



**"A vital link between global technology developers and the local technology practitioners"**

**Newsletter of the Technology Watch Centre (TWC), National Science Foundation**

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## **LOCAL RESEARCH BREAKTHROUGH**

### **Rice-Fish Integration: Rearing of goldfish post larvae and fry in organic paddy cultivations**

Results of a series of experiments conducted for fourteen years reveal that even improved paddy varieties could be successfully grown with animal wastes. Basal application at 0.1 kg/m<sup>2</sup> and four applications by broadcasting at 0.03 – 0.04 kg/ m<sup>2</sup> every fortnightly provided the necessary fertilizer for paddy as well as fish. With improved protective measures, goldfish post larvae (PL) and fry were grown successfully at 120 PL/m<sup>2</sup> and 80 fry /m<sup>2</sup> respectively in paddy plots (49 m<sup>2</sup> each) located at the Department of Animal Science, Faculty of Agriculture, University of Peradeniya, Sri Lanka having a pond refuge of 1 m<sup>2</sup> at the centre. Fish produced in the paddy fields from fry stage possessed red metallic, orange and yellow metallic body colours and possessed the export quality. Results indicated that there is a potential for the production of ornamental fish (either fry or fingerlings) in paddy fields, where water availability throughout the ten weeks of culture is guaranteed.

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E-mail : udenie@pdn.ac.lk*

## **Culture methods / improving growth rates**

### **Integrating seaweeds into marine aquaculture systems: a key towards sustainability**

The rapid development of intensive aquaculture (e.g. finfish and shellfish system) throughout the world is associated with concerns about the environmental impacts of such often monospecific practices, especially where activities are highly geographically concentrated or located in suboptimal sites whose assimilative capacity is poorly understood, and consequently prone to being exceeded. One of the main environmental issues is the direct discharge of significant nutrient loads into coastal waters from

open-water systems together with effluents from land-based systems. In its search for best management practices, the aquaculture industry should develop innovative and responsible practices that optimize its efficiency and create diversification, while ensuring the remediation of the consequences of its activities to maintain the health of coastal waters. To avoid pronounced shifts in coastal processes, conversion not dilution is a common-sense solution used for centuries in Asian countries. By integrating intensive aquaculture (finfish, shellfish) with inorganic and organic extractive aquaculture (seaweed and shellfish), the wastes of one resource user become a resource (fertilizer or food) for the others. Such a balanced ecosystem approach provides nutrient bioremediation capability, with mutual benefits to

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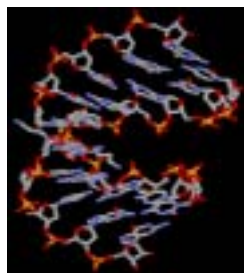
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### **Bioinformatics : Computational Analysis of Biological Information**

During the course of the past few decades, considerable progress has been made in the field of



Molecular Biology. Together with the breakthrough of novel genomic technology, a spectacular increase in biological information was generated by the scientific community. In 1988 a report mandated by the Congress was

published by the Office of Technology Assessment in the United States of America, which recommended that the sequence of the basic units (nucleotides) of the human genome be entirely elucidated by the year 2010.

Bioinformatics is the field of science in which, biology, computer science and information technology merge to form a single discipline. In other words it is the creation, development and operation of databases and other computer tools to collect, organize, and interpret molecular biological data (gene or protein sequence). Compiling this information in a digital format, bioinformatics solves problems of molecular biology, predict structures, and even simulate macro molecules.

At the beginning of the 21<sup>st</sup> century, advances in molecular biology, availability of sophisticated equipments, allowed the scientists to initiate the

rapid sequence of large portions of genomes belonging to different species. Subsequent storage of such data on computers, allow the use of bioinformatics to model and track a number of fascinating things.

In fact to date, several bacterial genomes as well as some eukaryotes (e.g. *saccharomyces cerevisiae*, bakers yeast) have been sequenced in full. The Human Genome project and Rice Genome project, illustrates application of bioinformatics. The Human genomic project, designed to sequence all 24 of the human chromosomes is also progressing. The results obtained from the human genome project reveals that the number of genes that exist in the human genome accounts to be in the range of 20,000- 70,000 in 2003/2004.

By examining a genome and watching how it changes overtime, evolutionary biologist can actually track evolution as it occurs. The process of evolution has produced DNA sequences that encode proteins with very specific functions. It is possible to predict the three-dimensional structure of a protein using algorithms that have been derived from our knowledge of physics, chemistry and most importantly, from the analysis of other proteins with similar amino acid sequences.

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ADVANCEMENTS IN ELECTRONICS &  
TELECOMMUNICATION TECHNOLOGY



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## LOCAL TECHNOLOGY BREAKTHROUGH

### National Disaster and Emergency Warning Network (DEWN)

*The unprecedented damages caused to life and property, and consequently to the economy of Sri Lanka by December 2005 Tsunami, has been blamed for the absence of an early disaster warning system in the country, or for that matter even anywhere in the South Asian Region. The tragedy which generated the shock waves across all sections of the population, has in particular awakened the scientists and technologists to respond urgently to the need for an effective mechanism for early detection and instantaneous country-wide transmission of an effective mechanism for early detection and instantaneous country-wide transmission of an impending disaster. It is in this context that the Mobile Communication Research Laboratory of the University of Moratuwa in collaboration with Dialog Telecom, Micro Images (Pvt.) Ltd. has developed a National Disaster Emergency Warning Network (DEWN), that can pick up signals from an emerging disaster and rapidly communicate messages to relevant State institutions to take prompt action.*

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The pilot phase of the country's first ever disaster and emergency warning network was launched recently at the Ministry of Public Security, Law and Order. It is expected that the system will be tested and modified over the next few months leading up to final deployment nationally.



The DEWN is an innovation based entirely on widely

available mobile communication technologies such as short messages (SMS) and cell broadcast, aimed-

at rendering a cost effective and reliable mass alert system. The network connects mobile subscribers, police stations, identified religious/social community centres and even the general public to, a national emergency alarming centre. A responsible authority would generate an alarm message from the alarming centre, which would be received by mobile phones as well as specialized alarm devices. The message could be selectively sent based on area, to identified individual/group of receivers, or to the general public as decided by the authority generating the message. Messages can be received by either a mobile phone or a special-purpose wireless alerting device. Cell phones may receive the message in any of the three languages.

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ADVANCEMENTS IN CIVIL, MECHANICAL  
MANUFACTURING ENGINEERING TECHNOLOGY



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## MANUFACTURING ENGINEERING

### *What is new in Computer Aided Manufacturing*

#### **Latest CAD/CAM software maximises sheet metal usage**

Radan 05, the latest release of the CAD/CAM software for sheet metal applications is now available from Radan Computational. Many of the software's new features focus on maximising sheet utilisation, reflecting the continuing escalation of world-wide raw material costs, said Radan. The new features include enhanced nesting routines for components that stack at specific angles, improved common line slitting and the ability to store and automatically nest part used sheets.

Automation is a further theme in Radan 05, with other features including the ability to define, store and retrieve tooling templates that specify the required tool blow combinations to be used whenever particular geometry is programmed. Further productivity improvements include new heat avoidance options for all types of profiling machines and enhanced parts removal and unloading capabilities. Radan 05 also supports ACIS 14, allowing the direct import of latest ACIS 3D models.

In addition, native Autodesk Inventor files can be imported directly in to the system, along with an extended range of optional 3D file formats - including Parasolid, CATIA V4 and V5, Solidworks.

Cold Spray is a revolutionary emerging industrial coating technology for surface engineering, reclamation and direct fabrication. Special feature of the Cold Spray system is the ability to produce coatings Unigraphics, VDA-FS and Pro/E.

Latest upgrades to the software's user interface and working environment include enhancements to auto-dimensioning, easier set up sheet and nesting report generation and more effective DNC flow control. Furthermore, Radan 05's support for Visual Basic for Applications (VBA) is claimed to provide simplified handling of macros, improve integration with third party software, and enable users to easily customise their working environments to individual requirements.

*For more information: [sales@uk.radan.com](mailto:sales@uk.radan.com)*

### *New technology of grinding, mixing and separating*

#### **Swirling flow technology provides a better industrial mix**

A new mixing technology has been invented by CSIRO which reduces cost of mixing liquid in industrial applications through the concept of swirling flow. The technology offers inexpensive construction, improved mixing, excellent solids resuspension, inhibition of scale growth on tank walls, and a relatively gentle action on particles suspended in the flow. CSIRO's industrial partner has progressively installed the swirling flow technology on their refinery precipitator tanks. The mixing concept could also be

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ADVANCEMENTS IN ENVIRONMENTAL SCIENCE & TECHNOLOGY



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## Tree planting not always green

*Forests can suck up water and change the soil planting forests to soak up carbon dioxide from the atmosphere can have a range of side effects, including drying up streams and making soil saltier, according to a global study. The discovery highlights the tradeoffs involved in tree-planting projects, say researchers.*

Because plants use carbon dioxide to grow, planting forests of large, fast-growing trees is one way to remove the gas from the atmosphere, thus staving off global warming. But such forests need a lot of water.



The team surveyed more than 500 places where new forests have been planted over the past half-century. In 13% of cases, streams dried up completely for at least a year. On average, plantations cut local stream flow by more than 50%. It doesn't matter where you are in the world, when you grow trees on croplands, you use more water. The effect can reduce the water available for drinking and irrigation, and harm local aquatic ecosystems. Researchers found that forest soils are saltier and more acidic, compared with other types of plant cover such as crops or grasslands.

## Carbon trading

These changes occur partly because tree-planting projects choose fast-growing species that suck up more carbon dioxide, explains Jackson. Often these are evergreen trees that grow all year round, meaning that they take up a lot of carbon dioxide and water. Some changes to water flow may be desirable, the team points out. For example, forest plantations in the US agricultural belt have reduced nutrient runoff from farmlands into the sea, which can cause algal blooms that kill marine life.

The key is to consider local factors when implementing afforestation projects, the researchers argue. Policy-makers often have a set of 'carbon blinders' on - they're thinking and talking only about carbon. Some nations and companies are currently planting forests as a way of earning 'carbon credits' in international carbon markets. These allow greenhouse-gas emitters such as power companies to balance their emissions by buying carbon savings elsewhere.

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## **Food industry gears up for new ISO safety standard**

With the dramatic increase of national standards for food safety management and consequent perplexity, the International Organization for Standardization recognized the need to harmonise the national standards at an international level.

The International Organisation for Standardisation (ISO) is in the process of developing a specific standard for food processors setting out safety management procedures. The development of ISO 22000 will become a key part in the efforts by governments and regulators to keep contaminants out of the food chain. ISO 22000 on food safety management systems will affect organisations ranging from feed producers, primary producers through food manufacturers, transport and storage operators and subcontractor, to retail and food service outlets. Related organisations such as producers of equipment, packaging material, cleaning agents, additives and ingredients will also be affected. The ISO is an international standard-setting body made up of representatives from national regulatory bodies. The organisation produces world-wide industrial and commercial standards, which often become law through treaties or national regulations.

The standards specify requirements on planning, implementing, operating, maintaining and updating a food safety management system. It will set the

standard for evaluating customer requirements. It will require companies to inform its suppliers, customers and other parties in the food chain about safety standards.



A food or beverage company will be able to use the new standard to demonstrate its ability to control food safety hazards. They will have to comply with part or all of ISO 22000 to meet applicable food safety regulations, or any requirements agreed with a customer. Currently food and drink

companies follow ISO 9001, which is a more general industry standard on quality management.

The standards specify requirements on planning, implementing, operating, maintaining and updating a food safety management system. It will set the standard for evaluating customer requirements. It will require companies to inform its suppliers, customers and other parties in the food chain about safety standards.

The publication of ISO 22000 will be followed by an ISO technical specification giving guidance on the implementation of the standard. The technical specification will focus on guiding small and medium-sized food producers. The ISO plans to publish another technical specification in a few months explaining certification requirements when third-party auditing is used.

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## Microsoft's vision of the future

*Everyone has a different idea of what fun gadgets they would like to see in the future, and some of Microsoft's researchers have been demonstrating in Brussels what they hope might take off. Those familiar with the Harry Potter books and films might recognise the first idea - called the Whereabouts Clock.*

It shows you where people are, and its inventor Abigail Sellen thinks its best use is in the home. It is noticed that our studies of family life that it was important to know - when you come home from work for example - are our kids still at school, have they left school yet? This kind of thing. Actually knowing where your family is very important to family life. This is more a new concept than a new technology, and the real version may still be a year or two away.

It would track the mobile phone signals of loved ones, then cross-reference which mobile cell they were in with pre-programmed locations, like the home, school, or workplace. This is not very specific at all about where people are, and that's deliberate. We don't want to invade people's privacy too much, so we deliberately keep things very coarse grained.

### Home front

Getting the future of domestic technology right is notoriously difficult: what has happened to the idea of putting the internet on the front of microwave ovens? Homenote is a 21st Century version of the Post, whereby you can text or e-mail your messages to a place rather than a person. Some might wonder though, whether we really want e-mail in the kitchen. Everything takes longer than you -

expect, and people hold onto their old ways of doing things. There are sometimes good reasons for that. The danger in a sense is that we fall in love with the technology and we don't ask enough questions about its usefulness, or whether or not it actually improves life; it often does but sometimes it just makes things more complicated.

### Interactive bowl

The next idea that really bowled us over at Click Online was a kind of interactive video and image bowl that reacts to touch. However the final product, if there is one, is still few years away. Here what



researchers hope to be able to do is take still images and video, and be able to see them in the bowl and possibly to listen to music. Further they hope to be able to drag the images around the bowl, making use of the physical properties of the bowl, to be able to display things in certain places, and possibly to store them in the bowl.

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ADVANCEMENTS IN MANAGEMENT OF  
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## Importance of managing technology for a wealthier Sri Lanka

The strong relationship between technological advancement and economic development is well established. In addition to improving productivity, technological advancements lead to new products, processes and even industries resulting in rapid economic growth. Depending on the technology status, a country or an industry can choose a specific technology strategy for survival and growth. These include *technology extender* strategy at the lowest end concentrating price minimisation, *technology exploiter* strategy emphasising quality maximisation, *technology follower* strategy for feature optimisation and *technology leader* strategy for image capitalisation at the most advanced end. As a developing country which strategy are we adopting?



Certainly we are nowhere near technology leader position in almost all industries, not even technology follower or exploiter stage. Can a country develop adopting technology extender, exploiter or even follower strategies? No, not for very long.

Economic development of a country can happen only by generating wealth as a country. This can happen either by trading goods and services outside the country earning foreign exchange or by importing less and less thus saving foreign reserves. Exporting is successful only if our products can compete in the global market. Importing will be less only if our products can compete with the imported products in the open economy. Both these can happen only if we equip ourselves with strategic technological capabilities. Thus, it is essential that we clearly understand the urgent need for building our national technological capability and managing our technology if we are serious about securing our -

- position in the increasingly turbulent global knowledge based economy.

Unfortunately, so far we have failed in this exercise. Let us take a few examples that any layman can see, apart from instances where several industries have closed down. If you go to shoe shops which used to sell locally manufactured shoes, you will see more imported shoes. If you go to any famous clothes shop you will see a lot of Chinese garments despite Sri Lanka being a major foreign exchange earner as a producer of garments. Why? Because these industries can not compete with other global players on continuous basis. Although we feel that our country is growing with higher standard of living of people, other countries with correct technological strategies are growing faster than us and hence there is no doubt that we will always be followers and not leaders.

*To be continued to pg.2...*

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## Stride into the future : future plastics industry

*Following is a technology foresight assignment done by industry experts after reviewing the most important technical developments of the past 50 years, to help us imagine the biggest headlines in plastics from now to 2055.*

### Say Hello to Nano Molding

The new frontier of injection molding is "sh r i n k i n g".

Miniaturization in electronic and medical parts will help push today's micro-molding



towards "nano"-size parts. Machinery will need to evolve to meet the "nano" challenge. Shot sizes must become smaller, and screw diameters are already shrinking from the standard lower limit of 14 mm. Hot-runner systems will also need to evolve to accommodate tiny shots. So will parts-removal and handling systems, since air drafts and static electricity will present major challenges when dealing with flyspeck-sized bits of plastic. As micro-molding gives way to "nano-molding," processors will need creative answers to the problems of handling flyspeck-sized parts.

### Make Way for the 'Microwave-Truder'

There has got to be something better than the single-screw extruder as a plasticating mechanism. It is anticipated a new apparatus to melt plastics using some new form of energy such as microwaves.

The invention of a technique for more energy-efficient conversion of resin into parts are predicted. We've got to find ways of taking cost out, and energy savings are the last venue for making processing cost-competitive in North America. Blow molders continually fight a battle to keep melt temperatures low to save energy and minimize resin degradation while needing temperatures high enough to obtain a uniform melt. Twin-screw extruders can provide a uniform melt at lower temperature, but their higher cost has made them rare in blow molding so far. There's plenty of R&D on new plasticating devices. The cone extruder from Finland, has demonstrated good energy efficiency, and the University of Paderborn in Germany is experimenting.

Researchers are looking into other methods of plastication, such as ultrasonic vibration to achieve a temporary reduction in viscosity. Highly conductive plastics will be developed that will allow inductive heating. In some plastics micro-wave heating will be applicable to replace plasticating screws. These approaches will revolutionize energy consumption in plastic extrusion.

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ADVANCEMENTS IN TEXTILE TECHNOLOGY



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## Advancements in Dyeing

### Deep-dyeing auxiliary that turns cotton jet-black

A deep-dyeing auxiliary is used mainly for improving the depth of shade in the aftertreatment of polyester dyeing in black, navy blue or dark green. With this new auxiliary, deeper shades can be expected even from reactive dyestuff. Moreover, its deep-dyeing effects are superior in durability and dyeing fastness. Although deep-dyeing effects as obvious as those on polyester may not be expected, the auxiliary remarkably enhances brightness in reactive dyeing.

#### Features

1. Produces superior deep-dyeing effects. Being composed of a special resin compound with self-crosslinking properties at a low refractive index, it forms a crater-shaped, low-refractive micro film on the surface of fiber. This results in enhanced light transmission to the fiber with less reflection (white light), thereby producing a deeper shade.
2. Displays superior durability in the deep-dyeing effect. Has superior colorfastness to washing and dry cleaning due to self-crosslinking properties.
3. Influences on colorfastness are minimal.
4. Due to the main component being resin,

the processing liquor does not suffer from gumming up or any alteration during treatment, unlike conventional silicone types.

*For more information : [maya@fine.ocn.ne.jp](mailto:maya@fine.ocn.ne.jp)*

### Innovative device for efficient dyeing

Brazzoli S.p.A, Italy has developed an innovative perforated basket that moves side to side as the fabric advances into the dyeing machine through the Turbovario, a variable conical cross-section venturi. The J-shaped basket's motion plait the rope of fabric as it moves from the top of the machine into the immersion area. The motion is synchronized automatically with the fabric driving wheel, which maximizes the space in the machine, and according to the company, increases repeatability and reduces foam formation. Maximizing the load size also maximizes the interaction between the dye or treatment bath and the fabric, reducing pilling and cycle time. Dyeing of 100-percent cotton using a reactive dark dye can be reduced from five hours to roughly three hours, while cotton/polyester dyeing can be reduced from six hours to four and a half hours.

The machine is available in a modular construction and can be run coupled or uncoupled. Because of its load efficiency and flexibility, it also is used in bleaching.

*For more information : [info@brazzoli.it](mailto:info@brazzoli.it)*