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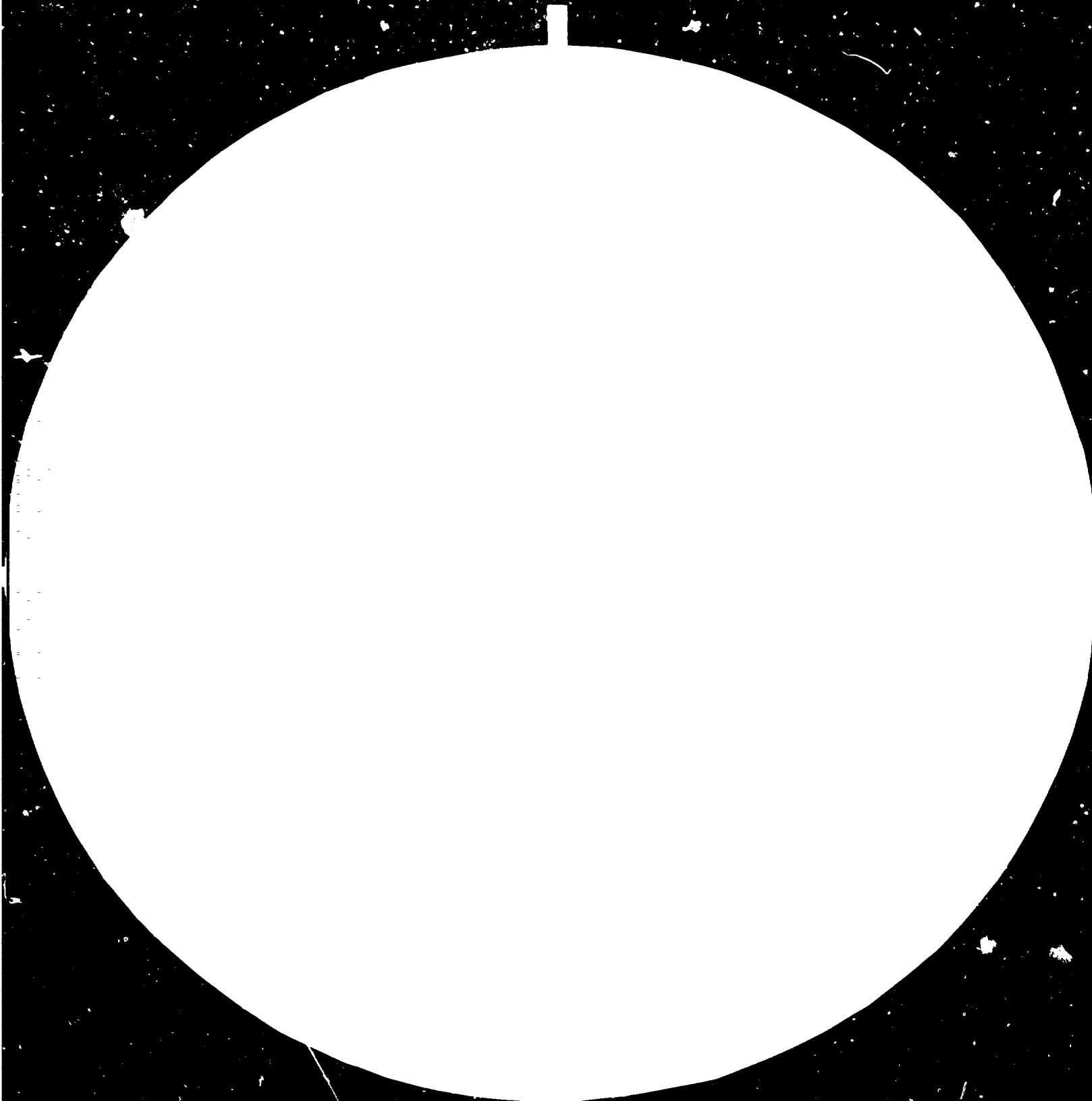

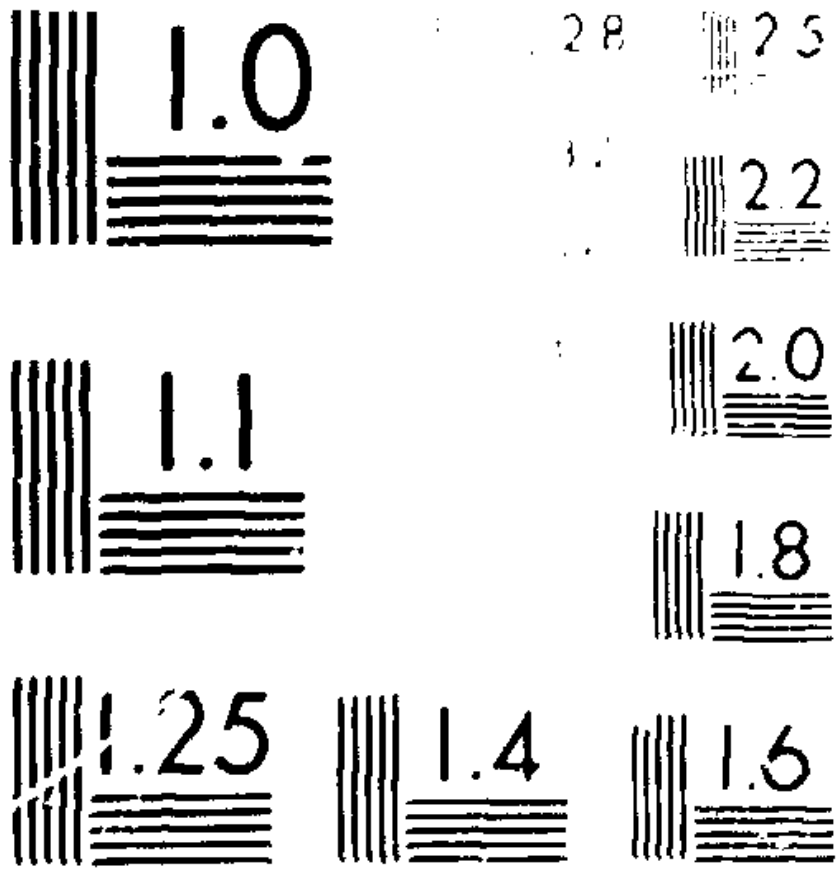
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UNITED N RIAL DEVELOPMENT ORGANIZATION

MICROELECTRONICS MONITOR

12016

Issue Number 2 April 1982

Dear Reader,

This is the second issue of the quarterly newsletter on developments in microelectronics compiled by UNIDO from relevant literature for the purpose of keeping interested readers in developing and developed countries informed on the developments that are rapidly taking place in this area. The first issue was published in December 1981 and distributed through the offices of UNIDO's Senior Industrial Development Field Advisers in developing countries as well as to interested individuals known to UNIDO from their participation in previous meetings on the subject.

The response to our first issue of the Microelectronics Monitor has been uniformly positive and very encouraging. It has confirmed the need for this type of information service and we feel there is justification for continuing our efforts. I should like to emphasize, however, that UNIDO cannot undertake any evaluation of the news presented, it can only create general awareness of developments taking place. Also mention of company names is only in the context of a specific news item and does not by any means constitute a recommendation by UNIDO. By necessity, news coverage is greater on activities in industrialized countries. However, things are on the move and applications are increasingly being reported from developing countries as well. We would welcome contributions from readers on ongoing research, industrial applications and plans and policies in their respective countries.

The next review of implications of microelectronics for developing countries will be organized for the Latin American region jointly by UNIDO and the Economic Commission for Latin America in Mexico in June 1982. You will find more details on this event in the Section "News and Events" in this issue.

G.S. Gouri
Director
Division for Industrial Studies

Compiled by the Technology Programme of UNIDO P.O. Box 300, A-1400 Vienna, Austria

NEWS AND EVENTS

Expert group meeting on implications of microelectronics for Latin America

A group of experts representing 12 developing countries in Latin America will discuss the specific aspects of the use of microelectronics in industry and suggest actions to be taken. They will review the situation in selected countries of the region, the responses that have already taken place, the likely impact on the industrial and trade structure and the socio-economic implications. Papers to be discussed include one by J. Rada on the socio-economic implications and another on the interface with telecommunications by E.A. Galli. The meeting will also prepare guidelines for a framework of national action to respond to the technological advances in microelectronics. The meeting is planned to be held in Mexico on 7-11 June 1982 and is a joint effort of UNIDO and ECLA, the first of its kind at a regional level to look at the implications of recent technological breakthrough such as microelectronics.

Club of Rome [1] on socio-economic implications of microelectronics

Some 200 participants attended a meeting of the Club of Rome held in Salzburg, Austria on 3-5 February 1982 to hear the results of a report [2] on microelectronics and society. Speakers featured A. Peccei, founder of the Club of Rome; F. Barnaby, former head of the Stockholm International Peace Research Institute; A. King, Chairman of the International Federation of Institutes of Advanced Studies (IFIAS); A. Schaff, Polish philosopher and social scientist; Prof. G. Gvishiani, Director of All-Union Res. Inst. of Systems Analysis, Moscow and Head of IASSA located in Austria. The discussion focussed also on a report prepared by J. Rada of the Geneva based Intl. Management Inst. on "A Third World Perspective". The tenor of the discussions was that there was no way of ignoring the new technology since competitiveness on the world markets was at stake, that it posed a serious threat to Third World economies and that a new approach to world development was required based on self-reliance.

Africa to review modern technologies

A proposed African Congress of Scientists will review, inter alia, the application of modern technologies to Africa. Following a request by the Organization of African Unity (OAU) in this connection, UNIDO has, with the help of Professor M. Radnor of Northwestern University, Illinois, USA as consultant, prepared a preliminary paper on the possible applications of microelectronics in Africa, reviewing the pros and cons and suggesting a programme. The paper is intended as an input to future meetings on modern technologies for Africa.

Asian working group on technology transfer

During the 7th General Assembly of the Asia Electronics Union (AEU) held on 2-3 December 1981 in Bangkok, a Working Group on Technology Transfer was set up, chaired by T. Hussain (Bangladesh). Members of the group include S.M. Goklaney (India); Dr. S. Oshima (Japan); Prof. S. Rajanayagam (Sri Lanka); Prof. C. Sripaipan (Thailand); Prof. H.A. Whale (New Zealand); and Dr. S. Yang (Korea). It was also recommended that concrete steps should be taken under the auspices of the AEU to find ways and means of setting up a central institute of electronics technology for providing facilities for post-graduate professional training and R+D activities for the benefit of scientists and engineers of member countries.

Mexico's watch on the future

As part of a project of the Government of Mexico executed by UNIDO with IFSTD financing, 8 high-level experts met in Mexico City on 3-5 March 1982 to assist the Mexican Government in setting up a national system for monitoring technological perspectives. On the 3rd of March the system was formally established by the Mexican President, Mr. José Lopez Portillo. During later sessions of the meeting a working group on electrical and electronic industries was formed which made a preliminary assessment of technological advances in miroelectronics of relevance to Mexico. It is expected that a separate national meeting on microelectronics will be held in Mexico on 14-16 June 1982, immediately after the meeting for Latin America.

1/ The Club or Rome is a group of 100 distinguished academics and researchers looking into world problems.

2/ "For Better or For Worse," by Friedrich/Schaff.

Egypt looking into technological advances

The Government of Egypt has requested UNIDO to field a team of experts, including one on microelectronics, to look into the transfer and development of advanced technologies in Egypt. The experts's findings will serve as input to a meeting on technology development in Egypt to be organized by the Academy of Science in November 1982.

UNIDO staff member visits Silicon Valley

A UNIDO staff member, along with a consultant, Prof. M. Radnor, visited Silicon Valley in March 1982 and had discussions with representatives of the American Semiconductors Industry Association and of several companies (INTEL, National Semiconductors, Fairchild, Signetics). Considerable interest was shown in UNIDO's programmes on microelectronics which was explained to them.

INTEL Manager to spend sabbatical with UNIDO

Jim Oliphant, National Field Applications Manager of INTEL Corporation (USA) will be spending his sabbatical leave with UNIDO in May and June 1982 to help identify potential applications of microelectronics for specific developing countries' problems through field visits to selected developing countries.

UNIDO mission on applications and software

UNIDO will be fielding a mission in May-June 1982 to Egypt, India, Mexico and Thailand with the objective of drawing up propcsals for action based on: (i) identification of suitable applications for developing countries; (ii) identifications of national institutions and teams to develop and promote applications; and (iii) promotion of software development. The members of the mission will be: Jim Olipnant of INTEL; Prof. Schneider of Technical University, West Berlin; and Konrad Fialkowski, UNIDO staff member, and former Professor, Technical University Warsaw. UNIDO is also initiating a programme of promoting the establishment of software houses in developing countries with possible assistance of similar houses in developed countries. Interest in this programme will also be explored by the mission.

UNIDO's $5 million project in DPRK

A project to establish a pilot plant and training centre for bipolar digital integrated circuits is being implemented in the Democratic People's Republic of Korea with the following objectives: (i) to create in-country capacity to manufacture, on a pilot basis, bipolar digital integrated circuits using mono-crystalline silicon; and (ii) to test and evaluate the various industrial applications of the integrated circuits produced. These objectives will be obtained by the direct transfer of the technology (not curently available in DPRK), necessary to establish a pilot production process in DPRK together with the necessary overseas and in-country training to upgrade the skills and knowledge of the national staff. The pilot plant will be established within the Institute of Electronics of the Academy of Sciences; when operational, it will provide the technical basis for the Government to decide on investment in mass production and in large scale training of staff. In time, it will also provide training opportunities in IC technology for applicants from selected developing countries.

France sets up World Centre for computer sciences

The French Government, under the personal initiative and authority of President François Mitterand, has announced the creation of the World Centre for computer science and the development of human resources. It will be staffed by eminent scientists from France, the United States, Japan and other developed and developing countries such as Terry Winograd, associate professor at the department of computer science at Stanford; and Radj Reddy, head of the robot department at Carnegie University in Pennsylvania; Zhison Tang, professor of Peking University, and Kristen Nygaard, research director at the computing centre at Oslo University, are also joining. The Board of Directors includes the following: President: Jean-Jacques Servan-Schreiber[1/]; Vice-Presidents: G. Balandier and Seymour Papert; Director General will be Nicholas Negroponte, a professor of communications and computer sciences at the Massachusetts Institute of Technology. The Centre proposes a number of pilot projects in developing countries to explore new possibilities in computer learning. The ultimate intention, according to the Director General, is to involve the Third World in designing its own computer programmes, from education to robotics, to suit their needs.

1/ Author of "The World Challenge".

VITA and microelectronics

Volunteers in Technical Assistance (VITA), 3706 Rhode Island Avenue, Mt. Rainier, Md. (USA) called a panel meeting on 16 March 1982 to define its role vis-à-vis the developments of microelectronics. The Executive Director of VITA, Mr. Henry Norman, visited UNIDO in March 1982 to discuss possible co-operation of his organization with UNIDO in the field of microelectronics application in developing countries.

Conference on Information Technology held in Dublin

A three day conference was held in Dublin in November 1981 under the auspices of the European Economic Community FAST Programme (Forecasting and Assessment in Science and Technology) on "Information Technology: Impact on the Way of Life". The conference contributions and discussions were distributed over 13 sessions, ranging in title from the general "Towards an Information Society" to the very specific "Survey Data on Changing Patterns of Time Usage".

New Look for Hanover Fair 1983

At the 1983 Hanover Fair, they will initiate a 'fair-within-a-fair', called Microtronic, at which components will not only be displayed in their own right but in assemblies, sub-assemblies and part-assemblies to demonstrate their applications.

As well as an exhibition there will be accompanying symposia, lectures, and seminars. The organisers will try to ensure that only genuine innovations will be on show at Microtronic (excerpted from Computer Weekly, 20 January 1982).

Calendar of Meetings 1982[1/]
(second - fourth quarter)

MAY

The 1982 Micro Show (Exhibition and seminars), 11-13 May
London, Wembley Conference Centre (UK);
Contact Online Conferences Ltd. Tel. 44(9274) 28 211.

Sensors and Systems - Temperature Control and Transducer Technology Exhibition and Conference, 18-20 May, Pasadena, Ca. (USA).

Computer Hongkong 82
International Computer Technology Exhibition, Hongkong, 19-21 May.

JUNE

First Conference on Software Engineering (AF-CET)
Paris (France), 8-10 June.

12th International Symposium on Industrial Robots/6th International Conference on Industrial Robot Technology, Paris (France), 9-11 June.

Sensors and Systems 82,
Houston, Texas (USA), 29 June - 1 July.

MICRO-EXPO
Small annual exhibition and conference on micros,
Paris (France), CIP, 15-19 June,
Contact Sybex, Tel. 33(1) 347 3020.

AUGUST

IKD 82 - International Congress on Computers and Information Technology,
ICC, Berlin, 31 August - 3 September.

1/ The list of meetings is not comprehensive, nor is it a recommendation by UNIDO.

SEPTEMBER

Annual European Symposium with exhibition and tutorials on microelectronics (exceptionally moved out of Europe this year)
Haifa (Israel), 5-9 September
Contact: Euromicro, Centre Paris Daumesnil, 4 Place Félix Eboué, F-75012 Paris (France), Tel. 33(1) 342 7110.

International Exhibition and Conference on Semiconductor Production Equipment
Wiesbaden (FRG), 20-22 September.

NOVEMBER

Second Conference on Robot Vision and Sensory controls
Stuttgart (FRG), 2-4 November.

SOME RECENT DEVELOPMENTS

The 256K State of the Art

Company	Chip	Technology	Access Time (nanoseconds)	Samples	Production
NEC/Toshiba	256K	CMOS NMOS	200	Sept 1981	Early 1983
OKI	256K		150	Oct 1981	Late 1982
Hitachi	256K RAM	NMOS	100/150	Now	Autumn 1982
	256K EPROM	CMOS	100/150	Now	Summer 1982
Fujitsu	256K				
IBM	288K		350	Now	Not declared
Motorola	256K RAM	CMOS	100/150	Sept 1982	1984/85
Bell Labs	256K		105	Late 1982	1983
Intel	256K	HMOS III		1983	Not declared
Siemens	256K				
Texas Instruments				Design stage currently	

Only NEC/Toshiba have made prices estimates, which suggest a price of about $20/30 per unit. Only IBM predicts yields (good chips). It estimates yields of about 60% for the 288K chips. (Computer Weekly, 25 February 1982).

New Chips:

1 Megabit Rams

National Electronics Corp. (Japan) claims it already has the technology to produce one-megabit rams (packing four times more information into the same space than even tomorrow's 256K chips). Its scientists are working on four-megabit memory chips. (Excerpted from The Economist, 20 March 1982.)

NTT claims superior vlsi chips

NTT (Nippon Telegraph and Telephone Public Corporation) has developed a chip technology which it claims is twice as sophisticated as any US product.

The new, very large scale integrated chip handles 32 bits of logic data, equal to the Bell and Intel equivalents, but offers 208 terminals, compared to Bell's 84 and Intel's 64.

Other key features are a line width of only 2 microns at the narrowest part (Bell achieved 3.5 microns and Intel 4 microns) and an energy consumption of only 0.75 watts a chip. The designers claim such low power demand will greatly cut costs.
(Computing, 3 December 1981)

New microchips

Texas Instruments (TI) plant to introduce a new generation of microchips for processing telecommunications signals. The new chips will be much more powerful than their predecessors, just one of them being able to replace an entire printed-circuit board of components. Potential applications include voice recognition and synthesis, high-fidelity music, high-speed industrial controls, robot vision, teleconferencing, meteorology and seismology. TI's was one of the few significant announcements at this year's international solid-state circuits conference in San Francisco. (Excerpted from The Economist, 20 February 1982.)

Changing memories

Intelligent robots, capable of reprogramming themselves, are one step nearer thanks to a breakthrough in memory-chip technology. Two small silicon Valley companies, Xicor and Seeq, have unveiled innovative types of eeprom - short for electronically erasable, programmable, read-only memory.

The new eeproms, made possible by advances in so-called floating-gate transistor technology, will run on the same five-volt current that powers microprocessor chips and will allow programmes contained on them to be changed by the computer they serve. The development has tremendous commercial significance The Californian consultancy Dataquest expects the world market to top $500m by 1985. (Excerpted from The Economist, 13 March 1982.)

Multi-task chips

Big computers have both extra circuitry and management programs, called multitasking operating systems, that enable them to do more than one job at a time. Now that microcomputers and low-cost microprocessors - computers on a single semiconductor chip - are finding wide application, users are beginning to want multiprocessing capability for their jobs too. In automobiles and small appliances, for instance, designers want microprocessors to perform several tasks, often simultaneously. In small business computer applications, users often want to edit copy in one file while printing out copy from another.

While the first application of the single-chip, shared multiprocessing approach will be in control-oriented applications such as automobiles and appliances, the concept is useful in any application where it is necessary to: eliminate the need for transfer of data between processors; increase system throughput without significantly increasing system cost; and/or eliminate complex task scheduling. (Excerpted from High Technology, November/December 1981.)

Chip-making

Manufacturers want to cram more, smaller circuits on to their chips. The advantages are twofold: the smaller the circuit the faster it works; and, though the chips' prices go up, the cost per circuit (or per memory cell) falls. The problem is how to do it. Firms in Silicon Valley are eyeing each other and Japan to see how the most complex chips will be produced in the next few years. The choices are three: current optical processes, electron-beam (E-beam) methods or X-rays. (For a discussion of the options see The Economist, 27 March 1982.)

The driving force behind the success of memory and microprocessor ships has been N-channel metal-oxide semiconductor (N-mos) technology but, try as they might, shipmakers are finding it harder to push N-mos technology to meet the performance demanded by the next generation of very large scale integrated (VLSI) circuits.

Now they are dusting off an older technology they once abandoned as unsuitable for complex microchip functions. Called C-mos, this promises a new class of powerful microchips for computing, automotive, consumer, instrumentation and telecommunications systems that will consume less power and be better able to combine the processing of analogue (voice) and digital signals. (Excerpted from The Economist, 13 March 1982).

Metal silicides are nudging out polysilicon in VLSI circuitry. Even with the highest practical doping, the sheet resistivity of polysilicon cannot go much lower than about 10 ohms/square, a value that threatens to impede further advances in the performance of VLSI circuits. Metal silicides are finding their way into commercial MOS ICs. Standard Microsystems Corp. is using titanium disilicide to enhance the performance of its video-display attributes-controller chip. (Electronic, 3 November 1981, p. 101, 102.)

Biochip

EMV Associates, Rockville, Md. (USA) has patented a simple "biochip" which received a lot of publicity recently. In collaboration with Dr. Jacob Hanker, professor of neurobiology and brain surgery at the University of North Carolina, the EMV researchers replaced the silicon chip with a glass slide coated with a single layer of protein, on which there was a layer of plastic. Electron beams traced out circuits on this resist by hardening it in a delicate tracery representing the circuits. Then alcohol washed the hardened parts away, exposing the underlying protein. When the chip was dipped into silver, the protein - polylysine - organized the metal into a circuit pattern. The chip had the same conductivity as an ordinary semiconductor . . . .

More important, however, the use of protein material with electron-beam lithography could result in a chip with more than 100,000 more electronic switches per unit area than conventional devices and capable of operating at close to the speed of superconductors. These superior characteristics arise becuase protein wafers can be covered in much thinner layers of resist than silicon.

The National Science Foundation has awarded EMV a grant of $30,000 to develop a biochip that will help restore sight to the blind. The protein-based chip will interface with the brain. Embryonic nerve cells will be used as a bridge for linking up the visual cortex of blind people to a biological microdevice implanted behind the eyes. (Excerpted from New Scientist, 14 January 1982, which discusses different concents of biochips.)

Genetic engineering may allow computer makers to fashion processors from organic material, according to Sperry Univac futurist E. Joseph. ScientistS have begun devising methods to express in molecules of DNA the information presently storable in bits that comprise semiconductor chips. (Computerworld, 9 November 1981, p. 25.)

Computer-aided manufacturing

Computers have begun to play an increasingly important role in manufacturing operations. They control production of complex aircraft shapes, aid in the design of modern automobiles, and help in procurement and production scheduling.

But many observers feel that these applications fall far short of the full potential of computer-aided manufacturing (CAM). Indeed, they believe a lack of hardware and software standards has actually impeded the advance of computers into the factory . . .

Working to remedy this situation is Computer-Aided Manufacturing-International (CAM-I), a nonprofit industry association based in Arlington, Tex. CAM-I counts among its sponsor-members many of the world's largest corporations, as well as representatives of governments and the educational community. It sponsors research in CAM technology and then encourages widespread use of the results.

To promote industry standardization, CAM-I is developing standards for computer languages, data, and techniques. In addition, the organization currently sponsors six technical projects that focus on specific aspects of computer-aided manufacturing. (High Technology, November/December 1981.)

Computer-aided design

A DO-IT-YOURSELF computer-aided design system which allows capital equipment manufactureres to lay out their own gate array curcuits has been put together by Ferranti. Cost is a surprisingly low £46,500. Leasing arrangements can be made . . . .

The system consists of a DEC PDP 11/23 minicomputer supported by the RSX-11M operating system, a DEC graphics terminal with keyborad, a control console in the form of the LA34 DEC writer, a plotter made by Bensons of Bristol, and a digitising tablet made by Sumi Graphics Inc. of the US . . . . (Excerpted from Electronics Weekly, 20 January 1982.)

MARKET TRENDS

256K RAMS

Potential customers for 256K dynamic RAMs will be offered sample devices in the third quarter of this year, claims Hitachi (Japan). (Ecerpted from Computer Weekly, 25 February 1982).

64K RAM prices

Prices for 64K dynamic RAMs continue to fall - the lowest prices are reported to be $4 each for high volume ordrs for slow parts on a long delivery schedule . . . . (Excerpted from Computer Weekly, 5 January 1982.)

Chip market to double in Europe

The European market for semiconductor production and test equipment will more than double over the next four years to peak at $542 million by mid-decade.

This prediction is made in the latest industry survey from market analysts Frost and Sullivan (106 Fulton Street, New York, N.Y. 10038), which shows that the sector will enjoy an average annual growth rate of nearly 20%.

'Increasing equipment complexity and the migration of electronic assembly from offshore sources back to Western Europe will prompt this rise,' according to Frost and Sullivan's report.

Currently West Germany accounts for 36% of the total European market for semiconductor production; France has 24% and the UK is third with 18%. Italy has a 7% share. These proportions will remain approximately the same, says the report.

The greatest change is predicted for the production and assembly equipment fields with new kit to make ribbon-type silicon material becoming available in a few years. (Excerpted from Computer Weekly, 25 February 1981.)

5bn market for 16-bit micros by 1986

The world market for 16-bit super micro systems will exeed $5.5 billion by 1986, according to a report published this month by California-based ITOA International.

The report predicts that export of super micros from the US will go from 20,000 this year to 25,000 in 1986. Over this period, the world-wide installed base will increase to 615,000 units, of which more than 375,000 will be in the US. (Excerpted from Computer Weekly, 25 February 1981.)

Japan semi-finished chip exports up 36%

Japan's exports to Europe of semi-finished integrated circuits increased by 36.5% in the period from January to August this year, and exports to the US doubled. But overall exports of finished chips fell by 2.1%, according to figures just released by the electronic industry's association of Japan . . .

. . . The overall total of semi-finished overseas sales stood at £66.7 million which represents an increase of 23.4% over the same period last year.

Chips were prinicpally exported to industrialised countries but a growth rate of 11.9% was also recorded in exports to South East Asia.

The association predicts that demand for industrial electronic equipment will almost double by 1985, from a 1980 figure of £4.8 billion to approximately £9.12 billion, with sales of computers and related equipment accounting for approximately 70% of this total.

Demand for electrical measuring equipment, such as digital products, is expected to rise 14.4% by 1985. (Experpted from Computing, 3 December 1981.)

Comparison of European consumption and output of ics against the rest of the world

	IC Manufacture by Region, %		IC Consumption by Region, %	
	1973	1980	1973	1980
TOTAL	100	100	100	100
of which				
US based companies	72	67	50	48
Japan based companies	20	25	25	23
Europe based companies	8	8	21	24
Others	1	1	4	5

(Electronics Times, 3 December 1981)

APPLICATIONS

Microelectronics in industry

In the near term, there are countless industrial applications for existing electronic equipment. Some of the most common can be divided into: control systems; microprocessor-based instruments; energy monitors; inspection systems; numerical input controls; and programmable controllers.

Control systems using microprocessors are widely used to control and monitor plant operations, as well as to ensure optimum performance.

Microprocessor-based instruments use electronic technology to give compact, accurate and often portable test or monitoring capabilities.

Energy monitors are now taking full advantage of advances in microelectronics. IBM will use thousands of microprocessors to stabilize temperature levels in its new office building in New York City, and many companies have developed computerized systems for lighting control (see IW April 1981: Lighting Systems).

United Technologies has developed controls for diesel engines in which a microcomputer and electrical components do jobs traditionally done mechanically. They will improve fuel economy by up to seven percent, as well as reduce emissions significantly, and make it much easier to tailor controls to the multitude of engine specifications.

An oxygen and combustibles analyzer, from Bailey Controls, has a solid state design which facilitates fast, accurate readings. Used in conjunction with their Conserver Trim programmed oxygen control loop, maximum fuel efficiency can be achieved.

Inspection systems are among the most popular applications of microprocessors in manufacturing. By programming the "perfect" part into a quality control system, customer reject rates can be greatly reduced, and faults can be detected on-line.

NC input controls are making great inroads into metalworking, achieving more precise machining and greater machining speeds. Companies such as Allen-Bradley, Siemens, Fujitsu Fanuc, General Electric and Philips have revolutionized the metalworking function through the application of NC and CNC machines.

Programmable controllers (PCS) are another area of microprocessor-applied technology with widespread use. Originating in the automotive industry, these controllers are now found in applications from material handling to steel-making.

Computer-Aided Tomography (CAT)

Medical developments in electronic technology have given industry a highly-efficient non-destructive testing technique. Computer-Aided Tomography (CAT) scanning, developed for x-raying patients, is now being marketed for industrial applications such as examining the interior of objects like metal pipe, tires, rocket motors, without cutting into them; and for monitoring continuous production processes for coated wire, industrial filters and similar products.

At the U.S. National Design Egineering Show more than 55 percent of engineers surveyed indicated they would incorporate microelectronic components to a far greater extent in the products they design over the next five years. (Excerpted from Industrial World, December 1981.)

Use of computers in Production Control

The initial capital investment in hardware is usually not a deterrent factor hindering the extensive use of computers in industry. The major considerations which have prevented management from using computers in production control are resistance from the workforce, software development cost, operational problems and the training of necessary manpower.

This view was expressed by Mr. Gerhard Zwiauer, an expert in computerised production control who has been deputed by the United Nations Development Programme (UNDP) to assist the Hong Kong Productivity Centre in providing an expanded service in the industrial use of computers particularly in production control. Mr. Zwiauer was on a 7-week assignment in Hong Kong to provide consultancy and technical advice to the HKPC.

At present, the use of computers in Hong Kong is widespread in the commercial sector. Although there are a number of computer systems users in the industrial sector, their usage is mainly concentrated in accounting applications such as payroll, sales analysis, inventory control, accounts payable/receivable, and general ledger. The use of computers in industrial applications such as production control, scheduling and machine monitoring, has been limited.

"In the garment sector, for instance, the use of computers in pattern grading and marking is probably suitable only for the larger manufacturing plants. However, computers can prove to be a most cost-effective solution even to small and medium operations in areas such as material handling and work-in-progress in the electronics sector, stock and inventory control in the toy industry and bundle ticketing in apparel manufacture," said Mr. Zwiauer.

According to Mr. Zwiauer, the desirable trend for Hong Kong will be the development of a limited number of application packages which can be readily applied in specific functional areas without too much training and orientation for the workforce. Once the workers are involved in a simple computer operation, they can be trained to use a keyboard and then later on to more complex applications.

It is generally recognised that the garment industry is labour-intensive and there is much room for modernisation and technical innovation. A number of garment manufacturers are using computers but their applications are mainly confined to administrative functions such as general accounting, payroll processing and finished goods inventory control.

Miss Maria Santos, Divisional Manager (Computer Services) of the HKPC was on a month-long UNDP fellowship to study the industrial use of computers in the United States, particularly in the garment sector. Miss Santos visited various apparel manufacturers to assess the state of automation in the US apparel industry. Miss Santos examined the varius systems available and collected valuable information on software and hardware developments as well as the latest technology for the apparel industry.

According to Miss Santos, there is an evident need for computerisation in the garment industry in the following areas:

i) resources requirements planning and control
ii) material requirements planning and control
iii) production planning, scheduling and control
iv) pattern grading and marking, and
v) cloth cutting and sewing.

At the moment, most garment manufacturers do not have a systematized approach in keeping and analysing production and sales statistics. Consequently, the planning and control of resource and material requirements cannot be efficiently worked out.

Miss Santos indicated that experience has shown that product movements are often not repoted between processes, leading to inadequate inventory and work-in-progress control. Sometimes work orders are not issued frequently enough, so that individual orders are out on the floor longer than necessary, leading to a loss in planning and management control of work-in-progress and production efficiency. The use of computers can provide a feasible solution to these common problems.

According to Miss Santos, the use of computers in pattern grading and marking, and cloth cutting and sewing can help upgrade garment quality, save labour cost and reduce operation time to meet the ever-changing fashion trends and diversification of designs demanded by customers.

Mr. Zwiauer's visit is part of HKPC's effort to develop and establish the necessary technical support services to assist local industry to use computers effectively in production control functions. During his stay in Hong Kong, Mr. Zwiauer also conducted a series of seminars on computer-aided financial planning and process control.

Another computer expert in production control, Mr. Ernest Gamper, will be deputed by the UNDP to visit and provide consultancy to the HKPC in the use of computers in the garment sector towards the end of the year. Mr. Gamper is highly experienced in the evaluation of commercial EDP systems as applied in a range of industries especially in textiles and garment manufacture. (Productivity News, Vol. 15, No. 2.)

Micros take control of railways

The whole question of how new ideas can be applied to the railways was the theme of "Railways in the Electronic Age", a conference held in November 1981 at the Institution of Electrical Engineers.

An example given by Roger Short of BR's Signals and Telecommunications department was an 8bit binary counter, used to detect the presence of a train in a given length of track.

It works by counting the number of wheels going into the section and the number of wheels coming out. If the number is different, then there is a train on the track and it is not safe to allow another to enter . . . .

. . . According to Short, a microprocessor can give the same logical performance as 2000 to 3000 signalling relays. In sheer space terms, this means banks of electro mechanical equipment are replaced by two pcbs. Microprocessors justify use on economic grounds as well, because the devices used are industry standard.

The microprocessor can also be used on board trains, an application to which relays have never been suited because of their size and poor vibration resistance.

With so many points in favour of microelectronics, there is still a problem for the designer. The railway is a harsh environment for microprocessors and other components, and the lifetime of the components has not yet been determined. (Excerpted from Electronic Times, 3 December 1981.)

Biochips speed up chemical analysis

Much of the bulky and expensive equipment that litters the laboratories of medical and industrial concerns could soon be obsolescent. A remarkable wedding of biology and microelectronics is producing a generation of devices that could provide immediate and accurate data about conditions in the human heart or on an offshore drilling rig.

The devices are based on conventional silicon gate technology and, like their counterparts in, for instance, a computer, are known as field effect transistors (FETs). But these FETs do not detect an electric current from a conventional power source. Instead, they rely on the electric potential created by selected ions or by reactions of whole molecules. The former are ion-selective FETs (ISFETs) and the latter are called ChemFETs.

The devices usually comprise a silicon chip embedded in an unreactive material such as epoxy resin. Surrounding the chip is a pocket of sensing fluid that carries current to the chip's surface. A membrane made of a polymer or a gel surrounds the fluid. These materials have specially-selected properties: some are punctured with holes designed to admit molecules up to a certain size; others are impregnated with organic substances - enzymes, for instance, which react with the substance an analyst wants to measure and set up electric potentials which the microchip detects. (Excerpted from New Scientist, 28 January 1982.)

Some more applications

Micro Scope (Maidenhead, UK) began producing a microbased label printing and stock control system aimed at pharmacists, developed jointly with Taylor Nelson Medical. The Scriptcounter, the size of a small typewriter, has a keyboard, display screen and two label printers, one for standard labels and the other for nonoral medicines, allowing preparations 'not to be taken' to be marked clearly. Abbreviated keyboard entry is used for the drug names and dosage. The labels can accommodate up to 26 characters, providing ample room for complicated drug names. The information to be printed is first shown on the screen so that it can be checked and corrected by simple editing routines. (Excerpted from the Financial Times, 12 April 1981.)

A major expansion of the numerical control systems in small and medium plants is expected by Bendix Industrial Controls Div. Constantly decreasing availability of skilled personnel is leading small shop owners to seek out equipment that can be operated by less skilled operators. The total US market for lower-cost and simpler to program manual-data-input (MDI) CNC systems will grow to 25,000 units by 1985. Most of the growth will be in low cost MDI controls and in larger controls integrated into flexible manufacturing systems (Excerpted from Am Machin, November 1980.)

Robert Bosch (Stuttgart, W. Germany) is developing microprocessor-based fuel-injection control systems for diesel engines. It could be the first company to go into production with them. With electronic control, Bosch says, engine-related parameters can be selected to optimize engine operating conditions. It becomes possible to compensate for deviations in an aging injection system's performance and to maintain close tolerances in allowable exhaust-gas emission values. Systems for trucks may come by 1984 and for passenger cars somewhat later. (Excerpted from Electronic, 3 November 1981.)

Micros make the going easier for airliners

When Europe's new Airbus A310 makes its maiden flight in a few weeks' time, it will be the first airliner to have control surfaces on its wings positioned entirely with the help of digital electronics. Microprocessors will control the slats and flaps that extend from the front and rear edges of the wings during take-off and landing to produce more lift. The aircraft's designers reason that microelectronic control will ensure that no dangerous failures can occur. (excerpted from New Scientist, 21 January 1982.)

A trawling micro can fish while a ship sleeps

For the past three years a group of scientists at Queens University Belfast (QUB) have been working on a computer system which could watch for fish while trawlermen slept. The scientists now believe that they have made enough progress in their research for it to have a commercial application. This microchip revolution could mean that every fishing boat will have a computer on board.

The scientist by using sophisticated computers have developed a programme to analyse information produced by an echo-sounder. From the readings on the computer they will be able to differentiate between different types of seabottom, such as mud, sand, shingles or rock.

In their studies of the habitat and feeding habits of different species of fish, the scientists found that the sea bottom determined their location and the system could be set to sound an alarm when the boat passed over the appropriate terrain. The scientists hope to be able in the near future to perfect the system to differentiate between shoals of different fish such as herring and whiting. (Technology Ireland, February 1982.)

Microprocessor-based SCR units for rigs

General Electric has introduced two microprocessor-based SCR units - one for small rigs with a 5,000 - 15,000-ft. depth capability and the other for all types and sizes of drilling rigs.

Since the solid-state design eliminates the need for most electro-mechanical contacts, the contactors have been replaced by direct connections to the DC motors, and electromechanical relays have been replaced by solid-state logic. The solid-state design also reduces the amount of cable and the number of moving parts in the system and the size of the system in many cases can be reduced by 20%.

Other advantages: automatic regenerative braking reduces drawworks' speed to cat head speed and feeds power back into the system: fewer operating engines and greater drive efficiency reduce fuel consumption and maintenance costs: the microprocessor in the AC control module provides superior performance and reliability. (Excerpted from Ocean Industry, August 1981.)

Calculator chip performs 48 drilling programs

What is called BOSSMOD by IMCO services is a calculator chip containing 48 programs for land or offshore drilling operations, greatly simplifying the logging of well data. The chips fit Texas Instruments' series of hand-held programmable calculators. An optional printer is available with the chip which produces answers labeled in alpha-numerics, allowing easy reference while the programs are running. (Excerpted from Ocean Industry, February 1981.)

Microcomputerization of stereo cassette decks

Recently, cassette tape deck models controlled by microcomputers have become available on the market. Microcomputers are used roughly in two different ways for stereo cassette decks, thus allowing the microcomputers to give full play to their effectiveness: (1) they are used for automatic programme selection and to simplify operations for program replay and (2) they are also used to improve the functions and performance of the recording and replay modes of cassette decks. (Excerpted from AEU, February 1982.)

Using chips for food processing

Microcomputers are especially suitable for the food processing industry as processes are usually based on a continuous flow.

One of the most skilled jobs in any cannery is that of the retort operator. The retort is a large pressure coocker in which sealed cans are heated to cook and sterilise the contents. Can distortion results if the temperature and pressure are not carefully controlled. . . . 'Analog Devices' MacSym II was selected by IIRS and programmed to control a Lagarde retort. The system, is now running well and can be operated by non-skilled staff.

Provender Milling Ltd. (milling is basically the weighing out of different raw materials and mixing them together to produce animal feed) was building a new provender mill and decided to introduce computerised control. A PDP8A based computer control system was bought for £35,000 in 1978 - today the system would cost less - but computerising an old mill would cost much more than building a system into a new one.

The firm has found that its computer has reduced labour numbers and cost, increased productivity, improved quality control and reduced product cost. (Excerpted from Technology Ireland, February 1982.

Micros and buildings

Microelectronic technology already offers improvements in management and control of building services and promises to have a major impact on the manner in which future services are provided.

How microprocessor technology can be exploited by designers and specifiers in modern building services without them necessarily having to become expert in detailed programming or circuit board design was shown at a seminar on 'Applying microprocessors in buildings' held at the Building Research Establishment, Garston, Herts, UK on 9 March 1982.

SOFTWARE AND TRAINING

Software packages

Package Which Comes First to Mind	Packages Most Likely to Buy Next	Package Used Most In Past 12 Months
Data Management	Accounting	"Unsure"
"Unsure"	"Unsure"	Accounting
Accounting	Data Management	Utilities
Utilties	Utilities	Data Management
Manufacturing	Computer Management Aids	Data Communications
Systems Programs	Manufacturing	Systems Programs
Data Communications	Systems Programs	Manufacturing
Computer Management Aids	Data Communications	Computer Management Aids
Payroll/Personnel	Payroll/Personnel	Language Processors
Banking & Finance	Engineering and Scientific	Payroll/Personnel
Language Processors	Language Processors	Banking & Finance
Engineering Scientific	Banking & Finance	Engineering Scientific
Math and Statistics	Math and Statistics	Math and Statistics
Programming Aids	Programming Aids	Programming Aids
Education	Education	Medical & Health
Medical & Health	Insurance	Insurance
Insurance	Medical & Health	Education
Management Science	Sale & Distribution	Sales & Distribution
Sales & Distribution	Miscellaneous	Management Science
Miscellaneous	Management Science	Miscellaneous

(Source: Datapro Research Corp., reproduced in Computer Weekly)

Inventory of software packages in the information field

Within the General Information Programme an inventory of software packages developed for and used in information work is being prepared.

The inventory will list and evaluate software packages for mainframe, mini- and microcomputers and will deal, inter alia, with hardware requirements, applications packages, data base management systems, transferability and availability to developing countries, users' experience, costs, performance data, etc. Packages developed outside normal commercial sources are especially solicited.

The principal emphasis will be on packages designed for use in libaries, archives, information centres, data (fact) retrieval centres and similar organizations. The application areas will be broadly interpreted.

The compilation of the inventory has been contracted to the National Centre of Scientific and Technological Information (COSTI) (P.O. Box 20125, Tel Aviv 61201 (Israel)). Information on suitable software packages is sought both from their users and their compilers or producers. Individuals and institutions using or producing such packages, in any part of the world, are requested to write for further information to Dr. Carl Keren at the address above, referring to the UNESCO inventory of software packages and giving brief details of the package(s) concerned and the name and address (including telephone and telex numbers) of the person to whom questionnaires should be sent. (UNISIST Newsletter, Vol. 9, No. 4, 1981.)

Software centre opens in Beijing

A Sino-Japanese computer software contre has been opened in Beijing as a co-operative project between the China Computer Technical Service Corporation and the Nippon Electric Corporation.

The centre has a medium-series computer with maintenance parts, tools and power supply equipment. Its main task is to train Chinese software technicians and teach managers of various enterprises basic computer knowledge. (Excerpted from Electronics Weekly, 3 February 1982.)

Singapore puts the accent on software

Singapore: The strategy drawn up by Singapore to become a regional computer centre by 1990, which is already well along the path of implementation, is resulting in a major thrust in the development of the computer software and service industries rather than computer manufacturing.

Foreign firms have already invested about Singapore $100m in the island State's fledgling computer hardware industry, and the industry is confident that within the next few years the whole range of computer hardware such as micros, minis, mainframes, peripheral disc drives, printers and video terminals will be produced in Singapore.

Singapore planners, however, think that the most lucrative future of the worldwide computer industry really lies in the software not only because the software costs are rising as fast as the demand for computer programs, know-how and personnel, but also because the hardware costs are falling as rapidly as computer circuity is shrinking in size.

Singapore has now legislated a new body, named the National Computer Board, to oversee the programme, and the target it has set is to reach Japan's present level of computerisation by 1990. To achieve the objective, Singapore, it is said, must raise the number of computer installations from the current 180 million people to 400 per million.

Its target for the software industry is to expand it to half the current Japan level. This, industry sources say, will require having 40 software firms, each employing an average of 100 people and generating revenue of around Singapore $5m a year.

The incentives now being offered by the Singapore government to companies that develop software for local and export markets have attracted many European and North American computer companies to Singapore to assess the opportunities, and some of them such as Canada's IP Sharp, France's Société Générale de Service et de Gestion and IX Conseil, and Norway's ER Communications, have already set up shop.

A programme designed to turn out the 6,000 to 8,000 computer personnel Singapore will need by 1990 has also been launched and an professioanl examination syndicate will be formed to monitor their professional standards. (Excerpted from Electronics Weekly, 30 December 1981.)

Solving the software maintenance problem

Thirty years ago, the hardware cost constituted the major expenditure on any computer-based system. Today, that ratio has drastically changed. By 1985, the hardware maintenance cost will have fallen to 10 to 15 per cent, while the software maintenance cost will rise to 65 per cent - with the software development cost running at a steady 20 to 25 per cent. (Excerpted from Electronics Weekly, 3 March 1982.)

Micro in all UK secondary schools now in sight

Excellent progress in the Department of Industry's Micros in Schools Scheme was reported by UK Information Technology Minister Kenneth Baker.

Some 2,200 applications for microcomputers had been processed by the end of 1981. And with the extension of the scheme to all secondary schools, large numbers of applications were expected this year.

A total of £9 million has been allocated by the Department of Education and Science (DES) for the training of teachers. He agreed that it would be useless to supply schools with microcomputers if staff were not trained to use them. (Excerpted from Computer Weekly, 4 February 1982.)

Computers in Education

Portora Royal School in Enniskillen (Ireland) has scored another 'first' in the use of computers in Irish education by introducing ICL's Business Management Exercise into its curriculum.

The school was the first in Ireland to participate in the 'Computer Education in Schools' project, which involved using a computer terminal in the classroom linked, over normal telephone lines, to an ICL 1907 computer at Queen's University.

In the exercise, Portora students have been divided into teams representing 'companies', with individual members responsible for specific management functions such as production, marketing, finance, research and development. They then make use of a mathematical model which simulates the functioning of the companies. Since the exercise is interactive, the decisions made react on, and are influenced by, those taken by other companies.

Each 'company' decision - representing three months' trading - taken weekly, and since the exercise lasts for eight weeks, participants can see the effects of their decisions over a long period. (Excerpted from Technology Ireland, January 1982.)

Micro appreciation courses

A series of courses to aid businessmen and researchers appreciate the possibilities of micro-technology and to invest sensibly when buying the new technology is beginning in Dublin, at Newman College, 82 Merrion Square, Dublin 2 (Ireland). . . . (Excerpted from Technology Ireland, February 1982.)

Microcomputers in Irish School

The Department of Education had decided to equip 105 post-primary schools with microcomputers by the end of the financial year 1981.

There is virtually no subject on the curriculum to which a computer cannot make a vast contribution: so far the only formal computer element of the Leaving Certificate is a maths "module" involving computers. However, Computer Education Society of Ireland (CESI) is confident that computer science in its own right will be organised by 1984/85.

The Department will pay the full cost of each system in the case of community, comprehensive and vocational schools and will meet 80 per cent in the case of secondary schools. Over 100 Irish schools are estimated by the CESI to have bought their own already through local fundraising. CESI are also interested in the advantages a computer will give remedial teachers allowing pupils with learning difficulties constant attention at their pace. (Excerpted from Technology Ireland, February 1982.)

A computer technology development and training program in India

The computer technology development and training program in India is geared to develop technical know-how in systems integration and engineering of small, computer-based systems dedicated to applications such as communications, power systems management, wagon-movement management systems, early-warning systems for meteorology, and non-linear language systems. The main thrust of the project is to promote Technical Cooperation among Developing Countries.

The immediate objectives of the project are:

1. To develop consciousness of a systems integration approach for computer-based applications;

2. To develop software and systems design and to integrate hardware for computer-based systems;

3. To train personnel in systems integration methods as applied to dedicated computer-based systems;

4. To disseminate technical information on both hardware and software, as developed during the project, to developing countries.

The project will place very heavy emphasis on technical cooperation with other developing countries from Central and Latin America, Africa, Arab states, Asia, and the Pacific region:

1. Professionals and experts from these countries would help to identify specific country needs for developing relevant computer-based systems in the application areas set out in the development objectives;

2. Computer professionals from these countries would work in the areas of systems analysis, design, and systems integration as co-workers and partners along with professionals from India. These co-professionals, at the end of their assignment, would be fully equipped to undertake such tasks on their own, as well as training others, in their country;

3. Of the 200 personnel to be trained in all aspects of dedicated computer-based systems, approximately 100 participants would be from the regions listed above. Therefore, by the end of the training program, these participants would have a clear understanding of the hardware and software involved in real-time computer systems.

The project's approach to research and development is:

1. Research and development would cover design, development, and realistic testing of computer-based systems involving systems engineering and software efforts.

2. A close link would exist between research and development and training activities;

3. There would be an emphasis on modularization and written specification of technical activity.

The project's approach to training is:

1. It is anticipated that the trainees would be drawn from developing countries from Central and Latin America, Africa, Arab states, Asia, and the Pacific region.

2. The trainees should have the following minimum qualifications:

   i) Degree or equivalent qualification in electronic, electrical, or telecommunication engineering. Trainees without degrees but with sufficient experience could also be covered.

   ii) A minimum of 2 years' experience in computer programming or computer hardware design or maintenance.

3. In view of techical considerations, all training would be conducted in English.

4. A twelve-week intensive course is the basic unit of training. A few of the courses planned are:

   - real-time systems design and implementation of hardware and software interfacing of computers in real-time systems
   - operating systems for real-time applications
   - real-time applications (power, wagon control, and communication)
   - non-linear scripts
   - computer maintenance

5. Creation of course materials, will be given importance.

6. It is anticipated that the course materials produced would be used by participants to teach others in their place of work; this will be kept in mind while preparing the course materials.

The main output of the project would be the competence building of the countries involved, including India, in the area of systems design, software development, and systems integration of real-time and other dedicated computer-based systems and the expertise to provide technical and economic assistance to various national organizations.

For further details on the project, especially with reference to technical cooperation among developing countries, please contact:

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Computer Maintenance Corporation Ltd.
The Arcade
World Trade Centre
Cuffe Parade
Bombay - 400 005 INDIA
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Telex: 011-3854
Cable: COMPSERVE

(Excerpted from AEU, December 1981.)

PATENT LEGISLATION

US court ruling on patents

The US Supreme Court in March 1981 decided to reverse its decision that the introduction of computers into industrial processing was not sufficiently innovative to warrant a patent. Legal authority to patent such programmes may be given soon.

In the majority 5 to 4 verdict a Supreme Court justice ruled that it was also possible to patent a new combination of steps in a process, even though all the constituent steps were well-known or in common use before the combination was made. (Excerpted from Science and Technology Quarterly, Science Council of Singapore, Vol2, No. 1, July 1981.)

Stopping copycat chips

As the development costs of new microchips increase, so chip makers are getting keener to prevent their designs being copied. Concern centres not only on the chip itself but also on the programming instructions needed to turn the chips into microcomputers.

Patenting should offer watertight protection. In practice, American courts frequently fail to uphold a patent. Even when they do uphold it, this is equivalent to locking the stable door after the horse has bolted: the microchip industry has usually moved on to a new generation of products. Furthermore, the would-be patent-holder has to submit a full verbal description of what he is claiming to be unique. When a chip has many thousands of components, this is complicated and does not guarantee clarity. . . . Some changes are under way. Last year, new legislation gave the United States patent office power to re-examine old disputes and overturn decisions, if necessary. Also, American copyright law was extended to cover computer programmes incorporated in a chip.

The computer industry would like to go much farther. It would like special copyright protection given to lists of programmes on a visual display unit. This would be equivalent to making it a copyright infringement to browse through a book in a library. It would be unduly restrictive to users.

The Common Market is studying copyright protection, as are several member governments. The attraction is that copyright is cheap and easy to implement, and takes effect immediately. The drawbacks are two. First, copyright confers less monopoly power than a patent. In the unlikely event that two identical computer programmes were written independently, both would qualify for copyright protection. The second problem is more serious. Many countries, especially third-world ones, have not signed any international copyright convention. This effectively allows them to steal - or to act as third-party territories for others who want to steal.

In many cases, would-be pirates can copy a microchip easily, buying samples of the chip and using sophisticated analytical equipment to find out how it works. The two-dimensional structure of the surface is visible. To unravel the complicated network of impurities diffused inside the chip, you can use beams of charged atoms to etch off the surface layer by layer, dislodging the exposed surface a few atomic layers at a time.

Chip makers are now learning to discourage these tactics by mixing dummy circuitry into the the chip design. The dummy circuits look like working parts but copying them renders the chip inoperable. Other techniques make a programme on a chip unreadable to unauthorized users but none offers a perfect solution. (Excerpted from The Economist, 20 March 1982.)

Software in Japan has no piracy protection

. . . The inadequacies of Japanese law on copyright and trade secrets were revealed last week by Graham Shipley, computer scientist and barrister, speaking at a European Study Conference on the legal protection of computer software.

Japan is making a determined push into software, but has little in the way of internal controls which apply specifically to software protection. . . .

The Japanese patent system caters only for inventions which are novel and non-obvious, which, as in most countries, bars the majority of programs.

The main deficiency is that Japan has no trade secret protection, except for its civil code, which decrees that "a person who has willfully or negligently injured the right of another is bound to compensate him for the damage, that has arisen therefrom."

There are laws which deal with unfair competition in export, and the Ministry of International Trade and Industry can revoke the export licence on programs which infringe copyright in the country of destination. (Excerpted from Computer Weekly, 17/24 December 1981.)

COUNTRY REPORTS

Australia

The Australian Government has invited the National Semiconductor Corporation, of USA, to examine the feasibility of establishing a silicon wafer fabrication plant in the Australian Capital Territory. The Government has indicated its willingness to lease land and buildings rent-free in return for certain undertakings from National Semi-conductor. . . .

The Government has an involvement in the funding of research and development in the electronics industry.

Part of this research is conducted within the Government's own facilities, e.g. the Telecom Australia Research Laboratories and certain defence establishments. Research undertaken by the CSIRO is not necessarily intended to have direct Government applications and the CSIRO is able to license the use by private manufacturers of specific technologies it develops.

Government funds for research and development in electronics are also made available through the Industrial Research and Development Incentives Program which is administered by the Australian Industrial Research and Development Incentives Board. . . .

Payments from 1979-80 funds for commencement grants and project grants for projects identifiable as falling within the electronics industry amounted to more than $3 million. In addition public interest projects in various electrical/electronics industries to a total value of some $3 million have been approved. (Excerpted from AEU, March 1982.)

Canada

Microelectronics centre proposed

An Ontario government task force has recommended the establishment of a microelectronic technology centre in the province. The proposed centre would co-operate with industry to monitor the Canadian supply of integrated circuits (the basic building blocks of microelectronics-based products). It would absorb the cost of design, development and testing of silicon chips, related tools and software for small- and medium-sized Canadian companies.

The task force also recommends the establishment of centres based on computer-assisted design, manufacturing and robotics technology.

The report also outlined a number of recommendations designed to enable the work force to adjust to the implementation of microelectronics in the workplace. These include retraining programs, health and safety measures, public awareness and education efforts.

Libraries and information centres should provide public access to microelectronics-based information services, said the task force. It also recommends that another task force be established to complete the analysis of the impact of microelectronic products in the home, schools and workplace. (Canada Weekly, 16 December 1981.)

People's Republic of China

The initiation of a computer development programme began in the People's Republic of China about 20 years ago. This was based on the realization that a modern, industrialized nation essentially needed computerized systems to be able to compete internationally and to improve standards at home.

Both in the early years of China's computer development and today, computers from both Russia and the West have exerted a strong influence. But rather than copy them directly, the Chinese have analyzed them carefully in terms of their own country's needs and adapted them accordingly.

The government body with overall control of computer production is the Fourth Ministry of Machine Building, and this ministry is divided into numerous research institutes. Actual research, development and production is designated to approved plants and factories.

According to 1978 statistics produced by the Joint Congressional Economic Committee, production of electronic equipment involves 200 major plants, 500 smaller plants and 1,500 neighbourhood factories, employing in total about a million people.

The first microcomputer was produced in April 1977, the DYS-050, developed by the electronic engineering department of Tsing-hua University and the No. 6 Research Institute of the Fourth Ministry of Machine Building. The Anhwei Radio Works provided the Chinese-developed MOS LSI circuitry for this eight-bit maschine.

Today many factories throughout China produce their own microcomputers, modelled on imported American or Japanese models. One example is the EYC-032A, produced in Guangzhou by Yuan Hua. It has 32K of RAM and 14K of ROM. Peripherals made in the factory are printers, plotters and two-Mbyte floppy disc units.

The factory has spent a long time doing minor production work for Commodore, and works with several Commodore microcomputers. All the memory chips for use in this factory are imported via Hong Kong, but include some produced in Taiwan, which has been on friendly trade terms with China since earlier this year.

The EYC-032A seems to be an identical model to the DIS-332 microcomputer, produced elsewhere in China. This points to one of the main problems in catalouging Chinese computer production, which is that similar or identical models can be given completely different names depending on which part of the country they are produced in.

The programming languages used by the Chinese machines range from Basic Fortran, Cobol, Pascal and Lisp, to a Chinese version of Algol 60 called PCY. The EYC-032A, for example, can be programmed in Basic, Pascal or Lisp.

Large volumes of components are being sent into China from Hong Kong for sub-assembly for Hong Kong companies.

Although not on the same technological level as the mainframe systems being imported from Japan and the US, this assembly work will give China access to the technological developments necessary to build up the lower end of its electronics range, and also the experience of delivering goods in bulk. (Excerpted from Computer Weekly, 28 January 1982.)

The Peoples Republic of China is shopping for 3-in.-wafer prpocessing equipment to install at two newly constructed semiconductor plants in Shanghai and in the city of Wuxi in Jiangsu province. The two new semiconductor plants are expected to fulfil more than half of China's near-term needs. (Excerpted from Electronics Weekly, 29 December 1981.)

EEC to grant aid micro research in five major areas

The EEC has launched a £24 million fund to grant aid research projects in five key areas of microelectronic technology. It will be giving 50 per cent grants to research carried out by firms and universities in the Community. The areas concerned are:

- step and repeat on wafer;
- electron beam for direct-writing on wafer;
- plasma etching and deposition;
- testing equipment;
- computer aided design for Very Large Scale Integration circuitry (VLSI) in the domain of architecture, language and data structure, testing, and device modelling.

The regulation passed by the EEC Council of Ministers gives detailed technical specifications for this research.

To be eligiole for one of these new research grants, applicants for aid under the first four headings must be manufacturers or industrial users within the EEC and the EEC Commission is to set a quota of projects carried out with international co-operation between unrelated firms.

The fifth category of grants, those applying to computer-aided design, is open to universities and research centres of firms. Again there is to be a quota to ensure a certain - so far unspecified - degree of international co-operation.

The EEC will be publishing a call for proposals in its Official Journal. Interested firms and organisations are then to reply giving evidence of their own suitability for grant aid and of the value of the proposed research.

The scheme is to be run by a co-ordinating committee with representatives of all EEC member states. This committee will meet twice a year.

The move reflects concern within the EEC about the US and Japanese lead in micro-technology and is seen as an effort to catch up on these competing countries.

The regulations also provides for a flow of information from EEC member states to the EEC Commission on progress made in the promotion and development of micro-technology. The aim is to co-ordinate more effectively European effort in the exploitation of micro-electronics. (Excerpted from Technology Ireland, February 1982.)

Hongkong

The Hongkong Productivity Centre has established a microprocessor application laboratory, which works with both hardware and software. One of the key programmes for the near and medium-term future at HKPC is the development and/or adaption of "standard" software packages for production management. UNIDO is co-operating with that institution in its development efforts.

Republic of Korea

The Korean government plans to invest 70 billion wong (about $1.1 billion) in the coming five years into the semiconductor industry in order to strengthen this technology-intensive industry.

The aimed at export amount of semiconductor-applied products in 1986, the first year after the 5-year-project, is $1.5 billion, according to the government. The 5-year-project includes the production of 90% of the semiconductors to be used in Korea, and the establishment of a fund for the development of technology that enables the domestic production of semiconductors. The fund will consist of 20 billion wong from the government and 50 billion wong from private enterprise.

Mexico

Mexico City has overhauled its antiquated traffic signal network, replacing it with synchronized, computerized traffic lights. They are expected to improve the flow of traffic and encourage a constant, controllable speed. (Excerpted from R+D Mexico, March 1982.)

The state-owned Mexican telephone company can boast of having developed the first Mexican-made digital microcomputer designed to check on almost everything - from how many times a subscriber uses the telephone to the quality of its service.

The portable computer, called Traffic Analysis Equipment (EAT in Spanish), is slightly larger than an electric typewriter. It was designed by three young engineers in Telmex's Research and Development Center over almost four years and was tested last October in one of Mexico City's 70 central telephone switching stations.

EAT was developed to monitor electrical relays, and it has the capacity to scan more than 1,000 relay points at the same time. Its practical application is two-fold. First it detects malfunctions in a telephone exchange's equipment and pinpoints their exact locations. This permits maintenance personnel to go directly to the unit causing the problem and repair or replace it without having to test other circuits. Second, as its name implies, it analyses traffic flow by answering questions such as which circuits are in use, how long they are in use, when peak periods occur, etc.

The unit accomplishes both functions by sensing a change in voltage at the points being monitored. Depending on the accuracy desired, these points may be scanned as often as every 7/100th of a second. (Excerpted from R+D Mexico, March 1982.)

Singapore

Sord Somputer Systems of Japan has announced plans to set up a project in Singapore costing US $7.6m to make microcomputers in Singapore.

This is the third computer maker and the first Japanese one to set up shop in Singapore giving the island nation a boost in its efforts to become a regional computer software centre.

Earlier Far East Computers, a subsidiary of Hindustan Computers of India, began production in Singapore. This was followed by Apple Computer of the United States.

The new Japanese unit in Singapore, the name of which has not yet been announced, will make all the elements of the microcomputer systems, including the central processing unit, floppy disc drives, printers, video monitors and related software package. (Excerpted from Electronics Weekly, 20 January 1982.)

Second National Seminar on Computer Use held in Sri Lanka

The developing nations should be given help to prevent them from making the same expensive mistakes in implementing computer systems that the developed nations have already made, according to Julian Bogod, director of the UK Council for Computing Development.

Bogod was speaking at the second National Seminar on Computer Use in Sri Lanka, organised under the auspices of the International Labour Organisation.

"During the latter half of the 1970s the world of computing in some developing countries changed dramatically", he said. "Politicians and administrators now appreciate the vital importance for the development of their countries of establishing and extending the use of computing in its broadest sense.

"They are also beginning to understand that computer usage will not just evolve of its own accord, but must be sponsored and supported by them", he added.

"Some countries", he pointed out, "have been able to develop their software competence to the point where they are exporting software products and services . . . what is missing however is the opportunity for local staff to gain experience or to be formally trained in the latest techniques and methods." (Electronics Weekly, 16/23 December 1981)

United Kingdom

A British company - Link-Miles of Lancing in Sussex - claims to lead the world with aircraft flight stimulators, and is the first to bring out a simulator that replaces mainframe computers with a distributed system of microprocessors. (Computer Weekly, 4 February 1982)

The Department of Industry (DoI) and the Scottish Development Agency (SDA) have given £760,000 to Integrated Micro Applications (Inmap) to promote industrial applications of microelectronics in Scotland. Under the DoI contract, worth £380,000, Inmap, whose share holders are the University of Edinburgh and Heriot-Watt University, also in Edinburgh, will be running 30 seminars a year as part of a microelectronics awareness programme. It will also set up an information centre at Inmap headquarters in Edinburgh.(Computer Weekly, 21 January 1982).

United Kingdom promotes information technology

Department of Industry support for information technology is expected in a full year to represent an annual expenditure of over £60 million, Kenneth Baker, Minister for Information, has told MPs.

He explained that it was difficult to say exactly because the schemes available were demand-related and so somewhat unpredictable in out-turn.

Baker pointed out that the DoI's space research programme of £45 million a year and British Telecom's research programme running at £100 million a year would contribute to the development of a UK capability in information technology.

Comparisons with the funding allocations of other industrialized countries' governments to information technology were difficult to make. He declined to attempt it because any such comparisons would inevitably be partial.

Results of a survey of 1,200 UK manufacturing establishments employing over 20 people carried out by the Policy Studies Institute last year estimated that 30.3 per cent of companies were using or intending to use microelectronics in products and/or production; 7.8 per cent in products and 26.6 per cent in production. (Excerpted from Computer Weekly, 18 February 1982.)

Employment effects in the UK

According to a report published by the Policy Studies Institute, application of microelectronics to products and production processes has caused no significant change in employment for nearly three quarters of the respondents to a survey of 1,200 manufacturing establishments. Nearly two thirds expect no great change in the next year and a half. The report shows that in process applications, for every firm that has experienced an increase in jobs through applying microelectronics, three have found a decrease. In product applications these findings are reversed, with three establishments reporting an increase for every one experiencing a decrease. (Excerpted from Computer Weekly, 17-24 December 1981.)

USA

The Semiconductor Industry Association (SIA) has established a program that will focus on long-term semiconductor research and stimulate joint study efforts by both manufacturers and universities.

The Semiconductor Research Cooperative (SRC) will seek to further expand investigation into such computer areas as very large-scale integration semiconductor designs, packaging and testing and other related technologies, Robert W. Noyce, SIA chairman and vice-chairman of Intel Corp., a leading chip manufacturer said (Computer World, 18 January 1982).

ROBOTICS

The industrial robot

Robot generation	
First	blind deaf not very 'intelligent' (can't adapt to changing situation
Second	vision force sensors voice sensors more 'intelligent' (hence adapts to changing situations)
Third	mobile autonomous more sensory capability more adaptive own 'intelligence' (microcomputers)?

(CSIRO Industrial Research News, September 1981)

1982, the year of the robot

With funding from the office of Naval Research and the Defense Advanced Research Projects Agency, the Massachusetts Institute of Technology's Artificial Intelligence laboratory in Cambridge, Mass., has declared 1982 the year of the robot. The goal is a "quantum jump in robotics," and to that end, the laboratory will invite robotics experts to Cambridge from industry and academe worldwide. The kickoff of a multiyear effort, the plans for 1982 include new seminars and courses at MIT and a new journal, the International Journal of Robotics Research, which would collect research reports now published in a variety of places. There also will be two main research goals during the months to come: design and control of a multifinger robotic hand with tactile sensors and the design of a high-level, task-oriented robotics programming language. (Excerpted from Electronics Weekly, 29 December 1981.)

Setting standards for robots

Moscow: The State Committee for Standards has adopted a whole set of documents setting out technical and design norms for industrial robots and classifying them by components, type and uses.

The aim of the detailed standardisation programme is to avoid in the relatively young robot sector the problems of unco-ordinated development and resultant incompatibility which characterise so many "planned" industrial sectors.

Even so, many Soviet engineering factories have their own do-it-yourself robots and manipulators. The Ministry of the Instrumentation Industry has attempted to unify controls and software within its own sector.

The new standards were drawn up following an exhibition of Western robotry in 1977, when leading manufacturers had their brains picked on prospects for development. A couple of production lines full of car-chassis welding robots was bought from Kawasaki at the same time, and the newly adopted standards are based on an analysis of the working of these and follow-up projects as well as a study of the state-of-the-art (Electronics Weekly, 20 January 1982).

Ingersoll report on UK robots

The UK has no major multiple robot installation. The report Industrial Robots by Ingersoll Engineers seeks to convince UK manufacturers that they should make more use of industrial robots. In a market survey of manufacturers and potential robot users, it was found only 30 per cent of the companies have installed robots. However most of these

companies have a hostile environment, boring work, jobs which people do not do well and problems with hard atutomation which could be alleviated by suitable robot use. The UK sales of about 150 programmable robots up to 1979 was insignificant compared with 7,000 installed worldwide.

The Ingersoll Report maintains that robots are financially viable particularly in countries with differential wage levels. Benefits arise from improved utilisation of large machines, saving of materials and flexibility of operation. Robots have been established elsewhere for specific production tasks especially by the metal work industry in the following areas:

- spotwelding
- pressure diecasting
- plastic injection moulding
- spraying of paint and powder
- forging and extrusion
- loading and unloading
- investment casting
- heat treatment.

Robots are used for these tasks because of their inherent programmability and abil ity to continually repeat operations. Special human judgement and dexterity are not needed here. These robots avoid typical human production losses due to fatigue, susceptibility to noise, air pollution and loss of concentration.

The use of robots in other activities such as mechanical assembly is not yet widely established due to the higher degree of judgement and dexterity needed. Automated assembly systems of all kinds are also developing slowly because of the vulnerability of such processes to outside influence.

Although there is a weak industrial base of robot users and manufacturers in the UK, there is considerable R & D in robotics going on, funded by the UK Department of Industry and the Science Research Council. Research has been mainly in the metal working industries, control aspects and design, and artificial intelligence. Following the National Engineering Laboratory Seminar on Robotics in 1977, the British Robot Association was formed. Its objects are to encourage the responsible use of robot technology, to stimulate exchange of information relating to robot technology and to promote the development of related sciences and technologies. Since then several seminars, a conference and an exhibition have been arranged to highlight users' experience in successful application areas.

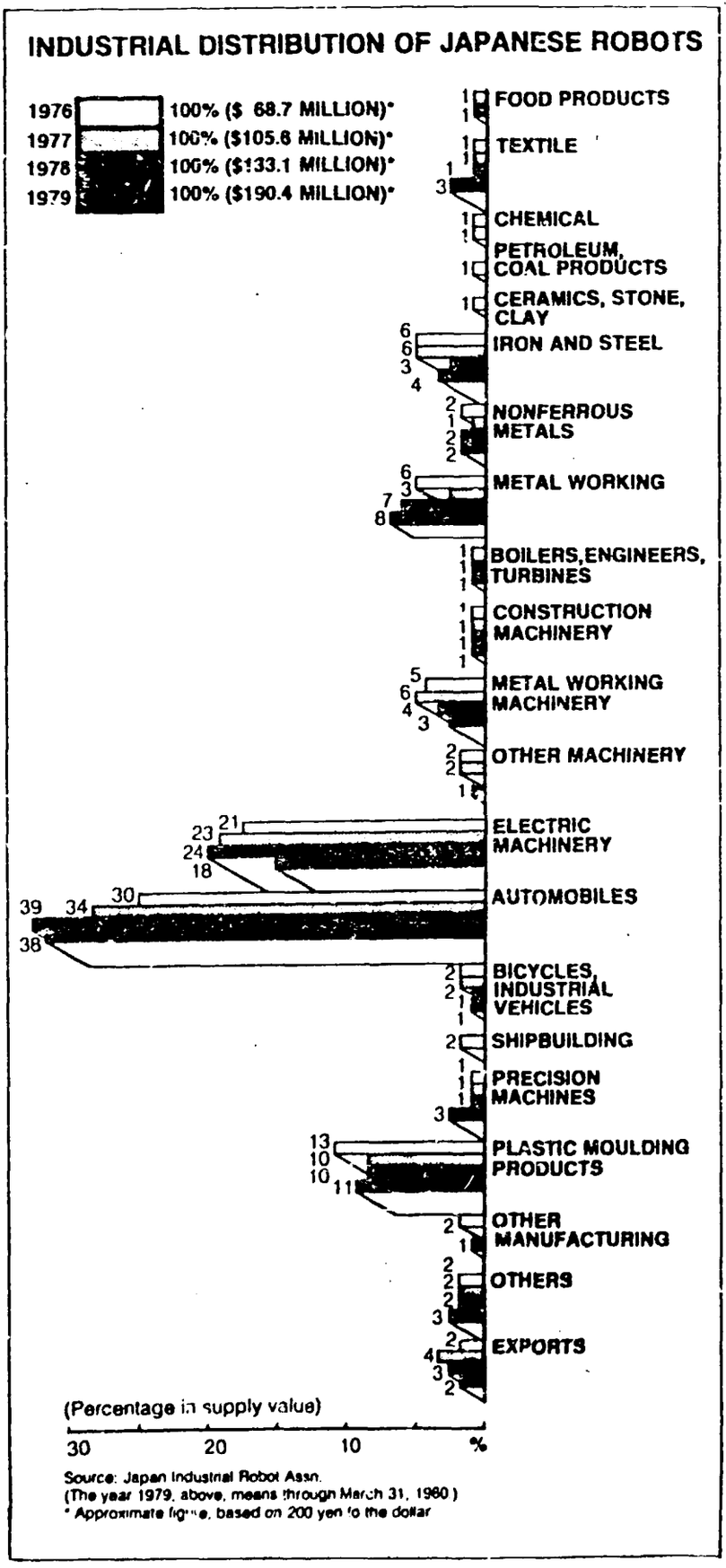
Robots in the USA:

Intnl Robomation/Intelligence's (San Diego, Calif.) small, light robot lifts heavy loads up to 22kg. The robot is controlled by 7 microprocessors, one of which acts as the 'manager' of the other 6. Main application will be loading and unloading machine tools. Many of the mechanical parts are made of an aluminum alloy favored by aircraft firms. Part of the structure has holes cut in it to reduce weight further (New Sci, 12 October 1981).

Lockheed Georgia will start building aircraft with robots. The first production aircraft parts to be assembled will be bulkhead webs. Although each contains 11 detailed parts and 154 rivets, the web is considered a typical aircraft sheet metal assembly amenable to automation. Wing bulkheads and other assemblies will be added to the robots' production responsibilities in late 1982 (Machine D, 11 December 1981).

Japan's robot population:

Robots are becoming smarter with new developments in 3-D vision, touch-sensing, spatial reasoning and manipulator design that will enable them to match humans in many assembly tasks. Japan's robot population totals about 10,000 vs about 4,000 in the US, reports the Robotics Inst. of America. Japan has also become a major producer of robots, making some 7,500 units/yr, or 5X the production of US robot makers. GE expects the market for robot systems in the US alone to grow from $65 mil in 1980 to $1.5 bil by 1990, with assembly application growing at the rate (50%/yr)(High Tech, 10/81).



(Datamation, July 1981)

Computer language for robots

Komatsu (Tokyo, Japan) has commercially developed Janpan's first computer language for controlling arc welding robots usable by workers unfamiliar with computer programming. Programming Language for Welding Robot (PLAW) allows any worker to address a robot through an operating console display screen and easily instruct it how to do a given job. PLAW can tell the robot through its built-in microcomputer to perform complex operations with shorter words like 'MOVE' and 'GOTO' (change the working order) than those used in the ordinary computer programming. Even when the target changes in shape, it can tell the robot to adapt the new work manner through the robot's own sensor. It can make the robot find the right welding spot by giving coordinates indicating the object's vertical and horizontal measurements and the height of the welding point (Jpn Econ J, 12 august 1981).

High-performance welding robot

A new type of fully electric industrial welding robot, Motoman-L10-G Robot, has been developed in Japan having three times the capability of conventional types of robots of comparable size. It has an articulated construction with five degrees of arm movement: turning, raising, lowering, twisting and spraying, driven by a direct current servo-motor. Various combinations of its motor skills give a relatively wide range of operations and a positioning accuracy of plus or minus 0.2 mm.

This robot is one of the many special-purpose custom-built units developed recently by manufacturers. It has a unique dustproof construction allowing for 20 self-diagnosis and mis-operation sensing functions compared with 7 in its conventional counterparts. Its memory is capable of storing up to 1,000 welding steps (Science & Tech. Quarterly, Science Council of Singapore, Vol 2/No 1/July 81).

India entering robot age

India has made a symbolic entry into the robot age with the development of industrial robots by Tata Engineering and Locomotive Company (TELCO). Two such robots - named 'Asha' and 'Amar' - are on display at the Tata pavilion at the India International Trade Fair, New Delhi. The robot Asha offers sweets to children and rose-buds to visitors (Electronics Weekly, 20 January 1982).

Robots for space

NASA wants to multiply by a factor of 10 the amount of cash it spends on computer research. This is in an effort to prepare for the next phase of space exploration, in which space planners think intelligent robots, rather than people, will do most of the work. The initiative has been partly stimulated by criticisms that NASA should do more to develop such machines which, according to some space planners, might one day be able to build factories on the Moon and replicate themselves. (Excerpted form New Scientist, 12 February 1981.)

RECENT PUBLICATIONS AND ARTICLES

Microelectronics and the textile industry

(Excerpt from "Technology Transfer in Fibres, Textiles and Apparel" by G.K. Boon, published 1981 by Sijthoff and Noordhoff, Netherlands.)

The rapid cost reductions in electronic chips lead also to a greater application of electronic control technology in textiles production. Particularly in ring spinning more electronic devices to detect yarn breakages and automatic thread repair devices per cylinder have now been developed. A central monitoring per spinning machine of the relevant parameters per cylinder has been developed. For example per machine the number of thread breakages in each cylinder is recorded, as well as their causes. This and similar information enables a better control of the quality of the spinning process, and it is labour saving also. More efficient centrally-computerized control systems for groups of spinning machines or whole plants are becoming available. Little by little a microelectronically controlled production system is on its way, which will lead to the gradual further reduction in operating, supervisory and factory management personnel. The automated factory is a

future possibility, eliminating all but one or a few people. As an example of the penetration of more electronic control technology into the rotor spinning process can be mentioned electronic devices for measuring the dust concentration in each rotor. If this concentration exceeds a certain critical level the thread is automatically broken and the rotor stops in order that it can be cleaned. This is an example of preventive output and quality control to keep both at the highest level. Also electronic devices for measuring temperatures in each rotor and of the thread itself are under development, all with the purpose to control the production process as much as possible. Often the problem is the way how a certain parameter best can be measured. If this is known, an electronic device measuring it is relatively easily developed.

The introduction of all these new devices is a question of costs. The chip may be cheap but the relevant breeding of the textile technology with mircroelectronic possibilities is often complicated and progress made is based on costly research. Therefore, at the time of writing (1979) the introduction of these various devices is tempered by their high cost. In this industry certainly the new technology as yet is not of a capital saving nature. In contrast savings in labour and improvements in quality are achieved by a higher capital-output ratio. Only a technological breakthrough in the basic textile processes combined with electronic applications may yield a capital saving technology. As yet such a technology is not operational. Much the same observations hold for weaving.

Technological change is at present in a dynamic stage, it proceeds rather fast, it has the potential for further substantial increases in labour productivity, it tends to be energy saving and ecologically sound. All this may have the tendency of increased investment requirements per worker, that is, of increased capital intensity, of high professional skill intensity in R & D, manufacturing and in the operation of this technology. The technology under development eliminates the illusion that textile production wil remain a relatively labour-intensive industrial activity. It may reverse the present comparative cost and the present international division of labour realities.

Robotics references

The Institution of Electrical Engineers Library has recently published a bibliography entitled 'Industrial Robotics'. The bibliography contains 226 important references dealing with the practical and general aspects of robots and their control. It is divided into two sections. Section A covers review articles and introductions and Section B deals with specific aspects and applications.

The bibliography is available from the Publications Sales Dept, IEE, P.O. Box 26, Hitchin, Herts SG5 1SA, price £10.50.

Microcomputer controls for an industrial sewing machine

The application of the microcomputer to various industrial machinery or equipment is expanding. The sewing industry is no exception to this trend, positively employing microcomputers for more advanced automation, labour saving and further industrialization. The author here explains the application of a 4-bit microcomputer to an automatic thread trimming sewing machine (Microproc. Micro Systems, by K. Fujikawa, 1981).

Electronics Industry in Pakistan

(Excerpt from a paper prepared for UNIDO by Dr. M. Aslam, Director, National Institute of Electronics, Islamabad.)

The total requirement of all types of electronic equipment/component has been estimated to be $736 million for the 5th plan period (1978-1983).

There are four industries in the public sector namely; Carrier Telephone Industry, National Radio and telecommunication Corporation, Telephone Industry of Pakistan and Equipment Production Unit of Pakistan Broadcasting Corporation. The range of product is telephone instruments, exchange equipment, teleprinters typewriters, HF & VHF receivers, power supplies, long distance carrier telephony, telegraphy as well as HF/VHF Radio Transmitters, discrete active components, passive components and printed circuit boards. The total financial outlay is approximately $10.3 million while annual turn-over is about $20.5 million.

There are 12 radio and T.V. and consumer electronics manufacturers in the private sector with a capital outlay of $5.05 million and annual turn-over of $42.8 million. There is sufficient assembly capacity available for radio and T.V. in the country. Apart from that there are a number of cottage industries which are producing mechanical parts for both these items and radio kits.

A company by the name of Micro-electronics Incorporated, Lahore was established in 1980 for production of custom built integrated circuits. The trial production has already started and the products are mostly meant for export. In the initial stage the processing of chips will be done by the foreign collaborators while packaging etc. will be done locally. However, it is expected that by 1983 the processing of the chips will also be done in Pakistan. The said firm intends to start production of Micro-processor (8 bit, 16 bit) in 1982. The technical know how as well as part-funding has been done by the foreign collaborators.

The Government of Pakistan decided to establish a National Institute of Electronics. The implementation of the project effectively started from the end of 1980. Some research products have already been initiated for design and development and maximum local integration. The aims of the Institute are primarily to develop a production proto-type with all its documentation and then pass it on to public or private sector industries for production for local consumption or export.

The National Institute of Electronics has been assigned the task of refresher courses for engineers and scientists working in the field of electronics. Since dissemination of information on current technology is necessary for development of a sizeable effort in this field so the National Institute of Electronics is going to publish an electronic journal and also going to organize national/international conferences every year.

The National Institute of Electronics has prepared plans to develop integrated circuits, transducer etc. up to production prototype stage. There are about 40 main frames computer in use in Pakistan and innumberable number of calculators.

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