



सीएसआईआर-सीरी वार्षिक प्रतिवेदन *CSIR-CEERI Annual Report*



2019 - 2020

सीएसआईआर - केन्द्रीय इलेक्ट्रॉनिकी अभियांत्रिकी अनुसंधान संस्थान, पिलानी, भारत
CSIR - Central Electronics Engineering Research Institute, Pilani, India



CSIR - Central Electronics Engineering Research Institute
Pilani, Rajasthan, India



Serving the country since 1953 through

- Technology Development
- Sponsored/Contract R&D
- Consultancy
- Skill Development

IN THE AREAS OF

Cyber-Physical Systems

- Intelligent Systems
- Societal Electronics

Microwave Devices

- Vacuum Electron Devices Design
- Vacuum Electron Devices Development

Smart Sensors

- Semiconductor Device Fabrication
- Semiconductor Device Design
- Microsystem Packaging

Some of the Devices and Technologies Developed

- Accelerometer, Diamond Detectors, Sensor Interface Circuits, Gas Sensor Platform, Low Temperature Co-fired Ceramic Technology based Circuits, MEMS Hotplate, Silicon Carbide Schottky Diode Detectors, MEMS Ultrasonic Transducers, MEMS Acoustic Sensors, Selective Ion Sensors, Biosensors, ISFET based PH Sensor, Hybrid Microcircuits (HMCs) for SROSS and INSAT series of Satellites, Re-configurable System Design, Application Specific Instruction-set Processor Design, 16/32-bit Microprocessor Design, P-MOSFET Gamma-ray Dosimeter, Piezoresistive Pressure Sensor, Capacitive Pressure Sensor, InP-InGaAs based PIN Photo Detectors, 980nm Pump Laser Diode, C-band High-power GaAs MESFETs and Amplifiers
- 140 W Ku-band Space TWT, 2.6 MW Magnetron for LINAC, Mercury-free VUV/UV Plasma Source, Pseudospark Switches, Cathode System (MTRDC), Software Packages, Related Infrastructure & Technologies, High-power Microwave Window Technology, Long-life Dispenser Cathodes, 40 kV 3 kA Thyatron, 25 kV 1 kA Thyatron, Design and Technology Development for Gyrotron Devices, 6 MW Pulse 24 kW Average Power S-Band Klystron, 5 MW Pulsed S-band Klystron, 6 Ghz 20 W Helix TWT, 60 W Space TWT, S-band 30 W Helix TWT, Broadband 40 W Mini Helix TWT, C-band 75 kW CC-TWT, 3 MW Pulsed S-Band Magnetron, 2 MW S-band Tunable Pulsed Magnetron, S-band 1 MW Magnetron, S-band 500 kW Magnetron, S-band 400 W Carcinotron
- Ksheer Tester, Ksheer Scanner, Grid-compatible Inverters, 5 kW Solar-power Drive for Pumps, RO Water Plant Automation, Specialised Power Supplies and Pulse Power Systems for High Power Microwave Tubes, Sensor Networks, Wired and Wireless Communication Network for Underground Mines, Electronic Tongue, Electronic Nose, NIR-based Instrumentation for Chemometrics, Electronic Instrumentation for Fresh Water Aqua-culture and RO Systems, Machine Vision Systems for Bakeries and Steel Mills, Machine Vision Systems for On-line Sorting and Grading of Fruit, Monitoring and Control System for Paper and Pulp Industry, Process Control Instrumentation for Sugar Industry, Withering Controls for Tea Processing, Converters/PWM Actuators, High-power ac and dc Drives

Academic Programmes Offered

- The institute conducts post graduate and research programmes under the aegis of AcSIR in Advanced Electronic Systems, Advanced Semiconductor Electronics, and High Power Microwave Devices and Systems Engineering.
- Skill Development Programmes for Students and Working Professionals
- ME/M Tech project work and doctoral thesis work for highly motivated university students in all the above areas of electronics

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वार्षिक प्रतिवेदन
ANNUAL REPORT
2019 - 2020



सीएसआईआर - केन्द्रीय इलेक्ट्रॉनिकी अभियांत्रिकी अनुसंधान संस्थान
CSIR - Central Electronics Engineering Research Institute

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सीएसआईआर-सीरी की अप्रैल 2019 से मार्च 2020 की अवधि की वार्षिक रिपोर्ट प्रस्तुत करते हुए मुझे प्रसन्नता हो रही है। मैं अपने संस्थान की कुछ महत्वपूर्ण उपलब्धियों का संक्षिप्त विवरण प्रस्तुत करना चाहूँगा।

इस अवधि के दौरान हमने अपना ध्यान मार्च 2018 से अगस्त 2019 की अवधि में शुरू की गई सीएसआईआर मिशन परियोजनाओं को सफलतापूर्वक पूरा करने पर केन्द्रित किया था। सीएसआईआर मिशन परियोजनाओं, नामतः आर्टिफिशियल इंटेलिजेंस, हेल्थकेयर के लिए नैनो-जैवसंवेदक और माइक्रोफ्लयुइडिक्स तथा दुग्ध गुणता मूल्यांकन के लिए किफ़ायती प्रौद्योगिकी के विकास में सीएसआईआर-सीरी की अग्रणी भूमिका है। हमने सीएसआईआर की चार अन्य मिशन परियोजनाओं में भी सहभागी प्रयोगशाला के रूप में योगदान दिया है। सीएसआईआर द्वारा वित्तपोषित फास्ट ट्रैक ट्रांसलेशन (एफटीटी) और फास्ट ट्रैक कमर्शियलाइजेशन (एफटीसी) परियोजनाओं के साथ ही इन मिशन परियोजनाओं को भी सफलतापूर्वक पूरा किया गया है।

सीएसआईआर-सीरी ने अपने तीनों शोध क्षेत्रों नामतः साइबर भौतिक प्रणालियाँ, स्मार्ट संवेदक और सूक्ष्मतरंग युक्तियाँ में चल रही कई प्रायोजित परियोजनाओं में उत्कृष्ट परिणाम प्राप्त किए हैं। अनेक नई प्रायोजित परियोजनाएं भी शुरू की गई हैं, जो विभिन्न सरकारी एजेंसियों जैसे विज्ञान एवं प्रौद्योगिकी विभाग (डीएसटी), इलेक्ट्रॉनिक्स और सूचना प्रौद्योगिकी मंत्रालय (मेडटी), रक्षा मंत्रालय (नौसेना) और आरईआईएल, जयपुर द्वारा वित्तपोषित हैं। इस अवधि के दौरान सीएसआईआर-सीरी ने बाह्य स्रोतों (ईसीएफ) से 22.5 करोड़ रुपये की धनराशि अर्जित की है। विशेषतः हमने केंद्र सरकार के महत्वाकांक्षी जिला कार्यक्रम के अंतर्गत राजस्थान के सिरोही जिले के लिए एक परियोजना भी क्रियान्वित की है जिसमें इस क्षेत्र में पथरों पर नक्काशी का काम करने वाले कामगारों के स्वास्थ्य में सुधार के लिए प्रणाली विकसित की गई है। प्रकाशनों के मामले में, संस्थान ने शोध जर्नलों तथा राष्ट्रीय व अंतरराष्ट्रीय सम्मेलनों की विवरणिकाओं, प्रत्येक में, सौ से अधिक शोध पत्र प्रकाशित किए हैं।

इस अवधि के दौरान, लक्षित समय के भीतर डिलिवरी सहित अनेक औद्योगिक परियोजनाएं पूरी की गई हैं। दुग्ध आपूर्ति शृंखला में मिलावट की निगरानी के लिए विकसित प्रणाली का प्रौद्योगिकी हस्तांतरण मेसर्स क्यूबॉयड आईओटेक प्राइवेट लिमिटेड, गुरुग्राम को किया गया है। जयपुर में स्थापित इंक्यूबेशन सह इनोवेशन हब (आईआईएच) ने इस वर्ष के दौरान नया स्वरूप लिया है। यह हब स्टार्ट-अप्स को मदद करने के साथ-साथ सीएसआईआर-सीरी द्वारा विकसित प्रौद्योगिकियों के हस्तांतरण को भी सुगम बनाएगा। जिज्ञासा के बैनर के अंतर्गत विद्यार्थियों के प्रयोगशाला दौरों के साथ ही छात्र-वैज्ञानिक संपर्क कार्यक्रम के अनेक संस्करण आयोजित किए गए।



संस्थान ने “एफपीजीए बेस्ड सिस्टम डिजाइन” और “आईओटी सिस्टम्स डिजाइन एंड कम्प्यूटिंग प्लेटफॉर्म” विषयों पर दो कौशल विकास कार्यक्रमों का आयोजन किया। सीएसआईआर-सीरी में सीएसआईआर स्पोर्ट्स प्रमोशन बोर्ड के तत्वावधान में थैकर मेमोरियल लॉन टेनिस टूर्नामेंट आयोजित किया गया।

मैं सभी प्रायोजक एजेंसियों, औद्योगिक सहयोगियों, प्रौद्योगिकी लाइसेंसधारियों और अकादमिक सहयोगियों के प्रति उनके अनवरत सहयोग एवं विश्वास के लिए धन्यवाद ज्ञापित करता हूँ। मैं इस अवसर पर अनुसंधान परिषद और प्रबंधन परिषद के मार्गदर्शन और योगदान के लिए भी आभार प्रकट करता हूँ। मैं सीएसआईआर-सीरी के लक्ष्यों को प्राप्त करने में मदद करने वाले अपने साथी वैज्ञानिकों और सहयोगी कर्मचारियों को भी धन्यवाद देता हूँ।

(पी.सी. पंचारिया)



I am happy to present to you the annual report of CSIR-CEERI for the period, April 2019 to March 2020. I shall briefly mention some notable items as a summary of our achievements.

During this period, our focus was to successfully complete the CSIR Mission projects that had been initiated during March 2018 to August 2018. CSIR-CEERI had a lead role in three CSIR Mission Projects, namely, Artificial Intelligence (AI), Nano-biosensors & Microfluidics for Healthcare and Affordable Technologies for Milk Quality Assessment. We also contributed in another four Mission projects of CSIR, as a participating laboratory. These Mission Projects along with several other CSIR funded Fast Track Translation (FTT) and Fast Track Commercialization (FTC) projects have been completed successfully.

We have achieved commendable results in several of the on-going sponsored projects, spread over all the three areas of CSIR-CEERI, namely, Cyber Physical Systems, Smart Sensors and Microwave Devices. A good number of new sponsored projects have also been initiated; these are funded by various Government agencies such as Department of Science & Technology (DST), Ministry of Electronics & Information Technology (MeitY), Ministry of Defence (Navy) and REIL Jaipur. As for External Cash Flow, CSIR-CEERI has generated around Rs. 22.5 Crore during this period. Notably, we have executed a project under the Central Government's Aspirational District programme for Sirohi district in Rajasthan and have developed solutions for improving the health of the artisans working in the stone-carving Industry of the region. On the publications front, the Institute published over a hundred research papers each, for Journals as well as for national & international conferences.

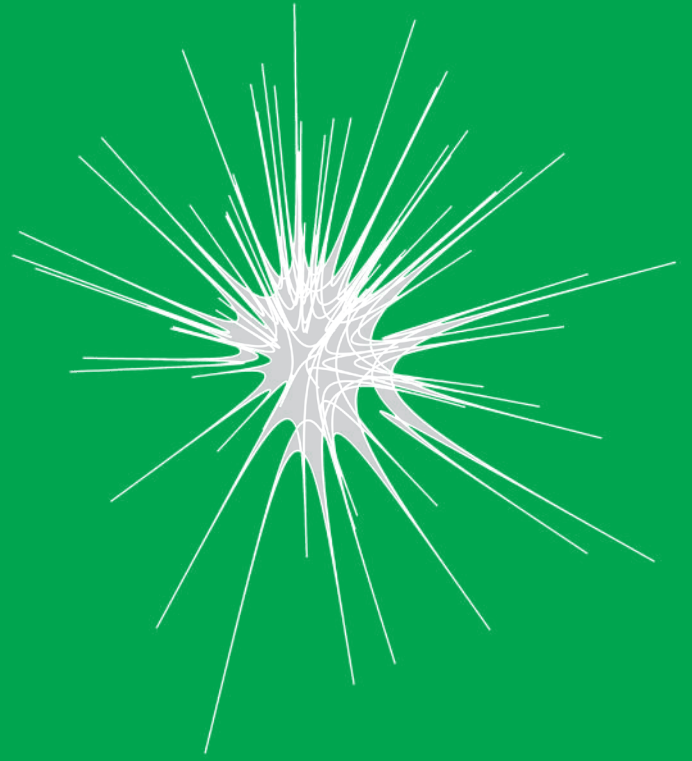
During this period, several industrial projects have been completed with the time-targetted deliveries. The technology entitled System for Adulteration Monitoring in Milk Supply Chain has been transferred to M/s Qboid Iotech Pvt. Ltd, Gurugram. The Incubation-cum-Innovation Hub (IIH) established by us at Jaipur, has also taken shape during this year. This hub will facilitate transfer of technologies developed by CSIR-CEERI, in addition to supporting start-ups.

Several editions of Student-Scientist Connect Program along with Laboratory visits were organized under the banner of Jigyasa. We conducted two Skill Development programmes on the topics FPGA based System Design, and IoT Systems Design and Computing Platforms. The Thacker Memorial Lawn Tennis Tournament was organized at CSIR-CEERI under the aegis of CSIR Sports Promotion Board.

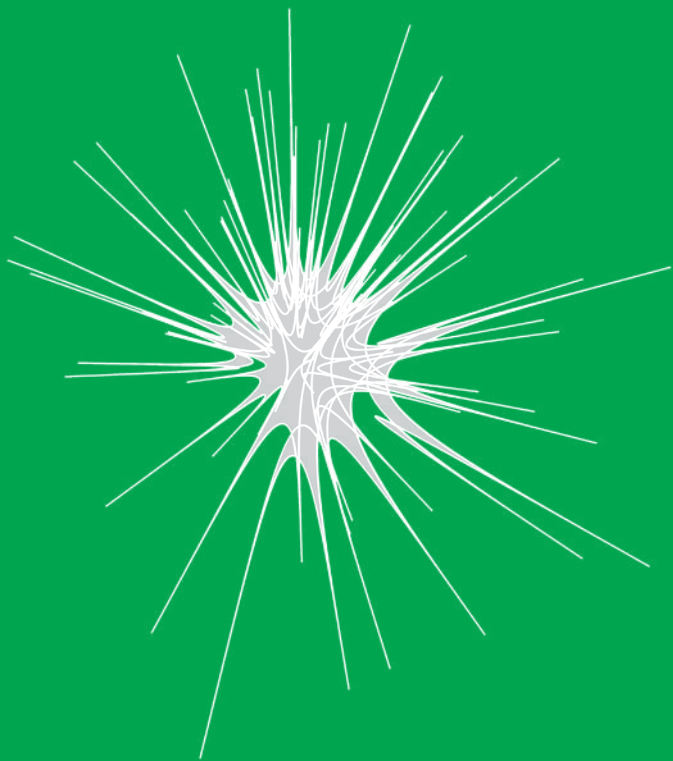
I wish to thank all the sponsoring agencies, industrial partners, technology licensees and academic partners for their continued support and trust. I also take this opportunity to thank the Research Council and the Management Council for their guidance and inputs. My thanks are also due to my fellow scientists and supporting staff members who contributed in achieving the goals of CSIR-CEERI.

A handwritten signature in blue ink, appearing to be "PC Panchariya".

(PC Panchariya)



Introduction



CSIR - Central Electronics Engineering Research Institute (CEERI) Pilani is a constituent laboratory under Council of Scientific and Industrial Research (CSIR), established in 1953. The institute has a research extension centre at Chennai, innovation-cum-incubation hub at Jaipur, and multi-disciplinary technology development centre at Naraina, New Delhi. The vision of the institute is to become a globally renowned coveted destination for scientific knowledge, research excellence and innovative technology in electronics as well as allied sciences and engineering, with high social and strategic impact. Keeping in view of the country's socio-economic, industrial, scientific and strategic requirements, mission and mandates are being identified to work in the area of science and technology; to innovate and collaborate with industry for innovative product development; to nurture trans-disciplinary hub of globally competitive technology in the area of electronics and allied sciences; to deliver technology for strategic requirements and industrial needs; to nurture and to motivate the disruptive innovations for entrepreneurship in the area of electronics and allied engineering; and to nurture the academic and scientific pursuit for manpower development.

India has the potential to develop and manufacture electronics and communication hardware systems and embedded software for the global markets in the areas of IoT, AI and 5G and can gain higher global share besides meeting the country's future societal and strategic requirements. CSIR-CEERI is poised to play a key role in this context. Driven by the mission and mandate, CSIR-CEERI has re-positioned its research activities to align with the focus of technology evolution and market demands. CSIR-CEERI has now defined its R&D agenda to focus on Smart Sensors for IoT platform, AI and Machine Learning, Integrated Cyber-Physical Systems and Micro and Millimeter-wave Devices for 5G and beyond. This would also help CEERI to achieve the self-sustenance model of CSIR. As per CSIR commitment and projections, CEERI is expected to generate 25% of the total budget through ECF and 15% of the salary budget through LRF. CSIR-CEERI is on its ways of achieving this target. To increase the income of the lab, we need to enhance earning through deliveries in public, strategic, societal, and private goods. The R&D activities in CEERI is spread over three areas namely Cyber-Physical Systems, Microwave Devices and Smart Sensors.

Cyber-Physical Systems: Cyber Physical Systems (CPS) are smart networked systems with embedded sensors, processors, and actuators that are designed to sense and interact with the physical world (including humans), and support real-time guaranteed performance in safety-critical applications. In CPS systems, the joint behaviour of the “cyber” and “physical” elements of the system is critical - computing, control, sensing and networking can be deeply integrated into every component, and the actions of components and systems must be safe and interoperable. CPS connects strongly to the currently popular terms of Internet of Things (IoT), Industry 4.0, the industrial Internet, Machine-to-Machine (M2M), Internet of Everything (IoE), TSensors (Trillion Sensors), and The Fog (like The Cloud, but closer to the ground). All of these reflect a vision of a technology that deeply connects our physical world with our information world. Emerging 5G technology is becoming a major enabler of this evolution. The term “CPS” is more foundational and durable than all of these, because it does not directly reference either implementation approaches (e.g. the “Internet” in IoT) for particular applications (e.g. “Industry” in Industry 4.0). It focuses instead on the fundamental intellectual problem of conjoining the engineering traditions of the cyber and the physical worlds. The cyber physical system is driven by the growth of applications in agriculture, water distribution, building controls, defence, emergency response, energy, intelligent manufacturing, and transportation. The confluence of the embedded and Internet worlds has led to the concept of Cyber-Physical Systems (CPS). These refer to ICT systems (sensing, actuating, computing, communication, etc.) embedded in physical objects, interconnected (including through the Internet) and providing citizens and businesses with a wide range of innovative applications and services. These also exploit the emerging Internet of Things (IoT) and smart sensors and trigger the next innovation towards intelligent and autonomous systems. AI and machine

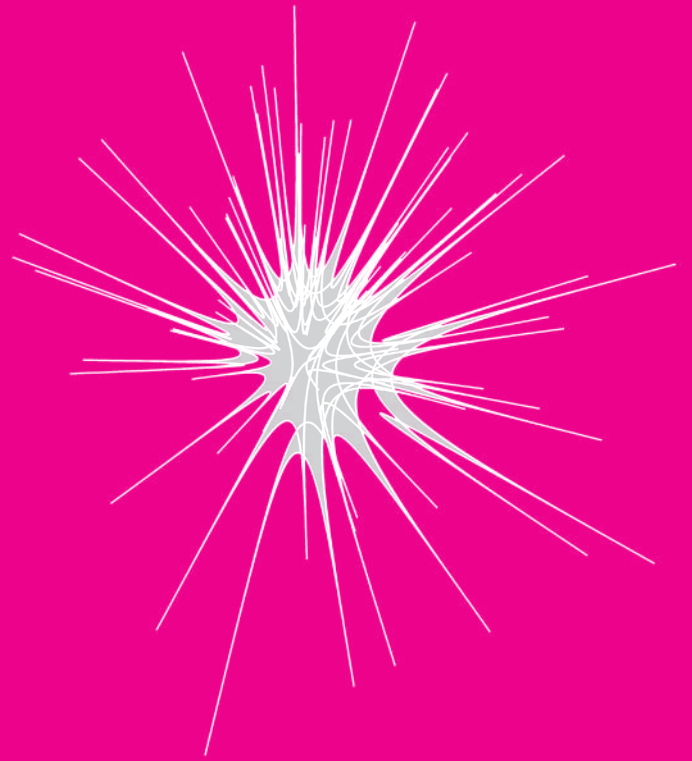
learning is playing a key-role in this matrix. Embedded ICT market today is estimated to grow to Euro 350 billion in next five years driven by demands in industrial and social sectors. Key drivers in the Indian context will be Smart City initiatives, Transportation, Smart Grid, Health Services and Smart Manufacturing and Process Control. The focused effort in this area of Cyber-Physical Systems can enable CSIR-CEERI to embark on a path to develop technologies touching the lives of millions and transforming industries through cutting edge initiatives and making itself a potential partner in the new ICT revolution. The capability to deliver smart sensors would supplement and complement growth in this area.

Microwave Devices: Microwave tubes play a vital role in several fields of strategic importance such as atomic energy, particle research, satellite communication, defence, biomedical and industrial applications. Hence, the necessity of their development and production within the country has been emphasized time and again. The development and production of MW tubes involve several highly advanced and critical technologies. With the growing demands on enhancing the performance parameters like efficiency, power, frequency coverage/bandwidth, life and reliability, the corresponding technology becomes extremely complex and challenging. Such technologies are available with only a handful of countries around the globe including India. India is aiming to nurture its capabilities in developing state-of-art technologies required for these devices. During the course of time, CSIR-CEERI has developed a very strong design and technological base with a modest investment. It is proposed to further advance the existing research, design and technological capabilities of CSIR-CEERI which has been working in this vital area right from its inception and is the only agency in the country which has been associated with R&D of different types of microwave devices. With the emergence of 5G technologies, demand for relevant mm-wave technologies has changed the landscape of technology development in this area. CSIR-CEERI is now orienting its research effort towards designing and developing high power nm-wave devices for meeting demands of high bandwidth communication in the realm of 5G and beyond.

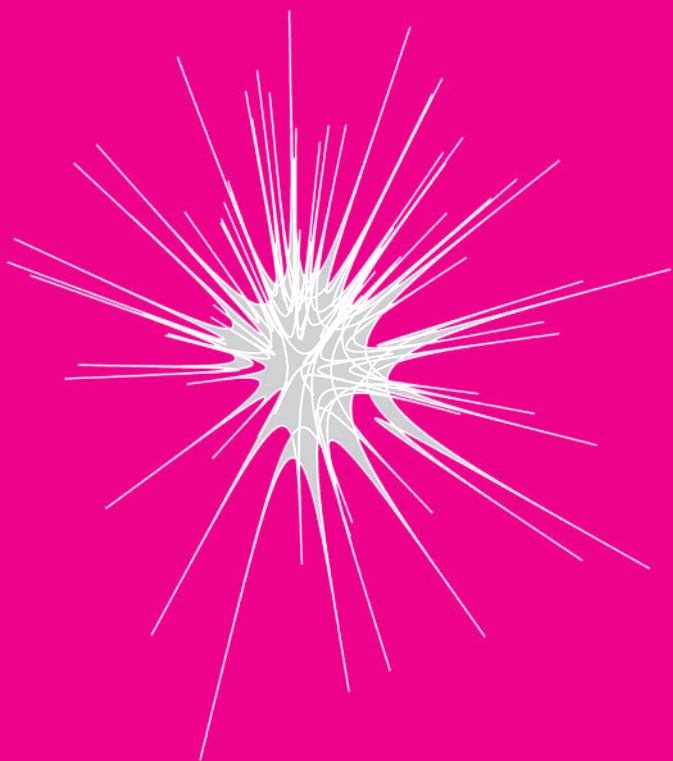
To meet the future projections of CSIR-CEERI and thrust areas of R&D, and also by-and-large the country's needs, it is intended to establish direct contact with stakeholders and stakeholder organisations through community meetings, workshops, seminars, or official meetings to solicit input; present and explain the new research, application of research to management or other community needs. Based on these, various projects and research activities with clear-cut deliverables would be carried out. The plan for revenue generation includes the service based business model, collaborative projects, technology licensing, technology services, skill development and training, setting up incubation centres and equity from start-ups.

Smart Sensors: During the last several years, autonomous sensing systems have gained significant attention due to the reduction of on-state power consumption of the electronic components and the spread of wireless communication technologies. Measurement, monitoring, and controlling of the environmental and physical parameters have become necessary in many important areas, such as home automation, industrial automation, medical aids, mobile health-care, elderly assistance, intelligent energy management and smart grids, automotive, traffic management, and many others. It is also essential to measure and monitor the quality of important liquids (milk, water, and other beverages) and food items. Smart sensors are sensors with integrated electronics that can perform one or more of the logic functions, two-way communication, make decisions, and store information for future analysis. Many undesirable sensor characteristics, which include input offset and span variation, nonlinearity, aging, temperature effect and cross-sensitivity can be automatically corrected by advanced algorithms (correction schemes) running on processors present in the smart sensor. Internet of Things (IoT) is all about physical items talking to each other, machine-to-machine (M2M) communications and person-to-computer communications. It is expected that by 2025, the IoT

nodes will connect most of the objects, many of which are essential in our day-to-day life. Key technologies that will drive the future IoT will be related to smart sensor technologies like advanced MEMS sensors, bioelectronics, nanotechnology and miniaturization of the sensing devices. The market projections of water and air quality monitoring, industrial IoT and wearable sensors justify the focus on the area of smart sensors. It is predicted that mix of smart sensor, machine learning and artificial intelligence can provide a new insight to predictive maintenance, healthcare and environmental pollution monitoring leading to substantial saving of revenue of enterprises by 2022. In CSIR-CEERI, a significant effort has been invested into MEMS design and other semiconductor devices over the last 10 years. To leverage this expertise, CSIR-CEERI has identified design and development of smart sensors and actuators using MEMS and related technologies as a key component of its future roadmap. The application domains can cover micro-sensors and actuators for physical quantities, communications (RF-MEMS), chemical assay (micro TAS) and biochemical/biomedical assay (bioMEMS). Use of nanotechnology will enhance CSIR-CEERI's capability substantially. Exploiting CSIR-CEERI's capability of SoC design and embedded system development along with sensor and actuator design expertise, CSIR-CEERI is perfectly poised to explore the field of smart sensors and actuators to develop new technologies and know-how as well as respond to projected market demands.



Major Achievements



IoT based Smart Water Distribution System (Smart Water Grid)

A facility for IoT based smart water distribution system also called as Smart Water Grid (SWG) has been installed at CSIR-CEERI to perform water quality analysis, leakage and burst detection. IoT and ML platforms have been integrated to address these challenges. The experimental setup consists of two layers- Layer 1 and Layer 2.

Layer 1 is the bottom layer which consists of pipes of diameter 76.2 mm and 38.1 mm. It has a separate RO unit which is used for water purification of capacity 200 LPH. Raw water enters into the network and passes through the piped network towards the RO plant for the water purification. The treated water is collected into the 500 Liters tank and subsequently pumped into the 5000 liters for further processing into the smart water distribution network. Layer 2 is the top layer in which ten distribution pipes of diameter 25.44 mm are present, each having flowmeter and valves.

Both the layers have multiple points to create leak manually and study the behavior of the



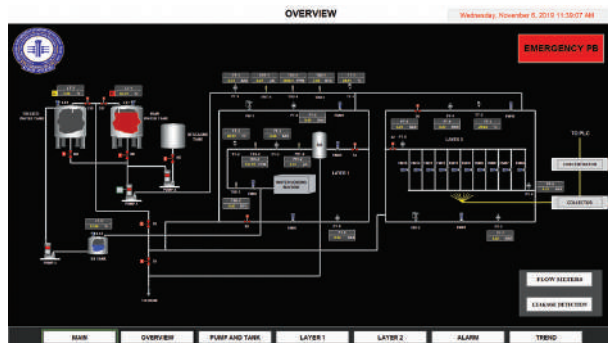
IoT based Smart Water Grid

system when leaks are created at different positions, and of different magnitudes. The various sensors and meters in the network include: conductivity, pH, turbidity, ultrasonic, electromagnetic and solar flow meters, pressure and temperature transmitters, solenoid, motorized, PIV and ball valves. The overall system is also incorporated with water quality, hydraulics and acoustic sensor to perform data analytics to detect anomalies in IoT water supply distribution network.

The layout of the distribution network, with appropriate location and labelling of various equipment are shown in figure. The SCADA software and PLC platform along with DAS cards are used for functioning of various operating modes of the water distribution network. The Smart Water Distribution Network can be operated in two ways - Automatic and Manual. During manual operation, pump and valves are to be switched on and off manually using SCADA interface. The pump frequency and mode of operation selection window is shown in the figure.

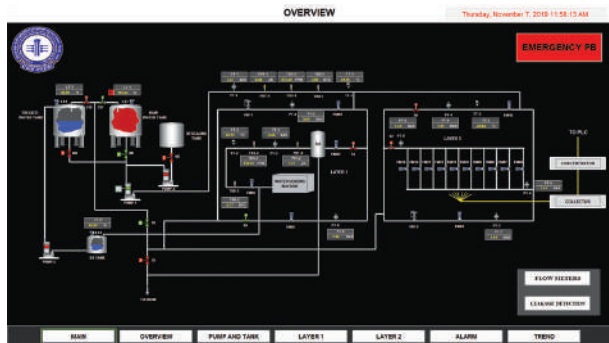


IoT based Smart Water Grid – Layer 1 & Layer 2



Overview of Smart Water Distribution Network on SCADA

In automatic operation, there are four modes in which the plant can be operated in, namely, Raw Water (RW) Mode, Treated Water (TW) Mode, Reverse Osmosis (RO) Mode and Descaling Mode.



Pump Frequency and Mode of Operation Selection Window

Vision-based Surveillance and Security System for Vital Installations

The project was part of the CSIR Mission on Safety and Security of Vital Installations and was executed during the period July 2018 to March 2020. Under this project, an integrated enterprise video surveillance system has been developed that is based on distributed multiple smart cameras, equipped with appropriate hardware and software, for securing important installations. The surveillance system provides identification of human beings based on non-intrusive biometric features and real-time awareness of various human activities that occur within the views of cameras inside the perimeter of interest.

A three-stage architectural framework has been developed for this purpose, a) Camera network equipped with edge analytics HW/SW to implement the required statistical, machine learning and deep learning based algorithms, b) Cloud server which receives the metadata, containing the feature vectors and the time stamps of individuals, required for human identification, along with detection of patterns and other suspicious activities, c) Query server that acts as an interface to the end-user and also gives flags and alerts.

The video database consists of 553 identities, obtained from 9 cameras, for developing

both person re-identification and multi-camera multi-person tracking applications. The human identity database was captured at 1080p resolution @ 30 fps, for almost an entire day covering the various illumination conditions due to the changes in position of the sun, pose variations, viewpoint variations and occlusion reflecting real life scenarios.

The processing pipeline on the camera node is implemented on the AI computing engine from NVIDIA, Jetson TX2. The widely-used YOLOv3 model has been employed for the purpose of person detection. For re-identification, ResNet-50 model has been employed as our base CNN and the mid-level features are extracted from layer 4 of the ResNet-50 network. The mid-level and final layer features have been combined in the fusion module to generate a 3072-dimensional feature vector. The ResNet-50-mid network is trained on our dataset and is used to obtain feature vectors (Re-ID features) for each tracklet. Further, the real-time implementation strategies, have been employed on the edge platform to enhance the performance.

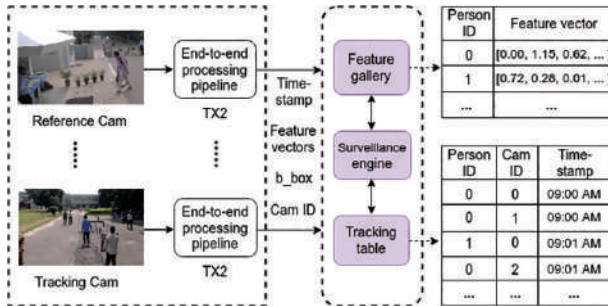
The feature gallery contains the feature vectors of all the persons entering the campus. It is used as a reference to track the people in the campus through the camera network. The correlation between the feature vectors has been used as a metric to determine the closeness of the feature vectors.

Various performance measures of the surveillance system, such as ID Precision, ID



Components of Camera Module and Installation. (a) Connect Tech's Orbitty Carrier Board interfaced with NVIDIA Jetson TX2 (b) Camera Housing (c) Hardware module with Heat Sink and HD Camera (d) Installation of Camera module

Recall, IDF1 have been computed and found to be in the range of 90-93%. An overall Top-1 accuracy of 90% and Top-5 accuracy of 93% is achieved with real-time performance. The multi-camera multi-person surveillance system have been implemented in the Institute campus and the proof-of-concept demonstration has been done in CSIR-CEERI Institute Campus with 9 cameras spanning across a road stretch of 700 meters.



Feature gallery and tracking table preparation

IoT-Cloud Enabled Integrated Online SHM Framework for Infrastructure

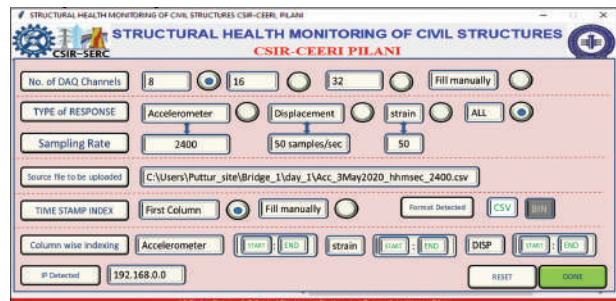
A robust and versatile IoT Cloud enabled framework has been developed, to provide remote, unattended and portable monitoring for civil infrastructure comprising of bridges, buildings, towers, pipelines, highway overpasses, and similar infrastructures. This work was done under CSIR Mission Programme on Technologies for Robust Structural Health Monitoring of Critical Infrastructure. The developed framework provides a user-customizable Integrated Development Environment (IDE) with three different functional modules with GUIs.

- **Data Acquisition:** This module accesses the stored raw data file. It also configures the data acquisition platform and provides the operator the support to select the available network at testing site to connect to the Central Server.
- **Data Storage:** The Data Storage module provides secured login system for effective visualization and usage of monitoring infrastructure data that is stored centrally in a SQL database. The

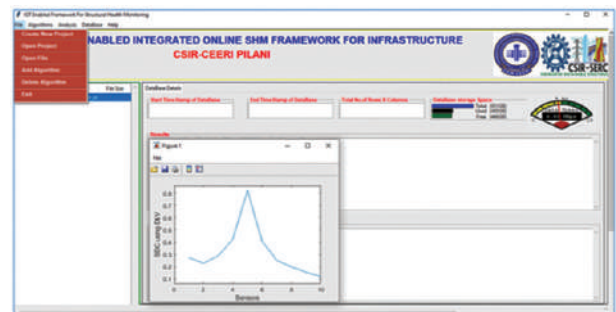
support for database management for a local server for short-term to long-term maintenance and management of infrastructures is also provided.

- **Data Analytics & Visualization:** Interface has been designed to integrate any third-party (MATLAB/NI) or open source (Python/C) executables as part of this module. It also provides visualization of plots/graphs.

The framework has been tested in a real environment at Puttur Railway Bridge, in Chittoor district, Andhra Pradesh in collaboration with SERC Chennai Team with more than 30 sensors including vibration, strain and displacement sensors.



Data acquisition User Interface for site engineer



Data visualization and decision in client GUI IDE (MATLAB)

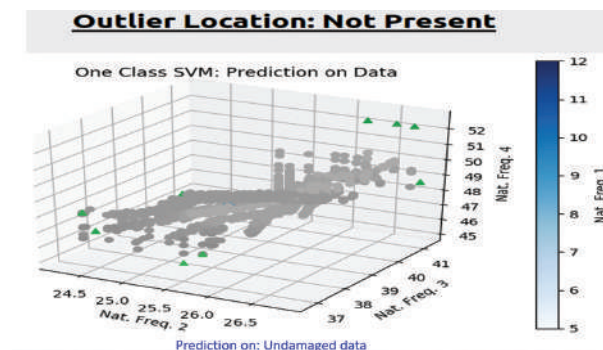
Damage Diagnostic Tools using Machine Learning Techniques

A suite of algorithms has been developed to find out whether the state of the civil structure under test is in a healthy or in a damaged state. The suite includes both supervised and unsupervised class of algorithms where excitation independent parameters of the structure have been used, to form

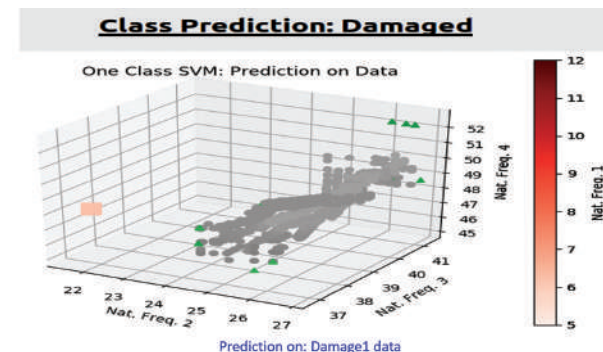
the feature set and for training of the models of the algorithms. The algorithms developed are both for damage detection and for damage localization. This work was done under CSIR Mission Programme on Technologies for Robust Structural Health Monitoring of Critical Infrastructure.

The MATLAB based simulation model for Phase-1 IASC _ASCE benchmark dataset has been used to produce the raw dataset of the structure. Following damage detection algorithms have been developed: i) One Class SVM, ii) Isolation Forest, iii) K-means Clustering, iv) K-Nearest Neighbors v) Density Based Spatial Clustering of Applications with Noise, vi) Local Outlier Factors, and vii) Logistic Regression.

The algorithms developed for localizing the damage of the civil structures are, i) Empirical Mode Decomposition, and ii) Neural Network with Discrete Wavelet Transform (DWT). The developed GUI platform combines all the algorithms in a single layout, thus, making it easier to generate and classify the data by choosing an algorithm from a list.



One class SVM (Undamaged Detection)

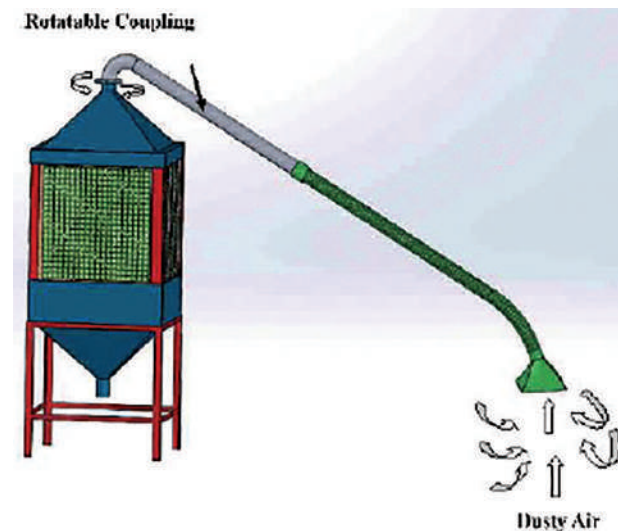


One class SVM (Damaged Detection)

Smart Stone dust-precipitator systems for Single Artisan

Silicosis is a disease caused by inhaling an air polluted with excess amount of silica (a common crystal-like mineral found in sand, rock, and quartz) over a long period of time. Inhaling excess amount of Silica can result in deadly consequences for people who work with stone, concrete, glass, or other forms of rock. Most of the workers associated with such occupation are uninformed and sometimes even illiterate, because of which they are neglectful towards protective means. The inhaling of Silica dust can result in inflammation and scarring of the lungs which gradually leads to nodular lesions in the upper lobes of the lungs and after some years can even cause the death of the individual.

To protect the stone carving artisans from this gradual life-threatening disease the “Smart Stone dust-precipitator systems for Single Artisan” is designed and developed, which provides the dust-free environment to the workers and can also be installed in small scale factories. This system collects the tiny dust particles with its high suction power, which is near about 10 times more than that of the inhaling power of human beings. The separated particles from the air are finally dissolved in water. The sediment of this stone dust is then drained through the drain pot which can later be utilized to make flower pot, crockery, and other decorative domestic items.



3-D view of the designed system for single artisans



Developed system at Pindwara (Dist. Sirohi)

The system is portable, more effective in absorbing all types of dust particles & dissolving into the water, cost, and is also power-efficient. It is also equipped with the option of self filter-cleaning, thus, providing an absolute eco-friendly solution to minimize the number of cases suffering from Silicosis.



Dust particle counter

Air quality index

The system has been tested in the laboratory at different levels and satisfactory results were found. After that, the system has been tested at an actual location in Pindwara (Dist. Sirohi) and the following results were obtained:

Atmospheric Condition:

Table -1 shows the air quality at the actual location without any carving work. The PM 2.5 dust particles count is between 52 and 68 which indicates the air quality to be satisfactory.

Table-1

PM 2.5	PM 10	Temp	Humidity	Time
52-68	283	36°C	27%	12:30 PM

Without System operation:

At the time of stone carving the production of PM 2.5 and PM 10 is very high. PM 2.5 is mainly responsible for silicosis (Table-2).

Table-2

PM 2.5	PM 10	Temp	Humidity	Time
627	1999	36°C	27%	12:50PM

When the system is used:

When the system was used, all the dust particles produced at the time of stone carving, were sucked out by the system. Thus dust particles could not reach the mouth of the stone artisans. Table-3 shows the data of Dust Particle counter near to the artisan's face.

The Air Suction Speed:

In the flexible conduit (2.5" dia.): ≥ 20 Meter per second.

At Suction Head: ≥ 2 Meter per second

Table-3

PM 2.5	PM 10	Temp	Humidity	Time
52	265	36°C	22%	1:30PM



Developed system

According to the test reports, a large amount of fine dust is produced during the stone workmanship, which is the main cause of silicosis. When the system was used, it was found that this system sucks out all the fine dust produced at the time of carving. Thereby, it makes the environment free of pollution.

Portable Version of the Food Scanner

Detection of adulteration like urea, detergent, salt, formalin, starch, glucose etc., in milk products, like khoa, paneer and milk powder is a big challenge in the food industry. NIR spectroscopic based detection methods have been developed to detect the adulterants. Presently 5% of the adulterants can be detected in a sample. The developed prototype is an IoT enabled device, which can be controlled through an Android application. The sample under investigation is placed on the detection window; after scanning the sample, the spectrum is transferred to a remote server. Spectrum analysis is carried out at the server end and the results are available on the application display.

List of Samples - Adulterants

Sample	Adulterants
Milk Powder	Starch, Corn, Maltodextrin & Melamine
Khoa	Maltodextrin, Skimmed Milk Powder
Paneer	Skimmed Milk Powder, Maltodextrin, HCl



Portable version of the food scanner

Portable version of the Edible Oil Scanner

Edible oils and clarified butter (ghee), share a big contribution to the Indian staple diet. Due to their high price and huge demand, it is tempting for the defrauders to adulterate these essential commodities with less expensive oils and other animal fats to make profits. In order to detect the adulterants, an embedded system has been designed and developed which acquires the NIR spectra of the sample. The data processing and PLSR models, for both blending and adulteration, are embedded into the software. The developed system can be used for the analysis of edible oils. Prototype of the developed embedded system is shown in the figure.

List of Samples - Adulterants

Sample	Adulterant
Coconut Oil	Palm Kernel Oil
Extra Virgin Olive Oil	Olive Pomace Oil
Sunflower Oil	Cotton Seed Oil
Mustard Oil	Ricebran Oil
Ghee	Vanaspati
Ghee	Animal fat



Portable version of the Edible Oil Scanner

Portable Humidifier and Peltier System

A portable humidifier and peltier system has been developed. The system helps in mitigating the post-harvest losses due to temperature for selected

fruits and vegetables. The compatible mixes of fruit and vegetables have been identified for which the shelf life can be increased.

Compatible Mixes

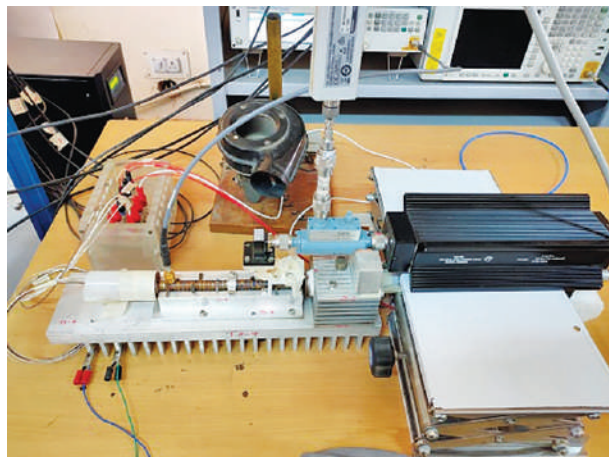
Temperature Range	Compatible Mixes
13 – 18 °C	Bananas, Papaya, Lemons, Tomatoes, Mangoes & Pumpkin
19 - 23 °C	Potatoes, Spinach, Watermelon, Tomatoes (Mature Green)



Portable Humidifer

Ku-band State-of-art TWT

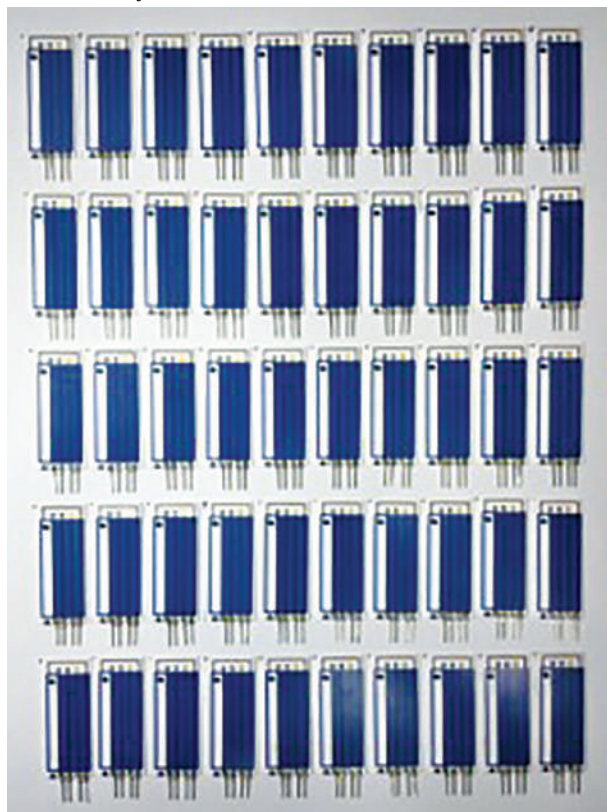
Ku-band state-of-art TWT has been designed and developed at CSIR-CEERI. Simultaneously, SAC-ISRO has also developed prototypes of the tube, using CSIR-CEERI's design and technical support, at India's premier microwave tubes industry – Bharat Electronics Ltd., Bengaluru to gear-up production of the tubes.



Ku-band TWT in test bed for RF aging

Thick Film Sensor Electrodes for EMAT

The project entitled, "Design & Development of Thick Film Sensor Electrodes for Electronic Milk Adulteration Tester (EMAT)" in collaboration with REIL, Jaipur aims in developing sensor electrodes that are capable of detecting various adulterants in milk viz., urea, salt and detergent. A total of 5000 thick-film sensor electrodes shall be delivered to Rajasthan Electronics & Instruments Ltd. (REIL) in phased manner. The design and development of 2nd batch of thick-film sensor electrodes, numbering 250, has been carried out as per REIL specifications and the fabricated sensor electrodes have been successfully delivered to REIL.



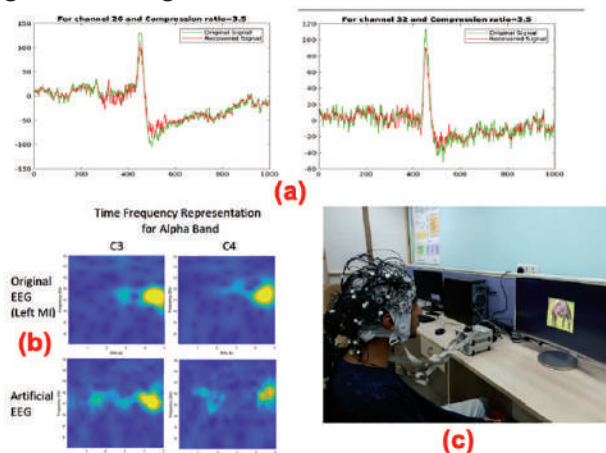
Thick-film sensor electrodes for EMAT

Interface Development of MAV/Drone Control based upon Cognitive Load Estimation using BCI Methods

Drones are extensively used for civil and military purposes for security and surveillance. In present scenario, the drones are controlled using handheld interface devices, which limit the usability of the drones as the soldier's hands are pre-occupied

by the remote controller. The need of suitable hands-free control of the drones by the soldier can be achieved by developing a Brain Computer Interface, analyzing EEG signal corresponding to motor imaginations of the operator and generation of navigation control signals for drone.

As the operator detects a target object, it generates a trigger for generating a navigation direction. The operator decides whether to follow the object or to continue the current navigation direction. The navigation direction of the drone is determined by classifying the motor imagery (MI) EEG signal by thinking about moving in a particular direction or performing a motor action. The brain signals corresponding to the motor imagery EEG signals have been classified by developing customized sequential deep learning models to generate navigation commands for the drone.



BCI based MAV/Drone control, (a) Compressive sensing of EEG signal, (b) Augmentation of EEG signal and (c) EEG signal Acquisition

The commands to the Ground Control Station (GCS) of the drone are to be generated in real-time (every 20 milliseconds in this case) for flying the drone. Thus the EEG signal is compressed using Sparse Bayesian models to reduce the sample to be communicated to the inference engine. The EEG data obtained by compressive sensing is classified at the inference engine using the optimized deep learning models for a fast and real-time operation. The inference engine is interfaced with drone

The commands to the Ground Control Station (GCS) of the drone are to be generated in real-time (every 20 milliseconds in this case) for flying the drone. Thus the EEG signal is compressed using Sparse Bayesian models to reduce the sample to be communicated to the inference engine. The EEG data obtained by compressive sensing is classified at the inference engine using the optimized deep learning models for a fast and real-time operation. The inference engine is interfaced with drone using wireless communication and the navigation commands are conveyed to the drone controller. The integrated system of drone controlled by Motor Imagery EEG signals is shown.



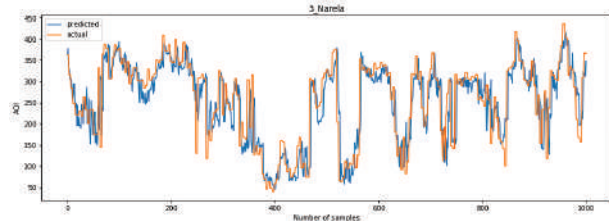
Drone navigation control by brain-computer interface

Intelligent Data Analytic Algorithms for Air Quality Monitoring

Under CSIR AI mission, Intelligent Data Analytic algorithms for Air Quality Monitoring project has been completed for air quality forecasting along with heat map generation. We have successfully developed the prediction model for air quality on real-time data as well as CPCB data. Under the project, we have installed the Robert Bosch Climo instruments (one in CSIR-CEERI, Pilani and other in CSIR-CEERI, Delhi) for generation of real-time air quality data for the air quality prediction model.

The prediction model anomaly detection algorithms have been implemented for various alerts. Implementation of algorithms has been done at node/edge level platform. The data has been crawled at frequency of 15mins from 35 stations. But due to unavailability of meteorological

data only 14 stations are chosen for algorithm development. The Beijing dataset is used and the claimed accuracy is around 75% for first six hours and then it linearly degrades for next 48 hours. We initially used the same model for New Delhi data set and found similar trend and percentage of accuracy for Indian dataset. Beside local emissions, the air quality of a location also depends on its neighbours, as air pollutants are dispersed among different locations. To model spatial correlations in air quality at different locations, we devise a spatial predictor which predicts the air quality of a location based on other stations' status consisting of AQIs and meteorological data. The spatial neighbours of a station include not only nearby stations but also the stations located in adjacent cities. To model the impact from different locations, the distance between the station and its neighbours ranges from a few kilometers to several hundred kilometers. The prediction aggregator results over 1000 samples for each station in Delhi. The results are shown are for first six hours. The results show that we have achieved reasonably good accuracy during initial hours and for the later hours the loss starts to increase and we can see the increasing variance in the graph of predicted and actual value.



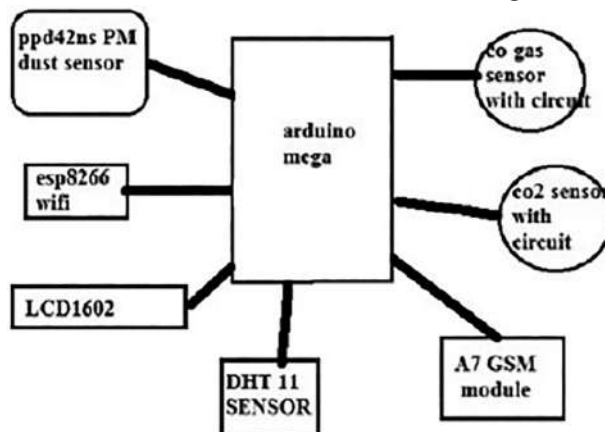
Prediction with our improved prediction model for Narela, New Delhi

Sensor Node development and AQI generation

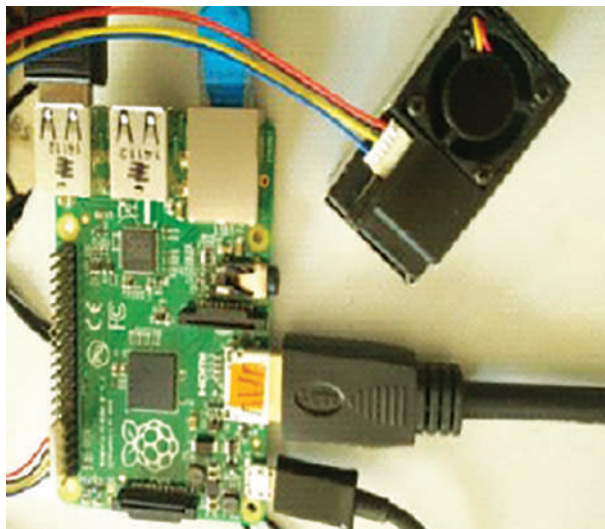
- Characterization of CO₂ sensor is successfully done for MOS based sensor
- Interfacing of PM2.5/PM10 sensor with Raspberry PI is tested successfully
- TGS 2442 (CO gas sensor), TGS 4161 (CO₂ gas sensor), PPD42NS (PM2.5/10 PM sensor) and DHT11 (temperature humidity sensor) are used for sensor node development
- Esp8266 is used for Wi-Fi data transfer to the cloud and web
- A7 GSM module is used for sending of SMS
- Arduino Mega is used for sensor node

development and interfacing of all the sensors and communication modules

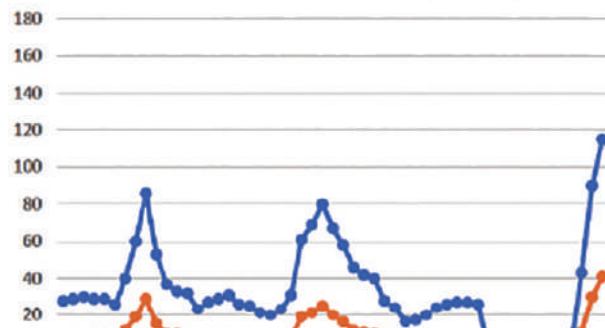
- The average of the values obtained is sent in five minutes.
- The reading is taken after every 30 seconds.
- The timing of GPRS reading and the dust sensor observation are same.
- Air pollution data taken from CSIR-CEERI, Naraina Industrial area, Delhi and Gurgaon



Block diagram of sensor node



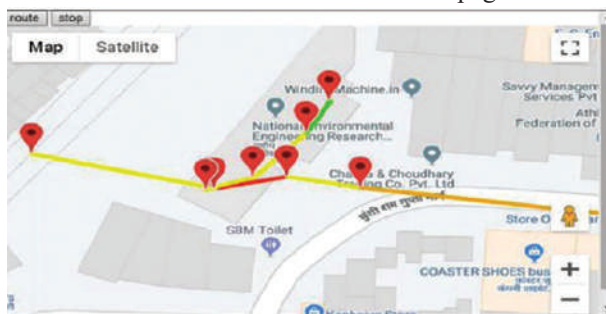
**Interface of raspberry PI board with SDS021 sensor
PM 2.5 and corresponding AQI**



PM 2.5 and corresponding AQI recorded for three months from March, 2019 to May, 2019

Development of Webpage for showing air quality of stationary and mobile node along with heatmap.

- Main web-page contains Google map enabled with the multiple marker (one marker over the google map for one sensor node) location-wise by using the JavaScript, html, CSS.
- Main web-page also contains the tab “About us” to explain about the air quality index and methods used to calculate the air quality index.
- Mobile node data (latitude, longitude) is collected on the Firebase (Real Time Database) platform and also is received over the web-page.



Trajectory generation of PM_{2.5} pollutants

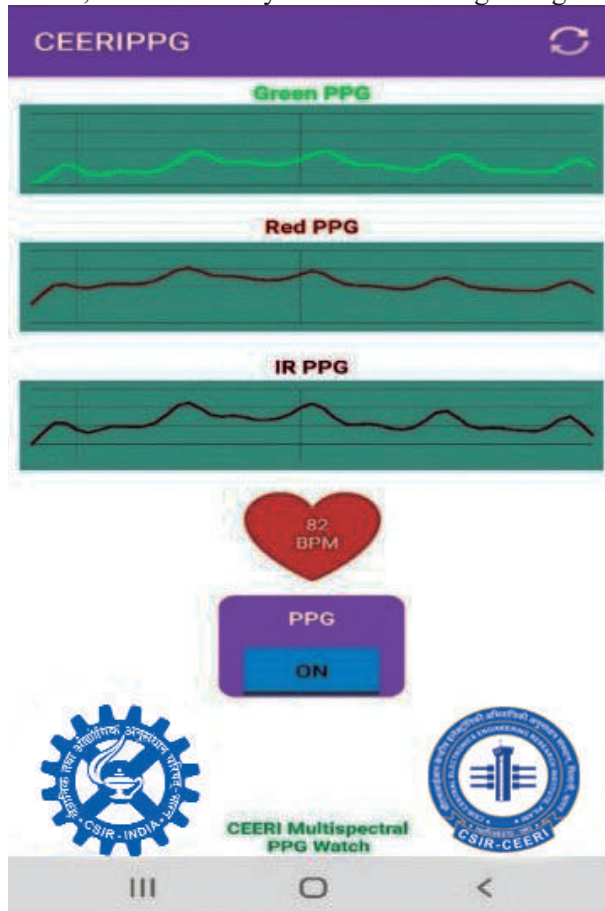
Smart Watch

Wearable devices are becoming prominent due to their ability to continuously track various health-related parameters. However, the current generation wearables can trace only basic parameters such as activity levels, heart rate, sleep quality etc. Further, the raw data such as the heart rate pulse waveform which has vital diagnostic information is inaccessible from the device. The privacy of the collected health data has also been a big concern. The goal of this activity is to develop privacy-preserving, next-generation wearable devices that can be used for fatigue monitoring, cardiac arrhythmia detection, blood pressure tracking, cardiac fitness monitoring and eventually non-invasive glucose tracking.

Keeping this in view, CSIR-CEERI has designed and developed a wearable device integrated with multi-spectral PPG sensors (from OSRAM) comprising of green, red and NIR wavelengths for capturing the heart rate, heart rate variability and blood oxygen saturation (SpO₂). The watch is also integrated with an accelerometer and barometer to measure the activity of the individual and to calculate

the cardiovascular fitness score. The hardware consists of an OSRAM sensor, comprising of three wavelengths and a detector. The detector gives a current signal proportional to the intensity of light falling on it. A TI Analog Front End (AFE) is integrated with the OSRAM sensor for controlling the LED power, blink rate of the three wavelengths and the gain of the trans-impedance amplifier. The advantage of CEERI-designed watch is that it can access the raw PPG data which can be used for advanced AI and analytics. The entire embedded hardware is packaged in a watch form factor as depicted in the figure. Two versions of the prototypes are developed. The second version has a smaller form factor for easy wearability. An android application for real-time data and HR display has also been developed.

In future, the watch will be tested on various subjects for continuous HR, SpO₂, activity, cardiac fitness, cardiac arrhythmia monitoring using the



Android application connected with CEERI smart watch

collected raw PPG data and optimized machine learning algorithms.



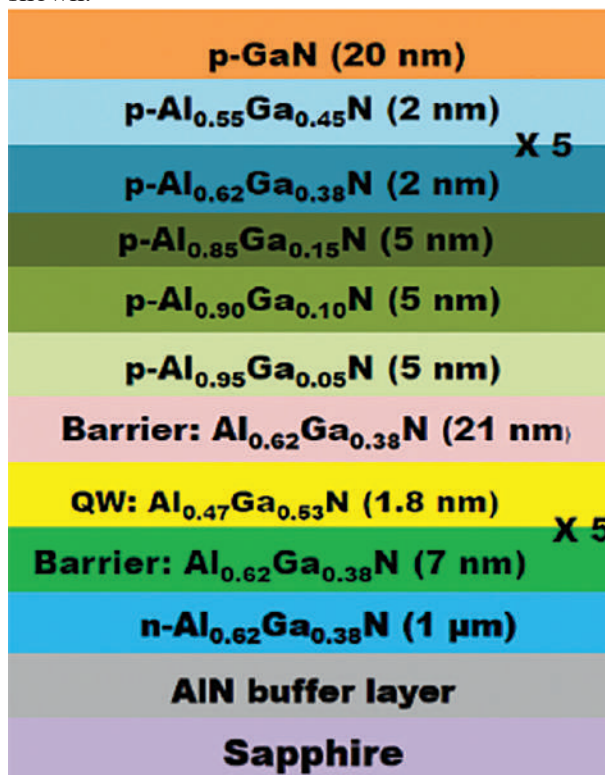
Realized multi-spectral PPG watches for HR, Blood oxygen saturation and HRV monitoring

Sapphire Substrate based UV-LEDs and its Application for Water Purification System

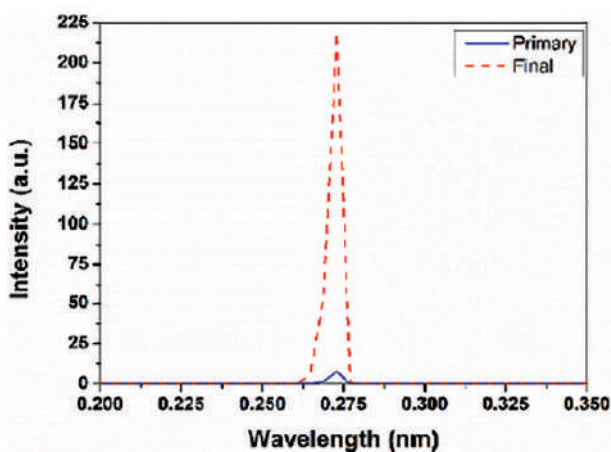
AlGa_N-based ultra violet light emitting diodes (UV-LEDs) are of prime focus of worldwide research because of its tremendous potential in societal and strategic applications. An activity of design and development of AlGa_N-based UV-LED devices along with development of an UV-LED array-based water-purification module is going on at CSIR-CEERI. The activity has been sponsored by the Office of Principal Scientific Advisor to the Govt. of India, New Delhi. In this project, one of the collaborators, IRPE-Kolkata is responsible for growth of the AlGa_N-based epitaxial wafers by MBE.

The objective of the project is to design and develop of AlGa_N-based light emitting diodes with emission wavelength in UV-C region. Initially, the AlGa_N-based UV-LED epilayer structure has been designed for emission wavelength of around 273 nm by using APSYS. For further improvement of the performance of the device in terms of the internal quantum efficiency and efficiency-droop, the design of the epi-structure has been optimized by slightly modifying the electron blocking layer (EBL). This is done by incorporating a thin AlGa_N layer as the EBL and by introducing a 5X AlGa_N/AlGa_N super-lattice structure on top of the EBL (instead

of only a relatively thicker EBL). The schematic of the new design of epi-structure, the corresponding emission wavelength, I-V characteristics, internal quantum efficiency along with efficiency-droop in comparison to the previous reference structure are shown.

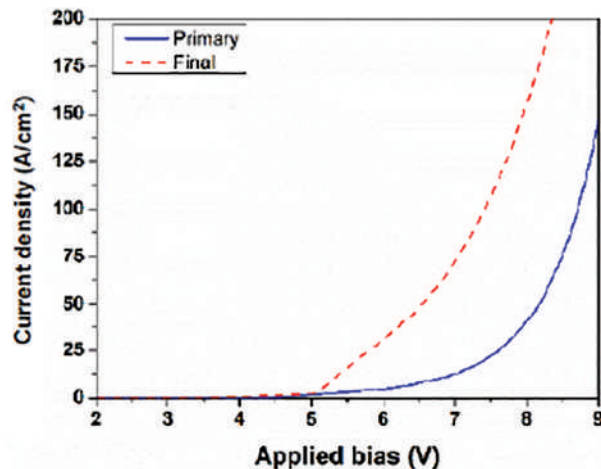


Schematic of the optimal design of UV-LED epi-structure

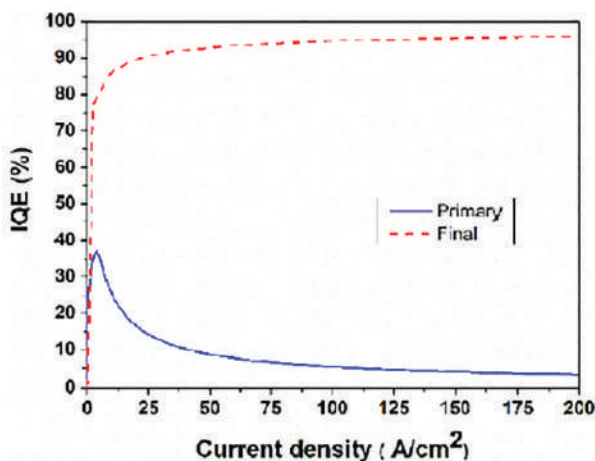


Comparison of the emission wavelength

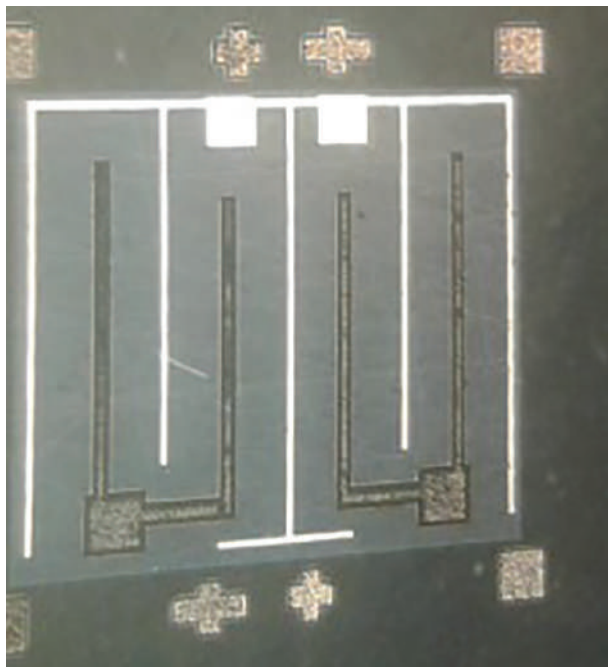
UV-LED devices have been fabricated at CSIR-CEERI in 2nd iteration with the MBE-grown epi-wafer sample (LED-5) supplied by IRPE, Kolkata. During fabrication of the devices, a



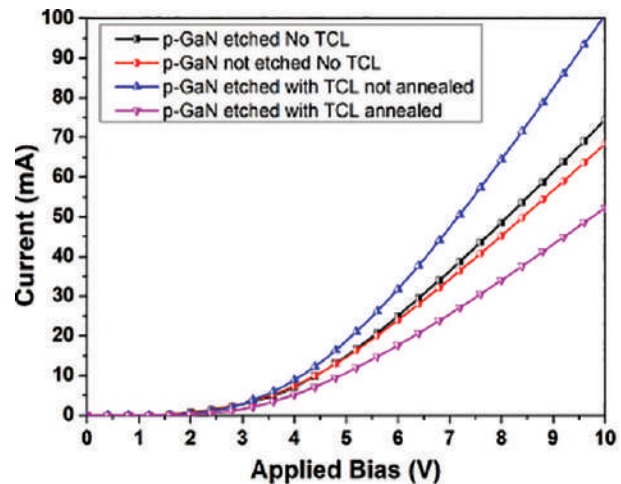
Comparison of the I-V characteristics



Comparison of the IQE Droop



Photographs of a fabricated UV LED chip on wafer



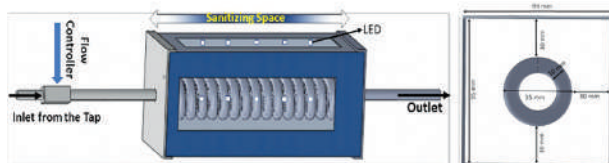
Electrical (I – V) characteristics of the UV-LED devices for different condition in wafer-level

series of experiments were conducted for studying and optimizing the p-GaN layer. Photograph of an UV-LED chip is shown and corresponding I-V characteristics have been measured and plotted. Experimental study shows that the I-V characteristics improves reasonably if the top p-GaN layer is etched slightly before depositing the transparent conducting layer (TCL: a thin layer of Ni/Au). However, I-V characteristics is found to be degraded when the TCL-deposited samples were annealed. This is further being studied for optimization. A range of forward current of 50 – 100 mA corresponding to the forward voltage of 10V has been observed for different condition of the device when tested in wafer-level.

UV-LED array-based water purification system has also been designed for emission wavelength of UV-C region for purification of the running water. The dose requirement for this wavelength has been kept in mind during simulation, which is around 13.8 mJ/cm², as per the available literature. For simulation, we have used Trace Pro 2019 software and we have fixed the total number of LEDs to 15, considering 5 number of LEDs in each of the 3 sides of the chamber. The configuration of series-parallel combination of LED arrays [5 (in series) × 3 (in parallel)] are used. Five numbers of representative SMD-packaged LEDs mounted on top of a star heat-sink are fixed on three copper

strips, which are to be fixed in three sides of the chamber with an isolation of a Perspex sheet. The optimized design is as follow,

- Pipe configuration: Helical
- Pipe material: Quartz (Qz)
- Outer diameter of Qz pipe: 10 mm
- Inner diameter of Qz pipe: 8 mm
- Spacing (edge-to-edge) between successive coil of helix: 2.5 mm
- Distance of the helical pipe from the LEDs source: 30 mm
- No of helix turns in Qz tube: 16
- Height of Qz pipe: ~ 200 mm
- Effective length of the Qz pipe: 1272.5 mm
- Size of LED considered: 4 mm (L) × 4 mm (B) × 2 mm (D)
- Gap between successive LEDs: 35 mm
- Inner wall of the housing is considered to be Aluminium with 94% reflectivity



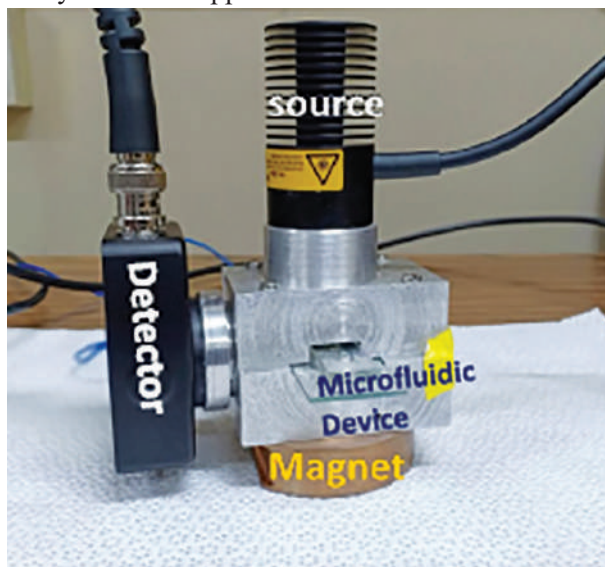
Schematic of the UV-LED array-based water purification chamber along with the top-view of the chamber

Good quality AlN template is very important for realization of high efficiency UV-C LEDs. At present, the commercially available AlN substrates are very expensive. The alternative is to grow high quality AlN buffer layer on sapphire substrate. We have grown high quality AlN layers of thickness of around 1- μm on sapphire substrates by using metal organic chemical vapor deposition (MOCVD) system at CSIR-CEERI. At first, the nucleation layer was grown on sapphire substrate at 950 °C followed by high-temperature growth of AlN layer at 1210 °C. The V/III ratio for nucleation and AlN layer was kept at 1460 and 210 respectively. After the growth of 450 nm AlN layer, the temperature was reduced to 1050 °C for the second nucleation layer and then the temperature was again ramped up to 1210 °C for the growth of AlN layer. This step was repeated twice to reduce the dislocation density in AlN. Dislocation density of grown AlN was measured by High Resolution X-ray diffraction (HRXRD) system. The edge- and screw-dislocation densities were found to be $2.04 \times 10^9 \text{ cm}^{-2}$ and $2.37 \times 10^8 \text{ cm}^{-2}$

respectively. Therefore, the total threading dislocation density of the MOCVD-grown AlN was estimated to be $2.27 \times 10^9 \text{ cm}^{-2}$, which is comparable to that of the commercially available AlN-on-sapphire templates being used for fabrication of UV-C LEDs.

Fluorescence-based Optical Platform

Early diagnostic of any disease is very critical to check any further criticality of deadly disease. The prototype of the final version of the system has been developed in WP-1.2 under the Nano-biosensor mission-mode project sponsored by CSIR. The system has capability in predicting early diagnosis of diseases where signal can be monitored using fluorescence-based probes. In this device, a source is used that is capable to excite the fluorescent sample to give the fluorescence signals, which are then recorded using a detector. Optical filters are used to select only the desired wavelength to reach the detector. The photograph of the prototype of fluorescence-based optical sensor system developed at CSIR-CEERI is shown. This type of fluorescence based optical platform can be used for detection of several other diseases and has potential for multiple applications, namely, sensing of bio-molecules, sensing adulteration in bio-fuels, medicines and chemicals. This multi-application adaptive platform device could be of great use for many industrial applications also.



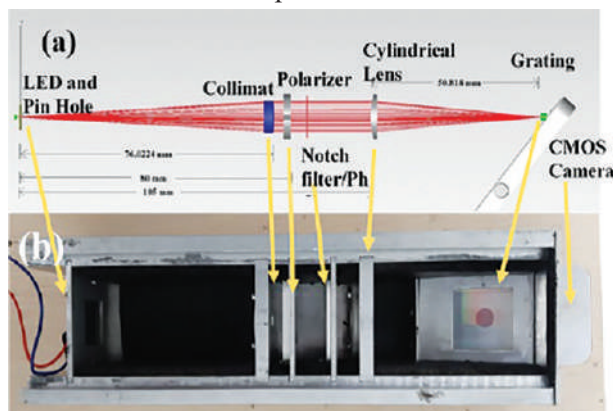
Photograph of a fluorescence-based optical sensor system

Photonic Crystal (PhC)-based Sensor Platform and Smartphone-integrated Module

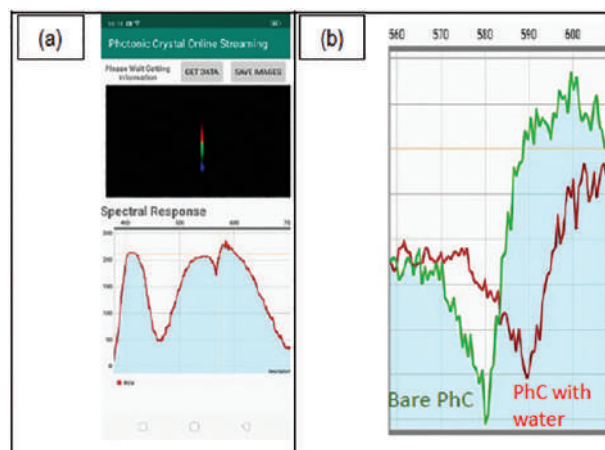
The objective of this activity is to develop a 1D and 2D photonic crystal (PhC)-based nano-structured platform device with a case study. The activity has been supported by CSIR under a mission-mode project entitled “Nano-biosensors and microfluidics for healthcare”. The detection scheme utilizes refractive index-based sensing principle for detection of bio-samples. Specific antibody binding increases the effective index of the photonic crystal slab and hence changes the optical characteristics. The change in the optical characteristics is directly in proportion to the value of the refractive index of samples. Thus, the output optical characteristics are observed for identifying and recognizing label-free biomarkers of the disease. In this case, the PhC structure of the platform has been designed in order to achieve the resonance wavelength in visible wavelength region. This visible light image is captured by the smartphone and is converted to corresponding wavelength for identifying the resonance wavelength. The shift in resonance wavelength happens when any analyte is placed on top of the structure, which can be measured by the system. The system is quite sensitive and can be used for early disease diagnosis in healthcare application. The optical read-out can be monitored using a CMOS camera, which is integrated with smartphone. Integration with smartphone gives an advantage of transmission of data to an expert/Doctor for advice. The actual realized integrated optical system is shown where the smartphone is integrated with the system through wi-fi connectivity. Furthermore, it can be used as a sensor-platform for healthcare diagnostics in general, where it can be customized depending on the identified biomarkers of the diseases. This platform can be used for other multiple applications including industrial applications after appropriate calibration in each case.

The screen-shot of the smartphone showing the output light image along with the corresponding spectrum is displayed. The system has been tested with DI water to check the feasibility of its working and the responses are also shown. The shift in the

spectrum clearly shows the capability of the sensors to differentiate even for minor change in the effective refractive index of the platform.



Integrated optical system, (a) Ray diagram of the optics, (b) Photograph of the fabricated optical chamber

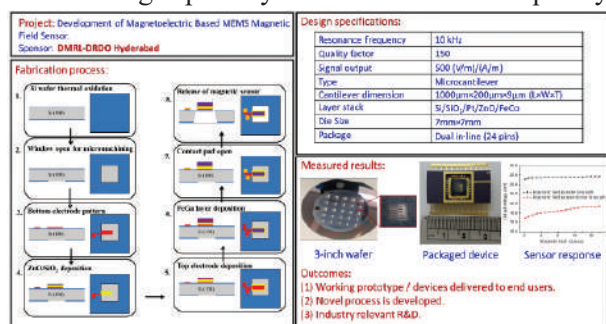


Smartphone screen-shot and spectral response, (a) Screen-shot of smartphone showing output light image and corresponding spectrum. (b) Spectral response showing the difference in observed signal for bare PhC and when DI water dropped on its sensing surface

Development of Magnetoelectric based MEMS Magnetic Field Sensor

Assessment of magnetic signature of naval vessels allows one to determine their vulnerability to mines. Therefore, reduction and detection of magnetic signatures has been exploited largely in the arena of naval warfare. While reduction of magnetic signature was accomplished through departing techniques, magnetic signature detection was primarily through magnetic field sensing technology. A variety of magnetic field sensors such as SQUID, fluxgate sensors and resonance based magnetometers are available in literature to detect

magnetic signals either close to or less than Earth's magnetic field (25 – 60 micro-Tesla). However, these sensors are bulky and expensive and hence not much used effectively in actual test bed. Recently, magneto-electric based magnetic field sensors have shown superior sensing properties on par with the existing magnetic field sensors. Magnetolectric sensors utilize magnetostrictive and piezoelectric layers as sensing elements to sense the external magnetic field. Further, these sensors are found to be cost-effective and compatible with micro-fabrication technologies. At CSIR-CEERI, an R&D programme for developing these sensors was undertaken in collaboration with DMRL-DRDO Hyderabad. The process methodologies for fabricating magnetolectric sensors were formulated using standard lithography process. The sensor chips were successfully fabricated on silicon and packaged in dual-in-line MEMS package. Array of sensors capable of operating at different resonance frequencies have been fabricated for sensing ac magnetic fields. The sensor exhibited high magnetic field sensing capability around resonance frequency.

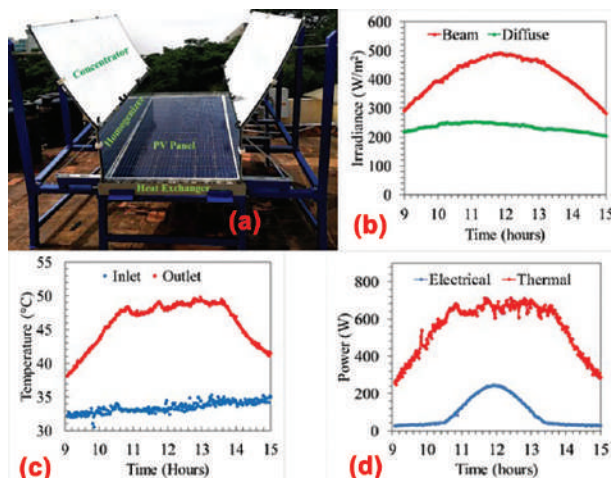


Magnetolectric MEMS magnetic sensor

Non-Imaging Optics based Low Concentrating Photovoltaic Thermal (LCPVT) Hybrid System

Solar Photovoltaic (PV) technologies have low conversion efficiency (15-20%) limited by Shockley-Queisser limit. Therefore, they require a high initial cost and huge capital investment. To overcome this problem, hybrid Photovoltaic Thermal (PVT) systems have gained a lot of research interest recently. In PVT systems, waste heat is extracted from the solar panels, which results in the cooling of the solar panels. The cooling of the solar panel

subsequently leads to improved electrical efficiency and thermal output simultaneously. The major drawback of such PVT systems is the grade of thermal output, which is relatively low ($>50^\circ\text{C}$) and hence find limited application in industries. The grade of thermal output can be improved by integrating a concentrator to the existing PVT module. In recent time, CPC based concentrators have received much attention for the CPVT application because of their highest average concentration ratio for given acceptance angle. However, the biggest challenge with such CPC based LCPVT system is the formation of non-uniform distribution of flux on the PVT module which not only brings down the electrical output due to current mismatch but also creates hotspot on solar panels. The non-uniform distribution of flux can be mitigated by integrating a homogenizer to the CPC. In the present work homogenizer integrated to the CPC based LCPVT system is fabricated. The testing of the system is carried out in outdoor condition. The results show that peak outlet water temperature of 50° , peak electrical power 246W and peak thermal power of 700W can be achieved at 36 LPH.



Low concentrating photovoltaic thermal (LCPVT) hybrid system, (a) Actual installed LCPVT system (b) Variation of Irradiance with time (c) Variation of outlet water temperature with time (d) Variation of thermal and electrical power output from the system

It is proposed that, LCPVT system will be scaled up to 5 kW with the design of different heat exchangers which can effectively extract the waste heat from the PV panel. Further, the thermal

output from the LCPVT system will be utilized for desiccant based cooling application.

Human Fatigue and Drowsiness Detection Systems Applicable to Drivers and Industrial Workers

The goal the project is design and development of non-intrusive systems to detect the state of the driver and industrial worker in real-time using physiological and behavioural measures.

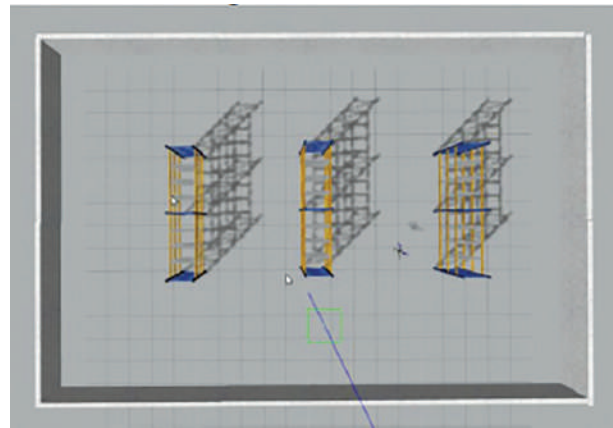
The significant achievements are as follows,

- Developed prototype-I system for driver drowsiness detection integrating physiological (i.e., ECG) and behavioural measures on a resource constrained platform (RPI+NCS platform)
- The system is integrated with the industrial partner's cloud platform for remote fleet monitoring application
- Successfully integrated deep learning algorithm for behavioural measures on a resource constrained platform
- Collected fatigue data for more than 100 subjects (using the approved protocol by CSIR-IGIB ethics committee) using an in-house developed modified N-back task
- Developed optimized machine learning framework for fatigue detection from ECG signals with > 90% accuracy
- The driver drowsiness detection system is demonstrated to various stake-holders as part of CII industrial workshop organized in November 2019.
- Interacted with other potential industry stakeholders (M/s. Visteon, M/s. Ford and M/s. Fleeca)

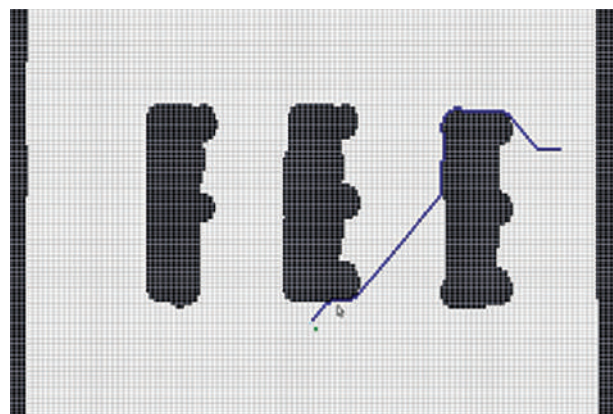


Prototype-I system for driver drowsiness detection integrating physiological (ECG) and behavioural measures on a resource constrained platform (RPI+NCS platform)

simulator. Integration of floorplan and rack plane path planning with QR-code scanning was completed for warehouse management and tested on simulator.



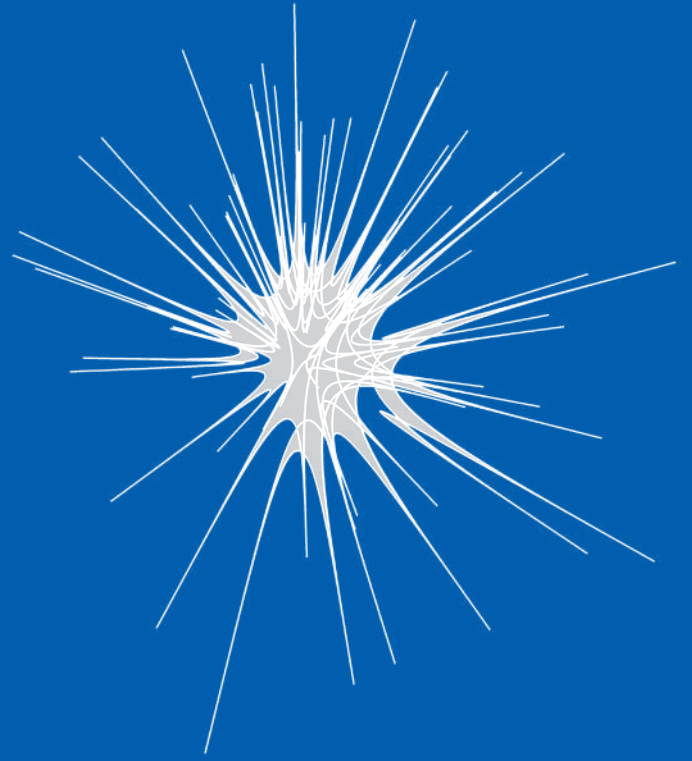
Showing simulated warehouse environment



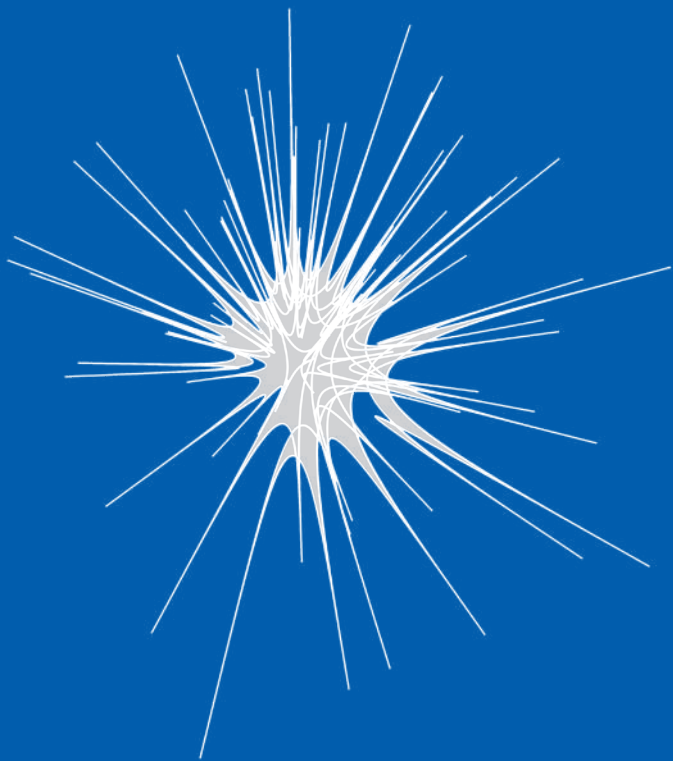
Showing global path planner generating path from start to goal location, while avoiding mapped obstacles (Top view)

Autonomous Navigation of Drones for Warehouse Management System

The Global path planning algorithm was developed for mapped regions and tested on simulator. Rack path planning for warehouses was tested on

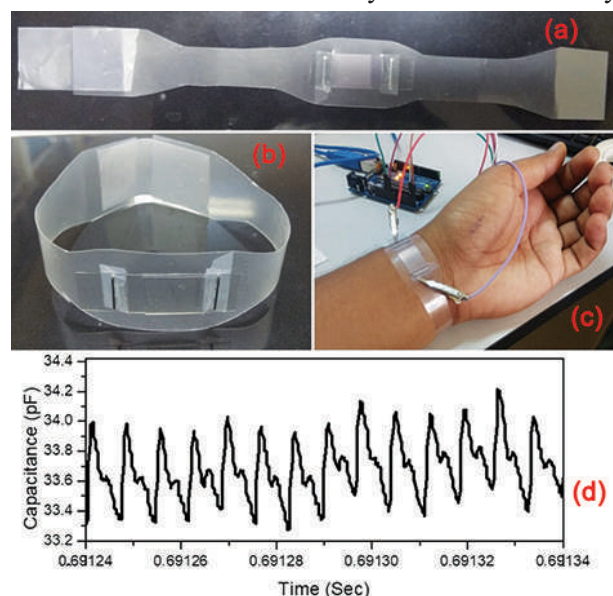


Research Highlights



Microstructure PDMS based Pressure Sensors

Microstructure PDMS based pressure sensors are being explored, for their potential applications in the area of bio-signal monitoring and for the concept of electronic-skin. At CSIR-CEERI, a capacitive pressure sensor has been fabricated with micro-pyramidal PDMS dielectric thin films and the arrangement of micro-pyramids' influence on sensor sensitivity has been studied. Pressure sensors are realized using periodically (surface coverage: 48.6%, 36.7%) and diagonally arranged pyramidal (surface coverage: 45.2%) dielectric thin films. Despite having large surface coverage (45.2%), pressure sensors with diagonally arranged pyramids exhibited a high sensitivity, of 0.05 kPa^{-1} in 1-2.5 kPa pressure range, than pressure sensors with periodically arranged pyramids (36.7%). This peculiarity is attributed to the large displacement of pyramids and an increase in effective permittivity in the case of pressure sensors with diagonally arranged pyramids. A flexible pressure sensor using IO-PET electrodes and PDMS micro-pyramidal dielectric layer has been fabricated, which is capable of measuring in-vivo blood pressure waveform when attached on the wrist. The study demonstrates a way



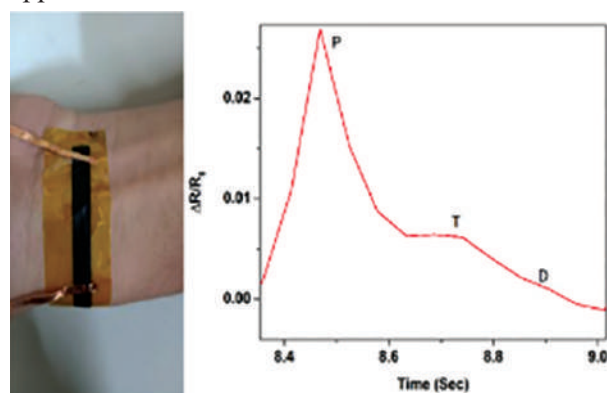
Realization of parallel-plate capacitor on flexible plastic substrate using IO-PET and IO-PET with micropatterned PDMS dielectric layer, in flat (a) and bending (b) conditions. Flexible pressure sensor is attached on wrist together with interfacing electronics for in-vivo measurement of wrist pulse wave form, (c) Recorded capacitance over time of wrist pulse (d)

to tune sensitivity using an arrangement of pyramids on sensor performance and for their potential application in in-vivo biosignal monitoring.

New Generation Nano Metal-oxide/ Graphene-Polymer Composite Materials for use in Wearable Electronics

A novel flexible resistive-strain sensor based on graphene nanoplatelets (GNP)/PDMS has been developed, that provides good strain sensitivity, stretchability up to 65% with a gauge factor of 62.5, indicating typical piezo-resistive characteristics.

Fabricated strain sensor exhibited long-term stability, reproducibility, durability and perfect linearity. Apart from this GNP/PDMS strain sensors have also been successfully fabricated for detecting small-scale motions such as wrist pulse. The fabricated GNP sensors can distinguish all the three positions of characteristic peaks (P, T and D) in wrist pulse spectrum, hence it could potentially be used in multi position pulse monitoring, i.e., detection for heart rate in the future. The large working range of GNP strain sensor makes it a potential choice for the application of wearable devices.

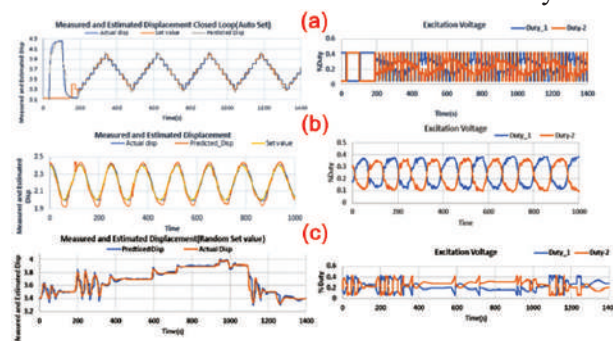


Wrist pulse sensor fabricated at CSIR-CEERI

Artificial Intelligence (AI) controlled Linear Displacement Actuator (LDA) based on Thermo-responsive Smart Materials (SMAs/ SMPs) 'SMAILDAS'

Shape Memory Alloy actuators have the advantage of providing larger force for a smaller size. Moreover, replacing bulky LVDT sensor is very crucial for many applications. In this work the RNN

feedback and control scheme has been integrated together, to formulate the sensorless SMA based displacement actuator, that finds wide variety of applications like car dicky locks, 3D printer head alignment etc. The design and development of RNN based position estimation and control algorithm for SMA actuator sensor-less displacement control has also been carried out and tested on the actual system.



Comparison of online performance: measured and estimation of displacement (a to c, from top to bottom). a and b: LVDT as a feedback in PID control Loop, with given excitation voltage c: RNN model given as a feedback and closed loop performance.

Technologies for Effective Management of Rain-water Harvesting (RWHT): Ensuring Safe Drinking Water and Optimal Water use for Agriculture

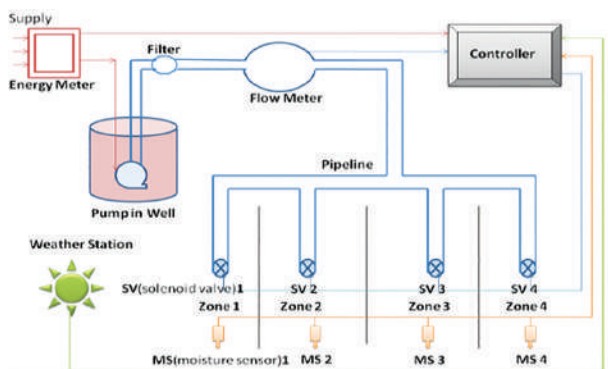
The main objective of the project was to design and develop a rain water harvesting scheme for safe drinking water with in situ quality monitoring system (around 200 places). The project activity also included developing a Smart Embedded Irrigation system/scheme for assessing optimal irrigational water requirements for Agriculture.

A preliminary design of the rain-water harvesting scheme with appropriate use of filter and disinfection treatment (UV and Chlorine) to ensure water quality with in situ quality monitoring system (pH, TDS and ORP) has been completed and installed in 15 households of Pachari (Bhuhana) and Chirawa. The necessary steps to follow for maintenance of all the components and safety measures have also been explained and demonstrated to the household users. Some of the notable advantages of the developed system are: automatic operation which requires no



Installed rainwater harvesting system

separate valve, appropriate filters that have been incorporated to collect the first flush reject water such that less amount of water is rejected during the first flush and easy cleaning is possible. The first reject water can be used for garden, vehicle wash and other similar day-to-day use. The system also ensures improved quality of storage tanks and avoids excess chlorination. The chlorine-based disinfection sub-system ensures that the chlorination level is maintained as per the Government recommendation level. A water circulation mechanism has also been incorporated to improve the DO level and to avoid the possibility of H₂S odor and bitter taste due to an insufficient amount of oxygen in the tank.



General layout and field installation of the three-phase controller system

The Smart Irrigation (Sprinkler and Drip) Controller System with 3-Phase 17.5 HP AC Pump for Rabbi Crop (Wheat and Grams) and Smart Solar Pump-Based Irrigation (Drip) Controller System with A 3HP DC Pump suitable for irrigating 1.2 hectors of the land have also been developed under the project. The field trial of the developed systems have been carried out during the Rabi season and is based on the data collected. It has been observed that the installed Smart Irrigation (Sprinkler and Drip) Controller System resulted in substantial saving in electricity (14.85 %) and water consumption (15.15 %) during the Rabi crop season causing a reduction in farmers expenditures. Moreover, an increase in crop production of Wheat (7.5 %) and Bengal Gram(5 %) was observed.



Farmer operating single-phase controller

The observations from the Smart solar pump-based irrigation (Drip) controller system with a 3HP DC pump also showed a substantial saving in electricity (daily 14.05 kWh generated by renewable energy source) and water consumption reduction (15%) during the Rabi crop season. An increase in crop production of Kinnu (13.33%) and Bengal

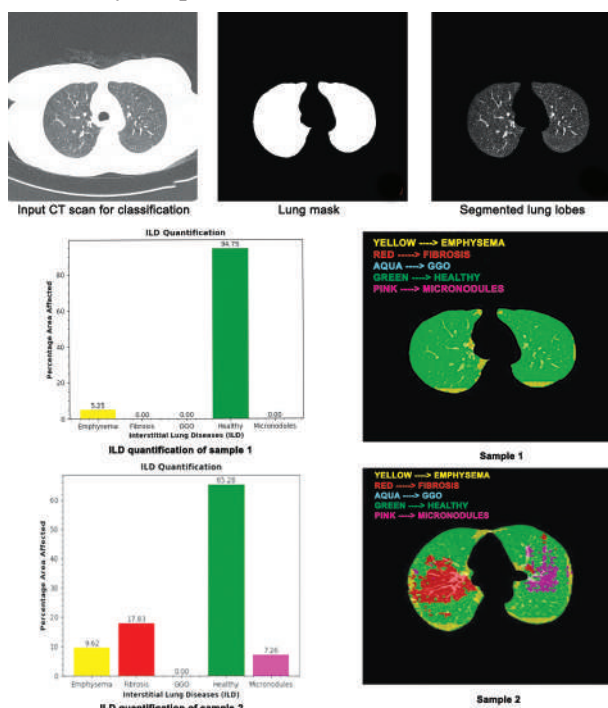
Gram (37.50 %) causing marginal benefit (25%) to the farmer was also observed. Based on the field trial results and observations, necessary modifications in the hardware and software have been carried out for both the systems. The developed systems are also equipped with Smart pump protection with water management module for ac & dc pump, smart sensor node module and smart weather station module.



Field-installed PV solar panels (235W), Lorentz PS4000 controller and submersible pump

Interstitial Lung Diseases (ILD): Deep Learning of Texture based Analysis for Quantification

The ILD patterns comprises of area of lung lobe that does not fall under the region of interest i.e. the area which is not infected. In order to remove that area, a pre-processing and a classification framework has been combined so that it classifies only the area of interest and assigns different colors to the ILD patterns, making it easier for physicians to identify the patterns.



In the following figure, ILD pattern classification carried out on dataset provided by AIIMS, Delhi has been shown. Sample 1 belongs to healthy dataset while Sample 2 belongs to unhealthy dataset.

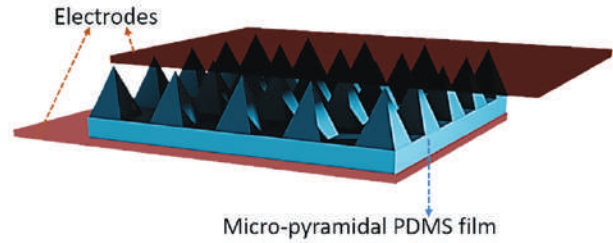
Capacitive Pressure Sensors using Micro-pyramidal PDMS Thin Films

Recently, microstructured polydimethylsiloxane (PDMS) based pressure sensors are explored as a potential candidate in bio-signal monitoring and electronic-skin applications. Here, we are developing capacitive pressure sensors using micro-pyramidal PDMS layers as dielectric thin films. During the process we have found something interesting related to the influence of surface coverage and arrangement of micro-pyramids on the sensitivity of pressure sensor devices. For the fabrication of these micro-pyramidal PDMS layers, we have first fabricated silicon molds using anisotropic etching of silicon wafers followed by PDMS polymer casting on this molds and curing. After curing, microstructured PDMS films are carefully peeled off from the molds. We have developed three micro-pyramidal PDMS thin films having 1 cm² area first two designs are having periodic arrangement of pyramids with different surface coverage, and the third design is having diagonal arrangement of pyramids. These three micro-pyramidal PDMS thin films are named as PS-1, PS-2, and PS-3, and the corresponding parameters are summarized in the table.

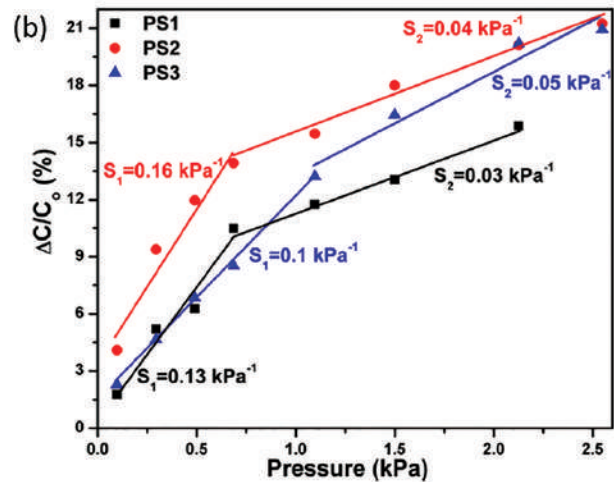
Different parameters of micro-pyramidal PDMS thin films PS-1, PS-2, and PS-3 (W: horizontal size and H: vertical size)

	PS-1	PS-2	PS-3
Average pyramid size (μm)	16.31±0.12 (W) ×17.9±0.13 (H)	16.85±0.16 ×18.53±0.16	17.52±0.34 ×18.81±0.17
Average horizontal gap between pyramids (μm)	7.83±0.14	12.37±0.2	19.71±0.14
Average vertical gap between pyramids (μm)	6.55±0.73	10.71±0.18	20.93±0.41
Surface coverage	48.6%	36.7%	45.2%

Capacitive pressure sensors are realized using these three micro-pyramidal PDMS thin films by placing these layers between two Ti/Au parallel plate electrodes. The $\Delta C/C_0$ with respect to the



The capacitive sensor structure obtained by placing micro-pyramidal PDMS layer between two electrodes



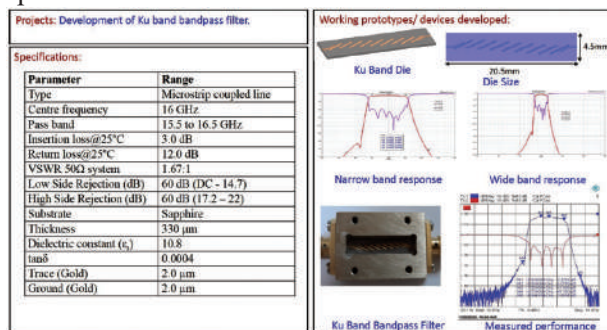
Relative capacitance versus applied pressure of pressure sensors PS-1, PS-2, and PS-3. Data points represent the experimental data whereas the line represents the linear fit

applied pressure of PS-1, PS-2, and PS-3 is also presented. All the three pressure sensors exhibit similar increase in $\Delta C/C_0$ with the applied pressure. The significance of arrangement of pyramids in tuning the sensitivity of these kind of PSs is clearly noticed. In PS-1 with large surface coverage, pressure is distributed on large number of pyramids; on the other hand. In PS-2, pressure is distributed on small number of pyramids. Small number of pyramids undergo large deformation for a given applied pressure, hence, PS-2 shows high sensitivity over PS-1. However, PS-3 with diagonal arrangement of pyramids and surface coverage near to PS-1 shows interesting sensitivity behavior in the experimented applied pressure region. This interesting behavior of PS-3 is attributed to diagonal arrangement of pyramids. This study demonstrates a way to tune sensitivity using arrangement of pyramids on sensor performance.

Ku Band Bandpass Filter

Reconfigurable microwave devices can work for multiple frequencies by electrically tuning the same device. Ferroelectric Tunable devices have merits compared to their counterpart existing technologies because of enhanced functionality. At the front-end of communication system filters and phase shifters are required, which can be made multi-functional by tuning technology. The size of personal communication system is continuously reducing and available space is also limited. Therefore, RF/microwave engineers are looking for alternative technologies with enhanced functionalities. Ferroelectric BST tuning technology can meet those requirements.

In this sponsored project from DMRL-DRDO Hyderabad, Ku band bandpass filter was developed and delivered to the end-user agency. Coupled microstrip lines were used for implementing microstrip filter and it is termed as microstrip coupled line filter. The working principle is based on electromagnetic coupling of resonators. End-to-end design, fabrication, characterization and packaging process was developed. Device housing was developed and SMA connectors are employed for RF signal input/output. Filter meets the end-user specification.

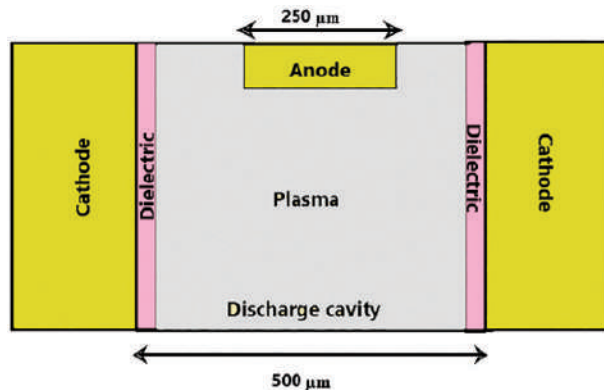


Ku Band Bandpass Filter

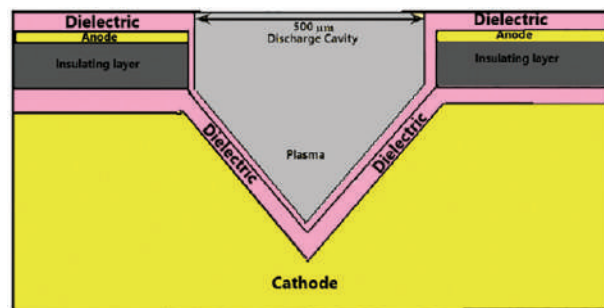
Dielectric Barrier Discharge Based Micro Hollow Cathode Plasma Device Arrays and their Characterization

A dielectric barrier discharge (DBD) based micro hollow cathode discharge (MHCD) has been simulated in two dimensions using the Plasma Module of COMSOL 5.4 software. Two design

prototypes have been simulated, namely, a cylindrical hollow cathode cavity design and a pyramidal cathode cavity design for different voltages and frequencies. The basic schematic of the unit cell of two designs are shown in the figure.



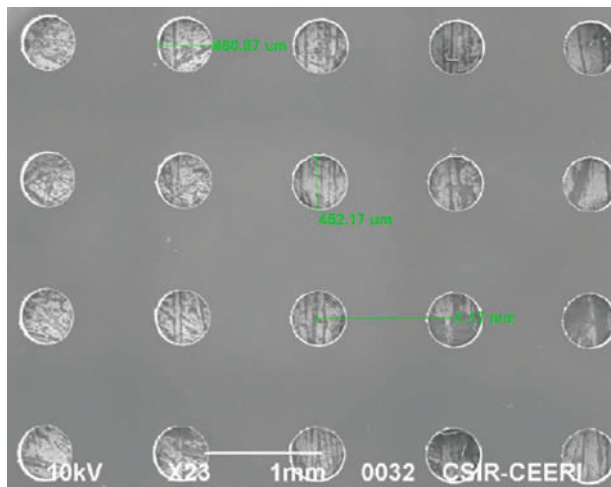
Schematic of cylindrical cavity design prototype of DBD based MHCD



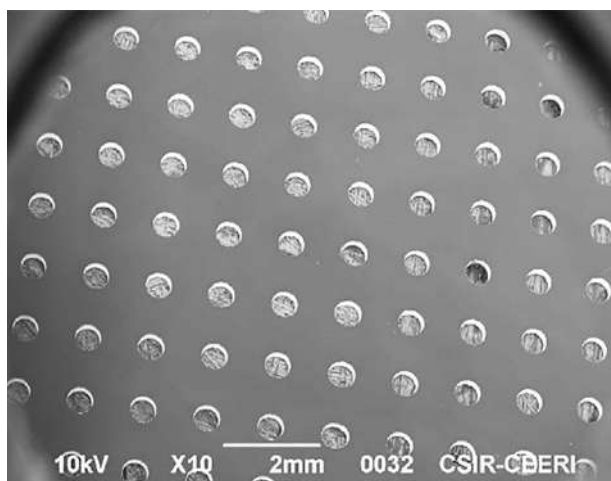
Schematic of pyramidal cavity design prototype of DBD based MHCD

In cylindrical cavity design, an Immersed anode (50 μm depth) has been used in the hollow cathode cavity. The simulations showed the initiation of discharge at the low gap region between anode and cathode followed by hollow cathode discharge in the cavity structure. The electron density in the range of $10^{16} - 10^{19} \text{ m}^{-3}$ have been reached in this design of MHCD. In the second design of MHCD with pyramidal cavity, the discharge has been created by exciting the thin anode layer with a voltage $\sim 200 \text{ V}$ at frequency of 25 kHz, coated on the surface along the boundary of circular opening of cathode and separated by an insulator of thickness $\sim 5 \mu\text{m}$. In this design due to pyramid shaped of hollow cathode, electron density have been higher than the cylindrical shaped hollow cathode in the range of $10^{16} - 10^{21} \text{ m}^{-3}$, with increased temperature.

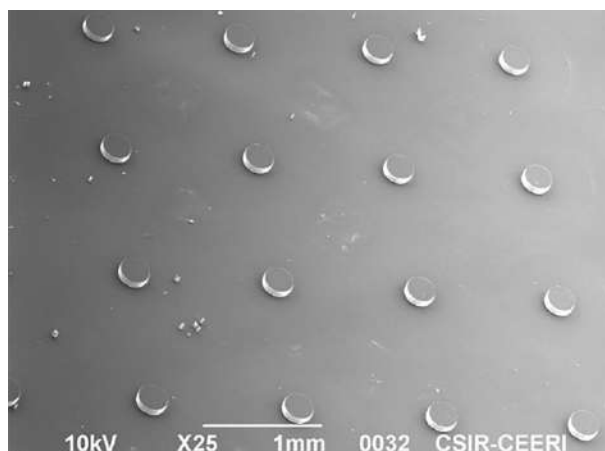
For the development of cylindrical cavity design of MHCD array, masks for development of array of cathode cavities and array of anode pillars have been fabricated. Using the fabricated cathode and anode masks, array of cylindrical hollow cathode cavities and array of anode pillars have been developed on silicon wafers using the micro machining processes. The cylindrical cavities have been developed with the dry etching and other processes of MEMS fabrication. An array of micro hollow cathode cavities on metal electrodes have also been developed on $\sim 300\mu\text{m}$ thick polished sheet of molybdenum by micro drilling (micro drill bit of diameter $500\mu\text{m}$) process of μEDM machine. Now, the bonding of developed cathode and anode array will be carried out to develop the DBD based MHCD array for characterization.



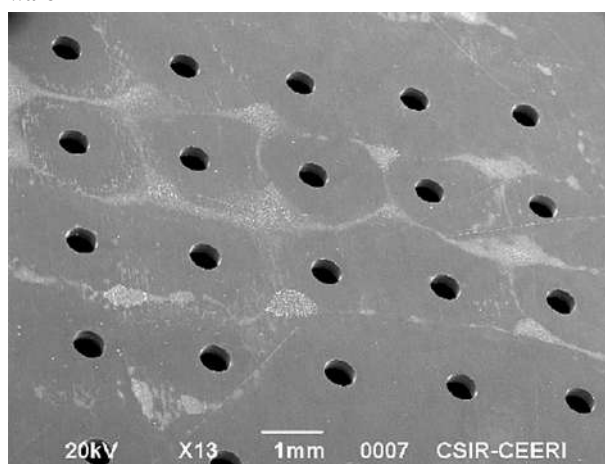
SEM image of array of cathode cavities developed on silicon wafer (higher magnification)



SEM image of array of cathode cavities developed on silicon wafer (lower magnification)



SEM image of array of anode pillars developed on silicon wafer



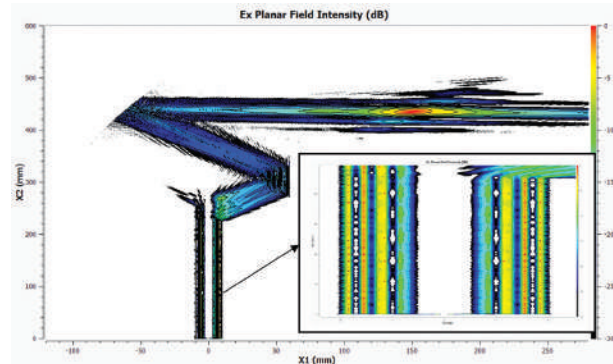
SEM image of array of cathode cavities on molybdenum sheet

The second design of pyramidal cavities of MHCD has been adopted due to non-operational of DRIE machine for further prototype development. For development of pyramidal cavity design, masks have been designed and TMAH process will be used to fabricate the pyramidal hollow cavities in the silicon wafer.

Engineering Drawings of 170GHz/100kW Gyrotron

Engineering drawing of all components of Gyrotron and integrated design of complete gyrotron for axial as well as radial output power has been completed according to different types of brazing joint and TIG welding process. In addition, electrical design of Vlasov mode launcher with helical cut and mirrors system has

been carried out and achieved Gaussian content factor (GCF) more than 80% at the window plane.

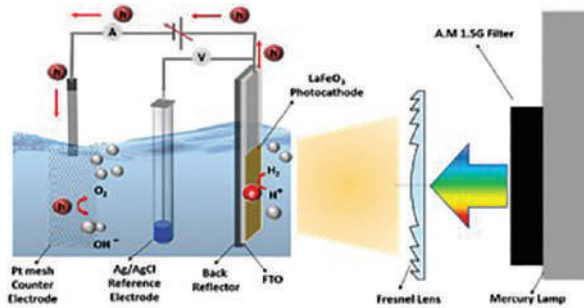


Planar electric field profile of quasi-optical launcher (inset figure is zoom view of launcher)

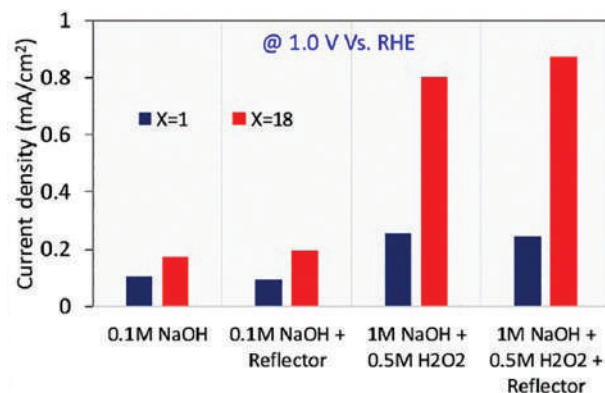
Concentrated Photovoltaic (CPV) Assisted Tandem Artificial Photosynthetic (AP) Device for Effective Solar to Chemical Conversion

Spontaneous bias-free photoelectro-chemical (PEC) water splitting by direct solar irradiation has been considered as a route to produce solar fuel but the technique is impeded by limitation of the photocathode materials. Although LaFeO_3 photocathode has been identified as a potential candidate for spontaneous hydrogen generation with excellent stability, however lower current densities limit its photoelectrochemical performance. Using solar concentration could prove to be an effective method to leverage its performance. In this study, we have developed a strategy to improve the current density of LaFeO_3 photocathode by applying concentrated solar flux. The results demonstrate that the photocurrent density follows a linear relationship with flux concentration and 2-fold performance enhancement with 18 times of incident flux. Furthermore, the addition of H_2O_2 to the electrolyte solution has significantly improved the photocurrent induced by LaFeO_3 due to efficient scavenging of electrons. The fabricated LaFeO_3 photocathode is translucent and therefore a reflector element is placed behind the substrate to redirect light back to the photocathode. The incorporation of high flux concentration, scavenger and reflector element, enhanced current density by 9 times (to 0.872 mA/cm^2). Our results demonstrate that concentrated solar flux assisted LaFeO_3 photocathode will play a significant role in renewable hydrogen production

and study will provide a new direction to photoelectrochemical water splitting.



Schematic of experimental set-up for CPV-assisted Tandem AD device



Overall enhancement of LaFeO_3 photocathode

A 350 W high stability mercury (Hg) lamp with A.M 1.5G filter is used as a source for the experiments. Light from the filter is passed through the Fresnel lens to control the flux concentration of light incident upon the LaFeO_3 photocathode film which is deposited on FTO substrate. A back reflector is used to reflect the light that is passing through the film and FTO substrate. Platinum mesh and Ag/AgCl are used as the counter and reference electrodes respectively. The comparison of all current densities at 1.0 V Vs is shown on over all enhancement of LaFeO_3 photocathode. RHE in 0.1M NaOH and 1M NaOH + 0.5M H_2O_2 electrolyte solutions with and without the reflector element is also presented.

In future, a photoanode will be developed and its PEC performance will be studied. Further, construction and optimization of CPV cell to provide required bias potential to achieve over 10% STH conversion efficiency.

Energy Harvesting Smart Windows using High Contrast Grating Based Planar Concentrators for Building Integrated Photovoltaics

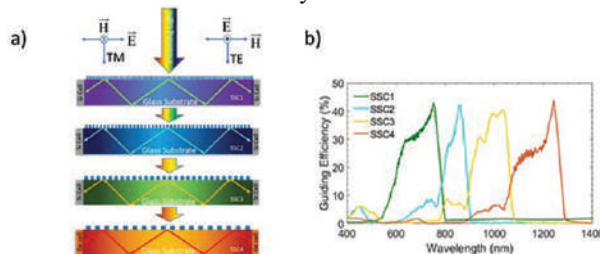
Electricity consumption by buildings in residential and commercial sector is increasing at a faster rate due to rapid urbanization and is a significant contributor to global warming. India, home to 3 of the 20 world's largest mega cities with an annual building rate of 700-900 million sq.m has great potential to significantly lower its carbon footprint by constructing energy efficient buildings to lessen the country's reliance on fossil fuels. Lighting and air conditioning loads form a major part of building electricity consumption. By optimized design of glass windows, natural lighting can be effectively harnessed to reduce the electricity consumption. However, conventional glass windows used in buildings trap heat, increases AC loads and causes "Urban Heat Island Effect (UHI)" resulting in significant local climate warming. UHI problem is further exacerbated due to alarming rise of high-rise buildings and skyscrapers in cities and towns. To reduce solar heat gain in a building, several passive and active solutions exist such as double pane windows, triple glazed windows, motorized blinds etc. However, none of these solutions effectively harness the infrared energy falling on a window.

In this project, we propose a novel smart window for building integrated photovoltaics that allows visible light to pass through the window but effectively harnesses the infrared light falling on the window to produce electricity. The window is based on engineered ultra-thin high index gratings (less than 1 μm) fabricated on the glass window. Grating design is optimized so as to transmit visible light falling on the window but diffract the incoming near-infrared light into the glass substrate. Light is subsequently guided in the glass window by total internal reflection and reaches the edge of the window with high concentration. A solar cell placed at the edge effectively converts the infrared radiation to electricity. By harnessing the infrared radiation, the proposed design also helps in reducing AC load of a building. As part of the project a 25

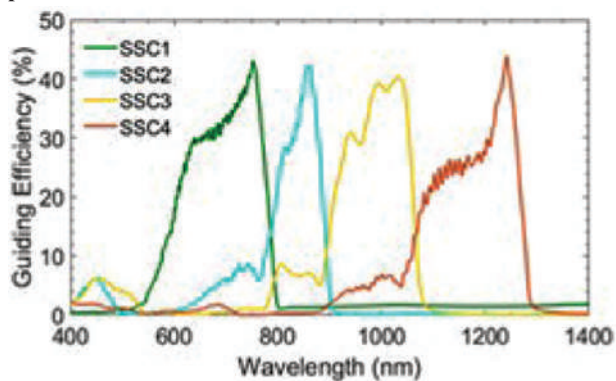
mm² window has been fabricated and tested. The first device shows a promising electrical conversion efficiency of 0.72%. In addition to this we have designed a four layered planar spectral splitting concentrator which shows a theoretical electrical conversion efficiency of 11.27%.

Key results:

- Fabricated a 25 mm² window with integrated solar cells which shows a conversion efficiency of 0.72%.
- Designed a four layered planar spectral splitting concentrator which shows a theoretical electrical conversion efficiency of 11.27%.
- Fabrication of large area window >30 cm and testing the same to attain higher electrical conversion efficiency.



Schematic of solar splitting concentrator with attached photovoltaic cells



Guiding efficiency of the spectral splitting planar concentrator

The solar splitting concentration is shown in the figure. The SiN diffraction gratings on top of glass substrate act as optical band pass filters for a plurality of wavelengths in the near infrared regime and guide each optical band to their corresponding band-gap selective photovoltaic units. The guiding efficiency of the spectral splitting planar concentrator with period 530 nm (green), period 602 nm (cyan), period 721 nm (yellow) and period 865 nm (red) is shown in the figure.

Photonic Crystal (PhC)-based Integrated-optic Sensor Platform

A photonic crystal based optical platform along with a smartphone-integrated module has been developed, in the Work Package (WP)-1.7 under the Nano-biosensor mission-mode project sponsored by CSIR. The device works on the principle of the shift in resonance wavelength of the PhC structure depending upon the change in effective refractive index, when an analyte is placed on the structure. The PhC structure of the platform has been designed for visible wavelength region. This visible light image is captured by the smartphone and is converted to the corresponding wavelength for identifying the resonance wavelength. The system is quite sensitive and can be used for early disease diagnosis. Integration with smartphone gives an advantage of transmission of data to an expert/Doctor. This platform can be used for multiple applications including healthcare and industrial applications after appropriate calibration in each case.

Fluorescence-based Optical Platform

Early diagnostic of any disease is essential as it provides enough time to strategize the medical treatment. A fluorescence-based optical platform system has been developed, in the WP-1.2 under the Nano-biosensor mission-mode project sponsored by CSIR, which is capable of accomplishing early diagnosis of diseases. The signal is monitored using fluorescence-based probes. The developed platform can be used for several diseases and has potential for multiple applications, namely, sensing of bio-molecules, sensing adulteration in bio-fuels, medicines and chemicals. This multi-application adaptive platform device can be of great use for many industrial applications.

AlInGaN-based Superlattice p-region for Improved Performance of UV-LEDs

A Deep Ultraviolet Light-Emitting Diode (DUV LED) consisting of an intermediate p-type region using a AlInGaN-based superlattice quaternary nitride alloy has been designed for improved performance. The peak emission wavelength of ~ 273 nm has been achieved. The

light output power of the structure has been found significantly high, 22.63 times higher in comparison to the conventional structure, at the current density of 200 A/cm^2 . The structure internal quantum efficiency (IQE) of 58.47% has been achieved.

Gallium Nitride based High Voltage Devices

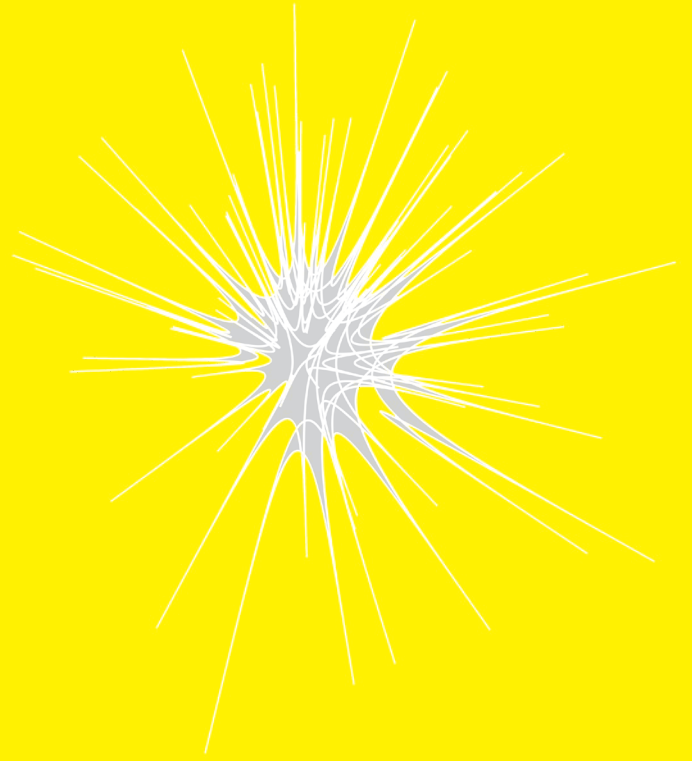
The work on Gallium Nitride based High Voltage Device has been carried out in association with SCL, Mohali. In this project, major gaps have been identified related to the unit process development on Ex-situ and In-situ passivated Gallium Nitride HEMT on Si substrate. Hence, contribution in optimization of unit process for the development of high voltage Gallium Nitride HEMT technology on Si substrate was done. Significant results obtained are as follows: Ohmic contacts have been optimized on SCL samples, a contact resistivity of 2.5×10^{-6} (Ohms- cm^2) has been achieved. At 100 V, isolation resistance (5×10^{10} Ohms/sq.) was recorded. Two-terminal burn in tests of contacts at full swing of current showed breakdown above 100 V. Three-terminal Breakdown voltage has been measured up to 200 V.

Gallium Nitride based Biosensors

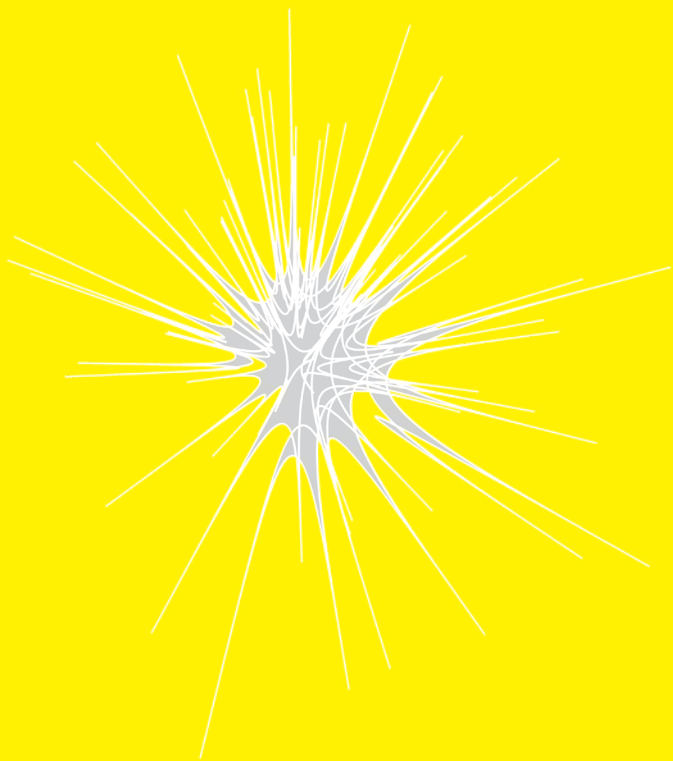
Under the CSIR Nano-biosensor Mission Project, designed and developed the GaN HEMT biosensor platform device has been designed and developed. The developed platform has delivered high sensitivity (pG/ml) and high resolution (mA).

The recorded O/P Current & response time were in mA and few seconds respectively. The platform has been successfully tested against:

- Commercially available Breast cancer biomarker Her2 (pg/ml to ng/ml)
- HER2 (ng/ml) in human serum @ CCMB
- Circulatory biomarker C3G @ CCMB (using indigenously developed C3G antibody)



New Projects



New Project Brief

Name of the Project: Development of Thermionic Emitter for High Thrust Electric Propulsion System

Sponsored by : VSSC-ISRO,
Thiruvananthapuram

Sanctioned Amount: Rs. 126 Lakh

Duration : 18 Months

Brief Description:

Ion thruster is an important electronic propulsion system in deep space to control the orbit of a satellite due to its high exhaust velocity. A cathode is a critical component of ion thruster system. Electrons, emitted from the cathode, collide with inert gas (mainly xenon and argon) through a propellant feed and produces plasma in the discharge chamber. The major challenges lie with the fabrication process. Due to cylindrical geometry and electron emission that takes place from the inner wall of the pellet, development of pellet fabrication technology remains a critical challenge. There is an urgent need to develop the emitter technology to cater to the country's need for strategic, space as well as societal applications. The indigenously developed pellets at CSIR-CEERI, meet all the specifications as par with the imported emitters. The developed 20 number of emitter pellets prototype by CSIR-CEERI have been handed in Phase-I to Vikram Sarabhai Space Centre (VSSC) on August 14, 2019.



Dr. Ranjan Barik, Principal Scientist, Dr. R.K. Sharma Head MWD Area, and Dr. D.K. Aswal, Director, CSIR-CEERI with the team of VSSC, Thiruvananthapuram

Name of the Project : Resource Constrained AI (Under MeitY's Consortium Project on Development of Application Oriented AI Systems

Sponsored by : MeitY, New Delhi,

Sanctioned Amount : Rs. 244.57 Lakh

Duration : 3 Years

Brief Description:

The project aims to develop technologies for the resource-constrained edge level embedded implementations of AI algorithms. The major objectives of the project are (a) Design and Implementation of resource-constrained Generative Adversarial Network (GAN) architectures to improve performance while reducing the targeted resource usage, (b) Design and Implementation of resource-constrained Capsule Network (CapsNet) Architectures to improve performance while reducing the targeted resources usage, and (c) Embedded implementations of these two emerging deep learning architectures.

Name of the Project: Technologies for Environmental Audio and Aroma Digitization and Recreation for Indian Heritage Sites

Sponsored by : DST, New Delhi

Sanctioned Amount: Rs. 75.59 Lakh

Duration : 3 Years

Brief Description:

The project is part of a consortium-mode proposal, consisting of seventeen projects across various Laboratories and Institutes, under the Indian Heritage in Digital Space (IHDS) of Interdisciplinary Cyber Physical Systems (ICPS) Programme of the Department of Science & Technology (DST), GOI. The objective of the project at CSIR-CEERI is to develop technologies for capturing, processing and playback for the soundscape and aroma environment. The focus is on development of prototype to synthesize/re-create the auditory and aromatic effects of an Indian architectural site from a remote location.

Name of the Project: Thick Film Sensor Electrodes for EMATS

Sponsored by : REIL, Jaipur

Sanctioned Amount: Rs. 107.50 Lakh

Duration : 3 Years

Brief Description:

CSIR-CEERI is involved in project entitled “Design & Development of Thick Film Sensor Electrodes for EMAT” in collaboration with REIL, Jaipur. It involves the design and fabrication of working, reference and counter electrodes. The developed sensor electrodes shall be used for detecting various adulterants in milk viz., urea, salt and detergent. These electrodes shall be delivered to REIL in phased manner.

Name of the Project: Flexible Tactile Sensor Matrix for Fetal Health Monitoring

Sponsored by : SERB-DST

Sanctioned Amount: Rs. 45.13 Lakh

Duration : 4 Years

Brief Description:

Research and Development of high sensitivity sensors is essential because of their applications in the healthcare sector. The recent surge of interest in this area is mainly driven by increase in demand for point-of-care devices which are low in cost and are portable. This project aims in development of flexible tactile sensor matrix with the focused application of fetal health monitoring. Fetal movement provides important measure of fetal health as movement patterns are determined by the neurological development of the fetus and its metabolic rate. Therefore, assessing or mapping of fetal movement is important to avoid stillbirths or adverse birth defects. Measurement of fetal movement requires a highly sensitive pressure sensor with a conformable attachment to the skin. The existing conventional techniques to assess fetal health are expensive and cannot be used for an extended period. These limitations can be addressed with the development of a flexible tactile sensor matrix, which is capable of measuring and mapping low pressures for extended period of operation. The proposed prototype is a capacitive type flexible tactile sensor matrix with microstructured polydimethylsiloxane (PDMS) thin film as a dielectric layer. The elastic PDMS thin films are flexible, stretchable, and biocompatible; importantly, micropatterning of these PDMS films

play a key role in the development of sensors for low pressures ($< 1\text{ kPa}$). Such low-pressure monitoring has many applications like blood pressure and fetal health monitoring when they are conformably attached to the skin as a patch. The proposed prototype shall have 9 pixels (or sensing elements) (3×3 matrix) over 4 cm^2 area that allows pressure mapping, which is an important functionality the most of the conventional sensors (patch like) lack. Each sensing element undergoes a change in capacitance under mechanical stimuli. The sensitivity of sensors shall be tuned by varying micropattern size and pitch, and PDMS film thickness. The developed sensor matrix will be tested using force gauge and parameter analyzer, and the properties of microstructured PDMS will be tuned to develop sensor with relative capacitance change $>10\%$ and low pressures ($<1\text{ kPa}$). The prototype shall initially be tested for blood pressure monitoring, and a feasibility study shall be conducted for fetal health monitoring.

Name of the Project: Investigation of Ion-focusing Mechanism based Sheet Beam Driven Sub-THz Source for High Power NDE Application

Sponsored by : DST, India

Sanctioned Amount: Rs. 28.86 Lakh

Duration : 3 Years

Brief Description:

This project is being implemented in collaboration with Russian Partners, Dr. Andrey Starodubov and Prof. Nikita M Ryskin from Saratov State University, Russia. The execution of the proposed research work will help in understanding the physics of discharge mechanism inside the plasma based cold sheet-electron-beam gun consisting of miniaturized sheet aperture on hollow cathode and anode. It will help in developing multiple relevant technologies for sheet-electron-beam sources for their utilization inside the sub-THz interaction structures. The developed plasma-assisted slow wave oscillator will not require any magnetic field due to presence of ion-focusing mechanism in plasma. Therefore, the proposed source will be a compact and portable THz source.

Name of the Project: Fabrication of MEMS Technology based Pressure & Temperature Sensors for Indian Navy and Pilot demonstration of Wireless Communication Scheme with the Sensors

Sponsored by : Indian Navy

Sanctioned Amount: Rs. 39.46 Lakh

Duration : 18 Months

Brief Description:

The project is sponsored by Indian Navy for development of pressure and temperature sensor for navy vessels. In-house MEMS pressure and temperature will be fabricated. The fabricated sensors will be interfaced with suitable interface electronics for temperature compensation and amplification of sensor output. Developed module will be packed in a metal enclosure to minimize contamination due to saline water. Currently both the sensors are fabricated and measurement results are shared with Naval Headquarter. An interface chip is also identified for amplification and temperature compensation along with power management.

Name of the Project: “TPMS” for fleet Management Industry

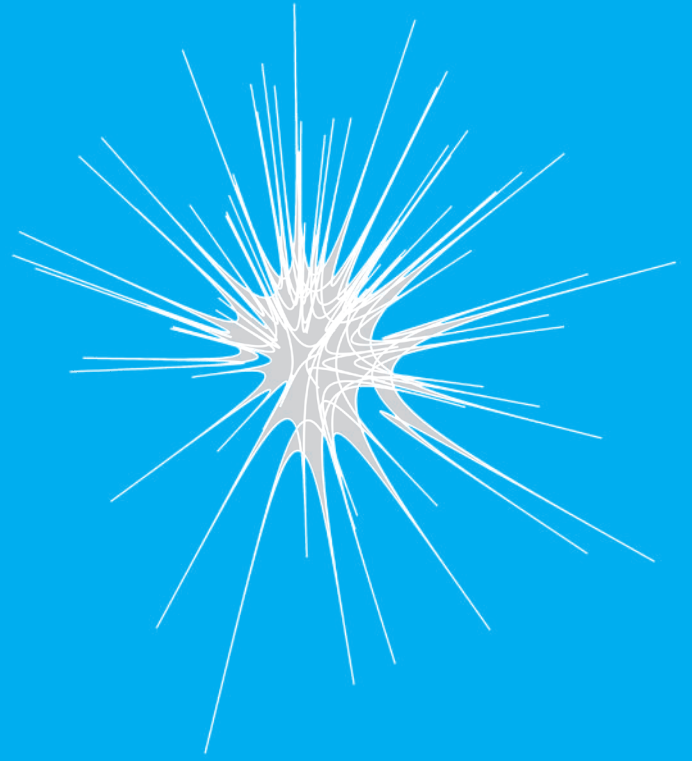
Sponsored by : M/s Fleeca Industry Pvt. Ltd., Jaipur

Sanctioned Amount: Rs. 5 Lakh

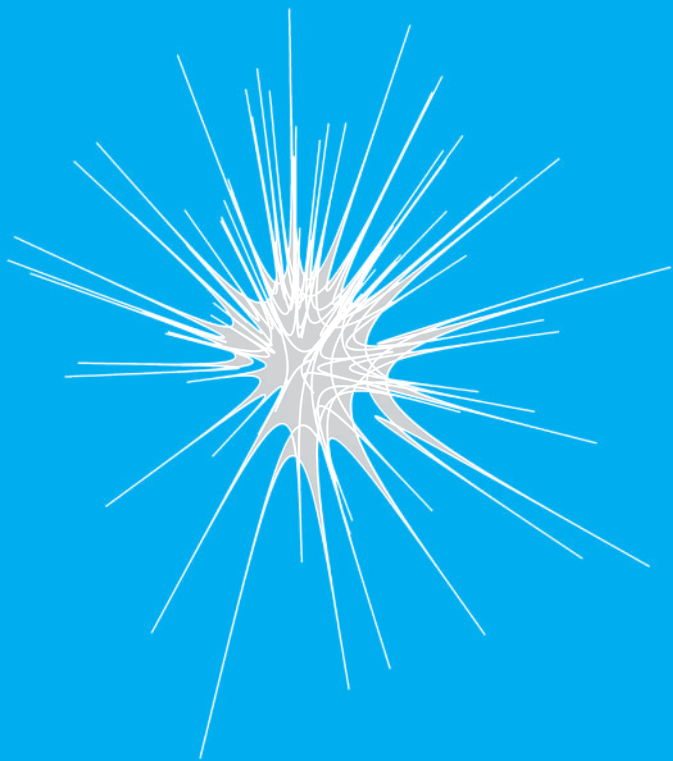
Duration : 18 Months

Brief Description:

The project is sponsored by a fleet management company (M/s Fleeca Ind Pvt Ltd) located in Jaipur. Main objective of the project is to develop customized tyre pressure monitoring system for fleet management industry. The proposed device will monitor cavity pressure and temperature precisely of each tyre. Subsequently data will be transmitted to a server managed by industry partner. Various development challenges like battery life enhancement, power management circuits suitable for automobile industry, sensor temperature compensation etc. are integral parts of the proposed device. The first phase of the project is installment of the devices on field, where as the second phase is on validation and data collection.



AcSIR Programs



Summary of AcSIR's MTech, IDDP and PhD Students at CSIR-CEERI

Total number of students completed MTech (under IMP program) (2009 – 2015)	88
Total number of students joined PhD after MTech (under IMP program) (2012 – 2017)	32
Total number of MTech students	02
Total number of IDDP students pursuing their research	05
Total number of AcSIR students pursuing their PhD (Sci. & Engg.) at present	51
Total number of AcSIR students pursuing their degrees (MTech/IDDP/PhD) at present	58
Total number of AcSIR students who submitted their PhD Thesis at present, but not defended so far	06
Total number of PhD (Sci. & Engg.) degree awarded (up to March, 2020)	17

1. PGRPE/IMP-2015 Batch : 10 nos. (Across 3 programs)

- AES - 3 nos. : 2 CSIR-NET-JRF, 1 CSIR-GATE-JRF
- ASE - 5 nos. : 5 CSIR-NET-JRF
- HPMDSE - 2 nos. : 1 CSIR-NET-JRF, 1 CSIR-GATE-JRF

All 10 students completed MTech; 5 students joined for PhD in August 2017 session and all are continuing

2. PhD – January, 2012 Batch : 9 nos.

- PhD (Engg.) - 9 nos. : 9 Scientists

Eight candidates have been awarded PhD (Engg) and one candidate (Scientist) has submitted PhD (Engg) thesis

3. PhD – August, 2012 Batch : 11 nos.

- PhD (Sci.) - 2 nos. : 1 Scientist, 1 DST-INSPIRE (tenure completed)
- PhD (Engg.) - 9 nos. : 8 Scientists, 1 CSIR-SRF

Four candidates have completed PhD (Engg). One candidate (Scientist) has submitted PhD (Engg) and one candidate (DST-INSPIRE) has submitted PhD (Sci) thesis. Five candidates have discontinued.

4. PhD – August, 2013 Batch : 9 nos.

- PhD (Sci.) - 1 no. : 1 CSIR-SRF has completed his PhD (Sci.)
- PhD (Engg.) - 8 nos. : 1 Scientist (multi-disciplinary), 4 Scientists, 2 CSIR-SRF, 1 CSIR-RA (multi-disciplinary)

Four candidate completed PhD (Sci: 1; Engg: 3); one candidate (Sci) has submitted PhD (Engg) thesis. Three candidates have discontinued

5. PhD – August, 2014 Batch : 7 nos.

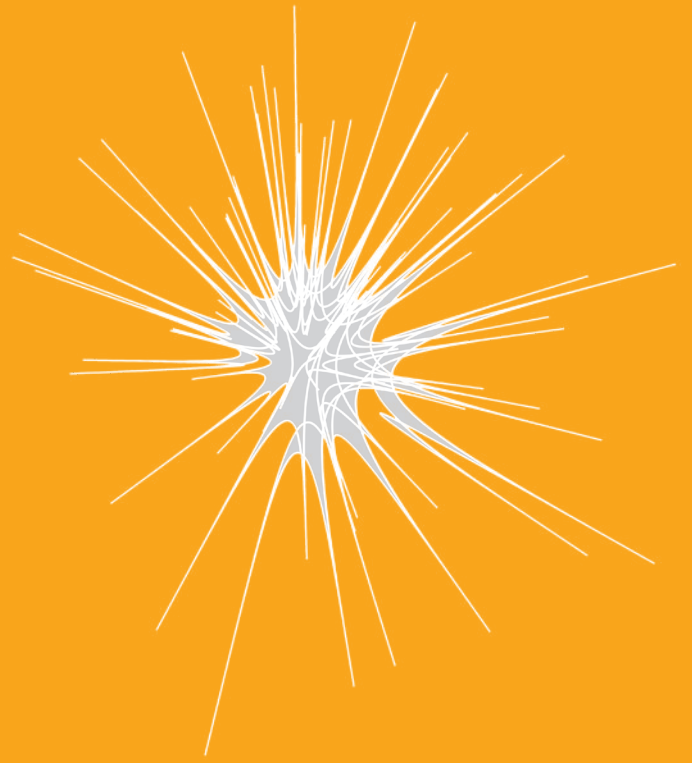
- PhD (Engg.) - 7 no. : 6 Scientists, 1 CSIR-SRF

One candidate (SRF) has completed PhD (Engg). One candidate (Sci) have submitted PhD (Engg) thesis.

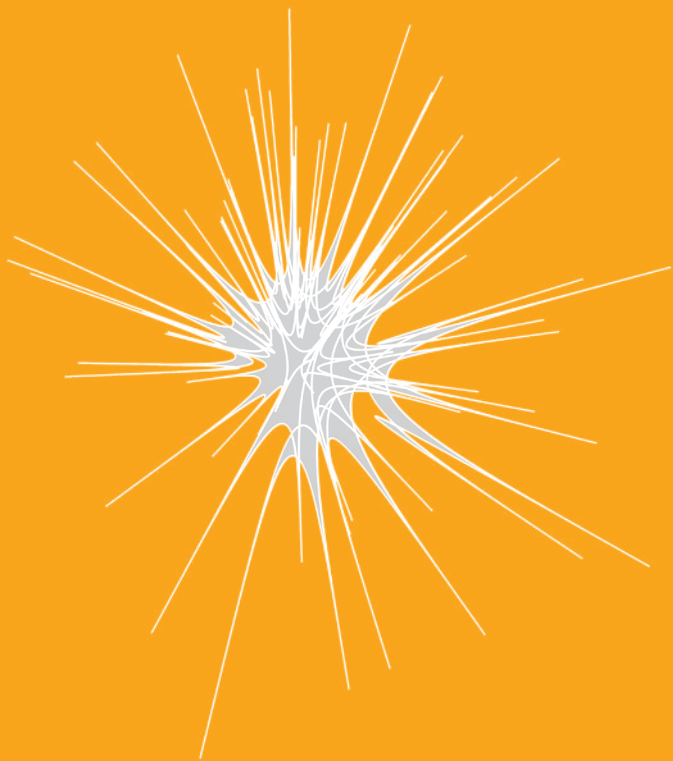
6. PhD – January, 2015 Batch : 1 no.

- PhD (Engg.) - 1 nos. : 1 CSIR-SRF/CSIR Scientist (delayed admission from August, 2014 session)
The candidate has submitted his PhD (Engg) thesis.

- 7. PhD – August, 2015 Batch : 2 nos.**
 • PhD (Engg.) - 2 nos. : 1 Scientist, 1 CSIR-SRF
- 8. PhD – January, 2016 Batch : 1 no.**
 • PhD (Engg.) - 1 no. : CSIR-NET-JRF (delayed admission from August, 2015 session)
- 9. PhD – August, 2016 Batch : 6 nos.**
 • PhD (Engg.) - 4 nos. : 1 Scientist, 2 CSIR-NET-JRF/SRF
 • Direct-PhD (Engg.) - 2 nos. : 2 CSIR-NET-JRF (including 1 candidate transferred from CSIR-CECRI)
 One candidate (CSIR-NET-JRF/SRF) has discontinued
- 10. PhD – January, 2017 Batch : 3 nos.**
 • PhD (Engg.) - 1 no. : 1 Scientist
 • Direct-PhD (Engg.) - 1 no. : 1 CSIR-GATE-JRF
 • PhD (Sci.) - 1 no. : 1 UGC-SRF
- 11. PhD – August, 2017 Batch : 11 nos.**
 • PhD (Engg.) - 11 nos. : 2 Scientists, 3 CSIR-SRF, 5 CSIR-NET-JRF/SRF (IMP-2015 Batch),
 1 INAE-AICTE-TRF
- 12. MTech/IDDP/PhD - August, 2018 Batch : 11 nos.**
 • Integrated Dual Degree PhD (IDDP) - 2 nos. : Self-supported/Research Assistantship
 • PhD (Engg.) - 9 nos. : 1 Scientist, 1 CSIR-SRF, 2 SPF, 1 INAE-AICTE-TRF, 4
 Self-supported/Research Assistantship
- 13. MTech/IDDP/PhD - August, 2019 Batch : 11 nos.**
 • MTech - 2 nos. : Self-supported
 • Integrated Dual Degree PhD (IDDP) - 3 nos. : GATE-JRF
 • PhD (Engg.) - 6 nos. : 1 UGC-JRF, 2 Project Assistant, 3 Self-supported
- 14. PhD – January, 2020 Batch : 09 nos.**
 • PhD (Engg.) - 09 nos. : 3 Scientists, 2 Technical Officers, 3 Project Assistants, 1 Self-supported



Important Events



Jigyasa-2019: Student-Scientist Connect Program

A one-day Student-Scientist Connect Program was organized on May 9, 2019 at CSIR-CEERI, under Jigyasa, 2019.

In this one-day camp, more than 150 students and teachers of Class 9,10,11 and 12 of various schools from Pilani took part. Sh. Bhagwat Nandan, Director, Barefoot College, Tilonia (Ajmer) was invited as the Chief Guest. The program was presided over by Dr. P.K. Khanna, the Officiating Director of the Institute.

During the program, Chief Guest Mr. Bhagwat Nandan, addressed the students and delivered a presentation on “Tackling Poverty through Science”. During his address he described the functioning and mission of his organization. The organization works for developing skills in people who have never received any formal education and thus links common people to the mainstream of development. While explaining, he said that it is a true social service to enable and strengthen the backward and deprived sections of society. “The Barefoot College” has been serving for the upliftment of backward and deprived sections of society since 1972 and has benefited lakhs of people from 96 different countries of the world so far. He also described the training process at their organization wherein they provide training to women from deprived sections through visual communication and hands-on experience in developing solar lamps. They call these trained women as “Solar Mamas”.



Chief Guest Mr. Bhagwat Nandan addressing the school students

Mr. Nandan persuaded the students, by saying that social services through science are the nation's urgent requirement and all the students must think about it and make their contribution in this direction in the future.

Earlier, the Officiating Director, CSIR-CEERI, Dr. P.K. Khanna welcomed the Chief Guest and the students. In his welcome address, Dr. Khanna described science as an integral part of life and emphasized on developing a scientific temperament. He wished everyone good luck and hoped that all the students would draw maximum benefit out of this program. Prior to this, the Jigyasa Committee Chairman, Dr. Suchandan Pal also welcomed everyone and gave a brief introduction of the Chief Guest, Sh. Bhagwat Nandan and honored him with a memento on behalf of the Institute.

The program was conducted by Ms. Nalini Pareek, Scientist, CSIR-CEERI. She introduced all the participants to the program's outline and background.

Dr. T. Ishwar, Scientist, CSIR-CEERI delivered a Science Talk on “Solar and Renewable Energy”, wherein, he discussed the benefits of solar energy. During the talk, the students interacted by asking questions and clearing their ambiguities regarding solar energy and the science behind it.

A Science Quiz was also conducted during the second half of the program by Dr. Niraj Kumar,



Scientists and students present in the auditorium during the program



Dr. S. Pal presenting a memento to the Chief Guest

and Mr. Anand Abhishek, Scientist, CSIR-CEERI. All the students showed great enthusiasm in the Quiz Session.

During the last session of the program, a Science Congress was organized. The panel included Mr. Bhagwat Nandan, Chief Guest, Dr. P.K. Khanna, Officiating Director of the Institute and Dr. S. Pal, Chairman, Jigyasa Committee, Senior Principal Scientist, CSIR-CEERI. Students and teachers also participated in the discussions.

In the end, Convener, Jigyasa Committee, CSIR-CEERI, Dr. Ayan Kumar Bandyopadhyay, Principal Scientist, expressed gratitude towards the Chief Guest. He thanked all the students and teachers for participating in the program and wished them good luck for the future and also thanked all the colleagues associated with the event.



Sh. Bhagwat Nandan and his associate Sh. Kiruva showing the solar products prepared by their organization



The panel during the Science Congress



Teachers participating during Science Congress

Skill Development Program on FPGA based System Design

CSIR-CEERI organized a Skill Development Program on FPGA Based System Design from June 3, 2019 to July 02, 2019 at the Pilani campus. This was an advanced level program for professionals which was conducted on request proposal from Indian Institute of Astro-Physics (IIAP). IIAP is known for exploratory research in Astronomical Missions. IIAP inherently use FPGAs for customizing/ prototyping the systems used in their Labs.

The Cyber-Physical Systems area of the institute conducted this Skill Development Program, which was coordinated by Dr. K.S. Raju. The topics covered during this program were VHDL, Static & Dynamic Timing Analysis, Booting mechanisms of FPGA based System, Debugging, On-Chip Debugging using Chipscope, Case studies and advanced level of system design.



Faculty and participants of the skill development program on FPGA based system design

The participants were placed in teams that comprised of five members from the different cadre of IIAP Scientists and a faculty from a reputed college. It was a fully residential program with the appropriate amalgamation of Theory and Hands-on Sessions. Morning sessions were occupied by Theory and post-lunch, practical hands-on sessions were conducted. Interactive sessions on Real-time problems kept the participants engaged. Students enjoyed the case studies and talks given by experts from R&D and Industry.

The program also had an evaluation component. On the last day, July 2, 2019 a valedictory session was organized, which included the certificate distribution and feedback session. The ceremony was also attended by Dr. S.A. Akbar, CPS Area Coordinator, and Dr. J.L. Raheja, PME Head. In the end, Acting Director Dr. P.K. Khanna



Distribution of the certificates to the participants of the FPGA course

distributed the certificates to the candidates. The ceremony was concluded with Vote of Thanks by Dr. K.S. Raju, Principal Scientist.

Augmented Reality Workshop at CSIR-CEERI, Naraina Centre, New Delhi

A workshop on Augmented Reality (AR) was organized from June 4-7, 2019 in association with NVIDIA and ELIXIR Systems, at CSIR-CEERI's Naraina Center. More than 100 participants including research students and professionals participated in the workshop.

The advancements in the AR industry and its potential applications were the topics that were highlighted during this workshop. The knowledge of the current market trend towards this technology and associated industry investment was also provided to the participants, in order to envisage the future possibilities.

The workshop was inaugurated in the auditorium of CSIR - National Physical Laboratory, New Delhi on 3rd June and the remaining part of the workshop was conducted at the Naraina Centre of CSIR-CEERI. On this occasion, AR expert Mr. L.Yagnik, Mr. S. Nair of NVIDIA and Dr. P.K. Khanna, Chief Scientist, CSIR-CEERI were present.

In the inaugural session, Dr. P.K. Khanna welcomed all the guests and participants and briefed everyone on the research activities of the institute and also on future research programs.



Dr. P.K. Khanna, Chief Scientist, during the Inaugural Session



Dr. D.K. Aswal, Director, CSIR-CEERI addressing the audience

Mr. Lalit Yagnik, Executive Chairman of Start-up Expert in Singapore and Mr. Shashi Kumar Nair, Senior Solutions Architect of NVIDIA, also addressed the audience. In his lecture, Mr. Nair highlighted the activities of NVIDIA and described how their group is addressing industrial problems through the state of the art technological solutions.

Later, Mr. Lalit Yagnik shared his 30 years of outstanding experience in the field of Augmented and Virtual Reality (AVR). In his address, he also expressed his opinion on India's ability to emerge as a global leader in this field. After the lecture, Dr. P.K. Khanna honored Mr. Yagnik and Mr. Nair with a memento.

During the workshop, participants were given hands-on training by industry experts to develop AR-driven mobile applications. The fundamental principles of technology were also discussed during the workshop. The training program structure was designed in such a way that it trains the participant to reach the final solution of the problem. The technical sessions were filled with an enthusiastic and vibrant spirit of participation. On the final day, trainees were given information about the process of application development, after which they created an AR-based mobile app.

During the workshop, NVIDIA also demonstrated the VR version of "Nefertari: A Journey to Eternity". The concluding session of the workshop was organized on June 7, 2019. In the



Dr. P.K. Khanna, Chief Scientist, felicitating Mr. Lalit Yagnik from NVIDIA

concluding session, Dr. D.K. Aswal, Director, CSIR-CEERI presented the certificate to the participants. Addressing on this occasion, he outlined the impact and importance of the Augmented Reality (AR) from the perspective of the Indian market and the importance of standards.

Prior to this, Dr. S.A. Akbar, Chief Scientist and Area Coordinator of the Cyber-Physical Systems, CSIR-CEERI welcomed all the participants and other dignitaries. Thereafter, Dr. J.L. Raheja, Chief Scientist, and Head, PME presented the details of the activities organized during this workshop. He highlighted CSIR-CEERI's roadmap and vision plan around advanced and virtual reality (AR-VR) technologies.

In the end, Mr. Pramod Tanwar, Senior Scientist, CSIR-CEERI and Mr. Harshit, Mr. Shubham, Mr. Shashamat and Mr. Faraj of the Elixir system, thanked everyone for their support for successfully organizing the workshop.



Dr. D.K. Aswal, presenting certificates to the participants



Dr. J.L. Raheja, giving details of the workshop in the closing session

Jigyasa Innovation Camp at CSIR-CEERI

CSIR-CEERI conducted the “Jigyasa innovation camp 2019” under the Jigyasa program launched by CSIR to promote scientific temper among the school children. The 15 days residential camp during 10-25 June 2019 was organized to support and nurture innovative project ideas presented by the school children through an open-to-all competition. Proposals were invited from the school children through online submission and selected students were invited at CSIR-CEERI to present their proposals. Based on their presentation, five students were selected to implement and enhance their project ideas under supervision of CSIR-CEERI scientists namely, Mr. M. Santosh, Dr. A. Karmakar, Mr. P. Tanwar and their respective teams.

In the concluding session of this program, the students along with their parents were invited to demonstrate the progress of their projects. In this session, Ms. Yaswaswi from Kendriya Vidyalaya (KV) Jhunjhunu demonstrated her work on “Installation of airbags in a helmet”, Ms. Rohanshi and Sh. Mohit Devas from KV, IIT-Jodhpur demonstrated their progress on “Hearing aid with smart features and solar/ wireless charger” and Ms. Khushi and Ms. Ishita from Birla Shishu Vihar demonstrated their work on “Mhara Flora”. Dr. Suchandan Pal, Senior Principal Scientist, CSIR-CEERI and Chairman of the Jigyasa committee and all the scientists present in the program praised the students for their interest in science and congratulated

them for their achievements. Parents and guardians of the students expressed their sincere thanks to CSIR-CEERI for providing this unique opportunity to the students. They also stated that this activity has encouraged the students a lot and boosted their enthusiasm towards science and technology. At the closure of the event, Dr. Pal thanked the Director, PME, members of Jigyasa committee, associated scientists alongwith their team members and other associated members for making this event a great success. He also wished the students a bright future and success in their future scientific endeavors.



Some glimpses of Jigyasa Innovation Camp 2019

Workshop on Technologies Developed by CSIR-CEERI

A workshop was organized at CSIR-CEERI Chennai center on the July 8, 2019, in order to share and facilitate dissemination of the technologies developed by CSIR-CEERI among the concerned industry and other professionals. During the workshop, representatives from CII, TANSIA & CLEAN Networks were also present to put forward

the MSME requirements and the possible impactful technology interventions.

In the inaugural session, Dr. A. Gopal, Chief Scientist & Scientist-in-charge, CSIR-CEERI, Chennai Centre, welcomed the distinguished guests from various industries, research institutions & other organizations, invitees, colleagues from CSIR-CEERI Pilani and CSIR-CEERI Chennai Centre, SICs of the participating Units of CMC, staff from CMC, SERC & other CSIR laboratories, Press & Media to the Workshop.

Later, Dr. S.A. Akbar delivered the presidential address and gave an overview of the activities of Cyber-Physical Systems (CPS) at CSIR-CEERI. In his address, Dr. Akbar mentioned that CSIR-CEERI has been working in different areas viz., water, energy, computer communication control, R&D infrastructure, IoT enabled Skill Development Programme, in order to fulfill the scientific social responsibilities. He said that CSIR-CEERI has been in tie-up with 68 core industries, coordinating with 7 CSIR labs in the AI Mission Programme, wherein industries like SAMSUNG, TCS, WIPRO, Krystal vision are some of the key participants. He also talked about the contribution towards food sector by CSIR-CEERI and mentioned the instruments for milk adulterations, viz., handheld milk analyzer which was dedicated to the nation by the President of India. Similarly, in the energy sector, significant contributions include IoT enabled solar trees and Solar PVT co-generation systems. He said that Jaipur Centre of CSIR-CEERI have

done significant work on supplying clean water technology by installing nearly 50 numbers. of RO plants in 15 villages of Rajasthan.

This was followed by the inaugural address by Dr. D.K. Aswal, Director, CSIR-CEERI, Pilani. Dr. Aswal highlighted the vision of the Government i.e., the technologies for the upliftment of rural people and the importance of the Science & Technology Development which should transform the country's economy. He mentioned a few key points that the Scientists should concentrate viz., (1) policymaking, (2) visualize the objectives of the areas and S&T tie-up with universities and educational institutions, (3) participation with industries, (4) to pick up and adopt the events and creation of job opportunities and (5) finally, to align with media for propaganda on good technologies. He said that once these five factors come together, the industry and the people will be benefitted. He further said that Government policies should be in alignment with the current needs and that the age-old policies will not fetch good results. Dr. Aswal pointed out the UNIDO's program on Quality Infrastructure which is specified on the standard method of measuring the quality accurately. He said that the factors viz., measurement, methodology, standardization, and implementation are the key factors in the development of technology. He insisted that quality infrastructure must be constructed for the benefit of good R&D. He also said that though the country is strong in software exports, in some of the areas we still depend on imported software.



Inaugural Speech by Director, CSIR-CEERI



Demonstration of AI-based Health Care technologies

During the Technical Programme, Dr. B. Pesala, Principal Scientist, CSIR-CEERI Chennai Centre, presented on Clean & Renewable Energy Technologies and AI-based Health Care Systems Technologies. Dr. Ajay Agarwal, Senior Principal Scientist & Area Coordinator, SSA, CSIR-CEERI Pilani, presented on Sensors Application Technologies and Dr. P.C. Panchariya, Senior Principal Scientist & Scientist-in-charge, CSIR-CEERI Centre, Jaipur presented on Milk Adulteration Detection Technologies. This was followed by the presentations on MSME Requirements and Impactful Technology Interventions by Ms. R. Remha, TANSIA-FNF Service Centre (TFSC), Chennai and Mr. Nitin Zimaji Akhade, Manager (Technology & Markets), Clean Energy Access Network (CLEAN), New Delhi.

In the afternoon session, technology demonstration of various products developed by CSIR-CEERI was held under four themes.

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The technology demonstration included:

- 1. Clean & Renewable Energy**
 - a. Solar Photovoltaic Thermal Co-generation System
 - b. IoT enabled Smart Solar Tree
 - c. Solar PV based EV charging station
- 2. AI-based Health Care Systems**
 - a. The human fatigue detection system
- 3. Sensors Applications**
 - a. Gas sensor systems for environment monitoring
 - b. Sensors for point-of-care applications
- 4. Milk Adulteration Detection**
 - a. Prevention of adulteration in milk – a real-time remote milk supply chain monitoring network (PRADUMN)
 - b. Acoustic milk analyzer (ultrasonic based milk content analyzer)
 - c. Handheld milk adulteration tester (KHEER-tester)

- d. The infrared fat content analyzer (IRFAN)
- e. Rapid milk analyzer (KSHEER-analyser)

Towards the closure of the workshop a feedback session was also organized. Dr. S.A. Akbar, Dr. P.C. Panchariya, Dr. A. Agarwal and Dr. B. Pesala were the panelists. The workshop was concluded with a Vote of Thanks.

Laboratory Visit under Jigyasa Program at CSIR-CEERI

A laboratory visit was organized for the students of Kendriya Vidyalaya from Rajasthan, during August 19-20, 2019 under the Jigyasa program launched by CSIR to promote scientific temper among the schoolchildren. In the two-day laboratory visit program, 519 students and 48 teachers participated from the KV's of Alwar, Itarana, Indrapura, Churu, Jhunjhunu, Khetrinagar, and Sikar.

At the beginning of the program the students and teachers were welcomed to the Institute by Dr. P.K. Khanna, Director (Off.), CSIR-CEERI and Dr. K.S. Raju, Acting Head PME. The details regarding the Jigyasa program were then presented by Dr. Suchandan Pal and Dr. A.K. Bandyopadhyay. The introductory session also included a brief description of science and technologies of CSIR and other research organizations of the country through an interactive presentation-movie session.

A laboratory visit was also organized for the students wherein research and development



Dr. P.K. Khanna during the welcome address

facilities on water infrastructure management, solar inverter for water pumps, printed circuit board, smart solar tree, high power microwave and plasma devices, MEMS, smart sensors and milk adulteration detection systems were demonstrated. During the visit, the students interacted with the associated scientists, project scientists, researchers, and technical staff. At the end of the laboratory visit, a science quiz was conducted by Dr. Niraj Kumar, Anand Abhishek, and Dr. T Eshwar. The program at the stage was conducted by Ms. Nalini Pareek, Scientist. Some of the students and participating teachers also presented their views during the concluding session and heartily appreciated the program.

At the closure of the event, Dr. Suchandan Pal thanked the Director, Head PME, members



Students during the Lab Visit

of the Jigyasa committee, associated scientists, team members, technical personnel and all other associated staffs for making this event a great success.



Participants with the Jigyasa Committee and Dr. P.K. Khanna

Foundation Day Celebration

CSIR-CEERI celebrated the 67th and 78th foundation days of CEERI and CSIR, respectively, on the September 21, 2019. On this occasion Sh. A. Jayakumar, Special Advisor to VIBHA, was present as the Chief Guest. Dr. Sanjay Kumar, Director, CSIR-IHBT, Palampur and the ex-scientists of CSIR-CEERI namely, Dr. N.K. Swami and Dr. Y.K. Jain were present as Guests of Honour.

The program was inaugurated with the lighting of the lamp, which was followed by a brief address by Dr. P.K. Khanna, Chief Scientist, CSIR-CEERI. In his address, Dr. Khanna enumerated the recent scientific and technological interventions by



Inauguration of the program by the guests



Dr. P.K. Khanna, Chief Scientist, CSIR-CEERI while addressing the audience



Chief Guest, Sh. A. Jayakumar, during the address

CSIR-CEERI and explained how they primarily focussed to promote the public interest. He talked about the RO plant, Air purification System, Ksheer Scanner, E-crackers that are being developed at CSIR-CEERI. He thanked the Chief Guest, the distinguished guests as well as all the other guests and colleagues present in the audience for taking out time to be a part of this occasion.

This was followed by the inaugural lecture by Director, CSIR-CEERI, Dr. D.K. Aswal. Dr. Aswal congratulated all the colleagues of the institute and the audience present in the auditorium on the 67th Foundation Day of CSIR-CEERI and 78th Foundation Day of CSIR. He appreciated all the scientists and other colleagues of the institute for their contribution towards accomplishing the objectives of CSIR. On this occasion, while addressing the colleagues of the institute, Dr. Aswal said that science is useful only when it is associated with society and

society gets the benefits from scientific research.

It is in this context he said that the research work of CSIR-CEERI is of national importance, but it is also necessary to ensure that the research is accessible to the market as a product. He emphasized in his address that the system cannot be improved without understanding its drawbacks, hence we should all introspect and move ahead by removing these deficiencies. He also talked about the need to improve science infrastructure in India and the need for mutual coordination to develop and establish quality infrastructure in the country. He referred to countries like China, Taiwan and said that India's exports can be increased only when India has a world-class facility of quality infrastructure. He added that the absence of quality infrastructure has led to the Indian market being flooded with harmful and inferior products as the existing infrastructure and mechanism is unable to keep a check on the



Dr. D.K. Aswal, Director, CSIR-CEERI during the inaugural lecture



Dr. Sanjay Kumar, Distinguished Guest, introducing the research activities of CSIR-IHBT during the Foundation Day address



Hon'ble guests releasing CSIR-CEERI Annual Report



Guests releasing Annual Hindi Magazine, Electronic Darpan

imported goods. He also stressed the need to develop the quality infrastructure for the success of the ambitious 'Make in India' program of the Government of India. In the end, he congratulated everyone on the occasion of Foundation Days.

Later, the Chief Guest, Sh. A. Jayakumar, during his speech said that it is a matter of concern that India's contribution is less than one percent to the total global scientific output. He then talked about the 18th century when India used to be the great power of the world. In this context, he referred to Acharya Dharampal's book 'Indian Science and Technology in the Eighteenth Century', highlighting the historical aspect of the science of India. He also mentioned Vedas and Upanishads emphasizing on the rich history of the country.

He talked about the Indian philosophy which is oriented inwards and contrasted it to the

western philosophy that emphasizes the exterior materialistic world. Talking about policymaking in the country, he said that earlier policies in India were made by few people and compliance was done by crores of citizens of the country. He further said that this, however, is changing. He stated that for the new education policy 84 thousand comments have been received which shows that the governance is becoming people- inclusive.

He said that CSIR-CEERI is a unique laboratory and has immense potential to contribute to the country. He appealed to the leadership of CSIR-CEERI to set their priorities and as a scientific institution, must be open to the general public. He cited the example of Silicon Valley, which is a comprehensive network of 400 top laboratories and 700 universities and 10000 technical institutes and said that such a system can be built in India with the existing intellectual asset in the country and also with the help of Indian diaspora present across the globe.

He also appealed to the young scientists to make every possible contribution to benefit the motherland from their expertise. At the end of his address, he said that the time has come that the scientific world should also issue its manifesto and assess its achievements and activities.

Dr. Sanjay Kumar, Director, CSIR-IHBT, Palampur, in his Guest of Honour speech, elaborated on the work being done at Palampur for the welfare



Exchanging of MoU documents between CSIR-CEERI and Rajasthan Electronics & Instruments Ltd. (REIL), Jaipur

of the society. He discussed agricultural techniques like hydroponic agriculture, floriculture, climate control greenhouse and the potential in the US \$ 50 billion floriculture market that can increase farmers' income.

He also presented the problems and prospects of Himalayan agriculture and mentioned the importance of aromatic crops under the Aroma Mission of the Government of India and exploiting the international market for marigold essential oil. He called upon the scientists of CSIR-CEERI and CSIR-IHBT to work together, appreciating the expertise of CSIR-CEERI scientists in the development of sensors and other applied electronics that can be used to serve the purpose of agro-electronics. This will help in building a quality infrastructure and testing facility required for cutting-edge agriculture and to ensure the quality of agricultural products.

This was followed by the Guest of Honour address by Dr. Y. K. Jain and Dr. N.K. Swami, former scientists of CSIR-CEERI. They thanked Director, CSIR-CEERI for being invited on this occasion and shared their memories at CSIR-CEERI.

On the occasion of CSIR-CEERI foundation day, an MoU for Thick film Sensors was also exchanged with Rajasthan Electronics & Instruments Ltd. (REIL), Jaipur which is a prominent electronics industry of Rajasthan and a joint venture between Government of India & Government of Rajasthan. CSIR-CEERI has had a long-term association with REIL for thick film sensors. Earlier, 1000 thick film



Dr. Nikhil Suri and team while receiving the Institute award



Mr. Mahendra Soni and team while receiving the Institute award

sensors were developed and delivered to REIL. These sensors have been deployed successfully in the field.

During the foundation day program, the release of the Annual Hindi Magazine, Electronic Darpan 2018-2019, also took place. The service awards were also presented by the guests to



Dr. A. Bera and team while receiving the Institute award



Technology Demonstration

colleagues who completed 10, 20, 25 and 30 years of service in the institute. The colleagues who retired last year were also felicitated. The felicitation of ceremony also included the children of the employees who have excelled in the class XII board examination last year. The winners of CSIR essay writing competitions were also awarded on this occasion.

The Institute awards were also given on this day to the research teams. Dr. Anirban Bera and team for Gyrotron Technology and Dr. Nikhil Suri and team for Thick Film Sensor Electrodes shared the Research Excellence award. Mr. Mahendra Soni and the team were awarded for developing the Air purifier for stone artisans.

Towards the end of the program, the Director, CSIR-CEERI felicitated all the guests on behalf of the CSIR-CEERI family.

The guests were then escorted to the Technology Demonstration presented by the scientists of the institute.



Dr. D.K. Aswal, Director, CSIR-CEERI honouring Dr. N.K. Swami and Dr. Y.K. Jain, Ex. chief scientists, CSIR-CEERI

In the end, vote of thanks was given by Dr. J.L. Raheja, Head, PME, CSIR-CEERI.



Dr. J.L. Raheja, Head, PME while delivering the vote of thanks

In the evening, a cultural programme was also organized wherein artists from Jawahar Kala Kendra, Jaipur presented a colorful performance.



Cultural Evening at CSIR-CEERI New Auditorium

Technology Transfer: System for Adulteration Monitoring in Milk Supply Chain

CSIR-CEERI signed an agreement with M/s Cuboid Iotech Pvt. Ltd., Gurugram on November 7, 2019 for manufacturing and marketing of the Adulteration Monitoring System for milk supply chain, developed by CSIR-CEERI. The system is the advanced version of the hand-held system “Ksheer Scanner” which was dedicated to the nation by Shri Ram Nath Kovind, President of India, on September 27, 2017.

The programme was chaired by Dr. D.K. Aswal, Director, CSIR-CEERI. Ms. Smriti Utkarsh, Director, Cuboid Iotech, Mr. Rami Kachroo, Chief Technology Officer and Mr. Rahul Agarwal, Chief Risk and Strategy Officer, Dr. S.A. Akbar, Chief Scientist and Coordinator, CPS, Dr. P.C. Panchariya, Senior Principal Scientist and In-charge, CSIR-CEERI, Jaipur Centre as well as other senior scientists of the institute and media personnel were also present.

The Director, CSIR-CEERI, welcomed all the representatives of M/s Qboid Iotech Pvt. Ltd. on this occasion and said that CSIR-CEERI, Pilani has developed this system for detecting adulteration in the milk supply chain under CSIR's Fast Track Translation Project (FTT) program. He further said that this achievement speaks of the efforts made by CSIR-CEERI towards its mission to make the lives of common citizens simple and comfortable. He also congratulated M/s Qboid Iotech Pvt. Ltd. as well as scientists from CSIR-CEERI for contributing towards the Make in India Programme of Government of India.

Later, Dr. Panchariya, Senior Principal Scientist and In-charge, CSIR-CEERI Jaipur Centre briefly highlighted the need and importance of the milk supply chain monitoring system developed by his team. He said that the inspection of quality of food items and the detection of adulteration are



Milk supply chain adulteration monitoring system

major challenges for the country. He added that proper monitoring of quality of milk must be done at several levels such as, at village milk collection centres, cold storage and during transportation to minimize the loss due to quality degradation and adulteration, and thus his team has come up with a system that can monitor adulteration of milk in the entire supply chain. Describing the system, he said that it is supported by the Internet of Things (IoT) and can monitor samples at the milk collection centres and send its data to the dairy in real-time.

The system can monitor adulterated substances commonly used in milk such as salt, urea, caustic soda, ammonium sulphate, etc., in 20-



Dr. D.K. Aswal, Director, CSIR-CEERI, addressing the media during the Technology Transfer Program



Dr. P.C. Panchariya giving presentations on Milk Supply Chain Monitoring System

25 seconds at almost zero test cost. The system can also quantify other parameters of milk such as fat and the solid non-fat content of milk. Dr. Panchariya also assured that the system is safe to use and that it is being installed at the milk collection centres of various milk societies at the village and tehsil level.

While interacting with the media, Dr. Aswal, praised Dr. P.C. Panchariya and his team for developing the technology to address the national level health problem caused by the adulteration of milk. Dr. Aswal said that apart from other benefits of this next-generation technology system, it provides automatic scanning of raw milk samples at milk collection centres. He said that the system can also prove useful for on-the-spot milk testing by food inspectors and for a healthy India, this type of effective technological intervention is necessary.

Representatives of the company expressed satisfaction with the technology and hoped that soon the technology would be available in the market as a product to benefit the masses.



Exchange of MoU between CSIR-CEERI and M/s Qboid Iotech Pvt. Ltd., Gurugram

Thacker Memorial lawn tennis tournament

Thacker Memorial Lawn Tennis Tournament was organized during December 17-20, 2019 at Central Electronics Engineering Research Institute (CSIR-CEERI), Pilani. The tournament was inaugurated on December 16, 2019, with a grand inaugural event. On this occasion, Professor Alok Dhawan, Director, CSIR-IITR, Lucknow was present as the Chief Guest, and Dr. R.K Sinha,

Secretary, CSIR Sports Promotion Board and Head CSIR Human Resource Development Center, Ghaziabad was invited as the distinguished guest. Apart from Prof. Alok Dhawan and Dr. R.K. Sinha at the inauguration ceremony, Member, CSIR Sports Promotion Board, Dr. Dipanjan Moitra, Dr. Shobhana Chaudhary, Dr. J.L. Raheja, Head, PME, scientists and colleagues from the institute and media personnel were also present. The event was presided over by Dr. P.K. Khanna, Officiating Director, CSIR-CEERI.

In his address, the Chief Guest, Prof. Alok Dhawan praised Dr. P.K. Khanna and his team for the excellent arrangement of the event, wishing all the players a good performance. He praised the work culture of CSIR and told all the players that such tournaments give players of different laboratories a healthy platform to interact.

Later, Dr. R.K. Sinha, Distinguished Guest, wished all the players for their best performance. He gave a brief introduction about Prof. M.S. Thacker and about the tournament to the colleagues and players. Dr. Sinha also apprised the CSIR Sports Promotion Board (SPB) activities on the occasion and thanked the Director, CSIR-CEERI for accepting to host the event. Earlier, while presiding over the event, Dr. P.K. Khanna, honored all the guests. In his address, he referred to the players who brought up the name of the institute in SSBMT and other CSIR tournaments last year. Dr. Khanna thanked the SPB for giving CSIR-CEERI the opportunity to host the tournament.



The opening ceremony of the Thacker Memorial Lawn Tennis Tournament



Greeting the participating teams, Prof. Alok Dhawan, Chairman, CSIR-Sports Promotion Board and Director, CSIR-IITR, Lucknow

A souvenir on the event was also released by the guests which was appreciated by all. Sh. Virendra Singh, Secretary, CSIR-CEERI Staff Club conducted the Oath-taking Ceremony wherein all the participants vowed to follow the rules and regulations of the game, team spirit and discipline. After this, all the guests and players inaugurated the tournament by flying colorful balloons in the sky. Finally, Dr. P.K. Khanna, the Officiating director announced the formal launch of the tournament.

Later, Dr. J.L. Raheja, Chief Scientist, and Head, PME thanked everyone. The opening ceremony concluded with the National Anthem.

The inaugural ceremony was followed by Managers' meet in which the schedule of tournament



Dr. R.K. Sinha while giving his address



Distinguished Guests Releasing the Tournament Souvenir

matches was prepared and all the teams were informed of the major rules. The meeting was chaired by Prof. Alok Dhawan. The meeting was attended by Dr. P.K. Khanna, Dr. R.K. Sinha, Dr. Shobhana Chaudhary, along with Mr. Dipanjan Moitra, the manager of the teams.

Twelve teams of CSIR including CEERI participated in individual singles, individual doubles and team events: CBRI-Roorkee, CDRI-Lucknow, CECRI-Karaikudi, CEERI-Pilani (A), CEERI-Pilani (B), CFTRI-Mysuru, CLRI-Chennai, IMMT-Bhubaneswar, NCL-Pune, NAL-Bangalore, SERC and CMC-Chennai, IICT-Hyderabad. In addition, two local teams (BITS-Pilani and BET-Pilani) participated in the Invitation Tournament.

Individual singles and individual doubles were played on the tennis courts of CEERI and the



The convener of the event, Dr. J.L. Raheja, Head, PME, CSIR-CEERI, while giving the Vote of Thanks

team events and invitation tournaments were held at BITS-Pilani tennis courts. The teams played on an event league basis and individual singles, individual doubles and invitation event on knock-out basis.

The details of the winners in the tournament played in four formats are as follows:

Individual singles

Winner: Ramesh R.N., CSIR-CFTRI, Mysuru

Runner-up: Snehasish Behera, CSIR-IMMT, Bhubaneswar



Dr. P.K. Khanna presenting the trophy to the winner of the individual singles

Individual doubles

Winner: Neeraj Kumar and Sushil Shukla, CSIR-CEERI, Pilani

Runner-up: Chandrasekhar Jagtap and Mahendra Balmiki, CSIR-NCL, Pune



Dr. P.K. Khanna presenting the trophy to the winner of the Individual Doubles

Team event

Winner: CSIR-CFTRI, Mysuru (Ramesh RN, Girish Ghiwari and Arun Kumar)

Runner-up: CSIR-IMMT, Bhubaneswar (Snehasish Behera and Chinnadurai)



Receiving Team Event's winning trophy from the chief guest

Invitation tournament

Winner: CSIR-A (Ramesh RN, Snehasish Behera, Chidambaram, and Virendra Singh)

Runner-up: CSIR-B (KS Srinivas, Chandrashekhar Jagtap, T Ashok Balamurugan, and Sushil Shukla)



Receiving the winning trophy from the chief guest

The closing and award distribution ceremony of the tournament was held on December 20, 2019 after the final match of individual singles and doubles. Dr. S.M. Prasanna Kumar, Director & CEO, BKBIET, Pilani was the Chief Guest on the occasion. The winners were rewarded with trophy and certificate by the Chief Guest, Dr. S.M. Prasanna Kumar.

The closing and award distribution ceremony was presided over by Dr. P.K. Khanna, Officiating director of the institute. Apart from the participants and spectators, senior scientists of the institute Dr. S.A. Akbar, Dr. R.K. Sharma, Dr. Ajay Agarwal, Supervisor of CSIR Sports Promotion Board,

Dr. Shobhana Chaudhary and other colleagues were also present.

In his address, Chief Guest, Dr. S.M. Prasanna Kumar congratulated all the winners and wished other players the best in the future. He said that by looking at the fitness of the players it becomes clear that a healthy mind resides in a healthy body. He also said that sports inculcate many important habits like discipline, patience, perseverance, and dedication which also contribute a lot to our career development.



Dr. P.K. Khanna, Officiating Director, CSIR-CEERI presenting shawl and memento to Chief Guest Dr. S.M. Prasanna Kumar

At the end, the convener of the event, Dr. J.L. Raheja, Head, PME, thanked the Chief Guest. He also thanked all the subcommittees and sponsors for supporting the successful organization of the tournament and BITS-Pilani for providing their tennis courts and other facilities.

SDP Programme on “IoT Systems Design and Computing Platforms” under CSIR Skill Initiative

A three-week programme on “IoT Systems Design and Computing Platforms” for unemployed SC/ST students and women candidates, was organized from 2nd March to 19th March 2020 under the Skill development programme of Govt. of India at CSIR- CEERI, Pilani.

The Chief Guest, Dr. D.K Aswal, Director CSIR-CEERI Pilani, Dr. P.K. Khanna, Dr. S.A.



Dr. D.K. Aswal, Director, CSIR-CEERI lighting the lamp

Akbar, Dr. Kota Solomon Raju and other scientific delegates were present on this occasion. The programme started with the address of Dr. D.K. Aswal explaining the necessity of communication and the Internet of Things in the recent scenario. Later, Dr. P.K. Khanna emphasized on the need for enhancing individual’s skill, in order to find employment in emerging fields and also described various research areas and opportunities at CSIR-CEERI Pilani.

During the programme, lectures, followed by practical sessions were conducted by CSIR-CEERI faculties. The course covered various computing platforms such as Raspberry Pi, MSP430 and Arduino boards using both Linux and Windows-10 OS. In the third week, FPGA software and Hardware training were provided. Hands-on lab sessions including communication using WiFi, ZigBee, BLE 4/5 and sensor peripheral



Dr. Kota Solomon Raju, Head SDP delivering his speech during inaugural event

with MSP430 and Raspberry Pi was demonstrated for real-time IoT. Apart from platforms and sensors, an in-depth understanding of Networking was also given to the candidates.

In the valedictory ceremony Dr. P.K. Khanna, Acting Director, Dr. J.L. Raheja, Head PME and Dr. Kota Solomon Raju, Head SDP, Mr. Pramod Kumar Tanwar, Dr. Gaurav Purohit, Mr. Vipin and other supporting staffs were present. The certificates were distributed to the successful twenty candidates. The candidates were happy and delighted after successfully finishing the course.



Participants and organisers of the SDP programme on “IoT Systems Design and Computing Platforms”

DST-AWSAR Award

Mr. Anand Abhishek working as a scientist in the Power Electronics Group of the Institute has been awarded second prize in the DST-AWSAR (Augmenting Writing Skills for Articulating Research) Award under the Ph.D. category for the year 2019. The award was conferred in the month of August in presence of Hon'ble President, Sh. Ram Nath Kovind, on the National Science Day-2020 (February 28, 2020) at Vigyan Bhawan, New Delhi.

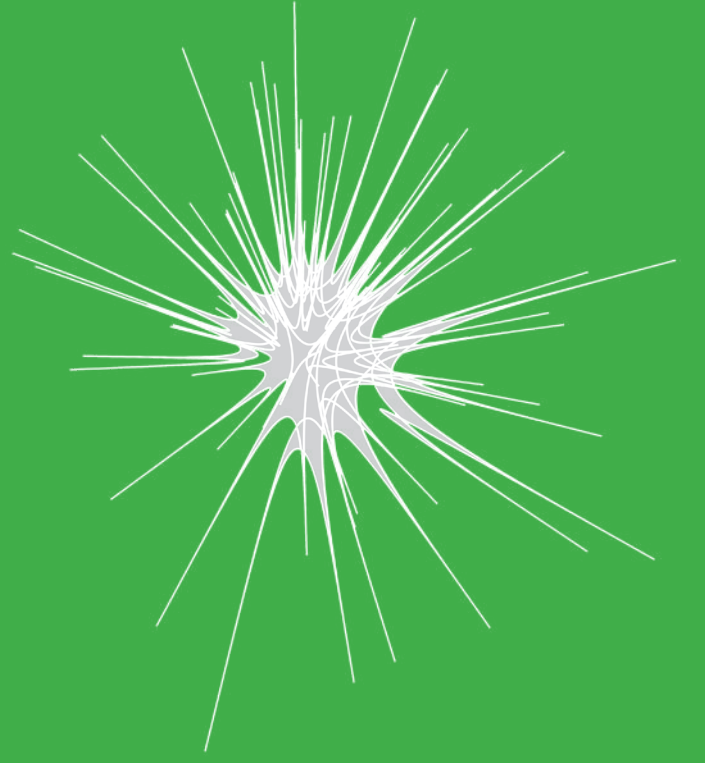
AWSAR is a new initiative conceptualized & supported by the National Council for Science & Technology Communication (NCSTC) Division, Department of Science and Technology (DST) which is actively engaged in developing various outreach programs for scientific fraternity. AWSAR envisages bridging the existing gap in communicating research

to the common man by utilizing the potential of active researchers through a popular scientific writing competition. This program is being coordinated by Vigyan Prasar, an autonomous institute of DST.

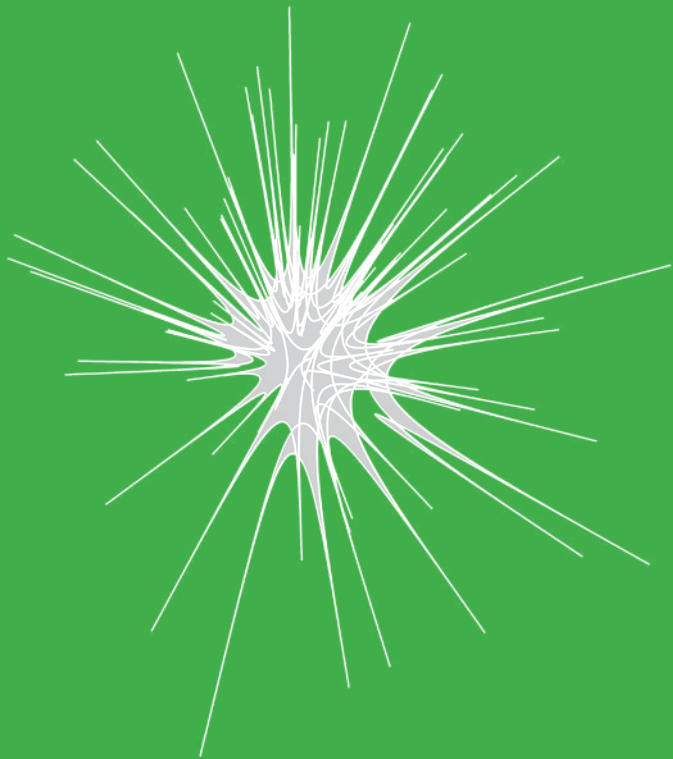
In this national level competition, entries are invited from Ph.D. or PDF pursuing candidates in any stream of science and technology and a total of 1690 entries have been received from research scholars of various national research laboratories and academic institutes under Ph.D. category. An expert panel of science communicators, media persons, subject experts and practitioners, constituted by DST, has evaluated the submitted science stories. The science story of Anand Abhishek titled “Empowering Rural India with Decentralized Energy Systems” is related to his Ph.D. work on DC microgrids. He is currently pursuing Ph.D. from the Academy of Scientific and Innovative Research (AcSIR) under the guidance of Dr. S. A. Akbar, Chief Scientist, CSIR-CEERI, Pilani and Dr. Bhim Singh, Professor, Department of Electrical Engineering, IIT-Delhi. Mr. Anand was awarded the second prize, which comprises of a cash prize of fifty thousand and a citation for the article.



Mr. Anand Abhishek receiving the award from Dr. Harsh Vardhan, Minister of Science and Technology and Minister of Health and Family Welfare



महत्वपूर्ण आयोजन



जिज्ञासा-2019: अंतर्गत स्टूडेंट-साइंटिस्ट कनेक्ट प्रोग्राम

संस्थान में विद्यार्थियों को विज्ञान व अनुसंधान की ओर आकर्षित करने के उद्देश्य से “जिज्ञासा-2019” के अंतर्गत छात्र-वैज्ञानिक संपर्क कार्यक्रम (स्टूडेंट-साइंटिस्ट कनेक्ट प्रोग्राम) का आयोजन 9 मई, 2019 को किया गया। इस एक-दिवसीय विज्ञान अनुसंधान शिविर में पिलानी पब्लिक स्कूल, हरिदेवी झूथाराम शिशु सदन, बिरला बालिका विद्यापीठ, जानकी देवी मंडेलिया स्कूल, वशिष्ठ पब्लिक स्कूल एवं सीरी विद्या मंदिर विद्यालयों के कक्षा 9, 10, 11 तथा 12 के 150 से अधिक विद्यार्थी एवं शिक्षक सम्मिलित हुए। कार्यक्रम के मुख्य अतिथि के रूप में श्री भगवत नंदन, निदेशक, बेयरफुट कॉलेज, तिलोनिया (अजमेर) उपस्थित थे। कार्यक्रम की अध्यक्षता संस्थान के स्थानापन्न निदेशक डॉ. प्रमोद कुमार खन्ना ने की। पिलानी व निकटवर्ती स्कूलों के विद्यार्थियों के लिए आयोजित किए गए इस कार्यक्रम का उद्देश्य विद्यार्थियों की कल्पना शक्ति को जाग्रत करते हुए उन्हें विज्ञान तथा वैज्ञानिक अनुसंधान की ओर आकर्षित करना था।

कार्यक्रम के दौरान मुख्य अतिथि श्री भगवत नंदन ने ‘टैकलिंग पॉवर्टी थ्रू साइंस’ विषयक अपने प्रस्तुतीकरण के माध्यम से छात्र-छात्राओं को संबोधित किया। अपने संबोधन के दौरान उन्होंने सभी विद्यार्थियों को अपनी संस्था की गतिविधियों से भी अवगत कराया। उन्होंने कहा कि औपचारिक शिक्षा के बिना भी आम जनमानस को



स्कूली विद्यार्थियों को संबोधित करते हुए मुख्य अतिथि श्री भगवत नंदन



कार्यक्रम के दौरान सभागार में उपस्थित वैज्ञानिक एवं विद्यार्थी

विकास की मुख्य धारा से जोड़ा जा सकता है। अपने संबोधन में उन्होंने कहा कि समाज के पिछड़े और वंचित वर्ग को सक्षम व सबल बनाना ही सच्ची समाज सेवा है। उन्होंने बताया कि उनकी संस्था समाज के पिछड़े एवं वंचित वर्ग के उत्थान से जुड़े कार्यक्रमों से वर्ष 1972 से सेवारत है और विश्व के 96 देशों में अब तक लाखों लोगों को लाभान्वित कर चुकी है। श्री नंदन ने सभी विद्यार्थियों का आह्वान करते हुए कहा कि मानव सेवा बड़ा सामाजिक कार्य है और आप सभी विद्यार्थी भी इस बारे में सोचें और भविष्य में इस दिशा में अपना यथासंभव योगदान दें।

अपने संबोधन में डॉ. प्रमोद कुमार खन्ना ने मुख्य अतिथि का स्वागत किया। उन्होंने विज्ञान को जीवन का अभिन्न अंग बताते हुए कहा कि सभी प्रतिभागी अपने अंदर भी वैज्ञानिक दृष्टिकोण विकसित करें। अपने संक्षिप्त उद्बोधन में उन्होंने आशा व्यक्त की कि सभी विद्यार्थी इस कार्यक्रम से लाभान्वित होंगे। इससे पूर्व आयोजन समिति के अध्यक्ष डॉ. सुचंदन पाल ने स्वागत उद्बोधन देते हुए सभी विद्यार्थियों, शिक्षकों व उपस्थित संस्थान के सहकर्मियों को मुख्य अतिथि श्री भगवत नंदन का संक्षिप्त परिचय दिया। डॉ. पाल ने श्री भगवत नंदन को संस्थान की ओर से स्मृति चिह्न भेंट सम्मानित किया।

कार्यक्रम का संचालन संस्थान की वैज्ञानिक सुश्री नलिनी पारीक ने किया। संचालन के दौरान उन्होंने सभी प्रतिभागियों को



मुख्य अतिथि को संस्थान की ओर से स्मृति चिह्न भेंट करते हुए डॉ. सुचंदन पाल



साइंस कांग्रेस में मंचस्थ विशेषज्ञ



प्रतिभागियों को अपनी संस्था द्वारा तैयार उत्पादों का प्रदर्शन करते हुए मुख्य अतिथि श्री भगवत नंदन एवं उनके सहयोगी श्री किरूवा



जिज्ञासा कांग्रेस में प्रश्न पूछते प्रतिभागी शिक्षक

कार्यक्रम की रूपरेखा और पृष्ठभूमि से परिचित कराया। संस्थान के वैज्ञानिक डॉ. टी. ईश्वर ने 'सोलर एंड रीन्यूएबल एनर्जी' विषयक अपने व्याख्यान के माध्यम से सभी प्रतिभागियों को सौर ऊर्जा के विभिन्न आयामों और लाभों से परिचित कराया। उन्होंने बताया कि पूरा विश्व आज सौर ऊर्जा से लाभान्वित हो रहा है और इसे भविष्य की ऊर्जा आवश्यकताओं की पूर्ति करने के लिए गंभीर है।

स्कूली विद्यार्थियों के लिए संस्थान में आयोजित इस कार्यक्रम में विज्ञान प्रश्नोत्तरी (साइंस क्विज़) का भी आयोजन किया गया जिसमें प्रतिभागी छात्र-छात्राओं से विज्ञान व सामान्य ज्ञान से जुड़े प्रश्न पूछे गए। प्रश्न मंच का संचालन संस्थान के वैज्ञानिकों डॉ. नीरज कुमार, सुश्री नलिनी पारीक और श्री आनंद अभिषेक ने किया। प्रश्न का सही उत्तर देने पर प्रतिभागियों को प्रतीक चिह्न के रूप में पेन भेंट किया गया। सभी बच्चों ने इसमें उत्साहपूर्वक भाग लिया।

कार्यक्रम के अंतिम सत्र में जिज्ञासा कांग्रेस का आयोजन किया गया जिसमें मुख्य अतिथि श्री भगवत नंदन, संस्थान के स्थानापन्न निदेशक डॉ. प्रमोद कुमार खन्ना तथा जिज्ञासा आयोजन समिति के अध्यक्ष डॉ. सुचंदन पाल, वरिष्ठ प्रधान वैज्ञानिक पेनल सदस्यों के रूप में सम्मिलित हुए। पेनल सदस्यों ने विद्यार्थियों और उनके शिक्षकों से चर्चा की और अपने ज्ञान और अनुभव से उनके प्रश्नों के उत्तर दे कर उनकी जिज्ञासा को शांत किया। इस विशिष्ट सत्र के माध्यम से छात्र-छात्राओं को वैज्ञानिकों से परस्पर चर्चा का अवसर प्रदान किया गया। सभी विद्यार्थी इस सत्र से लाभान्वित हुए।

अंत में आयोजन के संयोजक डॉ. अयन कुमार बंद्योपाध्याय, प्रधान वैज्ञानिक ने मुख्य अतिथि के प्रति आभार व्यक्त किया। उन्होंने सभी विद्यार्थियों व शिक्षकों को कार्यक्रम में सम्मिलित होने के लिए धन्यवाद दिया और भविष्य के लिए शुभकामना दी। उन्होंने आयोजन से जुड़े सभी सहकर्मियों को भी धन्यवाद दिया।

ऑगमेन्टेड रियलिटी (एआर) वर्कशॉप

संस्थान के नारायणा स्थित नई दिल्ली केंद्र द्वारा एनवीडिया और एलिकज़ार सिस्टम्स की तकनीकी भागीदारी में दिनांक 4 से 7 जून 2019 तक ऑगमेन्टेड रियलिटी (एआर) कार्यशाला का आयोजन किया गया। कार्यशाला में 100 से अधिक प्रतिभागियों, जिनमें दिल्ली, जोधपुर, पिलानी, कानपुर आदि विभिन्न शहरों के शोध छात्र व पेशेवर (प्रोफेशनल्स) सम्मिलित थे, ने पंजीकरण कराया।

आयोजन का उद्देश्य संवर्धित वास्तविकता (ऑगमेन्टेड रियलिटी) से उद्योग जगत में हो रहे उच्च स्तरीय बदलावों पर चर्चा करना और उसके महत्व पर प्रकाश डालना था। विदित हो कि एआर वीआर अपने अनुप्रयोगों के साथ दुनिया भर में प्रौद्योगिकी को और तेजी से बढ़ा रहा है। ज्यादातर सभी बड़ी कंपनियां इस क्षेत्र में भारी निवेश कर रही हैं और इस उभरते हुए तकनीकी बाजार पर कब्जा करने की कोशिश कर रही हैं। सीएसआईआर-सीरी एलिकज़ार सिस्टम्स जैसे अग्रणी स्टार्टअप की सहायता कर देश की प्रौद्योगिक प्रगति को और गति देना चाहता है।

कार्यशाला का उद्घाटन सीएसआईआर-राष्ट्रीय भौतिक प्रयोगशाला, नई दिल्ली के सभागार में आयोजित किया गया। इस



उद्घाटन सत्र में स्वागत उद्बोधन देते हुए डॉ. पी.के. खन्ना

अवसर पर एआर विशेषज्ञ श्री ललित याग्निक, एनवीडिया के श्री शशिकुमार नायर, डॉ. पी.के. खन्ना, मुख्य वैज्ञानिक, सीएसआईआर-सीरी सहित कार्यशाला के प्रतिभागी उपस्थित थे।

उद्घाटन सत्र में डॉ. पी.के. खन्ना, ने अपने स्वागत उद्बोधन में सभी अतिथियों व प्रतिभागियों का स्वागत किया और उन्हें संस्थान की प्रमुख शोध गतिविधियों की जानकारी दी। अपने संबोधन में उन्होंने सभागार में उपस्थित अतिथियों व प्रतिभागियों को संस्थान के तीनों शोध क्षेत्रों - स्मार्ट संवेदक, साइबर भौतिक प्रणालियाँ और सूक्ष्मतन्त्र युक्तियों की उपलब्धियों व गतिविधियों से अवगत कराया तथा भावी शोध कार्यक्रमों पर भी प्रकाश डाला।

उद्घाटन सत्र के दौरान ऑगमेन्टेड रियलिटी के विशेषज्ञों सिंगापुर स्थित स्टार्ट अप के कार्यपालक अध्यक्ष श्री ललित याग्निक और एनवीडिया के वरिष्ठ सॉल्युशन्स आर्किटेक्ट श्री शशिकुमार आर. नायर ने भी संबोधित किया। अपने संबोधन/व्याख्यान में श्री शशिकुमार नायर ने अपनी संस्था एनवीडिया के कार्यकलापों पर प्रकाश डालते हुए बताया कि किस प्रकार एनवीडिया स्टेट ऑफ द आर्ट इमर्सिव टेक्नोलॉजी के माध्यम से औद्योगिक समस्याओं का समाधान कर रही है।

अपने प्रस्तुतीकरण में श्री ललित याग्निक ने ऑगमेन्टेड और वर्चुअल रियलिटी (एवीआर) क्षेत्र में अपने 30 वर्षों के सुदीर्घ अनुभव साझा किए। अपने संबोधन में उन्होंने बताया कि भारत के पास इन एवीआर प्रौद्योगिकियों के क्षेत्र में नेतृत्व करने की क्षमता है।

अतिथियों के व्याख्यान के उपरांत डॉ. पी.के. खन्ना ने श्री याग्निक और श्री नायर को स्मृति चिह्न भेंट कर सम्मानित किया।

इस पाँच-दिवसीय कार्यशाला के अगले चार दिनों में प्रशिक्षार्थियों को उद्योग जगत के विशेषज्ञों द्वारा उनके एआर चालित मोबाइल एप्लिकेशन विकसित करने का हैंड्स-ऑन प्रशिक्षण दिया गया। यह गहन प्रशिक्षण सीएसआईआर-सीरी के नारायणा स्थित नई दिल्ली केंद्र में दिया गया। पाठ्यक्रम का डिजाइन प्रशिक्षार्थियों की आवश्यकता को ध्यान में रखते हुए प्रौद्योगिकी के मौलिक सिद्धांतों से उस शोध समस्या के अंतिम समाधान तक पहुँचने में मदद करने के लिए तैयार किया गया



श्री ललित याग्निक को स्मृति चिह्न भेंट करते हुए डॉ. पी.के. खन्ना, मुख्य वैज्ञानिक



समापन सत्र में संबोधित करते हुए डॉ. डी.के. असवाल, निदेशक, सीएसआईआर-सीरी

था। पाठ्यक्रम की संरचना ब्लेंडर, वुफोरिया और युनिटी सॉफ्टवेयर की सहायता से तैयार की गई थी। ये तीनों सॉफ्टवेयर ओपन सोर्स हैं और एआर-वीआर प्रौद्योगिकी में पेशेवर रूप से उपयोग किए जाते हैं।

तकनीकी सत्रों के दौरान परस्पर चर्चा के माध्यम से प्रशिक्षण में रोचकता व जीवंतता बनी रही। चौथे एवं अंतिम दिन प्रशिक्षार्थियों को एप्लिकेशन विकास की प्रक्रिया की जानकारी दी गई जिसके बाद उन्होंने एक एआर आधारित मोबाइल एप बनाया जो न्यूटर क्रेडल और जे के राउलिंग के डेली प्रोफेट (हैरी पॉटर सीरीज़ से प्रभावित) का अनुकरण कर सकता है।

कार्यशाला के दौरान एनवीडिया द्वारा 'नेफर्तारी : ए जर्नी टु एटर्निटी (Nefertari: A Journey to Eternity)' के वीआर संस्करण का भी प्रदर्शन किया गया जिसे सभी प्रतिभागियों व अन्य अतिथियों से काफी सराहना मिली।

कार्यशाला का समापन सत्र 7 जून, 2019 को सीएसआईआर-एनपीएल के सभागार में आयोजित किया गया। समापन सत्र में डॉ. डी.के. असवाल, निदेशक, सीएसआईआर-सीरी ने प्रतिभागियों को प्रमाण पत्र भेंट किए। इस अवसर पर संबोधित करते हुए उन्होंने भारतीय बाजार में ऑगमेन्टेड रियलिटी (एआर) के प्रभाव व माप और मानकों के महत्व को रेखांकित किया। उन्होंने अपने रोचक व्याख्यान के माध्यम से प्रतिभागियों से विमर्श किया और उनसे फीडबैक



प्रतिभागियों को प्रमाण पत्र भेंट करते हुए डॉ. डी.के. असवाल

प्राप्त किया। प्रतिभागियों ने कार्यक्रम के पाठ्यक्रम व उपलब्ध कराई गई सुविधाओं की सराहना की। विशेषज्ञ प्रशिक्षकों ने बताया कि इस प्रशिक्षण के उपरांत कार्यशाला के प्रतिभागी ब्लेंडर और बुफोरिया के उपयोग से अपने मॉडल बनाने में सक्षम हुए हैं।

इससे पूर्व सीएसआईआर-सीरी के साइबर भौतिक प्रणालियाँ क्षेत्र के समन्वयक डॉ. एस.ए. अकबर, मुख्य वैज्ञानिक ने सभी उपस्थित प्रतिभागियों व अन्य गणमान्यजनों का स्वागत किया। तत्पश्चात डॉ. जे.एल. रहेजा, मुख्य वैज्ञानिक एवं प्रमुख, पीएमईबीडी ने इस कार्यशाला के दौरान आयोजित गतिविधियों का विवरण प्रस्तुत किया। उन्होंने सीएसआईआर-सीरी के रोडमैप और विज्ञान-मिशन को ऑगमेन्टेड एवं वर्चुअल रियलिटी (एआर-वीआर) प्रौद्योगिकियों के उपयोग से लाभान्वित होने की योजना पर प्रकाश डाला।

अंत में श्री प्रमोद तंवर, वरिष्ठ वैज्ञानिक और एलिकज़ार सिस्टम के श्री हर्षित, श्री शुभम, श्री सशक्त और श्री फराज़ ने कार्यशाला को मूर्त रूप देने, सफल बनाने में सहयोग देने के लिए निदेशक, सीएसआईआर-सीरी के मार्गदर्शन में कार्यरत सभी सहकर्मियों के प्रति आभार व्यक्त किया। उन्होंने सभी प्रायोजकों तथा कार्यशाला में उपस्थिति के लिए सभी प्रतिभागियों को धन्यवाद दिया।



समापन सत्र में कार्यशाला का विवरण देते हुए डॉ. जे.एल. रहेजा

सीएसआईआर-सीरी में हिंदी सप्ताह

सीएसआईआर-केन्द्रीय इलेक्ट्रॉनिकी अभियांत्रिकी अनुसंधान संस्थान, पिलानी में 6-13 सितंबर, 2019 तक हिंदी सप्ताह का आयोजन किया गया। कार्यक्रम की अध्यक्षता संस्थान के स्थानापन्न निदेशक डॉ. पी.के. खन्ना, मुख्य वैज्ञानिक ने की।

संस्थान में हिंदी सप्ताह का शुभारंभ 6 सितंबर, 2019 को हुआ। इस अवसर पर मुख्य अतिथि के रूप में चिड़ावा के सुप्रसिद्ध शिशुरोग विशेषज्ञ डॉ. अरुण कुमार सूरा को मुख्य अतिथि के रूप में आमंत्रित किया गया। डॉ. सूरा ने “शिशुओं की देखभाल एवं बीमारियों से बचाव” विषय पर आमंत्रित व्याख्यान दिया। डॉ. सूरा ने बच्चों के लिए माँ के दूध का महत्व, बच्चों की रोग प्रतिरोधक क्षमता, खान-पान की बदलती आदतें, शरीर के लिए पोषक तत्वों का महत्व, एन्टी बायोटिक्स

का अधिक व अनावश्यक उपयोग, गर्भाशय के कैंसर से बचने के लिए टीकाकरण के साथ-साथ बच्चों की उचित परवरिश, बिना चिकित्सक की सलाह के दवा लेना, स्वच्छता, अर्ली फैटीग सिंड्रोम, शौच की आदतें (बाउल हैबिट्स) आदि विषयों पर विस्तार से चर्चा की। अंत में डॉ. सूरा ने संस्थान में आमंत्रित करने के लिए निदेशक महोदय और आयोजन समिति को धन्यवाद दिया।

आमंत्रित व्याख्यान के उपरांत डॉ. पी.के. खन्ना ने संस्थान की ओर से डॉ. अरुण कुमार सूरा को शॉल और स्मृति चिह्न भेंट कर सम्मानित किया।

अध्यक्षीय उद्बोधन देते हुए स्थानापन्न निदेशक डॉ. पी.के. खन्ना ने डॉ. सूरा के व्याख्यान की मुक्त कंठ से सराहना करते हुए इस बात का विशेष रूप से उल्लेख किया कि इस व्याख्यान के लोकप्रिय एवं सुग्राह्य होने का सबसे बड़ा कारण है कि यह व्याख्यान लोकप्रिय हिंदी भाषा में प्रस्तुत किया गया।

संपर्क भाषा के रूप में हिंदी की महत्ता को निर्विवाद बताते हुए डॉ. खन्ना ने ज़ोर देकर कहा कि हम सभी अपनी भावनाओं का संप्रेषण सबसे प्रभावी तरीके से केवल अपनी मातृभाषा में ही कर सकते हैं, यही कारण है कि इस व्याख्यान से सभी श्रोता अपना भावनात्मक तादात्म्य स्थापित करने में सफल रहे। अंत में उन्होंने सभी सहकर्मियों से आगामी प्रतियोगिताओं में सम्मिलित होने का आह्वान किया और हिंदी सप्ताह के शुभारंभ की शुभकामना दी।

इससे पूर्व प्रशासनिक अधिकारी श्री विनोद कुमार ने इस अवसर पर सप्ताह पर्यन्त आयोजित की जाने वाली प्रतियोगिताओं की जानकारी दी। उन्होंने भी सहकर्मियों से बड़ी संख्या में इन प्रतियोगिताओं में सम्मिलित होने का आह्वान किया।

हिंदी सप्ताह का समापन समारोह 16 सितंबर, 2019 को आयोजित किया गया। हिंदी दिवस एवं पुरस्कार वितरण समारोह में स्थानापन्न निदेशक डॉ. पी.के. खन्ना ने हिंदी सप्ताह के दौरान तथा उससे पूर्व वर्ष पर्यन्त आयोजित की गई प्रतियोगिताओं तथा उनके 105



आमंत्रित व्याख्यान देते हुए मुख्य अतिथि डॉ. अरुण कुमार सूरा



हिंदी सप्ताह की रूपरेखा प्रस्तुत करते हुए श्री विनोद कुमार, प्रशासनिक अधिकारी



राजभाषा संदर्शिका 2018-19 का विमोचन करते हुए डॉ. पी.के. खन्ना, स्थानापन्न निदेशक एवं डॉ. राजेन्द्र कुमार शर्मा, वरिष्ठ प्रधान वैज्ञानिक

विजेताओं को पुरस्कृत किया। हिंदी दिवस समारोह की अध्यक्षता डॉ. पी.के. खन्ना ने की। अपने अध्यक्षीय उद्बोधन में उन्होंने सभी सहकर्मियों को हिंदी दिवस की शुभकामना दी। इस अवसर पर उन्होंने सभी पुरस्कार विजेताओं को भी बधाई दी।

हिंदी दिवस एवं पुरस्कार वितरण समारोह की अध्यक्षता करते हुए स्थानापन्न निदेशक डॉ. पी.के. खन्ना ने कहा कि यह हर्ष का विषय है कि कार्यालय में हिंदी के उपयोग में उल्लेखनीय प्रगति हुई है और इसमें अनवरत प्रगति हो रही है। उन्होंने कहा कि प्रशासनिक अनुभागों की तरह ही संस्थान के वैज्ञानिक अनुभागों में भी हिंदी के प्रयोग को और बढ़ाने की जरूरत है। उन्होंने वैज्ञानिक अनुभागों/प्रभागों में दैनिक प्रकृति के टिप्पण कार्यों में हिंदी का अधिकाधिक प्रयोग बढ़ाने पर बल दिया। उन्होंने कहा कि संस्थान के भीतर तथा बाहर ई-मेल के माध्यम से संप्रेषण करते समय हिंदी टूल्स का उपयोग करते हुए हिंदी या द्विभाषी ई-मेल का उपयोग किया जाना चाहिए। उन्होंने संस्थान से प्रकाशित होनेवाली वैज्ञानिक पत्रिका “इलेक्ट्रॉनिक दर्पण” की प्रशंसा करते हुए सभी वैज्ञानिकों से अपील की आप सभी सामूहिक प्रयास द्वारा पत्रिका के स्तर के उन्नयन में अपना महत्वपूर्ण योगदान प्रदान करें। उन्होंने सभी पुरस्कार विजेताओं से अपील की आप सभी वर्षभर हिंदी के प्रयोग को बढ़ावा देने के लिए यथासाध्य प्रयासरत रहें। उन्होंने कामना की कि सरकारी और गैर

सरकारी कार्यालयों में हिंदी कामकाज व सभी के उपयोग की भाषा बने। उन्होंने कहा कि सभी के समन्वित प्रयासों से हम इस ओर बढ़ भी रहे हैं। अंत में उन्होंने सभी विजेताओं को बधाई दी।

इस अवसर पर डॉ. पी.के. खन्ना, स्थानापन्न निदेशक तथा हिंदी सप्ताह आयोजन समिति के अध्यक्ष डॉ. राजेन्द्र कुमार शर्मा, वरिष्ठ प्रधान वैज्ञानिक ने राजभाषा प्रकोष्ठ द्वारा प्रकाशित “राजभाषा संदर्शिका (वर्ष 2018-19)” का विमोचन भी किया।

समारोह के दौरान कविता पाठ (स्वरचित) खंड के विजेताओं द्वारा अपनी पुरस्कृत रचनाओं का वाचन किया गया। इससे पूर्व श्री पंकज गोस्वामी, अनुभाग अधिकारी ने सभी उपस्थित सहकर्मियों के समक्ष भारत सरकार के माननीय गृहमंत्री श्री अमित शाह का हिंदी दिवस संदेश पढ़ा। उन्होंने भी सभी सहकर्मियों को हिंदी दिवस की शुभकामना दी। विगत वर्षों की भाँति पुरस्कार वितरण से पूर्व कविता पाठ (स्वरचित) के विजेताओं द्वारा अपनी पुरस्कृत रचनाओं का वाचन भी किया गया।

हिंदी दिवस एवं पुरस्कार वितरण समारोह का संचालन हिंदी अधिकारी श्री रमेश बौरा ने किया। उन्होंने निदेशक महोदय सहित इस अवसर पर उपस्थित हिंदी सप्ताह आयोजन समिति के अध्यक्ष



पुरस्कार वितरण समारोह का संचालन करते हुए श्री रमेश बौरा, हिंदी अधिकारी



धन्यवाद ज्ञापित करते हुए श्री पंकज गोस्वामी, अनुभाग अधिकारी

डॉ. राजेन्द्र कुमार शर्मा, प्रधान वैज्ञानिक, उपस्थित राजभाषा कार्यान्वयन समिति के सदस्यों, अधिकारियों एवं सहकर्मियों का स्वागत करते हुए वर्ष पर्यन्त आयोजित की गई प्रतियोगिताओं की जानकारी दी।

संस्थान में राजभाषा हिंदी के प्रचार-प्रसार के लिए लागू की गई राजभाषा चल वैजयंती योजना के विजेता अनुभागों/प्रभागों को भी निम्नानुसार चल वैजयंती एवं प्रमाण पत्र भेंट किए गए :

1. प्रशासनिक वर्ग में हिंदी में सर्वाधिक कार्य करने के लिए स्थापना अनुभाग-II
2. तकनीकी वर्ग में हिंदी में सर्वाधिक कार्य करने के लिए भवन निर्माण एवं अनुरक्षण (सिविल) प्रभाग
3. वैज्ञानिक वर्ग में हिंदी में सर्वाधिक कार्य करने के लिए नेटवर्क प्रबंधन प्रकोष्ठ (साइबर भौतिक प्रणालियाँ) प्रभाग

अंत में श्री पंकज गोस्वामी, अनुभाग अधिकारी ने धन्यवाद ज्ञापित करते हुए सभी पुरस्कार विजेताओं को बधाई दी तथा निदेशक महोदय, आयोजन समिति के सदस्यों तथा इस आयोजन में प्रत्यक्ष या परोक्ष रूप से सहयोग करने वाले सभी सहकर्मियों के प्रति आभार व्यक्त किया।

सीएसआईआर तथा सीएसआईआर-सीरी स्थापना दिवस समारोह

संस्थान (सीएसआईआर-सीरी) के 67^{वें} तथा वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद (सीएसआईआर) के 78^{वें} स्थापना दिवस के अवसर पर 21 सितंबर, 2019 को सीएसआईआर-सीरी के निदेशक डॉ. डी.के. असवाल की अध्यक्षता में मुख्य सभागार में भव्य समारोह का आयोजन किया गया। इस अवसर पर मुख्य अतिथि के रूप में विज्ञान भारती (विभा) के विशेष सलाहकार श्री ए. जयकुमार, मुख्य अतिथि के रूप में तथा सीएसआईआर-आईएचबीटी के निदेशक डॉ. संजय कुमार, सीएसआईआर-सीरी के सेवानिवृत्त मुख्य वैज्ञानिक डॉ. एन.के. स्वामी एवं सेवानिवृत्त वरिष्ठ प्रधान वैज्ञानिक डॉ. वाई.के. जैन विशिष्ट अतिथि के रूप में उपस्थित थे। इस अवसर पर संस्थान के सहकर्मियों एवं शोध छात्रों के अतिरिक्त संस्थान से गतवर्ष सेवानिवृत्त हुए एवं अन्य पूर्व सहकर्मी,



दीप प्रज्वलित कर समारोह का शुभारंभ करते हुए मुख्य अतिथि एवं विशिष्ट अतिथि

स्थानीय शिक्षण व अन्य संस्थानों के गणमान्य अतिथियों तथा मीडिया जगत के प्रतिनिधियों के अतिरिक्त मीडिया कर्मी भी उपस्थित थे।

कार्यक्रम का शुभारंभ मुख्य अतिथि एवं विशिष्ट अतिथियों द्वारा दीप प्रज्वलन के साथ हुआ। इससे पूर्व परंपरानुसार अतिथियों का गुलदस्ता भेंट कर स्वागत किया गया।

मुख्य अतिथि श्री ए. जयकुमार ने अपने संबोधन में स्वयं को इस अवसर पर आमंत्रित किए जाने के लिए निदेशक, सीएसआईआर-सीरी का धन्यवाद किया। उन्होंने भी अपनी ओर से संस्थान के सभी कर्मचारियों को स्थापना दिवस की बधाई दी। अपने संबोधन में श्री जयकुमार ने कहा कि यह एक विचारणीय प्रश्न है कि विश्व के विज्ञान जगत में हमारा योगदान एक प्रतिशत से भी कम है जबकि 18^{वीं} शताब्दी तक हम विश्व की बड़ी शक्ति हुआ करते थे। उन्होंने इस संदर्भ में आचार्य धर्मपाल की पुस्तक 'इंडियन साइंस एंड टेक्नोलॉजी इन एटीन्थ सेंचुरी' पुस्तक का उल्लेख किया। भारत के विज्ञान के ऐतिहासिक पक्ष को उजागर करते हुए उन्होंने कहा कि हमारा लाखों वर्षों का इतिहास है जिसके प्रमुख स्रोत वेद, उपनिषद् आदि हैं।

उन्होंने कहा कि विश्व का दर्शनशास्त्र बाहरी दुनिया की ओर उन्मुख है जबकि भारत का दर्शनशास्त्र अंदर की ओर उन्मुख है। देश में नीति निर्माण की चर्चा करते हुए उन्होंने कहा कि भारत में पहले नीतियाँ कुछ ही लोगों द्वारा बनाई जाती थीं और उसका अनुपालन देश के करोड़ों नागरिकों द्वारा किया जाता था, लेकिन अब इसमें परिवर्तन हो रहा है और इसका जवलंत उदाहरण नई शिक्षा नीति है जिसके लिए 84 हजार टिप्पणियाँ प्राप्त हुई हैं। उन्होंने कहा कि सीएसआईआर-सीरी एक अनोखी प्रयोगशाला है और इसमें देश के लिए योगदान करने की अपार संभावनाएं हैं। उन्होंने सीएसआईआर-सीरी के नेतृत्व से अपनी प्राथमिकताएं निर्धारित करने की अपील की। साथ ही उन्होंने कहा कि वैज्ञानिक संस्थान आम लोगों के लिए खुले होने चाहिए। उन्होंने सिलिकॉन वैली का उदाहरण देते हुए कहा कि भारत में मौजूद 400 शीर्षस्थ प्रयोगशालाओं और 700 विश्वविद्यालयों और 10000 तकनीकी संस्थानों का भी एक व्यापक नेटवर्क तैयार किया जा सकता है। इसमें



संस्थान के सहकर्मियों को संबोधित करते हुए डॉ. पी. के. खन्ना, मुख्य वैज्ञानिक, सीएसआईआर-सीरी



सीएसआईआर एवं सीरी स्थापना दिवस कार्यक्रम में संबोधित करते हुए मुख्य अतिथि एवं विज्ञान भारती के विशेष सलाहकार श्री ए. जयकुमार



स्थापना दिवस संबोधन के दौरान आईएचबीटी की शोध गतिविधियों से परिचित कराते हुए डॉ संजयकुमार, विशिष्ट अतिथि

भारत से बाहर रहने वाले 1.7 करोड़ भारतवंशियों का भी व्यापक योगदान हो सकता है। अपने संबोधन में उन्होंने युवा वैज्ञानिकों से अपील की कि वे भारत माँ को अपनी विशेषज्ञता से लाभान्वित करने के लिए हरसंभव योगदान दें। अपने संबोधन के अंत में उन्होंने कहा कि अब समय आ गया है कि विज्ञान जगत को भी राजनीतिज्ञों की तरह भी अपना घोषणा पत्र (मैनिफेस्टो) जारी करना चाहिए और अपनी उपलब्धियों व कार्यकलापों का आकलन करना चाहिए।

विशिष्ट अतिथि एवं सीएसआईआर-हिमालय जैवसंपदा प्रौद्योगिकी संस्थान, पालमपुर के निदेशक डॉ. संजय कुमार ने अपने स्थापना दिवस संबोधन में देश व समाज के हित में आईएचबीटी द्वारा किए जा रहे शोध एवं विकास कार्यों से अवगत कराया। उन्होंने हाइड्रोपोनीक कृषि, फूलों की खेती (फ्लोरिकल्चर), क्लाइमेट कंट्रोल ग्रीनहाउस जैसी कृषि तकनीक का विस्तृत उल्लेख करते हुए किसानों की आमदनी बढ़ाने के लिए 50 बिलियन यूएस डॉलर के फूलों की खेती के बाजार का दोहन करने की अपील की। साथ ही उन्होंने हिमालयन कृषि की समस्याओं एवं संभावनाओं पर अपना विमर्श प्रस्तुत किया एवं भारत सरकार के एरोमा मिशन के तहत संगंध (एरोमैटिक) फसलों की महत्ता का उल्लेख किया और गेंदे के फूल के गंध तेल (मैरिगोल्ड एसेंसियल

ऑयल) के अंतरराष्ट्रीय बाजार के दोहन के लिए भारत में माहौल तैयार करने की अपील की। उन्होंने कैमोमाइल, ग्लूटेन मुक्त स्नेक्स, स्टेविया (प्राकृतिक स्वीटनर), लिलियम, मोंक फ्रूट, हींग, शिटाकी मशरूम (विटामिन 'डी' का समृद्ध स्रोत), केसर की खेती के महत्व को रेखांकित करते हुए इनमें छुपी व्यावसायिक संभावनाओं का उल्लेख किया। अपने संबोधन में उन्होंने संवेदकों के विकास में सीएसआईआर-सीरी के वैज्ञानिकों की विशेषज्ञता की सराहना करते हुए सीएसआईआर-सीरी व आईएचबीटी के वैज्ञानिकों से मिलकर कार्य करने का आह्वान किया। उन्होंने कहा कि सीरी के वैज्ञानिक अत्याधुनिक कृषि के लिए संसर आधारित आवश्यक नवीनतम तकनीकों के विकास एवं कृषि उत्पादों की गुणता सुनिश्चित करने के लिए गुणता अवसंरचना एवं परीक्षण सुविधा (क्वालिटी इन्फ्रास्ट्रक्चर और टेस्टिंग सुविधाएं) में अपना महत्वपूर्ण योगदान दे सकते हैं। डॉ. संजय कुमार ने उदाहरण दे कर स्पष्ट किया कि सीएसआईआर-सीरी गंध तेल, शहद, सक्रियित चारकोल (एक्टिवेटेड चारकोल), चाय आधारित सांद्र, ग्लूटेन मुक्त खाद्य उत्पाद (बाजार मूल्य तीस हजार करोड़), की गुणता की जांच में अपना योगदान दे सकता है, साथ ही मृदा के सूक्ष्म जीवों आदि के लिए जैव संवेदकों के विकास में अपनी महती भूमिका का निर्वहन कर सकता है।



संस्थान के सहकर्मियों को संबोधित करते हुए डॉ. डी.के. असवाल, निदेशक, सीएसआईआर-सीरी



सीएसआईआर-सीरी प्रतिवेदन 2018-19 का विमोचन करते हुए मुख्य अतिथि एवं विशिष्ट अतिथि

डॉ. डी. के. असवाल ने अपने अध्यक्षीय उद्घोषण में संस्थान के सभी सहकर्मियों एवं सभागार में उपस्थित श्रोताओं को सीएसआईआर-सीरी के 67^{वें} एवं सीएसआईआर के 78^{वें} स्थापना दिवस की हार्दिक बधाई दी। उन्होंने संस्थान के सभी वैज्ञानिकों व अन्य सहकर्मियों की सीएसआईआर के उद्देश्यों की पूर्ति में उनके योगदान के लिए सराहना की।

इस अवसर पर संस्थान के सहकर्मियों को संबोधित करते हुए डॉ. असवाल ने कहा कि विज्ञान की उपयोगिता तभी है जब यह समाज से जुड़े और समाज वैज्ञानिक अनुसंधानों से लाभान्वित हो। इसी संदर्भ में उन्होंने कहा कि सीएसआईआर-सीरी के अनुसंधान कार्य निश्चित रूप से राष्ट्रीय महत्व के हैं परंतु यह भी सुनिश्चित करना होगा कि हमारा अनुसंधान उत्पाद के रूप में बाजार तक अपनी पहुंच सुनिश्चित करे। उन्होंने अपने संबोधन में इस बात पर जोर देते हुए कहा कि सिस्टम की खामियों को समझे बिना सिस्टम को बेहतर नहीं बनाया जा सकता है, अतः हम सभी को आत्म निरीक्षण करना चाहिए और कमियों को दूर करते हुए आगे बढ़ना चाहिए। उन्होंने भारत में विज्ञान संबंधी अवसंरचना को व्यवस्थित करने की जरूरत पर बल देते हुए कहा कि भारत के आईसीएआर, सीएसआईआर, आईसीएमआर, डीआरडीओ, यूजीसी, आईआईटी जैसे शोध संस्थानों को परस्पर तालमेल के साथ कार्य करना चाहिए ताकि देश में क्वालिटी इन्फ्रास्ट्रक्चर विकसित एवं स्थापित किया जा सके।

इस अवसर पर उन्होंने सीएसआईआर की स्थापना की पृष्ठ-भूमि का विस्तृत परिचय देते हुए सीएसआईआर की स्थापना में बड़ी भूमिका निभाने वाले वैज्ञानिकों एवं सीएसआईआर के प्रथम निदेशक डॉ. एस.एस. भटनागर, सीएसआईआर के प्रथम अध्यक्ष सर एरकॉट रामास्वामी मुदलियार का विशेष रूप से उल्लेख किया। उन्होंने बताया कि सीएसआईआर की शुरुआत नेशनल टेस्ट हाऊस के रूप में कोलकाता से हुई थी और आज भी सीएसआईआर की सबसे बड़ी भूमिका टेस्टिंग एंड क्वालिटी कंट्रोल (परीक्षण एवं गुणता नियंत्रण) में हो सकती है। उन्होंने चीन, ताईवान जैसे देशों का उल्लेख करते हुए कहा कि भारत के निर्यात को तभी बढ़ाया जा सकता है जब भारत में भी चीन की तरह ही क्वालिटी



सीएसआईआर-सीरी और आर.ई.आई.एल., जयपुर के बीच समझौता ज्ञापन का आदान-प्रदान

इन्फ्रास्ट्रक्चर की विश्वस्तरीय सुविधा उपलब्ध कराई जाए। उन्होंने इस बात का भी उल्लेख किया कि भारत में आयातित माल एवं उत्पादों की गुणवत्ता जाँचने के लिए भी क्वालिटी इन्फ्रास्ट्रक्चर की विश्वस्तरीय सुविधा अपरिहार्य है, इसके अभाव में भारत का बाजार हानिकारक एवं घटिया उत्पादों से भर जाएगा जिसका खामियाजा भारत की आम जनता को स्वास्थ्य हानि आदि के रूप में भुगतना पड़ेगा। उन्होंने सीरी के संदर्भ में क्वालिटी इन्फ्रास्ट्रक्चर की सुविधा का उल्लेख करते हुए कहा कि भारत में इलेक्ट्रॉनिक्स के क्षेत्र में सीएसआईआर-सीरी की बहुत बड़ी भूमिका है। उन्होंने भारत सरकार के महत्वाकांक्षी 'मेक इन इंडिया' कार्यक्रम की सफलता के लिए भी क्वालिटी इन्फ्रास्ट्रक्चर के विकास पर जोर दिया। अंत में उन्होंने इस अवसर पर पधारने के लिए सभी मुख्य अतिथि, विशिष्ट अतिथियों एवं अन्य अतिथियों सहित सभागार में उपस्थित जनसमुदाय को पुनः स्थापना दिवस की बधाई दी।

इससे पूर्व इस अवसर पर स्वागत संबोधन देते हुए डॉ.पी. के. खन्ना, वरिष्ठतम मुख्य वैज्ञानिक ने संस्थान के सहकर्मियों एवं सभागार में उपस्थित सभी श्रोताओं को सीएसआईआर-सीरी के 67^{वें} एवं सीएसआईआर के 78^{वें} स्थापना दिवस की हार्दिक बधाई दी और संस्थान के तीनों शोध क्षेत्रों द्वारा किए जा रहे शोध कार्यों एवं मिशन परियोजनाओं व सहयोगात्मक औद्योगिक परियोजनाओं की जानकारी साझा की।

डॉ. खन्ना ने सीएसआईआर-सीरी द्वारा जन सामान्य के लिए विकसित ई-कैंकर्स, आरओ प्लांट, एयर प्यूरिफिकेशन सिस्टम, क्षीर स्कैनर जैसे सामाजिक एवं जनहित के शोध कार्यों का भी उल्लेख किया। उन्होंने मुख्य अतिथि, विशिष्ट अतिथियों के साथ-साथ सभागार में उपस्थित सभी अतिथियों एवं सहकर्मियों के प्रति इस अवसर पर पधारने के लिए आभार व्यक्त किया।

विशिष्ट अतिथि डॉ. वाई.के. जैन ने स्थापना दिवस समारोह में आमंत्रित किए जाने के लिए सीएसआईआर-सीरी के निदेशक के प्रति अपना आभार व्यक्त किया तथा संस्थान में अपने सेवाकाल के अनुभव साझा किए। उन्होंने सेवा एवं अन्य पुरस्कार प्राप्त करने वाले सहकर्मियों एवं पुरस्कृत विद्यार्थियों को बधाई दी।



इलेक्ट्रॉनिक दर्पण, वर्ष 2019 का विमोचन करते हुए मुख्य अतिथि एवं विशिष्ट अतिथि

डॉ. एन.के. स्वामी ने भी इस अवसर पर विशिष्ट अतिथि के रूप में आमंत्रित किए जाने के लिए निदेशक, सीएसआईआर-सिरी के प्रति अपना आभार व्यक्त किया तथा संस्थान में अपने कार्यकाल के अनुभव साझा किए। साथ ही उन्होंने इस अवसर पर पुरस्कृत सीरी कर्मियों के बच्चों का मार्गदर्शन करते हुए कहा कि सभी छात्रों को अपनी कमजोरियों, ताकत और उपलब्ध अवसरों एवं बाधाओं का सम्यक बोध होना चाहिए तभी वे बेहतर योजना बनाकर उत्कृष्ट प्रदर्शन करते हुए अपने लक्ष्यों को प्राप्त कर सकते हैं।

इस अवसर पर मुख्य अतिथि एवं विज्ञान भारती के विशेष सलाहकार श्री ए. जयकुमार सहित सभी मंचस्थ गणमान्य अतिथियों ने संस्थान के प्रतिवेदन 2018-19 तथा संस्थान की हिंदी वैज्ञानिक पत्रिका 'इलेक्ट्रॉनिक दर्पण' के तीसरे अंक का विमोचन किया।

इस अवसर पर निदेशक एवं अन्य अतिथियों की उपस्थिति में सीएसआईआर-सिरी और राजस्थान इलेक्ट्रॉनिक्स एंड इंस्ट्रुमेंटेशन लिमिटेड (आरईआईएल.), जयपुर के बीच ईमैट (Electronic Milk Adulteration Tester) के लिए थिक फिल्म इलेक्ट्रोड्स के डिजाइन और विकास हेतु समझौता ज्ञापन का आदान-प्रदान किया गया। सीएसआईआर-सिरी और आरईआईएल के बीच थिक फिल्म सेंसर के क्षेत्र में दीर्घकालिक संबंध है। आरईआईएल ने अब तक ऐसे 1000 से अधिक संवेदकों का विकास किया है और संबंधित क्षेत्र को हस्तांतरित किया है। सीएसआईआर-सिरी की ओर से पीएमईबीडी प्रमुख डॉ. जे.एल. रहेजा और आरईआईएल की ओर से श्री प्रशान्त सैनी, उप-प्रबंधक, आरएंडडी ने समझौता ज्ञापन का आदान-प्रदान किया।



विशिष्ट अतिथि डॉ. एन.के. स्वामी और डॉ. वाई.के. जैन को सम्मानित करते हुए डॉ. डी.के. असवाल, निदेशक, सीएसआईआर-सिरी

निदेशक, सीएसआईआर-सिरी ने मुख्य अतिथि एवं विज्ञान भारती के विशेष सलाहकार श्री ए. जयकुमार तथा विशिष्ट अतिथि सीएसआईआर-आईएचबीटी के निदेशक डॉ. संजय कुमार को संस्थान की ओर से शॉल व स्मृति चिह्न भेंटकर सम्मानित किया। इनके साथ ही निदेशक महोदय ने विशिष्ट अतिथियों डॉ. एन.के. स्वामी एवं डॉ. वाई.के. जैन को भी संस्थान की ओर से शॉल व स्मृति चिह्न भेंटकर सम्मानित किया।



प्रदर्शनी में संस्थान की शोध गतिविधियों का अवलोकन करते हुए मुख्य अतिथि श्री ए. जयकुमार

अतिथियों ने सम्मेलन कक्ष में लगाई गई प्रौद्योगिकी प्रदर्शनी का भी अवलोकन किया जिसमें वर्तमान में संस्थान में चल रही शोध गतिविधियों एवं परियोजनाओं का प्रदर्शन किया गया था। संस्थान के वैज्ञानिकों ने अतिथियों को शोध कार्यों की जानकारी दी।

स्थापना दिवस समारोह के दौरान संस्थान में प्रौद्योगिकी विकास, अनुसंधान उत्कृष्टता एवं नवाचार के लिए वैज्ञानिकों एवं अन्य सहकर्मियों को पुरस्कृत किया गया। विजेताओं व उनके अनुसंधान/प्रौद्योगिकी का विवरण निम्नवत है :

1. थिक-फिल्म सेंसर इलेक्ट्रोड्स फॉर सोसाइटील एंड स्ट्रैटेजिक एप्लिकेशन्स
डॉ. पी.के. खन्ना, डॉ. निखिल सूरि, श्री धीरज खरबंदा, डॉ. अचू चंद्रन, श्री सुनील कुमार, श्री बी.एस.जांगिड़ और श्री आई.सी. शर्मा
2. स्मार्ट स्टोन डस्ट-प्रेसिपिटेटर सिस्टम फॉर सिंगल आर्टिसन
महेन्द्र सिंह (सोनी), श्री जे.पी. मीणा, श्री महेन्द्र सिंह, श्री कुलबीर सिंह और श्री रवि कुमार
3. डिजाइन एंड डेवलपमेंट ऑफ 200 किलोवॉट सी डब्ल्यू/लॉन्ग पल्स 42 गीगा हर्ट्ज जायरोट्रॉन
डॉ. अनिर्बान बेरा, डॉ. मुकेश आलड़िया, डॉ. हसीना खातून, डॉ. विषांत, श्री ओम रंजन, सुश्री नलिनी पारीक, डॉ. नितिन कुमार, श्री आलोक मिश्र, श्री नरेन्द्र सिंह

निदेशक महोदय सहित सभी अतिथियों ने विजेता शोधकर्ताओं एवं उनकी टीम को पुरस्कार प्राप्त करने के लिए बधाई दी।



विजेता टीमों को सम्मानित करते हुए निदेशक एवं अतिथिगण

इस अवसर पर अतिथियों ने संस्थान एवं सीएसआईआर में 10, 20, 25 तथा 30 वर्ष की सेवा पूरी करने वाले सहकर्मियों को सेवा पुरस्कार और गत वर्ष सेवानिवृत्त हुए सहकर्मियों को भी शॉल व स्मृति चिह्न भेंट किए। साथ ही गतवर्ष कक्षा 12 की परीक्षाओं में उत्कृष्ट प्रदर्शन करने वाले बच्चों को पुरस्कृत किया। सीएसआईआर निबंध लेखन प्रतियोगिताओं के विजेता बच्चों को भी इस अवसर पर पुरस्कृत किया गया।

अंत में मुख्य वैज्ञानिक एवं पीएमईबीडी के प्रमुख डॉ. जे.एल. रहेजा ने धन्यवाद ज्ञापित किया। उन्होंने मुख्य अतिथि एवं विशिष्ट अतिथियों सहित निदेशक एवं अन्य सभी आमंत्रित अतिथियों के प्रति



धन्यवाद ज्ञापित करते हुए डॉ. जे.एल. रहेजा, प्रमुख, पीएमईबीडी

आभार व्यक्त किया। उन्होंने आयोजन में प्रत्यक्ष या परोक्ष रूप से सहयोग करने के लिए सभी समितियों के सदस्यों एवं अन्य सहकर्मियों को भी धन्यवाद दिया।

स्थापना दिवस के उपलक्ष्य में अतिथियों के मनोरंजन के लिए सांस्कृतिक संध्या का आयोजन किया गया जिसमें जवाहर कला केंद्र, जयपुर के सौजन्य से आरकेएसके फिल्मस, जयपुर के कलाकारों ने अपने रंगारंग लोक गीतों व लोक नृत्यों से अतिथियों का मन मोह लिया। उपस्थित अतिथियों एवं दर्शकों ने तालियाँ बजाकर कलाकारों का उत्साहवर्धन किया। सांस्कृतिक कार्यक्रम का संचालन श्री पंकज गोस्वामी, अनुभाग अधिकारी ने किया।



सांस्कृतिक कार्यक्रम में प्रस्तुति देते हुए कलाकार

सतर्कता जागरूकता सप्ताह

सीएसआईआर-सीरी, पिलानी में 28 अक्टूबर से 2 नवंबर, 2019 तक सतर्कता जागरूकता सप्ताह का आयोजन किया गया। भारत सरकार के केंद्रीय सतर्कता आयोग तथा सीएसआईआर मुख्यालय, नई दिल्ली के दिशा निर्देशानुसार संस्थान में आयोजित उद्घाटन सत्र में 28 अक्टूबर, 2019 को संस्थान के कार्यकारी निदेशक डॉ. एस.ए. अकबर, ने सभी सहकर्मियों को भ्रष्टाचार से संघर्ष तथा अपने दायित्वों को ईमानदारी से निर्वहन करने की शपथ दिलवाई। इस अवसर पर संस्थान



सहकर्मियों को शपथ दिलाते हुए डॉ. एस.ए. अकबर, कार्यकारी निदेशक

के वरिष्ठ वैज्ञानिकों सहित अन्य सहकर्मी भी उपस्थित थे। केंद्रीय सतर्कता आयोग द्वारा इस वर्ष के आयोजन का केंद्रीय विषय-ईमानदारी-एक जीवनशैली (Integrity-A Way of Life) निर्धारित किया गया था।

अनुभाग अधिकारी श्री पंकज गोस्वामी ने कार्यक्रम की संक्षिप्त रूपरेखा प्रस्तुत की तथा सप्ताह पर्यंत आयोजित किए जाने वाले कार्यक्रमों की जानकारी दी। इस अवसर पर उन्होंने उपस्थित सहकर्मियों के समक्ष देश के माननीय उपराष्ट्रपति जी तथा डॉ. जितेन्द्र सिंह, केन्द्रीय मंत्री जी का संदेश पढ़ा। अपने संक्षिप्त उद्बोधन में निदेशक महोदय ने सभी सहकर्मियों से इस आयोजन में बढ़-चढ़ कर भाग लेने का आह्वान किया।

दिनांक 1 नवंबर, 2019 पिलानी के निकटवर्ती ग्राम झेरली में ग्राम सभा का आयोजन किया गया जिसमें लोगों ने काफी उत्साह के साथ भाग लिया। ग्राम सभा में ग्राम सचिव सहित 50 से अधिक गणमान्य नागरिक (जिसमें महिलाएँ भी थी) उपस्थित हुए जिसमें संस्थान की ओर से वरिष्ठ वैज्ञानिक, श्री कुलदीप सिंह, प्रशासनिक अधिकारी, श्री विनोद कुमार, अनुभाग अधिकारी, श्री अनिल कुमार शर्मा, हिन्दी अधिकारी, श्री रमेश बौरा व कनिष्ठ सचिवालय सहायक, श्री गुरमेन्द्र सिंह आदि ग्राम सभा में उपस्थित हुए। श्री कुलदीप सिंह ने अपने संबोधन में नागरिकों को सतर्क रहते हुए सरकार की सभी योजनाओं का लाभ उठाने का आह्वान किया तथा डिजिटल लेनदेन को बढ़ावा देने का आह्वान किया। अपने संबोधन में उन्होंने नागरिक अधिकारों पर प्रकाश डाला और सरकार द्वारा नागरिकों के हितों के लिए उठाए जा रहे कदमों की जानकारी दी उन्होंने ग्राम सचिव से सरकारी और राज्य स्तर पर चलाई जाने वाली योजनाओं की जानकारी सभी लोगों तक पहुँचाने का आह्वान किया। अंत में प्रशासनिक अधिकारी श्री विनोद कुमार केन्द्र व राज्य सरकार द्वारा चलाई जा रही विभिन्न योजनाओं जैसे की प्रधानमंत्री जीवनज्योती बीमा योजना, प्रधानमंत्री सुरक्षा बीमा योजना, सुकन्या समृद्धि योजना तथा पालनहार योजना आदि की जानकारी दी तथा ग्रामवासियों को योजनाओं का अधिकाधिक

लाभ उठाने की सलाह दी। अन्त में ग्राम सचिव तथा उपस्थित जनसमूह को देश हित में उनकी भागीदारी के लिए धन्यवाद दिया।

सतर्कता जागरूकता सप्ताह का समापन एवं पुरस्कार वितरण समारोह 4 नवंबर, 2019 को आयोजित किया गया। कार्यक्रम की अध्यक्षता कार्यकारी निदेशक डॉ एस.ए. अकबर, मुख्य वैज्ञानिक ने की। उन्होंने सतर्कता जागरूकता सप्ताह के दौरान आयोजित प्रतियोगिताओं के विजेताओं को पुरस्कृत भी किया।

अपने अध्यक्षीय उद्बोधन में संस्थान के कार्यकारी निदेशक ने देश से भ्रष्टाचार के उन्मूलन में अपना योगदान देने का आह्वान किया तथा बताया की निम्नलिखित 7 चीजें हमें बर्बाद कर सकती हैं: बिना कार्य के सम्पत्ति अर्जन, बिना चरित्र के ज्ञान, बिना त्याग के धर्म, सिद्धान्तों के बिना राजनीति, मानवता के बिना विज्ञान, नैतिक मूल्यों के बिना व्यापार तथा विवेक रहित उपभोग। अंत में उन्होंने पुनः सभी विजेताओं को बधाई दी और उपस्थित जनसमूह का आभार जताया।

श्री पंकज गोस्वामी, अनुभाग अधिकारी ने सतर्कता जागरूकता सप्ताह के दौरान आयोजित गतिविधियों का विवरण देते हुए सप्ताह पर्यन्त आयोजित की गई प्रतियोगिताओं की जानकारी दी। उन्होंने बताया कि इस बार केंद्रीय सतर्कता आयोग के निर्देशानुसार इस आयोजन में संस्थान के सहकर्मियों के अतिरिक्त सीरी विद्या मंदिर, बिरला शिशु विहार व राकेश पी. जी कॉलेज के विद्यार्थियों तथा संस्थान के सहकर्मियों के परिजनों को भी शामिल किया गया था। विद्यार्थियों ने उत्साहपूर्वक इस आयोजन में भाग लिया। इसके अतिरिक्त गाँव-झेरली में भी ग्रामसभा का आयोजन किया गया जिसमें ग्रामिणों ने बढ़-चढ़ कर भाग लिया। अंत में आयोजन समिति के संयोजक-सदस्य श्री अनिल कुमार शर्मा ने धन्यवाद ज्ञापित करते हुए निदेशक, सीएसआईआर-सीरी के मार्गदर्शन में आयोजन को सफल बनाने में सहयोग देने के लिए सभी सहकर्मियों तथा प्रतिभागियों को धन्यवाद दिया।

दुग्ध आपूर्ति चेन में मिलावट की मॉनिटरिंग प्रणाली का प्रौद्योगिकी हस्तांतरण

सीएसआईआर-सीरी ने दुग्ध आपूर्ति शृंखला की मॉनिटरिंग के लिए विकसित प्रणाली के विनिर्माण और विपणन (Manufacturing & marketing) के लिए 7 नवंबर, 2019 को मेसर्स क्यूबॉयड आईओटेक प्राइवेट लिमिटेड, गुरुग्राम के साथ समझौता किया। यह प्रौद्योगिकी हस्तांतरण संस्थान में आयोजित एक कार्यक्रम में किया गया। कार्यक्रम की अध्यक्षता संस्थान के निदेशक डॉ. दिनेश कुमार असवाल ने की। समझौता ज्ञापन का आदान-प्रदान मेसर्स क्यूबॉयड आईओटेक प्राइवेट लिमिटेड, गुरुग्राम के सीईओ श्री उत्कर्ष कपूर और डॉ. जे.एल. रहेजा, प्रमुख, पीएमई के बीच संपन्न हुआ। प्रौद्योगिकी हस्तांतरण कार्यक्रम के दौरान क्यूबॉयड आईओटेक से सुश्री स्मृति उत्कर्ष, निदेशक; श्री रामी काचरू, चीफ टेक्नोलॉजी ऑफिसर और श्री राहुल अग्रवाल, चीफ रिस्क एंड स्ट्रैटेजी ऑफिसर के अलावा सीएसआईआर-सीरी से डॉ. एस.ए. अकबर, मुख्य वैज्ञानिक और समन्वयक, सीपीएस, डॉ. पी.सी. पंचारिया, वरिष्ठ प्रधान वैज्ञानिक और प्रभारी, सीरी, जयपुर केंद्र के साथ ही संस्थान के अन्य वरिष्ठ वैज्ञानिक और मीडिया कर्मी उपस्थित थे। उल्लेखनीय है कि भारत के राष्ट्रपति श्री रामनाथ कोविंद जी ने सीएसआईआर-सीरी द्वारा दूध में मिलावट की जांच करने के लिए विकसित क्षीर स्कैनर प्रौद्योगिकी के हैंड हेल्ड संस्करण 'क्षीर टेस्टर' को 27 सितंबर, 2017 को राष्ट्र को समर्पित किया था।

डॉ. दिनेश कुमार असवाल, निदेशक, सीएसआईआर-सीरी ने इस अवसर पर मेसर्स क्यूबॉयड आईओटेक के सभी प्रतिनिधियों का स्वागत किया और कहा कि यह संस्थान अपने सामाजिक मिशन के तहत आम नागरिकों के जीवन को सरल और सहज बनाने के लिए तथा भारत सरकार के स्वच्छ भारत और मेक इन इंडिया मिशन को साकार करने के लिए अनवरत काम कर रहा है। उन्होंने बताया कि सीएसआईआर-सीरी, पिलानी ने सीएसआईआर के फास्ट ट्रेक ट्रांसलेशन प्रोजेक्ट (एफटीटी) कार्यक्रम के तहत दुग्ध आपूर्ति शृंखला में अपमिश्रण (मिलावट) की जांच के लिए यह प्रणाली विकसित की है।



प्रौद्योगिकी हस्तांतरण कार्यक्रम के दौरान संबोधित करते हुए डॉ. डी.के. असवाल, निदेशक, सीएसआईआर-सीरी

डॉ. पंचारिया, वरिष्ठ प्रधान वैज्ञानिक एवं प्रभारी, सीरी जयपुर केंद्र ने भी उनकी टीम द्वारा विकसित दुग्ध आपूर्ति शृंखला मॉनिटरिंग प्रणाली की आवश्यकता और महत्व इस पर संक्षेप में प्रकाश डाला। उन्होंने बताया कि खाद्य पदार्थों की गुणता की जांच और मिलावट (अपमिश्रण) का पता लगाना संबंधित विभागों की बड़ी चुनौतियाँ हैं। यह सर्वविदित तथ्य है कि नष्ट होने वाले खाद्य पदार्थों विशेषकर दूध आपूर्ति चेन या शृंखला का मॉनिटरिंग अनिवार्य है। गावों के दूध संग्रहण केंद्रों, प्रशीतन केंद्र (कोल्ड स्टोरेज) के स्तर पर और परिवहन आदि के दौरान दूध की गुणता का उचित मॉनिटरिंग आवश्यक है ताकि गुणता ह्रास (क्वालिटी डीग्रेडेशन) और मिलावट के कारण होने वाले नुकसान को कम से कम किया जा सके। यह प्रणाली इंटरनेट ऑफ थिंग्स (IoT) समर्थित है जो दुग्ध संग्रहण केंद्र के प्रत्येक नमूने को मॉनीटर कर सकती है और इसके आंकड़े वास्तविक समय (रियल टाइम) में डेयरी को भेज सकती है। आम तौर पर दूध में उपयोग किए जाने वाले मिलावटी पदार्थों जैसे नमक, यूरिया, कॉस्टिक सोडा, अमोनियम सल्फेट आदि को यह प्रणाली 20-25 सेकंड में लगभग शून्य परीक्षण लागत पर मॉनीटर कर सकती है। यह प्रणाली दूध के अन्य पैरामीटरों जैसे वसा और दूध की ठोस गैर-वसा सामग्री के बारे में भी बताते हैं। उन्होंने इस बात को रेखांकित किया कि यह इस्तेमाल के लिए सुरक्षित होने के साथ-साथ गाँव और तहसील स्तर पर विभिन्न दुग्ध समितियों के दूध संग्रहण केंद्रों पर संस्थापन (इन्स्टॉल) किए जाने के लिए बे-हतर है। मेसर्स क्यूबॉयड आईओटेक के प्रतिनिधियों ने प्रणाली के संबंध में प्रश्न पूछे और डॉ. पंचारिया ने उनके प्रश्नों के उत्तर देकर उनकी जिज्ञासा शांत की।

प्रौद्योगिकी हस्तांतरण के उपरांत मीडिया से चर्चा करते हुए डॉ. असवाल ने कहा कि सीएसआईआर-सीरी, पिलानी ने दुग्ध आपूर्ति शृंखला मॉनिटरिंग प्रणाली के विनिर्माण और विपणन (Manufacturing & marketing) के लिए मेसर्स क्यूबॉयड आईओटेक प्राइवेट लिमिटेड, गुरुग्राम के साथ समझौता किया है।



दुग्ध आपूर्ति शृंखला मॉनिटरिंग प्रणाली एवं उसकी आवश्यकता और महत्व पर प्रस्तुतीकरण देते हुए डॉ. पी.सी. पंचारिया



दुध आपूर्ति शृंखला में मिलावट की मॉनिटरिंग प्रणाली

उन्होंने दूध में मिलावट के कारण होने वाली राष्ट्रीय स्तर की स्वास्थ्य समस्या के समाधान हेतु इस प्लेटफॉर्म प्रौद्योगिकी को विकसित करने के लिए डॉ. पी.सी. पंचारिया और उनकी टीम की प्रशंसा की। डॉ. असवाल ने कहा कि इस अगली पीढ़ी की प्रौद्योगिकी प्रणाली के अन्य लाभों के अलावा यह दुग्ध संग्रहण केंद्रों पर कच्चे दूध के नमूने की स्वचालित स्कैनिंग की सुविधा प्रदान करती है। यह प्रणाली खाद्य निरीक्षकों द्वारा मौके पर ही दुग्ध परीक्षण के लिए भी उपयोगी सिद्ध हो सकती है और “स्वस्थ भारत” के लिए इस प्रकार का प्रभावी प्रौद्योगिकीय हस्तक्षेप आवश्यक है।

इस अवसर पर मेसर्स क्यूबॉयड आईओटेक प्राइवेट लिमिटेड, गुरुग्राम के मुख्य कार्यकारी अधिकारी (सीईओ) श्री उत्कर्ष कपूर ने भी पावर पॉइंट प्रस्तुतीकरण के माध्यम से अपनी कंपनी की स्थापना एवं उसके उद्देश्यों से अवगत कराया।



सीएसआईआर-सीरी और मेसर्स क्यूबॉयड आईओटेक प्राइवेट लिमिटेड, गुरुग्राम के बीच समझौता ज्ञापन का आदान-प्रदान

अंत में उन्होंने निदेशक, सीएसआईआर-सीरी के प्रति आभार व्यक्त किया कि उन्हें इस प्रौद्योगिकी के माध्यम से इस प्रतिष्ठित संस्थान से जुड़ने का अवसर प्राप्त हुआ। कंपनी के प्रतिनिधियों ने इस प्रौद्योगिकी के संबंध में संतोष व्यक्त करते हुए आशा व्यक्त की कि शीघ्र ही यह प्रौद्योगिकी जनसामान्य को लाभान्वित करने के लिए उत्पाद के रूप में बाजार में उपलब्ध होगी।

थैकर मेमोरियल लॉन टेनिस टूर्नामेंट

संस्थान में 17-20 दिसंबर, 2019 को प्रतिष्ठित प्रोफेसर एम. एस. थैकर लॉन टेनिस टूर्नामेंट का आयोजन किया गया। टूर्नामेंट का उद्घाटन 16 दिसंबर, 2019 को संस्थान के मुख्य लॉन में आयोजित भव्य कार्यक्रम में किया गया। इस अवसर पर सीएसआईआर स्पोर्ट्स प्रमोशन बोर्ड के अध्यक्ष प्रोफेसर आलोक धावन, निदेशक, सीएसआईआर-आईआईटीआर, लखनऊ मुख्य अतिथि तथा सीएसआईआर स्पोर्ट्स प्रमोशन बोर्ड के सचिव डॉ. आर.के. सिन्हा, प्रभारी, सीएसआईआर मानव संसाधन विकास केंद्र, गाज़ियाबाद विशिष्ट अतिथि थे। उद्घाटन समारोह में प्रोफेसर आलोक धावन और डॉ. आर.के. सिन्हा के अलावा सीएसआईआर स्पोर्ट्स प्रमोशन बोर्ड के सदस्य श्री दीपांजन मोइता, डॉ. शोभना चौधरी, आयोजन के संयोजक डॉ. जे.एल. रहेजा, विभिन्न समितियों के अध्यक्ष, संस्थान के वैज्ञानिक एवं सहकर्मियों व उनके परिजन तथा मीडियाकर्मियों उपस्थित थे। आयोजन की अध्यक्षता डॉ. पी.के. खन्ना, स्थानापन्न निदेशक, सीएसआईआर-सीरी ने की। अतिथियों का स्वागत परंपरागत रूप से गुलदस्ता भेंट कर किया गया।

मुख्य अतिथि प्रोफेसर आलोक धावन ने अपने संबोधन में सभी खिलाड़ियों को अच्छे प्रदर्शन की शुभकामना देते हुए आयोजन की उत्कृष्ट व्यवस्था के लिए डॉ. पी.के. खन्ना और उनकी टीम की प्रशंसा की। उन्होंने सीएसआईआर की कार्य संस्कृति की सराहना करते हुए सभी खिलाड़ियों से कहा कि ऐसे टूर्नामेंट न केवल विभिन्न प्रयोगशालाओं के खिलाड़ियों को परस्पर मिलने का अवसर देते हैं अपितु इनके द्वारा नए मिल भी बनते हैं। उन्होंने सभी प्रतिभागियों से अनुशासन व खेल के नियम-विनियमों के पालन का आह्वान किया।

उद्घाटन समारोह के दौरान अपने विशिष्ट अतिथीय संबोधन में डॉ. आर.के. सिन्हा ने सभी खिलाड़ियों को बेहतर प्रदर्शन के लिए



थैकर मेमोरियल लॉन टेनिस टूर्नामेंट के उद्घाटन समारोह में मंचस्थ अतिथिगण



प्रतिभागी टीमों को शुभकामना देते हुए प्रोफेसर आलोक धावन, अध्यक्ष, सीएसआईआर-स्पोर्ट्स प्रमोशन बोर्ड



टूर्नामेन्ट की स्मारिका का विमोचन करते हुए मंचस्थ गणमान्य अतिथि, मुख्य अतिथि एवं विशिष्ट अतिथि

शुभकामना दी। उन्होंने संस्थान के उपस्थित सहकर्मियों एवं उनके परिजनों व खिलाड़ियों को टूर्नामेन्ट के आयोजन की जानकारी देते हुए प्रोफेसर एम एस थैकर का संक्षिप्त परिचय दिया। डॉ. सिन्हा ने इस अवसर पर सीएसआईआर स्पोर्ट्स प्रमोशन बोर्ड की गतिविधियों से भी अवगत कराया और आयोजन की मेज़बानी स्वीकार करने के लिए निदेशक, सीएसआईआर-सीरी को धन्यवाद दिया।

इससे पूर्व आयोजन की अध्यक्षता करते हुए सीएसआईआर-सीरी के स्थानापन्न निदेशक डॉ. पी.के. खन्ना ने स्वागत व अध्यक्षीय उद्बोधन दिया। उन्होंने मुख्य अतिथि एवं विशिष्ट अतिथि सहित अन्य गणमान्य अतिथियों एवं सीएसआईआर की विभिन्न प्रयोगशालाओं एवं अन्य संस्थानों से आए सभी खिलाड़ियों का स्वागत किया। उन्होंने गतवर्ष एसएसबीएमटी एवं अन्य सीएसआईआर टूर्नामेन्टों में संस्थान का नाम रोशन करने वाले खिलाड़ियों का भी उल्लेख किया। डॉ. खन्ना ने सीएसआईआर-सीरी को टूर्नामेन्ट की मेज़बानी का अवसर देने के लिए एसपीबी के प्रति आभार व्यक्त किया।



विशिष्ट अतिथीय उद्बोधन देते हुए डॉ आर के सिन्हा, सचिव, सीएसआईआर-स्पोर्ट्स प्रमोशन बोर्ड

उद्घाटन समारोह में उपस्थित टीमों के खिलाड़ियों ने सीरी विद्या मंदिर के विद्यार्थियों की बैड धुन पर मार्च पास्ट किया। इसके बाद बैड दल ने सुंदर बैड प्रदर्शन भी किया। इसके अतिरिक्त विद्यालय के अन्य बच्चों ने देश भक्ति गीत भी गाए। मुख्य अतिथि ने सीरी विद्या मंदिर के विद्यार्थियों के बैड प्रदर्शन और ऑर्केस्ट्रा पर देशभक्ति गीत गाने वाले बच्चों की मुक्त कंठ से सराहना की।

इस अवसर पर मंचस्थ अतिथियों द्वारा आयोजन की स्मारिका का विमोचन भी किया गया। सभी ने स्मारिका की सराहना की। डॉ. पी. के. खन्ना ने संस्थान की ओर से अतिथियों को शॉल व स्मृति चिह्न भेंट कर सम्मानित किया।

सीरी स्टाफ क्लब के सचिव श्री वीरेन्द्र सिंह, सुरक्षा अधिकारी ने सभी प्रतिभागी खिलाड़ियों को खेल के नियम-विनियमों के पालन, टीम भावना व अनुशासन के साथ खेलने की शपथ दिलाई। इसके बाद सभी अतिथियों व खिलाड़ियों ने परंपरागत रूप से रंग-बिरंगे गुब्बारे आकाश में उड़ाकर टूर्नामेन्ट की शुरुआत की। अंत में डॉ. पी.के. खन्ना, स्थानापन्न निदेशक ने टूर्नामेन्ट के औपचारिक शुभारंभ की घोषणा की।

आयोजन के संयोजक डॉ जे एल रहेजा, मुख्य वैज्ञानिक एवं प्रमुख, पीएमईबीडी ने धन्यवाद ज्ञापित किया। उद्घाटन समारोह का समापन राष्ट्रगान के साथ हुआ।

उद्घाटन समारोह के बाद टीमों के प्रबंधकों की बैठक (Managers' meet) का आयोजन किया गया जिसमें टूर्नामेन्ट के मैचों की अनुसूची तैयार की गई और सभी टीमों को प्रमुख नियमों की जानकारी दी गई। इस बैठक की अध्यक्षता प्रोफेसर आलोक धावन ने की। बैठक में डॉ पी के खन्ना, डॉ आर के सिन्हा, डॉ शोभना चौधरी सहित, श्री दीपांजन मोइता सहित टीमों के प्रबंधक उपस्थित थे।



धन्यवाद ज्ञापित करते हुए आयोजन के संयोजक डॉ. जे.एल. रहेजा, प्रमुख, पीएमईबीडी, सीएसआईआर-सिरी

इससे पूर्व कार्यक्रम का संचालन करते हुए सीएसआईआर स्पोर्ट्स प्रमोशन बोर्ड के सदस्य श्री रमेश बौरा, हिन्दी अधिकारी ने आयोजन की जानकारी देते हुए कहा कि सीएसआईआर स्पोर्ट्स प्रमोशन बोर्ड अपने पूर्व महानिदेशकों की स्मृति में विभिन्न खेल टूर्नामेंटों का आयोजन करता है। उन्होंने सभी खिलाड़ियों सहित उपस्थित दर्शकों को संक्षेप में टूर्नामेंट की रूपरेखा से अवगत कराया।

मुख्य अतिथि प्रोफेसर आलोक धावन एवं विशिष्ट अतिथि डॉ. राकेश कुमार सिन्हा ने संस्थान के विज्ञान संग्रहालय का परिदर्शन भी किया। उन्होंने संस्थान की शोध गतिविधियों का अवलोकन किया तथा अर्जित उपलब्धियों की सराहना की। इस अवसर पर उन्होंने आगंतुक पंजिका में अपने विचार दर्ज किए।

सीएसआईआर स्पोर्ट्स प्रमोशन बोर्ड के सौजन्य से सीएसआईआर-सिरी में आयोजित इस टूर्नामेंट में सीएसआईआर प्रयोगशालाओं ने तीन प्रतिस्पर्धाओं में भाग लिया जिनमें सिरी सहित सीएसआईआर की निम्नलिखित 12 टीमों ने व्यक्तिगत एकल, व्यक्तिगत युगल और टीम ईवेंट में प्रतिभागिता की: सीबीआरआई-रुड़की, सीडीआरआई-लखनऊ, सीईसीआरआई-कारैकुडी, सिरी-पिलानी (ए), सिरी-पिलानी (बी), सीएफटीआरआई-मैसूर, सीएलआरआई-चेन्नै, आईएमएमटी-भुवनेश्वर, एनसीएल-पुणे, एनएएल-बैंगलूरु, एसईआरसी एवं सीएमसी- चेन्नै, आईआईसीटी-हैदराबाद। इसके अलावा आमंत्रण टूर्नामेंट में टीम ईवेंट में प्रतिभागिता के आधार पर चयनित सीएसआईआर की दो टीमों (ए तथा बी) ने दो स्थानीय टीमों (बिट्स-पिलानी और बीईटी-पिलानी) ने भाग लिया। सीएसआईआर की दोनों टीमों का चयन टीम ईवेंट में सीएसआईआर प्रयोगशालाओं की टीमों के प्रदर्शन के आधार पर किया गया था।

दिनांक 17 से 20 दिसंबर, 2019 के दौरान सिरी और बिट्स-पिलानी के लॉन टेनिस कोर्टों पर समानांतर रूप से खेले गए।

व्यक्तिगत एकल और व्यक्तिगत युगल ईवेंट के मैच सिरी के टेनिस कोर्ट पर और टीम ईवेंट और आमंत्रण टूर्नामेंट बिट्स-पिलानी के टेनिस कोर्टों पर खेले गए। टीम ईवेंट लीग आधार पर तथा व्यक्तिगत एकल, व्यक्तिगत युगल और आमंत्रण ईवेंट नॉक-आउट आधार पर खेले गए। चार प्रारूपों में खेले गए इस टूर्नामेंट में विजेताओं का विवरण इस प्रकार है:

व्यक्तिगत एकल

विजेता: रमेश आर.एन., सीएफटीआरआई-मैसूर
उपविजेता: स्नेहाशीष बेहेरा, आईएमएमटी-भुवनेश्वर



व्यक्तिगत एकल के विजेता को ट्रॉफी भेंट करते हुए डॉ. पी.के. खन्ना

व्यक्तिगत युगल

विजेता: नीरज कुमार और सुशील शुक्ल, सिरी, पिलानी
उपविजेता: चंद्रशेखर जगताप और महेंद्र बाल्मीकि, एनसीएल, पुणे



व्यक्तिगत युगल के विजेता को ट्रॉफी भेंट करते हुए डॉ. पी.के. खन्ना

टीम ईवेंट

विजेता: रमेश आर.एन., गिरीश धिवारी एवं अरुण कुमार, सीएफटीआरआई, मैसूर
उपविजेता: स्नेहाशीष बेहेरा एवं चिन्नादुरई, आईएमएमटी, भुवनेश्वर



मुख्य अतिथि से टीम ईवेन्ट की विजेता ट्राफी प्राप्त करते हुए टीम सीएफटीआरआई, मैसूरू के खिलाड़ी

आमंलण टूर्नामेंट

विजेता: सीएसआईआर-ए (रमेश आर.एन., स्नेहाशीष बेहेरा, चिदंबरम एवं वीरेन्द्र सिंह)

उपविजेता: सीएसआईआर-बी (के.एस. श्रीनिवास, चंद्रशेखर जगताप, टी. अशोक बालामुरुगन और सुशील शुक्ल)



मुख्य अतिथि से आमंलण ईवेन्ट की विजेता ट्राफी प्राप्त करते हुए टीम सीएसआईआर – ए के खिलाड़ी

संस्थान में आयोजित टूर्नामेंट (टीएमएलटीटी 2019) का समापन एवं पुरस्कार वितरण समारोह दिनांक 20 दिसंबर 2019 को सीरी के लॉन टेनिस कोर्ट पर व्यक्तिगत एकल और युगल मैच के फाइनल के बाद सायं 6 बजे आयोजित किया गया। इस अवसर पर डॉ. प्रसन्ना कुमार एस.एम., निदेशक एवं सीईओ, बीकेबीआईईटी, पिलानी मुख्य अतिथि थे। विजेताओं को मुख्य अतिथि डॉ. एस.एन. प्रसन्ना कुमार द्वारा ट्रॉफी और प्रमाण पत्र भेंट कर पुरस्कृत किया गया।

समापन एवं पुरस्कार वितरण समारोह की अध्यक्षता संस्थान के स्थानापन्न निदेशक डॉ पीके खन्ना द्वारा की गई। इस अवसर पर प्रतिभागी खिलाड़ियों और दर्शकों के अलावा संस्थान के वरिष्ठ वैज्ञानिक

डॉ. एस.ए. अकबर, डॉ. आर.के. शर्मा, डॉ. अजय अग्रवाल, सीएसआईआर स्पोर्ट्स प्रमोशन बोर्ड की पर्यवेक्षक डॉ. शोभना चौधरी एवं अन्य सहकर्मी उपस्थित थे।

मुख्य अतिथि डॉ. प्रसन्ना कुमार एस एम ने अपने संबोधन में सभी विजेताओं को बधाई दी और अन्य खिलाड़ियों को भविष्य में बेहतर प्रदर्शन के लिए शुभकामनाएं दी। अपने संबोधन में उन्होंने कहा कि खिलाड़ियों की फिटनेस देखकर यह स्पष्ट हो जाता है कि स्वस्थ शरीर में ही स्वस्थ मन का निवास होता है। उन्होंने कहा कि खेलों से हम अनुशासन, धैर्य, लगन और समर्पण जैसे जीवन के कई महत्वपूर्ण सबक सीखते हैं जो हमारे कैरियर के विकास में भी बड़ा योगदान देते हैं। इससे पूर्व संस्थान के निदेशक डॉ. पी.के. खन्ना ने अपने स्वागत उद्बोधन में अतिथि और अन्य दर्शकों व खिलाड़ियों का स्वागत किया। उन्होंने अत्यंत अल्प सूचना पर संस्थान का आतिथ्य स्वीकार करने और समापन समारोह की शोभा बढ़ाने के लिए आभार व्यक्त किया। सीएसआईआर स्पोर्ट्स प्रमोशन बोर्ड की सदस्य एवं टूर्नामेंट की पर्यवेक्षक डॉ. शोभना चौधरी ने सभी रेफरियों को स्मृति चिह्न भेंट कर सम्मानित किया।

पुरस्कार वितरण के उपरांत डॉ पीके खन्ना ने संस्थान की ओर से मुख्य अतिथि को शॉल एवं स्मृति चिह्न भेंट कर सम्मानित किया।



मुख्य अतिथि से आमंलण ईवेन्ट की विजेता ट्राफी प्राप्त करते हुए टीम सीएसआईआर – ए के खिलाड़ी

आयोजन के संयोजक डॉ. जे.एल. रहेजा, प्रमुख, पीएमईबीडी ने धन्यवाद ज्ञापित करते हुए मुख्य अतिथि के प्रति आभार व्यक्त किया। उन्होंने टूर्नामेंट के सफल आयोजन में सहयोग देने के लिए सभी उपसमितियों तथा प्रायोजकों को धन्यवाद दिया। उन्होंने बिट्स-पिलानी द्वारा अपने टेनिस कोर्ट एवं अन्य सुविधाएं उपलब्ध कराने के लिए आभार व्यक्त किया।

कार्यक्रम का संचालन आयोजन समिति के सदस्य श्री रमेश बौरा, हिंदी अधिकारी ने किया। संचालन के दौरान उन्होंने टूर्नामेंट का संक्षिप्त विवरण प्रस्तुत किया। खिलाड़ियों ने अपने फीड बैक में इस टूर्नामेंट के दौरान संस्थान द्वारा उपलब्ध कराई गई सुविधाओं की भूरि-भूरि प्रशंसा की।

विश्व हिंदी दिवस के उपलक्ष्य में एक दिवसीय वैज्ञानिक-प्रशासनिक हिंदी कार्यशाला

सीएसआईआर-सीरी, पिलानी में दिनांक 10 जनवरी, 2020 को विश्व हिंदी दिवस का आयोजन किया गया। इस अवसर पर संस्थान के सभी सहकर्मियों के लाभार्थ एक-दिवसीय वैज्ञानिक-प्रशासनिक हिंदी कार्यशाला का भी आयोजन किया। कार्यशाला में संस्थान के तीनों शोध क्षेत्रों – साइबर भौतिक प्रणालियाँ, सूक्ष्मतरंग युक्तियाँ और स्मार्ट संवेदक के वैज्ञानिक ‘विज्ञान तथा प्रौद्योगिकी : सामाजिक उत्थान के लिए’ विषय पर अपने प्रस्तुतीकरण दिए गए। अपने प्रस्तुतीकरणों में संस्थान के तीनों शोध क्षेत्रों के चयनित वैज्ञानिकों द्वारा समाज कल्याण के लिए किए गए शोध कार्यों पर प्रस्तुतीकरण दिए गए। कार्यशाला की अध्यक्षता स्थानापन्न निदेशक डॉ. पी.के. खन्ना द्वारा की गई। इस अवसर पर अतिथियों द्वारा आयोजन की स्मारिका का विमोचन भी किया गया। साथ ही संस्थान की विज्ञान पत्रिका इलेक्ट्रॉनिक दर्पण 2019 में प्रकाशित लेखों/शोध पत्रों के लेखकों को स्थानापन्न निदेशक डॉ. पी.के. खन्ना द्वारा प्रमाण पत्र भी भेंट किए गए। इस अवसर पर विश्व हिंदी दिवस आयोजन समिति के अध्यक्ष डॉ. एस.ए. अकबर, मुख्य वैज्ञानिक; पीएमईबीडी के प्रमुख डॉ. जे.एल. रहेजा, जयपुर केंद्र के प्रभारी डॉ. पी.सी. पंचारिया, प्रधान वैज्ञानिक डॉ. निधि चतुर्वेदी, प्रशासनिक अधिकारी श्री विनोद कुमार सहित अन्य सहकर्मियों एवं प्रतिभागी उपस्थित थे।

संस्थान के सभागार में आयोजित विश्व हिंदी दिवस के उद्घाटन सत्र में सहकर्मियों, उपस्थित प्रतिभागियों को संबोधित करते हुए डॉ. पी.के. खन्ना, स्थानापन्न निदेशक ने सभी सहकर्मियों को विश्व हिंदी दिवस की बधाई और शुभकामना दी। अपने संबोधन में डॉ. खन्ना ने कहा कि विश्व में भारत के बढ़ते प्रभुत्व के साथ-साथ हिंदी का प्रचार-प्रसार और स्वीकार्यता तेजी से बढ़ रही है। उन्होंने इसके लिए सभी हिंदी प्रेमियों को बधाई दी और आशा व्यक्त की कि शीघ्र ही हिंदी न केवल विश्व भाषा के रूप में स्थापित होगी बल्कि यह संयुक्त राष्ट्र संघ की आधिकारिक भाषाओं में अपना स्थान बनाएगी। उन्होंने विश्व हिंदी दिवस के उपलक्ष्य में आयोजित की जा रही एक-दिवसीय वैज्ञानिक-प्रशासनिक हिंदी कार्यशाला के लिए संस्थान के राजभाषा प्रकोष्ठ और आयोजन समिति की सराहना की। कार्यशाला के व्याख्यानों की प्रशंसा करते हुए उन्होंने



विश्व हिंदी दिवस के अवसर पर सहकर्मियों को संबोधित करते हुए डॉ. पी.के. खन्ना, स्थानापन्न निदेशक, सीएसआईआर-सीरी, पिलानी

आशा व्यक्त की कि सभी सहकर्मियों कार्यशाला के दौरान दिए जाने वाले व्याख्यानों से लाभान्वित होंगे।

इससे पूर्व आयोजन समिति के अध्यक्ष एवं साइबर भौतिक प्रणालियों के क्षेत्र समन्वयक डॉ. एस. अली अकबर, मुख्य वैज्ञानिक ने भी उद्घाटन सत्र में उपस्थित सभी सहकर्मियों एवं प्रतिभागियों को विश्व हिंदी दिवस की बधाई दी। उन्होंने इस अवसर पर आयोजन की पृष्ठभूमि की चर्चा करते हुए कार्यशाला की रूपरेखा पर भी प्रकाश डाला। अपने संबोधन में उन्होंने भाषाओं के समावेशी गुण को रेखांकित करते हुए कहा कि हिंदी अत्यंत उदार भाषा है और इसने न केवल अंग्रेजी के अपितु भारत की क्षेत्रीय भाषाओं के शब्दों को अपनाते हुए अपने शब्द भंडार में वृद्धि की है।

इससे पूर्व हिंदी अधिकारी एवं आयोजन के संयोजक श्री रमेश बौरा ने निदेशक सहित सभागार में उपस्थित सभी अधिकारियों, सहकर्मियों और कार्यशाला के प्रतिभागियों का स्वागत किया। उन्होंने विश्व हिंदी दिवस मनाए जाने के ऐतिहासिक तथ्यों की जानकारी देते हुए कहा कि यह प्रतिवर्ष 10 जनवरी को मनाया जाता है। उन्होंने कहा कि इस दिन को विश्व हिंदी दिवस या अंतरराष्ट्रीय हिंदी दिवस के रूप में मनाए जाने की घोषणा पूर्व प्रधानमंत्री डॉ. मनमोहन सिंह ने 10 जनवरी 2006 को की। उन्होंने बताया कि इस दिन वर्ष 1975 में नागपुर (महाराष्ट्र) में प्रथम विश्व हिंदी सम्मेलन आरंभ हुआ था। इसलिए इस दिन को विश्व हिंदी दिवस के रूप में मनाने का निर्णय लिया गया। उद्घाटन सत्र में कार्यक्रम संचालन के दौरान श्री बौरा ने हिंदी दिवस और विश्व हिंदी दिवस में अंतर स्पष्ट करते हुए कहा कि कोई भी तिथि किसी भाषा की जन्म तिथि नहीं हो सकती। परंतु किसी ऐतिहासिक घटना से जोड़ते हुए प्रतीकात्मक रूप में हम किसी दिन को उस भाषा के दिन के रूप में मनाते हैं। उन्होंने बताया कि सीआईआर-सीरी में वर्ष 2018 से विश्व हिंदी दिवस का आयोजन किया जा रहा है। उल्लेखनीय है कि इस दिन विदेशों में स्थित भारतीय दूतावासों में अनेक कार्यक्रमों का आयोजन किया जाता है। इस अवसर पर उन्होंने अब तक हुए विश्व हिंदी सम्मेलनों की जानकारी भी दी।

विश्व हिंदी दिवस के उद्घाटन सत्र में डॉ. पी.के. खन्ना एवं अन्य मंचस्थ अधिकारियों द्वारा राजभाषा प्रकोष्ठ द्वारा तैयार एक-दिवसीय



विश्व हिंदी दिवस के अवसर पर आयोजित एक-दिवसीय वैज्ञानिक-प्रशासनिक हिंदी कार्यशाला की रूपरेखा प्रस्तुत करते हुए डॉ. एस.ए. अकबर, मुख्य वैज्ञानिक



विश्व हिंदी दिवस के अवसर पर आयोजित एक-दिवसीय वैज्ञानिक-प्रशासनिक हिंदी कार्यशाला की स्मारिका का विमोचन करते हुए डॉ. पी.के. खन्ना एवं अन्य



उद्घाटन सत्र के अंत में धन्यवाद ज्ञापित करते हुए श्री विनोद कुमार, प्रशासनिक अधिकारी

वैज्ञानिक-प्रशासनिक हिंदी कार्यशाला की स्मारिका का विमोचन भी किया गया। स्मारिका में कार्यशाला के दौरान दिए जाने वाले व्याख्यानों के सारांश के साथ-साथ राजभाषा संबंधी प्रमुख संवैधानिक प्रावधानों को संकलित किया गया है। डॉ. खन्ना ने विश्व हिंदी दिवस 2020 के अवसर पर आयोजित एक-दिवसीय कार्यशाला के आयोजन तथा स्मारिका प्रकाशन के प्रयासों के लिए आयोजन समिति और राजभाषा प्रकोष्ठ की सराहना की।

इस अवसर पर स्थानापन्न निदेशक डॉ. पी.के. खन्ना ने संस्थान की विज्ञान पत्रिका इलेक्ट्रॉनिक दृष्टि 2019 के लेखों के लेखकों को प्रशस्ति पत्र भी भेंट किए। उद्घाटन सत्र के अंत में प्रशासनिक अधिकारी श्री विनोद कुमार ने धन्यवाद ज्ञापित किया।

एक-दिवसीय वैज्ञानिक प्रशासनिक कार्यशाला

सत्र 1 : सलाह्यक्ष – डॉ. कोटा सोलोमन राजू, वरिष्ठ प्रधान वैज्ञानिक

- देवनागरी लिपि का मानकीकरण
रमेश बौरा, हिंदी अधिकारी
- संस्थान की राजभाषा प्रोत्साहन योजनाएँ
रमेश बौरा, हिंदी अधिकारी
- सामाजिक उद्देश्य हेतु स्मार्ट इलेक्ट्रॉनिक प्रौद्योगिकी (जल संवर्धन एवं कृषि उत्पादन)
शशिकांत सदिस्तप, वरिष्ठ प्रधान वैज्ञानिक

सत्र 2 सलाह्यक्ष – डॉ. अनिर्बान बेरा, वरिष्ठ प्रधान वैज्ञानिक

- सामाजिक उत्थान में सूक्ष्म तरंग युक्तियों का योगदान
राजेन्द्र कुमार वर्मा, वैज्ञानिक
- सेवा संबंधी मामले : पालता एवं अन्य महत्वपूर्ण बिंदु
पंकज गोस्वामी, अनुभाग अधिकारी (स्थापना 2)

सत्र 3 सलाह्यक्ष – डॉ. सुचंदन पाल, वरिष्ठ प्रधान वैज्ञानिक

- सह-अध्यक्ष – श्री कुलदीप सिंह, प्रधान वैज्ञानिक
- विज्ञान एवं प्रौद्योगिकी का सामाजिक जीवन में योगदान
विजय चटर्जी, वैज्ञानिक

vii. सीएसआईआर क्रय प्रक्रिया : महत्वपूर्ण बिंदु

प्रहलाद राय, अनुभाग अधिकारी (भं एवं क्र)

सत्र 4 सलाह्यक्ष – डॉ. निधि चतुर्वेदी, वरिष्ठ प्रधान वैज्ञानिक

viii. सामाजिक अनुप्रयोगों के लिए 3-नाइट्रेट्स की उपयोगिता

मनीष मैथ्यु, प्रधान वैज्ञानिक

ix. सामान्य वित्तीय नियमावली 2017 – प्रावधान एवं महत्वपूर्ण बिंदु

मनीष कुमार शर्मा, वित्त एवं लेखा नियंत्रक

व्याख्यान के उपरांत वक्ताओं और सत्र के अध्यक्षों को निदेशक महोदय द्वारा स्मृति चिह्न भेंट कर सम्मानित किया गया। प्रतिभागियों ने विश्व हिंदी दिवस और कार्यशाला के आयोजन की सराहना करते हुए कहा कि भविष्य में भी इस प्रकार की कार्यशालाओं का आयोजन किया जाए।

अंत में आयोजन के संयोजक श्री रमेश बौरा, हिंदी अधिकारी ने धन्यवाद ज्ञापित करते हुए निदेशक महोदय सहित आयोजन समिति के प्रति आभार व्यक्त किया। उन्होंने आयोजन को सफल बनाने में प्रत्यक्ष और परोक्ष रूप से सहयोग करनेवाले सभी सहकर्मियों और प्रतिभागियों को धन्यवाद दिया।



कार्यक्रम के समापन पर धन्यवाद ज्ञापित करते हुए कार्यक्रम के संयोजक श्री रमेश बौरा, हिंदी अधिकारी

एकीकृत कौशल पहल के अंतर्गत सीएसआईआर-सीरी में आईओटी पर प्रशिक्षण कार्यक्रम

भारत सरकार के कौशल विकास कार्यक्रम तथा सीएसआईआर एकीकृत कौशल पहल के अंतर्गत सीएसआईआर-सीरी में बेरोजगार महिलाओं, अनुसूचित जातियों-जनजातियों के पुरुषों एवं विद्यार्थियों के लिए आईओटी सिस्टम डिजाइन और कंप्यूटिंग प्लेटफॉर्म पर दिनांक 2 मार्च से 27 मार्च, 2020 तक प्रशिक्षण कार्यक्रम का आयोजन किया गया। मुख्य अतिथि डॉ. डी.के. असवाल सहित इस अवसर पर प्रतिभागी प्रशिक्षार्थियों के अलावा डॉ. पी.के. खन्ना एवं संस्थान के वरिष्ठ वैज्ञानिक, अन्य सहकर्मी आदि उपस्थित थे। यद्यपि यह कार्यक्रम 27 मार्च, 2020 तक प्रस्तावित था परंतु भारत सरकार के निर्देशों के तहत इसे 19 मार्च ही को समाप्त कर दिया गया।

कार्यशाला का उद्घाटन 2 मार्च, 2020 को परंपरागत रूप से डॉ. डी.के. असवाल, निदेशक, सीएसआईआर-सीरी द्वारा दीप प्रज्वलन से हुआ। उद्घाटन सत्र की अध्यक्षता करते हुए डॉ. डी.के. असवाल ने सभी प्रशिक्षार्थियों से संचार की आवश्यकताओं और मशीनों के प्रशिक्षण के बारे में विस्तार से चर्चा की। इस अवसर पर उन्होंने प्रतिभागियों को आईओटी के सकारात्मक तथा नकारात्मक पहलुओं से अवगत कराया।

डॉ. डी.के. असवाल ने सभी प्रशिक्षार्थियों से उनकी अपेक्षाओं के बारे में पूछा जिसके लिए वे इस कार्यक्रम में सम्मिलित हो रहे हैं। उन्होंने कहा कि जैसे नवजात बच्चे को उनकी पाँच ज्ञानेन्द्रियों के माध्यम से सिखाया जाता है वैसे ही हम मशीन की दुनिया में सेंसर, प्रोग्रामिंग और सॉफ्टवेयर का उपयोग करते हैं। उन्होंने बताया कि आईओटी के माध्यम से मशीनों को जोड़ा जाता है और नियंत्रित किया जाता है। उन्होंने आमेजन और गूगल जैसे बड़े प्रतिष्ठानों द्वारा आईओटी के इस्तेमाल के बारे में बताया। उन्होंने जहाँ एक ओर आईओटी द्वारा दूर बैठकर घर के उपकरणों जैसे गीजर, टीवी, एसी, दरवाजे आदि को नियंत्रित करने जैसे लाभ बताए, वहीं दूसरी ओर आईओटी के संभावित नकारात्मक पक्ष को भी उजागर किया।

सीएसआईआर-सीरी के वरिष्ठतम मुख्य वैज्ञानिक डॉ. पी.के.



दीप प्रज्वलन कर प्रशिक्षण कार्यक्रम का शुभारंभ करते हुए डॉ. डी.के. असवाल, निदेशक, सीएसआईआर-सीरी

खन्ना, मुख्य वैज्ञानिक ने अपने उद्घोषण में रोजगार के लिए आवश्यक कौशल का उल्लेख करते हुए सीएसआईआर-सीरी के विभिन्न अनुसंधान क्षेत्रों पर प्रकाश डाला। उन्होंने उपस्थित प्रशिक्षार्थियों का आह्वान किया कि वे इस कार्यक्रम में बढ़-चढ़कर हिस्सा लें और विद्वान संकाय सदस्यों (फैकल्टी) का अधिक से अधिक लाभ उठाएँ।

इससे पूर्व डॉ. के.एस. राजू, वरिष्ठ प्रधान वैज्ञानिक ने अपने स्वागत उद्घोषण में डॉ. डी.के. असवाल, मंचासीन महानुभावों, सभागार में उपस्थित प्रशिक्षार्थियों, गणमान्य अतिथियों एवं सहकर्मियों का स्वागत करते हुए प्रशिक्षार्थियों को इस पाठ्यक्रम की आवश्यकता व पृष्ठभूमि से अवगत कराया। उन्होंने बताया कि इस कार्यक्रम के लिए कुल 84 पंजीकरण हुए थे जिनमें से केवल 30 का चयन किया गया। डॉ. राजू ने आयोजन की पृष्ठभूमि पर प्रकाश डालते हुए देश में कौशल विकास कार्यक्रम की उपयोगिता और महत्व की चर्चा की।

कार्यक्रम का संचालन करते हुए संस्थान की वैज्ञानिक सुश्री नलिनी पारीक ने सभी अतिथियों का औपचारिक स्वागत किया और उपस्थित प्रतिभागियों व अन्य सहकर्मियों को कार्यक्रम की रूपरेखा से अवगत कराया।

अंत में डॉ. जे.एल. रहेजा, मुख्य वैज्ञानिक ने इस बेहतरीन कार्यक्रम के डिजाइन और समन्वयन के लिए डॉ. के.एस. राजू, वरिष्ठ प्रधान वैज्ञानिक और उनकी टीम, डॉ. डी.के. असवाल, निदेशक, सीएसआईआर-सीरी एवं आयोजन से प्रत्यक्ष एवं अप्रत्यक्ष रूप से जुड़े सभी व्यक्तियों का धन्यवाद ज्ञापित किया और प्रशिक्षार्थियों का आह्वान किया कि सभी प्रशिक्षार्थी इस कार्यक्रम का अधिक से अधिक लाभ उठाएँ। उन्होंने कहा कि प्रशिक्षण के दौरान वे उपस्थित फैकल्टी से अपने संदेह को लेकर निःसंकोच भाव प्रश्न करें और अपनी जिज्ञासा शांत करते हुए अपना कौशल संवर्द्धन करें जिससे आप उद्योग जगत की आवश्यकताओं के अनुरूप स्वयं को तैयार कर सकें।

प्रशिक्षण कार्यक्रम के दौरान प्रशिक्षार्थी-प्रतिभागियों को विषयों के विशेषज्ञों, उद्योग जगत के अनुभवी विद्वानों एवं कुशल



स्वागत उद्घोषण देते हुए कार्यक्रम समन्वयक डॉ. कोटा एस राजू, वरिष्ठ प्रधान वैज्ञानिक, सीएसआईआर-सीरी

प्रशिक्षकों द्वारा प्रशिक्षण दिया गया। इस प्रशिक्षणकार्यक्रम के आयोजन का उद्देश्य वर्तमान समय में उद्योग जगत की आवश्यकताओं के अनुरूप प्रतिभागियों को कार्यकुशल बनाना था। प्रशिक्षण कार्यक्रम के दौरान वास्तविक हार्डवेयर (रास्पबेरी Pi एवं MSP430) बोर्ड के साथ लाइनक्स सहित सर्वर कनेक्टिविटी तथा FPGA का उपयोग करते हुए आईओटी आधारित प्रणाली को डिजाइन और प्रोग्राम करने की जानकारी दी गई। इसके अलावा बाहरी पेरिफेरल्स की रास्पबेरी Pi तथा MSP430 बोर्ड के साथ इंटरफेसिंग तथा ऐज एवं गेटवे जैसी आईओटी युक्तियों की सर्वर/क्लाउड के साथ नेटवर्किंग एवं तत्संबंधी टूबलशूटिंग भी पाठ्यक्रम का प्रमुख अंग था।

प्रशिक्षण कार्यक्रम भारत सरकार के दिशानिर्देशों का पालन करते हुए निर्धारित अवधि से पूर्व दिनांक 19 मार्च, 2020 को ही समाप्त कर दिया गया तथा प्रशिक्षार्थियों को प्रतिभागिता प्रमाणपत्र दिए गए।



एकीकृत कौशल पहल कार्यक्रम के प्रतिभागी और आयोजक

स्वच्छता पखवाड़ा

भारत सरकार के पेयजल एवं स्वच्छता मंत्रालय तथा सीएसआईआर मुख्यालय से प्राप्त दिशानिर्देशों के अनुसार संस्थान में 1 से 15 मई, 2019 तक स्वच्छता पखवाड़ा मनाया गया। स्वच्छ भारत मिशन के अंतर्गत 1-15 मई, 2019 तक आयोजित किए गए इस कार्यक्रम के दौरान संस्थान के सहकर्मियों व कॉलोनीवासियों सहित सीरी विद्या मंदिर के विद्यार्थियों में स्वच्छता के प्रति जागरूकता बढ़ाने व इसके के प्रसार के लिए संस्थान में स्लोगन लेखन, आशुभाषण, पोस्टर बनाना, निबंध लेखन आदि प्रतियोगिताओं का आयोजन का आयोजन किया



सहकर्मियों को स्वच्छता की शपथ दिलाते हुए डॉ. ए.एस. मंडल, मुख्य वैज्ञानिक

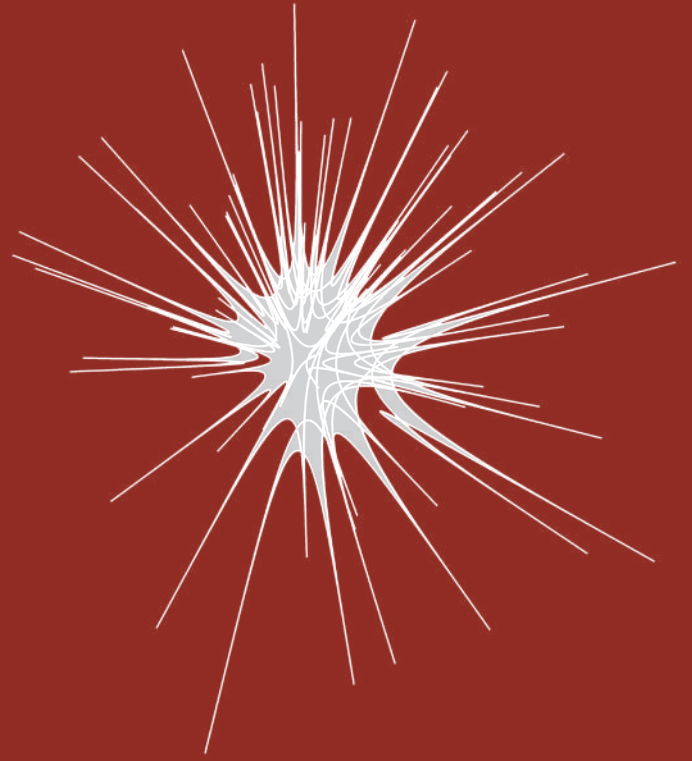
गया। इसके अतिरिक्त सभी अनुभागों-विभागों के लिए स्वच्छता प्रतियोगिता भी रखी गई थी।

संस्थान में आयोजित किए गए स्वच्छता पखवाड़ा का उद्घाटन 2 मई, 2019 को स्वच्छता संबंधी शपथ के साथ किया गया। इस अवसर पर डॉ. ए एस मंडल, मुख्य वैज्ञानिक तथा श्री विनोद कुमार, प्रशासनिक अधिकारी ने सभी सहकर्मियों को स्वच्छता संबंधी शपथ दिलाई उन्होंने सभी सहकर्मियों को न केवल संस्थान में अपने कार्यस्थल अपितु अन्य स्थानों पर भी साफ-सफाई का ध्यान रखने का आह्वान किया। संस्थान के सभागार में आयोजित इस कार्यक्रम में संस्थान के वैज्ञानिकों व अन्य सहकर्मियों के साथ-साथ अस्थायी सहकर्मी भी उपस्थित थे। स्वच्छता पखवाड़ा 2019 के उद्घाटन सत्र का संचालन करते हुए श्री पंकज गोस्वामी, अनुभाग अधिकारी ने कार्यक्रम के दौरान आयोजित किए जाने वाले कार्यक्रमों की रूपरेखा प्रस्तुत की।

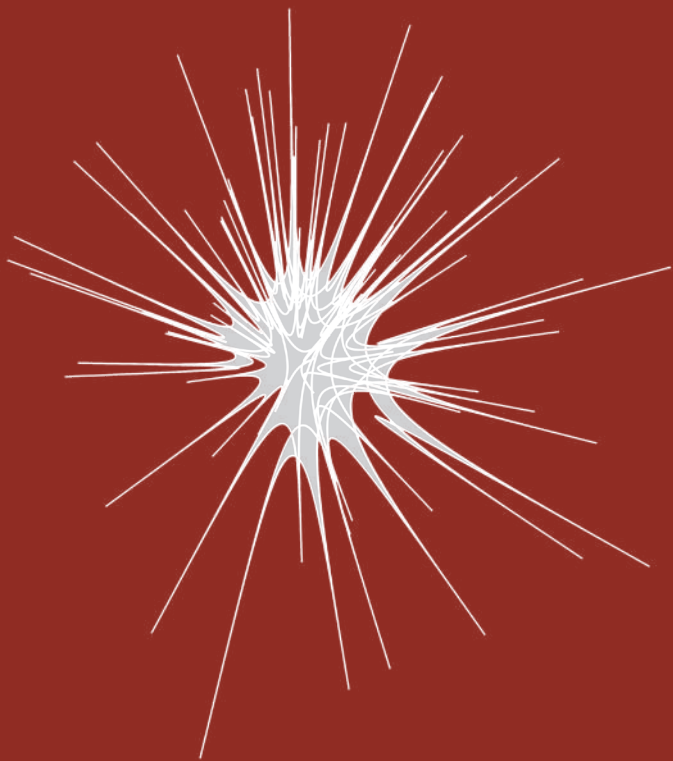
इस अवधि के दौरान सहकर्मियों को स्वच्छता व स्वास्थ्य संबंधी विषयों के संबंध में जागरूक व प्रेरित करने के उद्देश्य से विभिन्न प्रतियोगिताओं का आयोजन भी किया गया।

पुरस्कार वितरण एवं समापन समारोह का आयोजन 15 मई, 2019 को संस्थान के सभागार में आयोजित किया गया। समारोह की अध्यक्षता संस्थान के स्थानापन्न निदेशक डॉ. प्रमोद कुमार खन्ना ने की। डॉ. खन्ना ने स्वच्छता पखवाड़ा के दौरान आयोजित प्रतियोगिताओं के विजेताओं को पुरस्कृत किया। अपने संबोधन में उन्होंने सभागार में उपस्थित सहकर्मियों एवं विद्यार्थियों के समक्ष स्वच्छता को परिभाषित करते हुए उसके विभिन्न आयामों से परिचित कराया। उन्होंने उदाहरण देते हुए समझाया कि कार्य की प्रकृति और परिवेश के अनुसार स्वच्छता का अर्थ बदल जाता है परंतु उसकी मूल भावना अपरिवर्तित रहती है। उन्होंने कहा कि प्रशासनिक अनुभागों, सुविधाओं और शोध प्रयोगशालाओं में स्वच्छता के मानदंड और कसौटियाँ बदल जाती हैं। उन्होंने कहा कि अपने आस-पास के वातावरण को स्वच्छ रखना हमारा अपना दायित्व है। स्वास्थ्य और स्वच्छता के परस्पर संबंध पर प्रकाश डालते हुए उन्होंने कहा कि यदि हम अपने परिवेश को स्वच्छ रखेंगे तो निरोगी रहेंगे। उन्होंने कहा कि यह प्रसन्नता का विषय है कि पखवाड़े के दौरान संस्थान के सभी अनुभागों एवं विभागों ने गहरी रुचि दर्शाते हुए अपने कार्यस्थलों की स्वयं साफ-सफाई की। उन्होंने कहा हमें स्वच्छता को अपने व्यवहार में डालना होगा तथा आशा व्यक्त की कि हमारे सभी सहकर्मी इसे केवल पखवाड़े तक सीमित न रखते हुए इसे आगे भी बरकरार रखेंगे। अपने संबोधन के अंत में उन्होंने सभी विजेताओं विशेषकर सीरी विद्या मंदिर के विजेता विद्यार्थियों को बधाई दी।

कार्यक्रम के अंत में धन्यवाद ज्ञापित करते हुए आयोजन समिति के अध्यक्ष डॉ सुचंदन पाल, वरिष्ठ प्रधान वैज्ञानिक ने आयोजन को सफल बनाने में सहयोग देने के लिए सभी सहकर्मियों का आभार व्यक्त किया।



Annexures





1. श्री तपन मिश्रा
प्रतिष्ठित वैज्ञानिक (व पूर्व निदेशक)
अंतरिक्ष अनुप्रयोग केंद्र
जोधपुर टेकरा, अंबावाड़ी विस्तार
अहमदाबाद-380 015
अध्यक्ष
2. डॉ. दिनकर कांजीलाल
निदेशक
इंटर-यूनिवर्सिटी एक्सेलेरेटर सेंटर
अरुणा आसफ अली मार्ग
निकट वसंत कुंज
नई दिल्ली - 110 067
सदस्य
3. प्रोफेसर वी. रामगोपाल राव
निदेशक
भारतीय प्रौद्योगिकी संस्थान-दिल्ली
हौज़ खास
नई दिल्ली - 110 016
सदस्य
4. श्री पी. सुधाकर
पूर्व मुख्य प्रबंध निदेशक व ओएसडी
इलेक्ट्रॉनिक्स कॉर्पोरेशन ऑफ इंडिया लिमिटेड
पीओ: ईसीआईएल
हैदराबाद 500 062
सदस्य
5. श्री सुरेंद्र सिंह
निदेशक
अर्धचालक प्रयोगशाला (एससीएल)
सेक्टर 72, एस ए एस नगर,
(चंडीगढ़ के निकट)
पंजाब - 160 071
सदस्य
6. डॉ. अलोकनाथ डे
कॉर्पोरेट उपाध्यक्ष एवं मुख्य प्रौद्योगिकी अधिकारी
सैमसंग आर एंड डी इंस्टिट्यूट, बैंगलोर
ओरियन बिल्डिंग बागमाने कान्टेलेशन
बिजनेस पार्क, बाहरी रिंग रोड,
डोड्डनकुंडी सर्किल, मराथाहल्ली पोस्ट,
बैंगलूर 560 037
सदस्य



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| 7. | प्रोफेसर भारद्वाज अमृतुर
इलेक्ट्रॉनिक्स एंड कम्युनिकेशन विभाग
अध्यक्ष, साइबर-भौतिक प्रणालियों हेतु रॉबर्ट बॉश सेंटर
भारतीय विज्ञान संस्थान
बैंगलोर -560 012 | सदस्य |
| 8. | डॉ. चंद्रशेखर
सीनियर एमेरिटस प्रोफेसर
बिट्स पिलानी, पिलानी-कैम्पस
पिलानी - 333 031 | सदस्य |
| 9. | महानिदेशक - सीएसआईआर (या उनके द्वारा नामित) | सदस्य |
| 10. | डॉ. डी.के. असवाल
निदेशक
सीएसआईआर-एनपीएल
डॉ. के.एस. कृष्णन मार्ग
नई दिल्ली -110 012 | सदस्य |
| 11. | डॉ. आर.के. सिन्हा
निदेशक
सीएसआईआर-सीएसआईआर
सेक्टर 30-सी
चंडीगढ़ -160 030 | सदस्य |
| 12. | डॉ. डी.के. असवाल
निदेशक (अतिरिक्त प्रभार)
सीएसआईआर-सीरी
पिलानी - 333 031 | सदस्य |
| 13. | डॉ. पी.के. खन्ना
मुख्य वैज्ञानिक
सीएसआईआर-सीरी
पिलानी - 333 031 | सचिव |

- | | | |
|----|--|----------|
| 1. | Sh. Tapan Misra
Distinguished Scientist and Ex. Director
Space Application Centre - ISRO
Jodhpur Tekra, Ambawadi Vistar
Ahmedabad-380 015 | Chairman |
| 2. | Dr. Dinakar Kanjilal
Director
Inter-University Accelerator Centre
Aruna Asaf Ali Marg
Near Vasant Kunj
New Delhi-110 067 | Member |
| 3. | Prof. V. Ramgopal Rao
Director
Indian Institute of Technology-Delhi
Hauz Khas
New Dehi-110 016 | Member |
| 4. | Sh. P. Sudhakar
Former CMD and OSD
Electronics Corporation of India Limited
PO: ECIL
Hyderabad-500 062 | Member |
| 5. | Sh. Surinder Singh
Director
Semi-conductor Laboratory (SCL)
Sector 72, S A S Nagar
(Near Chandigarh)
Punjab - 160 071 | Member |
| 6. | Dr. Aloknath De
Corporate Vice President and CTO
Samsung R&D Institute, Bangalore
Orion Building Bagmane Constellation
Business Park, Outer Ring Road
Doddanekundi Circle, Marathahalli Post
Bangaluru-560 037 | Member |

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| 7. | Prof. Bharadwaj Amrutur
ECE Department
Chairman, Robert Bosch Center for Cyber-Physical Systems
Indian Institute of Science
Bangalore-560 012 | Member |
| 8 | Dr. Chandra Shekhar
Senior Emeritus Professor
BITS Pilani, Pilani-Campus
Pilani-333 031 | Member |
| 9. | DG-CSIR (or his nominee) | Member |
| 10. | Dr. D.K. Aswal
Director
CSIR-NPL
Dr. KS Krishnan Marg
New Delhi-110012 | Member |
| 11. | Dr. R.K. Sinha
Director
CSIR-CSIO
Sector 30-C
Chandigarh-160 030 | Member |
| 12. | Dr. D.K. Aswal
Director (Addl. Charge)
CSIR-CEERI
Pilani-333 031 | Member |
| 13. | Dr. P.K. Khanna
Chief Scientist
CSIR-CEERI
Pilani-333 031 | Secretary |



वार्षिक प्रतिवेदन 2019-2020

प्रबंधन परिषद (2019 दिसम्बर तक)

1. डॉ. डी.के. असवाल
निदेशक (अतिरिक्त प्रभार)
सीएसआईआर - सीईआईआरआई, पिलानी - 333 031
अध्यक्ष
2. डॉ. पी.के. खन्ना
मुख्य वैज्ञानिक
सीएसआईआर - सीईआईआरआई, पिलानी - 333 031
सदस्य
3. डॉ. पी.सी. पंचारिया
वरिष्ठ प्रधान वैज्ञानिक
सीएसआईआर - सीईआईआरआई, पिलानी - 333 031
सदस्य
4. डॉ. रंजन कुमार बारिक
वरिष्ठ वैज्ञानिक
सीएसआईआर - सीईआईआरआई, पिलानी - 333 031
सदस्य
5. श्री प्रमोद तंवर
वैज्ञानिक
सीएसआईआर - सीईआईआरआई, पिलानी - 333 031
सदस्य
6. श्रीमती अदिति
वैज्ञानिक
सीएसआईआर - सीईआईआरआई, पिलानी - 333 031
सदस्य
7. डॉ. महेश कुमार शर्मा
प्रधान तकनीकी अधिकारी
सीएसआईआर - सीईआईआरआई, पिलानी - 333 031
सदस्य
8. डॉ. आर.के. सिन्हा
निदेशक
सीएसआईआर - सीएसआईओ, चंडीगढ़ - 160 030
सदस्य
9. डॉ. आर.पी. सिंह
वरिष्ठ प्रधान वैज्ञानिक
सीएसआईआर (मुख्यालय), नई दिल्ली - 110 001
महानिदेशक सीएसआईआर नॉमिनी
10. श्री राजेश पारीक
वित्त एवं लेखा अधिकारी
सीएसआईआर - सीईआईआरआई, पिलानी - 333 031
सदस्य
11. श्री विनोद कुमार
प्रशासन अधिकारी
सीएसआईआर - सीईआईआरआई, पिलानी - 333 031
सदस्य सचिव



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|---|------------|
| 1. डॉ. डी.के. असवाल
निदेशक (अतिरिक्त प्रभार)
सीएसआईआर - सीईआईआरआई, पिलानी - 333 031 | अध्यक्ष |
| 2. डॉ. पी.के. खन्ना
मुख्य वैज्ञानिक
सीएसआईआर - सीईआईआरआई, पिलानी - 333 031 | सदस्य |
| 3. डॉ. जे.एल.जहेजा
मुख्य वैज्ञानिक एवंपीएमई/बीडी विभाग के प्रमुख
सीएसआईआर - सीईआईआरआई, पिलानी - 333 031 | सदस्य |
| 4. डॉ. संजय घोष
वरिष्ठ प्रधान वैज्ञानिक
सीएसआईआर - सीईआईआरआई, पिलानी - 333 031 | सदस्य |
| 5. डॉ. कुलदीप सिंह
प्रधान वैज्ञानिक
सीएसआईआर - सीईआईआरआई, पिलानी - 333 031 | सदस्य |
| 6. डॉ. हसीना खातुन
वरिष्ठ वैज्ञानिक
सीएसआईआर - सीईआईआरआई, पिलानी - 333 031 | सदस्य |
| 7. डॉ. नितिन कुमार
तकनीकी अधिकारी
सीएसआईआर - सीईआईआरआई, पिलानी - 333 031 | सदस्य |
| 8. डॉ. डी.के. असवाल
निदेशक
सीएसआईआर - एनपीएल, नई दिल्ली - 11 0012 | सदस्य |
| 9. श्री मनीष कुमार शर्मा
वित्त एवं लेखा नियन्त्रक
सीएसआईआर - सीईआईआरआई, पिलानी - 333 031 | सदस्य |
| 10. श्री विनोद कुमार
प्रशासन अधिकारी
सीएसआईआर - सीईआईआरआई, पिलानी - 333 031 | सदस्य सचिव |

- | | |
|---|-------------------|
| 1. Dr. D.K. Aswal
Director (Addl. Charge)
CSIR-CEERI, Pilani - 333 031 | Chairman |
| 2. Dr. P.K. Khanna
Chief Scientist
CSIR-CEERI, Pilani - 333 031 | Member |
| 3. Dr. P.C.Panchariya
Principal Scientist
CSIR-CEERI, Pilani - 333 031 | Member |
| 4. Dr. Ranjan Kumar Barik
Senior Scientist
CSIR-CEERI, Pilani - 333 031 | Member |
| 5. Sh. Pramod Tanwar
Scientist
CSIR-CEERI, Pilani - 333 031 | Member |
| 6. Ms. Aditi
Scientist
CSIR-CEERI, Pilani - 333 031 | Member |
| 7. Dr. Mahesh Kumar Sharma
Principal Technical Officer
CSIR-CEERI, Pilani - 333 031 | Member |
| 8. Dr. R.K. Sinha
Director
CSIR-CSIO, Chandigarh - 160 030 | Member |
| 9. Dr. R.P. Singh
Senior Principal Scientist
CSIR HQ, New Delhi - 110 001 | DG CSIR's Nominee |
| 10. Sh. Rajesh Pareek
Finance & Accounts Officer
CSIR-CEERI, Pilani - 333 031 | Member |
| 11. Sh. Vinod Kumar
Administrative Officer
CSIR-CEERI, Pilani - 333 031 | Member-Secretary |

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|--|------------------|
| 1. Dr. D.K. Aswal
Director (Addl. Charge)
CSIR-CEERI, Pilani - 333 031 | Chairman |
| 2. Dr. P.K. Khanna
Chief Scientist
CSIR-CEERI, Pilani - 333 031 | Member |
| 3. Dr. J.L. Raheja
Chief Scientist and Head, PME & BD
CSIR-CEERI, Pilani - 333 031 | Member |
| 4. Dr. S.K. Ghosh
Senior Principal Scientist
CSIR-CEERI, Pilani - 333 031 | Member |
| 5. Dr. Kuldeep Singh
Principal Scientist
CSIR-CEERI, Pilani - 333 031 | Member |
| 6. Dr. (Ms.) Hasina Khatun
Senior Scientist
CSIR-CEERI, Pilani - 333 031 | Member |
| 7. Dr. Nitin Kumar
Technical Officer
CSIR-CEERI, Pilani - 333 031 | Member |
| 8. Dr. D.K. Aswal,
Director
CSIR-NPL, New Delhi 110 012 | Member |
| 9. Sh. Manish Kumar Sharma
Controller of Finance & Accounts
CSIR-CEERI, Pilani - 333 031 | Member |
| 10. Sh. Vinod Kumar
Administrative Officer
CSIR-CEERI, Pilani - 333 031 | Member-Secretary |

1 CSIR-Fast Track Translational (FTT) and other Projects

S No.	Title of the Project	Funding Agency	Committed Amount (Rs. in Lakh)*
A. CSIR Mission Projects (Ongoing)			
1.	Drone based Electromagnetic and Magnetic System	CSIR	162
B. CSIR-FTT/FTC/NCP and Others Projects (Completed)			
1.	Dispenser Cathodes for Microwave Tubes	CSIR	100
2.	Software for Real Time Monitoring of Milk Supply Chain	CSIR	30
3.	Induction Furnace Monitoring System with IoT and Artificial Intelligence (AI) Technique in a Pelletization Plant	CSIR	22
4.	Image Processing-based System for Monitoring Feed Rate of Materials Moving on a Conveyor	CSIR	15
5.	Solar PV based Smart Multi-vehicle EV Charging Station	CSIR	151
6.	Novel Compact High Power THz Device Technologies	CSIR	137
7.	Augmentation of Facilities for Micro/Nano Sensors, Actuators and Microfluidics Devices	CSIR	4140
8.	Technologies and Products for Reduced Emission Fireworks	CSIR	42
9.	New Generation Nano Metal-oxide/Grapheme Polymer Composite Materials for use in Wearable Electronics	CSIR	49
10.	Ku-band (140-210 W) and Ka-band (100-150 W) TWTs	CSIR	857
C. Skill Development and Jigyasa Projects (Completed)			
1.	CSIR Integrated Skill Initiative Programme	CSIR	96
2.	Jigyasa	CSIR	14
D. CSIR Mission Projects (Completed)			
1.	Nano-biosensors and Microfluidics for Healthcare	CSIR	962
2.	Intelligent Systems (IS) - Intelligent Technologies and Solutions	CSIR	1671

3.	Affordable Technologies for Quality Milk Assessment	CSIR	431
4.	Food and Consumer Safety Solution	CSIR	559
5.	Safety and Security of Vital Installations	CSIR	364
6.	Technologies for Robust Structural Health Monitoring of Critical Infrastructure and Conservation and Restoration of Heritage Structures	CSIR	346

E. Inhouse Projects (Completed)

1.	CEERI-SCL Mohali Joint R&D Programme	CSIR	12
2.	CSIR-CEERI's Smart Technologies in Aspirational District "SIROHI"	CSIR	17

2. Sponsored Projects**A. Sponsored Projects Continued from Previous Year**

1.	Multi-ceramic Rectangular RF Window	IPR, Gandhinagar	35
2.	Special Manpower Development Programme from Chips-to-System Design (SMDP-C2SD)	MeitY, New Delhi	9972
3.	Real-time Wireless Embedded Multi-sensor System for Monitoring of RO Plants with Water Quality	DST, New Delhi	103
4.	Non-Imaging Optics Based Low Concentrating Photovoltaic Thermal (OCPVT) Hybrid System	DST, New Delhi	63
5.	Technology Development of High Current Density Nano-scandate Cathodes	ER&IPR (DRDO) New Delhi	65
6.	Salivary Glucose Sensing System	Vital Sense Pvt. Ltd., Bengaluru	22
7.	Creation of Common Research and Technology Development Hub (CRTDH) in the Area of Electronics/Renewable Energy	DST, New Delhi	500
8.	Evaluation of Behavioural Video Analytics System	M/s United White Metals Ltd., Mumbai	171
9.	MEMS Accelerometer	IISU-ISRO, Bengaluru	69



10.	Design and Fabrication of Large Deflection MEMS Bimorph Elements for Tunable Filters	SAC (ISRO), Ahmedabad	21
11.	170 GHz, 100 kW Short Pulse Gyrotron	ITER-India (IPR), Gandhinagar	23
12.	Intelligent Embedded E-sense System for Online and Offline Detection of Heavy Metals (Iron, Arsenic etc.) in Ground Water for Quality Assessment	DST, New Delhi	30
13.	Concentrated Photovoltaic (CPV) Assisted Tandem Artificial Photosynthetic (AP) Device for Effective Solar-to-Chemical Conversion	DST, UKIERI	32
14.	Indigenous Design, Development and Qualification of Ku Band (140-210 W) and Ka Band (100-150 W) Travelling Wave Tube (TWT)	SAC (ISRO) Ahmedabad	2020
15.	III-Nitride White and UV LED Technology for Green Energy and Societal Impact	PSA, New Delhi	244
16.	Tunable Film Bulk Acoustic Wave Resonators (FBAR) and Filters	DST, New Delhi	58
17.	Automatic Control System for Gemstone Cutting and Polishing Machine	M/s Rajasthan Tools & Spares, Jaipur	8
18.	Detection of Threat Objects in Baggage and Food Quality Inspection using Image Processing & Pattern Recognition Techniques for Single View X-Ray Scanners & Development of Near 3D Image Visualization Software for Dual View X-ray Scanner	M/s Krystal Vision Image Systems Pvt. Ltd., Pune	60
19.	MEMS Magnetic Sensor and RF/Microwave Tunable Devices	DMRL (DRDO), Hyderabad	72
20.	Information Access from Document Images of Indian Languages	IIT-Kharagpur	80
21.	Computer Vision Algorithms for UAV	CSIR-NAL, Bangalore	46
22.	High Resolution Air Quality Monitoring and Air Pollutant Data Analytics	DST, New Delhi	148
23.	Reactive Ion Etching (RIE) for InGaN/GaN Laser Structure on GaN and Sapphire Substrate	SSPL-DRDO, New Delhi	9

24.	Power Assistive Hybrid e-Trike (PAH e-Trike) for Differently Abled Person in Rural and Urban Regions of India	DST, New Delhi	37
25.	Indoor Environmental Quality (IEQ) Monitoring and Control System based on Wireless Sensor – Actuator Network for Smart Indoor Environments	DST, New Delhi	29
26.	Rural Technology Business Incubation (RTBI)-Jaipur	DST, Jaipur	30
27.	10 kW 3-phase Converter with Unity Power Factor for Industrial Applications	M/s IC Electricals Company Pvt. Ltd., Haridwar	14
28.	High Current Density (>500 A/cm ²) Sheet-beam Plasma Cathode Electron Gun for Sub-mm Microwave Source	BRNS-DAE, Mumbai	34
29.	Foetus Monitoring Patch System	M/s Vital Sense Pvt., Ltd., Bengaluru	23
30.	Research in Human Centered Robotics with Special Emphasis on Field and Bio-medical Rehabilitation (Indo-Korea Joint Network Centre on Robotics)	DST, New Delhi (IIT-Delhi as Coordinating Agency)	39
31.	Twinning Programme with MIDI, Ethiopia	MIDI, Ethiopia	101
32.	Thermionic Emitter for High Thrust Electric Propulsion System	VSSC-ISRO, Thiruvananthapuram	126
33.	2D RGB Camera Input Based Face Anti-Spoofing Solution	M/s LG Soft India Pvt. Ltd., Bengaluru	45
34.	MEMS based Piezoelectric Acoustic Sensor for Low Frequency Applications	SERB, New Delhi	48
35.	Dielectric Barrier Discharge based Micro-hollow Cathode Plasma Device Arrays and Their Characterization	SERB-DST, New Delhi	31
36.	Technologies for Effective Management of Rain-Water Harvesting (RWHT): Ensuring Safe Drinking Water and Optimal Water use for Agriculture	DST, New Delhi DST, Jaipur	339
37.	Non-intrusive Health Care Analytics	M/s Samsung India, New Delhi	57
38.	Spectroscopic Platform for Detection of Adulteration in Milk	MeitY, New Delhi	64

39.	Renewable Energy based DC Microgrid System for Rural Electrification	SERB-DST, New Delhi	42
40.	Energy Harvesting Smart Windows using High Contrast Grating Based Planar Concentrators for Building Integrated Photovoltaics	SERB-DST, New Delhi	77
41.	Software Algorithms using IR and Fluorescence Spectroscopy for Crude oil and other Downstream fluids in Refinery's Property Measurement	M/s Lambda Point Innovation, Pune	9
42.	Leather Quality Estimation using an Automated Machine Vision System	MeitY, New Delhi	48
43.	Autonomous Drones for Warehouse Management Project	M/s Cognizant Technology Solutions India Pvt. Ltd., Chennai	75
44.	VANET Security Research	M/s Cognizant Technology Solutions India Pvt. Ltd., Chennai	10
45.	Work Function Measurement Set-up for Thermionic Emitter Materials for ISRO's Electric Propulsion System using Closely Spaced Diode Method	ISRO, Bangalore	29
46.	Fabrication of Linear Variable Optical Filter (LVOF) in the 450-900 nm Wavelength	IRDE, Dehradun	9
47.	Remote Vital Information and Surveillance System for Elderly and Disabled Persons	DST, New Delhi	25
48.	Fabrication of Silicon Carbide Power Diodes	RIC-DRDO, Chennai	24

B. Sponsored Projects (Completed/Closed)

1.	MEMS based Integrated Micro Gas Sensor for VOCs and Pollutant Gases	MCIT/DIT, New Delhi	349
2.	MEMS Technology based Pressure Sensors	BARC, Mumbai	53
3.	Sensor Electrodes for Use in Biosensing Applications	DRDE-DRDO, Gwalior	10
4.	Document Image Enhancement to boost Existing OCR Performance	M/s Cognizant Technology Solutions India Pvt. Ltd., Chennai	20

5.	170 GHz, 100 kW Short Pulse Gyrotron	SAMEER, Mumbai	23
6.	Circuit using LTCC Technology and Investigation of Methodology for packaging of Power Devices	SSPL-DRDO, New Delhi	10
7.	Chronic Disease Detection (Primarily Cardiac Arrhythmia Detection)	M/s Samsung India Pvt. Ltd., New Delhi	50

C. Sponsored Projects (New)

1.	Technologies for Environmental Audio and Aroma Digitization and Recreation for Indian Heritage Sites	DST, New Delhi	76
2.	Flexible Tactile Sensor Matrix for Fetal Health Monitoring	SERB-DST, New Delhi	45
3.	“TPMS” for Fleet Management Industry	M/s Fleeca Ind. Pvt. Ltd., Jaipur	5
4.	Thick Film Sensor Electrodes for EMAT	REIL, Jaipur	108
5.	Fabrication of MEMS Technology based Sensors and Temperature Sensors for Indian Navy and Pilot Implementation of Wireless Communication Scheme with the Sensors	Ministry of Defence (NAVY), New Delhi	39
6.	Investigation of Ion-focusing Mechanism Based Sheet Beam Driven Sub-THz Source for High Power NDE Application	DST, New Delhi	29
7.	Reliable, Low-cost, Portable, IoT-enabled, Optical Device for Measuring PM2.5 Concentration in Air	DST, New Delhi	9
8.	Bio-mimetic and Phyto-technologies Designed for Low-cost Purification and Recycling of Water	DBT, New Delhi	65
9.	Resource Constrained AI	MeitY, New Delhi	125

I. Research Papers in Journals

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91. P. Kachhawa, S. Mishra, A.K. Jain, R.R. Thakur, K. Singh and N. Chaturvedi, 'In-situ Passivated GaN on Si HEMT for High Voltage Applications,' *ibid.*
92. J. Singh and A. Kumar, 'ZnO/FeCo Thin Film based Tunable Resonator,' 64th DAE Solid State Physics Symposium, IIT Jodhpur, Dec 18-22, 2019.
93. B.K. Verma, S. Devassy, S.K. Ram, A. Abhishek and A. Dhakar, 'Control of a Multi-functional Solar PV-Battery System for Operation in a Microgrid Environment,' 8th International Conference on Power Systems, MNIT, Jaipur, Dec 20-22, 2019.
94. N. Devi, S. Ray, A. Shukla, S.D. Bhat and B. Pesala, 'Bound, Bulk and Free Water Quantification in Fuel Cell membranes using Terahertz Spectroscopy,' National Symposium on Light - Matter Interactions (NSLIMI 2019), IIT-Madras, Dec 26, 2019.
95. A. Abhishek, S. Devassy, S.A. Akbar and B.

- Singh, 'Consensus Algorithm based Two-level Control Design for a DC Microgrid,' IEEE International Conference on Power Electronics Smart Grid and Renewable Energy (PESGRE-2020), Le Meridien, Cochin, Jan 2-4, 2020.
96. J.G. Pandey and A. Karmakar, 'A VLSI Implementation of the PRESENT Cipher for System-on-chip Applications,' 33rd International Conference on VLSI Design and 19th International Conference on Embedded Design, Bangalore, Jan 4-8, 2020.
97. Vijay, A.K. Saini, S. Banerjee and H. Nigam, 'An IoT Instrument Smart Agricultural Monitoring and Irrigation System,' International Conference on Artificial Intelligence and Single Processing (AISP-20), VIT-AP University, Amaravati, Jan 10-12, 2020.
98. A.P. Singh, S. Prakash, R. Pareek, A. Aggarwal, A.S. Mandal, A. Bhalla, V. Sardana, 'Interstitial Lung Diseases: Deep Learning for Texture Based Analysis for Quantification from CT Data,' International Workshop on Science of Intelligence, IIT Jodhpur; Jan, 18-19, 2020.
99. S. Maiti, P. Akula, S. Menon, C.M. Ananda, A.S. Mandal, 'Brain Computer Interface for Drone Navigation,' *ibid.*
100. R. Guha and S.K. Ghosh, 'Dispersion Control of a Helix Slow-wave Structure by I-shaped Metamaterial Loading for Wideband Traveling-wave Tube,' URSI Regional Conference on Radio Science (URSI-RCRS 2020), IIT-BHU, Varanasi, Feb 12-14, 2020.
101. V. Gahlaut, A.M. Latha and S.K. Ghosh, 'Brazing Failure Analysis in Single-Insulator Multi-stage Depressed Collector of TWTs,' *ibid.*
102. C. Mistry and S.K. Ghosh, 'Effect of Vibration on the Cathode Lead of Electron Gun Assembly of the Travelling Wave Tube,' *ibid.*
103. S. Chakraborty, M.K. Alaria and S.K. Ghosh, 'Design of Helix Wave Structure for X Band Helix TWT using Multi-dispersion,' *ibid.*
104. A. Nagaraju, A. Shankar and S.K. Ghosh, 'DC Analysis of Space Traveling Wave Tube,' *ibid.*
105. A.K. Singh, S. Manna, S. Sukla, P.K. Sharma and R.K. Barik, 'Numerical Analysis of Inter-Electrode Capacitance of Vacuum Micro-electronics Devices,' *ibid.*
106. J.G. Pandey, S. Gupta and A. Karmakar, 'A Unified Architecture for AES/PRESENT Ciphers and Its Usage in an SoC Environment,' 11th IEEE Latin American Symposium on Circuits and Systems, Costa Rica, USA, Feb 25-28, 2020.
107. S.K. Vaddadi, and S. Sadistap, 'On Site Water Quality Measurement and Alert System using IoT and Cloud Services,' 7th International Conference on Signal Processing and Integrated Networks, NOIDA, Feb 27-28, 2020.
108. A. Kumar and J. Singh, 'Effect of Underlying Silicon on Performance of Film Bulk Acoustic Resonator (FBAR),' National Conference on Advances in materials Science and Technology (NCAMST-2020), Feb 29-Mar 1, 2020.
109. J. Singh, 'Piezoelectric Thin Film Based Nano-electronic Devices,' *ibid.*
110. Z.A. Ansari, S. Baloda, S. Powar, S.M. Islam and S. Singh, 'Flexible Resistive Strain Sensors for Application in Wearable Electronics,' Two Day Conference on Flexible

- Electronics for Electric Vehicles (FlexEV-2020), Manipal University, Jaipur, Mar 5-6, 2020.
 111. P. Kachhawa, N. Sharma, A.K. Jain, and N. Chaturvedi, 'Gallium Nitride Technology for Electrical Vehicles,' *ibid*.
 112. Aditi, S. Das, P. Kothari, S. Das and R. Gopal, 'Dual-axis Lorentz Force MEMS Magnetometer,' IEEE Sensors Applications Symposium, Kuala Lumpur, Malaysia, Mar 9-11, 2020.
- ### III. Invited Talks
1. V. Chatterjee, 'How to write a research proposal,' TEQIP-III, Government Engineering College, Ajmer, Rajasthan, May 2, 2019.
 2. M. Mathew, 'Chip Fabrication of Different III-Nitride Semiconductor Material and their Applications,' Government Engineering College, Ajmer, Rajasthan, Jul 22, 2019.
 3. A. Agarwal, 'Engineering Solution for POC and Early Diagnostics,' 4th International Conference on Communication Systems (ICCS-2019), BKBIET, Pilani, Oct 18-19, 2019.
 4. M. Mathew, 'III-Nitride Devices, their Fabrication and Applications,' Government Engineering College, Ajmer, Rajasthan, Nov, 8, 2019.
 5. S. Singh, 'Graphene based Highly Sensitive Flexible Pressure Sensor for Warble Electronics,' BITS, Pilani, Nov 8-9, 2019.
 6. A. Bera, 'Hyperbolic Medium and Graphene: Towards Realization of Compact Vacuum Electron Devices,' National Symposium on Vacuum Electronic Devices and Applications (VEDA-2019), NIC- Patna, Nov 21-23, 2019.
 7. S. Maurya, 'Spatial Harmonic Magnetrans for High Power Millimetre and THz Wave Applications,' *ibid*.
 8. V. Chatterjee, 'Do's and Don'ts while Working in a Laboratory,' Semiconductor Society of India, Pilani Chapter, Nov, 23, 2019.
 9. A.S. Mandal. 'AI in HCI and Next Generation AI challenges and Issues,' IIIT Allahabad, Dec 14, 2019.
 10. S. Pal, 'GaN-based Visible and Ultra-violet Light Emitting Diodes: An overview of Design and Fabrication,' 7th International Conference on Computer and Devices for Communication (CODEC-2019), University of Kolkata, Kolkata, Dec 19-21, 2019.
 11. A.S. Mandal, 'Mind and Consciousness,' Banasthali Vidyapith, Rajasthan, Jan 8, 2020.
 12. A.S. Mandal, 'Next Generation AI Issue and Challenges,' *ibid*.
 13. S.K. Ghosh, 'Travelling Wave Tubes for Space Application: Present and Future,' URSI Regional Conference on Radio Science (URSI-RCRS 2020), IIT-BHU, Varanasi, Feb 12-14, 2020.
 14. A. Karmakar, 'Significance of Research and its Relevance in Present Day Context,' Industry Day and Research Conclave, MNIT, Jaipur, Feb 15, 2020.
 15. A. Agarwal, 'Environmental Monitoring: What Need to be Done,' International Conference on Engineering Science and Technologies for Environmental Care (ESTEC-2020), CSIR-NEIST, Jorhat, Feb 20-22, 2020.
 16. V. Chatterjee, 'Contribution of Science and Technology to the Society under Jigyasa Programme,' KV, Udaipur, Feb 28, 2020.

17. P.K. Khanna, 'Advanced Microelectronics Packaging using LTCC Materials and Technology,' Rajasthan University, Jaipur, Feb 29-Mar 1, 2020.

2. Dr. Shivendra Maurya, received Mid-Career Award-2019 at National Symposium on Vacuum Electronic Devices and Applications (VEDA-2019), NIC- Patna, Nov 21-23, 2019.

IV. Book Chapters

1. S. Maiti, P. Gidde, S. Saurav, S. Singh and S. Chaudhury, 'Pattern Recognition and Machine Intelligence: Proceedings, Part I,' *In Advances in Signal Processing and Communication*, Springer, 2019, pp 565-571.
2. P. Joshi, J. Singh, V.K. Jain and J. Akhtar, 'A Comprehensive Characterization of Stress Relaxed ZnO Thin Film at Wafer Level,' *In Nanotechnology for Energy and Environmental Engineering*, Springer, 2020, pp 495-509.

V. Awards

1. Mr. Chirag Mistry, Scientist, CSIR-CEERI received Best Poster Award and \$ 100 cash prize for the paper titled 'Thermal analysis of the slow-wave structure assembly of the traveling wave tube' at the 20th IEEE International Vacuum Electronics Conference (IVEC-2019), Busan, South Korea.



Prof. Gun-Sik Park, Seoul National University, South Korea presenting an award to Mr. Chirag Mistry



Dr. Shivendra Maurya while receiving the award and citation from the dignitaries

3. A paper entitled 'Brain Computer Interface for Drone Navigation,' by S. Maiti, P. Akula, S. Menon, C.M. Ananda and A.S. Mandal, received Best Poster Award at International Workshop on Science of Intelligence, IIT-Delhi and IIT-Jodhpur Jan, 18-19, 2020.

V. Patents Granted

1. Design and Fabrication of Lab on Chip for Blood Plasma and Cell Separation and Blood Cell Counting (Inventors: A. Agarwal and P. Balyan) Patent No. 2592DEL2013.



वार्षिक प्रतिवेदन 2019-2020

स्टाफ समाचार

मानव संसाधन

स्टाफ	2016-17	2017-18	2018 -19	2019- 20
वैज्ञानिक	118	115	111	109
तकनीकी	176	169	160	147
प्रशासन	70	61	64	61

विदेश दौरे

नाम व पदनाम	देश	अवधि
आर.के. शर्मा, व.प्र. वैज्ञानिक	साऊथ कोरीया	23.04.2019-02.05.2019
सी. मिस्त्री, वैज्ञानिक	साऊथ कोरीया	28.04.2019-01.05.2019
ए. अभिषेक, वैज्ञानिक	इथियोपिया	15.06.2019-14.07.2019
ए.के. सैनी, व. वैज्ञानिक	इथियोपिया	15.06.2019-14.07.2019
यु.एन. पाल, प्र. वैज्ञानिक	युएसए	20.06.2019-02.07.2019
बी. पैसला, प्र. वैज्ञानिक	चाईना	20.07.2019-28.07.2019
अशोक चौहान, प्र. वैज्ञानिक	इथियोपिया	25.08.2019-31.08.2019
संजय सिंह, व. वैज्ञानिक	जापान	01.09.2019-19.09.2019
सुमित सौरव, वैज्ञानिक	जापान	01.09.2019-12.10.2019
डी.के. असवाल, निदेशक	इथियोपिया	16.09.2019-18.09.2019
बी. पैसला, व. प्र. वैज्ञानिक	यु.के.	14.11.2019-20.11.2019
जे.जी. पांडे, प्र. वैज्ञानिक	यु.एस.ए.	10.12.2019-19.12.2019
संजय सिंह, व. वैज्ञानिक	जापान	18.12.2019-22.12.2019

नियुक्तियाँ

नाम	पदनाम	तारीख
एम.बी. सिंह	हिंदी अधिकारी	27.05.2019

बधाईयाँ ।

पदोन्नतियाँ

नाम व पदनाम	पदोन्नत पद	तारीख
एस. के. घोष, प्र. वैज्ञानिक	व. प्र. वैज्ञानिक	01.07.2014
आर. मुखिया, वैज्ञानिक	व. वैज्ञानिक	23.09.2014
संजय सिंह, वैज्ञानिक	व. वैज्ञानिक	23.09.2014
ए.एम. लता, वैज्ञानिक	व. वैज्ञानिक	01.12.2014
नीरज कुमार, वैज्ञानिक	व. वैज्ञानिक	14.12.2014
यु.एन. पाल, व. वैज्ञानिक	प्र. वैज्ञानिक	19.01.2015
एन. सूरी, वैज्ञानिक	व. वैज्ञानिक	06.04.2015
राम अवतार, प्रयोगशाला परिचर(1)	प्रयोगशाला परिचर(2)	15.06.2015
ए. अग्रवाल, प्र. वैज्ञानिक	व. प्र. वैज्ञानिक	21.06.2015
डी. बंसल, वैज्ञानिक	व. वैज्ञानिक	23.09.2015
ए. एच. किरनमयी, वैज्ञानिक	व. वैज्ञानिक	25.09.2015
धीरज, वैज्ञानिक	व. वैज्ञानिक	30.09.2015
एस. अधिकारी, वैज्ञानिक	व. वैज्ञानिक	04.10.2015



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एस. प्रकाश जे., वैज्ञानिक	व. वैज्ञानिक	17.10.2015
राम प्रकाश, व. वैज्ञानिक	प्र. वैज्ञानिक	21.10.2015
एस.एस. कुमार, वैज्ञानिक	व. वैज्ञानिक	01.12.2015
ए.के. जैन, वैज्ञानिक	व. वैज्ञानिक	01.12.2015
ए.के. मिश्रा, वैज्ञानिक	व. वैज्ञानिक	01.12.2015
विषांत, वैज्ञानिक	व. वैज्ञानिक	01.12.2015
एस. मौर्य, व. वैज्ञानिक	प्र. वैज्ञानिक	19.01.2016
महंत प्रशाद, व. वैज्ञानिक	प्र. वैज्ञानिक	19.01.2016
कुलदीप सिंह, व. वैज्ञानिक	प्र. वैज्ञानिक	19.01.2016
आर.के. बारिक, व. वैज्ञानिक	प्र. वैज्ञानिक	07.02.2016
दीपेंद्र कान्त, व. वैज्ञानिक	प्र. वैज्ञानिक	04.04.2016
एन. चतुर्वेदी, प्र. वैज्ञानिक	व. प्र. वैज्ञानिक	23.09.2016
एस. देवासी, वैज्ञानिक	व. वैज्ञानिक	23.09.2016
बी.के. वर्मा, वैज्ञानिक	व. वैज्ञानिक	23.09.2016
देबसिंह पाल, व. वैज्ञानिक	प्र. वैज्ञानिक	20.10.2016
नितीन कुमार, टीओ	एसटीओ (1)	03.11.2016
संजीव कुमार, टीओ	एसटीओ (1)	03.11.2016
एम. कौर, टीओ	एसटीओ (1)	23.11.2016
अदिति, वैज्ञानिक	व. वैज्ञानिक	01.12.2016
ए.एस.एन. देवी, वैज्ञानिक	व. वैज्ञानिक	01.12.2016
के. अंधनारायण, टीओ	एसटीओ (1)	09.12.2016
आर.पी. सिंह, अधीक्षण अभियंता	व. अधीक्षण अभियंता	16.12.2016
आर. प्रजेश, वैज्ञानिक	व. वैज्ञानिक	27.12.2016
संजीव कुमार, वैज्ञानिक	व. वैज्ञानिक	27.12.2016
डी.के. खरबंदा, वैज्ञानिक	व. वैज्ञानिक	27.12.2016
एस.के. शुक्ला, वैज्ञानिक	व. वैज्ञानिक	27.12.2016
एन. पुरुषोत्तमन, वैज्ञानिक	व. वैज्ञानिक	27.12.2016
जे.जी. पांडे, व. वैज्ञानिक	प्र. वैज्ञानिक	19.01.2017
ए.आर. चौधरी, व. वैज्ञानिक	प्र. वैज्ञानिक	19.01.2017
मनीष मैथ्यु, व. वैज्ञानिक	प्र. वैज्ञानिक	24.01.2017
पी.बी. अग्रवाल, व. वैज्ञानिक	प्र. वैज्ञानिक	25.01.2017
ए. चौहान, व. वैज्ञानिक	प्र. वैज्ञानिक	02.02.2017
सी. गौतम, वैज्ञानिक	व. वैज्ञानिक	03.02.2017
बी. पैसला, प्र. वैज्ञानिक	व. प्र. वैज्ञानिक	23.03.2017
सोनिया गुप्ता, एल.एम.ओ. (III-6)	एल.एम.ओ. (III-7)	17.06.2017
देवीश पाठक, व. तकनीशियन(1)	व. तकनीशियन(2)	10.08.2017
दिनेश गुप्ता, आर.एम.ओ. (III-6)	आर.एम.ओ. (III-7)	14.08.2017
सुमिता सिंह, व. वैज्ञानिक	प्र. वैज्ञानिक	02.01.2019
ओम रंजन, वैज्ञानिक	व. वैज्ञानिक	09.01.2018
ए.के. सैनी, व. वैज्ञानिक	प्र. वैज्ञानिक	19.01.2018
रवि सैनी, व. वैज्ञानिक	प्र. वैज्ञानिक	08.02.2018
ए. बेरा, प्र. वैज्ञानिक	व. प्र. वैज्ञानिक	28.02.2018
एम.के.आलरिया, व. वैज्ञानिक	प्र. वैज्ञानिक	12.03.2018



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स्टाफ समाचार

ए.के. धाकड़, व. वैज्ञानिक	प्र. वैज्ञानिक	12.03.2019
बी.ए. बोले, व. वैज्ञानिक	प्र. वैज्ञानिक	23.03.2018
एच. खातुन, व. वैज्ञानिक	प्र. वैज्ञानिक	23.03.2018
बस्ती राम, व. तकनीशियन(2)	व. तकनीशियन(3)	26.03.2018
महेन्द्र सिंह, टीओ	एसटीओ (1)	27.03.2018
सुलतान सिंह, प्रयोगशाला परिचर(2)	प्रयोगशाला सहायक	26.09.2018
आलम, प्रयोगशाला परिचर(2)	प्रयोगशाला सहायक	26.09.2018
माडू राम सैनी, प्रयोगशाला परिचर(2)	प्रयोगशाला सहायक	26.09.2018
मोहन सिंह, प्रयोगशाला परिचर(2)	प्रयोगशाला सहायक	27.09.2018
एस.एस. शर्मा, व. तकनीशियन(1)	व. तकनीशियन(2)	20.10.2018
बी.एल. मीणा, एसटीओ(2)	एसटीओ(3)	24.12.2018
एच. चौधरी, कम्पाउण्डर	कम्पाउण्डर	04.02.2019
होल सिंह, डिस्पेंसर	डिस्पेंसर	11.02.2019
बनवारी लाल, व. तकनीशियन(2)	व. तकनीशियन(3)	18.02.2019
एस.के. शर्मा, प्रयोगशाला परिचर(2)	प्रयोगशाला सहायक	22.03.2019
आर.ए. शर्मा, प्रयोगशाला परिचर(2)	प्रयोगशाला सहायक	22.03.2019
सोमबीर, तकनीशियन(1)	तकनीशियन(2)	30.03.2019
हनुमान प्रसाद, क.सचि. सहा.(सा.)	व. सचि. सहायक (सा.)	05.07.2019

बधाईयाँ ।

सेवानिवृत्तियाँ

नाम	पदनाम	तारीख
एस.सी. बोस	मुख्य वैज्ञानिक	30.04.2019
राम प्रकाश	प्रधान वैज्ञानिक (इस्तीफा)	23.05.2019
नंद लाल	व. तकनीशियन	31.05.2019
भगवान सिंह	प्रयोगशाला सहायक	31.05.2019
जी.एस. राठौड़	व. तकनीशियन	31.05.2019
राजेंद्र काक	व. तकनीशियन	30.06.2019
आर.आर. मीणा	व. तकनीशियन	30.06.2019
गजराज	प्रयोगशाला सहायक	31.07.2019
जे.एन. भाटी	व. तकनीशियन	31.12.2019
पी.डी. अजल	अधीक्षण अभियंता	31.12.2019
सुमेर सिंह	एम.टी.एस.	31.12.2019
कृपानन्द	व. तकनीशियन(3)	31.01.2020
सुरेन्द्र सिंह शेखावत	प्रयोगशाला सहायक	31.01.2020
सुमेर सिंह	प्रयोगशाला सहायक	31.01.2020

हम इनके स्वस्थ, सुखी व शांतिपूर्ण सेवानिवृत्त जीवन की कामना करते हैं।



Human Resources

Staff	2016-17	2017-18	2018-19	2019-20
Scientific	118	115	111	109
Technical	176	169	160	147
Administration	70	61	64	61

Foreign Visits

Name & Designation	Country	Period
R.K. Sharma, Sr. Pri. Sci.	South Korea	23.04.2019-02.05.2019
C. Mistri Sci.	South Korea	28.04.2019-01.05.2019
A. Abhishek Sci.	Ethiopia	15.06.2019-14.07.2019
A.K. Saini, Sr. Sci.	Ethiopia	15.06.2019-14.07.2019
U.N. Pal, Pri. Sci.	USA	20.06.2019-02.07.2019
B. Pesla, Pri. Sci.	China	20.07.2019-28.07.2019
A. Chauhan, Pri. Sci.	Ethiopia	25.08.2019-31.08.2019
Sanjay Singh, Sr. Sci.	Japan	01.09.2019-19.09.2019
Sumeet Saurav, Sr. Sci.	Japan	01.09.2019-12.10.2019
D.K. Aswal, Director.	Ethiopia	16.09.2019-18.09.2019
B. Pesla, Sr. Pri. Sci.	UK	14.11.2019-20.11.2019
J.G. Pandey, Pri. Sci	USA	10.12.2019-19.12.2019
Sanjay Singh, Sr. Sci.	Japan	18.12.2019-22.12.2019

Appointment

Name	Designation	Date
M.B. Singh	Hindi Officer	27.05.2019

Congratulations!

Promotions

Name & Designation	Promoted to	w.e.f
S.K. Ghosh, Pri. Sci	Sr. Pri. Sci	01.07.2014
R. Mukhiya, Sci.	Sr. Sci	23.09.2014
Sanjay Singh, Sci.	Sr. Sci	23.09.2014
A.M. Latha, Sci.	Sr. Sci	01.12.2014
Niraj Kumar, Sci	Sr. Sci	14.12.2014
U.N. Pal, Sr. Sci	Pri. Sci	19.01.2015
N. Suri, Sci.	Sr. Sci	06.04.2015
Ram Avatar, Lab Att.(1)	Lab Att.(2)	15.06.2015
A. Agarwal, Pri. Sci	Sr. Pri. Sci	21.06.2015
D. Bansal, Sci.	Sr. Sci	23.09.2015
A.H. Kiranmayee, Sci.	Sr. Sci	25.09.2015
Dhiraj, Sci.	Sr. Sci	30.09.2015
S. Adhikari, Sci.	Sr. Sci	04.10.2015



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Staff News

S. Prakash J., Sci.	Sr. Sci	17.10.2015
Ram Prakash, Sr. Sci	Pri. Sci	21.10.2015
S.S. Kumar, Sci.	Sr. Sci	01.12.2015
A.K. Jain, Sci.	Sr. Sci	01.12.2015
A.K. Mishra, Sci.	Sr. Sci	01.12.2015
Vishant, Sci.	Sr. Sci	01.12.2015
S. Maurya, Sr. Sci	Pri. Sci	19.01.2016
Mahanth Prasad, Sr. Sci	Pri. Sci	19.01.2016
Kuldip Singh, Sr. Sci	Pri. Sci	19.01.2016
R.K. Barik, Sr. Sci	Pri. Sci	07.02.2016
Deepender Kant, Sr. Sci	Pri. Sci	04.04.2016
N. Chaturvedi, Pri. Sci	Sr. Pri. Sci	23.09.2016
S. Devassy, Sci.	Sr. Sci	23.09.2016
B.K. Verma, Sci.	Sr. Sci	23.09.2016
Debasish Pal, Sr. Sci	Pri. Sci	20.10.2016
Nitin Kumar, TO	STO (1)	03.11.2016
Sanjeev Kumar, TO	STO (1)	03.11.2016
M. Kaur, TO	STO (1)	23.11.2016
Aditi, Sci.	Sr. Sci	01.12.2016
A.S.N. Devi, Sci.	Sr. Sci	01.12.2016
K. Andhanarayan, TO	STO (1)	09.12.2016
R.P. Singh, Super. Er.	Sr. Super. Er.	16.12.2016
R. Prajesh, Sci.	Sr. Sci	27.12.2016
Sanjeev Kumar, Sci.	Sr. Sci	27.12.2016
D.K. Kharbanda, Sci.	Sr. Sci	27.12.2016
S.K. Shukla, Sci	Sr. Sci	27.12.2016
N. Purushothaman, Sci	Sr. Sci	27.12.2016
J.G. Pandey, Sr. Sci	Pri. Sci	19.01.2017
A.R. Chaudhury, Sr. Sci	Pri. Sci	19.01.2017
Manish Mathew, Sr. Sci	Pri. Sci	24.01.2017
P.B. Agarwal, Sr. Sci	Pri. Sci	25.01.2017
A. Chauhan, Sr. Sci	Pri. Sci	02.02.2017
C. Gautam, Sci.	Sr. Sci	03.02.2017
B. Pesla, Pri. Sci.	Sr. Pri. Sci.	23.03.2017
Sonia Gupta, LMO (III-6)	LMO (III-7)	17.06.2017
Devish Pathak, Sr. Tech(1)	Sr. Tech(2)	10.08.2017
Dinesh Gupta, RMO (III-6)	RMO (III-7)	14.08.2017
Sumitra Singh, Sr. Sci.	Pri. Sci.	02.01.2019
Om Rajna, Sci	Sr. Sci	09.01.2018
A.K. Saini, Sr. Sci	Pri. Sci	19.01.2018
Ravi Saini, Sr. Sci	Pri. Sci	08.02.2018
A. Bera, Pri. Sci.	Sr. Pri. Sci.	28.02.2018
M.K. Alaria, Sr. Sci.	Pri. Sci.	12.03.2018



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Staff News

A.K. Dhakar, Sr. Sci.	Pri. Sci.	12.03.2019
B.A. Botre, Sr. Sci.	Pri. Sci.	23.03.2018
H. Khatun, Sr. Sci.	Pri. Sci.	23.03.2018
Basti Ram, Sr. Tech(2)	Sr. Tech(3)	26.03.2018
Mahendra Singh, TO	STO (1)	27.03.2018
Sultan Singh, Lab Att.(2)	Lab Assistant	26.09.2018
Alam, Lab Att.(2)	Lab Assistant	26.09.2018
Madu Ram Saini, Lab Att.(2)	Lab Assistant	26.09.2018
Mohan Singh, Lab Att.(2)	Lab Assistant	27.09.2018
S.S. Sharma, Sr. Tech(1)	Sr. Tech(2)	20.10.2018
B.L. Meena, STO(2)	STO(3)	24.12.2018
H. Chaudhary, Compounder	Compounder	04.02.2019
Hol Singh, Dispenser	Dispenser	11.02.2019
Banwari Lal, Sr. Tech(2)	Sr. Tech(3)	18.02.2019
S.K. Sharma, Lab Att.(2)	Lab Assistant	22.03.2019
R.A. Sharma, Lab Att.(2)	Lab Assistant	22.03.2019
Sombir Tech(1)	Tech(2)	30.03.2019
Hanuman Prasad, JSA(G)	SSA(G)	05.07.2019

Congratulations!

Retirements

Name	Designation	w.e.f
S.C. Bose	Chief Scientist	30.04.2019
Ram Prakash	Pri. Sci. (Resigned)	23.05.2019
Nand Lal	Sr. Technician	31.05.2019
Bhagwan Singh	Lab. Assistant	31.05.2019
G.S. Rathore	Sr. Technician	31.05.2019
Rajendra Kak	Sr. Technician	30.06.2019
R.R. Meena	Sr. Technician	30.06.2019
Gajraj	Lab. Assistant	31.07.2019
J.N. Bhati	Sr. Technician	31.12.2019
P.D. Ajal	Super Er.	31.12.2019
Sumer Singh	MTS	31.12.2019
Kripanand	Sr. Technician (3)	31.01.2020
Surendra Singh Shekhawat	Lab. Assistant	31.01.2020
Sumer Singh	Lab. Assistant	31.01.2020

We wish them a peaceful and happy retired life.



Budget Head	Sanctioned Amount 2019-20 (Rs. in lakh)	Actual Expenditure (Including Laboratory Reserve Fund) 2019-20 (Rs. in lakh)
A. Revenue		
Salary & Salary Linked Allowances	3537.695	3667.695
Re-imbursement of Medical Expenditure	65.115	65.115
Honorarium	2.000	2.000
Leave Travel Concession	26.339	26.339
T.A. (India)	16.189	16.189
T.A. (Foreign)	0.000	0.000
Professional Update Allowance	0.000	0.000
Total Other Allowances	109.643	109.643
Total Salaries (P-01 to P-03)	3647.338	3777.338
P-04 Contingencies	316.044	316.044
P-05 HRD	0.000	0.000
P-06 Lab Maintenance	348.869	348.869
P-701 Staff Quarters Maintenance	56.213	56.213
P-07 Chemicals, Consumables & other Res Exp	233.207	233.272
Total Revenue	4601.671	4731.736
B. Capital		
P-50 Works/Services	38.335	80.735
P-50 Apparatus & Equipment	189.945	189.945
P-50 Office Equipment	13.445	13.445
P-50 Furniture & Fittings	8.275	8.275
P-50 KRC Books/Journals/E-Journals	144.191	144.191
P-50 Vehicles	0.000	0.000
P-702 –Capital (Staff Quarters)	50.624	110.624
Total (Capital)	444.815	547.215
Total (Revenue+Capital) (A+B)	5046.486	5278.951
C. SIP/NWP/FAC/FTT/IAP/RSP/HCP	936.905	922.124
Grand Total (A+B+C)	5983.391	6201.075
External Cash Flow Attracted	2251.455	
Laboratory Reserve Generated	166.457	
Laboratory Reserve Utilised	232.465	
Net Laboratory Reserve	918.360	

Director

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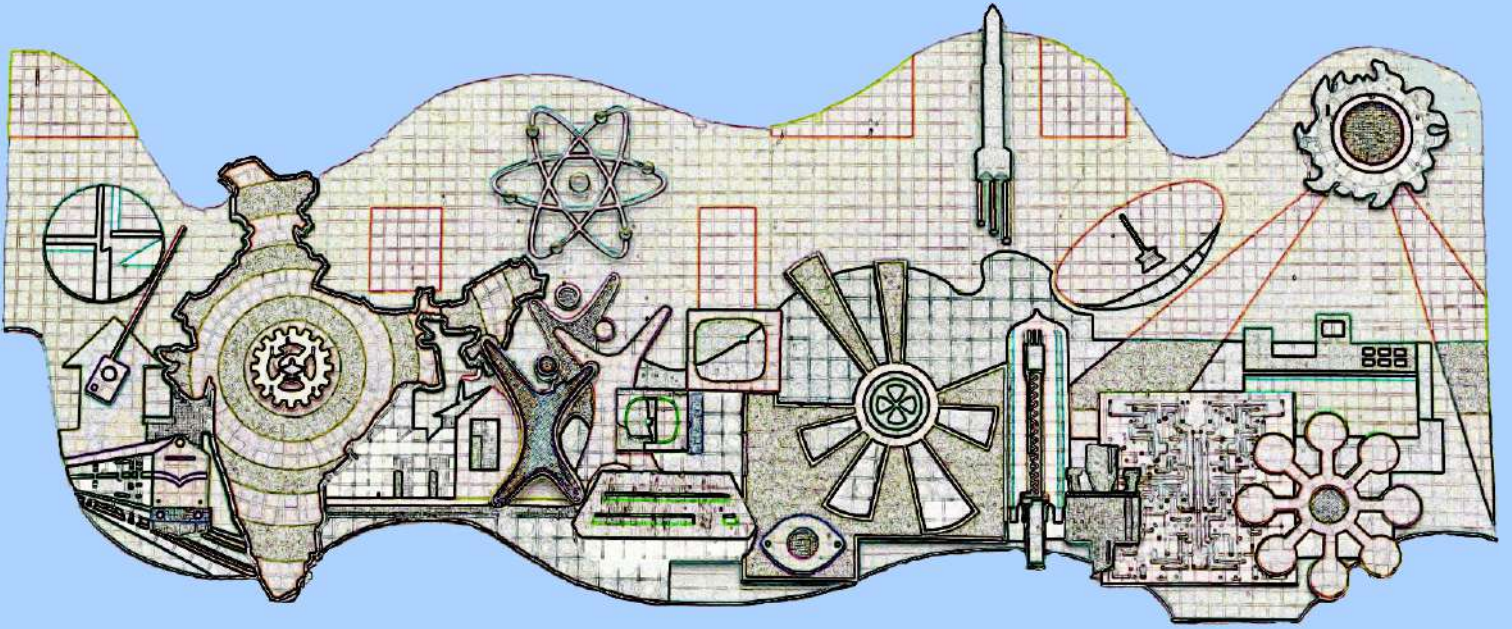
Project Leaders/Sectional Heads

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