

वार्षिक प्रतिवेदन  
annual report  
2002 - 03

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CSIO

*Sky is the limit*

## *the Institute*

CSIO was started in October, 1959 in pursuance to the recommendations of the committee set up by the Planning Commission to formulate a scheme for the development of scientific instruments industry in India.

Initially, it was located in the CSIR building at New Delhi and then shifted to Chandigarh in 1962. It occupies an area of around 120 acres of land in the heart of city. The main campus comprises of R&D laboratories, Indo-Swiss Training Centre (ISTC), Administrative Block, Workshop & Housing Complex.

CSIO is one of the constituent laboratories under the umbrella of the Council of Scientific & Industrial Research (CSIR), New Delhi and a foremost National Laboratory, engaged in research, design & development of scientific instruments in the country. The instruments are designed in keeping with contemporary international standards and their relevance to potential needs of the nation.

Presently the Institute has a total staff strength of 583 including scientists, technologists, scientific & technical supporting personnel and administrative & supporting staff. Fifteen major R&D disciplines, three Service & Maintenance Centres and ISTC form the core strength of the Institute.

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Satish Kumar and Ms Kavita Chauhan

### **Acknowledgment**

Thanks to all Divisional Heads,  
Area Co-ordinators, Administration  
and Account & Purchase sections for their  
valuable inputs & advice

### **Published by**

#### **Director**

Central Scientific Instruments Organisation  
Sector-30 C, Chandigarh 160 030 (India)

### **Printed at**

Sanjay Printers, 404, Indl. Area-II,  
Ramdarbar, Chandigarh  
Tel. : 0172-2650390

## **Mission**

To be a leader at national level for designing and developing scientific and industrial instrument systems and devices; play a lead role in providing repair, maintenance & calibration and training of instrument technologists and be a custodian of instrumentation activity in the country

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### **Title page**

Light Combat Aircraft (TD-2) on its maiden flight on 6th June, 2002 with CSIO's Head Up Display on board

### **Back page**

National Flag encoded as DNA bases using DNA based encryption & software developed by CSIO



**वार्षिक प्रतिवेदन**  
**Annual Report**  
**2002-03**

**केन्द्रीय वैज्ञानिक उपकरण संगठन, चण्डीगढ़ (भारत)**

**Central Scientific Instruments Organisation, Sector 30, Chandigarh (India)**



I am pleased to present the Annual Report of the Institute for the year 2002-03 on the occasion of CSIO's Foundation Day. The preceding year has been a very eventful year with the Institute being more buoyant than ever.

The year was marked by CSIO demonstrating its creditable success

in the development of Head Up Display (HUD) System for the Light Combat Aircraft. It was totally a CSIO technology and has been acknowledged as much superior compared to similar systems available elsewhere in the world. Technologically this has put CSIO on the forefront and built the confidence of the industry in indigenous know-hows. It was a matter of great pride that this development enabled the Institute to bag the prestigious CSIR Technology Award of the Year in Engineering Technology. The award was presented to Director, CSIO by Shri Atal Bihari Vajpayee, Hon'ble Prime Minister of India and President CSIR, on the occasion of CSIR Diamond Jubilee Celebration on September 26, 2002 at Vigyan Bhavan, New Delhi.

Successful development of HUD gave CSIO a big leap forward as the Institute was flooded with proposals to take up development of more sophisticated versions viz Helmet Mounted Display besides offers for developing HUDs for Intermediate Jet Trainer and other combat aircrafts.

The year was also marked by several scientists of this Institute receiving awards for their singular accomplishments.

During the year, the laboratory was very fortunate to have been graced by the visits of a number of very important dignitaries. Prof. Murlimanohar Joshi, Hon'ble Union Minister for HRD and Science & Technology and Vice President, CSIR visited CSIO on 28<sup>th</sup> January, 2003. Prof. Joshi laid the foundation stone of new ISTC building, inaugurated the Seismological Observatory and Biomolecular Electronics & Nanotechnology lab.

Prof. Joshi lauded CSIO's initiatives in new areas. Informal interaction that Prof. Joshi had with the scientists, generated lot of excitement among the scientists and infused them with renewed vigour to take up more challenging tasks. Prof. Joshi was also witness to the signing of the agreement for transfer of technology of HUD by CSIO to Bharat Electronics Ltd., the cost of the technology being Rs. 1.50 crores which is the highest ever in the history of CSIO.

The Parliamentary Standing Committee on Science & Technology, Environment and Forests comprising 16 Hon'ble Members of Parliament, led by Shri Ramachandraiah visited CSIO on 7<sup>th</sup> June, 2002. The most honoured and enlightened guests interacted with the scientists and were astounded to see the state-of-art developments made by CSIO for the benefit of different sectors of the economy.

Dr. D.N. Tewari, Member, Planning Commission and CSIR Society, visited CSIO in November, 2002 and unfolded new initiatives of the Government in developing newer areas and the role that CSIO could play. Dr. Tewari's visit set the ball rolling for CSIO to launch a new initiative in developing plant and machinery for processing of Indian bamboo.

On the R&D front, CSIO's efforts led to its participation in four networked programmes launched by CSIR/Planning Commission. These programmes were: Electronics for Societal Purposes where CSIO is the nodal lab, Development of Key Technologies for Photonics and Opto-Electronics, Custom Tailored Special Materials and High Science & Technology for National Aerospace Programmes.

Other than these programmes, CSIO bagged over 20 new projects while another 20 were successfully concluded during the year. Notable among the new programmes started during the year were : Fiber Bragg Gratings and Long Period Gratings for Health Monitoring of Aerospace & Civil Structures, National Facility for R&D in Aspheric based Optical and Electro-Optical Systems, DNA Computers and their Applications in Biomolecular Electronics , Bio-MEMS based Micro clinical Diagnostic Kit for Tuberculosis and Genome Studies Peripherals and Oscillation Monitoring System for Railway Safety Applications.



Among the Projects successfully concluded were : Instrumentation Systems for Condition Monitoring of Critical Rotary Machines for Generation of Electric Power. The system developed in collaboration with IIT New Delhi, IIT Kanpur and BHEL Corporate R & D Centre was successfully installed at GGSS Thermal Power Plant under PSEB, 24 bit technology based Seismic Data Acquisition System, Digital Automatic Moisture Computer, Human Breath Sensor for detection of alcohol, Clinical Chemistry Analyzer for diagnostic applications, Off flavour Detection System for edible oils, Fast Optical Pyrometer, etc etc.

In order to share its expertise in servicing diverse variety of scientific and medical instruments, CSIO recently undertook the assignment for the repair of scientific instruments in Myanmar. A 3-member expert team from Chandigarh & Chennai Centres of CSIO visited Myanmar during May-June, 2002 for about six weeks and repaired 84 instruments valued around Rs.1.00 crore in several S&T departments at Yangon. Besides improving bilateral relations with neighbouring countries, the objective of the entire exercise was to help the S&T organisations in Myanmar in their scientific and technological pursuits and to make Myanmar self-sufficient so far as repair and maintenance of scientific and medical instruments is concerned.

Towards the end of the previous year, the Department of Science & Technology (DST), Government of India had launched a major initiative of organizing training programmes for hospital technicians on repair & maintenance of medical instruments. The step had been initiated to circumvent the problem of medical instruments' maintenance from becoming perennial. This responsibility had been given to CSIO.

The year saw this activity taking a big leap as around 25 programmes conducted by CSIO all over the country winning accolades. DST now proposes to organize such programmes in 541 districts, all over the country besides the metros.

The technology based Entrepreneurship Development Programme on Repair & Maintenance of Analytical Equipments sponsored by DST, New Delhi was successfully carried out by CSIO's Chennai Centre, besides other activities in energy instrumentation.

Indo-Swiss Training Centre established under the patronage of Swiss Foundation for Technical Assistance and being run under the aegis of CSIO enjoys very good reputation by the industry both in India and abroad, R&D Institutions and custodians of technical education. Besides undertaking its usual hi-quality training programmes, the Centre introduced short-term courses in CNC Milling, Precision Turning and design of Press Tools during the year. While disseminating its expertise to the industry personnel, its initiative is ultimately aimed at bringing the Centre and industry closer, leading to more business in the long run.

In the past, the ISTC faculty has been assisting the CSIO scientists in execution of the R&D projects, but during the year, the Centre independently took up a few R&D programmes through its own initiative. This is bound to improve the quality of training further.

The Institute has ultra modern infrastructural facilities like: aspherics generation & polishing, microelectronics, microprocessor controlled thin film coating, trace elemental analysis, computerized numerically controlled machines alongwith CAD/CAM, packaging and mould design. I am particularly very happy to report that CSIO has been successfully attracting the industry in solving the challenging problems faced by them in specific areas and providing these facilities wherever needed.

Dedicated and painstaking efforts put in by the CSIO scientists and other staff enabled this Institute to cross the magic figure of Rs.1000 lakhs of External Cash Flow during 2002-03. This happened for the first time in the



history of CSIO and is certainly a singular achievement.

Five technologies were transferred during the year while another five were in the process of being transferred. With vast improvement in the quality of research & development and the realisation among the scientists about the imperative need to protect the Intellectual Property Rights led to a significant increase in the patent filing process. The Institute filed 16 patents this year at national and international level in the areas of Biomolecular Electronics, Fiber Optics, Energy Monitoring, Opto Electronics, Medical Electronics and Metallurgy. The scientists of the Institute published 23 research papers in reputed journals, apart from presenting 52 research papers in conferences/seminars and delivering 23 invited lectures in various organizations, academic institutions/universities. All these years, the intellectual level of CSIO has been going up which will soon get reflected in the Institute making significant breakthroughs in contemporary technologies.

Several users, industries, academic & research institutions like SASE, TBRL, ICAR, HAL, IITs, RDSO, CAT, ADE, ADA, and government agencies like Agriculture, Rural Development, Social Justice and Empowerment, Science & Technology, Information Technology, Bio-Technology, Environment & Forestry reposed full confidence in our capabilities and the acquired knowledgebase by sponsoring various R&D programmes worth several crores of rupees. We certainly feel proud and deem it to be our privilege and honour to accept the challenging and daunting tasks.

Another hallmark in the activities of CSIO has been that of maintaining quality systems as per the normative standards of ISO-9002: 1994 in key areas of fabricating mechanical components of assemblies, systems and sub-systems for scientific instruments, calibration services and technical training in the field of instrument technology, die & mould making, mechatronics and industrial automation within the scope of this certification. CSIO is heading towards the implementation of ISO-9001 : 2000 during the coming years.

Prof. Ashok Sahni, Dean of University Instruction, Panjab University formally launched the CSIO website : [www.csio.org](http://www.csio.org) on the occasion of National Science Day.

It is our privilege to express our profound gratitude to Dr RA Mashelkar, FRS, Director General CSIR, and Shri Sudhir Kumar, IAS, Joint Secretary, CSIR and the team at CSIR Headquarters for their constant help, encouragement and support. This enabled the laboratory to rejuvenate, acquire new glory and hence contribute in the task of nation building.

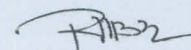
No words are adequate enough to express our gratefulness to Dr KG Narayanan, Hon'ble Chairman and Members of the Research Council of CSIO for their direction, guidance and encouragement in carrying out our R&D programmes during the year.

The achievements made by the Institute could not have been possible without the contribution, pragmatic attitude and support provided by CSIO's yard staff. This has certainly facilitated CSIO to establish a very congenial environment for undertaking hi-tech research. With the collegial system of management being followed by the Institute, the scientist-staff relations continued to be more than cordial. Today, I am proud to say that CSIO is a well integrated team of dedicated scientists and staff, full of motivation and zeal to give their best to the Institute.

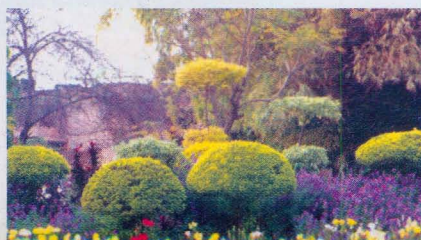
The Institute too, is committed to continue with its efforts to achieve excellence in R&D in niche areas of instrumentation and is poised to enhance its interaction with industry, apart from undertaking contract research programmes and training activities of societal relevance. It is gratifying to record that the period 2002-03 has been the most eventful in the history of CSIO as the Institute succeeded in achieving high performance levels.

I express my grateful appreciation to all those who made it possible.

October 30, 2003



(R.P. Bajpai)  
Director



मुझे सीएसआइओ स्थापना दिवस के अवसर पर संगठन की वर्ष 2002-03 की वार्षिक रिपोर्ट प्रस्तुत करते हुए अत्यंत हर्ष का अनुभव हो रहा है। बीता वर्ष अत्यंत उपलब्धिपूर्व रहने के कारण बहुत महत्वपूर्ण रहा।

इस वर्ष हल्के लड़ाकू विमान के लिए हैड-अप डिस्प्ले (हड) प्रणाली के विकास में सीएसआइओ ने उल्लेखनीय सफलता को प्रदर्शित किया। यह पूर्णतः सीएसआइओ की प्रौद्योगिकी थी तथा इसे विश्व में उपलब्ध इसी प्रकार की प्रणालियों से कहीं अधिक बेहतर माना गया। प्रौद्योगिकी की दृष्टि से इसने सीएसआइओ को अग्रणी श्रेणी में स्थान दिलाया है तथा इससे उद्योग जगत में स्वदेशी तकनीकों के प्रति एक विश्वास की भावना जाग्रत हुई है। यह अत्यंत गर्व की बात है कि इस प्रौद्योगिकी के कारण सीएसआइओ को इंजीनियरिंग प्रौद्योगिकी के क्षेत्र में सम्मानजनक सीएसआइआर प्रौद्योगिकी पुरस्कार प्राप्त हुआ। यह पुरस्कार सीएसआइओ के निदेशक को श्री अटल बिहारी बाजपेयी, प्रधानमंत्री, भारत सरकार द्वारा सीएसआइआर स्थापना के हीरक जयंती समारोह के अवसर पर 26 सितंबर, 2002 को विज्ञान भवन, नई दिल्ली में प्रदान किया गया।

हड के सफल विकास ने सीएसआइओ को उन्नति के पथ पर एक और सफलता दिलवाई तथा सीएसआइओ को इसकी जैसी अत्याधुनिक प्रणालियां यथा हैलमेट माउंटेड डिस्प्ले व इंटरमीडिएट जैट ट्रेनर व अन्य वायुयानों के लिए हड के विकास के प्रस्ताव प्राप्त हुए।

गत वर्ष इसलिए भी महत्वपूर्ण रहा कि संगठन के अनेक वैज्ञानिकों को उनके अनुपम कार्यों के लिए विभिन्न पुरस्कारों से सम्मानित किया गया।

वर्ष के दौरान संगठन को अनेक गणमान्य एवं प्रतिष्ठित व्यक्तियों के स्वागत-सम्मान का भी अवसर प्राप्त हुआ। माननीय प्रो. मुरली मनोहर जोशी, केंद्रीय विज्ञान एवं प्रौद्योगिकी, मानव संसाधन विकास एवं महासागर विकास मंत्री तथा उपाध्यक्ष, सीएसआइआर ने दिनांक 28 जनवरी, 2003 को संगठन का दौरा किया। प्रो. जोशी ने आइएसटीसी के नए भवन की आधारशिला रखी तथा भूकम्पीय वेधशाला और जैव-आण्विक इलैक्ट्रॉनिकी एवं नैनो-प्रौद्योगिकी प्रयोगशाला का उद्घाटन किया। प्रो. जोशी ने अनुसंधान एवं विकास के नए क्षेत्रों में सीएसआइओ द्वारा की जा रही पहल की प्रशंसा की। प्रो. जोशी के साथ वैज्ञानिकों के अनौपचारिक विचार-विमर्श से वैज्ञानिकों का न केवल उत्साह बढ़ा

अपितु उन्हें और अधिक चुनौतीपूर्ण कार्य प्रारंभ करने की प्रेरणा भी मिली। प्रो. जोशी के समक्ष सीएसआइओ और भारत इलैक्ट्रॉनिक्स लि. के बीच रूपये 1.50 करोड़ में हड प्रौद्योगिकी का हस्तांतरण हुआ, जो कि सीएसआइओ के इतिहास में अधिकतम है।

श्री रामचन्द्रैया की अध्यक्षता में 16 संसद सदस्यों की विज्ञान एवं प्रौद्योगिकी, पर्यावरण तथा वन पर संसदीय स्थायी समिति ने 7 जून, 2002 को सीएसआइओ का दौरा किया। परम् माननीय एवं विद्वान अतिथियों ने वैज्ञानिकों के साथ बातचीत की और वे सीएसआइओ द्वारा अर्थव्यवस्था के विभिन्न क्षेत्रों के लाभ के लिए किए गए अत्याधुनिक विकास कार्यों को देखकर प्रभावित हुए।

डॉ. डी. एन. तिवारी, सदस्य, योजना आयोग तथा सीएसआइआर सोसाइटी ने नवंबर, 2002 में सीएसआइओ का दौरा किया तथा नए क्षेत्रों में विकास कार्यों की भारत सरकार की योजना का विवरण देते हुए इनमें सीएसआइओ द्वारा किए जाने वाले कार्य के बारे में बातचीत की। डॉ. तिवारी के दौरे से भारतीय बांस के प्रक्रमण के लिए संयंत्र एवं मशीनों के विकास कार्य में सीएसआइओ द्वारा नवीन पहल का मार्ग प्रशस्त हुआ।

अनुसंधान एवं विकास क्षेत्र में, सीएसआइओ के प्रयासों से सीएसआइआर एवं भारतीय योजना आयोग द्वारा प्रारंभ किए गए चार नैटवर्क कार्यक्रमों में संगठन को प्रतिभागिता मिली। ये कार्यक्रम थे : सामाजिक कार्यों के लिए इलैक्ट्रॉनिकी, जिसमें सीएसआइओ केंद्रीय प्रयोगशाला थी; फोटोनिक्स तथा ऑप्टो-इलैक्ट्रॉनिक्स की तकनीकों का विकास; आवश्यकतानुसार निर्मित विशिष्ट पदार्थों, तथा राष्ट्रीय वांतरिक्ष कार्यक्रमों के लिए उच्च विज्ञान एवं प्रौद्योगिकी।

इन कार्यक्रमों के साथ-साथ सीएसआइओ ने वर्ष भर में 20 नई परियोजनाएं प्रारंभ कीं तथा 20 ही परियोजनाएं पूरी कीं, ये थी : वांतरिक्ष एवं सिविल संरचनाओं के निरीक्षण के लिए फाइबर ब्रैग ग्रेटिंग्स एवं दीर्घावधि ग्रेटिंग्स, एस्फेरिक आधारित ऑप्टिकल एवं इलैक्ट्रोऑप्टिकल प्रणालियों के लिए राष्ट्रीय सुविधा, डीएनए कम्प्यूटर तथा उनका जैवआण्विक इलैक्ट्रॉनिकी में अनुप्रयोग, टीबी



तथा जीनोम अध्ययन हेतु बायो-मेम्स आधारित सूक्ष्म चिकित्सीय निदान किट तथा रेलवे सुरक्षा अनुप्रयोग के लिए ऑसीलेशन मॉनीटरिंग प्रणाली।

सफलतापूर्वक पूरी की गई परियोजनाएं थीं : विद्युत ऊर्जा उत्पादन हेतु महत्वपूर्ण रोटरी मशीनों की कंडीशन मॉनीटरिंग के लिए उपकरण विन्यास प्रणालियां - ये प्रणालियाँ आइआइटी, दिल्ली व कानपुर तथा बीएचईएल कोरपोरेट अनुसंधान एवं विकास केन्द्र के सहयोग से विकसित की गई तथा इन्हें जीजीएसएस थर्मल पावर प्लांट में सफलतापूर्वक अधिष्ठापित किया गया।

विविध प्रकार के वैज्ञानिक और चिकित्सा उपकरणों की मरम्मत की अपनी विशेषज्ञता का दूसरों को लाभ प्रदान करने के लिए संगठन ने हाल ही में म्यंमार से वैज्ञानिक उपकरणों की मरम्मत का कार्य लिया। चण्डीगढ़ और चेन्नै से तीन सदस्यों का एक विशेषज्ञ दल मई-जून, 2002 में लगभग छह सप्ताह के लिए म्यंमार के दौरे पर गया। दल ने वहां यंगोंन के अनेक एस एण्ड टी विभागों के लगभग एक करोड़ रूपए से अधिक कीमत के 84 उपकरणों की मरम्मत की। इस दौरे का उद्देश्य पड़ोसी राज्यों के साथ द्विपक्षीय संबंधों को सुधारने के अतिरिक्त म्यंमार में एस एण्ड टी विभागों को उनके वैज्ञानिक और प्रौद्योगिकी कार्यों में सहायता प्रदान करने के साथ-साथ देश को वैज्ञानिक और चिकित्सा उपकरणों की मरम्मत और अनुरक्षण के क्षेत्र में आत्मनिर्भर बनाना था।

गत वर्ष के अंत में विज्ञान और प्रौद्योगिकी विभाग (डीएसटी), भारत सरकार ने अस्पतालों के तकनीशियनों के लिए चिकित्सा उपकरणों की मरम्मत व अनुरक्षण के क्षेत्र में प्रशिक्षण कार्यक्रम आयोजित करने का महत्वपूर्ण कार्य प्रारंभ किया। इस कार्यक्रम का उद्देश्य चिकित्सा उपकरणों के अनुरक्षण की समस्या को शाश्वत होने से रोकना था। डीएसटी ने यह दायित्व सीएसआइओ को सौंपा। संगठन ने उच्च स्तर पर कार्य करते हुए वर्ष के दौरान देश भर में ऐसे लगभग 25 कार्यक्रम आयोजित किए, जो अत्यधिक सराहे गए। डीएसटी का अब ऐसे कार्यक्रमों को देश भर के 541 जिलों और महानगरों में आयोजित करने का प्रस्ताव है।

चेन्नै केन्द्र ने उर्जा उपकरण विन्यास क्रियाकलापों के अतिरिक्त विश्लेषणात्मक उपकरणों की मरम्मत व अनुरक्षण पर प्रौद्योगिकी आधारित उद्यमिता विकास कार्यक्रम का सफल आयोजन किया। यह कार्यक्रम डीएसटी, नई दिल्ली द्वारा प्रायोजित किया गया था।

स्विस फाउंडेशन फॉर टैकनिकल असिस्टेंस के सहयोग से स्थापित तथा केन्द्रीय वैज्ञानिक उपकरण संगठन, चण्डीगढ़ के नियंत्रणाधीन कार्य करने वाला इण्डो-स्विस प्रशिक्षण केन्द्र देश तथा विदेश के

उद्योग जगत, अनुसंधान एवं विकास संस्थानों में तकनीकी शिक्षा के संरक्षक के रूप में प्रख्यात है। केन्द्र ने वर्ष के दौरान अपने सामान्य प्रशिक्षण के अतिरिक्त सीएनसी मिलिंग तथा प्रसीज़न टर्निंग एवं प्रैस टूल्स परिकल्पना पर लघु अवधि के कोर्स प्रारंभ किए। इन कार्यक्रमों का उद्देश्य उद्योगों में कार्यरत लोगों को अपनी विशेषज्ञता का लाभ प्रदान करने के साथ-साथ केन्द्र व उद्योगों को निकट लाकर परिणामतः उद्योगों के साथ व्यावसायिक संबंध स्थापित करना है। गत वर्षों में आइएसटीसी के संकाय सदस्य सीएसआइओ के वैज्ञानिकों को उनकी आर एंड डी परियोजनाओं में सहयोग करते रहे हैं, परन्तु वर्ष के दौरान केन्द्र ने अपनी पहल पर कुछ आर एंड डी कार्यक्रमों पर स्वतंत्र रूप से कार्य करना प्रारंभ किया। इससे निश्चित ही केन्द्र की गुणवत्ता में सुधार होगा।

संस्थान को अत्यधुनिक ढांचागत सुविधाओं यथा एस्फेरिक्स सृजन तथा पॉलिशिंग, माइक्रोइलैक्ट्रॉनिकी, माइक्रोप्रोसेसर कन्ट्रोल्ड थिन फिल्म कोटिंग, ट्रेस एलिमेंटल विश्लेषण, कम्प्यूटरीकृत डिजिटल नियंत्रित फ़ैब लाइन कैंड/कैम, पैकेजिंग एवं मोल्ड डिज़ाइन से सुसज्जित होने का गौरव प्राप्त है। मुझे इस बात से विशेष प्रसन्नता है कि उद्योग विशिष्ट क्षेत्रों से संबंधित अपनी चुनौतीपूर्ण समस्याओं के समाधान के लिए सीएसआइओ की ओर आकृष्ट हो रहा है और संगठन उन्हें सफलतापूर्वक आवश्यकतानुसार सुविधाएं प्रदान कर रहा है।

संगठन के वैज्ञानिकों और अन्य कर्मियों के समर्पित और कठोर प्रयासों से संस्था का बाह्य नकद प्रवाह (ईसीएफ) वर्ष 2002-2003 में 1000 रूपये के आंकड़े को पार कर गया है। संगठन के इतिहास में यह पहली बार हुआ है और निश्चित ही यह अनुपम उपलब्धि है।

वर्ष के दौरान संगठन द्वारा विकसित 5 प्रौद्योगिकियों का हस्तांतरण किया गया तथा अन्य 5 को हस्तांतरित किया जा रहा है। अनुसंधान एवं विकास की गुणवत्ता में व्यापक सुधार तथा वैज्ञानिकों में बौद्धिक संपदा अधिकारों के संरक्षण की अत्यावश्यकता की समझ से पेटेंट फाइल करने में महत्वपूर्ण वृद्धि हुई। संस्थान ने इस वर्ष जैवआण्विक इलैक्ट्रॉनिकी, फाइबर ऑप्टिक्स, एनर्जी मॉनीटरिंग, ऑप्टो इलैक्ट्रॉनिकी, चिकित्सा इलैक्ट्रॉनिकी तथा मैटलर्जी के क्षेत्रों में राष्ट्रीय व अंतरराष्ट्रीय स्तर पर 16 पेटेंट फाइल किए। संगठन के वैज्ञानिकों ने सम्मेलनों/संगोष्ठियों में 52 शोधपत्र प्रस्तुत करने तथा विभिन्न संगठनों, शैक्षिक संस्थानों/विश्वविद्यालयों में 23 अतिथि व्याख्यान देने के साथ-साथ प्रतिष्ठित पत्रिकाओं में 23 शोधपत्र प्रकाशित





करवाए। इन वर्षों में सीएसआइओ के बौद्धिक स्तर में उल्लेखनीय वृद्धि हो रही है तथा शीघ्र ही परम्परागत प्रौद्योगिकियों में महत्वपूर्ण उपलब्धियां प्राप्त कर इसे पहचान प्राप्त होगी। करवाए। इन वर्षों में सीएसआइओ के बौद्धिक स्तर में उल्लेखनीय वृद्धि हो रही है तथा शीघ्र ही परम्परागत प्रौद्योगिकियों में महत्वपूर्ण उपलब्धियां प्राप्त कर इसे पहचान प्राप्त होगी।

एसएसई, टीबीआरएल, आइसीएआर, एचएएल, आइआइटी, आरडीएसओ, सीएटी, एडीई, एडीए जैसे अनेक अनुसंधान संस्थानों, उपभोक्ता, उद्योग व शैक्षणिक संस्थानों तथा कृषि, ग्रामीण विकास, सामाजिक न्याय एवं सशक्तिकरण, विज्ञान एवं प्रौद्योगिकी, सूचना प्रौद्योगिकी, जैव-प्रौद्योगिकी, पर्यावरण एवं वन जैसे सरकारी अभिकरणों ने कई करोड़ रुपये की आर एंड डी परियोजनाओं को प्रायोजित कर हमारी क्षमताओं तथा प्राप्त ज्ञानाधार पर पूर्ण विश्वास प्रकट किया है।

सीएसआइओ के क्रियाकलापों की एक अन्य महत्वपूर्ण कड़ी आइएसओ-9002 : 1994 मानक के अनुरूप वैज्ञानिक उपकरणों के लिए असैम्बलीज, प्रणालियों, उप-प्रणालियों के यांत्रिक संघटकों के निर्माण के क्षेत्र, अंशाकन सेवाओं तथा इस प्रमाणन की विस्तार के अनुरूप उपकरण प्रौद्योगिकी, ड्राई एंव मोल्ड निर्माण, मैकैट्रॉनिकी एवं औद्योगिक स्वचलन के क्षेत्र में तकनीकी प्रशिक्षण में गुणवत्ता प्रणाली को बनाए रखना है। सीएसआइओ आगामी वर्षों में आइएसओ-9001:2000 के कार्यान्वयन की दिशा में अग्रसर है।

प्रो. अशोक साहनी, डीन ऑफ यूनिवर्सिटी इंस्ट्रक्शन, पंजाब यूनिवर्सिटी, चण्डीगढ़ ने राष्ट्रीय विज्ञान दिवस के अवसर पर सीएसआइओ की वेबसाइट [www.csio.org](http://www.csio.org) को विधिवत् प्रारंभ किया।

डॉ. रघुनाथ अनंत माशेलकर, एफआरएस, महानिदेशक, सीएसआइआर; श्री सुधीर कुमार, आइएएस, संयुक्त सचिव, सीएसआइआर तथा सीएसआइआर मुख्यालय की टीम के प्रति उनके सतत् सहयोग, प्रोत्साहन एवं मार्गदर्शन के लिए हम हार्दिक आभार प्रकट करते हैं। इससे प्रयोगशाला को राष्ट्र निर्माण की प्रक्रिया में योगदान के लिए नवीन उत्साह एवं गौरव प्राप्त हुआ है।

सीएसआइओ की अनुसंधान परिषद् के अध्यक्ष डॉ. के. जी. नारायणन् तथा माननीय सदस्यों के प्रति वर्ष के दौरान अनुसंधान एवं विकास कार्यक्रमों में उनके द्वारा प्रदान किए गए निर्देशन, मार्गदर्शन तथा सहयोग के लिए हम हार्दिक आभार प्रकट करते हैं।

संगठन द्वारा प्राप्त की गई उपलब्धियां स्टाफ कर्मियों के योगदान, सकारात्मक सोच तथा सहयोग के बिना संभव नहीं थी। इससे निस्संदेह सीएसआइओ में हाइटेक अनुसंधान कार्य प्रारंभ करने के लिए अत्यंत अनुकूल वातावरण स्थापित हुआ है। संस्थान द्वारा अपनाई जा रही प्रबंधन की संगठनात्मक प्रणाली से वैज्ञानिकों व स्टाफ सदस्यों के बीच सम्बन्ध पहले के समान अत्यंत सौहार्दपूर्ण है। आज मुझे यह कहते हुए गर्व हो रहा है कि सीएसआइओ प्रोत्साहित एवं उत्साहित वैज्ञानिकों व स्टाफ की एक निष्ठावान् संगठित टीम है, जो संगठन को अपनी बेहतरीन सेवाएं प्रदान करने के लिए सदैव तत्पर है।

संगठन भी अपने प्रयासों से उपकरण विन्यास के विशिष्ट क्षेत्रों में अनुसंधान एवं विकास में उत्कृष्टता प्राप्त करने के लिए प्रतिबद्ध है। संगठन संविदागत अनुसंधान कार्यक्रम एवं सामाजिक महत्व के प्रशिक्षण क्रियाकलापों को प्रारंभ करने के साथ-साथ उद्योग के साथ अपनी सहभागिता बढ़ाने के लिए भी कृतसंकल्प है। यह अत्यंत हर्ष की बात है कि वर्ष 2002-03 में संगठन ने उच्च कार्यनिष्पादन स्तर तक पहुंच कर ऐतिहासिक सफलताएं प्राप्त की हैं।

मैं उन सभी के प्रति हार्दिक आभार व्यक्त करता हूँ, जिन्होंने इसे संभव बनाया है।

रा. 5. बाजपेयी  
(राम प्रकाश बाजपेयी)  
निदेशक

30 अक्टूबर, 2003



## Biomolecular Electronics & Nanotechnology Laboratory



*Inauguration by Prof. Murli Manohar Joshi*

The newly established laboratory was inaugurated by Prof. Murli Manohar Joshi, Hon'ble Minister of Science & Technology, on January 28, 2003. The concept of this laboratory is to use life processes and materials for bioengineering and to develop devices which can improve quality of human life. It confines to multi-disciplinary integrated approach to understand the physical and biological processes at molecular level for designing devices out of DNA, Bio-MEMS for disease diagnosis, biomolecular motors for high speed high density electronic switching and targeted drug delivery. Carbon nanotubes are studied for electronic and display devices and targeted drug delivery. The multidisciplinary team is comprises of physicists , material scientists, biochemists, molecular

biologists, physicians, electronic, electrical, mechanical engineers and semiconductor experts, etc. The group is taking both theoretical and experimental aspects for development of commercially viable globally competitive products and to carry fundamental research in the domain of nanotechnology.



## CSIO BAGS PRESTIGIOUS CSIR TECHNOLOGY AWARD

Shri Atal Behari Vajpayee, Hon'ble Prime Minister of India, presented the Engineering Technology Award to CSIO, Chandigarh for developing a Head Up Display for Light Combat Aircraft, during a function organised on September 26, 2002 at Vigyan Bhawan, New Delhi. Dr RP Bajpai, Director, CSIO received this award on behalf of the team comprising Shri VML Narasimham, Dr MSN Srinivas, Dr KR Sarma, Dr S Mohan, Dr RP Bajpai, Shri PK Jain and Shri BD Sharma.

Other team members included : Shri PP Bajpai, Shri Vinay Kumar, Shri Suresh Kumar, Shri Sanjay Sharma, Shri Vinod Karar, Shri Vipan Kumar, Shri PK Garg, Shri RC Takkar, Shri Hardeep Singh of CSIO and Shri K Narasimha Rao and Shri M Adinarayan Murthy of IISc, Bangalore. They were honoured on the occasion of CSIO Foundation Day on October 30, 2002.



## HEAD UP DISPLAY FOR LIGHT COMBAT AIRCRAFT

**Sponsor: ADE, Bangalore**

### Brief Description

The design of Head Up Display (HUD) is based on the specifications provided by Aeronautical Development Establishment (ADE), Bangalore. The design was conceived and realised by team of scientists in CSIO. This approach led to provide in-depth understanding of design issues and fabrication challenges. It helped in creating strong expertise in the Institute to take up the design related issues of HUD for any aircraft suiting to the requirements of MIG-27 up-gradation program or new fighter aircrafts like SUKHOI SU-30 and Intermediate Jet Trainer Aircraft (HJT-36).

Due to its operational vitality and no redundancy, the HUD unit should have highest performance reliability. There is no forced air cooling or internal fan to remove the heat generated in the system. The mechanical housing has been used as heat sink to dissipate the heat generated by the system by natural convection and radiation.

### International Scenario

There are very few manufacturers at international level such as Sextant, France; ELOP, Israel and GEC, USA who had the technology to develop Head Up Display system for combat aircraft. The CSIO designed HUD is tailor made to LCA and all specifications are derived from LCA requirements. No other HUD in the world meets the exact requirements of LCA like size, height, field of view, photometric performance, measurement accuracies etc.

The CSIO-HUD has superiority in comparison to the international suppliers in terms of symbol brightness, field of view (FOV) and thermal management. CSIO-HUD provides 25 FOV, symbol brightness of  $>3500$  fL. In most of the internationally available models, thermal management is through forced air cooling, whereas CSIO-HUD manages thermal problem without using a fan and thereby reducing cockpit noise and increasing pilot's comfort.

### Novelty - Innovativeness

The cockpit size and geometry of LCA has severely restricted the space envelope available to HUD. The major design constraints of the HUD system are :

- Hardware should be accommodated within the spatial geometry available in the LCA cockpit
- Weight should not exceed 18 kg
- Power consumption should be less than 250 watts
- Large field of view and adequate luminance requirements

The HUD for LCA specifies a total field of view as 25 and an instantaneous field of view (IFOV) of 18 in elevation and 20 in azimuth. The IFOV is limited by the size of the collimator exit lens and the distance between the latter and the pilot eye location. Thus it cannot be increased beyond a limit defined by the available space and geometry of the aircraft. The requirement of 18 IFOV elevation could only be achieved by adopting dual beam combiners. The novelty of optical system design not only addressed number of constraints but also met the dimensional restrictions such as axial spread of exit group ( $<55$ mm), air gap between two main groups (120mm), the maximum diameter permissible of first lens of second group (104mm) etc. The optical system



Sh. M.M. Joshi, Hon'ble Minister for Science & Technology and Vice-President, CSIR, viewing the screen in Head Up Display at CSIO

*HUD occupies the prime location in LCA cockpit and provides the pilot with essential flight information, navigational and target/weapon release cues etc, superimposed on the view of the outside world.*

*One air worthy unit of CSIO's HUD has been integrated in LCA-TD2 and working satisfactorily for the last one year. More than 40 flights have taken place successfully with CSIO's HUD on board.*

is made compact by reducing the airspace to minimum and compensates the same by innovative cutting of a groove on the lens on the periphery so that spacers have large thickness for strength, etc. Dual Beam Combiner (BC) approach is adopted to achieve required IFOV in elevation, high reflectivity for CRT display wavelength and at the same time high transmission for the outside world visible wavelength region. Total field covered is large (25) resulting in large variation of incident angle. High transmission and reflectance achieved by suitably selecting the number of layers and the materials and uniformity achieved by graded coating. Special fabrication techniques (floating techniques) for polishing are developed to produce large beam combiners with small thickness so that the desired surface quality and parallelism between the surfaces is achieved.

By adopting multi-layer selective coating and dual beam combiner approach, peak spectral reflectivity (545nm) of 75% has been achieved. With this novel approach, the losses incurred in the optical system have been minimised.

In the absence of forced air cooling, the thermal management became a design constraint. The outer casing of the system (electronics and optical) has been constructed using aluminum casting and the heat generating driver amplifiers have been mounted directly on the casing. With this innovative approach the System casing acts as a heat sink and thus the heat generated is dissipated by natural convection and radiation.

The extensive Built in Test (BIT) of various sub systems / modules and information exchange through RS422 communication protocol helps the user to probe the health of the system and the sub-systems continuously.

HUD is integrated using a Mounting Tray which is harmonised and installed first on to the aircraft.

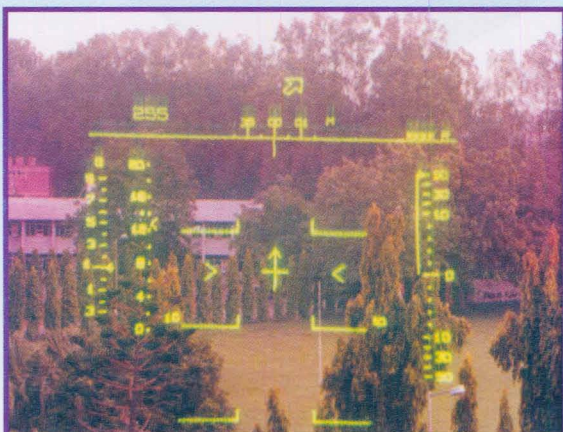
## Significant Features

- Compact design suiting to the space envelope constraints of LCA cockpit
- Total Field of View (TFOV) as 25, Instantaneous Field of View (IFOV): 20 Azimuth and 18 Elevation
- Optical design of collimating optics with aperture ratio  $f/0.9$ , total field of view of 25 to fit in a foldable space envelope
- Graded multilayer thin film coating for dual beam combiners to obtain 70% combiner transmission
- Multimode symbology writing operation (cursive and crsive in raster symbology display), with high symbol brightness and contrast
- Full readability in ambient light with automatic brightness control feature to provide proper contrast for all ambient light conditions up to a maximum of 10,000 fL
- Colour CCD camera (CCIR standard) to record displayed information
- Meeting environmental standards of 810D, power supply MIL standards 704D and EMI/EMC requirements as per MIL standards 461C
- User friendly Up Front Control Panel (UFCP)
- Continuous interaction with Display Processor (DP) regarding health of the System through RS 422 communication link
- Thermal management upto 250 watts dissipation without using forced air-cooling
- Mounting and dismounting of HUD from the cockpit with ease

*All features and required specifications have been achieved successfully by adopting state-of-art technologies.*

***Aeronautical Development Agency Bangalore, placed a supply order to CSIO for 11 units of HUD for LCA. The batch production of HUDs has been commenced at M/s Bharat Electronics Ltd., with the technical assistance of CSIO.***

***HAL, Bangalore has also sponsored the programme to carry out feasibility study of Head Up Display for Intermediate Jet Trainer (HJT-36).***



View through Head Up Display



LCA with CSIO's HUD on test flight

## EFPI SENSOR FOR STRUCTURAL HEALTH MONITORING & SAFETY

*Sponsor: BRNS, DAE, Mumbai*

### Uniqueness and Modification

Fiber optic sensors to date is a rapidly growing technology making revolutionary impact in various application sectors such as industry, civil structures, novel materials, medicines, aerospace, power generation, transportation, military and scientific research. Optical fiber sensors have been configured to detect and measure different physical phenomena such as strain, pressure, temperature, acceleration, magnetic and electric fields for various applications in industry and other sectors but more recently they have emerged as the key enabling technology for health monitoring of existing and futuristic advanced civil and aerospace structures and materials. Fiber sensors serve as nerves of structures and materials when buried in them for monitoring their characteristics over the lifetime. They provide a nervous system capable of sensing change while being part of the structure itself. It will allow critical parameters of materials and structures, to be sensed while offering light weight, immunity to EMI, flexibility, geometric versatility, ability to be embedded under hostile environments with ease and extremely high bandwidth capability. Currently, fiber optic sensors are being extensively investigated for quantitative non-destructive monitoring of advanced materials and structures and their deployment for the measurement of internal material changes during fabrication, in-service lifetime measurement of strain and temperature vibration. The eventual detection of damage or property degradation has recently been demonstrated. The in-situ monitoring capability of bonded/embedded fiber optic sensors offers the measurement tools required to optimize the design of advanced composite materials and concrete/metallic structures, monitor fabrication process for improved quality control and detect operational overloads to provide advance warning of catastrophic structural failures.

The Extrinsic Fabry Perot Interferometric (EFPI) sensor offers the advantage of simple construction, single-ended operation, high resolution, accuracy and cost-effectiveness. Strain and temperature measurements in structures may be carried out employing various fiber sensing methods.

Recent developments in that category have been EFPI devices which are being investigated, in particular, to a wide range of measurement problems in composites, metal and civil structures. The EFPI output is not affected by transverse strains e.g. zero cross sensitivity and the sensor only monitors axial strain components, since the cavity comprises a small air gap formed between two fiber end faces. The strain measurements by EFPI are also not affected by surface shears. A small size sensor makes a constant strain assumption reasonable. The EFPI sensor can be manufactured with a very small gauge length and meets the requirement of essentially providing a point measurement of the strain.

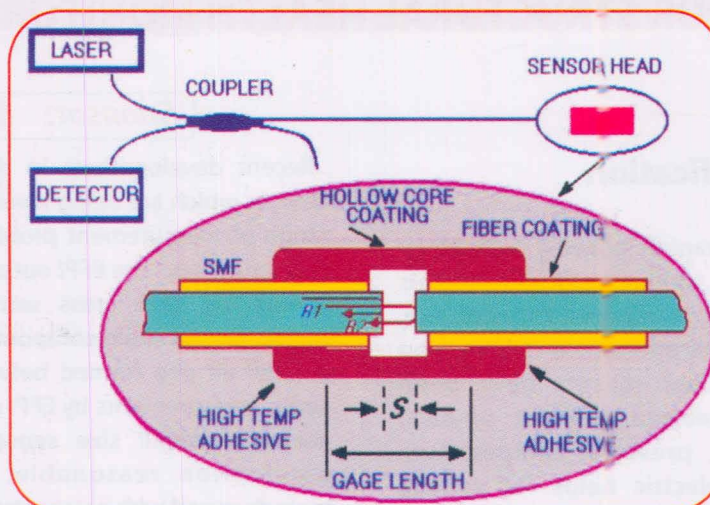
### Technical Details and Specifications

An extrinsic Fabry Perot interferometer has evolved recently as an extremely useful embeddable and bondable sensing configuration for health monitoring of structures. Operation of an EFPI sensor basically depends on an air cavity working as a low finesse 2-beam Fabry Perot interferometer. The FP air cavity is realized between cleaved end faces of an input/output single mode fiber and a reflecting single mode or multimode fiber aligned in a silica capillary tube. An EFPI sensor system consists of a single mode laser diode, which illuminates a Fabry-Perot cavity through a fused bi-conical tapered coupler.

The cavity is formed between an input/output single mode fiber and a reflecting single mode or multimode fiber. The far end of the multimode fiber is shattered so that reflections from this end do not add to detector noise. The input fiber and the reflecting fiber are aligned in a silica capillary and fixed to the inside of the tube with an epoxy resin. The distance between the input/output and reflector attachment points in the silica capillary tube defines the gauge length 'L' of the EFPI. The gauge length could be set during fabrication to be several millimeters or less. For uncoated fiber ends, a 4 percent Fresnel reflection results at both ends of the cavity.



Experimental set up for fabrication of EFPI sensor



The first reflection,  $R_1$ , called the reference reflection, is independent of the applied perturbation. The second reflection,  $R_2$ , termed the sensing reflection, is dependent on the length of the cavity 's' which, in turn, is modulated by the applied perturbation. Operation of the EFPI revolves around the air cavity. The interference between the two signals is observed at one output of the 3dB coupler as sinusoidal variations in optical intensity in response to micro-displacements in the air gap cavity and the sensor signal thus provides a relative measurement of strain induced in the sensor head. The optical signal in FP sensors

is dependent, only on the optical path length change, thereby producing a lead insensitive optical fiber sensor. The air gap acts as a low-finesse FP cavity and the effect of multiple reflections taking place between the fiber ends could be shown to be negligible and the system basically works as a two-beam interferometer.

Strain  $\epsilon$  is determined as the ratio between the end face displacement measured, e.g.,  $s$  and the gauge length 'L'.

$$\epsilon = \Delta s / L$$

*The performance of the indigenously developed EFPI was tested at the Strain Analysis Lab, Reactor Safety Division, BARC, Mumbai in comparison with conventional electrical strain gauges and was found satisfactory.*

## Applications

- EFPI devices are extensively used in wide range of measurement problems in composites, metal and civil structures
- Measurement of blast pressure
- Load on propeller blades of an ice breaker
- Aircraft runways
- Pressure in internal combustion engines
- Unsteady gas temperature
- Strains in gun barrels
- Monitoring of vehicular traffic
- Study of optical properties of photopolymers

*For health monitoring of structures, a full 3-dimensional state of strain is required to assess quantitative damage state of the material whereas the EFPI sensors provide only one dimensional measurement of strain.*

*For determining full 3-dimensional state of strain, rosettes are required. Rectangular rosettes involving three EFPI gauges oriented at 45 degrees were developed and fabricated. The rosettes bonded metal blocks were subjected to compressive stress under a UTM. The strain data obtained from the respective EFPI gauges was recorded and analysed.*

$\Delta s$  is determined from the number of the interference fringes shifted due to the applied strain. If 'm' is the number of fringes shifted, then

$$\Delta s = m\lambda / 2$$

$$\therefore \epsilon = m\lambda / 2L$$

The extrinsic Fabry Perot interferometric sensor with gauge length of 12 mm and air gap of 46 $\mu$ m was thus fabricated and realized.

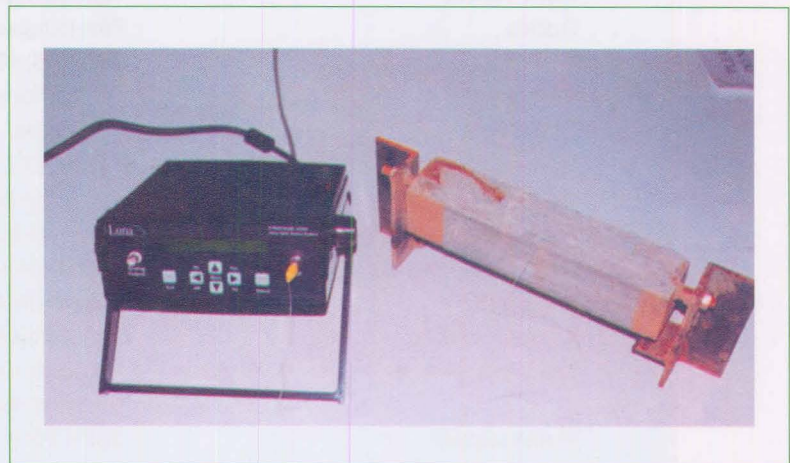
While optical fibers are fragile entities, civil structures present a hostile and harsh environment. For marriage of

these two extremes, special sensor configurations and bonding/embedding techniques were needed to be developed and established to take advantage of the potential benefits offered by optical fiber sensors for structural health monitoring applications.

Suitable techniques were developed for bonding of EFPI sensors to metal and concrete surfaces and their embedding into concrete specimens so that the interfacial bonds created are able to transfer the strain from the specimen to the Sensor. Sensor bonding/embedding issues such as ingress/egress, gauge contamination, sensor orientation and coating effects, lead routing etc. were addressed and investigated.



EFPI sensor and conventional strain gauge bonded to a concrete cubical specimen cast at PEC



EFPI sensor embedded in concrete

*Development of fiber optic sensors for health monitoring of structures and materials, will make it possible to realize intelligent buildings/structures and materials to sense their environment and intimate the status of their health to the control room.*

*Implementation of such sensor systems will lead to structures and material with improved designs resulting in enhanced man and material safety. Such buildings, in fact, will act as their own watchman.*



## CLINICAL CHEMISTRY ANALYSER

**Sponsor: DST, Govt. of India, New Delhi**

### Brief Description

Clinical Chemistry Analyser is a high performance micro-controller based photometric biochemistry analyzer, used to measure various blood biochemical parameters such as Blood glucose, Urea, Protein, Bilirubin etc. that are associated with various disorders such as diabetes, kidney diseases, liver malfunctions and other metabolic derangements. The quantisation of these parameters is helpful in classifying such diseases and under appropriate circumstances results of the system are used for diagnostic purposes.

System hardware is based on 8031 Micro-controller. This is interfaced with 64Kbytes of EPROM for monitor and control program and 24Kbytes of RAM with battery back up for temporary data storing and 24 hour results storage capacity, 12 bit A/D converter for converting analog OD into digital form, I/O devices 8255 are used for interfacing 30-keys keyboard for selecting various functions of the system,

Graphical LCD module for displaying various parameters and results of each test, Real Time Clock for displaying date and time on LCD, 40 columns mini printer for hard copy of the results, temperature sensor LM335 and Pettier device for sample heating and cooling, roller type peristaltic pump for sample aspiration and optical module. Menu driven software is written in C language.

### International Status

A number of automated clinical chemistry analysers are available from abroad. Companies in the world manufacturing similar type of instruments are Hitachi, Japan, Gem Star, USA and many more. The degree of automation varies from one manufacturer to another. The cost of such an instrument also depends upon the degree of automation starting from Rs. 2.5 lakhs in case of a semi auto analyser to Rs. 15 lakhs for a highly automated clinical chemistry analyser.

*System works on the principle of absorbance transmittance photometry.*

### Specifications

Light source	: Halogen lamp 12V, 20W
Optics	: Filters mounted on rotor 340, 405, 505, 546, 578, 630 nm
Detector	: Photodiode
Cuvette	: Flow type
Thermostat	: 25, 30, 37° C Programmable
Electronics	: Based on 8031 $\mu$ C, 64K byte EPROM and 16K byte RAM
Display and printer	: LCD display and 40 columns digital printer
Keyboard	: Alphanumeric keyboard
Sample volume	: 500 $\mu$ l (minimum)
Sample aspiration	: Through a peristaltic pump; aspiration volume programmable from 200 $\mu$ l to 1000 $\mu$ l
Mains supply	: 220V, 50Hz

*System is highly needed in clinical diagnostic laboratories of all hospitals, nursing homes, primary health centres, dispensaries and private clinical laboratories.*

*Applications in: Hospitals, Nursing Homes and Diagnostic Centres*



Clinical Chemistry Analyser

#### Technology Transferred to:

**M/s Rohini Micro Systems  
E-22, Phase-VII, Industrial Area,  
SAS Nagar, Mohali (Punjab), India**

### Features

Fully micro-controller controlled

6 Standard interference filters provide the required wavelengths (340, 405, 505, 546, 578 & 630nm)

Performs photometric measurement and computes results according to preprogrammed parameters that are also operator selectable through keyboard

Parameters & results displayed on the graphics liquid crystal display (LCD) and printed out on miniprinter

Performs four types of tests :

- Absorbance Mode
- Concentration (End Point) Mode
- Fixed Time Mode
- Kinetic Mode

Sample aspiration by programmable roller type peristaltic pump

Automatic selection for any test filter

Manual sample preparation, reagent mixing and steps involved upto colour development

### Clinical Trials

*First prototype of the Clinical Chemistry Analyser has been clinically evaluated on over 1000 blood samples at the Deptt. of Biochemistry, Govt. Medical College & Hospital, Chandigarh. All the 17 parameters were analysed and results found satisfactory.*

## NIGHT DRIVING FILTER FOR AUTOMOBILES

**Sponsor: DST, Govt. of India, New Delhi**

### Brief Description

The vehicle driving during night hours is very troublesome and becomes uncomfortable, particularly during long journeys. It is, therefore, very important to protect eyes from glazing light from front.

The filters developed by CSIO are very useful for night driving and protecting eyes from the dazzle and radiation in the wavelength region of 350-400 nm produced by the

head lights of approaching vehicles. The frequent dazzling not only makes the driving difficult but also impairs the vision. The glare / excessive light is reduced to comfortable viewing the incoming vehicles using high and low beams. The scattering of rays from the headlights of oncoming vehicles is comparatively suppressed. The headlight of incoming vehicles look like a dipper and left hand side view in front of driver is clearly visible while driving on the dark roads. The driving becomes comfortable with less strain by the use of night driving filters in the vehicles.

### Specifications

Substrate material	: Optical glass / polycarbonate plastic
Size of substrates	: 350 x 200 x 2.5mm
Distance of minimum T% from right edge of substance	: 100mm to 150mm
Coating	: Graded absorbing film

### Spectral Characteristics

Transmission at 550nm	: Continuously varying along the length of the filter
Film gradation	: 20% to 80%
Transmission in wavelength regions	
320-400nm	: Less than 10%
400-700nm	: Neutral; neutrality within 10% of the value at 550nm

*The field trials of the System developed were made by different automobile manufacturers in India for its overall assessment. Some of the automobile manufacturers have given very satisfactory reports, suggesting some minor modifications in the mechanical mounts.*

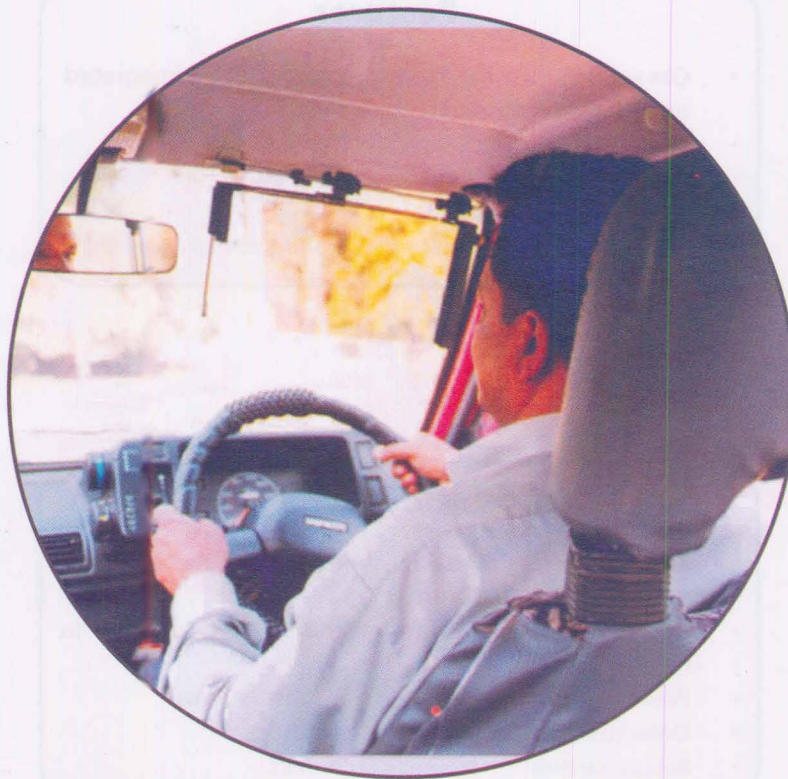
## Uniqueness and Novelty

It is well known that dazzle (excessive visible radiation) produced by the headlights of the oncoming vehicles during night driving blinds the driver's eyes instantly. This is one of the factors causing most of the road accidents during the night hours, resulting in the death or serious injuries to the persons. The halogen lamp used in the automobiles has a quartz envelope which gives out enough radiations in the UV region from 350 nm onwards, besides visible radiations. These radiations are dangerous for causing retinal damage under normal environmental conditions. It is, therefore, necessary to suppress the dazzle and radiations by the use of an optical filter of appropriate dimensions in the vehicles.

A system meeting the above requirements has been designed and developed at CSIO for use as an accessory to vehicle's wind shield. The graded film is designed by taking into consideration the luminance distribution of sealed beam headlamp, distance of the glass from centre of rotation of the eye and dark adapted eye pupil etc. The film is deposited on the transparent surface under vacuum by vapour beam chopping technique.

The coated substrate assembled in the adjustable mechanical mount is fitted in the vehicle at appropriate place. The mount has the mechanism to flip the filter in and out of driver's field of view on the windshield.

The uniqueness of the filter lies in the fact that it has a special type of graded coating increasing from left to right side to suppress the dazzle to the maximum. The coloured goggles available in the market as antiglare devices do not fulfill all the requirements and provide reduced visibility through the entire surface.



Ambassador Car fitted with Night Driving Filter

*The Commissioner of Police (Traffic), Delhi has highly appreciated the System and recommended it for general use by the public.*

# HUMAN BREATH SENSORS FOR DETECTION OF ALCOHOL

**Sponsor: DST, Govt. of India, New Delhi**

## Brief Description

Since the discovery of gas-sensitive effect of metal oxide semiconductors, much work has been done on tin oxide gas sensors of several types, such as bulk, thick-film and thin film. The importance of gas sensors has been recognized and efforts are being stimulated towards the basic research and practical applications in importance encompassing a broad spectrum of technologies covering safety, pollution, full economy, and industrial processes. The rapidly growing concern over domestic, industrial and stratospheric pollutants and their effects on the environment has greatly intensified interest in gas sensing techniques.

One of the important applications of gas sensors is in traffic management to check drunken driving. Ethanol is the popular member of alcohol family for it has both useful and harmful effects. Development of breath sensors based on thin film technology offers certain advantages like high sensitivity, low cost, portability etc. Vacuum thermal evaporation technique is used to deposit SnO<sub>2</sub> which is the sensitive layer of breath sensor.

### Features

- Gas sensing element, heater, contact array; all integrated on a single substrate
- Metal oxide thin film sensor
- Cost effective, easy to use and a compact unit
- Low power dissipation
- Simple electronic circuit for operating sensor

### Specifications

- Sensor : a metal oxide thin film having electrical resistance of 5-10 K ohm
- Heating through Platinum thin film deposited in meander form
- Power consumption : around 990 mw
- Detection limit for alcohol : > 200 ppm
- Response time : 30 secs

**Sensors form the crucial link between the control system and the test object. In fact, they serve as eyes and ears for any control system.**

## ATOMIC FORCE MICROSCOPE ---An Improved Version

Sponsor: DST, Govt. of India, New Delhi

### Brief Description

Atomic Force Microscope (AFM) creates topographic images of surfaces by positioning a micro fabricated cantilever with an integrated sharp tip, very close to a sample surface, which is mounted on an X, Y, Z piezoelectric tube scanner. AFM mainly consists of a sharp tip attached to a soft cantilever spring, a way of sensing the cantilever deflection (position sensitive detector), a feedback system to monitor and control the deflection (and hence the interaction force), a piezoelectric scanning system that moves the sample with respect to the tip in a raster pattern, a data acquisition and computer system that acquires and converts the data into an image. The sensor - a cantilever with an effective spring constant  $K$ , moves in accordance with the forces acting on its tip. The detector measures the cantilever's position, which determines the force on the tip. The force of interaction between the sample and the tip after approaching each other causes the cantilever to deflect according to Hooke's

law  $F = -k(Z)$ , where  $Z$  is the cantilever deflection. This deflection is measured by optical techniques. The electronic feedback system keeps the force constant by applying necessary voltage to the z piezo. Data is collected in the form of cantilever deflection or force as a function of sample position. An image or force map is generated with the help of a computer as the position of sample is rastered in X and Y directions. The AFM rests on a vibration isolation table to provide adequate isolation from building vibrations.

The interaction force can be measured as a function of the separation between the tip and the surface (force curve) by plotting the cantilever deflection against the extension and retraction of the piezo electric scanner. AFM technology can be adopted to measure electrostatic and magnetostatic interactions, as well as long range Vander Waal Forces.



AFM Set-up



AFM Head

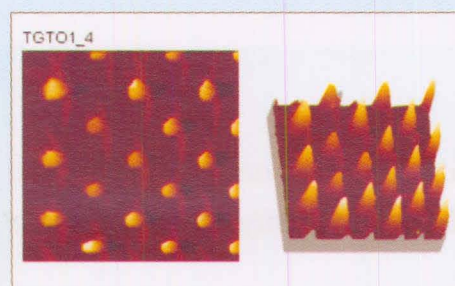
*A complete unit of Atomic Force Microscope made available to Applied Physics Department, Bharathiar University by CSIO for R&D investigations*

## Uses

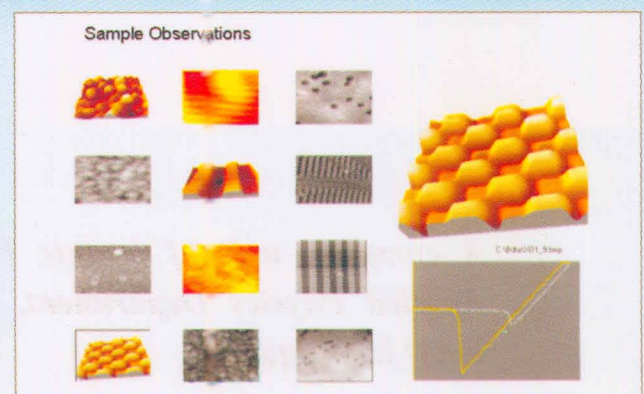
- *Imaging and profiling of surfaces from micrometer to nanometer scale*
- *Since AFM has no demand for electrical conductivity, there is no limit to the types of materials that can be examined*
- *3D surface topography*

## Technical Details / Specifications

Mode of operation	: Topographic imaging (constant repulsive force), force curve plotting
Displacement detection system	: Optical lever
Light source	: Semiconductor laser diode (670 nm, 3mw)
Detector	: 1D silicon photodiode (psd)
Cantilever	: Microfabricated Si cantilever (Stiffness 0.10 -10 N/m)
Scanning method	: Scanning by sample
Scanning range	: (piezo tube size dependent)
X, Y	upto 25 micron
Z	upto 4 micron
Max. sample size	: Dia. 15 mm Thickness 3 mm
Sample securing	: Magnetic / Adhesive
Coarse approach	: Motorised micrometer
Feedback control	: Analog
Max. feedback voltage	: $\pm 150$ V
Scan control	: DAC
Max. scan voltage	: $\pm 150$ V
Resolution	: 12 bit
Computer	: Pentium 550 MHz with 256 MB RAM
Display	: 17" colour monitor
Printer	: Photo quality colour printer
Software	: Windows based, 3D display, slope correction, surface analysis, zoom, rotation, print style function etc.



Standard Sample Image (TGT01)



Results

Force Curve

## DIGITAL AUTOMATIC MOISTURE COMPUTER

**Sponsor: TMOP&M, New Delhi**

### Brief Description

Grains and seeds are living organisms and moisture content plays an important role in their procurement, processing, preservation or storage.

The Instrument sensing system comprises of a capacitive transducer which converts moisture content into the dielectric constant variations. This variation of the dielectric constant of hygroscopic materials with moisture content is approximately linear over a limited and useful range of 10 - 25% of moisture. These dielectric changes cause capacitance changes and, in turn, frequency variations proportional to the moisture contents of the sample of grain. The packing density of grains has an appreciable effect on the precision of the

measurement. A provision has been made so that the grains are equally distributed in the sensor cell.

The variation in the capacitance is converted to frequency, compared with a reference frequency and the difference shown on LCD. Automatic temperature compensation is incorporated to get measurement at environmental temperature. A micro-controller has been incorporated in the electronic design to facilitate accurate, quick and reliable measurements of moisture percentage in different grains/seeds.

The Instrument has a self diagnostic facility to take care of the whole system. It has a printer interface. No reference charts are to be used and mere pressing of the key meant for the grain under test displays moisture percentage.

### Significant Features

- Instant display of measurements
- Minimum controls
- No charts to be referred to
- No special training required for its operation
- Micro-controller usage makes it versatile and more user friendly
- Grain once selected remains stored in memory for repeated operations
- Very useful in quality control during post-harvest, storage and processing

### Users

- Procurement agencies
- Mandis
- Agricultural universities
- Storage houses
- Food processing industries
- R & D establishments

*Simple to use, highly accurate, versatile with minimum controls to determine moisture content in different types of grains and seeds*



## Technical Details

The Instrument comprises of a capacitive sensor (dielectric cell) which converts moisture content into the dielectric constant variations. This variation of the dielectric constant of hygroscopic materials with moisture content is approximately linear over a limited and useful range of 10 - 25% of moisture. These dielectric changes cause capacitance changes and in turn frequency variations proportional to the moisture contents of the sample of grain. The packing density of grains has an appreciable effect on the precision of the measurement. A provision has been made so that the grains are equally distributed in the sensor cell.

The sample to be measured is poured into the sensor chamber. The variation in the capacitance results in frequency change. This change is converted into voltage and given to an ADC. Digitised signal is processed further using a micro-controller. Special standard subroutines, based on the calibration curves for different grains, are stored in EPROMS as look-up tables. The resultant moisture alongwith room temperature is displayed on an intelligent 4 line 20 character LCD. Micro-controller has been incorporated in the electronic design to facilitate accurate, quick and reliable measurements of moisture percentage in different grains / seeds.

## Facilitators

- PAU, Ludhiana (Punjab)
- HAU, Hissar (Haryana)
- IARI, New Delhi
- NRL, New Delhi
- MARKFED (Punjab)
- HAFED (Haryana)
- FCI, Govt. of India
- Agricultural universities
- Research Institutes

## Specifications

Measuring range	: 7% to 27%
Accuracy	: $\pm 0.5\%$ of the moisture range
Temperature correction	: Automatic
Grain selection	: Through microswitches
Display	: 4 line, 20 character LCD with backlight
Power	: Mains / battery operated



## INSTRUMENTATION SYSTEM FOR CONDITION MONITORING OF CRITICAL ROTATING MACHINES IN POWER PLANTS

*Sponsor: DST, Govt. of India, New Delhi*

### Brief Description

Critical Rotating Machines for which no back up exists such as large turbine generator sets, need to be monitored continuously to minimize down-time and costs of failures. Condition monitoring aims to define the current condition of a machine and compare it with the previously measured conditions. Some element of prediction is inferred by observing trends in the monitored parameters e.g. vibration levels, power output, speed etc. Condition monitoring is a subset of preventive / predictive maintenance, and vibration

A robust Online Expert System and Artificial Neural Network based monitoring and fault diagnostic system, which is capable of detecting the existence of faults and predicting the nature of fault has been developed.

The Instrument has been installed on Turbo Generator Set No. 1 at Guru Gobind Singh Super Thermal Power Plant Ropar (Punjab) by CSIO for acquiring vibration signals from the turbo generator's various bearing locations, process signals, speed and load signals for machine health

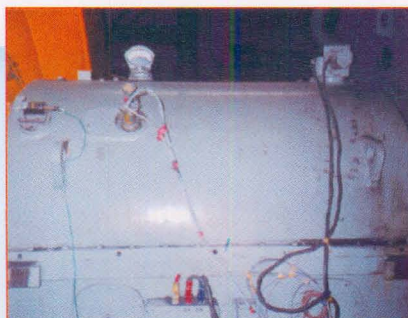


Site view of installation in Thermal Plant

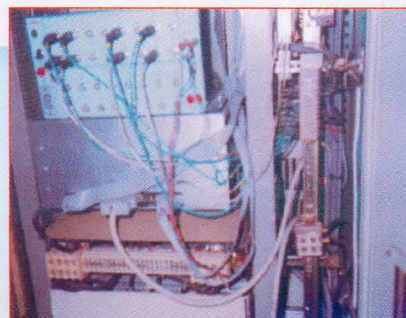
monitoring is an important subset of both, as it is non destructive, reliable and permits continuous monitoring without stopping the machine. The condition of the machine is reflected by parameters such as frequency of vibration signals, direction of predominant amplitude, location of amplitude, response to speed variations etc. The increasing amplitude of vibration is an indication of a deteriorating machine condition and the rate of increase is proportional to the degree of damage. Therefore, it is possible to predict the trend of deterioration of a machine by monitoring the amplitude and frequency of its fault related vibration features.

monitoring, based on vibration signature analysis. The acquired signals are converted into a compatible file format and sent to Online Expert System (IIT- Delhi) and Artificial Neural Network System (IIT- Kanpur) for monitoring, detecting and predicting faults, if any. The protective monitoring system has two set levels, the first is the warning (Alert), and the second is danger (Shutdown). The first level provides the operating personnel sufficient time to solve the problem before the shutdown level occurs.

*The System has been implemented at GGS Super Thermal Power Plant, Ropar as per the directive of Department of Science & Technology, New Delhi.*



Transducer on Pedestal



Control Unit



Data Acquisition Setup

## PASSIVE & ACTIVE INTEGRATED OPTIC DEVICES

**Sponsor: IRDE, Dehradun**

### Brief Description

Keeping in view the end use of the Integrated Optic (IO) devices, Integrated Optics has been identified as a major project which forms a part of the Photonics Programme of Defence Research & Development Organisation. To establish a strong base in the country, the IRDE had sponsored a sub - project on the development of Passive and Active Intergrated Optic Devices to CSIO. The infrastructure and knowledgebase have been established for its fabrication of Passive & Active Ti diffused Lithium Niobate (IO) Devices, which would be very useful for development of complex Integrated Optic devices. These devices have various applications in the areas of chip based photonic sensors, instrumentation and communication.

*IRDE, Dehradun is pursuing this project as a nodal agency.*

### Uniqueness and Technical Details

A channel waveguide is the basic structure of any integrated optics device for opto-electronic applications. A software for design of channel waveguide has been developed. The output design data can be used as sufficiently accurate input data to any standard modelling software. This would save considerable amount of CPU time avoiding 'hit and try' approach. Based on the design, three IO components: 1X4 Power Divider, Switch and Active Coupler have been designed and optimised, using modelling software. In order to develop the devices, various processing parameters have to be optimised. Processing parameters like Ti film deposition: RF power, plasma pressure, deposition rate, diffusion, temperature, time, ambient environment for fabrication of Ti diffused Lithium Niobate IO Devices have been optimised.

*The project supplements the effort of the DRDO's Photonics Programme.*

*The infrastructure and knowledgebase developed would be useful for developing chip based, more complex IO devices.*

## FAST OPTICAL PYROMETER

**Sponsor: TBRL, Chandigarh**

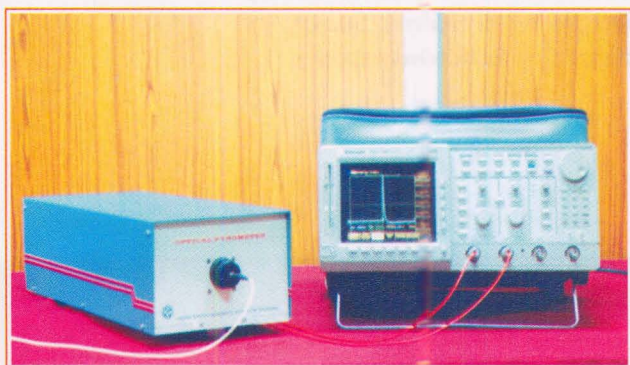
### Significant Features

Fast optical pyrometer has been designed and developed for the measurement of transient explosion temperature in the range of 1,000-10,000 K where the detonating response time is of the order of 100 nsecs. The instrument consists of focusing optics, fiber optic beam splitter (50/50), interference filters, O-E converters and application software.

Light emitted from the transient explosion is collected by the focusing optics which focuses light on to the tip of the fiber optic beam splitter. The fiber optic beam splitter (200/230  $\mu$ m) splits the light (50/50) into two channels. In each channel, the ends of the fiber optic beam splitter are connected to the collimating optics which provides the collimated light beam. The collimated beams in each channel are made to pass through the chosen interference filters and focusing optics, which focuses light on fiber cable

(202/230  $\mu$ m). The other end of cable is attached to a device which converts optical signal into an electrical signal. The output of the optical to electrical converter is then displayed on the oscilloscope which gives the intensities of the signals from both the channels. The values of the signals (in volts) in both the channels correspond to the respective intensities. These intensities,  $N(\lambda, T)$  and  $N(\lambda, T)$ , are being used as input values to the software module for temperature calculations.

The software is organized in five sub-modules. Module-1 is used for the selection of the interference filters for the measurement of the required temperature. Module- 2 is used for interpolating the emissivity values with respect to wavelengths based on a set of standard emissivity values for the detonation material under use. Module-3 is used to generate the emissivity values with respect to temperature. Once the data is available, it is used in Module-4 to calculate the temperature which is directly displayed on the monitor.



**FAST OPTICAL PYROMETER**

### Specifications

Temperature range	:	1,000- 10,000 K
Response time	:	100 n secs
Object distance	:	10-20 meters
Object size	:	25-100 mm
Spectral range	:	250-700 nm

### Applications/Uses

- Measurement of ultra-fast transient explosion temperature ( ~ 10,000 K)
- Defence and strategic applications
- Material manufacturing and process industry

*The instrument is simple to use, highly accurate and modular in approach.*

*One unit has been delivered and installed successfully at Terminal Ballistics Research Laboratory (TBRL), Chandigarh.*

## PRECISION SEISMIC TIMING CLOCKS

**Sponsor: Indian Meteorological Deptt., N. Delhi**

### Brief Description

Digital Seismic Clock, developed and fabricated at CSIO is a sophisticated, rugged and extremely accurate low power system for use in seismic workstation. Provision is made for the operator to alter time mark sequences. Controls are available on the timing system Front Panel. Programmable function switch is provided to control the six digit seven segment LED display to set the time of the clock.

It is completely self-contained, battery-cum-mains powered unit capable of operating unattended for very long period without any maintenance. Its clock can be synchronized with ATA signal received by the radio receiver. The Time Marker output signal is available at the back panel for impinging it on a drum recorder. A relay output at the back panel is provided which may be used to have audio or visual Time Marker outputs. Program selector switch enables the operator to preset time, correct for Time Drift @8 ms/sec and to alter the time marker program available for the recorder. Provision for external battery is made in case of non-availability of mains power at Seismic Station. Its internal 2.4 AH dry battery is continuously charged by main power supply.



PRECISION SEISMIC TIMING CLOCKS

### Features

- Tight weather proof mechanical design incorporated
- System automatically switches on to its internal battery during power failure from main supply
- Highly accurate timing, drift less than 25 ms/day
- Capable of interfacing with analog Seismic Recorder for time marks information

***CSIO itself is fabricating seismic clocks to meet the users' needs. A number of units have been fabricated and supplied to users.***

## Specifications

### Timing System

Type	:	TCXO Crystal Controlled
Crystal Frequency	:	4.194304 MHz
Stability	:	Drift less than 25 ms/day
Display	:	6 Digit & 7 Segment LED Display Hours, Minutes, Seconds

### Time Mark Output

Time Marks	:	Hours, Minutes, 10 Sec. & Sec with adjustable amplitude
Time Mark Duration	:	Hour - 2 Sec Minute - 1 Sec 10 Sec - 250 ms Sec - 125 ms
Relay Output	:	Relay output is as per time Marker Setting

### Input Signal

WWV/ATA	:	1 Volt (RMS)
Accessibility	:	Modular Construction
Power	:	480 mW (Display off) 1.8 W (Display on)
	:	220 VAC, 50 Hz $\pm$ 10 % with standby internal chargeable dry battery provided
Internal Battery Power	:	12 V, 2.4 AH maintenance free Re-chargeable Battery

### Major Users

- **India Meteorological Department, New Delhi**
- **National Geophysical Research Institute, Hyderabad**
- **Nuclear Power Corporation**
- **Universities and Research Institutions**
- **Indira Sagar Project (Khandwa) and Hydro-Dams**
- **Central Water & Power Research Station, Pune**

## 24-BIT SEISMIC DATA ACQUISITION SYSTEM

----- with Dial-up Facility for Data Transfer

Sponsor: DST, Govt. of India, New Delhi

### Brief Description

24-bit Seismic Data Acquisition System (SDAS) designed and developed at CSIO is a versatile, portable, rugged data digitizer/recorder for unattended field use. CSIO has developed an indigenous technology which not only satisfy users current requirement and compatible with other available systems, but can also easily be upgraded at minimum possible cost. In view of this, SDAS has been designed around flexible PC-architecture based concept, which supports PCI-Bus, ISA Bus & PC-104 Bus. Due to availability of PC-104 Bus, as many cards can be added to the system, independent to the motherboard as an embedded unit. The SDAS contains inbuilt Disk-on-chip (DOC) that contains the firmware operation of the system. The SDAS has dial up facility for remote configuration and data downloading facility. The System has capability to form a local node in regional network. The data format of the system is compatible with the internationally available standard seismic signal analysis software so that it can be used globally.

### Salient Features

- Three channels expandable up to six channels
- PC Architecture based system
- 24-bit high resolution digitizer
- GPS based timing system
- 40 GB storage capacity for recording long period seismic data
- Compatible with seismometers and accelerometers
- Dial up communication for setting field parameters from central recording station to field station
- Instrument works in stand alone mode as well
- User's interactive software for setting and verification of parameters and controlling the operation
- Inbuilt facility for sensor calibration
- Data compatibility with standard formats such as SEISAN, SUDS etc
- RS-232 interface and ethernet interface available
- Data can be downloaded to PC without stopping data acquisition of the instrument
- Fast data downloading rate @ 10 mbps



## Specifications

### Digital Data Acquisition Unit

- Input Channels 3 channels, can be easily upgraded to 6 channels
- Sensors Seismometer / Accelerometer
- Architecture PC Architecture, pentium processor based
- Low Pass Filter Programmable digital filter from DC to 30 Hz
- ADC Resolution 24-bit
- Sampling Rate Programmable
  - 10 to 1000 sps (single-channel acquisition)
  - Up to 200 sps (multi-channel acquisition)
- Dynamic Range > 130 dB
- Primary Data Storage 128 MB RAM
- Recording Mode
  - a) Continuous mode
  - b) Trigger mode ( using STA / LTA )
- Pre Event Period Programmable 1 To 1000 sec
- Post Event Period Programmable 1 To 1000 sec
- De-trigger Ratio Programmable
- Timing Unit GPS based synchronization
- Main Data Storage 40 GB capacity
- Noise Not more than 4-6 bits of 24 bit system on RMS basis at a mean sampling rate
- System Response DC to 50 Hz
- Full Scale Nominally  $\pm 2.5$  V peak to peak
- Provision of Indicators Indicators for each 'Pulse' per second and 'True - Event' provided on the front panel of SDAS
- Provision for Data Transfer SDAS have capability for transmission of data through Modem link from remote station to the central recording station
- Environmental Tolerance Operating temperature 0°C to 55°C and humidity upto 100%

### Data Retrieval Unit

Normal LAPTOP PC / PC with ethernet interface data can be downloaded using ethernet interface @ 10 MBPS

### System Software and Analysis Software Packages

System software developed as inbuilt part of the SDAS

### User's Interface Software

Software developed for setting up and verification of field parameters, start acquisition, stop acquisition, and restart of system

### Format Conversion Software Package

Software developed to convert data recorded by CSIO instrument into standard SEISAN format so as to analyze the data as per international standard

## Applications

Recording local, regional and distant earthquakes  
 Study of preshocks & aftershocks  
 Study of induced seismicity  
 Site survey for local seismicity assessment  
 Strong motion recording and analysis

## Beneficiaries

Indian Meteorological Department, New Delhi  
 Hydro Dams Authority  
 Nuclear Power Stations  
 Research and Educational Institutes

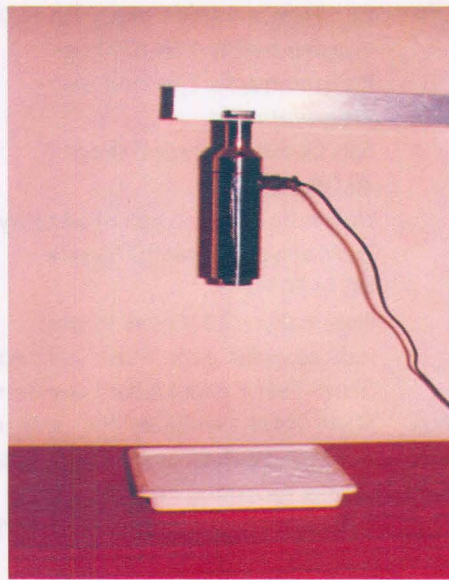


## IR BASED SNOW SURFACE TEMPERATURE MEASURING PROBE

*Sponsor: SASE, Chandigarh*

### Brief Description

Prediction of avalanche occurrence demands the measurement of snow and meteorological parameters of the avalanche formation. Specific kind of state-of-the-art instruments and systems are needed for this purpose. These must be capable of unmanned data collection from highly inaccessible areas in deep Himalayas. As the temperature of the object increases, its molecular activity also increases, causing the object to generate more energy. By using this concept, CSIO has designed and developed an infrared technique based, Snow Surface Temperature Measuring Probe/Sensor. It has been interfaced with automatic weather station installed in deep Himalayan region. The sensor is used to measure the snow surface temperature using non-contact remote sensing method. The snow surface temperature data is used in snow cover melting and run-off water modeling.



### Salient Features

- Tight weather proof mechanical design
- Direct interfacing to Data Acquisition System
- Round the clock operation of sensor for several months under severe weather conditions
- Sensor operates under high humid conditions (up to 100% RH) and a wind speed of the order of 200 km/ h
- Resolution in temperature measurement (0.1 °C)
- Cost- effective and state-of-art instrument

***The Instrument has been tested on long term basis by Snow & Avalanche Study Establishment (SASE), Chandigarh and passed all the necessary field tests.***

### Specifications

Range	:	-40 °C to 100 °C
Resolution	:	0.1 °C
Accuracy	:	± 0.5 °C
Repeatability	:	± 0.1 °C
Optical configuration	:	12.7 mm aperture, precision, double coated, germanium optics
Spectral band pass	:	8 < wavelength < 14 micron
Sighting	:	Line of sight
Response time	:	0.25 sec
Emissivity	:	0.2 to 0.98 selectable
Power consumption	:	10.5 to 14 V DC, 20 mA
Output signal	:	0 to +5 V in voltage form and 0 to 10 KHz in frequency form
Weight	:	Less than 2Kg

### Applications

Snow surface temperature measurement in deep Himalayan regions  
 Temperature measurement of any object in wide range of 40 °C to 100 °C  
 Assessment and forecast of river water level  
 Forecast of flood and water rise due to snow melt  
 Snow hydrological studies  
 Snow cover modelling and hydrological computations

### Beneficiaries

Snow and Avalanche Study Establishment, Manali  
 National Institute of Hydrology  
 Central Water Commission  
 Chemical Plants & Industries  
 Oil & Natural Gas Commission  
 National Remote Sensing Agency  
 Research Institutes

*Snow & Avalanche Study Establishment R&D Centre, Chandigarh has appreciated the excellent efforts made by CSIO in the development of indigenous technology for snow instrumentation.*

## CHEMICAL SENSING OF POLLUTANTS

Sponsor: DST, Chandigarh Adm.

### Brief Description

*The sense of smell is the most mysterious of all the five senses. The human nose has become an exciting new frontier as scientists and engineers try to better understand how the nose functions.*

*Electronic nose is a device used to analyse the contents of air through the classification of odours.*

The rise in interest concerning the olfactory system is due to recent advances in electronic noses. Electronic noses are generally made up of two main parts: a sensing system which consists of an array of sensors and a pattern recognition system in which pattern recognition technique like Principal component analysis (PCA), Artificial neural network (ANN) or Fuzzy logic can be used.

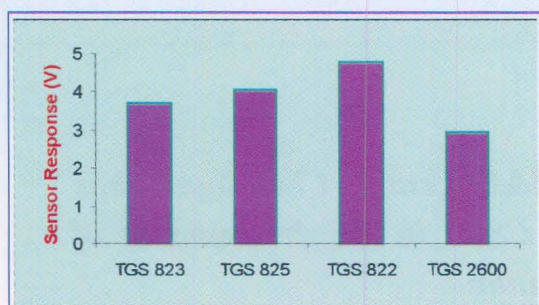
The release of various chemical pollutants from industries, automobiles and domestic places into the atmosphere has raised environmental issues globally. The toxicity of certain chemicals could prove harmful to someone who was trying to determine an odour using his nose. Thus development of new methods like Electronic Nose to measure toxic gases is very important for solving environmental problems. Metal oxide based gas sensors have been used extensively for chemical and gas detection which includes volatile organic compounds (VOCs) and toxic and pollution gases like CO, H<sub>2</sub>S, Cl<sub>2</sub>, NO<sub>2</sub>, NH<sub>3</sub>, SO<sub>2</sub>, CO, etc.

The model nose uses a finite array of metal oxide sensors (typically 3 to 8 sensors), the sensors are independent but each one is sensitive to a very wide range of odours. Odours are identified by an adaptive pattern recognition analysis of the signals induced on the sensor array. Tin oxide sensors are of particular interest due to their high selectivity at relatively low operating temperature.

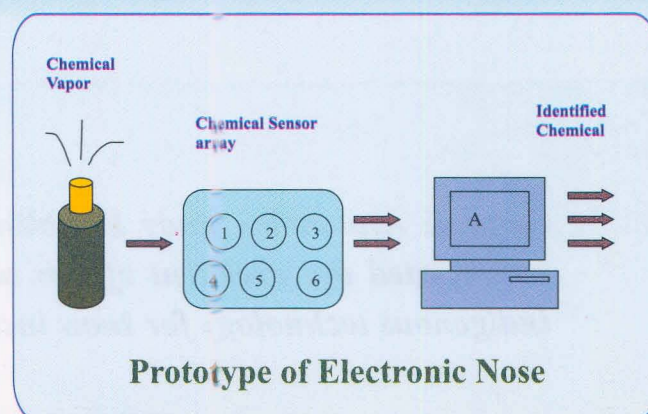
### National and International Status

In India, the work is mostly concentrated on oxide semiconductor thin films and their response to gases like CO, CH<sub>4</sub>, and H<sub>2</sub> etc. The research in India, on gas sensors has been mostly directed towards understanding the detection mechanism or to study the effect of material properties on detection etc. Appreciable work on the pattern recognition techniques has been carried out for multi component gas analysis using thick film SnO<sub>2</sub> based sensors.

In late 1994 and early 1995, commercial Electronic Noses began appearing in the market, based largely on university-developed prototypes. This is still a fairly immature but evolving technology with significant improvements in hardware and cost reductions in price per unit occurring each year.



Bar diagram showing TGS sensor array response to benzene



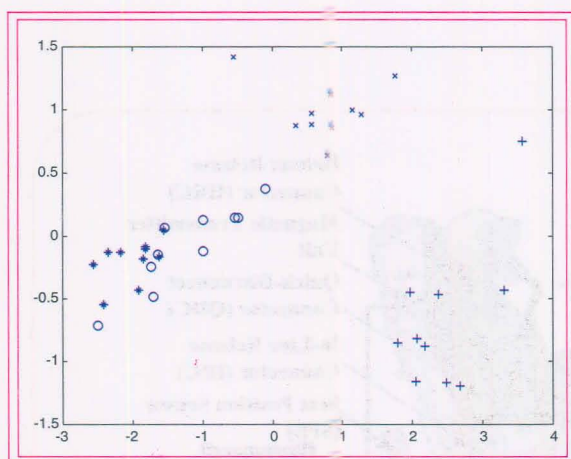
## Methodology

The prototype of electronic nose employs an array of five tin-oxide gas sensors to examine the environment. Although each sensor is designed for a specific chemical, each responds to a wide variety of chemical vapors. The system works by placing an odorant sample in the test chamber which is fitted with a mixing fan along with the sensor array. The volatile compounds produced with the sample are blown over the sensor array with the aid of the mixing fan. This process both transports odorant molecules to the sensors and produces a uniform mixture of odorant molecules across the sensor array so that each sensor is interacting with the same concentration of odorant molecules. This process is analogous to the physiological process of sniffing in the biological nose. Exposure of tin oxide sensor array to a volatile compound produces a large change in its electrical resistance. This is analogous to the reception and detection process in the olfactory process in the olfactory receptors.

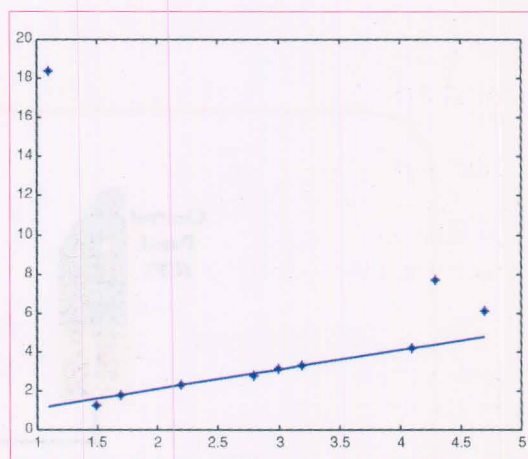
## Estimation of Concentration of CO

The gas sensor signals are the functions of the gas concentration and the type of the gas. The System consisting of sensor array, power supply and digital multimeter is taken to a near pollution check center. For the concentration estimation. The equipment used by the pollution check station is called "Exhaust Gas Analyzer" (EGA).

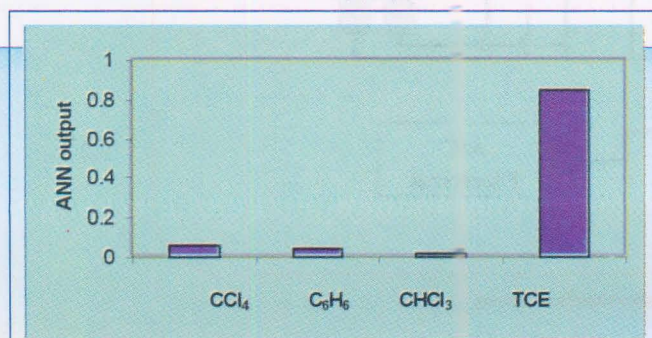
Each experiment is divided into the test set and the calibration set. For the test set, various responses of the sensor array to the gases emitted by the exhaust of the vehicle are noted. The sensor responses are defined as voltage on reference resistor, with the power supply of the circuit fixed at 5V. The sensors are operated at high temperature, by applying constant 5V supply to the heaters. The measurements are made after heater voltage of 5V is given to the sensor array for about 15 min. The sensor array is put in a cover and is placed near the exhaust of the vehicle. As the study aims at evaluating the ability of the array to identify gases in the exhaust of the vehicle, the samples are collected near the source and not from the surrounding. The response is measured sequentially with the help of a digital multimeter.



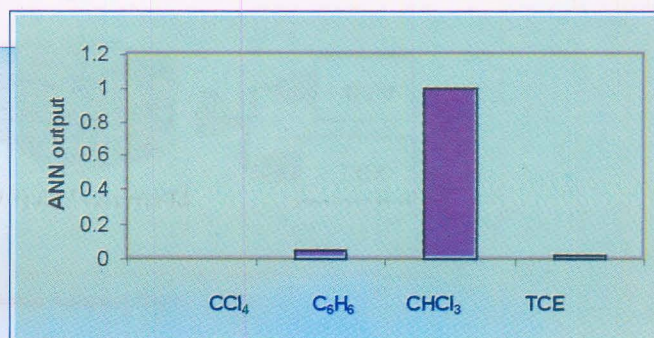
Results of the PCA on all 40 responses to the four VOCs.



Predicted against true concentrations of CO for the two-dimensional PLS model.



Bar diagram showing ANN output for TCE



Bar diagram showing ANN output for CHCl<sub>3</sub>

# DESIGN AND DEVELOPMENT OF HELMET MOUNTED DISPLAY

## ----- A Feasibility Study

**Sponsor: Aeronautics R&D Board, Govt. of India, New Delhi**

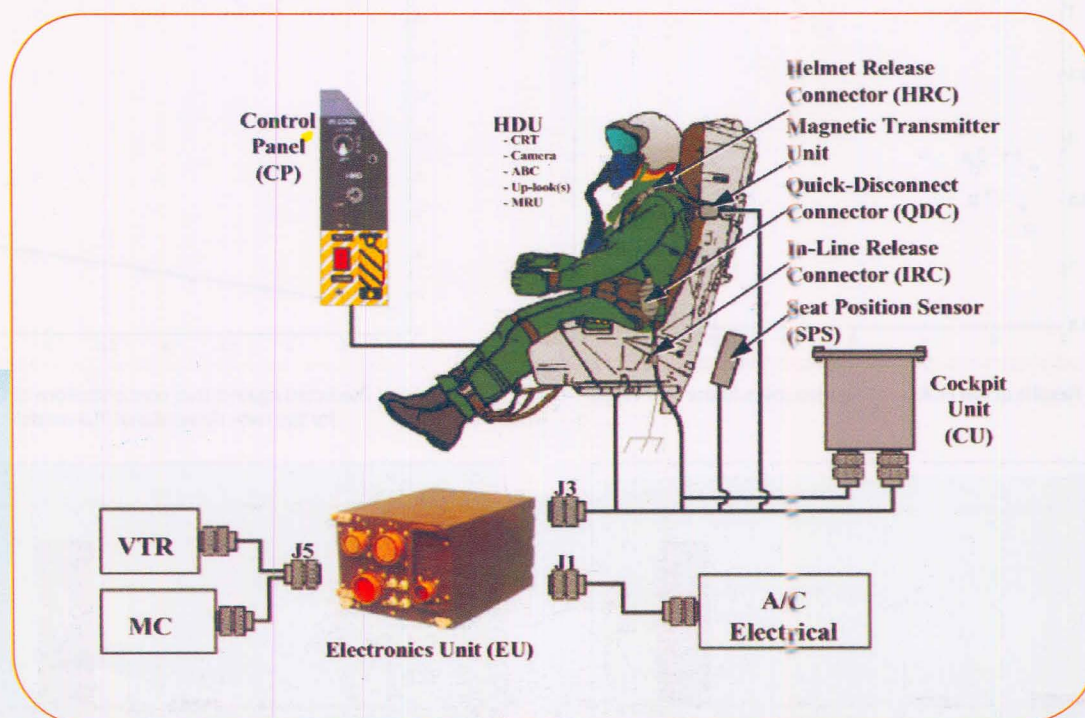
A feasibility study was completed with an aim to study in detail about the challenges involved in designing an indigenous Helmet Mounted Display (HMD) for Light Combat Aircraft (LCA) and thereby finalizing its specifications.

### Brief Description

HMD is a helmet mounted cueing/display system, which in conjunction with the missile system, provides a high off-bore sight capability for IAF tactical fighter aircraft. This capability gives the war fighter first-look, first-shot, air-to-air and air-to-ground weapons and sensor cueing that allow eyes out of the cockpit targeting within the visual range arena. The HMD will produce major improvements in Pilot situational awareness with good overall system accuracy, faster target acquisition and less exposure time.

A general method of classifying HMDs is by whether they are occluded or see-through displays. The occluded display is one where only the image produced by the display is visible to the viewer. The see-through display is one where the viewer sees both the image produced by the display and the ambient scene. Another method of classifying HMDs is by how many images are presented and to which eyes. The three classifications are monocular, biocular, and binocular. A monocular display presents one image to one eye. A biocular display presents one image to both eyes. A binocular display presents different images to each eye. It is only with a binocular display that true stereoscopic images can be presented. Head mounted displays, in general, project virtual images into the eye.

The Helmet Display Unit (HDU) is connected to the helmet shell through a universal connector, and has a built-in hinge pivot that allows symbology to be projected onto the Pilot's visor and fold clear of the visor assembly when the visor is retracted.



HMD comprise seven major components as shown

The system interfaces requirement with the aircraft to provide the pilot with the capability to visually cue weapons and sensors to the helmet Line of Site (LOS) has also been reviewed in detail in the feasibility report. Feedback of the weapon and/or sensor line-of-sight is also required to be provided for target verification. Aircraft state information such as altitude and airspeed is also provided.

### Weapons, systems and equipment that HMD interfaces

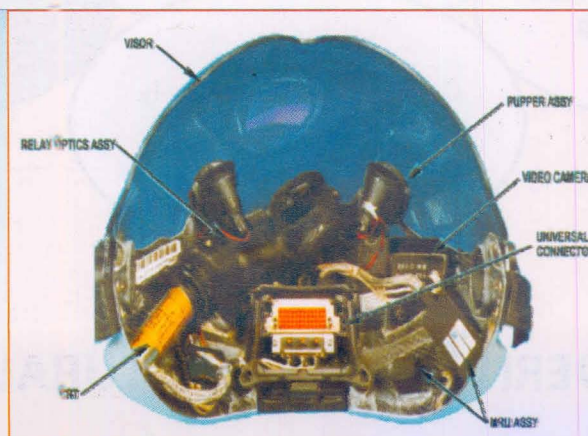
- Cockpit Video Recording System (CVRS)
- Stores Management System
- Advanced Tactical Forward Looking
- Infra Red Radar
- Radar Warning Receiver
- Night Vision Goggles
- Parachute Restraint Harness Assembly
- Existing/Future Laser Eye Protective Devices
- Mission Computer System
- Radar
- Ejection Seat
- Anti-Gravity Flight Ensemble
- Enhanced Pressure-Demand

Current helmet mounted displays typically use either a liquid crystal matrix array or cathode ray tube to generate the image. A transmission mode liquid crystal display is an electrically addressed two dimensional matrix of holding cells filled with a liquid crystal material. Some head mounted displays consist of CRTs imaged into a fiber optic bundle which carries the signal to the eye. The fiber optic ray bundle approach offers no improvement in image quality but can allow for better ergonomics on the head. The collection of fibers acts as a secondary screen which must then be imaged into the eye. For a large field of view display, the fiber bundle will have to be magnified or placed close to the eye.

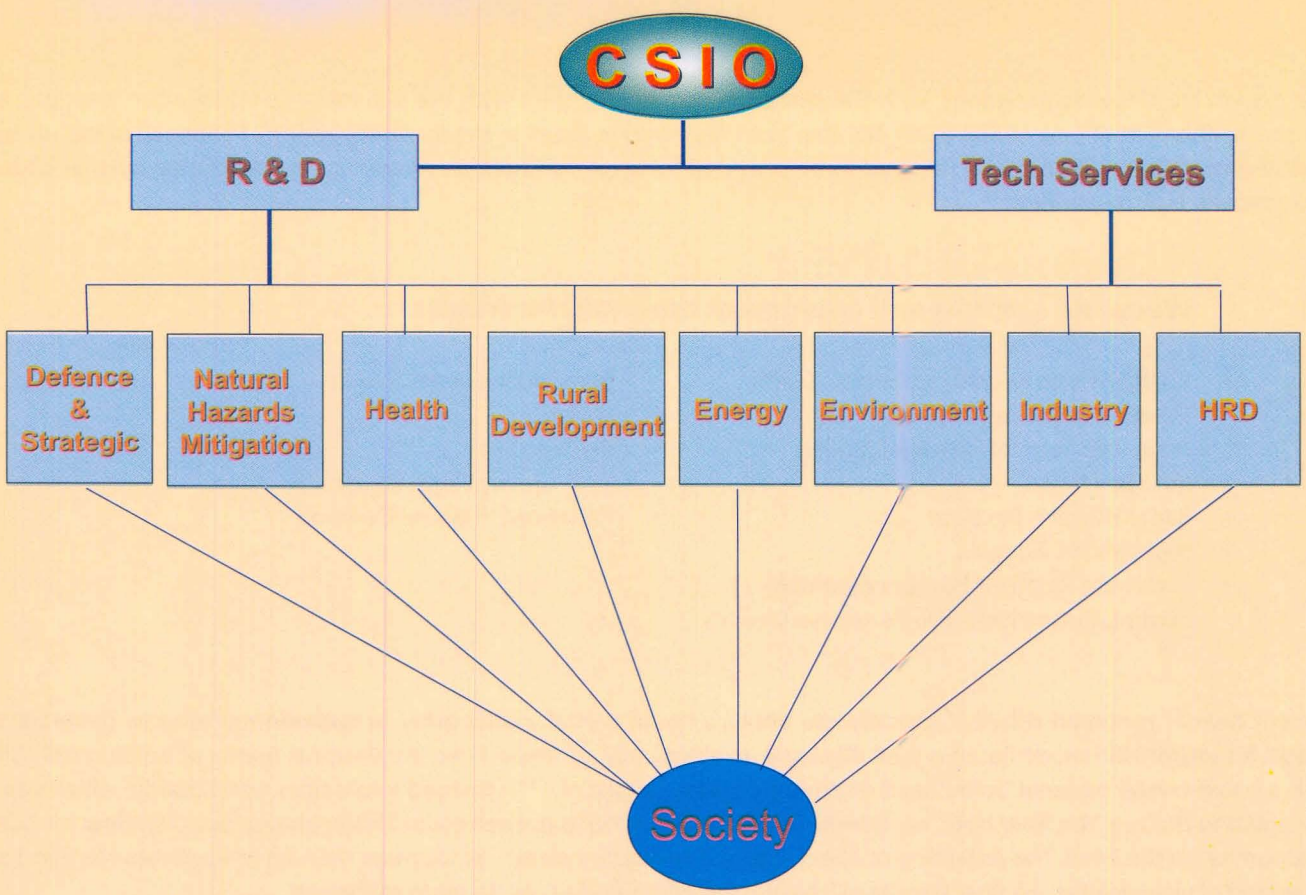
Several disadvantages are existing in the technologies used in the current HMDs, one of these being high cost as miniature cathode ray tubes alone cost thousands of dollars.

### Some of the recommendations made in the feasibility study are :

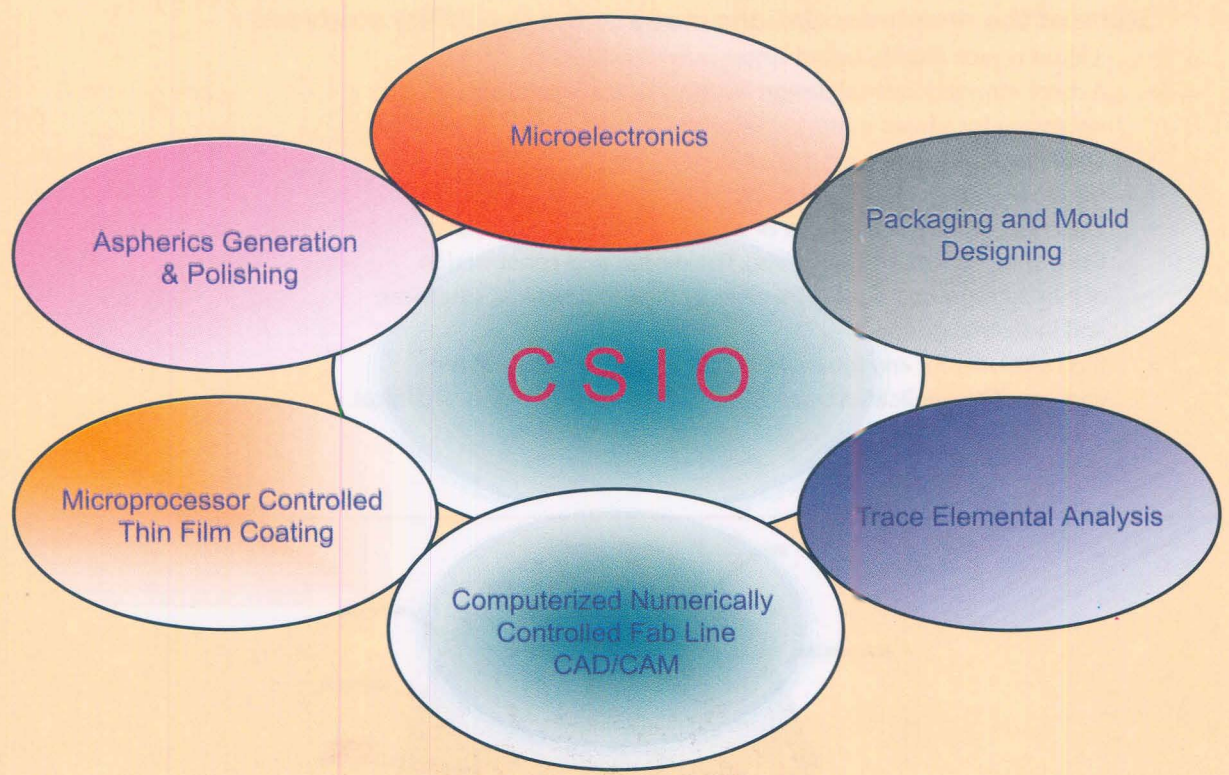
- Liquid crystal display based systems are cheaper.
- A more compact optical design for the viewing optics may be necessary for a head mounted display.
- Similarly a more compact design for the viewing optics may be necessary for a head mounted display
- The eventual size and weight of a head mounted version of the display should be minimized. The design and construction of a head mounted display involves optical, mechanical, electrical, and industrial design.
- It is necessary for any future work to include the needs of the end user. The applications are diverse and some are highly technical



Artistic view of the placement of sub-assemblies proposed in HDU



### CONTRIBUTION TO SOCIETY



### ULTRA MODERN INFRASTRUCTURAL FACILITIES

## ON-GOING R&D PROJECTS

S. No	Title of the Project	Funding Agency	Project Investigator
<b>Agri-Electronic Instrumentation</b>			
1.	Instrument for Evaluation of Proteins in Soyabean, Oil Cakes & Other Foods	TMOP&M, New Delhi	SS Randhawa
2.	Digital Moisture Probe	Deptt. of Food & Public Distribution, Ministry of Consumer Affairs, Food & Public Distribution, New Delhi	AK Ganju
3.	Popularisation of Digital Aflatoxin Meter	TMOP&M, New Delhi	AK Ganju
4.	Popularisation of Technologies Developed under TMOP&M Programme: Portable Kits and Instruments for Edible Oils & Detection of Pollutants	TMOP&M, New Delhi	ML Singla
5.	Portable Instrument or the for the Determination of Gossypol in Cottonseed Deoiled Cake	TMOP&M, New Delhi	ML Singla
6.	Electronic Gadget for Bird Scare	ICAR, New Delhi	VP Giridhar
7.	Laser Land Leveller	ICAR, New Delhi	RK Jain
8.	Automated Argemone Concentration Measurement System	TMOP&M, New Delhi	Dial Singh
9.	Popularisation of Technology Developed under TMOP&M Programme - Digital Cereal/Grain Analyser	TMOP&M, New Delhi	VP Giridhar
<b>Analytical Instrumentation</b>			
10.	Upgradation of Gold Analyser	In-house Project	RR Dongaonkar
<b>Environmental Monitoring Instrumentation</b>			
11.	Real Time Sound Analyser	DST, New Delhi	Basudeo Prasad
12.	Microcontroller based Ozone Monitor	Min. of Environment & Forests, New Delhi	Basudeo Prasad
13.	Microcontroller based Coefficient of Haze (CoH) and Dust Mass Monitor	Min. of Environment & Forests, New Delhi	Amod Kumar
<b>Instrumentation for Energy Management</b>			
14.	On-line Energy Monitoring & Control System and its installation in an Industry	DST, New Delhi	RK Mohan Rao
15.	Consultancy Services on Energy Management Systems (under Indo-German Energy Efficiency and Environment Project-IGEEP)	German Technical Cooperation (GTZ)-IGEEP, New Delhi	RK Mohan Rao
16.	Design, Supply, Installation, Commissioning and Proving the Energy Saving Capability of Energy Management System at M/s Sun Paper Mill Ltd., Tirunelveli	1. German Technical Cooperation (GTZ)-IGEEP, New Delhi 2. Sun Paper Mill Ltd. (SPM) Chennai	RK Mohan Rao
<b>Instrumentation for Geo-Science &amp; Disaster Mitigation</b>			
17.	Fabrication of 2-Units of 16-bit Seismic Recorder	DST, New Delhi	MA Shamshi



S. No	Title of the Project	Funding Agency	Project Investigator
18.	Advanced Technology based Strong Motion Recorder - Dev. of Accelerometer	DST, New Delhi	BK Sharma
19.	Study of Seismicity in & around Chandigarh by Establishing a Network of Three BB Seismographs	DST, New Delhi	MA Shamshi
20.	Analog Seismic Recorder (4 Nos.) with Accessories	CWPRS, Pune	MA Shamshi
21.	Development & Fabrication of Infra-Red Technique based Snow Surface Temperature Sensing Probe (11 Nos.) with Accessories	SASE, Chandigarh	MA Shamshi
22.	Dev. & Supply of Portable Analog Seismograph with Accessories	IIT, Kanpur	MA Shamshi
23.	Design & Dev. of Oscillation Monitoring System for Railway Vehicles	RDSO, Lucknow	SK Mittal

### Instrumentation for Strategic and Defence Applications

24.	Dev. of Head-Up Display (HUD) for LCA - DRISHTI	ADE, Bangalore	PK Jain
25.	Design & Dev. of 35mm Mini Panoramic Camera - FOCUS	ADE, Bangalore	PK Jain
26.	Dev. of Fire Safety Sensors for LCA (Phase-IA & II)	ADA, Bangalore	ML Singla
27.	Dev. of Non-Linear Junction Detector	DIT, New Delhi	NK Sharma
28.	Dev. of Velocity Panel for the Small Caliber Projectiles	DIT, New Delhi	RC Kalonia
29.	Development of Electronic Stethoscope	DIT, New Delhi	NK Sharma
30.	Design & Dev. of Fiber Optics based Fire Detection & Warning System for Aircraft	AR & DB, New Delhi	JK Chhabra
31.	Relay Lens Systems	ADE, Bangalore	PK Jain
32.	Design & Dev. of Relay Lens 2.3X	ADE, Bangalore	PK Jain
33.	Design, Development & Supply of Head Up Display (HUD) for LCA	ADA, Bangalore	PK Jain
34.	Design, Development & Supply of Improved Collimating Optics for Head Up Display for LCA	ADA, Bangalore	PP Bajpai
35.	Dev. of Molecular Beam Epitaxy (MBE) System (Jointly by CAT & CSIO)	CAT, Indore	Nathai Ram
36.	Dev. of Laser based Flash Shadow Photographic System for Terminal Studies of Small Arms Ammunitions (SAA)	ARMREB, New Delhi	Gautam Mitra
37.	Dev. of Fly-By-Light Tail Rotor Control System for Advanced Light Helicopter (ALH)	HAL, Bangalore	JK Chhabra
38.	Feasibility Study for Development of Head Up Display for Intermediate Jet Trainer Aircraft	HAL, Bangalore	PK Jain
39.	Design & Dev. of Relay Lens	ADE, Bangalore	PP Bajpai

### Medical Instrumentation

40.	Higher Energy (15 MeV) Medical Linac	DIT, New Delhi	PS Malhotra
41.	Anaesthesia Ventilator	DST, New Delhi	RN Sengupta
42.	Vascular Microendoscope of Various Diameters	DST, New Delhi	CR Prasad

S. No	Title of the Project	Funding Agency	Project Investigator
43.	Design & Dev. of Sodium/Potassium Analyser	DST, New Delhi	SS Ahluwalia
44.	Design & Dev. of Surgical Microscope for Cataract Surgery	DST, New Delhi	PK Goel
45.	National Programme for the Deployment of Indigenously Developed Integrated Medical Linac System for Cancer Therapy (Phase-I)	DIT, New Delhi	PS Malhotra
46.	Dev. of Adaptive Neuro-Fuzzy Controller for Anaesthesia	DST, New Delhi	Amod Kumar
<b>Optics &amp; Opto-Electronics (including Coherent Optics)</b>			
47.	Design & Dev. of Low Vision Aids (Plastic Aspheric Lenses)	Min. of Social Justice & Empowerment, N. Delhi	SV Rama Gopal
48.	Optical Components for UV-Vis Spectrophotometer	M/s Systronics, Ahmedabad	PK Jain
49.	Tele-Microscope (using Plastic Aspheric Doublets) As Low Vision Aids	Min. of Social Justice & Empowerment, New Delhi	SV Rama Gopal
50.	Establishment of National Facility for R&D in Aspheric based Optical & Electro-Optical Systems	DST, New Delhi	PK Jain
51.	Design & Dev. of Night Driving Filter (Phase II)	DST, New Delhi	PK Rao
52.	Precision Aspheric Lenses for Indirect Ophthalmoscope	DST, New Delhi	GS Singh
53.	Optical System for CD Mechanism	M/s Trident Industries Ltd, New Delhi	PK Jain
54.	Investigation of High Security Embossed Hologram Mastering Techniques	DST, New Delhi	SK Kaura
55.	Automatic Detector for Fake Currency Notes	In-house	HK Sardana
<b>Process Control Instrumentation</b>			
56.	Microwave Microbial Decontaminator System 1.5 X (Modified Version)	RRL, Jammu	Lalit M Bharadwaj
<b>Biomolecular Electronics and Nanotechnology</b>			
57.	Study of Electrical Characteristics of DNA for Fabrication of Biomolecular Electronic Devices using Conducting Polymers	DST, New Delhi	Lalit M Bharadwaj
58.	Study of DNA Computers and its Application in Biomolecular Electronics	DBT, New Delhi	Lalit M Bharadwaj
<b>Microelectronics Instrumentation</b>			
59.	Protective Biocompatible Coating on Surgical Tools	DST, New Delhi	AK Dimri
60.	Fabrication of Porous Silicon Light	DST, New Delhi	Sunita Mishra

S. No	Title of the Project	Funding Agency	Project Investigator
	Emitting Diodes (LEDs) using Conducting Polymers		
	<b>Micro Electro Mechanical Systems &amp; Sensors for Diverse Applications</b>		
61.	Plasma Etching Processes for High Aspect Ratio Structures for MEMS Applications	NPSM, ADA, Bangalore	AK Paul
62.	Bio-MEMS based Microclinical Diagnostic Kit for Tuberculosis	NPSM, ADA, Bangalore	LM Bhardwaj
	<b>Networked Programmes of CSIR</b>		
1.	Electronics for Societal Purposes	CSIR, New Delhi	<b>Participating Labs:</b> CSIO Chandigarh (Nodal Lab), CRRI New Delhi, NPL New Delhi, CBRI Roorkee, CFTRI Mysore, CEERI Pilani, CMERI Durgapur, NGRI Hyderabad
2.	Development of Key Technologies for Photonics and Opto Electronics	CSIR, New Delhi	<b>Participating Labs:</b> CGCRI Kolkata (Nodal Lab), CSIO Chandigarh, IICT Hyderabad, CEERI Pilani, NPL New Delhi, RRL Thiruvananthapuram
3.	Custom Tailored Special Materials	CSIR, New Delhi	<b>Participating Labs:</b> CGCRI Kolkata (Nodal Lab), CECRI Karaikudi, CSIO Chandigarh, NPL New Delhi, RRL Bhopal, IICT Hyderabad, NCL Pune, NAL Bangalore, NML Jamshedpur, CMERI Durgapur, RRL Thiruvananthapuram, RRL Bhubaneswar
4.	High Science & Technology for National Aerospace Programmes	CSIR, New Delhi	<b>Participating Labs:</b> NAL Bangalore (Nodal Lab), CMERI Durgapur, CSIO Chandigarh, NPL New Delhi, RRL Bhopal

## OUTREACH ACTIVITIES



**CSIR Diamond Jubilee Exhibition at CSIO**



**Signing of Agreement with BEL, Panchkula  
for production of HUDs**

## OUTREACH ACTIVITIES

### Business Development & Marketing

#### Marketing of Technology for Gold Analyser through NRDC

CSIO added yet one more success story to its achievements when it assigned the technology of Gold Analyser, a non-destructive gold purity measurement instrument, to National Research Development Corporation (NRDC), New Delhi. An agreement was signed by Dr NK Sharma, Managing Director, NRDC; Dr SK Gupta, Advisor DST, Govt. of India, the sponsoring agency and Shri MR Masan, Controller of Administration, CSIO on October 11, 2002 at CSIO, Chandigarh.

This technique is non-destructive and based on x-ray fluorescence spectrometry. It can measure the purity of finished jewellery in the presence of copper, silver and other metals without any loss in it. The beneficiaries of the technology shall be jewellers and customers buying gold.



Gold Analyser

### Know-hows Transferred

#### Head Up Display for LCA

The Head up Display (HUD) system is CSIO's own technology. It has been designed to meet the exact requirements of LCA like size, height, field of view, photometric performance measurement accuracies etc. Due to its operational vitality and no redundancy, the HUD unit should have the highest performance reliability. There is no forced air cooling or internal fan to remove the heat generated in the system. The mechanical housing has been used as heat sink to dissipate the heat generated by the system by natural convection and radiation.

HUD's know-how was transferred to Bharat Electronics Limited (BEL), Bangalore on January 28, 2003. Shri Basvarajaiah, General Manager, BEL Panchkula, signed the agreement on behalf of BEL, Bangalore. Prof. MM Joshi, Hon'ble Union Minister for HRD and Science & Technology, Govt. of India and Vice-President, CSIR presided over the function, organised on this occasion at CSIO, Chandigarh. Prof. MM Joshi lauded CSIO's contributions in the development of strategic and sophisticated equipments.



Signing of Agreement



Technology transfer documents being handed over

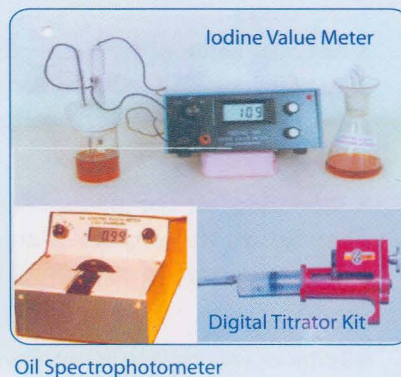
### Portable Kits & Instruments for Quality Control of Edible Oils

The Portable Kits consisting of following three instruments was developed under the sponsorship of Technology Mission on Oilseeds, Pulses & Maize (TMO &M), New Delhi.

- Iodine Value Meter
- Oil Spectrophotometer
- Digital Titrator Kit

The know-how of the technologies developed was transferred to following two industries in April, 2002 for commercial production :

- Vaisheshika Electron Devices, Ambala
- Abrol & Associates, Chandigarh.



### Aflatoxin Meter

Technical know-how of Aflatoxin Meter, developed with TMOP&M funding, was assigned to Azjtronics Instrumentation, Chandigarh on April 23, 2002. The agreement was signed and know-how documents were presented to Mr. Dev Dutt, Proprietor, Azjtronics Instrumentation by Mr. S.K. Batra, Senior Processing Technologist, TMOP&M, Union Ministry of Agriculture & Co-operation, New Delhi.

The first unit of productionised Aflatoxin Meter, was handed over by Mr. A.K. Ganju, Head, Agri-Electronics Division, CSIO to Dr. M. Z. Abdin, Reader, Centre for Biotechnology, Jamia Hamdard, New Delhi on 21<sup>st</sup> August, 2002.



Aflatoxin Meter

### Semi Automatic Pick & Place Machine for SMDs

Pick & Place Machine has wide applications in the small scale electronics industry. The system is useful for the assembly of printed circuit boards of mobile phones, fax machines, disk drives, consumer electronic gadgets, TV, computers etc. with surface mount devices (SMDs). The hardware and software of the system developed at CSIO uses state-of-art technology. The handling of SMD components demands such high precision machine because of its small size. The machine can achieve the assembly speed of 600 SMD components per hour. The entire requirement of the machine in the country is presently met through imports. The indigenously developed machine is cost-effective and can be commercialised at much lower price in the country. Its know-how was transferred to M/s EMS Technologies Pvt. Ltd., Pune, on September 16, 2002..



Pick & Place Machine



Discussions with the Directors during Transfer of Technology



Signing Agreement

## Workshops/Seminars Organised

1. A National Seminar on 'Technological Developments in Aeronautics and its Impact on Maintenance' was jointly organized by CSIO, Chandigarh and Regional Centre for Military Air-worthiness (RCMA), Chandigarh during January 3-4, 2003 at Chandigarh.
2. A Workshop on the theme 'Preparation of Vermi Compost' sponsored by the Environment Society of India, Chandigarh, was organised on June 5, 2002 on the occasion of World Environment Day. The Workshop was attended by around 30 teachers and students from various engineering colleges located in Punjab and Haryana.
3. A Seminar was organised on 'Environmental Monitoring Instruments' for talented students and teachers of Punjab state during November 11-12, 2002. This programme was sponsored by Punjab State Council for Science & Technology, Chandigarh. Nearly 20 participants attended the seminar.
4. CSIO organised a 2-day 'All India Seminar on Instrumentation for Agriculture', jointly sponsored by the Ministry of Human Resource Development, Govt. of India and TMOP&M, Ministry of Agriculture, New Delhi, during April 23-24, 2002. More than 70 experts and scientists from different labs of CSIR and universities participated in the seminar and presented scientific papers.



Panel Discussion in progress

5. An 'Indo-German Workshop on Nano and Nuclear Sciences in Electronics-Electrical-Medical and Environment' held at CSIO and Panjab University, Chandigarh, during February 16-18, 2003 as a part of CSIR Diamond Jubilee Year Celebrations was organised jointly by the Alexander von Humboldt Foundation, Germany; Panjab University and CSIO, Chandigarh.

About 17 eminent academicians and scientists including eight from Germany participated in the workshop and delivered invited talks in the emerging areas of nano and nuclear sciences. Prof. HJ Buchkremer, Reader, Aachen University of Applied Sciences, Germany, in his inaugural address, talked about the Education System in Germany and the benefits Indian students can derive from it. The workshop was attended by a number of scientists, educationists and students representing various research organisations and Institutes.

6. A 'Hindi Workshop for Scientists' was organized on August 20-21, 2002 with the joint efforts of CSIO and Commission of Scientific and Technical Terminology, New Delhi. About 60 Scientists from CSIO and other scientific organisations participated in this workshop.

## Visits of Dignitaries

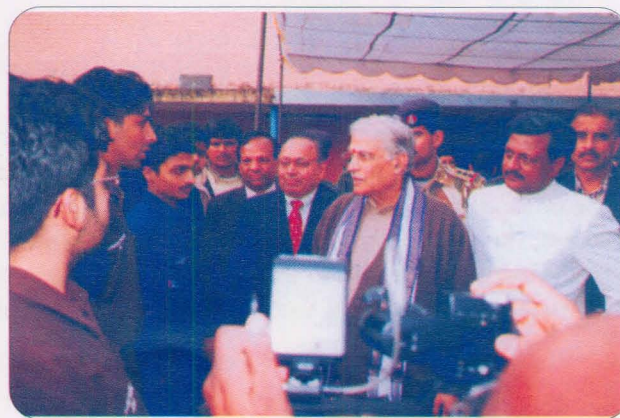
### Prof. Murli Manohar Joshi, Hon'ble Union Minister

Prof. Murli Manohar Joshi, Hon'ble Union Minister for Human Resource Development, Science & Technology, Ocean Development and Vice-President, CSIR, visited the Institute on January 28, 200. He visited various labs in the Institute and addressed the scientists. Prof. Joshi expressed the views that science should be simple as complex theories ultimately lead to dead end. Citing several examples, the Hon'ble Minister opined that western science is coming back to the findings mentioned in our ancient literature. Earlier, in his presentation, Dr RP Bajpai, Director, CSIO, highlighted the past achievements, present activities and the vision of the Organisation in various sectorial application areas related to instrumentation.

During his visit to CSIO, Prof. Joshi laid the foundation stones of the new building of Indo-Swiss Training Centre and Staff Quarters. He also inaugurated the Seismological Observatory and Biomolecular Electronics & Nanotechnology Laboratory in the Institute. He showed keen interest in the technologies developed at CSIO.



Inauguration of Seismological Observatory



Prof. MM Joshi interacting with the students of ISTC.



Inauguration of New ISTC Building



### Parliamentary Standing Committee on Science & Technology, Environment and Forests

The Parliamentary Standing Committee on Science & Technology, Environment and Forests undertook a study visit to CSIO on 7<sup>th</sup> June, 2002, under the Chairmanship of Sh. Ramachandraiah. The Hon'ble Members of Parliament present in the meeting included Shri Manoj Bhattacharya, Smt Savita Sharda, Shri Dwijendra Nath Sharmah, Shri Nihal Chand Chauhan, Dr (Smt) Beatrix D' Souza, Adv Suresh Ramrao Jadhav, Shri Gordhanbhai Javiya, Shri Sadashivrao Dadoba Mandlik, Shri S Murugesan, Shri Ali Mohd Naik, Shri A Venkatesh Naik, Shri Suresh Pasi, Dr Ashok Patel, Shri Prahlad Patel, Prof RR Pramanik and Shri Ganta Srinivasa Rao. This Committee was accompanied by four officials from Rajya Sabha Secretariat.



Welcome of Hon'ble Members



Presentation by the Director to the Hon'ble Members

Dr RP Bajpai, Director, CSIO extended a very hearty welcome to the Hon'ble Chairman and Members of the Parliamentary Standing Committee. He then made a presentation to the Hon'ble Members covering the historical background of CSIO, main areas of its activity and achievements made. The Hon'ble Members were also taken for Lab visit. They were highly impressed with the achievements made by CSIO, which has emerged as a Centre of Excellence in the field of Instrumentation in the country.

### Document and Evidence Sub-Committee of Parliamentary Committee on Official Language

Document and Evidence Sub-Committee of Parliamentary Committee on Official Language visited Chandigarh to have discussions with Heads of Departments of 15 organisations/institutes including CSIO on 4<sup>th</sup> June 2002 on the progressive use of Hindi. The Committee headed by Dr Laxmi Narayan Pandey included : Smt Sarla Maheshwari, Shri Sushil Kumar Indora, Shri Naval Kishore Rai, Shri Jagdambi Prashad Yadav, Shri Ram Rai Choudhary. Earlier questionnaire duly filled-up by the Institute was sent to the Parliamentary Committee office in New Delhi. On the basis of this questionnaire, the MPs evaluated the progressive use of Hindi in the Organisation.

### Dr DN Tewari, Member, Planning Commission

Dr. D.N. Tewari, Member, Planning Commission and CSIR Society, visited CSIO in November, 2002 and unfolded new initiatives of Government of India in developing newer areas and the role that CSIO could play. Dr. Tewari's visit set the ball rolling for CSIO to launch a new initiative in developing plant and machinery for processing of Indian bamboo.

## Activities/Programmes/Meetings

### CSIR Programme on Youth for Leadership in Science (CPYLS)

The CSIR Programme on Youth for Leadership in Science for attracting young and brilliant minds in science stream was organised on 28-29<sup>th</sup> November, 2002 at the Institute. 25 students from the state of Haryana participated in this Programme. The students, their parents and teachers were addressed on this occasion by Prof. Rajesh Kochhar, Director, National Institute of Science, Technology and Development Studies (NISTADS), New Delhi. Scientific lectures by scientists from CSIO were organized to inspire and motivate the young students to develop a scientific temper and adopt a scientific approach.



Students being awarded certificates



Students visiting Laboratory

Visits to various laboratories were also arranged for the participants to get a feel of R&D work places and to see various scientific instruments that they had only read about till now. It was a hand holding exercise where the students got an opportunity to closely interact with scientists. Experiments were especially set up for these students to help them understand the basic principles of how things work.

### Maiden Flight of Light Combat Aircraft with CSIO designed Head Up Display

The maiden flight of the Light Combat Aircraft (LCA) Technology Demonstrator (TD-2) aircraft KH 2002 was carried out at 11:45 hours on June 6, 2002. The aircraft piloted by Wg. Cdr. Tarun Banerjee of the National Flight Test Centre, ADA and headed by Air Cmdr. AK Nagalia made a perfect landing after 30 minutes of flight, after successfully meeting all test parameters set for the flight. This marks the entry of second aircraft into the Flight Test Programme and is a significant milestone in LCA programme at ADA & HAL.



Maiden Flight of LCA

The flight was witnessed by Shri George Fernandes, Hon'ble Defence Minister; Shri UV Krishnamraju, Hon'ble Minister of State for Defence; Dr VK Aatre, SA to RM; Shri NR Mohanty, Chairman, HAL; Dr Kota Harinarayanan, LCA Programme Director; Air Marshal (Retd) P Rajkumar, PVSM, AVSM, VM, Director AD; Shri A K Saxena, MD (BC), HAL; Shri Yogesh Kumar, Executive Director (Design), HAL; AOC-in-C, Training Command Air Marshal T J Master, PVSM, AVSM and many other dignitaries from the Defence, R&D, Industry & Services.

The purpose of this flight test programme was to validate a number of advanced technologies incorporated in the LCA e.g. unstable configuration, quadruplex fly-by-wire digital flight control system, integrated avionics with glass cockpit, advanced composite materials & primary structure, and novel utility systems management system.

### Hindi Divas Celebration

Hindi Fortnight was celebrated in the Institute during September 2-13, 2002. Various programmes were organised for the promotion of Hindi Language and around 200 employees participated in the competitions. Hindi Divas was organised at CSIO on Sept.13, 2002 and Shri Vijay Sehgal, Editor, "Dainik Tribune" was the Chief Guest.

Hindi Report for the year was presented by Shri MR Masan, Controller of Administration, CSIO on this occasion.



Chief Guest addressing the audience

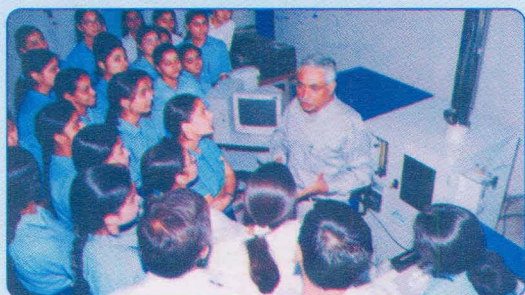
### CSIO Foundation Day Celebration

CSIO celebrated its Foundation Day by organising a guest lecture by Dr VK Saraswat, Director, IRCI, DRDL, Hyderabad on "Technology Development in New Millennium" in CSIO on October 30, 2002.

Dr Saraswat, in his address, traced his long association with Dr APJ Abdul Kalam, Hon'ble President of India, and talked of various technologies as identified in his book "Technology Vision 2002". He opined that sustained efforts for design innovation and quality improvement should be made to achieve the desired objectives. He dwelt on the importance of developing Micro-machines, MEMs, integrated MEMs and Nano-technologies.



Chief Guest addressing the audience



Students interacting with the Scientist in CSIO

Earlier Dr RP Bajpai, Director, CSIO welcomed the Chief Guest and highlighted the significance of CSIO Foundation Day. Shri SR Taneja, Scientist-G, CSIO presented the Annual Report of the Institute on this occasion.

### National Science Day

CSIO celebrated "National Science Day" on 28<sup>th</sup> February, 2003. A large number of visitors including the students from various schools, colleges, university and general public went around various laboratories of the Organisation. They interacted with the scientists and had an exposure to the technologies being developed at CSIO.



Lab. visit of students

Later in the evening, Prof. Ashok Sahni, formerly Dean of University Instruction, Panjab University, Chandigarh delivered a lecture on "Dinosaurs of India: Dead but Alive". He highlighted India's rich fossil heritage of Dinosaurs.

Dr RP Bajpai, Director in his welcome address, stressed upon the need for developing scientific instruments which can help in taking our country forward in the new fields of Nanotechnology, Biotechnology and Advanced Sensors for various applications. He gave an overview of various areas which are coming up and the imperative need for all of us to brace up our knowledge to compete in the world.



Dr RP Bajpai presenting Memento to the Chief Guest

**Prof. Ashok Sahni formally launched the CSIO website**

**[www.csio.org](http://www.csio.org)**

### World Environment Day

CSIO in association with Environment Society of Chandigarh, organised a state level awareness programme for teachers and students on June 5, 2002 which was formally inaugurated by Dr KK Garg, Additional Director, Ministry of Environment and Forests, Government of India. In this Programme, Shri SK Sharma, Chairman of the Society gave demonstration of making organic fertilizers.

### CSIR Foundation Day Celebration

CSIO organised different programmes in series to mark the CSIR Foundation Day in the Institute on 26th September, 2002. An Open Day was observed on September 26, 2002 when around 600 persons including students from different schools, engineering colleges and general public visited CSIO. This provided them a unique opportunity to see the live demonstration of the instruments developed at CSIO and a chance to interact with the scientists.

On 27<sup>th</sup> September, 2002 a lecture by Prof. UR Rao, Chairman, PRL Council, ISRO-DOS on "Space and Human Security" was also organised. Prof. Rao in his address highlighted the various dimensions of space technology, which can be beneficially exploited for ensuring a better human security. He highlighted various modern miniaturization and innovative technologies and new materials being developed which will lead us to the era of micro and nano satellites.



Address by Dr. RP Bajpai, Director



Students interacting with Scientist

### National Technology Day

The National Technology Day was celebrated in the Institute on 11<sup>th</sup> May, 2002. The Laboratories were kept open for general public and students on this occasion. A large number of visitors including the students from various schools, colleges, University & General Public went around various laboratories of the organisation. They directly interacted with the scientist & were exposed to the technologies being developed at the CSIO.



Address by the Chief Guest To the audience

Shri. RS Khandpur, formerly Director General, CEDTI, Mohali delivered a talk on "Trinity of Science, Technology & Design". Shri.S.R. Taneja, Officiating Director, while welcoming the chief Guest, highlighted the achievements made by CSIO and underlined the importance of the technological developments taking place in the country to become self reliant.

### CSIR Diamond Jubilee Exhibition

Council of Scientific and Industrial Research (CSIR), New Delhi entered its Diamond Jubilee Year on 26th Sept. 2002. It was celebrated in all CSIR Institutes and Laboratories in the country. A number of programmes were initiated on this occasion. Dr. RP Bajpai, Director, CSIO, Chandigarh inaugurated the CSIR Exhibition in the Institute, which highlighted the various important and unique achievements made by CSIR. Visits of students, teachers, scientists and general public were arranged to apprise them about the societal, scientific & technical impact made by CSIR at national and international level.



Dr. RP Bajpai inaugurating CSIR Diamond Jubilee Exhibition at CSIO



Visit of students to the exhibition



Visit of students to the Lab.

## SERVICE & MAINTENANCE OF INSTRUMENTS

The Service & Maintenance of equipments is one of the important activities of CSIO. The services are rendered to different institutes / organisations in public and private sectors by three Service & Maintenance Centres located at Chennai, New Delhi and Jaipur as well as by S&M Division of CSIO Chandigarh. Instruments worth crores of rupees are repaired by CSIO thus saving valuable resources. A brief report on the activities and performance of S&M Centres is as:

### 1 Chennai Centre

#### Consultancy Services

Consultancy services on Energy Management System (EMS) under Indo-German Energy Efficiency and Environment Project (IGEEP) covered :

- Latest Energy Management Systems
- Report on EMS prepared for M/s Seshasayee Paper and Boards Ltd., Erode
- Test set-up designed and built for the characterisation of Bosch Lambda Oxygen Sensors
- Designed and developed interoperable nodes for Energy Management Networks

#### Energy Audit

Energy Audits were conducted for sixteen industrial and other organisations during the period under report

#### Performance Evaluation of Equipment / Utilities

- Comparative power and lux level study on 40W IC lamp, 20W FL lamp and 10W CFL carried out in three railway passenger coaches of Southern Railway, Chennai
- Lighting level test conducted on LED markers to be placed in front of the engine for Southern Railways, Arakkonam, Chennai
- Studied the performance of Heat Treatment Plant & Paint Shop furnaces of M/s Tata Engineering and Locomotive Ltd. (TELCO), Pune

#### Power Quality / Harmonics Studies Conducted

- Studied the power quality and harmonic analysis in a running locomotive for Southern Railways, Chennai from Chennai to Salem
- Studied the power quality and harmonic analysis at one of the pumping stations of TWAD Board, Trichy for Enpro Hitech Distributors (P) Ltd., Chennai

#### Assignments Accomplished

- Estimation of flue gas quantity and its temperature from coke oven furnace at M/s Saurashtra Fuels Pvt. Ltd., Porbander, Gujarat. The Study was undertaken with a view to assessing the capacity of power plant to be installed by recovering the waste heat from flue gas
- Measurement of water flow in chilled and condenser water circuits of centralised air conditioning plant of Reserve Bank of India, Chennai

## Calibration of Instruments

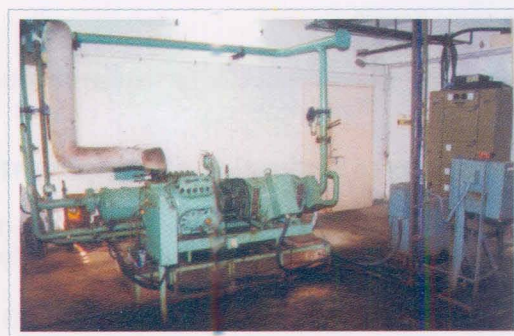
The Centre has facilities to calibrate instruments measuring electrical parameters and other physical parameters like temperature, pressure, length, mass etc. The Centre extended calibration services to 332 clients from different sectors.

## Service & Maintenance of Instruments

- Repair & maintenance of instruments referred by the instrument users in the region, like state govt. depts., public sector undertakings, educational and research institutions, public test laboratories and industries
- Annual Maintenance Contract (AMC) servicing of instruments to ensure minimum downtime through preventive maintenance
- Design & development work necessitating circuit modifications in respect of instruments where spares are either too costly or are normally not available
- Under take installation and commissioning jobs



Inaugural function of the training programme for hospital technicians/doctors at Sea Horse Hospital, Tiruchy



SERC AC plant compressor and compressor panel

## Training Programmes Organised

- Training programmes on Repair & Maintenance of Bio- Medical Instruments for hospital , technicians /doctors, sponsored by DST, New Delhi, was organised and was attended by 25 participants at each location;
 

Chennai	Nov. 18 -29, 2002
Madurai	Dec. 16-27, 2002
Tiruchy	Jan. 27-Feb.7, 2003
- A Technology based Entrepreneurship Development Programme (TEDP) on Repair & Maintenance of Analytical Instruments was organised during Aug. 19 - Oct. 16 ,2002. The Programme sponsored by DST, New Delhi was attended by 14 participants.

## 2 Delhi Centre

The Service and Maintenance Centre of CSIO at New Delhi was established to cater to the needs of instruments users especially in the capital city of India. It is located in CSIR complex at Pusa, New Delhi. The Centre is playing stellar role in revitalizing instruments worth several crores of rupees and thus making considerable savings in national resources.

Initially, the major activity of the Centre was confined to the service and maintenance of instruments. Over a period of time, its spectrum of activities has been enlarged by including various R&D programmes, HRD programmes and AMCs for instruments.

Three sponsored R&D projects viz : Development of Non-Linear Junction Detector; Development of Electronic Stethoscope; Development of a Robust Speech Recognition and a Text to Speech Synthesis System for Hindi are under progress besides other developmental activities.

### Contract Servicing

Annual Maintenance Contract service is provided to a number of institutions/organizations in the capital city for repair & maintenance of various equipments. In all, 787 equipments including those under AMC, were repaired during the period under report, generating extra resources for the Institute. The major organizations/institutions to which the services had been rendered were:

- Computer Division, CSIR, New Delhi
- Dr. Ram Manohar Lohia Hospital, New Delhi
- Deen Dayal Upadhyaya Hospital, New Delhi
- Indian Institute of Technology, New Delhi
- Guru Nanak Eye Centre, New Delhi
- Lady Hardinge Medical College & Hospital, New Delhi
- CGHS, New Delhi
- National Physical Laboratory, New Delhi
- Tuberculosis Centre Society, Noida
- SDTO, Distt. Tuberculosis Centre, Barasat, West Bengal

### Training Programmes Organised

- A 2-week training programme on Basic Concepts of Instrumentation for Delhi Jal Board Personnel, sponsored by M/s ECIL, Hyderabad, was organised during Dec.12-16, 2002. Fourteen participants took part in the training programme.
- A 6-month Computer Hardware Maintenance Course was conducted during Oct. 01, 2002 to Mar. 31, 2003. Seventeen participants attended the training course.
- Seven special training programmes on Repair & Maintenance of Bio-Medical Instruments for technicians/doctors were organised during June, 2002 to Feb., 2003 for different hospitals in Delhi and UP states. In all 175 participants benefitted from these programmes, conducted at following places:

Delhi	June 17-27, 2002
Ghaziabad	July 15-26, 2002
Rohtak	Sept. 9-19, 2002
Shimla	Sept. 27-Oct. 08, 2002
Delhi	Oct. 28-Nov. 10, 2002
Bulandshahr	Dec 17-31, 2002
Almora	Feb. 15-24, 2003

The programmes had been sponsored by IDP, Deptt. of Science and Technology, Govt. of India, New Delhi.



Training Session in Progress



### 3 Chandigarh Centre

- *Training Programme on Repair & Maintenance of Bio-Medical Instruments*, sponsored by IDP, Department of Science & Technology, New Delhi were organised for Doctors, Paramedical staff and Technicians of Medical Hospitals at different places in Punjab and Chandigarh :

Chandigarh	Nov.11-23,2002
Amritsar	Dec.9-20,2002
Patiala	Jan.20-30,2003
Jalandhar	Mar.3-14,2003

- Twenty five participants from each Medical College/Hospital participated in this programme and were given practical training on repair & maintenance of Photocolorimeter, Suction Machine, Spectrophotometer, ECG Machine, Ophthalmoscope, Microscope, Centrifuge Machine, Autoclave, Flamephotometer, X-ray Machine, pH meter, BP Apparatus and Stethoscope. All the participants were provided with tool-kits by the sponsoring agency.
- The Centre provided Annual Maintenance Contract to the Institute of Oral Health Sciences, PGI, Chandigarh for Dental chairs/Units/Systems. In all, 33 Units were repaired during the period of contract.
- Repair & Maintenance of Medical Equipments for different Organisations / Agencies in the states of Punjab, Himachla Pradesh, Haryana and J&K was carried out by the Centre. 177 equipments were repaired during this period.



Inaugural address by Dr. VK Sharma, Vice-Principal, Medical College Patiala



Use of measuring Instruments being explained to trainees, at Patiala



Sh. SR Taneja welcoming the Chief Guest of Training Programme at CSIO Chandigarh



Dr RP Bajpai presenting Tool Kit & Certificate to the Trainee, at Chandigarh



Participants showing museum of human anatomy to CSIO scientist at Medical Hospital, Patiala.

## 4 Jaipur Centre

### Training Programmes Organised

- *Training Programmes on 'Repair and Maintenance of Bio-Medical Instruments for hospital technicians / doctors, sponsored by IDP, Department of Science & Technology, New Delhi were organised in Rajasthan state :*

Jaipur	Jan.15 -25,2003
Udaipur	Feb.19-28,2003
Jodhpur	Mar. 20-29,2003

- *An Entrepreneurship Development Programme on Repair & Maintenance of Bio - Medical Equipments was organised during May 27 - June 22, 2002 in which 19 persons participated. The Programme was jointly sponsored by DST, New Delhi & DST, Rajasthan Govt.*

### Services Rendered / Other Information

- 245 Instruments repaired including those on contract service
- 7 Annual Maintenance Contracts (AMCs) executed satisfactorily
- Activities in the areas of X-ray machines and specialized refrigerated instruments expanded
- National TB Control Board has directed all TB Prevention Centres located in Rajasthan state to avail of the services of CSIO's Jaipur centre for AMC of Binocular Microscopes



Dr IB Singh Advisor DST distributing Tool Kits & Certificates to participants in Training Program at Jodhpur



Participants attending practical session in Training Program at Jodhpur



Training in Bio Medical Equipments in progress at Udaipur



Practical Session of Training in progress at Jaipur

## 5 Activities jointly Undertaken by S&M Centres of CSIO

### Repair of Scientific & Medical Instruments

In order to share its expertise in servicing of a diverse variety of scientific and medical instruments, CSIO recently undertook the assignment for the repair of scientific instruments in Myanmar. A three member expert team from Chandigarh & Chennai centres of CSIO, visited Myanmar during May-June, 2002 for about six weeks and repaired 84 instruments valued at approx. Rs.100 Lakhs in:

- Myanmar Scientific and Technological Research Department, Yangon
- Yangon Technological University, Yangon
- Department of Medical Research, Yangon
- Department of Atomic Energy, Yangon

The objective of the entire exercise was to help the S&T organisations in Myanmar in their scientific and technological pursuits and to make Myanmar self-sufficient so far as repair and maintenance of scientific and medical instruments is concerned.

During the next phase, CSIO proposes to render help in establishing country-wide facilities for repair and maintenance of scientific instruments in Myanmar, duly staffed by trained personnel and equipped with state-of-art test & measuring instruments, necessary tools, jigs and fixtures. CSIO also proposes to create a cadre of private entrepreneurs in Myanmar who would establish their own service outfits for this specific job.

### Training Programmes Organised

- 10<sup>th</sup> Management Development Programme on Operation, Maintenance & Repair of Bio-Medical Equipment for the delegates of Third World Countries was organised by S&M Centre, New Delhi; S&M Centre, Jaipur and S&M Division, Chandigarh during September 4 to October 29, 2002. Eleven delegates from Seychelles, Syria, Kenya, Uganda, Colombia, Mozambique and Mauritius participated in this programme which was sponsored by Ministry of External Affairs, Govt. of India, New Delhi. This was a total 8-week programme out of which the participants spent 4 weeks Delhi Centre, 1-week at Jaipur Centre, and for the remaining 3 weeks at CSIO, Chandigarh. The course consisted of theoretical as well as hands-on sessions. The participants were also taken to different institutions like PGI, General Hospital, Allengers Pvt. Ltd., Viridi Eye Hospital, Recorder & Medicare Systems, Panjab University and Kaiser Hospital at Panchkula.



Training in Progress

*The Ministry of External Affairs, Govt. of India has identified CSIO as a Nodal Centre for Management Development Programmes. CSIO has been organising such training programmes on Bio-Medical Equipment since March 1994.*

## HUMAN RESOURCE DEVELOPMENT

### Indo-Swiss Training Centre

Established under the patronage of Swiss Foundation for Technical Assistance and being run under the aegis of Central Scientific Instruments Organization (CSIO), Chandigarh, Indo-Swiss Training Centre (ISTC) is held in high esteem by private industry, both in India and abroad, R & D Institutes and custodians of technical education.

Formally inaugurated on 18<sup>th</sup> December, 1963 by the then Prime Minister, Pt. Jawahar Lal Nehru, the Institute is dedicated to serve the industrial sector by producing highly skilled and competent manpower.

### Objectives

- To infuse knowledge and impart industry-oriented practical training to make the trainees a breed apart
- To inculcate the sense of discipline and responsibility coupled with logical thinking so that they are an acquisition to their employers
- To instil a high level of self confidence to make them successful in all walks of life including entrepreneurship
- To emphasize their all round development by ensuring participation in cultural activities, sports, adventure activities, NCC camps, trekking and blood donation
- To imbibe qualities that make them better citizens
- To create professional competence

### Training Courses

- 3-Year Diploma in Instrument Technology
- 4-Year Advanced Diploma in Mechatronics & Industrial Automation
- 4-Year Advanced Diploma in Die & Mould Making

### 37<sup>th</sup> Convocation

Indo-Swiss Training Centre had its 37<sup>th</sup> convocation on 2<sup>nd</sup> August, 2002 when 73 students were awarded diplomas in the disciplines of Instrument Technology, Mechatronics & Industrial Automation and Die & Mould Making. Ms. Neeru Nanda, IAS, Advisor to the Administrator, UT Chandigarh, was the Chief Guest on this occasion. In her convocation address, she exhorted the students to achieve perfection in whatever they do and feel proud of what they do. Earlier Sh. H.S. Gupta, Principal, ISTC presented the Annual Report of the ISTC. Sh. S.R. Taneja, Acting Director, CSIO highlighted the activities of ISTC and welcomed the Chief Guest. He awarded diplomas to the passing out students whereas, Ms. Neeru Nanda gave away prizes and medals to the following students who had excelled in various fields :

- **Diploma in Instrument Technology**  
Director's Gold Medal - Abhijit Dass  
Principal's Silver Medal - Devender Kumar
- **Advanced Diploma in Mechatronics and Industrial Automation**  
Director's Gold Medal - Randeep Chaudhary  
Principal's Silver Medal - Yugesh K. Singh
- **Advanced Diploma in Die and Mould Making**  
Director's Gold Medal - Satinder Singh  
Principal's Silver Medal - Inderjeet Singh



Sh SR Taneja, Acting Director, presenting Memento to the Chief Guest, Ms Neeru Nanda, Advisor to Administrator, UT, Chandigarh

## Other Activities

### Personality Development Programme

Arranged seminars on 'Personality Development' and 'Communication Skills' for trainees.

### Blood Donation Camp

Being a regular activity of ISTC, two camps were organised and around 250 students and staff members donated blood.

### NCC and Co-Curricular Activities

Students participated in NCC camps and other activities

### Games

ISTC cricket team declared Runner-up during the 7<sup>th</sup> Kinetic Honda League-cum-Knockout Tournament

### Placement

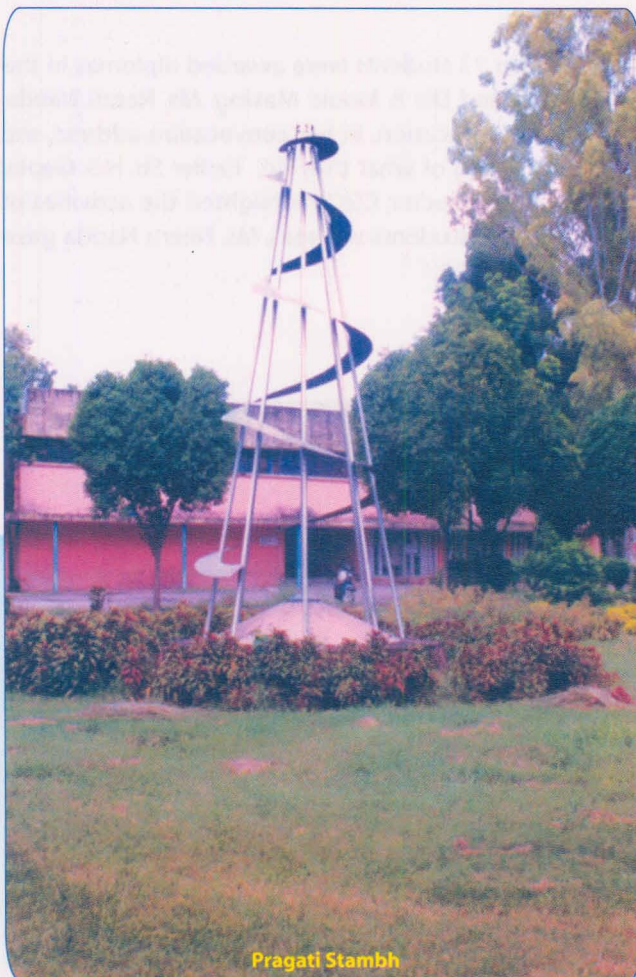
100% placement of all the trainees in reputed companies

### R & D Programmes

ISTC scientists initiated to get involved in various R&D programmes, beside the teaching work  
Associated actively in various R&D projects for the fabrication and assembly of mechanical components

### Technical Assistance

Provided technical assistance to the industry by offering services for the fabrication of press tools & moulds and other tool room work

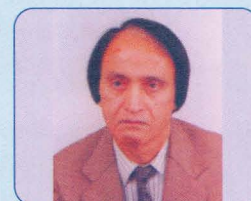


## CSIO Scientists Honoured

### Dr MA Shamshi, Scientist 'G'

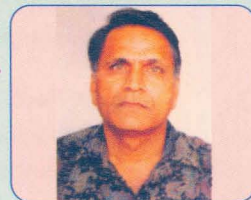
Awarded prestigious "13<sup>th</sup> IETE - Hari Ramji Toshniwal Gold Medal" for the year 2001 for his outstanding contribution in the area of research, design and development of advanced instrumentation. The award consists of a Gold Medal and a Citation.

Dr Shamshi has designed and produced Intelligent Instruments and Digital Data Telemetry Networks for 'Natural Disaster Mitigation'. A number of technologies have been developed under his leadership and know-hows transferred to industries for commercialization.. Currently, he is working on development of highly advanced instruments for Rescue Operations and Seismic Alert Systems.



### Dr MSN Srinivas, Scientist 'EII' and Mr VML Narasimham, Emeritus Scientist

The Gian Chand Memorial Foundation conferred "Scientist of the Year Award" jointly upon Dr MSN Srinivas and Mr VML Narasimham of CSIO, during the 13<sup>th</sup> Gian Chand Jain Memorial Lecture held at Ambala on 22<sup>nd</sup> October, 2002. The award was given to the scientists for their contribution in developing "Head Up Display for Light Combat Aircraft (LCA)". It was presented by Dr R Chidambaram, Principal Scientific Advisor to the Government of India.



### Mr PS Malhotra, Scientist 'G'

Bharat Jyoti Award for "Enriching Human Life and Outstanding Attainments" and a Certificate of Excellence for Meritorious Services was conferred on Mr PS Malhotra, Scientist G, Medical Linac Division, CSIO on 26<sup>th</sup> October 2002.



### Mr RN Sengupta, Scientist 'F'

Dr Myung Se Kims Award of "Excellence in Hyperthermic Oncology" for the year 2002 was conferred on Mr RN Sengupta for his singular contribution in the development of RF Hyperthermia and presentation of a research paper "Design of an Asymmetrical Intracavitary Capacitive Applicator based RF Hyperthermia & Thermal Mapping". The award was presented during the conference on Hyperthermic Oncology and Medicine, organized by Indian Association of Hyperthermic Oncology at Mumbai, during April 5- 6, 2003.



## TALKS / LECTURES DELIVERED

- 1) **Shri RC Arora, Scientist 'F'**  
*'Science as Career'*, CPYLS Programme, organised by CSIO, Chandigarh; April 4-5, 2002
- 2) **Dr RP Bajpai, Director**  
*'Current Trends & Future Scenario of Microelectronics in India'*, National Seminar on Microelectronics - Current R&D Industrial Scenario, held at Panjab University, Chandigarh; April 12, 2002
- 3) **Shri Basudeo Prasad, Scientist 'F'**  
*'Vehicular Pollution & Control'*, World Environment Day, organised by Environmental Society of India, Chandigarh; June 4, 2002
- 4) **Dr HK Sardana, Scientist 'EII'**  
*'Image Recognition using Back Propagation'*, Short-term Course on Neural Networks for Technical Teachers at TTTI, Chandigarh; July 5, 2002
- 5) **Dr AK Aggarwal, Scientist 'G'**  
*'Fundamentals of Lasers and its Applications'*, Kishore Vaigyanik Protsahan Yojna, coordinated by Panjab University, Chandigarh; July 8, 2002
- 6) **Shri C Sethuraman, Scientist 'B'**  
*'Energy Audit - Case Study Presentation'*, Small Industries Service Institute, Govt. of India, Chennai; August 30, 2002
- 7) **Shri AK Paul, Scientist 'EII'**  
*'Dry Etch Requirements for MEMS Applications'*, IETE 45<sup>th</sup> Annual Technical Convention (Pre-convention Tutorials), held at CSIO, Chandigarh; September 29, 2002
- 8) **Shri AK Dimri, Scientist 'F'**  
*'ICP-OES: Introduction and Applications for Ultra Trace Elemental Analysis'*, CEES (DRDO), New Delhi; October 14, 2002
- 9) **Shri NS Aulakh, Scientist 'B'**  
*'Medical Applications of Optical Fiber'*, DST-CSIO Training Programme on Repair & Maintenance of Bio-Medical Instruments for Hospital Technicians / Doctors, at CSIO; November 13, 2002
- 10) **Shri Amod Kumar, Scientist 'EII'**  
*'Action Potentials and Bio-signals'*, DST-CSIO Training Programme on Repair & Maintenance of Bio-medical Instruments for Hospital Technicians / Doctors, held at CSIO, Chandigarh; November 18, 2002
- 11) **Dr HK Sardana, Scientist 'EII'**  
*'DFT/FFT'*, Short-term Course on Digital Signal Processing & System Design at TTTI, Chandigarh; November 19, 2002
- 12) **Shri Basudeo Prasad, Scientist 'F'**  
*'Rajbhasha & its Use in Science & Technology'*, Seminar on Rajbhasha and its Application in Science & Technology, held at TBRL, Chandigarh; November 27, 2002
- 13) **Dr RP Bajpai, Director**  
*'Bio & Nano Devices Instrumentation and Future Trends'*, National Symposium on Instrumentation, held at Bharathiar University, Coimbatore; November 28, 2002

- 14) **Dr MSN Srinivas, Scientist 'EII'**  
*'Development of Head Up Display for Light Combat Aircraft', National Symposium on Instrumentation, held at Bharathiar University, Coimbatore; November 27-29, 2002*
- 15) **Shri RC Arora, Scientist 'F'**  
*'Insight through Science', CPYLS Programme, organised by CSIO, Chandigarh; November 29, 2002*
- 16) **Dr HK Sardana, Scientist 'EII'**  
*'Digital Filtering and Correlation', Short-term Course on Digital Signal Processing & System Design at TTTI, Chandigarh; November 29, 2002*
- 17) **Shri D Krishna Moorthy, Technical Officer 'B' and Shri GS Ayyappan, Technical Officer 'A'**  
*'Energy Management Instrumentation', Karunya Institute of Technology, Coimbatore; November 29, 2002*
- 18) **Shri NS Aulakh, Scientist 'B'**  
*'Computer Viruses', CPYLS Programme held at CSIO; November 29, 2002*
- 19) **Shri JK Chhabra, Scientist 'EII'**  
*'Medical Applications of Fiber Optics', AICTE sponsored Winter School on Optical Fiber Technology and Applications, organised at Guru Nanak Dev Engineering College, Ludhiana; December 18, 2002*
- 20) **Shri NS Mehla, Scientist 'F'**  
*'Optical Fiber Sensors Technology: Status, R&D Scenario and Applications', AICTE sponsored Winter School on Optical Fiber Technology and Applications, organised at Guru Nanak Dev Engineering College, Ludhiana; December 20, 2002*
- 21) **Shri SC Jain, Scientist 'EII'**  
*'Fiber Optics Technology, Components and Measurements', AICTE sponsored Winter School on Optical Fiber Technology and Applications, organised at Guru Nanak Dev Engineering College, Ludhiana; December 20, 2002*
- 22) **Dr RP Bajpai, Director**  
*'Networking of Knowledge between Industry and Academy', Higher Education Summit organized by CII, Chandigarh; December 20, 2002*
- 23) **Shri Amod Kumar, Scientist 'EII'**  
*'EEG Signal Processing for Anaesthesia Monitoring', AICTE and ISTE sponsored Course on 'Telemedicine: Information Technology in Biomedical Engineering', held at Sant Longowal Institute of Engg. and Technology, Longowal; January 1, 2003*
- 24) **Dr HK Sardana, Scientist 'EII'**  
*'Image Processing Applications', Institute-Industry Interaction, at Institute of Engineering and Technology, Bhattal, Punjab; January 6, 2003*
- 25) **Dr AK Aggarwal, Scientist 'G'**  
*'Coherent Optics R&D Opportunities at CSIO', 28<sup>th</sup> OSI Conference on Optics and Photonics in Engineering (COPE 03), held at NSIT, Dwarka, New Delhi; January 6-8, 2003*
- 26) **Shri HS Gupta, Scientist 'F'**  
*'Industry-Institute Interaction, a Win - Win Situation', Sant Longowal Institute of Engg. and Technology, Longowal; February 6, 2003*



## CONFERENCES/WORKSHOPS/SEMINARS ATTENDED

1. **Sushil Kumar**  
Conference on Strategy and Methodology for Conservation of Heritage Buildings and Monuments, held at CBRI, Roorkee; April 4-5, 2002
2. **RC Arora**  
Workshop on Continuing Education Programme in the field of Technical Education, Industry, Manpower and Development held at TTTI, Chandigarh; April 4-5, 2002
3. **RC Arora**  
Workshop on Curriculum Development for Engineering Education, held at REC, Kurukshetra; April 6, 2002
5. **RC Arora**  
IETE Mid-Term Symposium on Information Technology, held at New Delhi; April 7, 2002
6. **RC Arora, PC Sagotra and SC Juneja**  
Workshop on Purchase & Vigilance, held at NBRI, Lucknow; April 15-16, 2002
7. **JK Chhabra, NK Sharma, SK Chauhan, M Ganesan, JTS Arun Kumar and NS Aulakh**  
ELITEX 2002, held at India Habitat Centre, New Delhi; April 29-30, 2002
8. **AK Ganju and Lal Singh**  
5<sup>th</sup> National Seminar on Edible Rice Bran Oil, held at Chandigarh; June 30, 2002
9. **VK Khanna**  
Testing Techniques for Motor & Pumps, held at ERDA, Vadodara; July 11-12, 2002
10. **Gurdial**  
Evaluation of Measurement Uncertainty in Dimensional Metrology based on ISO-GUN Guidelines/NABL, held at Mecro Inspection and Testing Centre, Chennai; July 18, 2002
11. **K Srinivas and D Krishnamoorthy**  
Training Course on Digital Signal Processors and Applications, held at IIT, Chennai; July 31 - August 7, 2002
12. **M Ganesan**  
EMIST 2002 Workshop on EMC Design, held at IETE Delhi Centre, New Delhi; August 9-10, 2002
13. **VK Sharma, RC Arora, Dinesh Kumar and Neelesh Kumar**  
Workshop on Hearing Aid, held at All India Institute of Speech and Hearing, Mysore; August 26-30, 2002
14. **VK Khanna, Jiwan Singh and Mange Ram**  
Certified Internal Auditor Course for ISO-9001: 2000, held at ETDC, Mohali; September 17-19, 2002
15. **C Ghanshyam, Sunita Mishra, ML Singla, Baldev Raj, VR Harchekar and Nathai Ram**  
National Conference on Sensor Technology -2002, held at Centre for Environment and Explosive Safety, DRDO, Delhi; September 26-27, 2002
16. **AK Dimri, RC Arora, AK Paul, Rajesh Singh, VP Giridhar, Satinder Singh, Nathai Ram, SK Angra, C Ghanshyam, LM Bharadwaj, Sunita Mishra, MA Shamshi, BK Sharma, SK Mittal and Sandeep Kalra**  
Annual Technical Convention on Nano-technology, held at Central Scientific Instruments Organisation, Chandigarh, organised by IETE, Chandigarh Centre; September 30 - October 1, 2002
17. **JTS Arun Kumar**  
Seminar on Speaker Characterisation and Identification, held at DRDO, New Delhi; October 9, 2002

18. **K Srinivas, C Sethuraman and D Bansal**  
Seminar on Energy Efficiency in Sugar Industries, held at Tamil Nadu Energy Development Agency, Chennai; October 10, 2002
19. **Sangeeta Garg and Neeru**  
National Conference on Bio-active Molecules, held at RRL, Thiruvananthapuram; October 24-25, 2002
20. **LM Bharadwaj, AK Dimri, C Ghanshyam, Sunita Mishra and AK Paul**  
Program for Commercial Development of Ceramic Glass Sensors, held at NPL, New Delhi; October 29-30, 2002
21. **D Krishnamoorthy**  
Workshop on Embedded Systems and Networking, held at Chennai; November 16, 2002
22. **AK Ganju , SS Randhawa and VP Giridhar**  
New Technologies for Oilseeds, Pulses & Maize and Demonstration of Instruments Developed under TMOP&M Programme, held at SCOPE Auditorium, New Delhi; November 22, 2002
23. **Sandeep Kalra**  
Rashtra Bhasha Technique Avum Vigyanic Rashtriya Sangoshthi, held at TBRL, Chandigarh; November 26, 2002
24. **Mahipal and Basudeo Prasad**  
National Seminar on Implementation of Rajbhasha & its Application in Science & Technology, held at TBRL, Chandigarh; November 27-28, 2002
25. **M Ganesan**  
National Symposium on Instrumentation, held at Bharathiar University, Coimbatore; November 27-29, 2002
26. **RK Mohan Rao, C Sethuraman and D Bansal**  
Energy Summit 2002, held at Chennai, organised by Confederation of Indian Industries, Chennai; December 2-5, 2002
27. **SK Angra**  
National Workshop on Microwave Application, held at Microwave Application Society of India, New Delhi; December 3, 2002
28. **ML Singla**  
Asian Conference-2002 & Italian Exhibition on Lipid Fats & Oils, organised by Oil Technologists Association of India at Hotel Le Meridian, New Delhi; December 6-8, 2002
29. **JTS Arun Kumar**  
VIROHA - National Conference on Communication Technologies in Medical Science, held at Vellore Institute of Technology, Tamil Nadu; December 12-14, 2002
30. **NK Sharma**  
Seminar on Wireless Communication, held in Department of Information Technology, New Delhi; December 15-16, 2002
31. **NS Mehla and SC Jain**  
Photonics 2002 : 6<sup>th</sup> International Conference on Opto-Electronics, Fiber Optics and Photonics, held at Tata Institute of Fundamental Research and IIT, Bombay; December 16-18, 2002
32. **Manish Kumar and Waryam Singh**  
Workshop on Tax Deduction at Source, held at National Institute of Financial Management, Faridabad; December 20-21, 2002

33. **HK Sardana and KD Chattopadhyay**  
Recent Trends of Research on Advanced Manufacturing and Robotics, held at CMERI, Durgapur; December 23, 2002
34. **K Srinivas, C Sethuraman and D Bansal**  
PCRA Empanelled Energy Auditor's Meet, held at Chennai; December 23, 2002
35. **MSN Srinivas, Vinod Karar, Vipin Kumar, SS Saini and MD Patil**  
National Seminar on Technological Developments in Aeronautics and its Impact on Maintenance, held at Chandigarh; January 3-4, 2003
36. **NK Sharma, HK Pir and SK Chauhan**  
Seminar on e-Learning, held at IETE Delhi Centre, New Delhi; January 4, 2003
37. **AK Ganju and SS Randhawa**  
4<sup>th</sup> National Seminar for Popularisation of Oil Meal Usage in Compound Cattle, Poultry and Aqua Feeds, held at Chandigarh; January 16, 2003
38. **ML Singla**  
Workshop on Intellectual Property Management & Leveraging of IPR for Organisational Strategy, held at Le Meridien Hotel, New Delhi; January 18-19, 2003
39. **K Srinivas, Meenalochani Chander and D Krishnamoorthy**  
Seminar on Test Automation and Planning, held at Chennai; January 22, 2003
40. **AK Ganju and SS Randhawa**  
5<sup>th</sup> National Convention on Health, Nutrition and Value Addition of Indian Mustard, held at India Habitat Centre, New Delhi; February 5, 2003
41. **NK Sharma, HK Pir and SK Chauhan**  
Seminar on IT in Indian Languages, held at IETE Delhi Centre, New Delhi; February 7, 2003
42. **ML Singla**  
Workshop on Intellectual Property Assets in Business Development, held at NML, Jamshedpur; February 10-11, 2003
43. **AK Dimri, AK Paul, Rajesh Singh, SK Angra, C Ghanshyam, Sunita Mishra, Satinder Singh and Nathai Ram**  
Chandigarh Symposium on Microelectronics (CSME), held at Panjab University, Chandigarh, organised by Indian Microelectronics Society; February 14-15, 2003
44. **AK Dimri, AK Paul, Rajesh Singh, Nathai Ram, SK Angra, C Ghanshyam, LM Bharadwaj, Amol Bhonekar and Sunita Mishra**  
Workshop on Applications of Nano & Nuclear Sciences in Electronics-Electrical-Medical and Environment, held at Central Scientific Instruments Organisation, Chandigarh, jointly organized by CSIO, Chandigarh; AvH Foundation, Germany and Panjab University, Chandigarh; February 16-18, 2003
45. **HS Gupta and KK Thariyan**  
Plastic-India Exhibition, held at Delhi; February 17-18, 2003
46. **NK Sharma, HK Pir and SK Chauhan**  
Seminar on Trends in Broadcasting, held at IETE Delhi Centre, New Delhi; February 25-26, 2003

## PAPERS PUBLISHED

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**Journal of Scientific and Industrial Research**, April 2002, **61**, 280-285

*C Ghanshyam, Sunita Mishra, Nathai Ram, Satinder Singh, RP Bajpai and RK Bedi\**

Design of a patterned substrate for gas sensor applications

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*AK Paul, AK Dimri and RP Bajpai*

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*A Srivastava, A Kumar, M Singh, ML Singla, YM Scindia, AGC Nair and AVR Reddy*

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*Nahar Singh, Subhash C Jain and AK Aggarwal*

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**Journal of Instrument Society of India**, June 15, 2002, **32(2)**, 148-156

*Sunita Mishra, C Ghanshyam, Nathai Ram, Satinder Singh, RP Bajpai and RK Bedi\**

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\*(Department of Physics, Material science, GND University, Amritsar)

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*Basudeo Prasad*

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*KK Thariyan, Sanjeev Verma, SR Taneja, RC Gupta and SS Ahluwalia*

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*HK Sardana, Gaurav Julka and JK Chhabra*

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*HK Sardana and PP Arya*

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**Indian Journal of Training and Development**, October-December, 2002, **XXXII: 4**, 77-88

*Jagdish Kumar, Sandeep Kalra and Anil K Chopra*

Implementation of hopfield neural network model in the area of associative memory

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*Nahar Singh, GC Poddar, Subhash Chander Jain, JK Chhabra, AK Aggarwal and RP Bajpai*

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*Nahar Singh, Subhash C Jain, Sanjeev Kumar, Vijay Mohal, V Pandey and AK Aggarwal*

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*AK Paul, AK Dimri and RP Bajpai*

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*Vijayender Bhalla, RP Bajpai and Lalit M Bharadwaj*

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*GS Khan, SV RamaGopal, KD Chattopadhyay, PK Jain and VML Narasimham*

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*Madhuri Thakur, SK Angra and Chandra Shakher*

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**Optical Engineers, Jan, 2003, 42(1), 86 - 91**

*Lalit M Bharadwaj, AP Bhondekar, AK Shukla, Vijayender Bhalla and RP Bajpai*

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**Biomedical Applications of Micro- and Nanoengineering, SPIE, 4937, 319-325**

*Lalit M Bharadwaj, Inderpreet Kaur, Rakesh Kumar and RP Bajpai*

Design simulation of DNA based electronic components

**Biomedical Applications of Micro- and Nanoengineering, SPIE, 4937, 226-230**

## PATENTS FILED

Title and Inventor(s)	Date of Filing	Country
<b>An Energy Efficient Data Acquisition System and a Computer Controlled On-Line Energy Monitoring System</b> RK Mohan Rao, C Selvam, M Chander, G S Ayyappan	19 .12. 2002	PCT
<b>A Ceramic Mixture having Negative Temperature Coefficient, a Thermistor Containing the Ceramic Mixture and the Process for Preparing thereof</b> ML Singla, Baldev Raj, VR Harchekar, RP Bajpai	25.02.2003	PCT
<b>Improved Semi-Automatic Pick &amp; Place Machine for Assembly Components</b> VML Narasimham, R Bhatnagar, BD Sharma, AK Mediratta, Shravana Kumar RR	20.03.2003	ZA
<b>Improved Semi-Automatic Pick &amp; Place Machine for Assembly Components</b> VML Narasimham, R Bhatnagar, BD Sharma, AK Mediratta, Shravana Kumar RR	21.03.2003	Australia
<b>Improved Semi-Automatic Pick &amp; Place Machine for Assembly Components</b> VML Narasimham, R Bhatnagar, BD Sharma, AK Mediratta, Shravana Kumar RR	22-03-2003	Malaysia
<b>Improved Semi-Automatic Pick &amp; Place Machine for Assembly Components</b> VML Narasimham, R Bhatnagar, BD Sharma, AK Mediratta, Shravana Kumar RR	25-03-2003	CN
<b>A New Multifiber 2D-Array Device for Sensing &amp; Localizing Environment Perturbations using Speckle Image Processing</b> HK Sardana, JK Chhabra, S Bandyopadhyay, PK Goel	31.03.2003	India
<b>DNA based Steganography</b> Lalit M Bharadwaj	31.03.2003	US
<b>An Opto-Electronic Device Generation of Ultrasonic Probe</b> SS Ahluwalia	31.03.2003	US
<b>A System and Method for Monitoring Properties of a Medium by Fiber Optics</b> Nahar Singh, SC Jain, AK Aggarwal, RP Bajpai	31.03.2003	US
<b>A Ceramic Mixture having Negative Temperature Coefficient, a Thermistor Containing the Ceramic Mixture and a Process for Preparing thereof</b> ML Singla, Baldev Raj, VR Harchekar, RP Bajpai	31.03.2003	US
<b>Microbial Decontaminator *</b> GN Qazi, SC Puri, A Braroo, V Verma, SRV Hasan, Rajesh Anand, AP Bhondekar, A Kumar, Lalit M Bharadwaj, RP Bajpai	31.03.2003	US
<b>Microbial Decontaminator *</b> GN Qazi, SC Puri, A Braroo, V Verma, SRV Hasan, Rajesh Anand, AP Bhondekar, A Kumar, Lalit M Bharadwaj, RP Bajpai	31.03.2003	PCT
<b>A Device Useful for Signal Transfer from Static to Rotating Surface</b> SS Ahluwalia, S Verma, SR Taneja	31.03.2003	US
<b>A Device Useful for Signal Transfer from Static Surface to Rotating Surface and Viceversa</b> SS Ahluwalia, S Verma, SR Taneja	31.03.2003	PCT

*\* Filed in association with RRL, Jammu*

## PAPERS PRESENTED IN SEMINARS/CONFERENCES

### **National Seminar on Agri Instruments held at CSIO, Chandigarh; April 23-24, 2002**

"Urbarak avam Pradushan"

Mahipal

"Jal Pradushan avm Prabandan"

RC Arora and VK Sharma

### **9<sup>th</sup> International Meeting on Chemical Sensors held at Boston, USA; July 7-10, 2002**

"UV Radiation Enhanced Detection Mechanism of SnO<sub>2</sub> Gas Sensor"

Sunita Mishra, C Ghanshyam, Nathai Ram, RP Bajpai and RK Bedi

### **National Conference on Sensor Technology held at CEES, Metacafe House, New Delhi;**

**September 26-27, 2002**

"Identification of Volatile Organic Compound from a Multi-Sensor Array by Pattern Recognition Techniques"

Sunita Mishra, C Ghanshyam, Nathai Ram and RP Bajpai

"Development of InGaAs/InP Detector a Replacement of Ge Detector"

Nathai Ram, C Ghanshyam, Sunita Mishra, AK Sharma, Satinder Singh and RP Bajpai

"Fire Safety Sensors for Strategic Applications"

ML Singla, VR Harchekkar, Baldev Raj, SK Angra, KD Chattopadhyaya and RP Bajpai

### **45<sup>th</sup> Annual Technical Convention on Nano-Technology, held at CSIO, Chandigarh;**

**September 30 - October 1, 2002**

"Technical Aspects of the Development of MEMS based Fiber Optic Pressure and Temperature Sensors"

NS Aulakh and JK Chhabra

"Military Application of MEMS and Nanotechnology"

NS Aulakh, Inderdeep Kaur and RS Prasad

"MEMS based Single Mode Fiber Alignment System for Minimum Attenuation in Signal Coupling"

NS Aulakh and JK Chhabra

"EMP Threat and Mitigation Concerns for MEMS and Nanotechnology"

NS Aulakh, Inderdeep Kaur and V Rihani

"Spin Coated SnO<sub>2</sub> Gas Sensor for the Detection of Alcohol Applications"

C Ghanshyam, Poonam Gujral, Sunita Mishra, Nathai Ram, Satinder Singh, RP Bajpai and RK Bedi

"Growth of Non-linear Optical Crystal using Molecular Beam Epitaxy system"

Nathai Ram, C Ghanshyam, Sunita Mishra, AK Sharma, Satinder Singh and RP Bajpai

"Sensing Characteristics of Nanocrystalline SnO<sub>2</sub> Thin Films"

Kamalpreet Kaur, Sunita Mishra, C Ghanshyam, Nathai Ram, Satinder Singh and RP Bajpai

"Discrimination of Various Organic Compounds using Fuzzy Art Map based Sensor Array"

Madhu Jain, Arshdeep Kaur, Sunita Mishra, C Ghanshyam, Nathai Ram and RP Bajpai

"Concept of Full Wave Bridge Rectifier using Molecular Electronic Diodes"

Sandeep Kalra, SK Mittal and MA Shamshi



"DNA based Encryption and Arithmetic"

AK Shukla

"Piezoresistive Micro Cantilever for DNA Detection"

Rakesh Kumar

"Theoretical Aspects of Charge Transmission through DNA"

Inderpreet Kaur

"DNA based Nanostructures"

Amol Bhondekar

"Effect of Feed gas Composition on Reactive Ion Etching of Silicon in  $CF_4/O_2$  gas Plasma"

Mukesh Kumar, Narendra Chauhan and AK Paul

**National Conference (Hindi) on Bio-active molecules held at RRL, Thiruvananthapuram; October 24-25, 2002**

"Bio-active Molecules in Medicines from Cold to Cancer"

Sangeeta Garg

**Indian-Toronto center for promotion of advance research held at Indian Institute of Science, Bangalore jointly organized by DST, University of Hyderabad & University of Toronto (Italy); November 25-27, 2002**

"Synthesis of Nano Structured Materials"

ML Singla

**Rajbhasha Scientific & Technical National Seminar held at TBRL, Chandigarh; November 26-27, 2002**

"Suksham Electronic Yantric Pranali tatha Nano-Prodyogiki ki Aayudh Yuktian"

Rajneesh Talwar, GC Poddar, Sandeep Kalra and NS Aulakh

"Anusandhan avam Vikas mein Software ka Mahatav"

Mahipal

"Use of Hindi in Science & Technology"

Basudeo Prasad

**National Symposium on Instrumentation held at Coimbatore; November 27-29, 2002**

"Microcontroller based Fermenter Controller"

D Krishnamoorthy, Meenalochni chander, K Srinivas and RK Mohan Rao

"Industrial Energy Management Systems"

RK Mohan Rao, C Sevlam, Meenalochni Chander, D Krishnamoorthy, GS Ayyappan and K Srinivas

**Recent Advances in Inorganic Materials-(RAIM-02) held at IIT Bombay, Mumbai; December 11-13, 2002**

"Effect of Calcination Temperature on Sensitivity of Nanocrystalline Tin Oxide Thin Film"

Sunita Mishra, C Ghanshyam, Nathai Ram, Satinder Singh, RP Bajpai, KK Bhasin and RK Bedi

**National Seminar on Technological Development in Aeronautics & its Impact on Maintenance, held at CSIO, Chandigarh; January 3-4, 2003**

"Development and Investigations of a Fiber Optic Sensor for Smart Structures and Skins for Aerospace Applications"

Nahar Singh, SC Jain, AK Aggarwal and RP Bajpai

"Attenuation Mitigation in Fly-by-Light System for Aircraft"

NS Aulakh and JK Chhabra

"Fiber optic Fire Alarm System for Aircraft"

NS Aulakh and JK Chhabra

"Challenges in Design and Development of Head Up Display"

Vinod Karar, MSN Srinivas, Vipin kumar and SS Saini

"Thermal Design and Derting factors in Display Systems"

Vipin Kumar, Vinod Karar, SS Saini and MSN Srinivas

**28<sup>th</sup> OSI Conference on Optics and Photonics in Engineering (COPE-03), held at NSIT, Dwarka, New Delhi; January 6-8, 2003**

"Development and Investigations of Extrinsic Fabry-Perot Interferometric (EFPI) Sensor and Embedding & Bonding Technique for Health Monitoring of Structures"

Nahar Singh, SC Jain, AK Aggarwal and RP Bajpai

"Effects of Tool Feed Rate in Single Point Diamond Turning of Aluminium 6061 Alloy "

GS Khan, SV Ramagopal, KD Chattopadhyay, PK Jain and VML Narasimham

"Aspheric Optics Testing : A Review"

GS Khan, SV Ramagopal, GS Singh, PK Jain and VML Narasimham

"Job RPM Vs Surface Quality in Single Point Diamond Turning of Aluminium 6061 Alloy for Optical Surface Generation"

GS Khan, SV Ramagopal, KD Chattopadhyay, PK Jain and VML Narasimham

"Optimum Machining Parameters vs. Optical Surface Quality for various Materials during Single Point Diamond Turning"

RS Pangtey, Ranabir Mandal, GS Khan, SV Ramagopal, PK Jain and VML Narasimham

"Simulation of Double Pass Interferometric Testing of Off-Axis Paraboloid Mirror"

Ranabir Mandal, SV Ramagopal and PK Jain

**National seminar on Tenth Plan Perspective of Electronics, Communication & Information Technology Impact in Indian Mining Sector held at NEERI, Nagpur; January 11-12, 2003**

"Fiber Bragg Grating and Extrinsic Fabry-Perot Interferometric (EFPI) Sensors for Geo-technical Strain Measurements"

Nahar Singh, SC Jain, AK Aggarwal and RP Bajpai

"Fiber Optic Coalmine Communication"

JK Chhabra, NS Aulakh, Amit Dhall, AK Aggarwal and RP Bajpai

**Chandigarh Symposium on Microelectronics (CSME-2003) held at Panjab University, Chandigarh; February 14-15, 2003**

"Indigenous Development of Molecular Beam Epitaxy System and Fabrication of Laser Diode based on AlGaAs / GaAs Heterojunction"

Nathai Ram, C Ghanshyam, Sunita Mishra, AK Sharma, Satinder Singh, Arvind Kumar, Namita Tiwari and RP Bajpai

"Fabrication of IMPATT Diode based on GaAs using Molecular Beam Epitaxy System"

Namita Tiwari, Nathai Ram, C Ghansyam, Sunita Mishra, AK Sharma, Satinder Singh and RP Bajpai

"Role of Kinetics in Metal Oxide Gas Sensor"

Deepti Komalan, Sunita Mishra, C Ghanshyam, Nathai Ram and RP Bajpai

"Development of Low Cost and Portable SnO<sub>2</sub> based Ethanol Sensors"

C Ghanshyam, SK Gupta, Sunita Mishra, Sanjeev Kumar, Nathai Ram, Satinder Singh, RP Bajpai and RK Bedi

"Basic Issues & Challenges of Semiconductor Gas Sensors"

C Ghanshyam, RP Bajpai and RK Bedi

**CSIR Diamond Jubilee Year workshop on Applications of Nano and Nuclear Sciences in Electronics, Electrical, Medical and Environmental, Jointly organized by AVH Foundation, Germany; Punjab University and CSIO held at CSIO, Chandigarh; February 16 - 18, 2003**

"Synthesis of Nano Particles of Metals and Semiconductors by Reverse Micelles"

ML Singla, Mewa Singh and Baldev Raj

**Sixteenth Annual National Symposium, held at Department of Chemistry, Panjab University, Chandigarh; February 22-23, 2003**

"Surface Chemistry at Metal Oxide Gas Sensor"

Deepti Komalan, Sunita Mishra, C Ghanshyam, Nathai Ram and RP Bajpai

**National Seminar on Energy Conservation in Industry and buildings held at Sri Vidyaniketan College of Engineering, Tirupati; February 28 - March 1, 2003**

"Substation Health Monitoring System"

GS Ayyappan, C Sevlam, Meenalochini Chander, D Krishnamoorthy, K Srinivas and RKM Rao

**2003 International Conference on Characterization and metrology for VLSI Technology held at JJ Pickle Research Centre, University of Taksas, Austin; March 24-28, 2003**

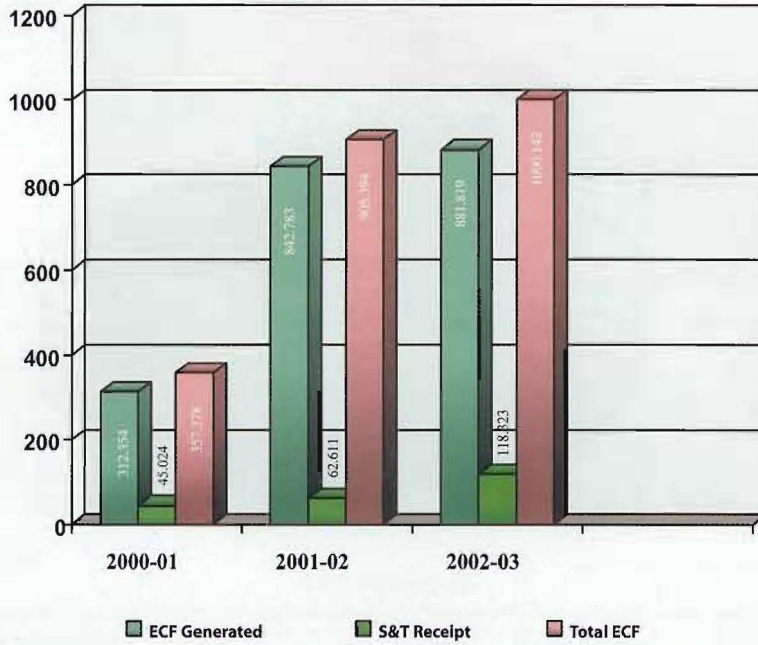
"ECR based Plasma Assisted Ion Chemical Etching"

RK Bhardwaj, LM Bhardwaj, SK Angra and RP Bajpai

# FINANCE & MANPOWER

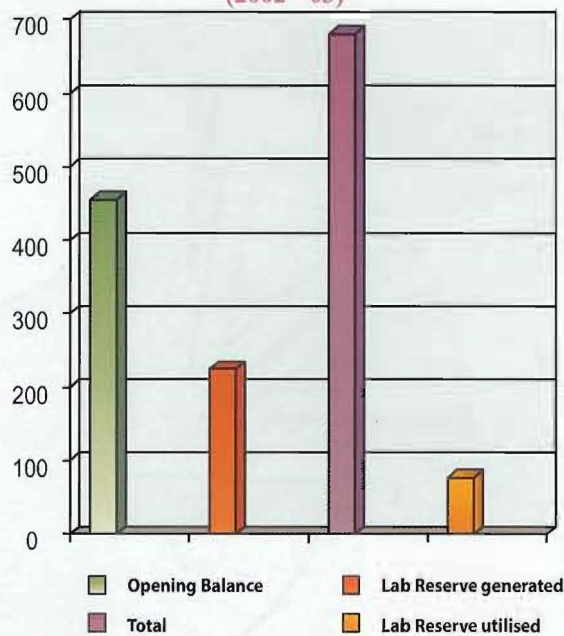
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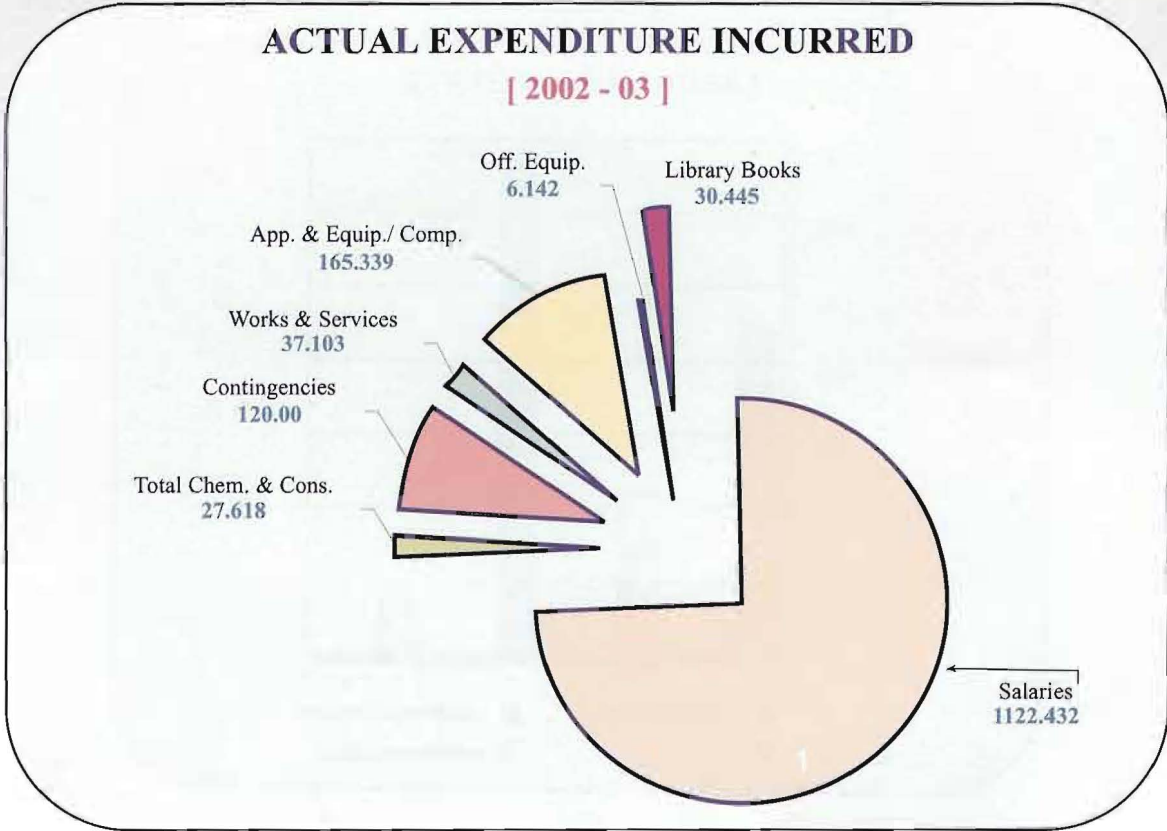
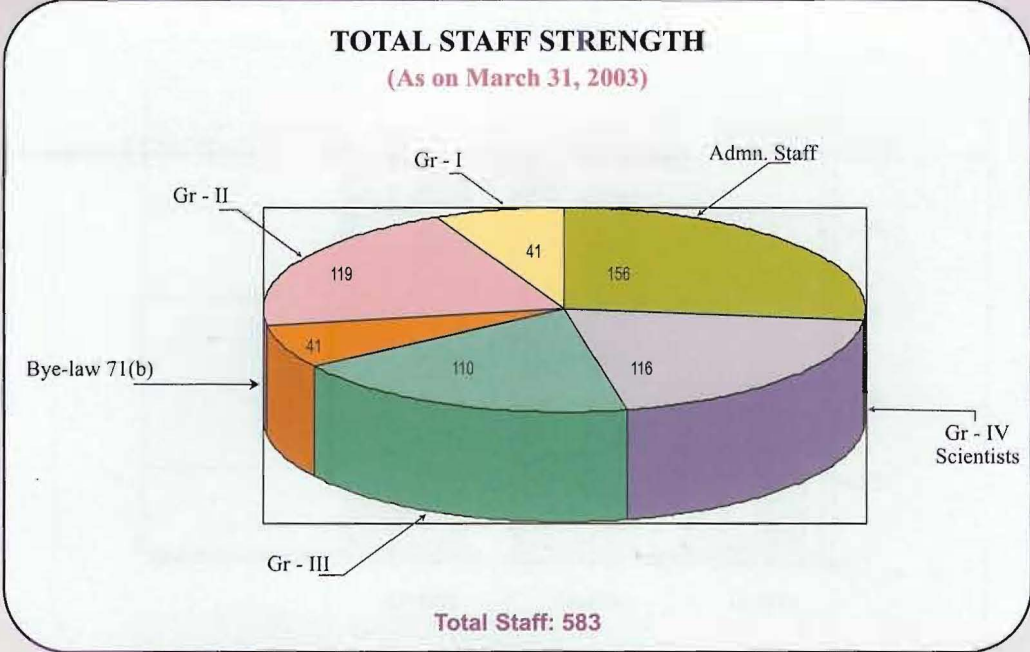
2000-01 to 2002-03



## LABORATORY RESERVE

(2002 - 03)







# वार्षिक प्रतिवेदन

## 2002-03

### विषय सूची

#### उल्लेखनीय क्रियाकलाप

- व्यवसाय विकास एवं विपणन
- अन्य गतिविधियां एवं प्रगामी विकास कार्य

#### उपकरणों की सेवा एवं अनुरक्षण

#### मानव संसाधन विकास

- इण्डो-स्विस प्रशिक्षण केन्द्र
- वैज्ञानिकों को पुरस्कार
- अन्य प्रगामी विकास कार्य/गतिविधियां

## सीएसआइओ को गरिमापूर्ण सीएसआइआर प्रौद्योगिकी पुरस्कार

श्री अटल बिहारी वाजपेयी, माननीय प्रधानमंत्री, भारत सरकार ने 26 सितंबर, 2002 को विज्ञान भवन में आयोजित एक समारोह में सीएसआइओ, चण्डगढ़ को हल्के लड़ाकू विमान के लिए हैड-अप डिस्प्ले के विकास के लिए इंजीनियरिंग प्रौद्योगिकी के क्षेत्र में सीएसआइआर प्रौद्योगिकी पुरस्कार प्रदान किया। डॉ. राम प्रकाश बाजपेयी, निदेशक, ने सीएसआइओ टीम, जिसमें श्री वी.एम.एल. नरसिंहम, डॉ. एम.एस. एन. श्रीनिवास, डॉ. के.आर. सार्मा, डॉ. एस. मोहन, डॉ. आर. पी. बाजपेयी, श्री पी. के. जैन तथा श्री बी. डी. शर्मा शामिल थे, की ओर से यह पुरस्कार ग्रहण किया।



अन्य टीम सदस्यों में सीएसआइओ के श्री पी.पी. बाजपेयी, श्री विनय कुमार, श्री सुरेश कुमार, श्री संजय शर्मा, श्री विनोद करार, श्री विपन कुमार, श्री पी.के. गर्ग, श्री आर.सी. टक्कर, श्री हरदीप सिंह तथा भारतीय विज्ञान संस्थान, बेंगलूर के श्री के. नरसिंहमा राव एवं श्री एम. आदिनारायण शामिल थे।

## जैवआण्विक इलैक्ट्रॉनिकी एवं नैनोप्रौद्योगिकी प्रयोगशाला

प्रो. मुरली मनोहर जोशी, माननीय विज्ञान और प्रौद्योगिकी मंत्री, भारत सरकार ने 28 जनवरी, 2003 को इस नव स्थापित प्रयोगशाला का उद्घाटन किया। इस प्रयोगशाला का उद्देश्य जैव-इंजीनियरिंग के लिए जीव प्रक्रियाओं तथा पदार्थों का प्रयोग करना तथा मानव जीवन की गुणवत्ता में सुधार के लिए उपकरणों का विकास करना है। डी एन ए से, रोग निदान के लिए बायो-मैम्स, उच्च गति, उच्च घनत्व वाले इलैक्ट्रॉनिक स्विच और अपेक्षित स्थल पर दवा पहुंचाने के लिए जैवआण्विक मोटर्स की परिकल्पना हेतु आण्विक स्तर पर भौतिक एवं जैविक प्रक्रियाओं को समझने के लिए विविधमुखी सुघटित प्रयासों की आवश्यकता है। इलैक्ट्रॉनिक और डिस्प्ले यंत्रों

एवं अपेक्षित स्थल पर दवा पहुंचाने के उपकरण के लिए कॉर्बन नैनोट्यूब्स का अध्ययन किया जाता है। विविधमुखी प्रतिभा से संपन्न इस दल में भौतिकीविद्, पदार्थ विज्ञान, जैवरासायनविद्, आण्विक जैव विज्ञानी, चिकित्सक, इलैक्ट्रॉनिक, विद्युत एवं मकैनिकल इंजीनियर एवं सैमीकंडक्टर इत्यादि विशेषज्ञ शामिल हैं। यह समूह व्यावसायिक रूप से विश्व स्तर पर प्रतियोगी उत्पादों के विकास और नैनोटेक्नोलॉजी के क्षेत्र में मौलिक अनुसंधान करने के लिए सैद्धांतिक और प्रायोगिक-दोनों पक्षों पर अपना ध्यान केंद्रित कर रहा है।



## उल्लेखनीय क्रियाकलाप

### व्यवसाय विकास एवं विपणन

#### 1. स्वर्ण विश्लेषक की प्रौद्योगिकी का एनआरडीसी के माध्यम से विपणन

संगठन ने स्वर्ण विश्लेषक की प्रौद्योगिकी के विपणन का कार्य राष्ट्रीय अनुसंधान विकास निगम, नई दिल्ली को सौंप कर अपनी उपलब्धियों में एक और सफलता जोड़ ली है। स्वर्ण विश्लेषक सोने की शुद्धता के मापन की एक गैर-विनाशक तकनीक है। इस समझौते पर डॉ. एन. के. शर्मा, प्रबंध निदेशक, एनआरडीसी ; डॉ. एस. के. गुप्ता, सलाहकार, डीएसटी ; और श्री एम. आर. मसान, प्रशासन नियंत्रक, सीएसआइओ ने 11 अक्टूबर, 2002 को संगठन कार्यालय, चण्डीगढ़ में हस्ताक्षर किए। इस अनुसंधान कार्य को डीएसटी द्वारा प्रायोजित किया गया था।

यह तकनीक एक्स-रे प्रतिदीप्ति स्पैक्ट्रोस्कोपी पर आधारित है। इससे बहुमूल्य आभूषणों के रंग आदि को प्रभावित किए बिना तांबे और चांदी की उपस्थिति में सोने की शुद्धता की माप की जा सकती है। इस प्रौद्योगिकी से देश में स्वर्ण आभूषणों की खरीद करने वाले उपभोक्ताओं को लाभ पहुंचेगा।

#### 2. प्रौद्योगिकी हस्तांतरण

##### एलसीए के लिए हैड-अप डिस्प्ले (हड)

अंतर्राष्ट्रीय स्तर पर ऐसे बहुत कम उत्पादक हैं, जिनके पास लड़ाकू विमानों के लिए हैड-अप-डिस्प्ले (हड) के विकास की प्रौद्योगिकी है। सीएसआइओ द्वारा डिजाइन किया गया हड हल्के लड़ाकू विमान (एलसीए) के लिए है तथा इसके विकास के लिए सभी विशिष्टताएं एलसीए अपेक्षाओं के अनुरूप प्राप्त की गई हैं। विश्व का कोई भी हड एलसीए की अपेक्षाओं, यथा आकार, लंबाई, फील्ड ऑफ वियु, फोटोमैट्रिक कार्य निष्पादन, मापन सटीकता आदि, को पूरा नहीं करता। इसी प्रचलनात्मक अनिवार्यता तथा बिना अतिरेकता के कारण हड यूनिट की उच्चतम कार्यनिष्पादन विश्वसनीयता है। प्रणाली में सृजित गर्मी को समाप्त करने के लिए इसमें कोई फोर्सड एयर कूलिंग अथवा आंतरिक पंखा नहीं है। इस प्रणाली की मकैनिकल हाउसिंग को हीट सिंक के रूप में प्रयोग करते हुए प्रणाली द्वारा सृजित गर्मी को प्राकृतिक संवहन तथा विकिरण द्वारा समाप्त किया जाता है।

प्रो. एम. एम. जोशी, भारत सरकार के कैबिनेट मंत्री ने 28

जनवरी, 2003 को केन्द्रीय वैज्ञानिक उपकरण संगठन, चण्डीगढ़ में हल्के लड़ाकू विमान के लिए हैड-अप डिस्प्ले प्रौद्योगिकी के हस्तांतरण समारोह की अध्यक्षता की। हड की प्रौद्योगिकी भारत इलैक्ट्रॉनिक्स लि. (बीईएल) को प्रदान की गई। बीईएल की ओर से श्री बस्वराज, महाप्रबंधक, बीईएल ने समझौते पर हस्ताक्षर किए। प्रो. मुरली मनोहर जोशी ने अत्यधुनिक उपकरणों के क्षेत्र में सीएसआइओ के योगदान की सराहना की।

#### खाद्य तेलों की गुणवत्ता नियंत्रण के लिए सुवाह्य किट और उपकरण

- आयोडीन वैल्यू मीटर ;
- ऑयल स्पैक्ट्रोफोटोमीटर ; तथा
- डिजिटल टाइट्रेटर किट ;

इन उपकरणों की प्रौद्योगिकी दो उद्योगों - मै. वैशेषिका इलैक्ट्रॉन डिवाइसिस, अंबाला और मै. एबरोल एंड एसोशिएट्स, चण्डीगढ़ को अप्रैल, 2002 में हस्तांतरित की गई।

इन उपकरणों का विकास टीएमओपी एंड एम, नई दिल्ली के प्रौद्योगिकियों के लोकप्रियकरण कार्यक्रम के अंतर्गत किया गया।

#### एफ्लोटॉक्सिन मीटर

टीएमओपी एंड एम की वित्तीय सहायता से विकसित एफ्लोटॉक्सिन मीटर की प्रौद्योगिकी दिनांक 24 अप्रैल, 2002 को एजट्रोनिक्स इंस्ट्रुमेंटेशन, चण्डीगढ़ को हस्तांतरित की गई। इस संबंध में समझौते पर हस्ताक्षर के बाद श्री एस. के. बतरा, वरिष्ठ प्रकम प्रौद्योगिकीविद्, टीएमओपी एंड एम, केन्द्रीय कृषि एवं सहकारित मंत्रालय, नई दिल्ली द्वारा श्री देवदत्त, प्रोपराइटर, एजट्रोनिक्स इंस्ट्रुमेंटेशन को सौंपे गए।

एजट्रोनिक्स इंस्ट्रुमेंटेशन द्वारा निर्मित एफ्लोटॉक्सिन मीटर की पहली इकाई श्री ए. के. गंजू, प्रभारी, कृषि इलैक्ट्रॉनिकी उपकरण विन्यास प्रभाग, सीएसआइओ ने डॉ. एम. जैड. अब्दिन, रीडर, जैव-प्रौद्योगिकी केन्द्र, जामिया हमदर्द, नई दिल्ली को 21 अगस्त, 2002 को प्रदान की।

#### एसएमडी के सैमी-ऑटोमैटिक पिक एंड प्लेस मशीन

पिक एंड प्लेस मशीन का लघु स्तर के इलैक्ट्रॉनिक उद्योगों में बहुत प्रयोग है। यह प्रणाली एसएमडी के साथ मोबाइल फोन, फैक्स मशीन, डिस्क ड्राइव, सामान्य उपयोग के इलैक्ट्रॉनिक



उपकरणों, टीवी, कम्प्यूटर इत्यादि के प्रिंटेड सर्किट बोर्ड के संयोजन में उपयोगी हैं। सीएसआइओ में विकसित प्रणाली के हार्डवेयर और सॉफ्टवेयर में अत्यधुनिक प्रौद्योगिकी का प्रयोग होता है। एसएमडी घटकों के लघु आकार के कारण इनके प्रयोग में अत्यंत उच्च प्रिंसीपल मशीन की आवश्यकता होती है। यह मशीन 600 एमएमडी घटक प्रति घंटे की गति से संयोजन कार्य कर सकती है। देश में इस मशीन की संपूर्ण मांग को इसके आयात द्वारा पूरा किया जाता है। स्वेदश में विकसित मशीन कम मूल्य की है तथा इसका देश में बहुत कम मूल्य पर विपणन किया जा सकता है। इसकी तकनीकी जानकारी को 16 सितंबर, 2002 को मै. ईएमएस टैक्नोलॉजीस प्रा. लि. को हस्तांतरित किया गया।

## कार्यशालाओं/संगोष्ठियों का आयोजन

1. सीएसआइओ तथा आरसीएमए, चण्डीगढ़ द्वारा संयुक्त रूप से दिनांक 3-4 जनवरी, 2003 को टैक्नोलॉजिकल डिवेलपमेंट इन एरोनॉटिक्स एंड इट्स इम्पैक्ट ऑन मैटीनैस" विषय पर चण्डीगढ़ में राष्ट्रीय संगोष्ठी का आयोजन।
2. विश्व पर्यावरण दिवस के अवसर पर दिनांक 5.6.2002 को भारतीय पर्यावरण सोसायटी, चण्डीगढ़ के प्रायोजन में एक कार्यशाला का आयोजन किया गया। इस कार्यशाला का थीम "प्रिपेरेशन ऑफ वर्मी कम्पोस्ट" था। इस कार्यशाला में पंजाब तथा हरियाणा के विभिन्न इंजीनियरिंग कॉलेजों के लगभग 30 अध्यापकों तथा विद्यार्थियों ने भाग लिया।
3. पंजाब के प्रतिभाशाली/मेधावी विद्यार्थियों के लिए दिनांक 11 - 12 नवंबर, 2002 को पर्यावरण मॉनीटरिंग उपकरणों पर एक संगोष्ठी का आयोजन किया गया। यह कार्यक्रम पंजाब राज्य विज्ञान एवं प्रौद्योगिकी परिषद्, चण्डीगढ़ द्वारा प्रायोजित किया गया था। इस कार्यक्रम में लगभग 20 प्रतिभागियों ने भाग लिया।
4. केन्द्रीय वैज्ञानिक उपकरण संगठन में दिनांक 23-24 अप्रैल, 2002 को "कृषि के लिए उपकरण विन्यास" विषय पर अखिल भारतीय हिंदी संगोष्ठी का आयोजन

संगठन में दिनांक 23-24 अप्रैल, 2002 को "कृषि के लिए उपकरण विन्यास" विषय पर दो-दिवसीय अखिल भारतीय हिंदी संगोष्ठी का आयोजन किया गया। इस संगोष्ठी में सीएसआइआर, आईसीएआर की विभिन्न प्रयोगशालाओं तथा देश के कृषि विश्वविद्यालयों से 70 से अधिक कृषि प्रौद्योगिकीविदों एवं वैज्ञानिकों ने निम्नलिखित विषयों पर पेपर प्रस्तुत किए :

- कृषि में इलेक्ट्रॉनिक्स एवं सूचना प्रौद्योगिकी

- फसल पशु प्रौद्योगिकी
- जल प्रबंधन
- कृषि में ऊर्जा
- इनपुट प्रबंधन - उर्वरक, कीटनाशी व भू-विकास तकनीकें

संगोष्ठी का उद्घाटन पूर्व सांसद श्री सत्यपाल जैन ने किया। उन्होंने अपने संबोधन में आम व्यक्ति तक वैज्ञानिक जानकारी मातृभाषा में पहुंचाने पर बल दिया। उन्होंने कहा कि भारतीय भाषाओं में व्यक्त भावनाओं की अभिव्यक्ति का अंग्रेजी में अनुवाद कर पाना असंभव है, क्योंकि शब्द भावनाओं के द्योतक होते हैं। उन्होंने संयोजकों को कृषि जानकारी हिंदी में उपलब्ध करवाने के लिए बधाई दी।

इस अवसर पर संगठन निदेशक, डॉ. राम प्रकाश बाजपेयी ने कृषि वैज्ञानिकों का स्वागत किया और कहा कि कृषि उत्पादन बढ़ाने में उपकरण बहुत ही सहायक हैं। उन्होंने संगठन में लेजर तकनीक द्वारा भूमि समतल करने, फसलों की सुरक्षा के लिए पशु-पक्षियों को दूर रखने और बीजारोपण के लिए विकसित किए जा रहे उपकरणों की जानकारी दी।

डॉ. हरीश कुमार, अध्यक्ष, वैज्ञानिक तथा तकनीकी शब्दावली आयोग, नई दिल्ली ने अपने अध्यक्षीय संबोधन में आयोग के योगदान का उल्लेख किया। उन्होंने बताया कि आयोग ने कृषि विषय पर 400 से अधिक पुस्तकें प्रकाशित की हैं और अपने नए कार्यक्रम के अन्तर्गत अन्य भारतीय भाषाओं में भी तकनीकी जानकारी उपलब्ध करवाने के लिए प्रयासरत हैं।

संगोष्ठी के समापन समारोह में संगठन निदेशक ने कृषि वैज्ञानिकों का आह्वान किया कि हिंदी भाषा इस देश के भू-भाग पर ही नहीं, अपितु विश्व के अन्य देशों में भी सर्वोच्च स्थान प्राप्त करने के लिए अग्रसर है, इसके लिए हम सभी के द्वारा सांझे प्रयास किए जाने की आवश्यकता है।

इस संगोष्ठी को वैज्ञानिक तथा तकनीकी शब्दावली आयोग, मानव संसाधन विकास मंत्रालय, भारत सरकार एवं तिलहन, दलहन एवं मक्का पर प्रौद्योगिकी मिशन (टीएमओपीएंडएम), कृषि मंत्रालय, भारत सरकार ने प्रायोजित किया।

## 5. नैनो तथा न्यूक्लीयर विज्ञान पर इण्डो-जर्मन कार्यशाला

सीएसआइआर हीरक जयंती वर्ष समारोह के अंतर्गत सीएसआइओ तथा पंजाब विश्वविद्यालय में 16-18 फरवरी, 2003 को नैनो तथा न्यूक्लीयर विज्ञान पर इण्डो-जर्मन कार्यशाला का आयोजन किया गया। यह कार्यशाला

एलैक्सजैन्डर वॉन हम्बोल्ट फाउण्डेशन (एवीएच), जर्मनी ; पंजाब विश्वविद्यालय तथा सीएसआइओ, चण्डीगढ़ द्वारा संयुक्त रूप से आयोजित की गई। श्री एस. के. आंगरा इस के संचालक थे। इस कार्यशाला में जर्मनी के 8 प्रतिभागियों सहित कुल 17 प्रतिष्ठित शिक्षाविदों तथा वैज्ञानिकों ने भाग लिया तथा नैनो एवं न्यूक्लीयर विज्ञान के उभरते हुए क्षेत्रों में वक्तव्य दिए। प्रो. एच. जे. बुक्खेमेर, रिएक्टर, आखेन यूनिवर्सिटी ऑफ एप्लाइड साइंसिज़ ने अपने उद्घाटन संबोधन में जर्मनी की शिक्षा प्रणाली के विषय में चर्चा की और बताया कि भारतीय विद्यार्थी इससे क्या सीख सकते हैं।

डॉ. आर. पी. बाजपेयी, निदेशक, सीएसआइओ ने जर्मनी तथा भारत के विभिन्न संस्थानों से आए अतिथियों का स्वागत करते हुए कार्यशाला की संक्षिप्त पृष्ठभूमि प्रस्तुत की और एवीएच फाउण्डेशन के स्थानीय चैप्टर के क्रियाकलापों पर प्रकाश डाला। पंजाब विश्वविद्यालय तथा एवीएच फाउण्डेशन के स्थानीय चैप्टर के सचिव डॉ. आलोक श्रीवास्तव ने फाउण्डेशन के लक्ष्यों तथा उद्देश्यों का संक्षिप्त परिचय दिया।

## गणमान्य अतिथियों का दौरा

### 1. प्रो. मुरली मनोहर जोशी, माननीय केंद्रीय मंत्री

प्रो. मुरली मनोहर जोशी, माननीय केंद्रीय मानव संसाधन विकास, विज्ञान एवं प्रौद्योगिकी तथा महासागर विकास मंत्रों ने दिनांक 28 जनवरी, 2003 को अपने सीएसआइओ दौरे के समय संगठन के वैज्ञानिकों को संबोधित किया। उन्होंने कहा कि विज्ञान सरल होना चाहिए। यह देखा गया है कि जटिल परिकल्पनाओं का अंततः कोई निष्कर्ष नहीं निकल पाता। अपनी बात के समर्थन में कई उदाहरण देते हुए मंत्री महोदय ने कहा कि पश्चिमी विज्ञान हमारे पुरातन साहित्य में उल्लिखित खोजों की ओर लौट रहा है। इससे पूर्व संगठन निदेशक डॉ. आर. पी. बाजपेयी ने उपकरण विन्यास के विभिन्न आनुवंशिक/अनुप्रयोग क्षेत्रों में संगठन की गत उपलब्धियों, वर्तमान क्रियाकलापों तथा भावी योजनाओं पर प्रकाश डाला।

प्रो. जोशी ने अपने सीएसआइओ दौरे के दौरान इण्डो-स्विस प्रशिक्षण केंद्र के नए भवन और स्टाफ क्वार्टरों का शिलान्यास किया तथा भूकम्पीय वेधशाला और जैवआण्विक इलैक्ट्रॉनिक एवं नैनोटेक्नोलॉजी प्रयोगशाला का उद्घाटन किया। उन्होंने संगठन की विभिन्न प्रयोगशालाओं को देखा और यहां विकसित की जा रही प्रौद्योगिकियों में गहरी रूचि दिखाई।

## 2. विज्ञान एवं प्रौद्योगिकी, पर्यावरण तथा वनों पर स्थायी संसदीय समिति

विज्ञान एवं प्रौद्योगिकी, पर्यावरण तथा वनों पर स्थायी संसदीय समिति ने श्री रामचंद्रैया की अध्यक्षता में दिनांक 7 जून, 2003 को संगठन का अध्ययन दौरा किया। बैठक में माननीय सांसद श्री मनोज भट्टाचार्य, श्रीमती सविता शारदा, श्री द्विजेन्द्र नाथ शर्मा, श्री निहाल चंद चौहान, डॉ. (श्रीमती) बीट्रिक्स डीसूजा, एडवोकेट सुरेश रामराव जाधव, श्री गोर्धनभाई जाविया, श्री सदाशिवराव दादोबा मंडलिक, श्री एस. मुरुगसेन, श्री अली मो. नायक, श्री ए. वैकटेश नायक, श्री सुरेश पासी, डॉ. अशोक पटेल, श्री प्रह्लाद पटेल, प्रो. आर. आर. प्रमाणिक तथा श्री गांता श्रीनिवासा राव उपस्थित हुए। समिति में राज्य सभा सचिवालय के चार अधिकारी भी शामिल थे।

डॉ. आर. पी. बाजपेयी, निदेशक, सीएसआइओ ने स्थायी संसदीय समिति के माननीय अध्यक्ष तथा सदस्यों का हार्दिक स्वागत किया तथा सीएसआइओ के इतिहास, क्रियाकलापों के क्षेत्र तथा उपलब्धियों की जानकारी दी। माननीय सदस्यों को प्रयोगशाला के दौरा भी कराया गया। वे सीएसआइओ, जो देश में उपकरण विन्यास के क्षेत्र में उत्कृष्टता के केन्द्र के रूप में उभर कर सामने आया है, की उपलब्धियों से अत्यधिक प्रभावित हुए।

## 3. संसदीय राजभाषा समिति की आलेख एवं साक्ष्य उपसमिति का दौरा

संसदीय राजभाषा समिति की आलेख एवं साक्ष्य उपसमिति ने चण्डीगढ़ नगर राजभाषा कार्यान्वयन समिति के कुछ कार्यालय प्रमुखों के साथ विचार विमर्श के लिए 4 जून, 2002 को चण्डीगढ़ का दौरा किया। इस विचार विमर्श के लिए संगठन सहित कुल 15 कार्यालयाध्यक्षों को आमंत्रित किया गया था। यह बैठक दिनांक 4.6.02 को होटल मांडटव्यू में आयोजित की गई थी। डॉ. लक्ष्मी नारायण पांडे की अध्यक्षता में सात सदस्यों वाली संसदीय समिति में निम्नानुसार सात सदस्य थे: श्रीमती सरला महेश्वरी ; श्री सुशील कुमार इंदौरा ; श्री नवल किशोर राय ; श्री जगदम्बी प्रसाद यादव ; तथा श्री राम राय चौधरी।

## 4. डॉ. डी. एन. तिवारी, सदस्य, योजना आयोग

डॉ. डी. एन. तिवारी, सदस्य, योजना आयोग तथा सीएसआइओ सोसाइटी ने नवंबर, 2002 में सीएसआइओ का दौरा किया तथा नए क्षेत्रों में विकास कार्यों की भारत सरकार की योजना का विवरण देते हुए इनमें सीएसआइओ द्वारा किए

जाने वाले कार्य के बारे में बातचीत की। डॉ. तिवारी के दौर से भारतीय बॉस के प्रक्रमण के लिए संयंत्र एवं मशीनों के विकास कार्य में सीएसआइओ द्वारा नीवन पहल का मार्ग प्रशस्त हुआ।

## क्रियाकलाप/कार्यक्रम/बैठकें

### 1. विज्ञान में युवा नेतृत्व पर सीएसआइआर कार्यक्रम (सीपीवाईएलएस)

विज्ञान के क्षेत्र में युवा तथा मेधावी छात्रों को आकर्षित करने के लिए सीपीवाईएलएस कार्यक्रम संगठन में दिनांक 28 - 29 नवंबर, 2002 को आयोजित किया गया। हरियाणा राज्य से 25 विद्यार्थियों ने इस कार्यक्रम में भाग लिया। इस अवसर पर प्रो. राजेश कोछड़, निदेशक, राष्ट्रीय विज्ञान, प्रौद्योगिकी तथा विकास अध्ययन संस्थान (निस्टैड्स) ने विद्यार्थियों, उनके अभिभावकों तथा अध्यापकों को संबोधित किया। युवा विद्यार्थियों में वैज्ञानिक मनःस्थिति के विकास के लिए उन्हें प्रेरित एवं प्रोत्साहित करने के उद्देश्य से इस कार्यक्रम में सीएसआइओ के वैज्ञानिकों द्वारा व्याख्यान आयोजित किए गए।

प्रतिभागियों को अनुसंधान एवं विकास कार्यस्थानों से परिचित करवाने तथा विभिन्न वैज्ञानिक उपकरण, जिनके बारे में उन्होंने केवल पढ़ा है, दिखाने के लिए उन्हें सीएसआइओ की विभिन्न प्रयोगशालाओं का दौरा करवाया गया। उन्हें प्रयोगशालाओं को कार्य पद्धति के मौलिक नियमों की जानकारी देने के दृष्टिगत विशेष रूप से प्रयोग लगाए गए थे। इस कार्यक्रम से विद्यार्थियों को शोधकर्ताओं से निकट संपर्क का अवसर प्राप्त हुआ।

### 2. सीएसआइओ द्वारा परिकल्पित हैड अप डिस्के (हड) के साथ हल्के लड़ाकू विमान (एलसीए) की प्रथम उड़ान

हल्के लड़ाकू विमान (एलसीए) प्रौद्योगिकी प्रदर्शक (टीडी-2) विमान केएच 2002 की प्रथम उड़ान राष्ट्रीय उड़ान परीक्षण केन्द्र, एडीए के पायलट, विंग कमांडर तरुण बैनर्जी के संचालन में 6 जून, 2002 को अपराह्न 11.45 बजे भरी गई। एयर कमांडर ए. के. नगालिया की अध्यक्षता में इसने सभी उड़ान परीक्षण मानदंडों का पूरा करते हुए अपनी 30 मिनट की उड़ान के बाद सफल लैंडिंग की। इससे उड़ान परीक्षण कार्यक्रम में दूसरे विमान के प्रवेश को मान्यता मिली तथा एडीए तथा एचएएल के एलसीए कार्यक्रम में इसका अत्यंत महत्वपूर्ण स्थान है।

इस उड़ान के दौरान माननीय रक्षा मंत्री जॉर्ज फर्नांडिस; सुरक्षा राज्य मंत्री श्री यू. वी. कृष्णमराजू; डॉ. वी. के. आत्रे, आरएम के एसए; श्री एन. आर. मोहनती, अध्यक्ष, एचएएल; डॉ. कोटा हरिनारायणन्, एलसीए कार्यक्रम के निदेशक; एयर मार्शल (सेवानिवृत्त) पी.

राजकुमार, परम विशिष्ट सेवा मैडल, अति विशिष्ट सेवा मैडल, विशिष्ट मैडल, निदेशक, एडीए; श्री ए. के. सक्सैना, एमडी (बीसी), एचएएल; श्री योगेश कुमार, कार्यपालक निदेशक (डिजाइन), एचएएल, एओसी-इन-चार्ज, प्रशिक्षण कमांड; एयर मार्शल टी. जे. मास्टर, पीवीएसएम, एवीएसएम तथा रक्षा, अनुसंधान एवं विकास, उद्योग तथा सेवाओं के अन्य गणमान्य अधिकारी उपस्थित थे।

इस उड़ान परीक्षण कार्यक्रम का उद्देश्य एलसीए में लगाई गई विभिन्न अत्यधुनिक प्रौद्योगिकियों यथा अतस्टेबल कॉन्फिगरेशन, क्वाड्रलैक्स फ्लाई-बाय-वायर डिजिटल फ्लाइट कंट्रोल सिस्टम, इंटीग्रेटेड एविऑनिक्स विद ग्लास कॉकपिट, एडवांस्ड कम्पोजिट मैटीरियल्स एंड प्राइमरी स्ट्रक्चर तथा नोवल सिस्टम्ज मैनेजमेंट सिस्टम को वैधता प्रदान करना है।

### 3. हिंदी दिवस समारोह

हिंदी को सम्मान दिलवाने के लिए दोहरी मानसिकता को त्यागना होगा, कुछ विवादों और राजनैतिक कारणों को छोड़ दिया जाए तो हिंदी काश्मीर से कन्याकुमारी तक बोली जाती है। यह विचार दैनिक ट्रिब्यून के संपादक श्री विजय सहगल ने दिनांक 13 सितंबर, 2002 को संगठन में आयोजित हिंदी दिवस समारोह के अवसर पर व्यक्त किए। उन्होंने आगे कहा कि विभिन्न चैनलों ने हिंदी को विशाव के कोने-कोने में पहुंचा दिया है और इन्हीं के माध्यम से भारतीय संस्कृति भी विशाव भर में अपनी श्रेष्ठता प्रदर्शित कर चुकी है। इस तरह से हिंदी को प्राप्त हुई लोकप्रियता के दृष्टिगत विदेशों में रहे भारतीय हिंदी को राजभाषा और राष्ट्रभाषा से भी ऊपर अन्तरराष्ट्रीय भाषा का दर्जा दिए जाने की मांग कर रहे हैं। उन्होंने इस बात पर बल दिया कि हिंदी को लोकप्रिय बनाने के लिए यह आवश्यक है कि हम सहज हिंदी का प्रयोग करें, जिसके द्वार प्रादेशिक भाषाओं के आदान-प्रदान के लिए भी खुले हों।

संगठन में दिनांक 2 सितंबर, 2002 से 13 सितंबर, 2002 तक हिंदी पखवाड़े के अवसर पर 9 प्रतियोगिताएं आयोजित की गईं, जिनमें इण्डो स्विस् प्रशिक्षण केन्द्र के विद्यार्थियों सहित 200 कर्मियों ने भाग लिया। संगठन के दो कर्मियों श्री प्रवीन कुमार गर्ग और श्री ओम प्रकाश को अपना शत-प्रतिशत कार्य हिंदी में करने के लिए प्रत्येक को रुपये 500६ की राशि से पुरस्कृत किया गया। मुख्य अतिथि श्री विजय सहगल ने प्रतियोगिताओं के विजेताओं को पुरस्कार व प्रमाणपत्र प्रदान किए। इससे पूर्व संगठन के प्रशासन नियंत्रक श्री एम. आर. मसान ने संगठन की गत वर्ष की हिंदी वार्षिक रिपोर्ट प्रस्तुत की।

इस अवसर पर संगठन निदेशक डॉ. राम प्रकाश बाजपेयी ने अपने स्वागत भाषण में संगठन के वैज्ञानिकों द्वारा हिंदी में शोधपत्र लिखे जाने पर प्रसन्नता व्यक्त की और बताया कि संगठन के वरिष्ठ वैज्ञानिकों के लेख एवं शोध पत्र विभिन्न पत्रिकाओं में प्रकाशित हो रहे हैं, जिनमें होलोग्राफी ग्रुप का एक शोध पत्र 'अनुसंधान पत्रिका' में प्रकाशित हो चुका है तथा दूसरा प्रकाशन के लिए स्वीकृत हो चुका है।

#### 4. सीएसआइओ स्थापना दिवस

सीएसआइओ ने अपना स्थापना दिवस दिनांक 30 अक्टूबर, 2002 को प्रो. वी. के. सारस्वत, निदेशक, आइआरसीआई, डीआरडीएल, हैदराबाद के 'नवीन सहस्राब्दि में प्रौद्योगिकी विकास' विषय पर संगठन सभागार में अतिथि व्याख्यान के आयोजन द्वारा मनाया।

डॉ. सारस्वत ने अपने संबोधन में भारत के राष्ट्रपति महामहिम डॉ. ए. पी. जे. अब्दुल कलाम के साथ अपने लंबे संपर्क का जिक्र करते हुए उनकी पुस्तक 'टैक्नोलॉजी विज़न 2002' में उल्लिखित विभिन्न प्रौद्योगिकियों के बारे में बात की। उन्होंने कहा कि अपेक्षित लक्ष्यों को प्राप्त करने के लिए परिकल्पना के क्षेत्र में नवाचार तथा गुणवत्ता में सुधार हेतु सतत प्रयास किए जाने चाहिए। उन्होंने सूक्ष्म-मशीनों, मैम्स, इंटीग्रेटेड मैम्स तथा नैनो प्रौद्योगिकियों के विकास की आवश्यकता पर बल दिया।

इससे पूर्व डॉ. आर. पी. बाजपेयी, निदेशक, सीएसआइओ ने मुख्य अतिथि का स्वागत करते हुए सीएसआइओ स्थापना दिवस के महत्व पर प्रकाश डाला। उन्होंने संस्थान को इसके वर्तमान प्रतिष्ठित रूप में तैयार करने में सीएसआइओ के पूर्व निदेशकों के बहुमूल्य योगदान को याद किया। उन्होंने कहा कि परम्परा के अनुसार लोग छोटी वस्तु से प्रारंभ करते हुए बड़ी वस्तु की ओर अग्रसर होते हैं, जबकि सीएसआइओ ने बड़े उपकरणों से कार्य प्रारंभ करते हुए अब छोटे उपकरणों अर्थात् सूक्ष्म उपकरणों के विकास की ओर अग्रसर है। इस अवसर पर सीएसआइओ के वरिष्ठ वैज्ञानिक श्री एस. आर. तनेजा ने संगठन की वार्षिक रिपोर्ट प्रस्तुत की।

इस वर्ष सीएसआइआर स्थापना दिवस के अवसर पर 26 सितंबर को सीएसआइओ को एलसीए के लिए हैड-अप-डिस्प्ले के विकास हेतु प्रौद्योगिकी पुरस्कार से सम्मानित किया गया। यह पुरस्कार देश के प्रधान मंत्री ने संगठन निदेशक डॉ. आर. पी. बाजपेयी के नेतृत्व में संगठन के वैज्ञानिक दल को नई दिल्ली में प्रदान किया। संगठन में आयोजित समारोह में मुख्य अतिथि ने हैड-अप-डिस्प्ले के विकास में महत्वपूर्ण योगदान देने वाले सदस्यों को

स्मृति-चिह्न तथा प्रशस्तिपत्र प्रदान किए, विकास दल के सदस्य हैं : सर्वश्री पी. पी. बाजपेयी, विनय कुमार, सुरेश कुमार, संजय शर्मा, विनोद करार, विपिन कुमार, पी. के. गर्ग, आर. सी. टक्कर, हरदीप सिंह तथा भारतीय विज्ञान संस्थान, बेंगलूर के डॉ. के. नरसिम्हा राव।

#### 5. राष्ट्रीय विज्ञान दिवस

केन्द्रीय वैज्ञानिक उपकरण संगठन में 28 फरवरी, 2003 को "ओपन-डे" रखकर राष्ट्रीय विज्ञान दिवस का आयोजन किया गया। इस दिन संगठन की सभी प्रयोगशालाएं आम जनता के लिए खुली रखी गईं। बड़ी संख्या में विभिन्न स्कूलों, कॉलेजों और विश्वविद्यालयों के विद्यार्थियों सहित अन्य लोगों ने संगठन की प्रयोगशालाओं को देखा। उन्होंने वैज्ञानिकों से बातचीत की और वैज्ञानिकों द्वारा उन्हें संगठन में विकसित प्रौद्योगिकियों की जानकारी दी।

दोपहर बाद राष्ट्रीय विज्ञान दिवस के उपलक्ष्य में प्रो. अशोक साहनी, पूर्व डीयूआई, पंजाब विश्वविद्यालय, चण्डीगढ़ के "डायनासोर्स ऑफ इंडिया : डैड बट अलाइव" विषयक व्याख्यान का आयोजन किया गया। उन्होंने भारत में डायनासोर की समृद्ध जीवाश्म विरासत के बारे में बताया।

संगठन निदेशक डॉ. आर. पी. बाजपेयी ने अपने स्वागत संबोधन में मुख्य अतिथि का स्वागत करते हुए ऐसे वैज्ञानिक उपकरणों के विकास की आवश्यकता पर बल दिया, जो देश को विभिन्न अनुप्रयोगों के लिए नैनोप्रौद्योगिकी, जैवप्रौद्योगिकी और उन्नत संवेदियों के क्षेत्र में उन्नति करने में सहायक हो सकते हैं। उन्होंने नए उभर रहे क्षेत्रों पर प्रकाश डाला और विश्व स्तर पर प्रतियोगी बनने के लिए अपने ज्ञानाधार को सुदृढ़ करने की जरूरत पर बल दिया।

प्रो. अशोक साहनी ने संगठन की वेबसाइट का भी विधिवत् उद्घाटन किया, जिसे [www.csio-india.org](http://www.csio-india.org) पर देखा जा सकता है।

#### 6. सीएसआइआर स्थापना दिवस समारोह

सीएसआइआर स्थापना दिवस के हीरक जयंती समारोह के प्रारंभ होने पर, सीएसआइओ के वैज्ञानिकों की टीम को एलसीए के लिए हैड-अप-डिस्प्ले के विकास हेतु वर्ष 2002 के प्रौद्योगिकी पुरस्कार से सम्मानित किया गया। यह पुरस्कार नई दिल्ली में दिनांक 26 सितंबर, 2002 को आयोजित एक समारोह में प्रधानमंत्री श्री अटल बिहारी बाजपेयी ने प्रदान किया। इस पुरस्कार में रूपये 2.00 लाख की नकद राशि सहित एक ताम्रपत्र व प्रशस्तिपत्र प्रदान किया गया।

संगठन में सीएसआइआर स्थापना दिवस के अवसर पर 26

सितंबर, 2002 को अनेक कार्यक्रमों का आयोजन किया गया। इस क्रम में सीएसआइओ में ओपन-डे रखा गया, जिसमें संगठन की प्रयोगशालाएं आम जनता एवं विद्यार्थियों के लिए खुली रखी गई। इसमें विभिन्न स्कूलों, इंजीनियरिंग कॉलेजों तथा आम जनता सहित लगभग 600 लोगों ने संगठन का दौरा किया। इससे लोगों को न केवल सीएसआइओ में विकसित उपकरणों को काम करते हुए देखने का, अपितु वैज्ञानिकों से बातचीत का अवसर भी प्राप्त हुआ।

इसी क्रम में दिनांक 27 सितंबर, 2002 को प्रो. यू. आर. राव, अध्यक्ष, पीआरएल परिषद, इसरो-डॉस का 'स्पेस एंड ह्यूमन सिक्नोरिटी' विषय पर व्याख्यान भी आयोजित किया गया। प्रो. राव ने अपने संबोधन में अंतरिक्ष प्रौद्योगिकी के विविध आयामों पर प्रकाश डाला और कहा कि बेहतर मानव सुरक्षा को सुनिश्चित करने के लिए इनका उचित उपयोग किया जा सकता है। इसमें खाद्य, स्वास्थ्य, अर्थव्यवस्था तथा क्षेत्र की सुरक्षा शामिल है। उन्होंने विभिन्न आधुनिक अतिलघु एवं नवाचार प्रौद्योगिकियों यथा मैम्स, नैम्स, नैनो उपस्कर तथा विकसित की जा रही नवीन सामग्रियों का भी उल्लेख किया, जो हमें माइक्रो तथा नैनो सैटेलाइट्स के युग में ले जाने के लिए उपयोगी होंगी।

## 7. राष्ट्रीय प्रौद्योगिकी दिवस

संगठन में हर वर्ष की भांति इस वर्ष भी 11 मई को प्रौद्योगिकी दिवस के अवसर पर ओपन डे के अन्तर्गत सभी प्रयोगशालाएं प्रातः 10.00 बजे से दोपहर 1.00 बजे तक आम जनता के लिए खुली रखी गई। स्कूलों, कॉलेजों और विश्वविद्यालय से बड़ी संख्या में विद्यार्थियों सहित आम जनता ने संगठन की विभिन्न प्रयोगशालाओं को देखा। उन्होंने वैज्ञानिकों के साथ बातचीत की और संगठन में विकसित की जा रही प्रौद्योगिकियों की जानकारी प्राप्त की।

सीईडीटीई, मोहाली के भूतपूर्व महानिदेशक, श्री आर एस खांडपुर इस अवसर पर मुख्य अतिथि के रूप में उपस्थित थे। उन्होंने अपने विज्ञान, प्रौद्योगिकी और परिकल्पना त्रयी विषयक अपने व्याख्यान में बताया कि गत अनेक वर्षों में देश में विज्ञान और प्रौद्योगिकी में हुई उल्लेखनीय प्रगति के बावजूद

हम उद्योगों के बंद होने की निराशाजनक स्थिति का सामना कर रहे हैं। उन्होंने इस स्थिति के लिए हमारे उत्पादों में परिकल्पना पक्ष के प्रति हमारी उपेक्षा को उत्तरदायी ठहराया। उनके अनुसार समाज और लोगों के बीच प्रभावी सम्पर्क स्थापित करने के लिए डिज़ाइन, एस एण्ड टी के साथ मानवीय पक्ष को जोड़ने में आदर्श कड़ी का काम करता है। उनके मतानुसार इस उपेक्षा से हुई हानि की क्षतिपूर्ति के लिए देश में डिज़ाइन स्कूल खोले जाने चाहिए।

कार्यकारी निदेशक श्री एस आर तनेजा ने मुख्य अतिथि का स्वागत करते हुए सीएसआइओ और संगठन की उपलब्धियों का उल्लेख किया। इसके अतिरिक्त उन्होंने आत्म निर्भर होने के लिए प्रौद्योगिक विकास की आवश्यकता पर भी बल दिया।

## 8. विश्व पर्यावरण दिवस

केन्द्रीय वैज्ञानिक उपकरण संगठन, चण्डीगढ़ के पर्यावरण मॉनीटरिंग उपकरण प्रभाग ने 5 जून, 2002 को एन्वायरन्मेंट सोसायटी, चण्डीगढ़ के सहयोग से अध्यापकों और विद्यार्थियों के लिए राज्य स्तरीय जागरूकता कार्यक्रम का आयोजन किया। इसमें सोसायटी के अध्यक्ष श्री एस के शर्मा ने कृमि खाद तैयार करने की व्यावहारिक जानकारी दी और इस नई इकाई का उद्घाटन पर्यावरण और वन मंत्रालय के अतिरिक्त निदेशक डॉ० के के गर्ग ने किया। डॉ० शर्मा चण्डीगढ़ और इसके आस पास ऐसी ही 20 इकाइयां पहले ही शुरू कर चुके हैं। डॉ० गर्ग तथा टीटीटीआइ, चण्डीगढ़ के ग्रामीण विकास और योजना समूह के डॉ० उपेन्द्र राय ने क्रमशः स्थायी विकास पर पर्यावरण से संबंधित वर्तमान मुद्दों और कृमि खाद तकनीकों पर व्याख्यान दिए। कार्यक्रम की अध्यक्षता संगठन के संयुक्त निदेशक श्री पी एस मलहोत्रा ने की और इसका संचालन पर्यावरण मॉनीटरिंग उपकरण प्रभाग के प्रमुख श्री बासुदेव प्रसाद ने किया। श्रीमती संगीता गर्ग और संगठन के अन्य संकाय सदस्यों ने पर्यावरण मॉनीटरिंग तकनीकों और सहायक यन्त्रों का व्यावहारिक प्रदर्शन किया। समापन सत्र में सभी प्रतिभागियों ने अपशिष्ट न्यूनिकरण कार्यक्रम के अंतर्गत निजी स्तर पर कृमि खाद तैयार करने की शपथ ली, जिससे कि पृथ्वी को अपने सौंदर्य को पुनरुज्जीवित करने का अवसर प्रदान किया जा सके। इस वर्ष विश्व पर्यावरण दिवस का थीम धरा को अवसर तो दो था।

## उपकरणों की सेवा व अनुरक्षण

उपस्करों की सर्विस एवं अनुरक्षण सी एस आइ ओ का एक क्रिया कलाप है। यह सेवाएं संगठन के चेन्नै, दिल्ली एवं जयपुर स्थित सेवा एवं अनुरक्षण केन्द्रों तथा सी एस आइ ओ, चण्डीगढ़ के सेवा व अनुरक्षण प्रभाग द्वारा विभिन्न सार्वजनिक एवं निजी क्षेत्र के संस्थानों/संगठनों को प्रदान की जाती है। सी एस आइ ओ द्वारा करोड़ों रूपयों के उपस्करों की मरम्मत कर बहुमूल्य संसाधनों की बचत की जाती है। सेवा एवं अनुरक्षण केन्द्रों के प्रमुख क्रिया कलापों एवं कार्यों का वितरण निम्नानुसार है:

### चेन्नै केन्द्र

इण्डो-जर्मन ऊर्जा कौशल एवं पर्यावरण परियोजना (IGEEP) के अन्तर्गत ऊर्जा प्रबन्धन प्रणालियों पर परामर्श सेवाएं प्रदान की गईं:

- आधुनिकतम ऊर्जा प्रबन्धन प्रणालियां
- मैसर्ज सेशासै पेपर एण्ड बोर्डस लि०, इरोड के लिए ईएमएस पर रिपोर्ट तैयार की गई
- बोश लाम्दा ऑक्सीजन संवेदियों की विशेषताओं के वर्णन के लिए परीक्षण व्यवस्था की परिकल्पना और निर्माण किया गया
- ऊर्जा प्रबन्धन नेटवर्क्स के लिए इंटरऑप्रेबल नोड्स की परिकल्पना और विकास किया गया

### ऊर्जा लेखा परीक्षा

रिपोर्ट की अवधि के दौरान 16 उद्योगों/एजेंसियों के लिए ऊर्जा लेखा परीक्षा की गई

### उपस्करों/सेवाओं की कार्यकारिता का मूल्यांकन

- दक्षिणी रेलवे, चेन्नै के चार यात्री डिब्बों में 40 वाट आइ सी लैम्प, 20 वाट एफएल लैम्प और 10 वाट सीएफएल लैम्प के बिजली और लक्स स्तर का तुलनात्मक अध्ययन किया गया।
- दक्षिणी रेलवे, अरक्कोनम, चेन्नै के लिए इंजन के सामने रखे जाने वाले एलईडी मार्कर्स के प्रकाश स्तर का परीक्षण किया
- मैसर्ज टाटा इंजीनियरिंग और लोकोमोटिव लि० (टैल्को), पुणे के ताप उपचार संयंत्र और पेंट शॉप भट्टियों की कार्यकारिता का अध्ययन किया

### बिजली गुणवत्ता/हारमोनिक्स अध्ययन किया गया

- दक्षिणी रेलवे, चेन्नै के लिए चेन्नै से सेलम तक चलती गाड़ी में बिजली गुणवत्ता/हारमोनिक्स विश्लेषण का अध्ययन किया गया

### आयोजित किए गए अन्य प्रशिक्षण कार्यक्रम

विश्लेषणात्मक उपकरणों की मरम्मत एवं अनुरक्षण पर प्रौद्योगिकी आधारित उद्यमिता विकास कार्यक्रम (टीईडीपी)

आयोजनकर्ता	: सेवा एवं अनुरक्षण केन्द्र, चेन्नै
प्रायोजक	: डीएसटी, नई दिल्ली
प्रतिभागियों की संख्या:	14
अवधि	: 19 अगस्त - 16 अक्टूबर, 2002

अस्पताल के तकनीशियनों/ डॉक्टरों के लिए जैव-चिकित्सा उपकरणों की मरम्मत एवं अनुरक्षण पर चेन्नै, मदुरै तथा त्रिची में प्रशिक्षण कार्यक्रम

आयोजनकर्ता	: सेवा एवं अनुरक्षण केन्द्र, चेन्नै
प्रायोजक	: डीएसटी, नई दिल्ली
प्रतिभागियों की संख्या:	25-25
अवधि	: चेन्नै : 18-29 नवंबर, 2002 मदुरै : 16-27 दिसंबर, 2002 त्रिची : 27 जनवरी-07 फरवरी, 2003

- एनप्रो हाइटैक डिस्ट्रिब्यूटर्स (प्रा लि०), चेन्नै के लिए टी डब्ल्यू एंडी बोर्ड के एक पम्पिंग स्टेशन पर बिजली गुणवत्ता/हारमोनिक्स विश्लेषण का अध्ययन किया गया

### पूरे किए गए कार्य

- मैसर्ज सौराष्ट्र फ्यूल्स प्रा० लि०, पोरबन्दर, गुजरात की कोयला ओवन भट्टी की चिमनी से निकलने वाली गैस की मात्रा और तापमान का आकलन। इस अध्ययन का उद्देश्य चिमनी की गैस की ऊष्मा के प्रयोग से लगाए जाने वाले बिजली संयंत्र की क्षमता का मूल्यांकन करना था।
- रिजर्व बैंक ऑफ इंडिया, चेन्नै के केन्द्रीय वातानुकूलन संयंत्र के शीतित और संघनित जल परिपथ में जल प्रवाह मापन।

### उपकरणों का अंशांकन

केन्द्र ने विभिन्न क्षेत्रों के 332 उपभोक्ताओं को अंशांकन सेवाएं प्रदान कीं। प्रयोगशाला में विद्युत तथा अन्य प्राचलों जैसे तापमान, दाब, लंबाई, भार इत्यादि का मापन करने वाले उपकरणों का अंशांकन करने की सुविधाएं हैं। इस संबंध में प्राचल-वार राजस्व निम्नानुसार है :

### उपकरणों की सर्विस एवं अनुरक्षण

- राज्य सरकार के विभाग, सार्वजनिक क्षेत्र के उपक्रमों, शैक्षिक तथा अनुसंधान संस्थानों, सार्वजनिक परीक्षण प्रयोगशालाओं तथा संस्थानों के प्रयोगकर्ताओं द्वारा भेजे गए उपकरणों की मरम्मत एवं अनुरक्षण।
- वार्षिक अनुरक्षण संविदा (एएमसी) : उपचारात्मक अनुरक्षण द्वारा उपकरणों के प्रति समय को न्यूनतम करने के लिए सर्विसिंग।
- अत्यधिक कीमत अथवा अनुपलब्ध पुर्जों वाले उपकरणों में आवश्यक सर्किट आशोधन का डिजाइन एवं विकास कार्य।
- अधिष्ठापन तथा कमीशनिंग कार्य करना।

### कार्य

जीटीजेड को एडोप्टर्स के निर्माण सहित उपस्कर ईएम600/ईएम800 की जांच तथा ईएम600 तथा ईएम800 की परिशुद्धता की जांच का कार्य सौंपा गया।

इस कार्य में एडोप्टर्स के निर्माण, उनके लिए मोल्ड डाइ का डिजाइन एवं निर्माण, नमूने तथा प्लग व सॉकेट सहित ईएम 600 व ईएम 800 की

सटीकता की जांच के बाद इसके 200 जोड़ों का निर्माण शामिल है। कार्य सफलतापूर्वक पूरा किया गया।

### दिल्ली केन्द्र

सीएसआइओ के नई दिल्ली स्थित सेवा एवं अनुरक्षण केन्द्र की स्थापना भारत की राजधानी के उपकरण प्रयोगकर्ताओं की आवश्यकताओं को पूरा करने के लिए की गई थी। यह केन्द्र सीएसआइआर कॉम्प्लैक्स तथा राष्ट्रीय भौतिक प्रयोगशाला, पूसा नई दिल्ली में स्थित है। यह करोड़ों रुपये के उपकरणों को पुनः जीवन प्रदान कर उल्लेखनीय भूमिका निभा रहा है तथा इससे राष्ट्रीय संसाधनों की महत्वपूर्ण बचत हो रही है।

प्रारंभ में, केन्द्र का प्रमुख कार्य उपकरणों की मरम्मत एवं अनुरक्षण पर केन्द्रित था, किंतु समय के साथ-साथ इसके क्रियाकलापों में विभिन्न अनुसंधान एवं विकास कार्यक्रमों, मानव संसाधन विकास प्रशिक्षण तथा उपकरणों का वार्षिक अनुरक्षण संविदा आदि कार्य शामिल हो गए हैं।

अनुसंधान एवं विकास कार्यक्रमों में अन्य के अतिरिक्त तीन प्रायोजित परियोजनाओं यथा: नॉन लीनियर जंक्शन डिटेक्टर का विकास, इलेक्ट्रॉनिक स्टैथोस्कोप का विकास, रोबस्ट स्पीच रिकोगनीशन एंड ए टैक्सट टू स्पीच सिंथेसिस फॉर हिंदी पर कार्य चल रहा है।

### संविदागत सर्विसिंग

राजधानी क्षेत्र में विभिन्न उपस्करों की मरम्मत एवं अनुरक्षण के लिए कई संस्थानों/संगठनों को वार्षिक संविदा सर्विस उपलब्ध करवाई जाती है। रिपोर्टाधीन अवधि में संस्थान के लिए बाह्य संसाधन जुटाते हुए कुल मिलाकर 888 उपस्करों की मरम्मत की गई। जिन प्रमुख संगठनों/संस्थानों को सेवाएं प्रदान की गईं, वे हैं :

- कम्प्यूटर डिवीज़न, सीएसआइआर, नई दिल्ली
- डॉ. राम मनोहर लोहिया अस्पताल, नई दिल्ली
- दीन दयाल उपाध्याय अस्पताल, नई दिल्ली
- भारतीय प्रौद्योगिकी संस्थान, नई दिल्ली
- गुरु नानक आइ सेंटर, नई दिल्ली
- लेडी हार्डिंग मैडिकल कॉलेज एवं अस्पताल, नई दिल्ली
- सीजीएचएस, नई दिल्ली
- राष्ट्रीय भौतिकी प्रयोगशाला, नई दिल्ली

- ट्यूबरकलोसिस सैन्टर सोसाइटी, नोयडा
- एसडीटीओ, जिला ट्यूबरकलोसिस सैन्टर, बारासत, पश्चिमी बंगाल

## चण्डीगढ़ सेवा एवं अनुरक्षण प्रभाग

आयोजित प्रशिक्षण कार्यक्रम जैव-चिकित्सा उपकरणों के प्रचालन, अनुरक्षण एवं मरम्मत पर प्रशिक्षण कार्यक्रम

संगठन द्वारा पंजाब तथा चण्डीगढ़ के विभिन्न भागों में स्थित अस्पतालों के डॉक्टरों, पैरामैडिकल स्टाफ तथा तकनीशियनों

## आयोजित किए गए प्रशिक्षण कार्यक्रम

1. दिल्ली जल बोर्ड के कर्मचारियों के लिए 'उपकरण विन्यास के मूलभूत सिद्धांत' विषय पर दो दिवसीय प्रशिक्षण कार्यक्रम आयोजित किया गया। मै. ईसीआइएल, हैदराबाद द्वारा प्रयोजित यह कार्यक्रम 12-26 दिसंबर, 2002 को आयोजित किया गया एवं इसमें 14 प्रतिभागियों को प्रशिक्षित किया गया।
2. दिनांक 1.10.2002 से 31.3.2002 तक छह माह के कम्प्यूटर हार्डवेयर अनुरक्षण कोर्स का आयोजन किया गया। इस कोर्स में 17 प्रतिभागी उपस्थित हुए।
3. दिल्ली और उत्तर प्रदेश के विभिन्न अस्पतालों के तकनीशियनों/डॉक्टरों के लिए जून, 2002 से फरवरी 2003 तक जैव चिकित्सा उपकरणों की मरम्मत एवं अनुरक्षण पर सात विशेष प्रशिक्षण कार्यक्रम आयोजित किए गए। विभिन्ना स्थानों पर आयोजित इन कार्यक्रमों में कुल 175 प्रतिभागियों को प्रशिक्षण प्रदान किया गया।

इन कार्यों का वितरण निम्नानुसार है:

प्रशिक्षण केन्द्र का स्थान	अवधि
सीएसआइओ, सेवा एवं अनुरक्षण केन्द्र, दिल्ली	17-27 जून, 2002
जिला एमएमजी अस्पताल, गाजियाबाद	15-26 जुलाई, 2002
पीजीआइ, रोहतक	09-19 जुलाई, 2002
इंदिरा गांधी मैडिकल कॉलेज, शिमला	28 सितंबर - 08 अक्टूबर, 2002
सीएसआइओ, सेवा एवं अनुरक्षण केन्द्र, दिल्ली	28 अक्टूबर - 10 नवंबर, 2002
जिला सरकारी अस्पताल, बुलंदशहर	17-31 दिसंबर, 2002
जिला अस्पताल, अल्मोड़ा	14-24 फरवरी, 2002
प्रशिक्षित डॉक्टरों की कुल संख्या	: 41
प्रशिक्षित तकनीशियनों की कुल संख्या	: 134
प्रशिक्षित व्यक्तियों की कुल संख्या	: 175



के लिए विज्ञान एवं प्रौद्योगिकी विभाग, नई दिल्ली द्वारा प्रायोजित चार प्रशिक्षण कार्यक्रमों का आयोजन किया गया :

चण्डीगढ़	: 11-23 नवंबर, 2002
अमृतसर	: 9-29 दिसंबर, 2002
पटियाला	: 20-30 जनवरी, 2003
जालंधर	: 10-21 मार्च, 2003

प्रत्येक चिकित्सा कॉलेज/अस्पताल से 25 प्रतिभागियों ने इस कार्यक्रम में भाग लिया तथा उन्हें फोटोकलॉमीटर, सक्शन मशीन, स्पैक्ट्रोफोटोमीटर, ईसीजी मशीन, ऑथैलमोस्कोप, माइक्रोस्कोप, सैन्ट्रीफ्यूज मशीन, ऑटोक्लेव, फ्लेमफोटोमीटर, एक्स-रे मशीन, पीएच मीटर, बीपी मापक तथा स्टैथोस्कोप की मरम्मत एवं अनुरक्षण पर व्यावहारिक प्रशिक्षण प्रदान किया गया। सभी प्रतिभागियों को प्रयोजक अभिकरण द्वारा कून-किट भी उपलब्ध करवाए गए।

प्रो. जे. डी. विग, एफआरसीएस, प्रमुख, सर्जरी विभाग, पीजीआई, चण्डीगढ़ ने 11 नवंबर, 2002 को 2-सप्ताह के पहले प्रशिक्षण कार्यक्रम का उद्घाटन किया। डॉ. आइ. बी. सिंह, निदेशक, डीएसटी, नई दिल्ली ने इस अवसर पर अपने संबोधन में देश में स्वास्थ्य देखभाल प्रणालियों के संबंध में ऐसे कार्यक्रमों के लाभ एवं महत्व का उल्लेख किया।

डॉ. राम प्रकाश बाजपेयी, निदेशक, सीएसआइओ ने इस अवसर पर अतिथियों तथा प्रतिभागियों का स्वागत करते हुए संगठन में किए जा रहे अनुसंधान एवं विकास क्रियाकलापों की जानकारी दी।

### कम्प्यूटर हार्डवेयर अनुरक्षण कोर्स

मौखिक स्वास्थ्य विज्ञान, पीजीआई, चण्डीगढ़ ने दंत चिकित्सा कुर्सियों/इकाइयों/प्रणालियों के लिए केन्द्र को वार्षिक अनुरक्षण कॉन्ट्रैक्ट प्रदान किया गया। कॉन्ट्रैक्ट की अवधि के दौरान कुल 33 इकाइयों की मरम्मत की गई।

### चिकित्सा उपकरणों की मरम्मत की सहायता

केन्द्र ने पंजाब, हिमाचल प्रदेश, हरियाणा और जम्मू कश्मीर राज्यों में विभिन्न संगठनों/एजेंसियों को चिकित्सा उपकरणों की मरम्मत एवं अनुरक्षण की सहायता प्रदान की गई। इस अवधि के दौरान कुल 177 उपकरणों की मरम्मत की गई।

### जयपुर केन्द्र

- सेवा व अनुरक्षण केन्द्र, जयपुर ने राजस्थान राज्य में अस्पतालों के तकनीशियनों/डॉक्टरों के लिए जैव-चिकित्सा उपकरणों के निवारक रखरखाव एवं मरम्मत पर तीन प्रशिक्षण कार्यक्रमों का आयोजन किया:

जयपुर जनवरी 15-25, 2003

उदयपुर फरवरी 19-28, 2003

जोधपुर मार्च 20-29, 2003

उपरोक्त कार्यक्रम विज्ञान एवं प्रौद्योगिकी विभाग, भारत सरकार, नई दिल्ली द्वारा प्रायोजित किए गए थे।

- जैव उपकरणों की मरम्मत एवं अनुरक्षण पर 27 मई, 2002 से 22 जून, 2002 तक एक उद्यमिता विकास कार्यक्रम का आयोजन किया गया, जिसमें 19 व्यक्तियों ने भाग लिया। यह कार्यक्रम डीएसटी, नई दिल्ली एवं डीएसटी, राजस्थान सरकार द्वारा संयुक्त रूप से आयोजित किया गया था।

### प्रदत्त सेवाएं एवं अन्य सूचनाएं

- संविदा सेवा के अन्तर्गत सहित कुल 245 उपकरणों की मरम्मत की।
- सात एएमसी संतोषजनक ढंग से पूरे किए गए।
- एक्स-रे मशीन और विशेषज्ञता आधारित शीतित उपकरणों के क्षेत्र के क्रियाकलापों को विस्तारित किया गया।
- राष्ट्रीय टीबी नियंत्रण बोर्ड ने राजस्थान में स्थित समस्त टीबी निरोधक केन्द्रों से द्विनेत्री सूक्ष्मदर्शियों के एएमसी के लिए जयपुर केन्द्र की सेवाएं लेने के लिए निदेशित किया है।
- माननीय राष्ट्रपति द्वारा अकालग्रस्त क्षेत्रों के दौरे के दौरान उदयपुर जिले के कोटरा जनजातीय क्षेत्र में पीएचसी की एक एक्स-रे मशीन की अत्यन्त कम अवधि में मरम्मत की गई।

### एस एण्ड एम सैटरों द्वारा संयुक्त रूप से किए गए कार्य

1. वैज्ञानिक तथा चिकित्सा उपकरणों की मरम्मत के लिए म्यंमार में सीएसआइओ का कार्य

विविध प्रकार के वैज्ञानिक तथा चिकित्सा उपकरणों की सर्विसिंग में अपनी विशेषज्ञता को बांटने के लिए सीएसआइओ ने हाल ही में म्यंमार में वैज्ञानिक उपकरणों की मरम्मत का कार्य किया। चण्डीगढ़ तथा चेन्नै केन्द्रों के तीन विशेषज्ञों की टीम ने मई-जून, 2002 माह में छह सप्ताह के लिए म्यंमार का दौरा किया तथा निम्नलिखित संस्थानों में रूपये 1.00 करोड़ मूल्य के 84 उपकरणों की मरम्मत की:

- म्यंमार वैज्ञानिक तथा प्रौद्योगिकी अनुसंधान विभाग, यान्गोन् ;
- यान्गोन् प्रौद्योगिकी विश्वविद्यालय, यान्गोन् ;
- चिकित्सा अनुसंधान विभाग, यान्गोन् ; तथा
- आण्विक ऊर्जा विभाग, यान्गोन्।

इस कार्यक्रम का उद्देश्य म्यंमार के विज्ञान एवं प्रौद्योगिकी संगठनों को उनके वैज्ञानिक एवं प्रौद्योगिकी कार्यों में सहायता प्रदान करना तथा वैज्ञानिक तथा चिकित्सा उपकरणों की मरम्मत एवं अनुरक्षण में म्यंमार को आत्मनिर्भर बनाना था।

म्यंमार के विभिन्न वैज्ञानिक एवं प्रौद्योगिकी संगठनों में प्रलेखन, पुर्जो तथा विशेषज्ञता की कमी के कारण बड़ी संख्या में वैज्ञानिक उपकरणों तथा उपस्करों का प्रयोग नहीं किया जा रहा था।

अप्रैल, 2002 में यान्गोन् में संपन्न हुई 'इंडिया-म्यंमार ज्वाइंट वर्किंग ग्रुप फॉर को-ऑपरेशन इन साइंस एंड टेक्नोलॉजी' की प्रथम बैठक में वैज्ञानिक तथा चिकित्सा से संबंधित मरम्मत किए जाने वाले उपकरणों की पहचान की गई और इस कार्यक्रम में सहयोग के लिए दोनों देशों ने समझौते पर हस्ताक्षर किए।

सीएसआइओ की विशेषज्ञ टीम का दौरा आइसैक के अंतर्गत विदेश मंत्रालय, भारत सरकार द्वारा प्रायोजित किया गया तथा विज्ञान एवं प्रौद्योगिकी विभाग, भारत सरकार ने अंतरराष्ट्रीय यात्रा के लिए अनुदान प्रदान किया। विदेश मंत्रालय ने म्यंमार में उपकरणों की मरम्मत के लिए अपेक्षित पुर्जो तथा अन्य उपस्करों के लिए भी सीएसआइओ को निधि प्रदान की।

आगामी चरण में, सीएसआइओ का म्यंमार में वैज्ञानिक उपकरणों की मरम्मत एवं अनुरक्षण के लिए देश-व्यापी सुविधाएं स्थापित करने में सहायता प्रदान करने का प्रस्ताव है, जिसमें प्रशिक्षित कार्मिक तथा सुसज्जित अत्यधुनिक परीक्षण तथा मापन उपकरण, आवश्यक औजार, जिग्स तथा फिक्चर्स शामिल हैं। सीएसआइओ का म्यंमार में निजी उद्यमियों को स्थापित करने का प्रस्ताव है, जो इस विशेषीकृत कार्य के लिए अपने सेवा यूनिट स्थापित करेंगे।

## 2. जैव-चिकित्सा उपकरणों के प्रचालन, अनुरक्षण एवं मरम्मत पर 10वां प्रबंध विकास कार्यक्रम

संगठन में दिनांक 9-29 अक्टूबर, 2002 को तृतीय विश्व के देशों के प्रतिनिधियों के लिए जैव-चिकित्सा उपकरणों के प्रचालन, अनुरक्षण एवं मरम्मत पर 10वां प्रबंध विकास कार्यक्रम आयोजित किया गया। इस कार्यक्रम में सीशल्स, सीरिया, कीनिया, यूगांडा, कोलंबीया, मोजांबीक तथा मॉरीशस के 11 प्रतिनिधियों ने भाग लिया, इसे विदेश मंत्रालय, भारत सरकार, नई दिल्ली द्वारा प्रायोजित किया गया था। यह कुल 8 सप्ताह का कार्यक्रम था, जिसमें से प्रतिभागियों ने 4 सप्ताह दिल्ली केन्द्र, 1 सप्ताह जयपुर केन्द्र तथा शेष 3 सप्ताह सीएसआइओ, चण्डीगढ़ में प्रशिक्षण प्राप्त किया। प्रशिक्षण कार्यक्रम में थ्योरी के साथ-साथ व्यावहारिक प्रशिक्षण भी प्रदान किया गया। प्रतिभागियों को पीजीआई, सामान्य अस्पताल, एलैन्जर्स प्रा. लि., विरदी आइ हॉस्पिटल, रिकॉर्डर एंड मैडीकेयर सिस्टम्ज़, पंजाब विश्वविद्यालय तथा काइज़र हॉस्पिटल, पंचकूला जैसे विभिन्न संस्थानों में भी ले जाया गया।

सीएसआइओ जैव-चिकित्सा उपकरणों पर मार्च, 1994 से इस प्रकार के प्रशिक्षण कार्यक्रमों का आयोजन कर रहा है।

विदेश मंत्रालय, भारत सरकार ने इस प्रकार के अंतरराष्ट्रीय कार्यक्रम आयोजित करने के लिए सीएसआइओ एक नोडल केन्द्र के रूप में चुना है।

प्रोटीन/डीएनए के प्रभावी मात्रात्मक विश्लेषण के लिए उपभोक्ता सुलभ उपकरणों को लाना, जिसमें प्रोटीयोमिक्स वर्कस्टेशन, डीएनए माइक्रोएसै, क्वांटिटेटिव पीसीआर मशीन जीन एरेस प्रणालियां शामिल हैं, जिन्हें परम्परागत पद्धतियों के स्थान पर प्रयोग में लाया जा रहा है।

नवीन प्रौद्योगिकियाँ पूरे जीनोम को एकल चिप में मॉनीटरिंग को सुनिश्चित करती हैं, जिससे अनुसंधानकर्ता एक साथ हजारों जीनों की क्रियाओं की तस्वीर देख सकें।

## मानव संसाधन विकास

### इण्डो-स्विस प्रशिक्षण केन्द्र

स्विस फाउंडेशन फॉर टैकनिकल असिस्टेंस के सहयोग से स्थापित तथा केन्द्रीय वैज्ञानिक उपकरण संगठन, चण्डीगढ़ के नियंत्रणाधीन कार्य करने वाला इण्डो-स्विस प्रशिक्षण केन्द्र देश तथा विदेश के उद्योग जगत, अनुसंधान एवं विकास संस्थानों में तकनीकी शिक्षा के संरक्षक के रूप में प्रख्यात है।

इस केन्द्र का औपचारिक उद्घाटन दिनांक 18 दिसंबर, 1963 को तत्कालीन प्रधानमंत्री पं. जवाहर लाल नेहरू ने किया। केन्द्र उच्च कुशलता प्राप्त तथा सक्षम जनशक्ति के सृजन द्वारा औद्योगिक क्षेत्र की सेवा में तत्पर है। आईएसटीसी अपने नाम "इनोवेटिव- साइंटिफिक- टैक्नोलॉजिकल- कमिटमैट" के अनुरूप संपूर्ण राष्ट्र विशेषतः देश के प्रति निष्ठावान है।

### लक्ष्य

- प्रशिक्षणार्थियों को एक अलग पहचान देने के दृष्टिगत उन्हें विषय का पूर्ण ज्ञान देना तथा उद्योगोन्मुख व्यावहारिक प्रशिक्षण प्रदान करना
- प्रशिक्षणार्थियों में तार्किक सोच के साथ-साथ अनुशासन तथा उत्तरदायित्व की भावना सृजित करना, जिससे कि वे अपने नियोक्ताओं के लिए मूल्यवान हो सकें
- प्रशिक्षणार्थियों में उच्च श्रेणी का आत्मबल उत्पन्न करना, जिससे कि वे उद्यमिता सहित जीवन के सभी क्षेत्रों में सफल हो सकें
- सांस्कृतिक क्रियाकलापों, खेल-कूद, रोमांचक कार्यक्रम, एनसीसी कैम्पों, ट्रेकिंग तथा रक्तदान में प्रशिक्षणार्थियों की प्रतिभागिता को सुनिश्चित करते हुए उनके संपूर्ण विकास पर बल देना
- उनमें ऐसे गुण उत्पन्न करना, जिससे कि वे देश के बेहतर नागरिक बन सकें
- प्रशिक्षणार्थियों में व्यावसायिक स्पर्धा का विकास करना

### प्रशिक्षण पाठ्यक्रम

- उपकरण प्रौद्योगिकी में 3 वर्षीय डिप्लोमा
- मैकैट्रॉनिकी एवं औद्योगिक स्वचलन में 4 वर्षीय उच्च डिप्लोमा
- डाई एवं मोल्ड निर्माण में 4 वर्षीय उच्च डिप्लोमा

### इण्डो स्विस प्रशिक्षण केन्द्र का 37 वां दीक्षांत समारोह

आईएसटीसी का 37वां दीक्षांत समारोह दिनांक 2 अगस्त, 2002 को

आयोजित किया गया। इस समारोह में उपकरण प्रौद्योगिकी के 35, मैकैट्रॉनिकस एवं इण्डस्ट्रियल ऑटोमेशन के 16 और डाई एण्ड मोल्ड मेकिंग के 22 प्रशिक्षणार्थियों सहित कुल 73 प्रशिक्षणार्थियों को डिप्लोमा प्रदान किए गए।

इस अवसर पर सुश्री नीरू नंदा, सलाहकार, चण्डीगढ़ प्रशासक मुख्य अतिथि थीं। अपने दीक्षांत सम्बोधन में उन्होंने विद्यार्थियों का आह्वान किया कि वे जो भी करें, उसे उत्तम ढंग से करें और सर्वाधिक महत्वपूर्ण है अपने कार्य पर गर्व करना। दो उदाहरण देते हुए सुश्री नंदा ने कहा कि वे ऐसे युग का निर्माण करें, जिसमें उत्तम ढंग से कार्य करना गौरव का विषय हो। आईएसटीसी में प्रदान किए जाने वाले व्यावहारिक प्रशिक्षण की प्रशंसा करते हुए मुख्य अतिथि ने इसे व्यावहारिक और सैद्धांतिक ज्ञान का सुंदर संगम बताया, जो आईएसटीसी के प्रशिक्षुओं को इंजीनियरों की तुलना में बेहतर कौशल प्रदान करता है। अपने सम्बोधन के अन्त में उन्होंने विद्यार्थियों से भारतीय मूल्यों में विश्वास रखने की अपील की।

इससे पूर्व श्री एस आर तनेजा, कार्यकारी निदेशक, सीएसआईओ ने मुख्य अतिथि का स्वागत करते हुए आईएसटीसी की गतिविधियों पर प्रकाश डाला। उन्होंने विद्यार्थियों को डिप्लोमा प्रमाण पत्र भी प्रदान किए, जबकि मुख्य अतिथि सुश्री नंदा ने विभिन्न क्षेत्रों में श्रेष्ठ प्रदर्शन करने वाले विद्यार्थियों को पुरस्कार एवं पदक प्रदान किए।

### उपकरण प्रौद्योगिकी में डिप्लोमा

निदेशक स्वर्ण पदक : अभिजीत दास ;

प्राचार्य रजत पदक : देवेन्द्र कुमार

### मैकैट्रॉनिकी एवं औद्योगिक स्वचलन में उच्च डिप्लोमा

निदेशक स्वर्ण पदक : रणदीप चौधरी ;

प्राचार्य रजत पदक : युगेश सुनेजा

### डाई एवं मोल्ड मेकिंग में उच्च डिप्लोमा

निदेशक स्वर्ण पदक : सतिंदर सिंह ;

प्राचार्य रजत पदक : इंद्रजीत सिंह

### अन्य क्रियाकलाप

#### ● व्यक्तित्व विकास कार्यक्रम

प्रशिक्षणार्थियों के लिए 'व्यक्तित्व विकास' तथा 'संप्रेषण कौशल' पर संगोष्ठियों का आयोजन किया गया।

#### ● रक्तदान शिविर

यह आईएसटीसी का एक नियमित क्रियाकलाप है - दो रक्तदान

शिविर लगाए गए, जिनमें लगभग 250 विद्यार्थियों तथा स्टाफ सदस्यों ने रक्तदान किया।

### • एनसीसी एवं अन्य गतिविधियां

प्रशिक्षणार्थियों ने एनसीसी शिविरो तथा अन्य कार्यक्रमों में भाग लिया।

### • खेल

आइएसटीसी की क्रिकेट टीम को 7वीं काइनेटिक होण्डा लीग-कम-नॉकआउट टूर्नामेंट में रनर-अप घोषित किया गया।

### • नियुक्तियां

प्रतिष्ठित कंपनियों द्वारा शत-प्रतिशत प्रशिक्षणार्थियों को नियुक्ति प्रदान की गई।

### • अनुसंधान एवं विकास कार्यक्रम

आइएसटीसी के वैज्ञानिकों ने अध्यापन के साथ-साथ विभिन्न अनुसंधान एवं विकास कार्यक्रमों में प्रतिभागिता की।

### • तकनीकी सहयोग

उद्योगों को प्रैस टूल्स, मोल्ड इत्यादि के निर्माण की सेवाएं प्रदान कर तकनीकी सहयोग प्रदान किया गया। विभिन्न अनुसंधान एवं विकास परियोजनाओं में यांत्रिक घटकों के निर्माण तथा संयोजन में सक्रिय रूप से प्रतिभागिता।

## वैज्ञानिकों को पुरस्कार

### • डॉ. एम. ए. शम्शी, वैज्ञानिक 'जी'

डॉ. एम. ए. शम्शी को बचाव कार्यों के लिए इलैक्ट्रो-ऑप्टिक्स तथा एकाॅस्टिक तकनीक पर आधारित उन्नत उपकरण-विन्यास से संबंधित अनुसंधान, डिजाइन तथा विकास के क्षेत्र में उनके उल्लेखनीय योगदान के लिए वर्ष 2001 का 13वां आइईटीई पुरस्कार- 'हरि रामजी तोशनीवाल स्वर्ण पदक,' प्रदान किया गया।

डॉ. शम्शी ने 'प्राकृतिक आपदा निराकरण' के लिए उन्नत उपकरणों तथा डिजिटल डाटा टैलिमैन्टरी नेटवर्क का डिजाइन एवं निर्माण किया। उनके नेतृत्व में कई प्रौद्योगिकियों का विकास किया गया और तकनीकी ज्ञान को विपणन के लिए उद्योग को हस्तांतरित किया गया। वर्तमान में वे सिस्मिक एलर्ट प्रणाली तथा बचाव कार्यों

के लिए आधुनिक उपकरणों के विकास कार्य में लगे हैं। यह पुरस्कार मेधावी वैज्ञानिकों के लिए राष्ट्रीय पहचान है तथा इसमें एक स्वर्ण पदक तथा प्रशस्ति-पत्र शामिल है।

### • डॉ. एम. एस. एन. श्रीनिवास, वैज्ञानिक ई तथा श्री वी. एम. एल नरसिंहम्, एमीरिटस वैज्ञानिक

ज्ञान चंद्र स्मृति व्याख्यान प्रति वर्ष विज्ञान एवं प्रौद्योगिकी के क्षेत्र में स्व. श्री ज्ञान चंद्र जैन जी के योगदान की स्मृति में आयोजित किया जाता है। फाउंडेशन ने डॉ. एमएसएन श्रीनिवास तथा श्री वीएमएल नरसिंहम् को संयुक्त रूप से दिनांक 22 अक्टूबर, 2002 को अंबाला में 13वें ज्ञान चंद्र स्मृति व्याख्यान के अवसर पर 'साईटिस्ट ऑफ द इयर अवार्ड' प्रदान किया। यह पुरस्कार उन्हें 'हल्के लड़ाकू विमान के लिए हैड-अप-डिस्प्ले' के विकास में उनके योगदान के लिए प्रदान किया। इस अवसर पर डॉ. आर. चिंदम्बरम्, प्रधान वैज्ञानिक सलाहकार, आण्विक ऊर्जा विभाग, भारत सरकार भी उपस्थित थे।

### • श्री पी. एस. मल्होत्रा

संगठन के चिकित्सा रैखिक उपकरण प्रभाग के वैज्ञानिक प्रभारी श्री पी. एस. मल्होत्रा को विज्ञान में उनके उल्लेखनीय कार्य एवं भूमिका के लिए इंडिया इंटरनेशनल फ्रेंडशिप सोसाइटी, नई दिल्ली द्वारा "भारत ज्योति अवार्ड" प्रदान किया गया। यह पुरस्कार उन्हें 26 अक्टूबर, 2002 को मुंबई में प्रदान किया गया।

### • श्री आर. एन. सेनगुप्ता, वैज्ञानिक 'एफ'

संगठन के वैज्ञानिक श्री आर. एन. सेनगुप्ता को वर्ष 2002 का 'डॉ. म्युंग से किम्स अवार्ड फॉर एक्सीलेंस इन हाइपरथर्मिक ऑन्कोलॉजी' प्रदान किया गया। यह पुरस्कार उन्हें 'डिजाइन ऑफ एन एसिम्मैट्रिकल इन्ट्रकैवैटरी कैपेसिटिव एप्लीकेटर बेस्ड आर. एफ. हायपरथर्मिया एंड थर्मल मैपिंग' विषयक पेपर प्रस्तुत करने व इस संबंध में उनके अनुपम योगदान के लिए दिया गया। श्री सेनगुप्ता को यह पुरस्कार इंडियन एसोसिएशन ऑफ हाइपरथर्मिक ऑन्कोलॉजी द्वारा 5-6 अप्रैल, 2003 को मुंबई में आयोजित एक सम्मेलन में प्रदान किया गया।

## DATELINE

April 23-24, 2002	All India Seminar on Instrumentation for Agriculture
May 11, 2002	National Technology Day Celebration
June 4, 2002	Visit of Document and Evidence Sub – Committee on Parliamentary Official Language Committee
June 5, 2002	World Environment Day Celebration
June 5, 2002	Workshop on Preparation of Vermi Compost
June 6, 2002	Maiden Flight of LCA with CSIO Designed HUD
June 7, 2002	Visit of Parliament Standing Committee on Science & Technology, Environment & Forests
September 13, 2002	Hindi Day Celebration
September 26, 2002	CSIR Foundation Day Celebration
September 30-October 1, 2002	Nano-technology, 45 <sup>th</sup> Annual Technical Convention of IETE at CSIO
October 30, 2002	CSIO Foundation Day Celebration
November 11-12, 2002	Workshop on Environmental Monitoring Instruments
November 28-29, 2002	CSIR Programme on Youth for Leadership in Science
January 3-4, 2003	National Seminar on Technology Development in Aeronautics and its Impact on Maintenance
January 28, 2003	Visit of Prof MM Joshi, Hon'ble Minister for Science & Technology & Vice President , CSIR to CSIO <ul style="list-style-type: none"><li>• Inauguration of Seismological Observatory and Biomolecular Electronics &amp; Nano Technology Lab</li><li>• Foundation Stone Laying for ISTC Building</li><li>• Technology Transfer of Head Up Display to Bharat Electronics Ltd.</li></ul>
February 5-9, 2003	Head Up Display System displayed at the International Air Show held at Bangalore
February 16-18, 2003	Indo German Workshop on Nano & Nuclear Sciences in Electronics-Electrical-Medical and Environment
February 28, 2003	National Science Day Celebration

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## [ 1.4.2002 to 31.3.2003 ]

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### DG's NOMINEE

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[ 1.4.2002 to 31.3.2003 ]

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Director  
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Sector 30, Chandigarh

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Director  
Institute of Microbial Technology  
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Scientist  
Central Scientific Instruments Organisation  
Sector 30, Chandigarh

### **Dr Lalit M Bharadwaj**

Scientist  
Central Scientific Instruments Organisation  
Sector 30, Chandigarh

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### **Shri Kulvinder Singh**

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### **Shri SC Juneja**

Finance & Accounts Officer  
Central Scientific Instruments Organisation  
Sector 30, Chandigarh

## MEMBER-SECRETARY

### **Shri MR Masan**

Controller of Administration  
Central Scientific Instruments Organisation  
Sector 30, Chandigarh



**CSIR (India)**

### Core Values

- Team CSIR spirit
- Excellence in everything
- High Science & Technology
- Customer satisfaction

### Five Virtues of the New Millennium placed by Director General CSIR

- Child centered education
- Women centered family
- Human centered Development
- Knowledge centered society
- Innovation centered India

**CSIR**

## Diamond Jubilee Celebration

The Council of Scientific and Industrial Research (CSIR) entered into its Diamond Jubilee Year, completing 60 years on 26 September, 2002. It is a time, both to look back and to look forward for both celebration and soul-searching.

CSIR was established in 1942, with the primary objective of advancement of scientific knowledge and sustained industrial development of the country and has over the years, created a base of scientific capability and excellence spanning a wide spectrum of areas. CSIR has provided a strong scientific base to the nation and has been helping in the creation of a pool of trained S&T manpower.

CSIR today has grown into a well-knit and action oriented network of 39 laboratories, spread throughout the country with scientific activities in the relevant areas, ranging from ocean to sky. The laboratories have generated new knowledge and new products, processes and technologies in sectors ranging from healthcare to aeronautics, during its 60-years journey. India's largest research and development organization, today employees more than 22,000 persons.

With increasing globalization and entry of multinationals into the country, the CSIR is revamping itself to meet the new challenges. It is striving to make the country a global contributor of innovative technology from merely being a consumer of technology.

**A year long Diamond Jubilee Celebration has been organised in all constituent laboratories of CSIR in the country.**

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# Globally Competitive Research in Biomolecular Electronics & Nanotechnology

