The Electronic Media in the '90s

Coming — World TV Programmes

by A'abad

THE rating of the CNN world television news service went up sky-high with its new style coverage of the recent war in Iraq. Now CNN is being relayed by many networks in many parts of the world. In the United States and Europe, TV channels devoted exclusively to news are gaining popularity.

Even the TV networks in several developing countries are using such feeds for their domestic viewers.

Fast changing new technologies in the satellite and broadcasting fields are forcing the broadcasters to review the patterns of traditional TV programming in the third world.

With the success of international TV news services, the regional programmes in Europe had a successful run, originating from several countries such as France (to European countries), Spain (Europe and S America), Italy (three services).

The BBC launched to World Service Television (WST) on April 15; now limited to an European footprint, but planned for other continents in the near future. The BBC's strategy is to cash in on the reputation built up by the world famous radio World Service. WST is now on the air for18 hours a day ; and the programme can be picked up in N Africa and in Russia west of Moscow. The current constraint is that the WST has to be self-financing, like its other competitors, according to Hugh William, the Programmes Director of the BBC World Service Television.

NHK Japan has also planned to invade the world of television, using its new satellites (services delayed due to launch mishaps) announced Kenji Aoki, NHK's Managing Director of New Media, at the 1991 Royal Television Society's Fleming Memorial Leeture. He unfolded Japan's new service with some telling statistics and astute observations. In Europe, the number of television channels will jump from 40 in 1980 to 250 by 1999 (120 currently). In Tokyo, the annual TV programming hours will jump from 118,000 to 463,000; creating huge markets. Information and software have replaced iron ore and oil as primary core trading products.

TV programme costing is rising 17 per cent annually, with fees for sports events skyrocketing. For NHK it means expenses to the tune of US $7 billion in the next ten years; facing a deficit of $2b, after including the revenue from licence fees.

Kenji says that we are now living in the multi-media age, and TV broadcasters must face multiple choices in management strategy; with competition from cable (optical), HDTV, video and video disc.

Now that it is possible to transmit news direct from a site in another country to the viewers around the world, the central control is lost. The viewers are getting accustomed to such independent TV news transmissions (CNN is still centrally controlled), and can build up their judgement values (Tiananmen and the Gulf); and hence expect to be fed in this manner in the future. The broadcasters have to be alert to this shifting needs of the society to diverse values.

Mobile/portable SNG (satellite news gathering) sets now allow real-time delivery of news over large areas of the globe. Since the cost is dear to a single broadcaster, global TV news network service is under contemplation by professional agencies (even Asiavision is looking into it). It will take some time before the dust of the debates settle down.

Japan has established the new Media International Corporation to project its image to the shrinking world of television.

The competition is stiff, with regional satellites now coming in (Asiasat, Hong Kong); but distribution is now much easier with a large number of domestic satellites now on the waiting list (even in the developing countries). The days of the captive audience is coming to an end (in the Third World the VCPs are over-busy), posing strategy problems for the state networks.

Philosophically, the information scientists are suffering in a miserable internal debate: what to do with the surfeit of information gushing out of the electronic media ? How to use it; how to store and sort it ?

And where is the time in every 24 hours ? If processing of the available information takes more time than it takes to use the information, then is it worth it ? At the fag end of the 20th century, the situation is reversed: more input than the output can handle.

Coming down to the level of our hearths, watch the children watching TV — then watch them what they do when not watching TV. We are in the Information Age.

The writer has worked for over 40 year in broadcasting.

Computers Talk Asian

Potential business from Asia's high-performance economies has the computer industry rushing to adapt its language to complicated Asian scripts. Yojana Sharma of IPS reports.

HONG KONG — With Asia poised to be the world's biggest computer market within the next decade, overtaking Europe and North America, research to perfect Asian-language software systems has been stepped up.

According to the Hong Kong-based magazine, Electronic Business Asia, rapid economic growth in Asia coupled with recession and slowing growth in traditional Western markets mean that demand for computer systems in Asia will overtake the West by the year 2000.

Economic growth is likely to double that of North America and Europe over the next few years, economists say.

In addition, the trend among Asian countries like South Korea and Taiwan to move towards less labour-intensive, high-technology manufacturing and countries like Hong Kong and Singapore from manufacturing-based to service-led economies will further boost the demand for computers and appropriate software.

The market for information technology in most Asian countries has leapt by an average of 25 per cent a year during the 1980's.

Even with much lower growth in the next decade, Asian markets are now large enough to justify the development of products geared to their national needs.

Where once the industry balked at the mammoth task of adapting software to complicated Asian scripts, including Chinese ideogrammes, computer companies now feel the investment could pay off.

Even with its technological supremacy in the computer manufacturing business, Japan was for years forced to compromise by using a phonetic version of the Latin alphabet to transcribe Japanese characters onto computer screens.

The development of Asian language systems in an industry once so dominated by Latin script softwares that computer professionals in Asian countries could only master their field by becoming proficient in English, has progressed by leaps and bounds.

This has opened up major possibilities in countries where computer literacy has hitherto been restricted to a small elite.

The cost of computerisation in countries where there is no tradition of English-language education in high. It has also meant that once technology is acquired, companies are reluctant to replace and update equipment.

Countries like Korea, Taiwan, China and Thailand that have virtually no tradition of English-language education appeared doomed to making do with expensive and often outdated equipment.

Meanwhile, former British colonies like Hong Kong, Malaysia and India, and countries where English is widely taught like the Philippines forge ahead, keeping pace with the West.

The news that the Korean market is now larger than what the rest of the Asian market — excluding Japan — was just five years ago, has made computer scientists realise that the future is in developing systems for these countries.

With Asian markets now able to compete with western ones, computer manufacturers in Asia are also worried that a rising tide of protectionism in the United States and Europe may force them to explore new markets.

The need to develop the market on their doorstep has now dawned.

Just as important, the potential of the Asian market has led to a concerted effort to set standards for the development of Asian language software systems.

"Up till, now approaches to developing Asian language software has been fragmented with different methods being used in different countries or even in the same country," says KC Wong of the Unisys company.

Wong is the Hong Kong representative of a new regional industry grouping called Portsoft, established to deal with Asian language software, which will set up its secretariat here.

Comprising computer manufacturers, software developers, research institutes and academic organisations in the region, Portsoft aims to provide guidelines to help programmers write genuinely portable Asian language software which can run on computers produced by different manufacturers.

Geneticists Build a New Kind of Cotton

In a single cotton crop genetic engineers in Australia have introduced resistance to a herbicide and built in a pesticide against a specific pest. The techniques could be used in other crops. But are products like these socially or economically necessary? Some green groups have their doubts. They also worry, reports Gemini News Service, that farmers in developing countries may become locked into using new crops that have to be bought from major companies. by Geoff Tansey

GENETIC engineering promises or threatens — depending on your point of view — to transform the world's crops. Will it, for example, remove the need for chemical pesticides or increase their use? For one crop in Australia the answer looks like: "Both."

Researchers at the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in Canberra have introduced into one crop a genetically-engineered resistance to the herbicide 2-4D and a built-in pesticide against a specific pest.

The crop is a widely-grown, locally-developed variety of cotton, siokra. The techniques could be used in other crops.

High-quality siokra was developed by traditional plant breeding methods. Its leaf shape gives it an open canopy which makes insecticide application more effective.

This increases yield by about 10 per cent compared with more broadleaved varieties, says Dr Danny Llewellyn, senior research scientist at the CSIRO Plant Industries Division.

His research team is changing siokra much more quickly using genetic engineering techniques than is possible by traditional breeding. One problem for farmers is cotton's sensitivity to the herbicide 2-4D, which is widely used on wheat grown in the same areas.

If it blows on to cotton up to 60km away it kills off the growing tips, which retards it, extends the growing season and can even wipe it out.

Cotton's sensitivity also makes weed control difficult with herbicides. Very few post-emergence herbicides can be used and these have to be applied manually with special applicators. Usually, teams of students are used in the holidays to weed the crop.

By introduction 2-4D tolerance into the plant, the spray drift will not harm it and 2-4D could be used to deal with the weeds around. 2-4D is biodegradable and breaks down in the soil in a few weeks, with many bacteria and fungi able to do this, says Llewellyn. He is transferring that ability into the plant.

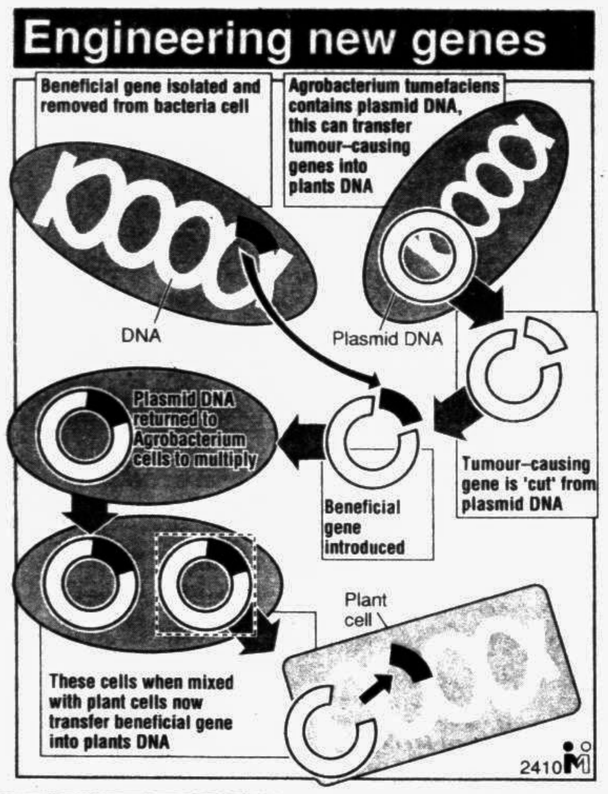
One of these bacterial — alcaligenes eutrophus — grows on 2-4D and uses seven genes in breaking it down. "We looked to see if a single step deactivated the herbicide," says Dr Llewellyn. It did. The first gene broke down the herbicide into dichlorophenol.

"We isolated the codes for it, modified it so it would work in plant cells, then tried it on a model system first before going with cotton which takes 12-18 months."

They used quick-growing tobacco plants for their model to check if the resistance could be transferred. When the tobacco with the new gene was grown and sprayed, it was 30 times more tolerant of 2-4D than normal tobacco. Next came the cotton itself.

The desired gene is transferred into the plant using another bacteria, agrobacterium tumefaciens. This soil organism causes crown gall disease, which produces tumours on the stems of plants.

A small part of its genetic material (DNA) occurs as a ring, called a "plasmid." It causes the disease by transferring part of this plasmid into the genetic material of the plant's cells, the chromosomes.



Llewellyn's team removes the disease-causing bit of DNA in the plasmid and replaces it with the first gene from the bacteria that breaks down the 2-4D.

When the plasmid is returned to the agrobacterium and mixed with chopped up seedling stems or leaves, the bacterium transfers the new gene to the plant cells.

In order to select out the cells which contain the new DNA, a second gene resistant to antibiotics is also transferred. By treating the mixture with antibiotics, only those cells which contain the new DNA survive.

For cotton, these cells are grown on nutrient media until they organise themselves like a seed. This embryo is pulled off, made to germinate and give a shoot which can be planted in soil and grown to maturity. It takes 12-18 months to get a transformed plant — called a transgenic — back.

It is the first time this transfer has been done for cotton in Australia and Llewellyn is now awaiting permission to grow the new transgenic plant outside.

However, he is not content with one gene giving herbicide tolerance but is also introducing a gene to produce a pesticide inside the cotton plant.

This will reduce the number of pesticide sprayings during the growing season. Currently cotton is sprayed 12-14 times and pests are becoming resistant.

This time, he is introducing a gene from bacillus thuringiensis (BT), which produces a toxin that poisons the cotton budworm caterpillar (heliothis armigera). The toxin is harmless to humans and this method could be used for other plants, he says.

With the BT-toxin gene inserted, the plant produces a protein which the insect eats when it nibbles the plant. The contents of the insect's gut activate the toxin and break it down to smaller toxins which kill the insect.

Monsanto has already synthesised a gene to make the BT-toxin in the plant and CSIRO has signed an agreement with them to use this artificial gene. Monsanto will get a percentage of the seed price, assuming field tests of the cotton prove its worth.

In future, Llewellyn expects plants will have a pyramid of insect resistant genes built into them to counter the danger of insects becoming resistant to a particular toxin.

However, not everyone is happy with the development of these transgenic plants and animals. In Europe, the German greens are campaigning to have the first transgenic crop to be grown outside, petunias with a gene from maize and resistance to antibiotics, to be destroyed.

They fear the environmental consequences of unleashing new plants and animals into the environment.

A well as using safety, efficacy and quality, in evaluating the new organisms they want a fourth criteria — need. Is the new product socially or economically necessary?

Others are concerned about the impact on developing countries, fearing that farmers may become locked into using new crops and animals that have to be bought from the major companies, which anyway have used plants and animals from developing countries in developing the product.

David Cooper of Genetic Resources Action International (GRAIN) says: "Generations of small farmers in developing countries have selected and nurtured an impressive array of plant varieties which provide the genetic basis on which we all depend."

They are calling for access to genetic resources to be guaranteed, a funding mechanism to promote conservation, access for Third World countries to biotechnologies like genetic engineering and strengthening locally based research and development using rural people's knowledge and skills. — GEMINI NEWS

How Foodstuffs are Produced in Laboratories

HUMANS and mammals are dependent on certain amino acids in food, as they themselves are not capable of producing these fundamental ingredients of proteins by means of metabolic processes. Consequently, approximately 500,000 tonnes of amino acids are produced annually as additives for fodder and foodstuffs world-wide.

During a project conducted in conjunction with industry, scientists at the Forschungszentrum Julich (Research Centre Julich) have recently discovered further opportunities to increase this production even more with the help of biotechnological processes.

To synthesize protein, approximately 20 different amino acids are required, which plants and microorganisms can produce. Animals and humans, on the other hand, must receive most amino acids from their food since, due to the absence of the appropriate enzymes, the synthesis of some amino acids in not possible.

This has consequences, particularly when it comes to fattening animals. As the metabolic absorption of animal fodder depends on the content of the amino acid which is present in the smallest amount, the correct composition is of importance. As a consequence, 100,000 tonnes each of methionine and lysine as well as 300,000 tonnes of glutamate are produced annually as fodder additives worldwide.

Lysine and glutamate are produced with the help of the bacterium Corynebacterium glutamicum and a few near relatives. The molecules of each amino acid occur in to structures, the D-and L-form, which are mirror images of each other. Organisms, however, can only utilize most amino acids in the L-form, while the D-form is excreted. As both forms occur in chemical synthesis, it is no match for the bacterial production method, which only produces the L-form. Methionine is an exception in that it can be utilized in both forms and is thus synthesized.

As the bacteria only produce amino acids to satisfy their own needs, L-lysine is not excreted by the wild strains of the bacteria. The enzyme aspartate kinase regulates this production process internally. It plays a strategically decisive role in the synthesis process.

In the active state it transforms an initial substance, aspartate, into an intermediate product, which can then be built up further into four amino acids in several stages : L-lysine, L-methionine, L-threonine and L-isoleucine.

This enzyme contains sensors for lysine and threonine in the form of receptor sites.

The amino acids attach themselves to the enzyme, thus changing its shape so that it can no longer form intermediate products. If the amount of amino acid decreases as result of cell processes, the attached molecules leave the enzyme once more and it can react further. Bacteria which, due to altered genetic information, produce defective enzymes to which the lysine molecules can no longer attach themselves, have helped interrupt this control cycle, thus making it possible to cultivate strains which produce and emit lysine continually.

The analysis of the overall synthesis process revealed that six enzymes in all participate in the production of lysine and that the quanties of the enzymes — unlike the case with numerous other bacteria — remain constant. Therefore, the production control depends solely on the aspartate kinase. If this mechanism is blocked, the amount of lysine produced should depend solely on the amount of enzyme employed.

In order to bear out this theory, the deoxyribonucleic acid (DNA) of Corynebacterium, which contains about 2,000 genes, was tested for the genes for these six enzymes in the Institute for Biotechnology at the Forschungszentrum Julich. When they were discovered and isolated, they were embedded in plasmids, the ring-shaped DNA chains which contain some of the genetic material of bacteria.

These plasmids were introduced into the bacterium Escherichia coli and multiplied. In this way, a large amount of enzyme genes was obtained, which could be implanted back into the Corynebacterium, thus resulting in a clear increase in the lysine production. In the laboratory an increase from approximately ten to almost 50 grams per litre of culture liquid was achieved.

However, it became evident that only a fraction of the surplus production of the bacterium is emitted and, consequently, a protein which regulates the permeability of the cell walls for this amino acid is being sought. Furthermore, it is planned to analyse L-threonine and L-isoleucine synthesis in order to increase the productivity of these amino acids which are of economic interest.

The results of this research work, supported by the Bundesministerium fur Forschung und Technologie (Federal Ministry for Research and Technology), are being implemented industrially by the Degussa AG in Frankfurt, a traditional and globally renowned poducer of amino acids.

— Peter Bensberg

New Species of Dinosaur Discovered

A previously unknown species of dinosaur lived in Germany at the dawn of the Jurassic period some 185 million years ago. These animals were armored, two meters long, quadrupeds and plant-eaters. This surprising announcement was made by Dr. Hartmut Haubold of Halle. In the Swiss journal Revue de Paleo-biologie, he describes the evidence on which he bases his conclusion: a skull 14 centimeters long and several bones. The remains were discovered by the paleontologist Dr. Werner Drnst in a clay pit near Greifswald in Mecklenburg-Western Pomerania in 1963, but a chain of unfortunate circumstances prevented their significance from being recognized for a long time.

In Spring, 1988, the find was handed over to Haubold, who concluded that it represented a hitherto unknown species of armored Ornithichiar. The spinal bone plates are evocative of the Stegosaurus, which emerged 45 million years later. Haubold has given the "new dinosaur the generic name Emausaurus; the first part was taken from the initials of the Ernst Moritz Arndt University in Greifswald where the find was first studied. In honor of Werner Ernst, he added the species name ernsti.

Intelligent Materials

by Dr K S Jayaraman

AN aircraft begins to lose height as sudden ice formation increases the load on its wings. An inbuilt sensor on the wings signals a microcomputer to change the configuration of the aircraft for more lift.

Walls of an office building begin to develop stress due to a hurricane but the inbuilt sensors immediately activate braces to prevent the walls from swaying.

A room gets overheated by sunlight and immediately the window glass changes colour to reflect sunlight bringing the room temperature down.

These are the intelligent or smart materials that respond to their environment just as a chameleon's skin adapts to its surroundings or like a tree leaf curling protectively in a drought.

Man's increasing ability to create new materials by manipulating the atoms of molecules of existing ones is revolutionizing our world. But today's materials — natural and man-made — have one drawback: they are unable to warn of problems or impending failure of the structure built with those materials.

All over the world scientists are trying to produce "Smart" materials that have inbuilt intelligence not only to sense the impending failure but also to take corrective action.

Photochromatic glass is one such smart material. It darkens in bright sunlight to lessen the glare in spectacle lenses then clears quickly when the wearer moves out of the sun.

Another class of intelligent materials is the shape memory alloy (SMA) so called because it can be deformed or distorted in any fashion but remembers its original shape to which it reverts when heated to a right temperature.

The Japanese have invented a brassiere reinforced with frame of shape memory alloy that would collapse while the garment was being laundered but regain its precise shape and size before it was worn again.

Already in market are heat shrinkable plastic sleeves made through the process of irradiation. These sleeves are ideal for insulating electrical and telephone cables because they shrink when exposed to heat tightening the grip on the wires and providing an excellent seal.

A nickel-titanium alloy called NITINOL is the most commercially important SMA. The ability of this alloy to revert to original shape when heated to right temperature is exploited to create a variety of products like nails, suture clips, splints (used in bone surgery) and self-spreading satellite antenna.

The shape memory effect remained a curiosity since 1932 until 1969 when an American company under a military contract developed the pipe connectors for F-14 combat aircraft using SMA containing nickel and titanium.

A Japanese company has introduced heat detection springs made of SMA. These springs installed in air conditioning ducts are designed to detect heat and to shut off ducts to prevent smoke, flame, and poisonous gases from reaching other rooms.

Applications of SMA are several. Clamps made of SMA can open and close without any mechanical strains. Plane surface could be covered with bumps and indentations. Straight wires can take spiral shapes.

In the biomedical sector, especially in orthodental field, the super elastic effect of SMA is already in use for making arches.

The SMAs are also expected to bring about radical changes in the field of constructions, acronautics, space and optics. Even the art world is taking an interest in these remarkable materials.

The French firm "Sourian" which has been actively concerned with SMA since 1983 is now trying to develop copper based memory alloys.

Another firm "Cezus" which makes 20 kg to 50 kg ingots of SMA is now planning to manufacture semi-finished goods: bars, wires, sections, plates, sheets and pipes.

Of late the shape memory effect has been discovered in resins and rubber.

Four Japanese companies have developed a shape remory resin called "ASMER". At room temperature it behaves like a resin while at temperatures above 60 degree (C) it behaves as a rubber.

The companies anticipate a wide range of commercial applications for ASMER from acoustic insulation and vibration control to shoe padding and artificial flowers.

In India the Surana Udyog group of industries has established a new unit in Hyderabad for indigenous manufacture of heat shrinkable cable jointing kits and plastic wire connectors.

Other SMAs are yet to attract Indian industry but they have already been developed at the Bhabha Atomic Research Centre (BARC) and the National Metallurgical Laboratory in Calcutta.

At BARC work is going on to develop Nitinol SMA hydraulic pipe coupling and fasteners using SMA. BARC scientists have also produced a rotary shape memory heat engine generating up to 70 rotations per minute.

Scientists have also developed a line of intelligent polymers or gels that could prove useful in a range of applications from self focusing contact lenses to miniature systems for delivering drugs to specific parts of the body.

The latest gel developed at the Massachusetts Institute of Technology in the United States is unique. It shrinks to one thousandth of its original size when exposed to visible light from a laser and then swells back once the light is removed.