the ratings with care.

Quite a few talks at the conference dealt with faces, specifically with tracking or recognition. The number of British researchers currently interested in this topic appears to be sizeable. The problem of recognition has, of course, been around for some time, and it has always engendered considerable commercial interest. One of the delegates told me he thought that if someone solved the problem, the solution would be kept proprietary. Be that as it may, it would be a good thing if the collective efforts witnessed at the BMVC97 would lead to a solution of the face recognition problem in the immediate or near future. In my opinion that would be a landmark.

Most of the talks presented at the BMVC97 involved joint work and ongoing research. Some of these projects were certainly described in previous conferences. Bad scenarios arise if n delegates present joint work describing a project, which they've described k times before in previous conferences, and where new material is less than half of ϵ. One of the members of the program committee told me he had rejected a number of papers like this when drawing up the program. I suppose to a certain extent something like this is inevitable.

On the other end of the scale, I think the authors Rosin and Lucas, each of whom gave a talk on individual work – and in course of the refereeing process, successfully competed against the collective wits of their rivals – deserve special mention; I hope that their papers get the attention they merit. If you are a junior colleague, who included – by necessity – the name of your supervisor as a co-author, despite that fact that his actual contribution was minimal, please add yourself to this list.

I hope that the program committees of future BMVC's will continue to be receptive to papers which present novel things which the vision community didn't know about already and keep it at the high level it was in 1997.

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Finnish Perspective

The eighth British Machine Vision Conference in Essex University was the most successful one. Nicely planned program with interesting talks and two invited sessions gave me an excellent view on the machine vision research in the UK. I especially enjoyed the invited talk given by Prof. Peleg on video mosaicing. Unfortunately I missed the tutorial on the image understanding environment. In addition to the excellent program also the organization was smooth. The local staff was really nice and made everything to make the conference succeed. The social program included the reception at the Colchester Castle Museum and the conference dinner. The reception was very nice since there was plenty of time to wander around the museum and look at the exhibitions there. The excellent dinner at the Moot Hall completed the memorable evening. To sum up, I really enjoyed the BMVC97 conference, the scientific and the social program as well as the beautiful surroundings of the Essex University.

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Australian Perspective

I attended the British Machine Vision Conference, recently held in Colchester, for the first time this year, and was impressed with what I saw. This report come from what must have been the most remote delegate, travelling about seventeen thousand kilometers from Australia.

The first impression, before I even registered, was of the natural beauty of the campus of the University of Essex. The next impression, after the start of the conference, was of the enthusiasm and organisational skills of the chairman, Adrian Clark, whose efforts surely made the conference the success that it was.

The overall quality of the research, and the presentations, was very pleasing to see, and a refreshing change from what I have seen in some conferences closer to home. I was particularly interested in work in stereo vision and motion segmentation and tracking, and there were a number of excellent papers presented in this area. It was also interesting to learn about other areas of research, and I discovered that referring to PDMs was almost mandatory at the conference, although they are not so widely used where I come from.

Perhaps even more useful than the formal presentations were the informal discussions that took place over various meals, and the contacts that were thus made. The provision of the meals at the conference was a great way to bring the delegates together, and should be more widely utilised at other conferences.

Finally I would like the thank the British Machine Vision Association, the chairman Adrian Clark, and all those involved for providing such an excellent conference.

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IEE IPA Conference

6^{th} International Conference on "Image Processing and its Applications" Trinity College, Dublin, Ireland, July 1997

This was the sixth in the series of image processing conferences organised by the IEE and was just as successful as its predecessors. Professor Mike Fairhurst and his team of organisers are to be congratulated on yet again achieving a memorable and worthwhile event. My own reaction, which I heard echoed by others many times, was the wide and interesting range of papers presented at the meeting. Although this necessitated three parallel sessions, so that delegates could not attend all the presentations, this did not seem to matter: indeed, having a choice of talks to go to suits a great many people – especially as all the papers can be found in the proceedings. More important was the lively spirit of the conference, which was no doubt fostered by its location in Dublin, close to the Temple Bar centre (which is renowned for its variety of restaurants, cafés and pubs, in many of which there is singing to all hours!). Naturally, after such a success, the conference promises to re-appear in two years' time, though the venue is still uncertain: maybe if you write to me with your views (in my other capacity as editor of *E4 News*, the newsletter of IEE Professional Group E4 *Image Processing and Vision*) you can influence the choice, but my (uninformed) guess is that after England, Holland, Scotland and Ireland the organisers will have to choose my home country of Wales!

Finally, just in case you missed the conference, it's not too late to order the Proceedings (IEE Conference Publication no. 443) from the IEE Publications Sales Department at the IEE, Michael Faraday House, Six Hills Way, Stevenage, Herts SG1 2SD; tel: +44 (0)1438 313311; fax: +44 (0)1438 742792.

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Forthcoming BMVA Technical Meeting

Image and signal based analysis of pigmented skin lesions

To be held at the British Institute of Radiology, London, 18 March 1998.

Melanoma is a malignant tumour of the melanocytes, the pigment forming cells of the skin. Its incidence in the UK is increasing at 10% per annum. If it is detected and removed early, whilst residing in the top layer of the skin, patients can usually be regarded as cured. Once it has infiltrated into the dermis below, however, the outcome progressively worsens with the depth of invasion. The clinical diagnosis of melanoma is not easy even for clinical specialists. A recent large study has shown that approximately $\frac{1}{3}$ of melanomas are missed by clinical diagnosis alone. There is a widely acknowledged need amongst medical professionals for an aid to reliably distinguish melanoma from innocent pigmented lesions. There are a number of groups worldwide working on computer analysis of lesion images and on various approaches to supporting the diagnosis, including statistical methods, neural networks and genetic algorithms.

It will be the purpose of this meeting to bring together UK researchers who are already involved in the subjects but who may be working in isolation; to make medical practitioners working on pigmented skin lesions aware of relevant developments in image and signal processing and pattern recognition; to make technical researchers aware of the problems facing medical practitioners; to inform others in the image processing and pattern recognition community about problems and challenges in the analysis of skin lesions; to encourage dialogue between technical and medical researchers.

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Calls for Papers

6th International Symposium on Intelligent Robotic Systems '98

Edinburgh, Scotland, UK, 21-23 July 1998

Aim and Scope

The aim of the event is to cover all modern approaches to robotics problems. It will provide invited lectures by established personalities, original presentations by junior scientists about research in progress, and discussions in particular on (but not limited to) the following topics:

- Mobile Robotics
- Active Perception
- 3D Reconstruction
- Learning and Control
- Cooperation
- Control Architectures
- Robotic Applications
- Planning and Plan Execution
- Fuzzy and Neural Networks
- Techniques for Control
- Miniature Robotics

The event is organised in cooperation with the International Society for Intelligent Autonomous Systems and sponsored by the Department of Artificial Intelligence and the EC TMR Networks SMART2 and CAMERA.

Submissions

Authors wishing to submit a paper should send FOUR copies of an extended abstract of approximately FOUR pages to the Programme Chair. Three copies must be anonymous (title and abstract only), the fourth have full author contact information, which MUST include the author's EMAIL address. All accepted papers will be published in the Proceedings of the Symposium. The conference language will be English.

Timetable

Reception of extended abstracts	9 March 1998
Notification of acceptance	29 April 1998
Reception of full papers	8 June 1998

Further Information

All information related to SIRS'98 is available at the following web site: `http://www.dai.ed.ac.uk/SIRS98/` Detailed information regarding programme, conference fee, accommodation and social events will appear in the SIRS'98 web site at the appropriate time. Questions can be put by email to: `sirs98@dai.ed.ac.uk`

IEE PG E4 Colloquium on High Performance Architectures for Real-Time Image Processing

To be held at Savoy Place on Thursday, 12 February 1998.

Digital image processing places extremely high demands on processors and algorithms in order to meet typical real-time requirements (largely attributable to the very high bandwidths of the data and the complexity and difficulty of the tasks demanded by a variety of automated application domains). Although general purpose programmable machines are becoming ever more powerful, rarely can they meet the real-time requirements of many image processing and interpretation applications. Furthermore, there are many applications where general purpose systems are not appropriate (turn-key and portable systems, for example) and application specific designs are required. A number of architectural and algorithmic approaches to meeting the demands of real-time processing have been investigated, often involving parallel programming paradigms and/or special purpose DSP and ASIC devices and modules together with the necessary high bandwidth interprocessor communication structure.

This Colloquium aims to bring together hardware and software researchers concerned with achieving both generic and specific architectural solutions for real-time image processing and image analysis.

Contributions are invited from those active in the above area. Potential contributors are asked to submit a short abstract, to arrive no later than Wednesday, 12 November 1997, to the programme Co-ordinators.

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IEE PG E4 Colloquium on Non-linear signal and image processing

To be held at Savoy Place, London on Friday 22 May 1998; organised by Professors Roy Davies and Alan Holt (E4) and Mr. Andy Fraser (E5).

The purpose of the meeting will be to air and discuss issues, methods and the latest non-linear signal and image processing techniques for such applications as non-destructive testing, geophysics, remote sensing and ground probing radar. In these areas, non-linear operations are able to achieve things which linear operations cannot – not least, elimination of interference in all its forms. In acoustics, elimination of cracks, pops, scratches and echoes is important, while in imagery, salt and pepper noise, blur and irrelevant detail all have to be removed or suppressed, often in special ways, with the aim of initiating segmentation or performing pre-processing prior to recognition operations. Indeed, non-linear processing includes the whole of the topical area of morphological operations. This colloquium will cover a range of applications of non-linear filters as well as current developments in the theory of non-linear filtering.

Prospective authors should submit an extended abstract (≈1000 words) describing their contribution by 22 February 1998 to:

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