Bulletin
of the Rutherford Appleton Laboratory
2 June 1986 No.5

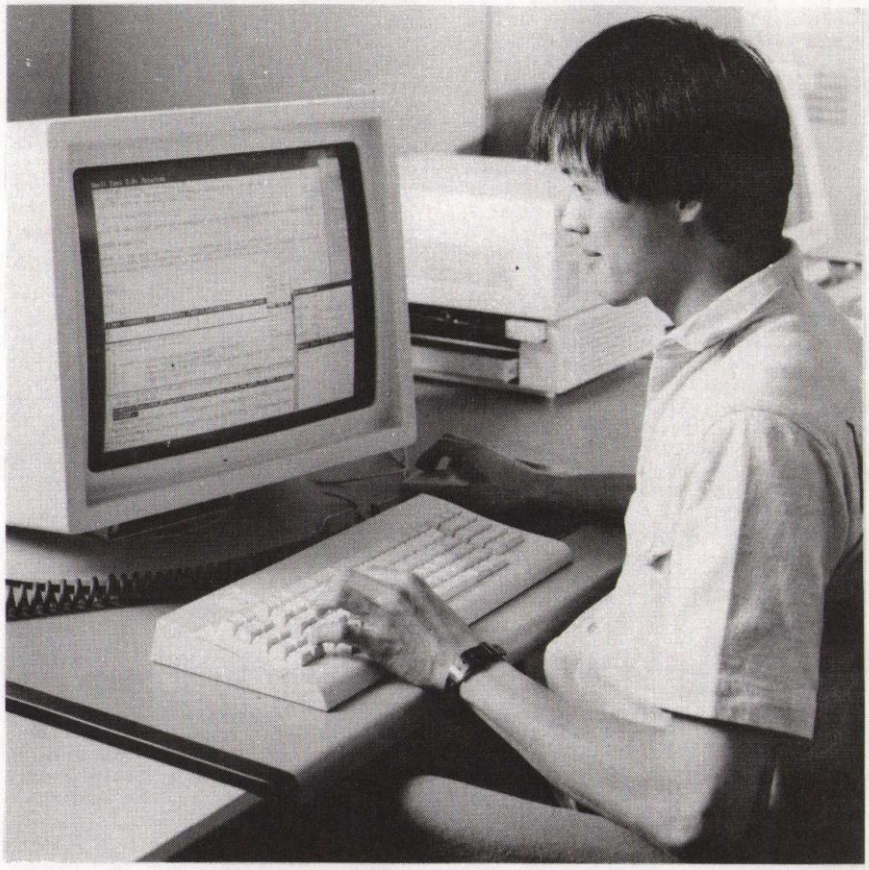
The Role of RAL in IKBS

(Intelligent Knowledge Based Systems)

The Laboratory first became involved in this rapidly developing field of advanced computing at the end of 1983 with the launch of the UK 'Alvey' programme for support of advanced Information Technology. The IKBS section was set up to provide technical support and coordination of the Alvey IKBS research programme; the section has subsequently successfully bid for research funds and is now just beginning to investigate possible applications of this technology within the Laboratory.

What is IKBS? It is sometimes defined, not very helpfully, as applied 'Artificial Intelligence' - the study of how to make a computer do things that in a person we would regard as exhibiting 'intelligent behaviour'. The earliest uses of AI were in game playing (like chess or backgammon) but the scope is now very wide. It covers particularly tasks which human beings perform with consummate ease but which computers can scarcely begin: instantaneous recognition of objects in a complex scene, instantaneous understanding of language read or spoken, learning from experience, making 'obvious' inferences etc. A straightforward human job such as delivering and collecting post down a laboratory corridor involves so-called 'simple' tasks such as recognising offices, locating whatever receptacles are being used as post trays, sorting out envelopes etc. The sheer variety of tasks is not remotely within the range of any software that can currently be constructed even if we could give a robot the mobility and sensors required.

Curiously a slightly more tractable province for AI is, those problems which we normally think of as requiring a high degree of intelligence - solving mathematical problems, diagnosing medical symptoms, maintaining complex machinery, designing electronic circuits, interpreting data, etc. The reason is that such problems although very difficult, involve a relatively 'narrow domain' of knowledge. Storing in a computer the data necessary to make a medical diagnosis is currently much easier than storing whatever data are required to recognise that an upended top of a Xerox carton, with a cup of coffee standing in it, is somebody's 'In-tray'.



Testing a natural language interface using 'Prolog'. 86FB2630.

The realisation that the performance of 'intelligent' tasks typically requires large amounts of rather ill-structured 'knowledge', is crucial, and explains the appearance of 'KB' in IKBS. Early game playing computer programs failed because it was believed that the application of the (fairly few) rules of chess by a fast computer was all that was needed. In fact the chess expert relies on long experience of winning patterns, gambits and assessment of positions and a winning computer program must have similar knowledge available. Typically of course the expertise is implicit and difficult for the player to articulate.

It is this huge problem of representing 'knowledge' and reasoning with it, which makes IKBS a subject in its own right rather than a rag bag of computing techniques. The search for new ways of representing and manipulating knowledge has led to a range of new programming techniques and languages which are making an impact in computing generally.

'Prolog', for example, is a language whose statements represent facts and rules about the real world. The application of logical inference

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IKBS at RAL

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yields a programming language of rare elegance and power. Prolog was invented in Europe and some of its leading exponents and experts are in the UK. The language sprang into prominence when Japan chose 'logic programming' as the basis of its fifth generation computer project.
'Production Systems' - essentially rules acting on a database - give another knowledge representation technique at the basis of many 'Expert Systems' on the market. These and many other programming 'paradigms' have been found more effective than traditional programming languages when applied to AI problems both in initial implementation, in validation and in subsequent enhancement.

The potential commercial value of systems which can see, speak, listen, advise - even in narrow domains - is great, and so IKBS was chosen as one of the enabling technologies to be supported in the Alvey programme. There was a small but excellent academic research community in the UK; this has now expanded and there are a large number of companies also involved. Particularly there has been an explosion in the production of software to produce 'expert systems' - systems which can embody specialist knowledge and give advice in a narrow domain. Expert Systems have been produced in a wide variety of applications: medical, legal, financial, engineering design, machine fault diagnosis, military, aerospace, oil exploration, scheduling etc. There are about 500 products on the market. Unfortunately many are primitive and could not be said to exhibit intelligent behaviour any more than the average spreadsheet program.

The Laboratory's role in supporting the Alvey IKBS programme has been wide ranging. It played a large part in coordinating the original research proposals, is responsible for ensuring all projects are monitored, runs research clubs and workshops, issues a regular mailshot and computer-based bulletin board. The IKBS section promotes standards in the languages/tools being used, and undertakes assessment, support and distribution of software and hardware. The section is beginning to establish a research programme: there is a project in the area of 'classification and representation of knowledge in Expert Systems'. This involves working with a number of banks and financial institutions who are developing a financial Expert System partly with Alvey funds. Another research topic is the area of 'Intelligent Front Ends' - these aim at allowing non-expert users to access highly complicated software packages.

The size of Rutherford Appleton Laboratory and the range of its activities should indicate numerous possible applications of IKBS. The section now has a range of software and expertise which has allowed it to begin pilot projects in Expert Systems applied to both scientific and administrative work. Initial explorations are in areas of interpretation of regulations, and planning work in the VLSI mask fabrication facility. Generally expert systems have been successful where the domain, although complicated, is narrow and where there are human experts (albeit a shortage of them). It would be interesting to know of further potential applications within the Laboratory of these novel techniques.

C J Pavelin

Obituary

Roger Gray

Friends and colleagues of Roger Gray were saddened to hear of his tragic and untimely death on May 6th after a short illness. Roger was well known throughout the Laboratory and especially in HEP Division which he joined in 1965. At that time, he was attached to the Imperial College group working on Nimrod. Later, he transferred to the π9 group also on Nimrod and stayed with that group when it went to CERN to mount experiments in the charged Hyperon beam. During the last 3 years, he served another period at CERN in the EMC experiment, returning only recently to the Laboratory to join his colleagues in the ALEPH project at LEP.

A Berkshire man, he was a product of Stoneham school, Reading who spent his early working years at Aldermaston Court on the AEI Reactor and then at the Oxford Van der Graaf machine.
He was an accomplished sportsman, having played rugby for the Wasps 1st XV, excelled at cricket and reached a high level of competence as a swimmer. In addition, he had a keen interest in amateur dramatics, playing star roles in productions of the Compton Players.

Our division has lost a fine colleague, a first rate technical physicist and a great friend. Roger will be remembered not only for his wizardry with equipment, but for his gentle, unassuming manner, his wry sense of humour and for his stoicism in adversity. We extend our deepest sympathy to his parents and children. Donations are still being collected to be given to the Newbury and District Cancer Care Trust. It is hoped to provide a pain relieving piece of equipment in Roger's name.

Internal Events

NEUTRON DIVISION SEMINARS
R3 CONF ROOM, - 1330 hrs

3 June	Workshop : Maximum Entry Technique G J Daniell/Southampton 'Of Maps and Monkeys'
10 June	Dr W C A Pulford/RAL 'Biophysics for Physicists'
17 June	Prof J Finney/Birkbeck 'Ices on ISIS? Structural Disorder and Transitions in High Pressure Ices.

Alexander Rose Day

The flag day for you to support local charities caring for local people in your own community.
Wednesday 11 June.

Bulletin Problem Page?

The Bulletin at present is primarily concerned with making announcements of what has, or is going to be achieved, or with what facilities are available - ie. "I've got a solution", "has anyone got a problem?" kind of approach. I am proposing a new kind of article which would give scientists and engineers the facility to air various immediate scientific and technical problems which they are trying to solve.

Within the readership of the Bulletin, there may well be someone who can provide a new idea, or who has some relevant expertise/experience to solve a particular problem. So this asks: "I have a problem", "anyone got a solution?"

Since people probably have wider experience than 'needed' for their present fields of work, and since different fields may overlap anyway, it would seem quite likely that this sharing and airing of problems could well bear some fruit, after all, many heads must be better than a few if applied in the right way! Any offers?

N Whitehead.

Tale(tail) of a Disappearing Mouse

A mouse, which is used with a software package on an IBM personal computer disappeared from terminal room 2.51 in R5 in April. A search was made for it, users questioned - all to no avail.

They won't adopt a cat, so please we ask, can we have our mouse back?

Joyce Wells Ext. 5424.

Civil Service Benevolent Fund

1986 Centenary Appeal

The Civil Service Benevolent Fund, which was founded in 1886, exists to help serving and retired Civil Servants (and in recent years, certain others) who find themselves in need of assistance because of ill-health or other misfortune. Financial help in the form of grants or allowances can be offered in suitable cases, both to serving and to retired employees, and dependents may be helped. A number of residential homes are provided for infirm or disabled beneficiaries and there are several convalescent centres where accommodation can be offered at a reasonable charge.

In recent years the scope of the Fund has been extended to include employees of a number of organisations outside the civil service, including for instance the Research Councils. All employees of the SERC whether or not they regularly contribute are now eligible for help from the Fund if they find themselves in need and can subscribe to it by authorising a small weekly or monthly deduction from pay or salary. It should be noted that certain RAL employees have already received assistance from the Fund.

This year the CSBF is launching a special Centenary Appeal for money to be used to extend its facilities to meet some of the increased need for places in its Residential Homes. The target for this Appeal is £1 million, much of which it is hoped to raise by office, workshop and laboratory collections. These collections will have been started at RAL by the time this Bulletin appears, and it is hoped that everyone will be able to make some contribution. No specific local target has been set, but if each person at the Laboratory gave as little as 25p (and no doubt those in a position to do so would wish to give significantly more) a respectable total of £350 could be forwarded to the Fund.

As people are often away from the Laboratory, or are missed for other reasons when collecting tins are taken round, anyone who has not yet been approached and who wishes to contribute should send a brief note to, or call the Appeal Organiser for RAL (J H Aram, R12, Extension 6102). Someone with a collecting tin will then be asked to make a call. It should be noted that cash shall not be sent through the internal mail system.

It is thought that RAL employees at present overseas in locations such as CERN or Hawaii may wish to make small collections among themselves. Any sum so collected may be forwarded to the Appeal Organiser who will record the amount separately, if so desired.

Details of all the amounts collected will be published in the next issue of this Bulletin.

RAL TECHNOLOGY LECTURES

The next lecture in this series will be held on Thursday 26 June 1986 at 3.15 pm in **Conference Room 12 Building R68.**

RENEWABLE ENERGY RESEARCH IN BRITAIN

by

MR H A COLE
PUBLIC RELATIONS GROUP
HARWELL LABORATORY

The meaning of renewable energy. Energy from the sun; solar panels, solar cells, solar furnaces. Energy from the Wind; types of aerogenerators. Energy from the Waves; types of wave power devices, (ducks, rafts, buoys, etc.). Energy from the Tides; the Severn barrage scheme, La Rance barrage power station. Energy from geothermal heat; geysers, hot water acquifers, hot rocks. Energy potential from renewable energy sources. Advantages and disadvantages.

FOR YOUR DIARY: The next lecture in the series will be held on Thursday 25 September 1986 in the Lecture Theatre.

Missing

The following items are the subject of loss reports. Would anyone knowing anything of their whereabouts please contact the enquirer.

AVO model 8	Ser.No. 10759-C-464D
AVO model 7	Ser.No. 16137-A-650
Megger BM6	" " 1937869
" "	" " 1994000
" CBT	" " 0245364
Ohm Meter/Megger 500V.	Ser.No. X000277
ABM Intertec Calculator, type 121	Ser.No. 60777

B Bridgeman, Ext. 5563, R18.

2 National Panasonic Video Cassette Recorders Type VR-370.

Ser. Nos.	B5KC06257
	C5KC00132
Inventory Nos.	R037558
	R037559

Mike Hapgood, Ext. 6520, R25.

Makita Heavy Duty Battery Drill Set Electrician's Tools in case.

B G Prior, Ext. 5573, R18.

"Orthodentic" spot welder	Ser.No. 1028
'Scintilla' saw	" " 30963
AVO model 7	" " 237A-1041

J H Aram, Ext. 6102, R12

Trade Exhibition

Martron-Yokogawa will be displaying their range of test and measuring equipment in the R20 layby on Wednesday 4 June from 10.00 hrs to 16.00 hrs.

RAL Report 1985

The moment you have all been eagerly awaiting! The RAL Annual Report 1985 is now available in the Library.

Discount for RecSoc

Discounts have been negotiated for members by the RAL RecSoc, for goods bought from the following retailers.

Wigfalls, Wantage (electrical)	5%
Motorquip, Wantage (motor spares)	10%
Richardson, Wantage (Jewellers)	10%
Westsports, Wantage (sports goods)	10%
Touchwoods, Abingdon (sports goods)	15%
" Oxford " "	15%

Film Badge Notice

It is period 6 Colour strip BLUE
Please be sure you are wearing the correct dosimeters and that all old ones are returned to Jenny Coates.

NEXT FILM ISSUE
Monday 16 June

Sales to Employees

The sale of scrap materials to RAL employees will take place from 12 noon to 12.30 p.m. at the R24 scrap compound on Fridays 13 and 27 June.

Christian Fellowship

The Fellowship meetings are held in R2 Conference Room at 12.30 pm on Thursdays. Visitors are always welcome.

June 5	Bible Study	Ray Powell
12	Prayer meeting	Lester Gale
19	Visiting Speaker	
26	Book Review	Grace/Janet/Gilles

Enquiries to Margaret Summers, Ext. 5617.

RAL Wives

The June coffee morning will take place at Sheila Harries house, 38 Oxford Road, Cumnor on Thursday 19 June.

We look forward to seeing you all at the usual time 10.30 am until noon. Weather permitting we hope to be able to sip in the sunshine outdoors.

For information about our gathering, please contact:

Celia Lockwood	Zoe Patrick
6 Long Barn	3 Bosley's Orchard
High Street	Grove
Sutton Courtenay	Wantage
Tel. Abingdon 847266.	Tel. Wantage 68809.

Retirements

"Bert" Hadley

'Another collaboration'. John Harries (left) and Ron Newport (right) both thank Bert for his work. 86 RC 2361.

Bert Hadley has qualifications in electrical engineering, electronics and mechanical engineering, which equipped him well for his varied and very successful career as a designer, Ron Newport told us at Bert's retirement presentation last month. He also had an outstanding knack of being able to literally take a 'back of the envelope' design and turn it into an elegant engineering solution, usually overnight, John Harries informed us at the same ceremony.

This talent had, for the past few years been used by Bert to design equipment for the ISIS beam-lines and experiments whilst at the same time becoming one of the finest space instrument designers in the world. His leaving is a profound loss to the Laboratory.

Bert's career spanned the PLA, Nimrod, Nimbus E, Nimbus G (SAMS), and ended most satisfactorily with the inauguration of ISIS and his basic design for a new generation of space instruments being accepted as standard.

Wishing Bert a long and happy retirement, Ron Newport presented him with the traditional Ray Roberts cartoon with the good wishes of his many friends and colleagues. A screen was then removed to reveal two sun loungers and a garden table complete with a parasol.

Bert said that he was not really looking forward to retirement but that the time had eventually come. He remarked that he must be one of the few people to have been on the maximum of their scale for 29 years and that during his working life, he has never once had a day off sick - he was always ill during the holidays. He said that he had always worked with good people and wished everybody well for the future. He thanked everyone very much for the splendid gifts and good wishes and was now hoping for a good summer.

Bill Jones

'And so say we all'. Bill with Jim Valentine - and card. 86 RC 2371

On 30 April over 100 people gathered in the Atlas Colloquium to say farewell to one of the Laboratory's longest-serving Admin staff.

Bill Jones joined NIRNS in 1960 from the UKAEA Oxford office, having started work in 1936 as an Accounts Clerk for the Wessex Electricity Co in Abingdon and having spent the years 1941 to 1946 in the RAF as a Wireless Operator.

Bill's 25+ years at the Laboratory fell into three distinct phases, the first and last of which were spent in the Finance area. His middle period, from 1969 to 1977, he spent in what was originally the Atlas Computer Laboratory working on computer utilisation analysis.

Presenting Bill with a gold watch on behalf of his colleagues, Dr Valentine reminded everyone of the tremendous changes in working methods which had occurred during these 25 years and thanked Bill warmly for the contribution he had made. Bill, modest as ever in his reply, thanked all those who had made it a pleasure to come to work and remarked that his parting gift was not only welcome but very 'timely' as his war-time watch was showing distinct signs of wear!

Bill Jones will be remembered as a courteous and gentle man, and a willing and able colleague, especially by those much younger staff whom he has guided during the early stages of their own careers. We wish him a long and happy retirement.

Thanks

Janet Fraser thanks all friends and colleagues for their good wishes and leaving present. "I have enjoyed working with Computing and Informatics Divisions and I will pop back occasionally to see you all", she writes.

Jane Brown wishes to thank all who contributed to her leaving present.

"When I finally had time to study the signatures on the card, I was amazed to find that I knew so many people!", she writes.

Though apologising for not saying thanks to everyone personally, she says she expects to be popping in with the new addition, when she can see everyone.

"Thanks for being such a nice bunch to work with, she ends.

'Bert' Hadley thanks his friends and colleagues for the grand send off, on his retirement, and says farewell to those he missed seeing.

"The garden furniture will be much used and appreciated", he says. "My thanks go also to my excellent team and those past members who have also retired, for their support and hard work, enabling the varied engineering projects to be completed successfully, (not least being the magnet coils for Nimrod, a section of which stand as a permanent exhibit outside the ISIS control room). I am sure the current space projects ISAMS and ATSR will be completed with equal success".

Bill Jones thanks all those who made his retirement day so memorable, for the beautiful watch and for the opportunity of seeing so many friends (old and new).

Crib

The annual RAL Crib Evening was held on Friday 9 May in the Rec Soc building R58. Thirty six players took part in Singles and Pairs competitions played in 4 leagues to produce Semi-finalists, then the usual knockout to decide winners and runners up.

Results

Singles	-	Winner	Geoff Brown
		Runner up	David Kent
Pairs	-	Winners	Brian Harrow Peter Wiltshire
		Runners up	Peter Craske Malcolm Davies

Dr Paul Williams, Deputy Director, presented the trophies, also those for the lunchtime league and knockout competitions to Janice Brown and Rob Hambleton.

It is now the close season, the league will resume in October - anyone interested in joining in please contact Tony Lubbock, Room 2.66 Bldg R1.

Bulletin

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