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Progress, Promise and Prospects

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C O N T E N T S

SHM of Unmanned Aerial Vehicles



*International Conference on, Utilization of TKDL
as a Model for Protection of Traditional Knowledge*



*International Conference on, Recent Trends in
Renewable Energy Resources at IICT, Hyderabad*



*Indo-US Workshop on, Transportation
and Greenhouse Gas Emissions*



*National Science Day Celebrations:
CSIO, NBRI, NEERI, NEIST, and NIO*



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Structural Health Monitoring of Unmanned Aerial Vehicles Using Fibre Optic Sensors

Structural Health Monitoring (SHM) technology has become increasingly important as an approach to increase the safety and reduce the maintenance costs of aircraft structures. Affordable advanced miniaturized sensors and continuous improvement in data processing technology combined with powerful hardware and software approaches have allowed this technology to become an integral part of such structures.

The key to an effective SHM system for aircraft structures is not only the appropriate sensor selection but also the processing of the sensor data to

predict the flight load and the damages in the structure. National Aerospace Laboratories (NAL), Bangalore has been working for the last eight years in this area in order to realize a fully online SHM system so as to enable a paradigm shift from ‘*Periodic Maintenance*’ to a ‘*Maintenance on Demand*’ philosophy.

NAL, Aeronautical Development Establishment (ADE), a DRDO laboratory and IMOD (Israeli Ministry of Defence) jointly conducted flight trials on ADE’s Unmanned Air Vehicle Nishant (N15-32) on 28 October 2010 at Kolar Airfield in which this

technological breakthrough has been achieved. Structural Health Monitoring technology has been developed for monitoring of structural health parameters while the UAV is in flight. This breakthrough enables the structural health of aeronautical structures to be monitored, so that online health can be assessed continuously and corrective action, if needed, can be taken. This also enables the UAV to be flown without unnecessarily grounding them. This is of immense strategic importance from considerations of readiness of the fleet and safety.

In order to realize this overall



Fig1 (a): FBG Sensor Instrumentation on aircraft mounting fixture

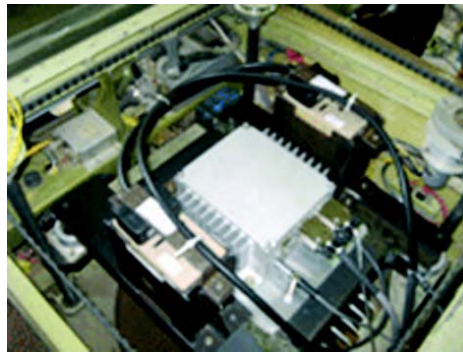


Fig1 (b): SHM system assembled in Nishant Aircraft



Fig1 (c): Nishant in Flight

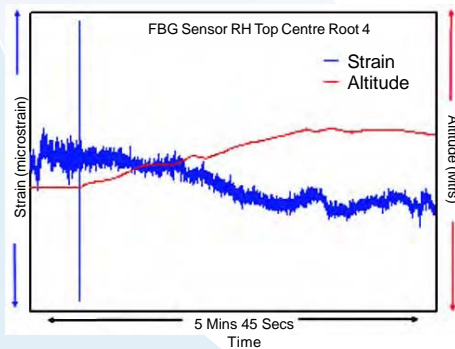


Fig2 (a): Strain variation during launch

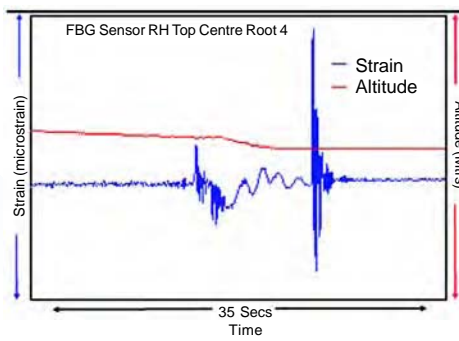


Fig2 (b): Strain variation during landing

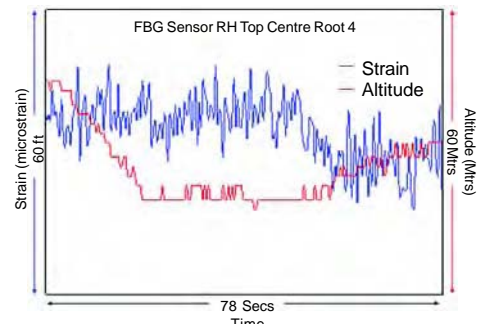


Fig2 (c): In-flight strain variation during cruise operation



objective, the principal factors considered were: (1) Evaluation and adaptation of the embedding technology of the Fibre Bragg Grating (FBG) sensors, (2) Connectorization and Routing Issues – Structural Integrity and Process Compatibility, 3) Ruggedized flight worthy Instrumentation for measuring large number of FBG sensors at adequate high scan rate and 4) Testing and development of load detection methodology for the data obtained from flight trials.

Figures 1(a) and 1(b) show the FBG sensor instrumentation comprising of FBG interrogator, on-board rugged computer and battery on mounting fixture and Nishant's payload area

respectively. These technologies developed have led to the successful flight trial. Figure 1(c) shows the Nishant UAV during flight. Initial analysis of the in-flight data acquired indicates that the system has worked very well and all the important maneuvers have been successfully captured by the embedded FBG sensors during the flight. Figures 2(a) and 2(b) show strain variation during launch and landing as measured from one of the embedded FBG sensor. Figure 2(c) shows the in-flight strain variation during cruise operation of the aircraft at different altitude levels. Detailed analysis of the flight data is in progress. Further intensive work, which will address all the issues which include telemetry, robust

damage detection algorithms and the like over the next couple of years, should lead to a fully online SHM system

This is indeed a historic moment as it is probably the first flight trial of an SHM system on an UAV. This is also the successful culmination of a joint collaboration between India and Israel under the I2MC (Indo-Israel Management council) Programme of DRDO.

In this major effort, NAL and IMOD were responsible for developing all the SHM technologies towards the realization of an online SHM system and ADE played the pivotal role of assembly of the SHM system onto the UAV and also in the conduct of flight trial.

NPL Develops a Novel Process for the Production of Carbon Thrust Pads

The carbon thrust pads are extensively used in high power submersible pumps and other related applications. These are so far conventionally produced from a mixture of carbonaceous filler, such as petroleum or pitch coke, synthetic or natural graphite and a carbonaceous binder, for example, coal tar pitch. The mixture, after being shaped by compression moulding or extrusion into an artifact of the desired shape and size is heated to 1000°C or so in a non-oxidizing atmosphere to get a rigid carbon product.

The product so obtained usually possesses low bulk density, low mechanical strength and high porosity which is usually impregnated with a suitable thermosetting phenolic resin to

improve the density, strength and to reduce the porosity of the final product. However, the product produced by this conventional process seldom possesses a bulk density of 1.70 g/cm³, bending strength of 50 MPa and hardness of 70 MPa.

NPL scientists have developed a novel process for producing the carbon thrust pad precursor material which is obtained by the heat treatment of coal tar pitches under suitable conditions. This material is then ball milled to a fine powder in a high speed planetary ball mill, moulded into plates,



The know-how of the process for production of carbon thrust pads being transferred to industry

blocks or cylindrical rings without any extra binder and carbonized to a temperature of 1000°C or so higher to produce the high quality carbon product useful as carbon thrust pad submersible pumps and other related applications. This baked carbon product can be



impregnated, if necessary, with a suitable thermosetting resin to increase further the density and to reduce the porosity.

The special carbon thrust pad produced by the NPL process possesses a bulk density of more than 1.75 g/cm^3 , bending strength of more than 70 MPa, shore hardness of more than 70 along with a homogeneous and fine microstructure. These properties are comparable to the best imported grades available in the country. This high quality carbon thrust pad is, so far, not produced in the country. Its potential applications besides carbon thrust pads include bearings, seals and other jigs for a variety

of mechanical applications.

A patent of the novel process technology for this high quality carbon product has been applied for by the team of scientists led by Dr. G. Bhatia, Scientist 'G' and the know-how of this process has been transferred to an industry, namely, M/s Omkar Engineers (Pvt.) Ltd., Rajkot Gujarat who are already manufacturing carbon thrust pads using a conventional process. The high quality thrust pads developed using this novel process will now be produced for the first time in



Carbon Thrust Pads

the country by this firm and its production will save a considerable foreign exchange besides having a good export potential.

One More Hansa-3 Aircraft of NAL Delivered For Flight Training

One more Hansa-3 aircraft, designed, developed and manufactured by National Aerospace Laboratories (NAL), Bangalore, bearing Registration VT-HOE was allotted to the Amritsar Aviation Club (AAC), Amritsar, by DGCA on 29 January 2011. This is the third Hansa-3 aircraft acquired by AAC through DGCA for training student pilots. Hansa-3 is reported to be very popular among the student pilots of the club. The representatives of AAC Capt. Rachhpal Singh Sohal, Chief Flying Instructor and Hon. Secretary, AAC and Shri. S. S. Rao, Chief Engineer, acknowledged that Hansa-3 aircraft is very economical to operate and an ideal platform to train flying students.

On behalf of NAL, AAC gave flight demonstration of this aircraft at the International Air Show, Aero India 2011, held at Air Force Station, Yelahanka, Bangalore, during 9-13 February 2011. The aircraft was later ferried to AAC on 14 February 2011. The ferry flying of this aircraft was commanded by the AAC pilot Capt. Vikram Singh Toor, Asst. Pilot Instructor with Capt. Amit Dahiya, Pilot Instructor, AAC, as co-pilot.



Handing over of aircraft documents: Shri. M. S. Chidananda, Head, C-CADD and Programme Director- Civil aviation (right) handing over documents to Shri. S. S. Rao, Chief Engineer, AAC, Amritsar

The ferry flying of this aircraft was commanded by the AAC pilot Capt. Vikram Singh Toor, Asst. Pilot Instructor with Capt. Amit Dahiya, Pilot Instructor, AAC, as co-pilot.

CSIR's Drug Defence Against Malaria

Dr. P. Cheena Chawla

The terror unleashed by mosquitoes on a summer night is unforgettable, for the aftermath of a scratchy, painful mosquito bite is truly irritating. Worse is, if the biting insect harbors the highly infective forms of a deadly bug called *Plasmodium* — the malarial parasite. This exactly happens in most tropical regions of the world particularly Asia, Africa, Central and South America, where malaria is rampant and people suffer from severe life-threatening complications of this disease.

Known since antiquity, malaria can be caused by four different species of *Plasmodium*, the most deadly being *Plasmodium falciparum*. The other three species are: *P. vivax*, *P. malariae*, and *P. ovale* that generally do not cause life-threatening disease. The first effective treatment for malaria came from the bark of cinchona tree, which contains quinine – a potent drug against malaria known since the 17th century. Chloroquine phosphate is the drug of choice for all malarial parasites.

Though chloroquine has been and still remains one of the most extensively used first line drug for malaria, resistance against this drug is quite frequent

that normally occurs due to non-adherence to the treatment schedule. For example, *P. falciparum* and *P. vivax* have been reported as resistant to chloroquine. Therefore, for a long time, there was a worldwide search for a drug that could be more effective than chloroquine and which could minimize the chance of resistance development. It is a matter of pride that CSIR has been on the forefront in searching for natural or synthetic drugs that could be used as a weapon to fight malaria since it has caused so much of devastation in tropical countries, especially India.

CSIR scientists at the Central Drugs Research Institute (CDRI), Lucknow have done pioneering research in developing novel anti-malarial drugs. For this, many plants

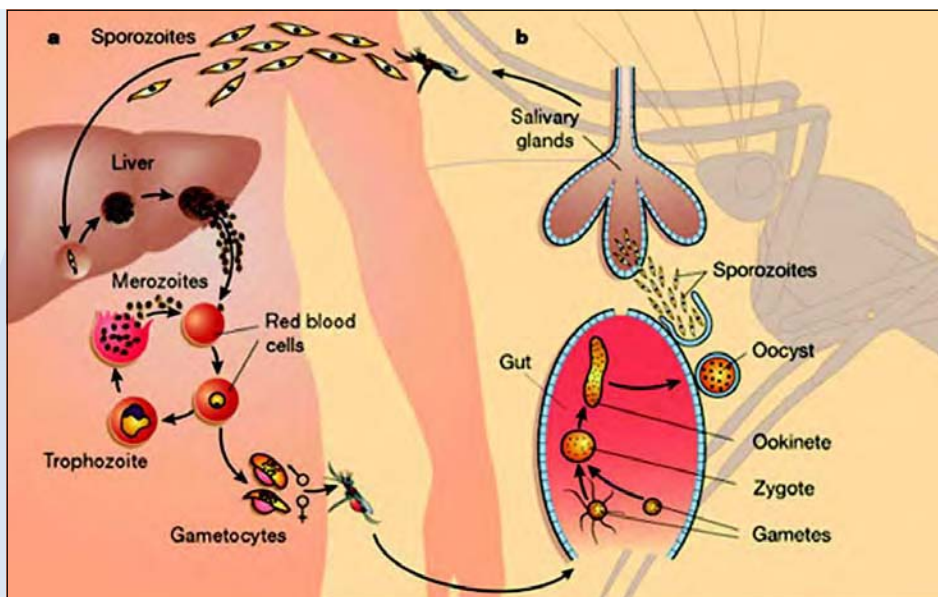


used by traditional systems of medicine were tried till CDRI got a major success in developing a drug named, Arteether from the plant *Artemisia annua* (sweet wormwood) while working in collaboration with Central Institute of Medicinal and Aromatic plants (CIMAP), Lucknow.

Now how exactly does Arteether acts to defend the human body against the onslaught of the malarial parasites? Nature has bestowed the malarial parasite a complicated life cycle that involves two hosts, female mosquitoes of the *Anopheles* genus are the primary host of malarial parasite, while human beings are secondary hosts. The disease raises its ugly head in human beings when an



Artemisia annua



infected *Anopheles* mosquito bites a person and injects the infective stage of malarial parasites called ‘sporozoites’ into the blood stream of human host.

Now what happens once the sporozoites gain entry in the human blood stream? Sure, the parasites embark upon their vicious journey to destroy liver and blood cells of the host. This normally takes about one to three weeks from the day of mosquito bite, as symptoms of illness start to appear in the victim only after this incubation period that is quite variable and depends on the species of the infecting parasite as well as the health status of the victim prior to infection.

The vigorously moving sporozoites, while traveling through the bloodstream, soon find their way to reach the liver, where they undergo maturation and multiply into merozoites. As their numbers increase, they rupture the liver cells and escape back into the

bloodstream. The bug finally wages a war on the human red blood cells (RBCs), where they develop into ring forms, and later form trophozoites, schizonts and then back into merozoites. The ‘exoerythrocytic’ phase of malaria infection in the human host involves infection of liver, while the ‘erythrocytic’ phase involves infection of the RBCs.

The characteristic waves of fever and chills in malaria occur as merozoites are released from liver cells that go on to infect the RBCs. Once inside the RBCs, the malarial parasite grows and reproduces to form many of its kind until a mosquito feeds on this infected human host while taking a blood meal and ingests the RBCs that contain the parasites.

The ingested malarial parasite, in the form of gametocytes, reaches the stomach of *Anopheles* mosquito. These gametocytes then differentiate into male or female gametes, which then fuse in the mosquito gut. The resultant,

an ookinete, penetrates the gut lining and produces an oocyst in the gut wall. This oocyst ruptures and finally releases the infective forms of malaria parasite called sporozoites that migrate through the mosquito’s body to the salivary glands. It is now that the infected mosquito is fully ready to infect a new human host. The parasite’s cycle is completed once an infected *Anopheles* mosquito bites a human host and transfers the sporozoites to the human bloodstream.

The cyclical occurrence of sudden chills followed by fever and sweating is repeated every two days in *P. vivax* and *P. ovale* infections, while it occurs every three days for *P. malariae*. *P. falciparum* can have recurrent fever every 36–48 hours or an almost continuous fever. A bout of malaria may typically cause severe anemia and cognitive impairment due to brain damage especially in children. The worse hit are the victims of *P. falciparum* infection or cerebral malaria as they might develop bleeding problems, liver or kidney failure, seizures and even coma. This lethal assault by the malarial parasite kills the victim in most cases. Chronic malaria normally occurs in *P. vivax* and *P. ovale* infections, where the disease can relapse months or years after exposure, due to the presence of latent parasites in the liver.

Arteether is actually a semi synthetic derivative of artemisinin, the active constituent of the plant, *Artemisia annua*. CDRI conducted extensive preclinical, toxicological and other



regulatory studies in which the drug was not only found to be very safe but also proved to be a fast acting, blood schizontocidal agent which attacks at the erythrocytic stage of malaria in blood. Extensive clinical trials were conducted at seven centres in malaria prone areas of India and over 500 patients showed excellent response. Arteether is prescribed to the patients as second line of treatment for chloroquine-resistant *P. falciparum* malaria including cerebral malaria.

The Drugs Controller General (India) has allowed the use of Arteether drug exclusively in hospitals and nursing homes. This drug is indicated for use only in severe *P. falciparum* malaria as a second line treatment for chloroquine resistant cases. Arteether is not recommended for using as a first line treatment for malaria to avoid its overuse, which may lead to the emergence of resistance against this drug once again. CDRI has licensed this drug to Themis Chemicals Ltd., Mumbai, which is marketing it under the trade name *E-Mal* as an injectable formulation. The efficacy and safety of Arteether in uncomplicated/complicated cases of *P. falciparum* malaria has been validated through surveillance data on 400 patients obtained from clinicians from different parts of the country. No drug related side effects were observed.

Scientists at CDRI have developed yet another anti-malarial drug called the *Compound 80/53* that has International Nonproprietary Name (INN) as

Bulaquin, which is actually a primaquine derivative. Primaquine is the only drug available for use as anti-relapse, anti-malarial for prophylactic in *P. vivax* malaria. However, this drug causes many side effects, the most common side effect being methaemoglobinaemia where there is a high level of methemoglobin (metHb) in blood that reduces the ability of blood to release oxygen to tissues. This mainly occurs in patients with deficiency of an enzyme called Glucose-6-phosphate dehydro-genase (G6PD). Higher doses of primaquine cause methaemoglobinaemia in most such patients.

Bulaquin is without any side effects that have been observed with primaquine. A comparative data analysis on initial (0 day pre-drug) and final (+7 day post-drug) values of haemoglobin, methaemoglobin, etc. in healthy human subjects treated with specified doses of primaquine and *Bulaquin* have been carried out. Remarkably, one-week primaquine treatment leads to rise in methaemoglobin levels from 3.97% to 16.32%, which is highly significant in comparison to the 2.29% and 3.02% levels of methaemoglobin before and after 7 days treatment with *Bulaquin* respectively. Thus, it is evident that primaquine treatment produces a steep rise in methaemoglobin in contrast with *Bulaquine* that does not raise the level of methaemoglobin significantly.

Bulaquin has been licenced to

Nicholas Piramal India Ltd., Mumbai for marketing. Nicholas Piramal has introduced *Bulaquin* alongwith chloroquine into the market as a combination pack under the trade name *Aablaquine*. The objective of the combined therapy is to control *P. vivax* malaria more effectively by providing initial cure and, thereafter, preventing relapses by use of this combination pack.

As a part of World Health Organization's global efforts to fight malaria, the Global Malaria Programme (GMP) envisages myriad activities that include malaria surveillance, monitoring and evaluation besides technical assistance and policy advice for integrating with national malaria programmes of different countries. Technical assistance at country level is also on diagnosis and treatment strategies, mosquito control including other preventive measures, besides supporting research for the development of new drugs and insecticides.

The common precautions one needs to take for preventing malaria in mosquito-infested areas include the wearing of appropriate clothing to avoid the mosquito bite, using insect-repellant creams on skin and spraying of insecticides to kill the mosquitoes, besides using mosquito bed nets and draining stagnant water where mosquitoes lay their eggs. It is also advisable to take specific anti-malarial drugs, thanks to CSIR, if one is traveling to malaria-risk areas.



International Conference on, *Utilization of the Traditional Knowledge Digital Library (TKDL) as a Model for Protection of Traditional Knowledge*

It is not often that one gets to see history being made and it is even rarer to observe history as it evolves. However, delegates from about 35 countries such as Bangladesh, Bhutan, Botswana, Brazil, Bulgaria, Chile, Cambodia, Ecuador, Fiji, Indonesia, Iran, Iraq, Jamaica, Kenya, Kyrgyzstan, Malaysia, Maldives, Mali, Mongolia, Nepal, Oman, Peru, Philippines, Republic of Korea, Russia, Sri Lanka, Thailand, Turkey, Uganda, Vietnam and Zambia who participated at the International Conference on, *Utilization of the Traditional Knowledge Digital Library (TKDL) as a Model for Protection of Traditional Knowledge*, held at New Delhi from 22- 24 March 2011 were privileged to witness both.

The Conference was aimed to share experiences and information on the role of the Traditional Knowledge Digital



The dignitaries seated on the dais

Library in the documentation of traditional knowledge (TK); to identify the intellectual property issues in and technical implications of the establishment of a TKDL; and to explore the role and functioning of the TKDL within the international IP protection system. It was organized by the Council of Scientific and Industrial Research (CSIR), in association with the World Intellectual Property Organization

previously known/documented knowledge or *prior-art*.

The birth of TKDL marks a momentous point in Indian history and has today passed into legend. Every Indian remembers the feeling of national outrage and personal helplessness as international patents were granted for the wound-healing properties of *haldi* (turmeric) and the anti-fungal properties of neem. The use of *haldi* and neem for such purposes, as Indians protested, was household knowledge. The medicine chests in Indian homes always had a bouquet of medicinal herbs for immediate use. *Haldi* and neem, along with *tulsi* and some other medicinal plants were greatly valued for their healing and health-giving properties. Indians recall with pride the fact that India did not take this misappropriation lying down. The Council of Scientific and Industrial Research decided to challenge the patent. Later the crusade was joined

(WIPO).

The TKDL documents traditional knowledge available in public domain in the form of existing literature related to Ayurveda, Unani, Siddha and Yoga, and presents it in searchable and digitized format in English, German, French, Japanese and Spanish. The information is structured to assist patent examiners in their search for existing evidence of



A view of the audience



by national NGOs and other organizations.

It became clear that patent examiners were handicapped because often the TK was oral in nature and even when actually documented in manuscripts and treatises (as Ayurveda, Yoga and Siddha were) the information is not structured as per their requirements. It is also not retrievable by search engines and so, remains out of the reach of patent examiners, although it is public domain.

It was against this backdrop that the TKDL was conceived and established. More than 150 experts in traditional medicine, law and computer science spent almost ten years accessing and classifying information codified in authoritative textbooks on *Ayurvedic*, *Unani* and *Siddha* medicines and documenting postures in Yoga. They collated scattered data published in ancient languages and transformed it into a systematic, proprietary database. The TKDL digitized available information in five languages and in a format that allowed patent examiners to retrieve the information in the way they needed.

As it stands today, the TKDL has documented 85,500 Ayurvedic formulations, 1,20,200 Unani formulations, 13,470 Siddha formulations and 1098 Yoga postures. TKDL safeguards 0.226 million medicinal formulations including neem and turmeric as these are used in Ayurveda, Unani and Siddha. The TKDL database size runs to 34 million A4 size pages.

The USP of TKDL is that it operates within the established rules and laws of the recognized patent system and does so in a manner that cannot be challenged in any way. TKDL establishes *prior art*

and does so in an internationally-acceptable manner despite the fact that the source of the *prior art* goes back thousands of years and was originally written in a language few today use regularly. By empowering patent examiners, TKDL is instrumental in preventing the grant of wrong patents and it is a formidable weapon against bids at misappropriation of TK.

For example, a patent that earlier took at least a decade of enormously expensive intensive litigation to be revoked is now being routinely refused in a matter of weeks at no cost (since the patent application is rejected and no rights have been granted, which need to be revoked.) A new and welcome trend is that many applicants are unilaterally withdrawing their applications on being faced with TKDL: their actions tacit acknowledgement of a misappropriation attempt.

The success of India's TKDL was acknowledged by Shri P. K. Bansal, Minister of S&T and Earth sciences who inaugurated the Conference. He said, "TKDL has made waves around the world, particularly in TK-rich countries by demonstrating the advantages of proactive action and the power of strong deterrence."

Prof. S. K. Brahmachari, Director General CSIR said that in the future TKDL could be utilized in open innovation models for diseases for the economically under-privileged for example, TB, malaria and filaria. He gave the example of *Risorine* –an anti TB medicine currently in the market where bio-enhancer lead was obtained from *Trikatu*. He emphasized that TKDL is community-knowledge and that CSIR/AYUSH do not "own" it.

The TKDL story is that of a path-breaking Indian initiative and has earned the appreciation and captured the interest of the world. This electronic online, searchable encyclopedia of Indian TK is the first of its kind, defensive knowledge for traditional knowledge. TKDL represents, perhaps, the first example of knowledge-based leadership emanating from a developing nation and being eagerly sought after and used by developed countries.

A path-breaking innovation never goes unnoticed. India's leadership in fighting misappropriation of TK began to attract visits of high-level delegations from international agencies. South Africa's Department of Science & Technology visited in 2003 and in 2004, delegations from African Regional Industrial Property Organization visited India with the idea to replicate TKDL for ARIPO Member States. Even five years before the present Conference, the Governments of Thailand, Mongolia, Cambodia, Malaysia and Indonesia had already evinced keen interest in TKDL.

The Patent Offices across the world were also eager to have access to TKDL so as to be able to grant patents correctly and without subsequent controversy and expensive, time-consuming litigation. The first request received for TKDL Access was in July 2005. However, formal access to the TKDL was granted with non-disclosure agreement to the European Patent Office only in February 2009 because legal formalities had to be completed.

Once the framework was in place, access was granted to the Indian Patent Office in July 2009; German Patent Office in October 2009; United States Patent and Trademark Office in



November 2009, United Kingdom Patent and Trademark Office in February 2010, Canadian Intellectual Property Office in September 2010; and to IP Australia in January 2011.

The Conference on, *Utilization of the Traditional Knowledge Digital Library (TKDL) as a Model for Protection of Traditional Knowledge* was scheduled to be the backdrop for signing a similar agreement with the Japan Patent office. However, this was postponed in view of the national calamity in Japan. A similar arrangement is currently being negotiated with the New Zealand IP Office. Interestingly, USPTO patent examiners were trained by CSIR for Search and Examination of TK-based patent applications, in October 2010 at the TKDL facility in Ghaziabad.

At the Conference, representatives of countries such as Peru, Brazil, Ecuador, Indonesia, Kenya and Thailand presented brief counts of the state of TK and/or TK documentation in their countries. Senior officials from WIPO also shared their experiences and detailed the issues related to the grant of a patent. It was clear that TKDL or similar Digital Database of documentation is a pre-requisite to identify evidence of *prior art*. It was also clear that certain common problems were still to be addressed and that the different countries were concerned about these. For example:

- Indian TKDL relied on already documented knowledge or knowledge that was already present in published format. What would be the case with orally transmitted TK?

- Indian documents used for TKDL are considered to belong to all the citizens of the nation. What could be the case for TK held by different communities; even cross-border communities?
- How could secret TK be documented? This was an important question as certain forms of TK are supposed to remain a secret to be effective. Documenting such knowledge would therefore contravene the tenets of TK.
- How could the spiritual covenant that travels with the use of TK be preserved?

Wrapping up the session, Shri V. K. Gupta, author, architect and implementor of the TKDL project was categorical that there cannot be a “one size fits all” situation as far as TKDL was concerned. He affirmed that there are solutions beyond TKDL for TK and that every country would have to explore the solution that suits it best. The Conference was a way of sharing the Indian TKDL experience; countries were welcome to look closely, go back and use the experience but were under no obligation to replicate the Indian TKDL in *toto*. However, irrespective of what path a country chose to safeguard its TK, acquiring prior informed consent was a non-negotiable and mandatory requirement. He emphasized that the ownership lies with TK-holder. This is an ethical issue that is beyond question.

Shri Gupta drew on his vast experience and advised that the way forward was to take up several initiatives and if even one or two yielded

continuous results that get noticed, as TKDL had been, then those are the leads to follow. He reiterated that the Indian initiative was aimed to stop biopiracy and that implementing TKDL has worked for India. He added that the next step forward was to evolve: to utilize and add value to TKDL. In the final analysis, it was evident that the deterrents-value of TKDL for those wishing to profit from the legacy that belongs to the people is beyond question. TKDL is thus of immense value for strategic negotiations with countries wishing to safeguard their own national TK.

In his closing remarks, Mr Naresh Prasad, Executive Director WIPO summed up the events, saying that the aim of the Conference had been to: (i) disseminate information about TKDL and (ii) raise awareness about TKDL. He said that attempt would be made to ensure enduring institutional relationship with CSIR subject to demands by Member States who have seen TKDL at work, and have been explained about it. He requested the delegates to mull over all they had heard and seen, reflect and consult and then to give their feedback to WIPO.

The Conference proved that the TKDL story is not just one of significance from the context of national pride but is one of inspirational leadership that can serve as a beacon illuminating the way forward in the global fight against bio-piracy and preservation of IP rights of the people.

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International Conference on, *Recent Trends in Renewable Energy Resources* at IICT, Hyderabad

Indian Institute of Chemical Technology (IICT), Hyderabad hosted the International Conference on *Recent Trends in Renewable Energy Resources (ICR2ER-2011)* organized by Indo-German Nachkontakt Association (IGNA) during 28-30 January 2011. The Conference was inaugurated by Padma Vibhushan Mr. T.L. Sankar,

IAS (Retd.) while Dr. Ahmed Kamal, Acting Director, IICT presided over the Function Mr. Chandan Mitra, IFS & MD, Non-Conventional Energy Development Corporation, Andhra Pradesh (NEDCAP) presented the Keynote Address.

Dr. R. Srinivas, Scientist, IICT & President, IGNA said that the Conference is organized to celebrate the Silver Jubilee of IGNA, which was founded in the year May 1985 with the blessings of Herr Wolfgang Meissner, the then Director of Max-Mueller Bhavan, Hyderabad. Dr. Ahmed Kamal, Acting Director, IICT said that IGNA's scientific activities are increasing by leaps and bounds with the efforts of a large number of members working in IICT, NGRI, ECIL, HMT, BHEL, MIDHANI and other public and private organizations. The membership stands at 190 today.

Mr. Chandan Mitra, in his Keynote Address, said that Andhra Pradesh is an energy deficient State, hence Govt. has to go for renewable energy resources



Dr. J. S. Yadav, Director, IICT (*left*) is seen during the Valedictory Function of the conference

like biogas and biofuel, wind, geothermal, solar energy, etc. He informed that AP has the potential to harvest 9MW from wind power but only 1.6MW have been harnessed so far. He further said that AP has 300 sunny days in a year, so there was a lot of potential for solar power. With the Govt.'s emphasis on Jawaharlal Nehru National Solar Mission (JNNSM), energy scenario in the State and country would be better by 2023.

Mr. T. L. Sankar, IAS & Former Chairman, APSEB in his Inaugural Address, said that a time will come by 2050, when the entire World could live only on renewable energy, 90% of which could be solar and wind energy and rest would be geothermal. He also informed that the scientists are exploring the potential of shale gas in USA, which has got five times the energy potential compared to oil reserves of Saudi Arabia.

Dr. E.V. R. Sastry, Former Advisor, Ministry of New-Renewable Energy (MNRE) reminded that India was

among the top five countries to use silicon in manufacturing photovoltaic cells and till the beginning of the millennium. With solar radiation level between 5.4 and 5.8 KWH/sm per day, India is endowed with an enormous potential to exploit both technology routes for conversion of solar radiation into heat and electricity, namely solar thermal (ST) and solar photovoltaic (PV).

Mr. Anil K. Rajvanshi, Director, Nimbkar Agricultural Research Institute (NARI), Maharashtra said that India produced 800-1200 million tonnes of agri residues every year and these could be utilized to produce liquid fuels like ethanol or pyrolysis oil, gaseous fuels like methane and electricity could be produced through biomass power plants.

Dr. Satyendra Kumar, Chief Technology Officer, Lanco Solar said that India would be transformed into a solar energy hub provided Government, R&D institutes and industry have a healthy collaboration.

The Conference continued upto 30 January 2011 having nine technical sessions with 24 highly informative lectures. The Concluding Session was chaired by Dr. Dr. J. S. Yadav, Director, IICT who presented certificates for the best poster awards to the participants. Dr. M. Chandrasekharam, Secretary, IGNA-Hyd and Convener of the Conference proposed a Vote of Thanks.



National Symposium on, *New Horizons in Avionic Display Held at CSIO, Chandigarh*

A National Symposium on, *New Horizons in Avionic Display, NHADS-2010* was recently organized at Central Scientific Instruments Organisation (CSIO), Chandigarh as a part of ongoing Golden Jubilee Celebrations in the laboratory and also to celebrate the commencement of regular production of Head Up Display by Bharat Electronics (BEL) Panchkula indigenously developed by CSIO.

Experts, users, scientists, engineers, academicians and representatives from Industry from all over the country including ADA, BEL, HAL, CEMILAC, RCMA, IIT, IRDE and representatives from several National Institutes participated in the Symposium and deliberated upon various issues and future strategies and technologies pertaining to avionic display technologies.

The programme was inaugurated by Shri P. S. Subramanyam, Distinguished Scientist, Programme Director (Combat Aircraft) and Director, ADA. In his Inaugural Address, he talked about various challenges in the integration of various disciplines in the new generation of aircrafts. He also discussed the need to come out with newer display technologies, and advanced cockpit displays like Helmet Mounted Display.



Dignitaries seen during the National Symposium on, *New Horizons in Avionic Display, NHADS-2010* at CSIO

Dr. Pawan Kapur, Director, CSIO while welcoming the guests talked about the challenges faced by CSIO during the development of Head Up Display (HUD) system. He also apprised the participants about the future strategic programmes and the role of CSIO in developing multi-functional displays, head-down displays etc.

Invited talks from eminent persons in their respective disciplines like display technologies, sensors, optics, metrology, fabrication, certification and standards etc., were delivered apart from presentation of research papers by researchers, students and scientists. Mr. N Suresh, GM, BEL, Panchkula was also present on the occasion and he shared experiences of BEL about this collaborative journey with CSIO.

CSIO has a very long association with the avionics industry by way of its participation in various programmes

related to military aviation sector. This includes Head Up Display (HUD) for Light Combat Aircraft and Hindustan Jet Trainer Aircraft, HUDWAC System for Jaguar Aircraft, 35 mm and 70 mm mini pan cameras, Fire safety sensor systems, and a few more. CSIO has been working in the area of Avionics suiting to the requirements of

combat and trainer aircraft while it plans to venture into civilian aviation and other civilian sectors as well.

The indigenously developed HUD for Light Combat Aircraft has been a part of various trials and test flights after passing rigorous qualification tests. Till date, more than 1220 test flights have been carried out with the CSIO-HUD and it has without fail succeeded in all the test flights. Some of the significant achievements in the HUD programme have been the firing of Missile R73 and high altitude flight trials at Leh air base under extreme cold weather.

Shri. P. S. Subramanyam, Distinguished Scientist, Programme Director (Combat Aircraft) and Director, ADA felicitated Dr Pawan Kapur for his contribution in absorption of Head up Display technology in LCA. He also congratulated his team for accomplishment of this task of National importance.



One-day Workshop on, *Industrial Perspectives in Bioinformatics at IICT, Hyderabad*

A one day Workshop on, *Industrial Perspectives in Bioinformatics* was organized on 14 February 2011 at the Indian Institute of Chemical Technology (IICT), Hyderabad for the 9th batch students of the ongoing, *Advanced Course in Bioinformatics* jointly organized by IICT, CDAC, and JNTU. The main aim of conducting the Workshop was to enlighten the students on the importance of the subject and the role Bioinformatics plays in the industrial field in the modern day and in the years to come.

The Workshop started with the Welcome Address by Dr. J. S. Yadav, Director, IICT, Hyderabad. Dr. Yadav stressed the need that the area of Bioinformatics is fast catching up and it is a very challenging field that will play a big role in the coming years in almost all the areas of major industries. He wished the Workshop a great success.

The theme of the Workshop was presented by Prof. U. S. N. Murty, Course Coordinator & Head Biology Division, IICT, Hyderabad. He stressed the need to learn Bioinformatics for competing in the competitive world. He also said that many major research laboratories overseas have taken up Bioinformatics in a big way and the same is being followed by Indian industrial giants including some leading



Dr. J. S. Yadav, Director, IICT, delivering the Welcome Address. Prof. U.S.N. Murty, Prashant S. Naik, Mr. Monzoorul Haque M., Mr. Ram Nangunoori and Mr. Govind Rao are seen on the dais.

IT companies. Prof. Murty also emphasized the present day importance of bioinformatics in many areas biology and allied branches.

The Workshop was designed with two scientific sessions with two lectures in the morning session and two in the afternoon session. The first speaker Mr. Monzoorul Haque M., Scientist R&D, TCS, Hyderabad delivered a talk on *Algorithms and Software Platforms for Analyzing Metagenomic Data Obtained Using High Throughput Sequence Technologies*. He emphasized on the latest tools to screen a large amount of genome data in a short duration of time. He also said that the future belonged to this area of specialization while highlighted the various databases available and briefly outlined the scope and performance of his company in the area of bioinformatics.

The second speaker, Dr. Govind Rao, Bioinformatics Head, Ocimum, Hyderabad delivered a talk on, *Informatics on Fast Tract Lane*. Dr. Rao presented the work carried out at his Institute in developing various tools and methods for rapid analysis of genome data. During the second session, Dr. Prashant S. Naik, Business Leader and Head of Informatics Jubilant Biosys, Bengaluru spoke on, *Challenges in Bioinformatics Industry*. He

emphasized that Bioinformatics, as a field of science had tremendous scope in recent times. Besides, with constant increase in the availability of data, there is always a demand to obtain novel outcomes in Bioinformatics.

To be successful in applying Bioinformatics and making the most of it in industry, it is essential to be concerned of new and emerging areas. Most of the new areas are around genomics and next generation sequencing, signaling pathways, biomarkers and others which can make a huge impact in drug discovery. Bioinformatics is a multi-disciplinary field and its allied areas are also important. Public-private partnerships are core to the industrial success of Bioinformatics.

Mr. Ram Nangunoori, Sr. Manager, IBM, Hyderabad, emphasized that today



various aspects of Information Technology are evolving fast that includes both hardware technology and software technology. Until recent past, our concentration was how to write algorithms to cater to the needs of different branches of science. He proposed various methods including

cloud computing, grid computing, neural networks etc., with relevance to Bioinformatics. As the cost of hardware is getting reduced, the latest approach is in-memory processing. This method adapts building and redesigning hardware architecture to improve processing capability.

After the Workshop there was an interactive session for the students of the course with the speakers, where a whole range of questions were raised and answered by the elite panel. The Workshop ended with a Vote of Thanks to the Chair, all the participants and students.

Indo-US Workshop on, *Transportation and Greenhouse Gas Emissions*

The Central Road Research Institute (CRRI), New Delhi, in association with Texas Transportation Institute organized a Workshop on, *Transportation and Greenhouse Gas Emissions* at New

Delhi on 10-11 February 2011. The Workshop was supported by Indo-US Science and Technology forum and was attended by 100 participants representing the private and public sector, universities and research agencies from both India and the United States. The overall goal of this Workshop was to discuss current trends and research in the area of transportation and greenhouse gas emissions, and to identify research needs and potential areas of collaboration between India and the US.

Dr. Arabindra Mitra of the Indo-USSTF and Welcome Address by Dr. S. Gangopadhyay, Director, CRRI. This was followed by a series of five Technical Sessions spanning two days, in which topics ranging from broad policy overviews, inventory methods, sources and mitigation strategies, technological solutions, modeling approaches, policies and programs, and other transportation sector interventions were covered.



Dr. Arabindra Mitra, Executive Director, IUSSTF speaking during the Inaugural Session

The Workshop consisted of an Opening Session which included Address by the Chief Guest

The final Plenary Session of the Workshop was a guided brainstorm session in which the participants discussed areas for future research and potential collaboration. It was noted that while policies, needs, and the local context may vary between India and the US, the topic of greenhouse gas emissions from the transportation sector was one that provided many avenues for future research and collaboration like in mitigation strategies, inventory and modeling approaches and innovative data collection and use. The Workshop also highlighted the opportunities for the research community and industry in India and US to learn from each other in tackling this global issue.



A view of the Technical Session



NBRI Organizes Programme on, *Faculty Training & Motivation and Adoption of Schools & Colleges by CSIR Labs*

NBRI organized the Programme on, *Faculty Training & Motivation and Adoption of Schools & Colleges by CSIR labs* from 27-28 January 2011. The purpose of the programme was to create awareness and motivate teaching faculty as well as students of adopted school and college for better

science education. The basic idea is to strengthen the concept of reaching the unreached. Furthermore, in collaboration with the CSIR Rural Development Programme, herbal gardens would be developed to create awareness on medicinal plants.

Representatives of three degree colleges and four schools namely, PMS College, Vikas Nagar; PMS Girls Degree College, Ruchi Khand, Kanpur Road; PMS Inter College, Eldeco, Bangla Bazaar; PMS Girls Degree College, Vikas Nagar; Career Convent Girls Degree College, Vikas Nagar; Brightway Inter College, Aliganj and Pioneer Montessori School, Rajajipuram participated in the training.

The Training Programme was inaugura-
ted by Dr. C.S. Nautiyal, Director, NBRI,



Trainees and faculty members with Dr C. S. Nautiyal, Director, NBRI

Lucknow. During the Inaugural Function, Dr. C. S. Nautiyal said that he has great respect for teachers whose motivation has great impact on the overall development of students. He urged the teachers to encourage children to visit NBRI and see its facilities and assured the participants that NBRI will provide all support to them. Dr. J. K. Johri, Scientist, NBRI, gave a brief background of the genesis of the Programme. Dr. Sanjeeva Ojha, Scientist, NBRI, presented the Vote of Thanks.

The participants also had an opportunity to visit the various facilities at NBRI. Lectures of Dr. P. B. Khare, Scientist, NBRI on *Biodiversity of Indian continent*, Dr. P. K. Trivedi, Scientist, NBRI on *Biotechnology and its Applications* and Dr. A. K. Goel, Scientist, NBRI on *Botanical Garden,*

Historical and Scientific Importance & Conservation were held on the first day of Training Programme. On the second day, the participants visited the Regional Science Centre, Aliganj where they got an opportunity to see the exhibits, science models, Scimex, 3D animation, etc. Other lectures by NBRI scientists included: *Dehydrated Flora Craft* by Dr. S. K. Tewari; *Health Through Herbs* by Dr. S. K. Ojha and *Teaching Methodology of Science Subjects* by Dr. J. K. Johri.



Participants of the Training Programme



Founders Day Lecture at IICT, Hyderabad

Prof. Amitabh Chattopadhyay, J. C. Bose Fellow and Outstanding Scientist (Scientist-H), Centre for Cellular and Molecular Biology, Hyderabad delivered the Founder's Day Lecture at the Indian Institute of Chemical Technology (IICT), Hyderabad on 17 March 2011 on, *Drug Discovery and Pathogenicity: Are Membrane Lipids Important?*

Welcoming a gathering consisting of CSIR fraternity, mainly IICT scientists and staff members, members from Osmania University and research fellows, Dr. J. S. Yadav, Director, IICT highlighted the importance of Founder's Day Lecture which is organized every year in the honour of late Dr. S. Husain Zaheer, former Director General, CSIR, and former Director and father figure to IICT. He praised the outstanding leadership provided by Dr. Zaheer to IICT and said that it was his vision and extraordinary services, that IICT could achieve the meteoric rise that has today made it one of the top chemical research laboratories of the world.

Dr. Ahmed Kamal, Scientist-H, IICT and Project Director, NIPER, Hyderabad said that Dr. Zaheer, a specialist organic chemist covered a vast area of drugs, coal, fertilizers, oils & fats and minerals in his research and was one of the first researchers to develop a sedative drug which was introduced in the market at that time. Dr. Kamal introduced the speaker to the audience.

Dr. Chattopadhyay, spoke in detail about the role of membrane cholesterol in regulating the organization dynamics and function of G-protein coupled receptors such as the serotonin 1A receptor. He also highlighted its role in the entry of pathogens into host cells. Later he threw some light on dynamic fluorescence macroscopic approaches to have an insight into organization dynamics and functions of membrane bound receptors.

Dr. Chattopadhyay is a Bhatnagar Awardee and is currently on the Editorial Boards of a large number of reputed international journals. In addition, he is a recipient of many National Awards like *Ranbaxy Research Award* and *J. C. Bose Fellowship* of the Department of Science and Technology, Govt. of India. His lecture was appreciated by one and all and was followed by question and answer session and brief discussions.

Silver Jubilee of Consultancy Development Centre

Prof. Samir K. Brahmachari, Director-General CSIR delivered the Inaugural Address at the celebratory function held at India Habitat Centre to mark the Silver Jubilee of the Consultancy Development Centre (CDC) and to felicitate Dr. S. Varadarajan, Founder-Chairman, CDC and former Director-General, CSIR.

Prof. Brahmachari acknowledged the debt of gratitude that is owed to those such as Dr. S. Varadarajan who accomplished so much in such short time and who continue to give new ideas on consultancy even today. His ideas are nothing less than transformational vision. The proof is that the idea to set up CDC was taken 25 years ago and the institution is thriving.

Prof. Brahmachari's speech focused on the future path that CDC could take and explored the many new openings that have presented themselves in recent times. CDC began when there was nothing and today international consultancy agencies have flooded India. It is, therefore, appropriate to look at what CDC can do in the future.

Prof. Brahmachari agreed with Prof. Varadarajan's idea that unexploited experience and training that is not being currently utilized optimally (for example, trained non-working women and superannuated experienced elders) can be roped in to provide consultancy in hitherto unexplored fields as well. Prof. S. K. Brahmachari also released a document on 25 years of CDC.

Earlier speaking on the occasion, Prof. S. Varadarajan shared details of his personal experiences while setting up CDC and put forward many ideas about developing consultancy strengths in unexplored areas such as Wealth of India and consultancy in S&T for small and developing nations.

Dr Sunil Abrol, DG-CDC delivered the Welcome Address and presented a report tracing the overall development of CDC over the past 25 years. Ms Jyoti S. A. Baht delivered the Vote of Thanks.



National Science Day Celebrations

On 28th February every year the National Science Day is celebrated throughout the country, in commemoration of the outstanding discovery of 'Raman Effect' by Nobel Laureate Sir C.V. Raman. The CSIR laboratories /Institutes hold special programmes including lecture, seminars, workshops and exhibition on this occasion. Highlights of the programmes held at CSIO, NBRI, NEERI, NEIST, and NIO are presented here:

Central Scientific Instruments Organisation, Chandigarh

The Central Scientific Instruments Organisation (CSIO), celebrated "National Science Day" on 28 February 2011 by holding an Open Day and organizing the National Science Day Lecture. All the labs of CSIO were kept

open for general public in the forenoon. Around 1500 visitors including students from various schools, colleges, universities and general public went around the laboratories of the Institute. They interacted with the scientists and

were given exposure to the technologies available and those being pursued at CSIO.

Later in the afternoon Prof. S.C. Dutta Roy, Emeritus Professor, IIT Delhi delivered a talk on , *Life and Time of Sir. C.V. Raman*. In his talk he emphasized upon the need for innovative approach to attain scientific distinctions and quoted the example of Sir C.V. Raman, who was able to design and successfully demonstrate the *Raman Effect* with a spectroscope, which fetched him the Nobel Prize. He quoted the biographical incidents from the life of Sir C.V. Raman with interesting anecdotes.

Prof. Roy told that Venkata Raman was born at Thiruvanaikaval, near Tiruchirappali, Madras Presidency to R. Chandrasekhara Iyer and Parvati Ammal. At an early age, Raman moved to the city of Vizag, Andhra Pradesh, studied in St. Aloysius Anglo-Indian High School and subsequently at the Presidency College, Madras. In 1907, he did his M.A. with Gold Medal in Mathematics & Physics and joined the Indian Finance Department as an Assistant Accountant General.

Prof. Roy informed in his lecture that in 1917, Raman resigned from his



Dr Pawan Kapur, Director, CSIO while addressing the audience



Prof. S.C. Dutta Roy, Emeritus Professor IIT Delhi delivering Science Day lecture



Students during their visit at CSIO, Chandigarh



government service and accepted the most prestigious Palit, Professorship in Physics at the University of Calcutta. At the same time, he continued doing research at the Indian Association for the Cultivation of Science, Calcutta, where he became the Honorary Secretary. Raman used to refer to this period as the golden era of his career. Many talented students gathered around him at the IACS and at the University of Calcutta.

On 28 February 1928, through his

experiments on the diffraction of light from the liquid molecules, he discovered the new spectra which he described as *Raman Effect*. He emphasized that Raman was confident of winning the Nobel Prize in Physics as well, and was disappointed when the Nobel Prize went to Richardson in 1928 and to Broglie in 1929.

Prior to this, Dr. Pawan Kapur, Director, CSIO while welcoming the Chief Guest highlighted the significance of National Science Day and said that

scientific methodology is required in every walk of life and also highlighted the achievements of CSIO. SIATI conferred the Excellence Award in indigenization of Technology of Head-up-Display on 12 February 2011 at Bangalore, Echoing this honour, Dr. Kapur gave away mementoes to the team members who developed Head-up-Display for Light Combat Aircraft-*Tejas*. Shri A.D. Kaul, Scientist, later proposed the Vote of Thanks.

National Botanical Research Institute (NBRI), Lucknow

The National Botanical Research Institute (NBRI), Lucknow observed the National Science Day on 28 February 2011. The Institute remained open to the students and public. A lecture was delivered by Prof. S. A. H. Abidi, Ex-Vice Chancellor of Fisheries University at Mumbai. While introducing the Chief Guest and speaker, Dr. Abidi, Dr. Nautiyal, Director, NBRI, detailed about the importance of this date.

Dr. Nautiyal stated that an oration by Prof. Abidi will help the scientists to understand the world of oceans.

Dr. Abidi, a renowned scientist stated that oceans constitute 71% of the Earth's surface and comprised 90% of water. Surprisingly, it is also the source of 90% of volcanic activities of the world. Ocean harbors 2,30,000 plant and animal species which is the wealth of Nature. It is also an important source of

many new drugs for the service of mankind. He expressed his concern about the increasing exploitation of oceans, as it not only leads to pollution but also affects the diversity of Nature. Dr. S. K. S. Rathore proposed the Vote of Thanks while Dr. Gauniyal conducted the programme. More than 200 students from Karamat girls and Central school visited the laboratories.



National Science Day Celebrations at NBRI, Lucknow



National Environmental Engineering Research Institute (NEERI), Nagpur

National Science Day was celebrated at the National Environmental Engineering Research Institute (NEERI), Nagpur on 28 February 2011. Dr. Y. V. N. Krishna Murthy, Deputy Director, National Remote Sensing Centre (ISRO), Hyderabad was the Chief Guest on this occasion.

While delivering the National Science Day Lecture on, *Application of Geomatics in Environmental Planning*, Dr.

Krishna Murthy said that Geographic Information System (GIS) is a powerful tool for environmental data analysis and planning. He informed that GIS stores spatial information (data) in a digital mapping environment. "A digital base map can be overlaid with data or other layers of information onto a map in order to view spatial information and relationship," he added.

Dr. Murthy said that GIS allows better viewing and understanding physical features and the relationships that influence in a given critical environmental condition. "Factors, such as steepness of slopes, aspects, and vegetation can be viewed and overlaid to determine various environmental



Dr. Y. V. N. Krishna Murthy, Deputy Director, National Remote Sensing Centre (ISRO), Hyderabad delivering the National Science Day lecture

parameters and impact analysis," he stated.

Dr. Krishna Murthy further said that all this information is being collected by various satellites. He briefed about various satellites that have been launched to monitor various sectors, such as agriculture, oceans, degraded lands etc. He also informed that there are such satellites available which can predict methane gas emissions, which is a major greenhouse gas.

Dr. Murthy also informed about ISRO's various plans of launching various satellites for environmental monitoring in the near future. He stated that the data being generated by satellites pertaining to various environmental

components helps in decision making and formulating new policies. On this occasion, he urged the common people to use this data and actively participate in decision making for their benefits.

Dr. Murthy advocated that natural resource-rich regions of the country could develop significantly with the appropriate application of space technology. "We are in a better position to motivate farmers to use suitable farm practices by explaining

various issues with the use of satellite images," Dr. Murthy remarked. He also mentioned that people opposing any particular project can also be convinced about merits of the scheme through satellite images. He said that satellite images have enabled a dialogue between scientists and common people.

Earlier, in his Welcome Address, Dr. S. R. Wate, Director, NEERI briefed about NEERI's significant achievements and urged the scientists to develop and propagate the technologies for the common people. Mr. Prakash Kumbhare, Head, R&D Planning Division introduced the Chief Guest and proposed the Vote of Thanks. Mrs. Jaya Sabjiwale compered the programme.

North East Institute of Science & Technology (NEIST), Jorhat

The North East Institute of Science & Technology (NEIST), Jorhat celebrated the National Science Day with a well charted out programme on 28 February 2011. Held at NEIST auditorium, the programme was presided over by

Dr. P. G. Rao, Director, NEIST in which Prof. S. C. Roy, Editor-in-Chief of the journal, *Science & Culture*, Kolkata attended as the Chief Guest and delivered the National Science Day lecture. The Function was largely

attended by invited dignitaries, distinguished scientists, students, teachers, science fans and others besides the scientific fraternity of NEIST, both old and new. Welcoming the audience, Dr. R. C. Boruah,



Scientist H spoke about the importance of the day and mentioned that NEIST has been working for cleaner environment and sustainable energy.

Delivering the Science Day lecture on “Pop Goes the Drop,” Prof. Roy mentioned “boiling” – a common phenomenon and characteristics of Super Heated Liquid and its importance in the industrial applications.

Prof. Roy mentioned that these Super Heated Drop Detectors, an outcome of research in basic science are used in various branches of Physics like High Energy, Basic, Nuclear, Health, Medical and Space. The Super Heated Emulsions are used in Radiation Detection Measurement, Targeted Drug Delivery



National Science Day Celebrations at NEIST, Jorhat

and Enhanced imaging, he mentioned.

Prof. Roy also briefly spoke on the Journal, *Science and Culture*. Mr Samarjit Kar, an eminent Science Journalist and ex-correspondent of *Amrit Bazar Patrika* also addressed the gathering and spoke on “Explore the

unexplored.” Mr. Kar mentioned about some of his interactions with reputed scientists around the world and gave some suggestions on few areas of work that the young scientists of NEIST can take up in future planning.

Dr. P. G. Rao advised the scientists of the NEIST to re-dedicate themselves for fruitful findings in their fields of research. The Function concluded with the Vote of Thanks by Dr Amrit Goswami,

Scientist F. Later, the day was declared as ‘Open Day’ for the visit of students and the public where nearly 500 students from various nearby schools along with teachers visited the laboratory and interacted with the scientists.

National Institute of Oceanography (NIO), Goa

The National Institute of Oceanography (NIO), Goa, participated in a three-day exhibition event called *Science Fiesta 2011* held at the Goa Science Centre,

Miramar during 24-26 February 2011. The Science Fiesta provides an opportunity to the people of all ages to see and understand what is happening

in the scientific world around us.

NIO showcased the field instruments and most pioneering technologies such as, Autonomous



Inauguration of the Science Fiesta 2011



A view of the students and general public at the Science Fiesta 2011 at NIO, Goa



Vertical Profiler (AVP), CTD, Current Meter, Van Veen grabs for sediment collection, novel products from the marine organisms for pharma-ceutical industries, pigmented yeast cultures from deep sea waters and biofouling

and bioinvasion from ballast water. During the event Dr. B. S. Ingole, Scientist, NIO interacted with the students on the topic, *Biodiversity of Goan Beaches*.

The *Science Fiesta 2011* was

inaugurated by Dr. Simon D'souza, Chairman, Goa Pollution Board. Dr. Satish Shetye, Director NIO, addressed the gathering. This three-day event attracted students and the citizens of Goa besides many tourists.

Nobel Laureate Prof. Johann Deisenhofer Visits CMERI, Durgapur

Prof. Johann Deisenhofer, who, along with Hartmut Michel and Robert Huber, received the Nobel Prize for Chemistry in 1988 for their determination of the structure of a membrane-bound complex of proteins and co-factors that are essential to photosynthesis visited the Central Mechanical Engineering Research Institute (CMERI), Durgapur to deliver an erudite lecture on

Structural Biology - Achievements and Challenges. The visit of Prof. Deisenhofer was facilitated by Prof. R. N. Roy and Prof. Pratima Roy of the Drury University, Springfield, Montana, USA. The occasion caused much enthusiasm amongst the members of the CMERI family and the academia as well as students of Durgapur, who turned out in large numbers to attend the

programme on 14 December 2010.

At the outset, Prof. Gautam Biswas, Director, CMERI, Durgapur welcomed Prof. Johann Deisenhofer, Prof. Kirsten Fischer Lindahl. Professors R. N. Roy and Pratima Roy and other dignitaries to the programme, and subsequently led the audience through a journey of the research areas that are crystallizing at CMERI. His short but succinct



Prof. Gautam Biswas, deliberating on the R&D activities at CMERI



Prof. Gautam Biswas, facilitating Prof. Johann Deisenhofer...



.....and Prof. Kirsten Fischer Lindahl



Capturing the Nobel Laureate's visit on an autograph book



Prof. Samir Bhattacharya, has a question for Prof. Deisenhofer.....



Dr. D. Chatterjee proposing the vote of thanks



presentation served as the ideal backdrop for the ensuing lecture by Prof. Deisenhofer on the achievements of and challenges to the field of structural biology.

Prof. Deisenhofer started his lecture with the work of British biophysicist Rosalind Elsie Franklin who was part of the discovery of the structure of DNA. Then he discussed briefly the work of James Watson and Francis Crick that answered to a fundamental mystery about living organisms.

Prof. Deisenhofer went on briefly explaining the work of Max Ferdinand Perutz, who shared the 1962 Nobel Prize for Chemistry with John Kendrew, for the studies of the structures of hemoglobin and globular proteins. He narrated the work of Aaron Klug, the winner of the 1982 Nobel Prize in Chemistry for his contribution in crystallographic electron microscopy and

his discovery of biologically important nucleic acid-protein complexes.

Nigel Unwin's work on electron microscopy to analyze the structures of protein received a special mention in his talk. His discussions then entered the paradigm of DNA manipulation, heterogeneous expression of proteins, X-ray crystallography, dedicated synchrotron and MAD/SAD phasing. He showed the hydrophobic and hydrophilic surfaces of proteins.

Prof. Deisenhofer mentioned about generic approach for the selective extraction of detergents from mixed detergent/ lipid/ protein mice. He explained that photosynthetic reaction centre proteins are main protein components of photosynthetic reaction centers of plants. He kept on explaining how ferric dicitrate complex enters the periplasm where it binds to a transmembrane protein. He finally

commented on two routes for future structural biology, namely, normal mode analysis and molecular dynamics calculations. Molecular dynamics approach is facing massive computational challenges.

Prof. Deisenhofer's detailed exposition helped in opened up a fascinating vista of structural biology and gave birth to a number of questions, which he, along with Prof. Kirsten Fischer Lindahl addressed during the lively interactive session that followed.

Prof. Deisenhofer welcomed queries from a number of high school students, and was extremely patient in answering these, while helping the person with the query to better formulate the question itself. After about 40 minutes, the curtains came down on the programme as Dr. D. Chatterjee, Scientist, CMERI proposed the Vote of of Thanks.

S. Narayanaswamy Award for Dr. V. Balaram, Scientist, NGRI

Dr. V. Balaram, Scientist-G & Head of Geochemistry Group at the National Geophysical Research Institute (NGRI), Hyderabad, received the prestigious *S. Narayanaswamy Award* instituted by the Geological Society of India, Bangalore for his significant contributions in the Field of Economic Geology, especially for gold and platinum group element exploration studies carried out by him in India.

He received the Award from Prof. V. S. Rama Murthy, Former Secretary, DST, New Delhi and Director, NIAS at the 51st Annual General Meeting of the Society on 12 October 2010 at the National Institute of Advanced Sciences (NIAS), IISc Campus, Bangalore.

Dr. H.K. Gupta, President and Shri. R. H. Sawkar, Secretary, Geological Society of India, Bangalore were also present on this occasion along with several other distinguished scientists, invitees and guests.





Tenure of Director, NEIST Extended

The Appointments Committee of the Cabinet (ACC), CSIR has approved the extension in the service of Dr. P. G. Rao, Director, North East Institute of Science & Technology (NEIST), Jorhat for a period of another two years, beyond the date of his superannuation i.e 31 December 2010. The extension was in recognition to his exemplary services rendered during his tenure and also in the public interest. The members of NEIST family heartily congratulated Dr. P. G. Rao, Director for this esteemed honour.

DG CSIR Honoured

DG CSIR has been awarded *Abha Maity Memorial Lectureship* of the Asiatic Society in appreciation of his significant contributions in S&T.

VASVIK Award Winners

Dr. A. J. Varma, Scientist, National Chemical Laboratory (NCL), Pune has been selected for the prestigious VASVIK Award for Chemical Sciences and Technology for the year 2008. Dr. Varma has made pioneering contributions to



the area of cellulose chemistry and chemistry of biodegradable polymers. Dr. Varma developed a process for physico-chemical fractionation of sugarcane bagasse to cellulose, hemicellulose and lignin for converting agricultural wastes to value-added polymers and chemicals and it has been transferred to industry.

Dr. Varma is currently the President of the Society of Polymer Science (India) (Pune Chapter). He has delivered invited talks in many countries such as USA, UK, Germany, Denmark, China, Egypt, Turkey, Italy, France, etc and also *Distinguished Alumni Lecture* in his alma mater, the State University of New York, in Syracuse, USA, from where he obtained two Ph.D. degrees. He is also a UNIDO-ICS (based in Trieste, Italy) Expert on Environmentally degradable polymers. Dr. Varma is on the Editorial Board of journals, *Carbohydrate Polymers* and *Trends in Carbohydrate Research*. He has over 100 research publications to his credit, besides 10 patents.

Dr. Absar Ahmad, Scientist, National Chemical Laboratory (NCL), Pune has been selected for the coveted VASVIK Award in the area of Biological Sciences & Technology for the year 2006 for his significant contribution to Nanoscience & Nanotechnology. The VASVIK Award is given for promoting industrial research, science and technology in India. Dr. Absar has made pioneering contributions to the field of bio-nano-science and technology.



In particular, his work on bioinspired synthesis of metal, semiconductor and oxide nanosystems using fungal and plant extract media and related studies on elucidation and control of the biomolecular processes and mechanisms are highly cited. His work on synthesis of triangular gold nanoparticles has been transferred to Tata Chemicals Ltd. Dr. Absar is recipient of the several awards including *Scientist of The Year Award* of NCL Research Foundation for 2007, *Tata Innovation Fellowship* (2007-2008) of the Department of Biotechnology, New Delhi, *Materials Research Society of India Medal* 2009, *Shome Memorial Award* 2004 and has been elected as a *Fellow of Maharashtra Academy of Sciences* 2008.

Dr. Ahmad was the Vice President of Mycological Society of India (2009). He was selected to deliver the Platinum Jubilee Lecture in section of Plant Sciences at the 98th Indian Science Congress, at Chennai during 3-7 January 2011. He is on the Editorial Board of *Kavaka*, a Journal of Mycological Society of India. Besides, he has published over 90 research publications in peer-reviewed journals and has 15 patents to his credit.



Ministry of Civil Aviation Felicitates NAL, Bangalore

The National Aerospace Laboratories (NAL), Bangalore was felicitated by the Hon'ble Minister for Civil Aviation, Shri Vayalar Ravi for its significant contributions to the growth of Civil Aviation in India on the occasion of launching of the Centenary Celebrations of Civil Aviation in India on 18 February 2011 at New Delhi. Dr. A. R. Upadhyaya, Director, NAL personally received the honour on behalf of the Laboratory, which included a Plaque and a Scroll. The other Institutions so felicitated are Aero Club of India, Aeronautical Society of India, Institute of Aviation Medicine and Hindustan Aeronautical Limited.

Director, NAL thanked all the members of the NAL family, past and present, for their valuable contributions and support, which had brought this unique honour to NAL. He also thanked Director-General, CSIR and the CSIR family as a whole.

Passing away of Prof. Hari Narain, Former Director, NGRI

Prof. Hari Narain, former Director, NGRI passed away on 27 January 2011. He was Director, NGRI from 1964 to 1983 and had contributed immensely to the development of this Institute right through its formative years.

Shri. M. A. Qureshi, Former Scientist, NISTADS Passes Away

Shri Mohd. Ashifaque Qureshi was born on 10 June 1938 in Delhi's middle class family and expired on 7 January 2011 at New Delhi. Shri Qureshi had his early education in Jamia Millia Islamia, New Delhi. After passing from Anglo-Arabic Senior Secondary School, he did his B.Sc and M.Sc (Mathematical Statistics), from Aligarh Muslim University (AMU), Aligarh in 1962. He worked for two years for the Ministry of Food, Govt. of India and in 1964 Sh Qureshi joined the National Institute of Science, Technology and Development Studies (CSIR), New Delhi and retired in 1998 as Scientist F.



Shri. M. A. Qureshi had been consistently engaged in science policy studies for more than 45 years. He contributed a number of monographs, reports, research papers and popular science articles in English, Urdu and Hindi. He made presentation of results of his research studies in various national and international conferences and seminars. He was very closely associated with the CSIR's popular Urdu magazine, namely '*Science Ki Duniya*', published by the National Institute of Science Communication And Information Resources (NISCAIR), New Delhi. He had about a dozen books and more than 100 popular science articles to his credit.

In 2000, for his outstanding services in popular science in Urdu, Delhi Urdu Academy awarded him '*Award Braye Sciencey Adab*'. Sh. Qureshi was President of a 24 year old registered NGO, viz. Mewat Development Society (MDS), Chharora, Haryana In 2005 a book entitled, '*Yoga ki Science Aur Sehat*' in Urdu written by him was published by MDS which was awarded by Delhi Urdu Academy. Besides, he was also awarded by Bihar Urdu Academy and West Bengal Urdu Academy.

Mohd Khalil, former Scientist, NISCAIR and former Editor, *Science Ki Duniya*.



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