

DRDO NEWSLETTER

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Civil spin-off: DRDO hands over Mountain Foot Bridge



VRDE gets Anti-lock Brake System Test Facility

Visitors to DRDO Laboratories



Shri GS Bhatnagar (4th from left), DG NAI, visited Proof & Experimental Laboratory, Chandipore, on 22 July 2014



Dr R Chidambaram (right), Principal Scientific Adviser to Govt of India visited Defence Laboratory, Jodhpur, during 5-6 July 2014



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INSIDE THE ISSUE

DRDO hands over Low Cost Foot Bridge for Mountain Region 4



IRDE develops Stabilised Electro Optic Sight 5

SA inaugurates Anti-lock Braking System Test Track 6

XXIInd Prof. DS Kothari Memorial Oration 7



DMRL Signs MoU with NIT Warangal 7

Manpower Development Activities 8

Raising Day Celebration 10



DLRL organised free Medical and Diabetic Camp 10

Personnel News 11

DRDO hands over Low Cost Foot Bridge for Mountain Region

A mountain foot bridge for civil applications developed by Research and Development Establishment (Engrs) [R&DE (E)], Pune a premier DRDO laboratory, was handed over by Dr R Chidambaram, Principal Scientific Advisor to Government of India on 17 July 2014 for public use near Himalayan Environmental Studies and Conservation Organisation (HESCO), Dehradun. Speaking on the occasion Dr Chidambaram highlighted the contribution of S&T agencies in improving lives of people in rural and remote areas.

Shri Avinash Chander, SA to RM, Secretary, Department of Defence R&D and DG, DRDO, in his message said, "DRDO is an innovation-based organisation and ensures that its technologies developed for armed forces are useful for public welfare as well. The technology of making Foot Bridges for armed forces developed by DRDO can be utilised to bring relief to the flood affected people. Handing over of two such bridges is an example of taking technologies to the people for larger benefit of masses. The low cost mountain foot bridge, costing just Rs 6.5 lakh, is easy to transport and deploy and expected to be of great help by making disaster hit regions accessible and thus facilitating relief and rescue work".

After Uttarakhand disaster in 2013, Dr Chidambaram during a visit to R&DE (E) suggested development of suitable low cost foot bridge for mountainous region. The bridge is an adaption of 35 m man-portable Mountain Foot Bridge (MFB) with a pathway of 0.8 m width developed for the armed forces by DRDO for bridging dry/wet gaps up to 35 m long especially in inaccessible high altitude regions.

The 13.5 m steel bridge for civil applications has a 1.5 m wide pathway and is launched using the launching system deployable within 2 to 3 hrs. Its launch does not require access to far-bank or elaborate site preparations and is therefore ideal in disaster situation.



From right: Shri Anil Datar and Dr Chidambaram during the handing over ceremony. Low cost mountain foot bridge (top)

The bridge developed for the armed forces is capable of bridging gaps up to 35 m and can withstand conditions prevailing in glacial regions. Its man-portable launching system allows bridge to be constructed from near-bank without any access to far-bank. The joints of the bridge facilitate easy assembly in cold conditions and it can be launched in about one hour. The bridge can withstand accumulation of fresh snow up to 250 mm having density up to 200 kg/m³.

Speaking on the occasion, Shri Anil Datar, DS and DG (ACS), DRDO, stressed on corporate social responsibility of DRDO and gave a brief account of contributions of DRDO in developing spin-off technologies. Dr Guruprasad, OS and Director, R&DE (E) chronicled the development of the bridge. Dr Anil Joshi, founder of HESCO, promised to work on delivering this technology to remote areas of Himalayas.

IRDE develops Stabilised Electro Optic Sight

Instruments Research and Development Establishment (IRDE), Dehradun, has developed a Stabilised Electro Optical Sight (SEOS) with two-axis stabilisation and integrated automatic video tracker facility. SEOS has three electro-optical sensors, viz., 3rd generation 3-5 μm (640 x 512 FPA) thermal Imager (TI) with optical zoom, colour day TV with optical zoom camera and eye-safe laser range finder (ELRF). The day TV camera and TI are having a narrow field of view (NFOV) of $0.8^\circ \times 0.6^\circ$ and wide field of view (WFOV) of $5^\circ \times 4^\circ$ with additional 2 X electronic zoom in TI. These sensors provide a recognition range of 7 km for a NATO type of target. ELRF provides range of the target from 200 m to 9995 m with an accuracy of ± 5 m.

The modular open architecture of gimbal facilitates the flexibility of mounting payloads (sensors) of different form factors and sizes without redesigning the gimbal or electronics. The system, with the 510 mm rotating diameter, 360 mm (width) x 502 mm (height), weighs 52 kg including all the sensors. The man-machine interface for EO sensors and servo control has been provided through a ruggedised programmable multi-functional 8.5 inch display which is readable under direct sunlight conditions also. The line of sight of the sensors can be steered by slewing the stabilised gimbal in azimuth and elevation direction with a joystick. The line of sight drift is fully controllable with auto drift, manual drift and zero drift compensation techniques.

A compact electronics hardware unit having optimal architecture with dimensions 212 mm x 205 mm x 132 mm has been designed to achieve maximum performance. Two powerful DSP processors has been used for signal processing, servo control algorithms and external interfaces. SEOS has been configured to facilitate integration with external systems through a serial link.

High degree of stabilisation for aerostat disturbance and for armored fighting vehicle disturbances in azimuth and elevation axis ensures blur-free image. The SEOS enables steering of line of sight with an azimuth angular freedom which enables the system operator to carry out independent surveillance over a wide area with target acquisition and tracking from a moving or static vehicle, with wide/narrow field of view in day and night. The sight is integrated with a robust automatic video tracker, to track the aerial and ground targets with the tracking accuracy of ± 3 pixels and maximum tracking rate of 0.1 mil/sec to 70 mil/sec.

The modular approach of this sight results into a quick customisation for different applications namely fire control solution for armoured fighting vehicles, surveillance from high speed boats and low altitude Aerostat, tracking system for quick reaction surface-to-air missile.



SA inaugurates Anti-lock Braking System Test Track

Shri Avinash Chander, SA to RM, inaugurated new Anti-lock Braking System (ABS) Test facility developed by Vehicles Research and Development Establishment (VRDE), Ahmednagar, on 14 July 2014. The facility helps in controlling vehicles during emergency braking at high speeds by unlocking the wheels and allowing traction control by distribution of requisite braking pressure to each wheel by an electronic control unit. It avoids skidding due to wheel lock which results in loss of control of the vehicle by the driver, causing serious accidents. The new facility simulates anti-lock braking system conditions on various types of vehicles—four wheelers, trucks, and tractor-trailer combination including two wheelers. Various low and high frictional surfaces have been created for dry and wet conditions, which a vehicle encounters during its lifecycle.

In his inaugural speech, Shri Avinash Chander said that the new automotive technologies are allowing high speed vehicles. Therefore it is critical and important for the government agencies to ensure the safety of occupants and road users. ABS is one of the technological innovations, which ensures the stability of vehicle when the brakes are applied. ABS also helps



Shri Avinash Chander inaugurating the ABS test track facility

in safe transportation of sensitive weapons used by defence forces. The new test facility will reduce the cost of testing of performance and endurance evaluation.

Dr Manmohan Singh, Director, VRDE, informed that test tracks are developed by VRDE mainly for defence vehicles applications. As the vehicle test tracks are available only at VRDE in the country, the facilities have been offered to automotive industries and are being extensively utilised by them for Central Motor Vehicle Rule certification and also for export homologation purpose. This state-of-the-art ABS facility will also help the tyre manufacturers to enhance their design features to improve the safety.



ABS track



A vehicle being tested on ABS Track

XXIInd Prof. DS Kothari Memorial Oration



Dr Chidambaram delivering the oration

Defence Laboratory (DL), Jodhpur, organised XXIInd Prof. DS Kothari Memorial Oration on 6 July 2014 to commemorate the fond memory of Prof. DS Kothari, the first SA to RM and founder of DL, Jodhpur. The oration was delivered by Dr R Chidambaram, Principal Scientific Adviser to Govt of India and former Chairman Atomic Energy Commission. Dr V Bhujanga Rao, DG (NS & M), DRDO, presided over the function.

Dr SR Vadera, Director, DL, welcomed the guests and briefed about the history behind the celebration of

Prof. DS Kothari Memorial Oration. He also highlighted the contributions made by Prof. Kothari in the field of science and education.

Dr V Bhujanga Rao, in his presidential address elaborated upon the dedication of Prof. Kothari for country's overall technological development by means of his scientific achievements. He also briefed about the R&D achievements of DRDO for Indian defence.

Dr Chidambaram delivered his oration on Need for Knowledge Economy for Development and Security. In his oration he emphasised on the requirement of technology development based on the challenges for country's security. He expressed that, as a country, we need to be better aware and confident of our abilities to cross the technology barriers that keep us from being best-in-class in the world.

On this occasion, Shri GL Baheti, Sc G, Shri Goda Ram, TO D and Shri NK Soni, TO B were conferred the Lifetime Achievement Award for their meritorious contributions in their respective field. Shri Ravindra Kumar, Sc G, proposed the vote of thanks.

DMRL Signs MoU with NIT Warangal

A Memorandum of Understanding (MoU) was signed between Defence Metallurgical Research Laboratory (DMRL), Hyderabad, and National Institute of Technology Warangal (NITW), on 8 July 2014 for collaborative research on materials. The agreement was signed by Dr Amol A Gokhale, OS and Director, DMRL, and Prof. T Srinivasa Rao, Director, NITW.

The scope of MoU includes collaboration in jointly identified research projects of mutual interest on materials, registration of scientists, JRFs and SRFs of DMRL for MTech and PhD, external registration of students at NITW subject to their meeting all the qualifying norms of NITW and usage of facilities in each other's institutions subject to their availability and as per the procedures of the respective institutions.



Dr Gokhale (left) and Prof. Srinivasa Rao with the MoU document

Manpower Development Activities

Conferences/Seminars/Symposia/Training Courses/Meetings

Training-cum-Awareness Programme

Defence Scientific Information and Documentation Centre (DESIDOC), Delhi, organised a training-cum-awareness programme on how to access e-resources in effective way on 15 July 2014. The awareness programme was attended by more than 150 officers of Delhi-based DRDO labs. Representatives of publishers, like IEEE, NPG, ACM, ASME, IHS Jane's, T&F, AIAA, Elsevier, AAAS/Science, besides experts from Eduserv, Informatics India, Knimbus and EBSCO imparted the training. Shri SK Jindal, Director, DESIDOC inaugurated the event. Shri Jindal highlighted the services provided by the DESIDOC and exhorted DRDO community to utilise these services optimally. The training was organised by Shri Yogesh Modi, Head, E-journals service.



Shri Jindal delivering the inaugural address

Course on Radar ECM Technologies and Systems

Defence Electronics Research Laboratory (DLRL), Hyderabad, conducted a course on Latest Trends in Radar ECM Technologies and Systems during 23-27 June 2014. The course was inaugurated by the Chief Guest Dr CG Balaji, Outstanding Scientist, DLRL. In his inaugural address, Dr Balaji highlighted the importance and application of latest trends in Radar ECM technologies in the field of electronic warfare. Thirty-two participants from different DRDO laboratories/

establishments attended the course. The broad topics covered during the course included radar design fundamentals and latest trends in radar system design, Missile seeker design with ECCM features, radar EW overview, design features of various modules in DRFM based ECM sub-system, etc.

Seminar for Young Scientists

Gas Turbine Research Establishment (GTRE), Bengaluru, organised the 19th in-house seminar for young Scientists on 5 July 2014. Dr K Tamilmani, DS and DG (Aero), DRDO, in his oration on Aero-Engine Development for Self-Reliance, elucidated the potential demand for aero-engines existing in the domestic market and monetary implications if imported.



Dr Tamilmani addressing the participants

Shri Suresh Babu S, Sc B, also delivered a lecture on Borescopic Inspection of Gas Turbine Engines, in which he highlighted the importance of in situ engine health monitoring.

Navotkarsh-2014

Navotkarsh-2014, a special training programme deliberated for DRTC personnel to enable to face the assessment board in an effective way was organised by Institute of Nuclear Medicine and Allied Sciences (INMAS), Delhi.



Dr (Mrs) Chitra Rajagopal, Director, Centre for Fire, Explosive and Environment Safety (CFEES), Delhi inaugurated the training programme. Shri SC Narang, Ex-Chairman, Centre for Personnel Talent Management, (CEPTAM); Dr Rajeev Vij, Sc F, INMAS; Dr Vineet Dwivedi, Scientific Analysis Group (SAG), Delhi; Smt Sumati Sharma, Defence Scientific Information and Documentation Centre (DESIDOC), Delhi and Dr Ravinder Yadav, Defence Institute of Psychological Research (DIPR), Delhi gave presentations and tips to the participants.

Course on Certificate in Project Management

A five-day course on Certificate in Project Management (CIPM) was conducted by Institute of Technology Management (ITM), Mussoorie, during 23-27 June 2014 at TTC Bengaluru. The objective of the course was to acquaint the participants with fundamentals of Project Management and various Tools and Techniques of Project Management so that they



L-R: Dr SB Singh, Dr Malakondaiah, Dr Tamilmani and Dr Ramanarayan at the inaugural session of the course

can contribute more effectively in time-bound projects of DRDO. The course was inaugurated by Chief Guest Dr G Malakondaiah, DS and CC R&D (HR) and Dr K Tamilmani, DS and DG (Aero) in presence of Dr CP Ramanarayan, OS and Director, GTRE and Dr SB Singh, Director, ITM. An exam was also conducted to assess the absorption of knowledge level for award of certification by International Institute of Projects and Programme Management and ITM.

Science Council Meeting

Research Centre Imarat (RCI), Hyderabad, organised its first Science Council Meeting on 3 July 2014. Shri G Satheesh Reddy, OS and Director, RCI, presided over the function. As part of the objective of the meeting two lectures on Sensing and Flying: A Multidisciplinary View of an Insect Flight by Dr Sanjay Sane, and Ancient India's Contributions to S&T by Shri Ved Veer Arya, DFA, were organised.

Workshop on Recent Trends in Hardware-in-Loop Systems

Research Centre Imarat, Hyderabad, organised one-day workshop on Recent Trends in Hardware-in-Loop Systems (HILS) on 10 July 2014. Shri G Satheesh Reddy, OS and Director, RCI inaugurated the workshop. Dr N Prabhakar, DS and CC R&D (SAM) was the Chief Guest on the occasion. Shri MV Dhekane, Dy Director, CGSE, Vikram Sarabhai Space Centre, was the Guest of Honour. Shri L Sobhan Kumar, Technology Director and Organising Chairman, welcomed the participants and spoke about the objective of the workshop.

Shri Satheesh Reddy, emphasised about introduction of futuristic technology in HILS and integrated HILS to remove any uncertainty. Shri MVKS Prasad, Sc F, presented current status and future plans of HILS in RCI. Six invited talks were delivered by the eminent experts in the areas of HILS for launch vehicles and satellite systems, HILS solutions, real-time radar target simulator based on DRFM and real-time operating system concepts. A panel discussion under the chairmanship of Dr Prabhakar was also conducted to lay a roadmap for future HILS. Shri Pramod Kumar Jha, Sc E, was the Organising Secretary of the workshop.

Workshop on Indigenous Development of On-board Sensors

Research Centre Imarat, Hyderabad, organised Workshop on Indigenous Development of On-board Sensors on 14 July 2014. Dr SB Gadgil, OS, RCI, in his welcome address stressed on the need to indigenise the on-board sensors. Shri G Satheesh Reddy, OS and Director, RCI, in his inaugural address elucidated the importance of the

different types of sensors for various missile projects. About 155 delegates participated in the workshop. Dr Rajanna, Indian Institute of Science, Bengaluru delivered lectures on strain sensors, vibration and shock sensors. Dr Hari Kumar, VSSC, Trivandrum, highlighted importance of on-board sensors. Dr A Lingamurthy, ANURAG Cell, Bengaluru, emphasised the need for MEMS-based pressure transducers. The workshop concluded with panel discussion and roadmap in all areas of on-board sensors.

Raising Day Celebration

Defence Scientific Information and Documentation Centre (DESIDOC), Delhi, celebrated its 44th Raising Day on 30 July 2014. Dr Kiran Bedi, IPS (Retd), was the Chief Guest of the function and delivered Raising Day Oration on Women Empowerment. Dr G Malakondiah, DS and CC R&D (HR) was the Guest of Honour on the occasion. Shri SK Jindal, Director, DESIDOC, welcomed the distinguished guests and presented achievements of the DESIDOC during the last year. Dr Malakondiah appreciated the efforts made by DESIDOC to fulfill the projects completed in the recent past. Various DRDO laboratory-level awards and sports awards were distributed on the occasion. The programme ended with the presentation of a cultural programme by the DESIDOC personnel.



Dr Kiran Bedi lighting the lamp

Shri Ashok Kumar, Associate Director, DESIDOC, proposed the vote of thanks.

DLRL organised free Medical and Diabetic Camp

Defence Electronics Research Laboratory (DLRL), Hyderabad, organised a free Medical and Diabetic Camp on 16 July 2014. Medical Staff of Hyderabad Nursing Home conducted BP and Sugar tests. Shri SP Dash, DS and Director, DLRL, visited the camp and enquired about the health problems of employees.

About 310 employees took benefit of the camp. DLRL Works Committee and Dr LK Kalyan, Medical Officer, DLRL, co-ordinated the camp.



Personnel News

Appointments

ASL, Hyderabad



Dr Tessa Thomas, Outstanding Scientist, has been appointed, Director, Advanced Systems Laboratory (ASL), Hyderabad.

Dr Thomas obtained her BTech in Electrical Engineering from Calicut University in 1985 and ME in Guided Missiles from Institute of Armament Technology (now Defence Institute of Advance Technology), Pune, in 1986. She obtained MBA in Operations Management from Indira Gandhi National Open University (IGNOU), New Delhi, in 2007 and PhD in Missile Guidance from Jawaharlal Nehru Technological University (JNTU), Hyderabad. She has also been conferred Doctor of Science (*Honoris Causa*) in Space Science by Kalyani University, West Bengal, in 2012 and Doctor of Science (*Honoris Causa*) by Mangalayatan University, Aligarh in 2012.

Dr Thomas started her career as Sc B from IAT, Pune, in 1986. In February 1988, she moved to Defence Research and Development Laboratory (DRDL), Hyderabad, and was associated with guidance design and HILS of Agni missile systems. In 1992, she moved to RCI, Hyderabad, where she designed an explicit guidance design for solid propelled missile Agni 2. Later, she moved to ASL and since then has been contributing in the field of mission design and explicit guidance design for all Agni systems (Agni 1 to Agni 5). She has designed and developed 6 DoF trajectory simulation for all Agni systems. In her career spanning 27 years, she has contributed in various fields such as guidance, control, inertial navigation, trajectory simulation and mission design.

As Project Director, Agni 4, she heralded a new set of technologies leading to quantum jump technologies

and brought world comparable mass fractions for the Indian long-range missile systems with the development of composite rocket motor casing for the first time in the country.

As Project Director (Mission), Agni 5, she designed a 3-stage all-solid system guidance, which resulted in high impact accuracy. As a project and technology leader, she has played a major role in strategic mission planning and infrastructure development.

Dr Tessa Thomas is the recipient of many prestigious awards including: DRDO Agni Award for Excellence in Self-Reliance-2001; DRDO Award for Pathbreaking Research/Outstanding Technology Development-2007; DRDO Scientist of the Year Award-2008; DRDO Performance Excellence Award for Agni 4 in 2011; DRDO Performance Excellence Award for Agni 5 in 2012; Lal Bahadur Shastri National Award for Excellence in Public Administration Academics and Management-2012; Suman Sharma Award by The Institute of Engineers (India), National Design and Research Forum for Engineering Design in 2009; Smt Chandaben Mohanbhai Patel Industrial Research Award for Women Scientists-2009 by VASVIK; Maharana Udai Singh Award-2013 by Maharana Mewar Foundation Annual Awards for Contribution in the field of S&T; Madam Marie Curie Mahila Vijnana Puraskar-2012; India Today Woman of the Year Award-2009; CNN-IBN Indian of the Year Award-2012; Outstanding Woman Award by National Commission for Women on International Women's Day-2013; Shree Ratna Award by Kerela Kalakendram on International Women's Day-2014; Empowering Woman-2014, Limca Book of Records Award, etc.

She is a Fellow of Indian National Academy of Engineering (INAE), Associate Fellow of Andhra Pradesh Academy of Science (APAS) and Life Member of Astronautical Society of India (ASI), Aeronautical Society of India (AeSI), Indian National Society for Aerospace and Related Mechanisms (INSARM), and Indian Society for Advancement of Materials and Process Engineering (ISAMPE).

SAG, Delhi



Dr G Athithan, Outstanding Scientist, has assumed the appointment of Director of Scientific Analysis Group, (SAG), Delhi, wef 1 August 2014.

Dr Athithan received his BE (Hons) degree in Electronics and Communications in 1981 from Madras University and PhD degree in Physics (Neural Networks) in 1997 from the Indian Institute of Technology, Bombay. In August 1982, he joined the Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam, where he worked in the field of computer graphics, computer aided design, and modelling of Penrose patterns and crystal structures.

In October 1988, he joined the Advanced Numerical Research and Analysis Group (ANURAG), Hyderabad, where he continued his work on computer graphics besides taking up projects on data visualisation, parallel processing, and neural networks. His R&D efforts in ANURAG contributed to the development of ANAMICA and other software for medical and scientific data visualisation and also to the design and productionisation of PACE series of parallel computers. As project coordinator to design and implement an Intranet for DRDO, he contributed to the setting up of the first version of DRONA network. During this tenure he obtained his PhD degree for his work on solving two fundamental problems of the Hopfield model of human memory.

From June 2000 onwards he was with the Centre for Artificial Intelligence and Robotics, Bengaluru, working in the field of Information Security. As the Project Director of a major initiative to develop Information Security Technologies and Solutions, he brought out a suite of products for preventive and reactive security requirements of the customers of DRDO. In particular, he developed the concept of information security overlay and applied it as a successful model for protection of two tactical C3I networks of the Indian Army. Since January 2013, he is with SAG and has made contributions to the framing of the DRDO Information Security Procedures and guidelines as well as to the drafting of the Cyber Security section of the Long Term Technology Perspective Plan.

His current research interests include Information Security Management, Computational Intelligence, Network Data Mining, and Cyber Security Technologies. He has guided two scientists towards their PhD and three scientists towards their MS (Engg) research degrees in reputed institutions of the country. He has participated in a number of international and national conferences and workshops, and has published about 25 papers in journals and about 30 papers in conference proceedings.

Dr Athithan was selected as a Young Associate of the Indian Academy of Sciences in 1989. He received the Scientist of the Year award from DRDO for the year 1998. He received the R&D Excellence Award for year 2006 from Bharat Electronics Ltd. During 2005 he became a senior member of the IEEE. As the leader of his team, he received the Agni Award for Excellence in Self-Reliance for the year 2008.

Award

DMRL, Hyderabad



Dr Ashim Kumar Mukhopadhyay, Sc G, DMRL, Hyderabad, has been elected Fellow of ASM International Society in recognition of his sustained and significant technical and scientific contributions in the areas of physical and mechanical metallurgy of aluminium alloys, and for development and commercial production of these materials for structural application.

Higher Qualification Achieved

DFRL, Mysore



Shri Johnsy George, Sc D, Defence Food Research Laboratory (DFRL), Mysore, has been awarded PhD for his thesis entitled investigation on Water Soluble Polymer based Nano Composites Using Bacterial Cellulose Nanocrystals and Organically Modified Nanoclays as Reinforcing Fillers from Visvesvaraya Technological University, Belgaum, Karnataka.