

DRDO NEWSLETTER

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***DRDO conducts text book flight
of Panchi, the wheeled UAV***



CAS inaugurates Computerised Pilot Selection System



Top: Air Chief Marshal Arup Raha cutting the ribbon of the newly established Computerised Pilot Selection System building at 2 Air Force Selection Board, Mysore. Centre: Chief of the Air Staff with personnel from the Air Force, Defence Institute of Psychological Research and Aeronautical Development Establishment in the Cognitive Testing Hall. Bottom: Chief of Air Staff in the CPSS cockpit in the Psychomotor Hall.



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DRDO conducts successful Maiden Flight of Panchi



Panchi taxiing before its maiden flight

Panchi, the wheeled adaptation of tactical Unmanned Air Vehicle (UAV) Nishant, had its maiden flight on 24 December 2014. The aircraft took off at 0930 am from the runway at Kolar, with the external pilot in loop, and flew for 25 minutes before making a safe and successful landing. The aircraft demonstrated excellent handling quality at every stage of flight.

The wheeled version, realised by Aeronautical Development Establishment (ADE), Bengaluru, within a record time of eight months, provides flexibility to the

Defence forces to launch the vehicle in a quick time in the interested sector of surveillance from limited/semi prepared runway of about 500 meters, The wheeled version is capable of providing more than four hours of endurance and can track any ground vehicle, as small as motor cycle, at a range of 165 km.

With the successful demonstration of conventional take-off and landing, the aircraft will undergo optimisation of structural modification that would lead to higher endurance and better performance.

CAS Inaugurates Computerised Pilot Selection System

Chief of Air Staff, Air Chief Marshal Arup Raha, PVSM, AVSM, VM, ADC, inaugurated the Computerised Pilot Selection System (CPSS) developed by DRDO on 28 November 2014 at 2 Air Force Selection Board, Mysore. The event was marked by the presence of high ranking officials from DRDO and the Indian Air Force. Dr K Tamilmani, Distinguished Scientist (DS), DG (Aero), DRDO and Dr Manas K Mandal, DS, DG (Life Sciences), DRDO and Air Marshal S Sukumar, AVSM, VM, Air Officer-in-Charge, Personnel, Air HQ, were among the dignitaries present on the occasion. The event also marked the opening of the new selection system at 1 Air

Force Selection Board (AFSB), Dehradun and 4 AFSB Varanasi through live streaming via AFNET. The Board Presidents Air Cmde OP Tewari, AOC 2 AFSB, Mysore, Air Cmde SW Gosewade, VM, AOC, 4 AFSB, Varanasi and Air Cmde Nitin Sathe AOC, 1 AFSB Dehradun, briefed on the progress made in their respective boards.

Dr K Ramachandran, Director, Defence Institute of Psychological Research (DIPR) and Shri P Srikumar, DS, Director, ADE, Bengaluru, apprised the CAS about the parallel run at these boards and the installation of CPSS at all three boards at Mysore, Dehradun and Varanasi.



CAS Raha in CPSS cockpit

In his inaugural address ACM Raha said, "CPSS is a modern facility and a lot of team work between the DRDO, IAF and DIPR has gone into it and the three organisations have worked and produced something that is operationally relevant for testing the young people for flying". It is a major step towards ensuring the safety of our skies. Only the best of the lot can fully exploit the potential of the ultra modern technology being inducted in to the IAF to establish itself as a power to reckon with in South East Asia", added CAS.

Indigenous On-board Oxygen Generating System-based Integrated Life Support System for Tejas

The ILSS-OBOGS, indigenous on-board oxygen generating system (OBOGS)-based integrated life support system (ILSS), designed and developed by Defence Bio-medical and Electromedical Laboratory (DEBEL), Bengaluru, to provide enhanced physiological protection to aircrew of high speed and high altitude fighter aircraft Tejas with primary objective of meeting long endurance flights was handed over by Dr VC Padaki, Outstanding Scientist (OS), Director, DEBEL, to Dr PS Subramaniam, DS, Programme Director, Combat Aircrafts and Director Aeronautical Development Agency (ADA), Bengaluru. Dr K Tamilmani, DS, DG (Aero), DRDO, and Dr Manas K Mandal, DS, DG (Life Sciences), DRDO, and Directors of Bengaluru-based laboratories were present during the ceremony.

Congratulating the team Dr Avinash Chander, SA to RM, Secretary, Department of Defence R&D and



Dr Padaki (left) handing over the OBOGS to Shri Subramaniam

DG DRDO lauded the achievement and said that development of ILSS-OBOGS is a major achievement and shows DRDO's commitment to deliver complex technologies to our armed forces.

Emphasising the role of working together towards development of multi-disciplinary systems Dr Mandal said, "Deliverability comes only if there is multi-disciplinarity. Individuals

do not make a team, the team makes an individual."

Dr Tamilmani, emphasised the importance of synergy and lauded the dedicated work of the young team of scientists and said, "Technology breakthrough for OBOGS for future airborne platforms is now within our capability".

Dr Subramaniam appreciated the role played by different stakeholders in the development of ILSS-OBOGS. Designed to get integrated within the confined



space available in the aircraft, the OBOGS replaces the liquid oxygen-based system using bleed air from aircraft engine by separating oxygen from other components using technology based on Pressure Swing Adsorption (PSA). Designed to provide breathing gas to aircrew continuously, OBOGS technology offers advantage of unlimited endurance in the sky unlike liquid oxygen system wherein endurance is limited by the storage capacity. In addition, it also provides improved safety, reduced logistics and significantly lowered operational costs. The advanced ILSS-OBOGS addresses in-flight Hypoxia (during high altitude flying and emergency escape) and gravity induced loss of consciousness (G-LOC) during high G manoeuvres.

The technology consists of On-Board Oxygen Generation System (OBOGS) that provides oxygen for breathing, a breathing regulator that supplies

the breathing gas to the aircrew at desired flow and pressure, an anti G valve (AGV) that inflates the anti G suit to apply desired counter pressure and an Electronic Controller Unit (ECU) to coordinate various functions. A dedicated solid-state oxygen sensor to sense oxygen concentration in the breathing gas is an integral part of the system.

Many other sub-systems that provide back-up/redundancy and also impart life support during emergency escape, are integral part of the ILSS-OBOGS that will now undergo ground fitment trials on Tejas, followed by flight trials. The ILSS-OBOGS has the versatility to be customised to the needs of other Indian fighter aircraft like MiG-29, Sukhoi-30 Mk1 and Mirage-2000. India will join the elite club of five countries who have established and mastered ILSS technology once the trials are successfully completed.

Successful Flight trial of Pinaka Mk-II Artillery Rocket

The Pinaka Mark-II rocket developed by Armament Research and Development Establishment (ARDE), Pune, was successfully test fired during 9-12 December 2014 at Proof and Experimental Establishment (PXE), Balasore. Rockets were fired for different ranges covering 20 km to 60 km. Pinaka Mk-II is an advanced version of the unguided Pinaka Multibarrel Rocket System wherein the firing range has been enhanced to 60+ km from the existing 38 km.

The rocket incorporates a high performance solid rocket propulsion system and advanced stabiliser system with six flat fin configuration developed by ARDE. The energetic propellant has been developed by High Energy Materials Research Laboratory (HEMRL), Pune. Pinaka Mk-II uses in-service warheads and fuzes and existing ground systems with minor modifications in Launcher, Loader Cum Replenishment (LCR) vehicle, Replenishment vehicle (RV) and Battery Command Post. Demonstration of the strike capability of Pinaka Mk-II rocket beyond 60 km is a landmark in the field of unguided rocket artillery.

Another milestone was reached when turbo generator-based Electronic Time Fuzes for artillery rockets developed in-house functioned satisfactorily,



Pinaka Mk-II

meeting the designed parameters during the dynamic trials. Flight performance of the entire mission, covering from low range to high range along with turbo generator-based ET Fuze was captured by telemetry and tracking radars of PXE and ITR achieving all the mission objectives.

Dr Mandal inaugurates New Admin Building of DRL



Dr Mandal inaugurating the Administrative Building of DRL, Tezpur

Dr Manas K Mandal, DS, DG (Life Sciences), DRDO, inaugurated the new Administrative Building of Defence Research Laboratory (DRL), Tezpur on 5 December 2014 in its technical premises in presence of Dr Lokendra Singh, OS, Director (Admin and Tech), Office of DG (Life Sciences); Dr Vijay Veer, Director, DRL, Tezpur; Dr Bhuvnesh Kumar, Director (PM), Office of DG (Life Sciences), all officers and staff of

DRL, Tezpur. The new Administrative Building of DRL is a state-of-the-art three storey building comprising a conference hall as well as an exhibition hall. Dr Vijay Veer in his welcome address said pending demand of the laboratory has been fulfilled and the building will cater to the needs of the officers and staff. CCE (R&D) East, Kolkata monitored the overall construction of the building with PMU, Tezpur.

RAC goes Online for Campus Selection

On the successful implementation of online activities for various selection programmes (recruitment and assessment) through Intranet and Internet for last more than four years, RAC conducted Computer Based Screening Test (CBST) on 4 January 2015 in 48 institutes (16 IITs, 30 NITs, IISc and DIAT) for the selection of Scientist B in DRDO under Campus Selection Scheme. The test was conducted for six subjects/disciplines, viz., Computer Science, Electronics, Aerospace, Electrical, Mechanical and Instrumentation Engineering and more than 3000 students from across the country appeared for the same.



Online test in progress

New Generation Electronic Warfare Equipment Integrated on Tejas

An advanced electronic warfare suite (EW suite) developed by Defence Avionics Research Establishment (DARE), a DRDO laboratory specialising in avionics and electronic warfare systems for combat aircraft, flew for the first time on-board the Tejas PV1 light combat aircraft (LCA) on 10 January 2015 at Bengaluru.

In addition to the Radar Warner, the tested EW suite is also equipped with Jammer, which gives the pilot an additional capability of nullifying the effect of detected radar threat by appropriate mode of jamming. Existing systems, fitted on various combat aircraft, are basic EW equipment known as Radar Warner Receiver to provide warning to pilot in case of detection of a radar threat.

After obtaining due flight clearances and certification, the first flight sortie of LCA PV1 with the EW equipment

detected radar signals operating in and around the flight path.

Dr Avinash Chander, SA to RM, congratulated the team on the achievement and said that the warfare suite adds an important capability to our LCA. Shri SS Sundaram, DS, DG (ECS), DRDO, called it a New Generation Electronic Warfare Equipment Integrated on Tejas. Ms J Manjula, OS, Director, DARE, said that LCA is the first fighter aircraft of India fitted with a Radar Warner and Jammer equipment. It has capability for both radar warning and jamming using a unified EW technology.

Over the coming months, Aeronautical Development Agency (ADA) and DARE will carry out further sorties to evaluate the system in various signal scenarios.

CAIR celebrates Raising Day

CAIR, Bengaluru

Center for Artificial Intelligence and Robotics (CAIR), Bengaluru, celebrated its Laboratory Raising Day and Karnataka Rajyotsava with lot of enthusiasm on 22 December 2014. The function started with an Invocation Song followed by welcome address by event chairperson Smt Padma Desiraju, Sc G.

Shri Sanjay Burman, OS, Director, CAIR, welcomed the Chief Guest Smt Usha Ganesh, IAS (Retd), and CAIR employees. This was followed by address by the Chief Guest. DRDO laboratory-level and Director's Commendation Awards were distributed to the meritorious employees.

The afternoon session, open for family members, was dedicated to Karnataka Rajyotsava celebration and technical exhibition. Dr Rajendra P Joshi and Dr JA Ananda Alwar, Koramangala Wellness Center, were the Chief Guests for the session. Dr Joshi delivered a talk



Smt Usha Ganesh inaugurating the CAIR Raising Day function with lighting the lamp

on Stress Management. Shri N Sitaram, former DS and CC R&D (ECS), DRDO, also attended this session. The ceremony concluded with a colourful cultural programme performed by the employees and their children.

Manpower Development Activities

Conferences/Seminars/Symposia/Training Courses/Meetings

All India Hindi Technical Workshop

Aerial Delivery Research and Development Establishment (ADRDE), Agra, organised one-day Hindi technical workshop on Quality Control, Assurance, Development and Certification of Indigenous Defence Products and Services on 28 November 2014.



Workshop CD being released

The workshop was inaugurated by Dr SC Sati, OS, Director, ADRDE, Agra. In his inaugural speech, Dr Sati explained the importance of quality and certification for indigenous defence products with stress on planning for Make in India. The workshop was coordinated by Shri Rajeev Jain, Sc F and Shri Arvind Kaushik, Sc C.

Symposium on Talent Management

Centre for Personnel Talent Management (CEPTAM), Delhi, organised a symposium on Talent Management in R&D Organisations: Present Practices and Future Challenges, during 12-13 December 2014 at Dr S Bhagvantham Auditorium, Metcalfe House, Delhi. Symposium was inaugurated by Prof. DP Agrawal, former Chairman, UPSC. Dr DN Reddy, Chairman, Recruitment and Assessment Centre (RAC), DRDO, Dr Gurbachan Singh, Chairman, Agriculture Scientist Recruitment Board (ASRB), Dr Malakondaiah, DS, CC R&D (HR), DRDO, Shri Rajwant B Singh, Chairman, CEPTAM, were among the dignitaries present during the inaugural function. Shri Sudhir Gupta, Director, CEPTAM welcomed the dignitaries and delegates. In his inaugural address, Prof. Agarwal emphasised on acquisition of the right talent to achieve the goals of the Organisations.

Dr Gurbachan Singh delivered keynote speech on the talent acquisition and career progression schemes. Dr DN Reddy emphasised on the need of talent management in R&D organisation. Dr G Malakondaiah highlighted the importance of HRD in R&D organisation. Shri Rajwant B Singh exhorted the need of symposium



Release of Souvenir on Symposium on Talent Management

on talent management. Around 25 eminent speakers, 283 delegates from DRDO and 29 delegates from other government/autonomous organisations/academic institute and private sectors participated in the symposium. A Souvenir was also released at the inaugural session.

The theme of symposium was based upon four main issues of HRD, namely, Talent Acquisition and Recruitment Practices, Performance Evaluation and Career Progression, Skill Enhancement and Training Methodologies, and HR Management as Integrated Approach (Policies, Retention, Motivation, Commitment, Succession Planning etc.)

Each session was chaired by DRDO experts and eminent speakers shared their views and experiences on various topics. There was an open discussion on lectures at the end of each technical session. Around 24 poster paper presentation was made by authors of the specified technical sessions. The valedictory session was headed by Shri SC Narang, former Chairman, CEPTAM, accompanied by Shri Rajwant B Singh, Chairman, CEPTAM, Shri RK Jain, OS, Director, RAC, Dr (Smt) Hina A Gokhle, Director, DHRD, and Shri Sudhir Gupta, Director, CEPTAM. There was an open session and deliberation regarding symposium. The symposium ended with the vote of thanks by Dr Ganga Prashad, Convener of the Symposium.

National Conference on Condition Monitoring

Combat Vehicles Research Development Establishment (CVRDE), Chennai and CMSI, Visakapatnam, jointly conducted National Conference on Condition Monitoring during 18-19 December 2014. The conference was inaugurated by the Chief Guest, Dr APJ Abdul Kalam, former President of India. He also delivered the keynote address. Dr Kalam dwelt at length



Dr APJ Abdul Kalam inaugurating the Conference on Condition Monitoring

on the importance of Condition Monitoring in Vehicles and the concept of Integrated Vehicle Health Monitoring for improved reliability. He discussed about Internet of Things (IOT) for better management of faults and use of encryption to transfer data over internet. Dr Kalam released a Souvenir on NCCM 2014 and also planted a tree to mark the occasion.

Dr V Bhujanga Rao, DS, DG (NS&M), DRDO and Chairman CMSI; Shri AM Datar, DS, DG (ACE), DRDO; and Dr P Sivakumar, OS, Director, CVRDE and Chairman NCCM 2014 also addressed the delegates. Dr Sivakumar briefed the salient features of Arjun MBT Mk-II and Arjun Catapult, which were displayed to the Chief Guest and other dignitaries. Dr Kalam appreciated the efforts made by CVRDE in the development of these vehicles.

The topics during the conference ranged from integrated vehicle health monitoring, reliability centered monitoring, structural health monitoring, power plant health monitoring, battery life monitoring, etc. The conference was attended by more than 350 delegates from SRM University, Hindustan University, Vel Tech, Sathyabama University, Tata Steel, Jindal Steel Work, Dessault, KPIT, Merlinhawk, Reliance, Structural Solutions, IRD, BEML, BEL, various DRDO Labs, and Ordinance Factory, Medak.

Training Course on NBC Defence

Defence Laboratory, Jodhpur (DLJ) organised a Nuclear-Biological-Chemical-Defence Specialisation Course for Air Force Officers/Personnel during 1-5 December 2014. The course was inaugurated by Dr SR Vadera, OS, Director, DLJ. The objective of the course was to acquaint the participants with advances in nuclear defence and nuclear emergency management concepts and techniques covering various aspects on fundamental nuclear physics and nuclear radiation units, nuclear radiation detectors and monitors, characteristics and effects of nuclear weapons, TREE and EMP effects, biological effects of radiation and operational limits, medical management in radiological emergencies, nuclear hazard prediction models, etc. Practical demo was also given on time, distance and shielding concepts, exploration of radioactivity, nuclear event monitoring system, slide rule and yield calculator, nuclear instruments, aerial surveillance of radiations using UAV, etc. Smt Anjali Bhatia, Officiating Director, DLJ distributed certificates to the course participants in the valedictory function.

Shri GL Baheti, Sc G and Shri DK Tripathi, Sc F were the Course Director and Course Coordinator, respectively.

Seminar on Functional Materials for Strategic Defence applications

Seminar on Functional Materials for Strategic Defence applications was organised by DLJ on 23 December 2014. Dr G Malakondaiah, DS, CC R&D (HR), DRDO, was the Chief Guest on the occasion.



Dr G Malakondaiah addressing the participants at DLJ

Prof. CVR Murty, Director, IIT, Jodhpur, presided over the function. Dr Narendra Kumar, DRDO Fellow and former Director, DLJ delivered the keynote address on the theme of the seminar. Dr SR Vadera, OS, Director, DLJ welcomed the guests and elaborated the objective of the seminar.

The seminar was held in two technical sessions chaired by Shri GL Baheti, Sc G and Ms Anjali Bhatia, Sc G, respectively. Brief on the materials related research work, being carried out at DLJ, was initially presented in the technical sessions. Subsequently, researchers from IIT-BHU, IIT Kanpur, IIT Jodhpur, BITS Pilani, Goa Campus, and National Aerospace Laboratories made presentations on their research work relevant to the theme of the seminar. Dr R Vijayaraghvan, Sc G, Convener, Organising Committee proposed the vote of thanks.

Research Council Meeting

The 2nd Research Council Meeting of Defence Research Laboratory (DRL), Tezpur was held on 15 December 2014 under the Chairmanship of Dr Brahma Singh, former Director, Directorate of Life Sciences, DRDO HQ, New Delhi. Expert members, Dr RS Chauhan, former Senior Scientist, DRDE, Gwalior; Dr P Kumar, Scientist, DRDE, Gwalior and Dr Y Shouche, Sc G, National Centre for Cell Science, Pune, were present in the meeting. Dr Vijay Veer, Director, DRL, Tezpur welcomed the members and delivered a brief presentation on the overview of ongoing research activities and futuristic programme of DRL. This was followed by the presentation by the HoDs of the laboratory.

The chairman expressed his satisfaction over current endeavours and the research roadmap of DRL. The council suggested ways to formulate futuristic R&D programme in the area of life sciences and suggested to emphasise more on certain areas like sharing entomological database with other agencies, high altitude agriculture technology, development of virus resistant Bhut Jolokia, biodigester



Research Council Meet of DRL in progress

technology, biodefence activities, commercialisation of developed products, nanomaterials for use in water quality study, etc.

CEP on Combat Modelling and Simulation

A CEP course on Combat Modelling and Simulation was conducted by **Institute of Systems Studies Analysis (ISSA)**, Delhi during 1-5 December 2014. The course was attended by participants from Wargaming Development Centre, Delhi, War Centre, Chandimandir, Simulator Development Division, Hyderabad, Integrated HQ, Delhi, scientists from sister DRDO laboratories, Office of DG, Missiles and Strategic Systems, DRDO, Hyderabad, and from ISSA.

Topics covered included System Dynamics Modelling, Combat Modelling, Joint Warfare, Modelling and Simulation Techniques, Strategic Planning, Intangible Modelling, Optimisation and Automated

Planning with MDP in uncertain environment. The course also presented case studies of existing combat models and its usefulness in land, naval and air wargaming. The lectures were delivered by experts from RCI, IIT Delhi, IDSA and ISSA scientists

Special Training on Safe Movement and Local Avalanche Assessment

Snow and Avalanche Study Establishment (SASE), Manali, conducted a special training on Safe Movement and Local Avalanche Assessment for the troops of 56 Mountain Brigade of Indian Army in Drass-Kargil Sector during 1-5 December 2014. Seventy-one participants from different units of 56 Mountain Brigade attended the course.

Brig. Ranjeet Singh, Brigade Commander, appreciated the efforts of SASE in educating the troops and mitigating avalanche hazard.

INDOCRYPT 2014

Indocrypt 2014, the 15th International Conference on Cryptology, was hosted by **Scientific Analysis Group (SAG)**, Delhi, under the aegis of Cryptology Research Society of India (CRSI) during 14-17 December 2014. Prof. Pankaj Jalote, Director, Indraprastha Institute of Information Technology (IIIT), Delhi, inaugurated the conference. The General Chairs of the conference were



Participants of the course on Combat Modelling and Simulation with Shri GS Malik (centre), Director, ISSA



Dr Saibal Kumar Pal welcoming the delegates

Dr PK Saxena and Dr G Athithan, former and present Director of SAG. The Programme Chairs were Prof. Willi Meier from University of Applied Sciences and Arts Northwestern Switzerland FHNW and Dr Debdeep Mukhopadhyay, IIT Kharagpur, India. The conference was also graced by Prof. Claude Carlet, University of Paris, Prof. Phillip Rogaway, University of California, Prof. Maria Naya-Plasencia, INRIA, France and Prof. Florian Mendel, Graz University of Technology, Austria.

The conference covered different aspects of cryptology like block and stream ciphers, public key

cryptography, elliptic curve cryptography, hash functions and digital signatures, cryptographic protocols, cryptanalysis, theory of cryptology, etc. INDOCRYPT 2014 attracted 25 foreign delegates and over 150 Indian delegates from industry, research institutions and academia.

The conference proceedings have been published by Springer in their LNCS series with Volume Number 8885. Dr Saibal Kumar Pal and Dr (Ms) Sucheta Chakrabarti were the Organising Chair and Secretary, respectively.

Personnel News

Awards

INAE Fellowship



Dr K Tamilmani



Dr P Sivakumar

Dr K Tamilmani, DS, DG (Aero), DRDO, and Dr P Sivakumar, OS, Director, Combat Vehicles Research and Development Establishment (CVRDE), Chennai, have been elected the Fellow of Indian National Academy of Engineering (INAE) w.e.f. 1 January 2015 by the INAE Council in recognition of their distinguished contributions to the field of engineering.

Best House Magazine Shield Competition

Nabhtarang, the in-house Hindi magazine of Aeronautical Development Establishment (ADE),



Shri Srikumar (right) receiving the prize for Nabhtarang

Bengaluru, has been awarded third prize under Best House Magazine Shield Competition 2014 organised by Town Official Language Implementation Committee (TOLIC)-CSIR-NAL, Bengaluru. Shri P Srikumar, DS, Director, ADE, received the shield during Joint Hindi Day Function for the year 2014.

Higher Qualification Achieved

ITR, Chandipur



Shri Sukhomoy Hazra, Sc D, Interim Test Range (ITR), Chandipur, has been awarded PhD degree by Indian Institute of Technology (IIT), Kharagpur, for the thesis titled Processing and Characterisation of Mullite Coating obtained by Plasma Spraying of Zircon-Alumina Powder Mixture.

NSTL, Visakhapatnam



Shri Kadagala Venkata Srinivas, Sc B, Naval Science and Technological Laboratory (NSTL), Visakhapatnam, has been conferred PhD by IIT, Delhi, for the thesis titled Analysis, Design and Control of Voltage Source Converters for High Power Utility Interface.

SASE, Chandigarh



Shri Hemendra Singh Gusain, Sc D, Snow and Avalanche Studies Establishment (SASE), Chandigarh, has been awarded PhD by IIT, Roorkee, for the thesis entitled Geospatial Modelling of Snow-Met Parameters and Estimation of Energy Fluxes.

Sports Round-up

North Zone Carrom Tournament

Defence Research Laboratory (DRL), Tezpur, organised DRDO North Zone Carrom Tournament 2014 during 10-12 December 2014. Fifty-four players from 10 DRDO laboratories participated in the tournament. The tournament included team championship, single events (open, women and veteran) and double events.

Dr Vijay Veer, Director, in his valedictory address highlighted the importance of sports in DRDO. The following are the winners and runners up of the tournament.

Categories	Winners	Runners-up
Men (Single)	Dr P Malviya DRDE, Gwalior	Shri SN Singh SSPL, Delhi
Women (Single)	Ms Ritika Vats SSPL, Delhi	Ms Barnali Bailung DRL, Tezpur
Men (Double)	Shri Bishambar Singh & Shri Subhash Narain DESIDOC, Delhi	Shri DL Dabral & Shri AP Gurung IRDE Dehradun
Veteran (single)	Shri DL Dabraj IRDE, Dehradun	Shri NK Chawla, DESIDOC, Delhi



Clockwise from top left: Shri Bishambar Singh, Shri Subhash Narain and Shri NK Chawla receiving certificates from Dr Vijay Veer, Director, DRL, Tezpur

North Zone Volleyball Tournament

Snow and Avalanche Studies Establishment (SASE), Manali, emerged runner-up in the North Zone Volleyball

Tournament organised by Instruments Research and Development Establishment (IRDE), Dehradun. Three of the SASE's players were selected to represent the

North Zone Volleyball team at the DRDO National level. Nk Vipin Kumar of SASE was judged as one of the best players of the tournament.

DARE joins Swacch Bharat Campaign

Responding to Prime Minister's Swacch Bharat campaign, Defence Avionics Research Establishment (DARE), Bengaluru, scheduled a plan of activities to be performed by DARE personnel. Twelve teams, each headed by a senior officer, have been formed to carry out the campaign for a fortnight starting from 1 December 2014. Accordingly, the first team headed by Ms J Manjula, OS, Director, DARE, carried out cleanness in front of DARE campus on 12 December 2014. All the team members participated in the campaign very enthusiastically, following the Prime Minister's call for the campaign in letter and spirits. The interest shown by the Director by picking a broom and seriously cleaning up was inspirational to all the team members who competitively took up the task of cleaning up of



Ms J Manjula leading the cleanness drive around DARE

even more areas than planned earlier. The campaign generated public awareness also.

Karnataka Rajyotsava

ADE, Bengaluru

Karnataka Rajyotsava was celebrated in Aeronautical Development Establishment (ADE), Bengaluru, on 21 November 2014. Dr Siddalingaiah, a renowned Kannada poet, was the Chief Guest for the function, and Smt Vasundhara Bhupathi, President, Women Writers' Association was the Guest of Honour. Shri P Srikumar, OS, Director, ADE, presided over the function. The Chief Guest and the Guest of Honour were honoured by Shri Srikumar. A number of competitions were organised to mark the occasion. Later the prize winners of the cultural competitions were awarded the prizes by the Guests.



DARE, Bengaluru

Defence Avionics Research Establishment (DARE), Bengaluru, celebrated Karnataka Rajyotsava on 5 December 2014. DARE celebrated the rich literary and cultural heritage of the state in a traditional way. Prof. Haldodderi Sudhindra, a prominent Kannada columnist, graced the occasion as the Chief Guest. Shri SS Sundaram, DS, DG (ECS), DRDO, blessed the occasion with his esteemed presence. Prof. Haldodderi Sudhindra



Karnataka Rajyotsava celebrations at ADE (top) and at DARE



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gave an enlightening presentation on technological progress made by the Karnataka. He also distributed the prizes won by participants of various competitions held

in the organisation relating to Karnataka literature and culture. The event concluded with a cultural programme with scintillating performances by the in-house talent.

Visitors to DRDO Labs/Estts

ADE, Bengaluru

Aeronautical Society of India hosted a delegation from American Institute of Aeronautics and Astronautics (AIAA), USA during 3-13 December 2014 to India to visit different aerospace organisations in India. The delegation visited Aeronautical Development Establishment (ADE), Gas Turbine Research Establishment (GTRE) and Hindustan Aeronautics Limited (HAL) on 4 December 2014. The nine member delegation was headed by Dr (Ms) Sandy Magnus, Executive Director, AIAA and a former astronaut.



Delegation from American Institute of Aeronautics and Astronautics

CAIR, Bengaluru

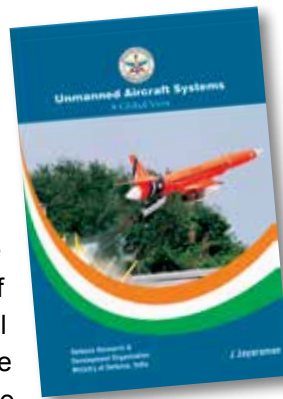
Dr Avinash Chander, SA to RM, visited Centre for Artificial Intelligence and Robotics (CAIR), Bengaluru, on 5 December 2014. Shri Sanjay Burman, OS, Director, briefed SA about technologies being developed by CAIR in the area of Intelligent Systems, Robotics, NMS, ICCS, Maritime Domain Awareness, etc.



Dr Dipti Deodhare giving demonstration to SA to RM

Monograph Released

Defence Scientific Information and Documentation Centre (DESIDOC), Delhi, a nodal establishment of DRDO for collection and dissemination of scientific information pertaining to defence technologies, has brought out a monograph entitled Unmanned Aircraft Systems: A Global View. The monograph provides a bird's eye view of the complex technology of Unmanned Aerial Vehicles (UAVs). It offers diversified knowledge to beginners who need an introduction to the subject, practicing specialist engineers who need to learn about other disciplines, and programme managers, bureaucrats, planners and policy makers who would like to get a holistic picture of the UAV



technology. It also provides an approach to the system engineering methodology for the initial sizing of an UAV.

Learned author, J Jayaraman, an engineer-scientist with an experience of over four decades of development of indigenous aeronautical systems at Aeronautical Development Establishment, Bengaluru, has added an informative chapter on lessons learnt to provide practicing engineers a glimpse of real-life problems faced while developing the UAVs.

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