ANNUAL REPORT
2019-2020

CENTRE FOR DEVELOPMENT OF ADVANCED COMPUTING

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One Vision. One Goal... Advanced Computing for Human Advancement...

Governing Council

(As on 31st March 2020)

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Shri Sunil Misar
Registrar-in-Charge, C-DAC and
Non-Member Secretary,
Governing Council, C-DAC

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Overview

The year 2019-20 witnessed several technological accomplishments, events and recognitions for C-DAC. PARAM Brahma, a state-of-the-art supercomputing facility with peak computing power of 797 TeraFlops was established under build approach of National Supercomputing Missionat IISER, Pune which was visited by Shri. Narendra Modi, Hon'ble Prime Minister on December 7, 2019. Shri M. Venkaiah Naidu, Hon'ble Vice President of India inaugurated Adaptive Traffic Signaling system in Hubli-Dharwad Bus Rapid Transit System (BRTS) corridor on February 4, 2020 in the presence of other Union Ministers & State Ministers. Shri Hardeep Singh Puri, Minister of State (Independent Charge) for Civil Aviation launched the Biometric enabled Centralized Access Control System (CACS) at New Delhi on December 30, 2019. Towards research in the areas of Agriculture and Bio-Informatics, "PARAM ShavakSristhi" - Supercomputing-in-a-Box solution was launched by Shri Sanjay Dhotre, Hon'ble Union Minister of State for Human Resources Development, Communications, Electronics and Information Technology on January 11, 2020 at Akola, Maharashtra. C-DAC developed and deployed the services for the Electors Verification Programme (EVP) which was launched by Shri. Sunil Arora, Hon'ble Chief Election Commissioner on September 1, 2019.

C-DAC announced year 2020 as year of HPC-AI Convergence and conducted Exascale Computing Symposium on January 10, 2020 at C-DAC Pune. C-DAC's PARAM Yuva II system helped to process more than 4,46,068 jobs till March 2020from 115 different institutions spread across the country. The first petaflop supercomputing system under NSM, PARAM Shakti with total peak performance of 1.66 PFs was established at IIT Kharagpur. PARAM ShivaY has processed 261946 jobs till March 2020 to cater the computational needs of IIT-BHU, Varanasi and various engineering and research institutes. PARAM Brahma has processed 39786 jobs till March 2020 that is designed and commissioned by C-DAC at IISER, Pune. PARAM Spoorthi is a HPC system with a total peak computing performance of 100 TF which is built and setup at C-DAC, Bangalore under NSM.PARAM AMBAR - Supercomputing facility with total peak computing capacity of 1.658 PFs performance (CPU+GPU) was established at National Atmospheric Research Laboratory (NARL) Gadanki, Andhra Pradesh. Trinetra-PoC platform with aggregate throughput of 240Gbps is ready for integration with all hardware and software components at cluster level. C-DAC developed its Indigenous Server Platform Rudra based on 2nd Generation Intel Xeon Scalable Processor Cascade Lake. VIVIDHA (Variant Analysis and Visualization Interface for Dynamic High-Throughput Applications) and GenoVault (cloud based repository) tools were launched during the event Accelerating Biology 2020 : SNiPs to SPiNs held at IISER Pune during February 4-6, 2020.

e-Mahashabdkosh, a Bilingual and Bidirectional English-Hindi pronouncing dictionary for mobile was launched by Shri Amit Shah, Hon'ble Home Minister of India, in presence of Hon'ble MoS of Home Affairson September 14, 2019 at Vigyan Bhavan, New Delhi. ePOSHAN - a mobile based multilingual attendance, networking and knowledge sharing platform was launched on July 12, 2019 by the district administration at Rajpipla, Narmada district, Gujarat. eVanbandhu- a mobile app for easy access and use of tribal development schemes of Gujarat was launched by Tribal Development Department, Government of Gujarat on July 25, 2019 at Ahmedabad, Gujarat. MANTRA-Rajya Sabha, a systemto facilitate the translation of documents pertaining to the Upper House of the Parliament of India is being used in the Session regularly with accuracy of more than 85%. Internationalized Domain Names (IDNs) are rolled out in 8 additional Indian languages.

As part of Microprocessor Development Program, 64-bit Quad core Processor has been validated on an FPGA platform and ongoing activities include fabrication of SoC ASICs based on the 64-bit Processor targeting embedded applications. Emergency Response Support System (ERSS) has been successfully operationalized in 22 States and 7 Union Territories. Field trials of Sweekar - Automatic Fare Collection System (AFC) using the National Common Mobility Card (NCMC) have been successfully completed at Delhi Metro Rail Corporation (DMRC) and field trials in Mumbai BEST and Bangalore Metro are under progress. Electronic Vision & Electronic Tongue system for estimation

of cooking quality of rice has been deployed at National Rice Research Institute (NRRI), Cuttack and Bidhan Chandra Krushi Vishwavidyalaya (BCKV), Mohanpur, West Bengal. Distributed Substation SCADA Automation System has been deployed at Rabom, Maltin and Lachung substations of Energy and Power Department (EPD), Government of Sikkim in February 2020. Wireless sensor network based Forest Fire Detection system has been deployed at Kolasib, Mizoram in February 2020 to monitor forest areas prone to fires.

Pradhan Mantri RojgarProtsahan Yojana (PMRPY) scheme implementation initiative facilitated disbursement of funds close to Rs. 8000 Crores to around 1.5 lakhs benefited establishments and Unified Portal for EPFO was customized to on-board Jammu, Srinagar and Leh PF offices. As part of development of Election Commission of India (ECI) solutions, new version of ERONet was released for all states and UTs and final publication for the General Election 2019 was carried out using the ER Printing tool developed by C-DAC. More than 72 lakhs signatures have been offered using C-DAC's eSign service for various agencies till March, 2020. 237 departments and agencies were integrated during the year using Mobile Seva platform. Total 265 departments have been integrated and around 10.52 Crores transactions have been completed using e-Pramaan. Around 128 Workshops/Trainings were conducted for rollout of Online Labs (OLabs) during the year and 3280 teachers from 613 schools of different State boards were trained. 51 capacity building workshops covering 4250 master trainers were organised under Vikaspedia in 50 aspirational districts and about 50 lacs citizens were reached through various ICT media to promote government schemes across the country. Around 90,000 systems were deployed with custom BOSS Linux desktop and 6000 BOSS servers were installed and configured as part of TamilNaduHiTech School lab initiative.

C-DAC's Cyber Threat Management System (CTMS) is being leveraged for generation of cyber threat intelligence by various sectors including Government, Financial agencies, Service Providers, R&D Organizations and Academic Institutions. Cyber Forensics labs for various agencies at Thrissur & Kozhikode and Hyderabad have been setup. C-DAC has evolved Live-Virtual-Constructive (LVC) hybrid testbed to overcome the limitations of physical, simulation, virtualization or emulation approaches for SCADA testbed. As part of Information Security Education & Awareness (ISEA), 53051 candidates have been trained in various formal/non-formal courses, 9183 members on short term courses, and a total of 302 awareness workshops were conducted covering 63048 participants.

As part of National roll-out of its Health Informatics solutions, C-DAC is engaged in telemedicine solutions (eSanjeevaniAB), artificial intelligence based medical image analysis, development of a ML based system to assist medical practitioners, healthcare data analytics, etc. C-DAC's e-RaktKoshhas reached more than 1,900 blood banks in 32 States / UTs across the country. "e-Aushadhi" solution has been deployed in Assam as per the mandate for Nation-wide rollout from the Ministry of Health and Family Welfare (MoHFW). C-DAC continued proliferation of its Hospital Management Information System at various hospitals including HMIS Punjab, AIIMS Raipur, AIIMS Bathinda, AIIMS Nagpur and AIIMS Bhubaneswar. Newer versions of C-DAC's Medical Informatics Software Development Kit (SDK) for Digital Imaging and Communications in Medicine (DICOM), V1.0 for Continuity of Care Document (CCD), Systematized Nomenclature of Medicine -Clinical Terms (SNOMED-CT) Toolkit -CSNOtk v5.5 and Common Drug Codes for India were developed and released during the year.

C-DAC imparts various industry specific post graduate diploma programmes, industry-academia collaborative programmes, IT training and skill development programmes throughout the year. C-DAC has also aligned its activities towards development and deployment of technologies for education and training including Comprehensive Recruitment System. C-DAC is conducting Comprehensive Recruitment for Air Force Common Admission Test (AFCAT) and Central Airmen Selection Board (CASB/STAR) using its indigenously developed solutions. For AFCAT and CASB/STAR,C-DAC conducted recruitment process for more than 12.42 lakh candidates in the year 2019-20. Under Pradhan Mantri Gramin Digital Saksharta Abhiyaan (PMGDISHA), C-DAC has been registered as one of the assessment agencies and has proctored 32.24 lakh students during the year.

The above mentioned activities have resulted in several research publications, patents, awards, recognitions and new collaborations with academic organizations within the country and abroad.

The annual report covers the achievements and major activities of C-DAC during the year 2019-20.

Major Activities in Thematic Areas

High Performance Computing (HPC), Cloud Computing and Big Data

C-DAC is carrying out research, design, development and deployment of infrastructure, applications and human resources in HPC under National Supercomputing Mission (NSM). It is engaged in indigenous R&D in HPC technology Components, HPC System Software, HPC Applications, HPC Solutions and Services, Grid Computing, Cloud Computing and Big Data & Analytics. A summary of activities carried out by C-DAC in this thematic area during 2019-20 is given below.

National Supercomputing Mission (NSM)

Approved in 2015 by Cabinet Committee on Economic Affairs (CCEA) to be implemented jointly by MeitY and DST with IISc Bangalore and C-DAC being the executing agencies, National Supercomputing Mission (NSM) comprises of building of Supercomputing systems, Application development, Human resources development and R&D towards exascale capability. The activity of building of Supercomputing systems is being implemented in three phases: Phase 1 – Assembly of subsystems in India, Phase 2 – Manufacturing of subsystems in India and Phase 3 – Design and manufacturing in India. NSM Technical Advisory Committee (NSM-TAC) has mandated C-DAC to work on all phases concurrently. In all three phases, the system software stack is being indigenously developed by C-DAC, which is based on Open Source Software and Tools, complimented with in-house software tools. For building the HPC systems for Phase 1 and Phase 2, C-DAC is integrating subsystems such as Compute node servers, HPC network elements assembled and manufactured in India. Under Phase 3, C-DAC is designing subsystems such as CPU motherboard, Direct-contact liquid cooling technology, Interconnect network components, System software and System engineering.

HPC Systems under NSM

PARAM Shakti

The first PetaFlop supercomputing system, PARAM Shakti was built and installed at IIT, Kharagpur under build approach of NSM by C-DAC. It has 420 CPU nodes and 22 GPU nodes amounting more than two lakh forty thousand computing cores (CPU and GPU). It has sustained computing power of 1.05 PFs (Rmax) with total peak performance of 1.66 PFs (Rpeak). Indigenous Software stack provided with this system has a gamut of software components which meets requirements of IIT Kharagpur.

PARAM Shivay, PARAM Brahma and PARAM Shakti Supercomputing facilities

PARAM Brahma

PARAM Brahma is a state-of-the-art supercomputing facility established under build approach of NSM with peak computing power of 797 TFs. It is designed and commissioned by C-DAC to cater the computational needs of IISER, Pune and various Research and Engineering institutes of the region. Like PARAM Shakti, it is also built with the cutting edge hardware and indigenous software technologies. Substantial components utilized to build PARAM Brahma are manufactured and assembled within India, which is a step towards the 'Make in India' initiative of the Government. 39,786 jobs have been processed by PARAM Brahma till March 2020.

PARAM ShivaY

PARAM ShivaY is the first supercomputer system under NSM with peak computing power of 837 TFs that caters the computational needs of IIT-BHU, Varanasi and various engineering and research institutes. 2,61,946 jobs have been processed by PARAM ShivaY till March 2020.

PARAM Spoorthi

PARAM Spoorthi is a HPC system built and setup at C-DAC, Bangalore under NSM. It consists of 2 Master Nodes, 4 Compute Nodes and 200 TB of storage with a total peak computing performance of 100 TF.

Build Approach Developments under NSM

Indigenous Server Platform: Rudra

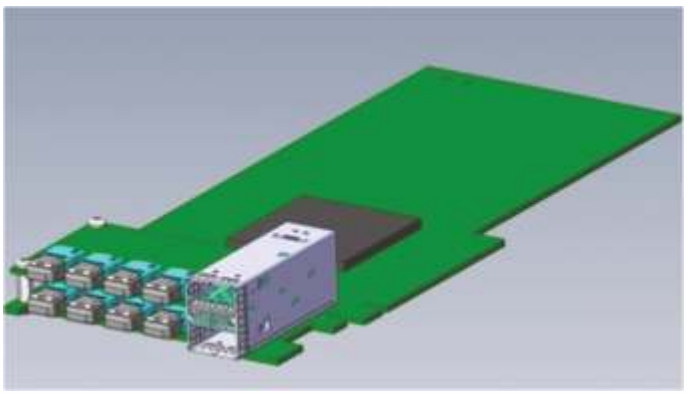
C-DAC has developed its Indigenous Server Platform Rudra based on 2nd Generation Intel Xeon Scalable Processor Cascade Lake. This platform is designed to serve usage models including HPC and cloud computing in Open19 form factor. The server design, development and engineering for 1U form factor has been completed.

Rudra Server Board

HPC Network – Trinetra

Trinetra-PoC platform (40Gbps*6 = 240Gbps aggregate) has been qualified with integration of all hardware and software components at cluster level. A six node cluster is set up for architectural validation. Trinetra-A platform (100Gbps*6 = 600Gbps aggregate) has been qualified and limited production has been initiated.

Trinetra-A NIC



Trinetra-B NIC

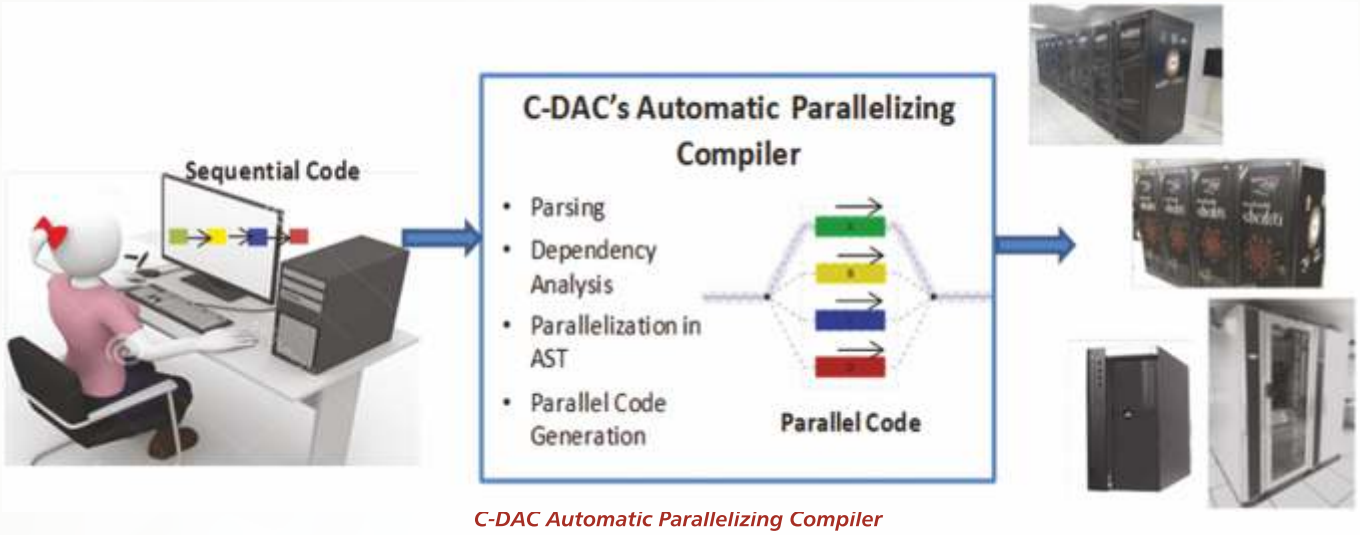
Design and Development of ARM processor based HPC SoC and Dual Socket Compute Node

A HPC Processor is planned to be developed under NSM. It comprises of design, development and fabrication of ARM v8.4 Zeus based multi-core (96 cores) SoC targeted for high-end infrastructure solutions along with complete software ecosystem for HPC application development. A HPC SoC compute node will be developed by partnering organizations/centers under NSM. It may host up to 96 cores of ARM v8.4 Zeus based processor, 8 DDR5 channels, 4 HBM2e Controllers (1.64 TB/s BW) and many other state-of-the-art components required for a HPC System. It will require a variety of off-chip components such as memory (DDR5), storage, network, debugging, testing and expansion interfaces. A specialized custom-made FPGA based test-jig card with provisions for onboard memory (DDR5 RAM), storage (flash/SSD/eMMC), network interfaces (Ethernet/SFP+), debugging interfaces (JTAG/SWD) and expansion interfaces (PCIe/SerDes) etc. will be designed and developed.

HPC System Software

C-DAC Automatic Parallelizing Compiler (CAPC)

CAPC is software that automatically converts a traditional sequential C program into parallel code desired for execution on parallel architectures. CAPC user feedback shows that CAPC is useful to make traditional programs to run on HPC systems with improved speedups and without any effort from the programmer. During the year, the enhancements in the software for hybrid parallelism across distributed, shared memory and GPU architectures were under progress.



C-DAC Automatic Parallelizing Compiler

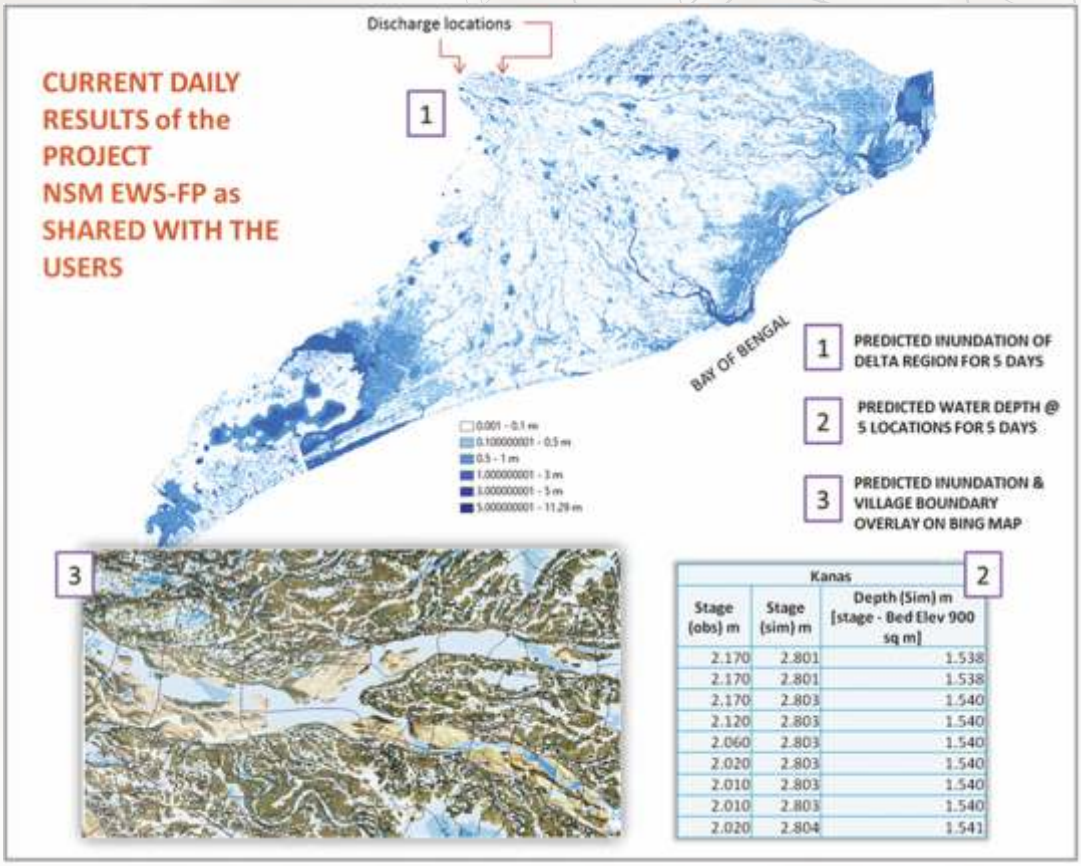
C-CHAKSHU, Multi-Cluster Monitoring Platform

C-CHAKSHU monitors complex system-wide resources distributed at multiple geographic locations using unified interface. It enables system administrators and decision makers to observe, diagnose, deliberate and, if necessary, take action on targeted supercomputing facilities. It gives real time system infrastructure insights to code developers, system administrators and system architects, supercomputer users. It ensures operational performance and guides future procurements and better policy design.C-CHAKSHU has been deployed on PARAM ShivaY, PARAM Brahma, PARAM Shakti, PARAM Shrestha and Sangam Test-lab.

Applications Development under NSM

Early Warning System for Flood Prediction for River Basins of India

Floods are an annual calamity affecting the Indian subcontinent with profound irreversible damages to crops and livelihood. 2-D flood prediction is a highly time-critical application with compute requirement of a PFs and above. Currently, daily flood prediction on a trial basis is being carried out for the deltaic region of Mahanadi River Basin (9225 Sq. Km.) on PARAM Brahma. It is using customized Open Source Software ANUGA hydro parallel and Q-GIS to simulate the real world conditions.



Predicted Flood Situation

Multi-Sectorial Simulation Lab and Science Based Decision Support Framework

As a part of a consortia initiative of C-DAC, IISc, IIT Bhubaneshwar, IITM Pune and SAC (ISRO) Ahmedabad, C-DAC is carrying out development of a fully coupled modeling system including urban meteorology, hydrology, CFD, and air quality to capture the urban representation of micro scale city environmental conditions. This initiative shall improvise urban weather forecast (temperature, wind, rainfall, humidity, etc.), atmospheric dispersion and air quality forecast (pollutant concentration, visibility, dust events); hydrology forecast (run-off, urban floods & water logging, storm surge) etc. and facilitatecreation of HPC enabled urban data and decision framework for fulfilling India's sustainable smart city goals.

A HPC software suite for seismic imaging to aid oil and gas exploration

C-DAC in collaboration with IIT Roorkee, Osmania University, CSIR-NGRI and ONGC, is developing a parallel 2D and 3D acoustic based Reverse Time Migration (RTM) software suitable for state of the art hybrid HPC computing platform to aid oil and gas exploration.

Direct Contact Liquid Cooling (DCLC) System

C-DAC along with IIT Bombay is developing cooling technology solutions for large scale HPC system. A 3 KW panel water heat exchanger has been designed and developed. The 360 W chip cooler is being designed. A CFD model has been developed to analyze the fluid flow pattern inside the chip cooler.

Application Porting, Optimization and Scaling services under NSM

During the year, more than 20 HPC applications from bioinformatics, molecular dynamics, climate modeling &weather prediction and disaster management along with all popular DL frameworks were ported and enabled across all NSM sites. Architecture specific tuning and optimization efforts are in progress for HPC applications including Weather Research and Forecasting (WRF), Large-scale Atomic/Molecular Massively Parallel Simulator (LAMMPS) and ANUGA – Hydrodynamic modeling.Acceptance testing of two NSM clusters PARAM ShivaY and PARAM Brahma were carried out as per NSM Mission document guidelines.

NSM Human Resource Development

- Two batches of PG Diploma courses in HPC System Administration (HPCSA) and a batch of PG Diploma in Artificial Intelligence (AI) were conducted at Pune
- Three HPC awareness workshops were conducted which were attended by 280 students
- One day Workshop on Education for High Performance Computing in association with Tennessee Tech University, USA was conducted during HiPC-2019 conference at Hyderabad on December 17, 2019
- Winter School on High Performance Computing in association with ACM, to familiarize students with fundamental topics in Parallel Computing was conducted at IIT Kanpur.
- Faculty development programs were conducted at Walchand College of Engineering, Sangli and IIT (BHU), Varanasi.

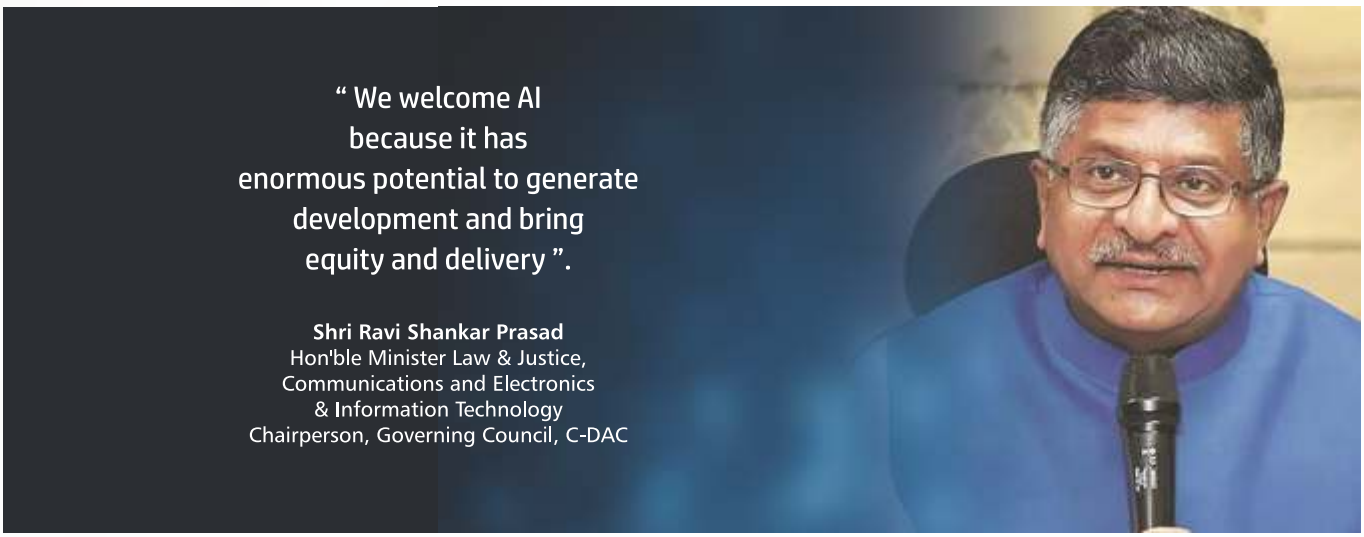
Hackathon 2019

A 5 day Open ACC Hackathon was conducted during September 14-18, 2019 in association with NVidia. Teams from premier Institutes such as IISc, NCRA, IPR, AIMSCS, Sandi Labs, BITS Pilani, TIFR Hyderabad, C-DAC, IIT Bombay, IIT Madras and IIT Kanpur participated in the hackathon. The applications include CFD, Plasma Research, Molecular Dynamics, Cryptology and Astrophysics. The teams were guided by mentors from NVidia, IIT Delhi, IIT Bombay, NERSC, C-DAC and IISER Pune to optimize their application codes. The maximum speedup achieved as compared to a single core was 470X.

HPC AI Convergence

Artificial Intelligence Hackathon

C-DAC organized "AI Hackathon 2019 (AIH-2019)" in collaboration with NVIDIA, ATOS and Startups to provide AI oriented problem statements with datasets along with computational resources that shall create awareness among researchers, students, startups and industry, working on AI/ML/DL technologies. Hackathon had three rounds of evaluation in which 88 teams were shortlisted from 450 registrations. 25 teams reached the final. 12 most competent teams were shortlisted for face-to-face event during September 26-30, 2019. Six teams were selected in the final stage and were awarded.



A High-Performance AI Framework with Big Data Analytics and Machine Learning APIs

This initiative is to design and deploy an AI Framework (comprising of Big Data Analytics and AI/ ML/ DL tools) on NSM HPC clusters for use by NSM application developers, scientific researchers and academic users. In addition to pre-trained models for Natural Language Processing (NLP) and Automatic Speech Recognition, it will provide a service through pre-trained models developed using AI/ ML/ DL and Image processing techniques for the following:

- Detection of malaria in blood smear slide images
- Detection of squamous epithelial cells in sputum slide images to determine quality of sputum
- Tongue examination based on images for early diagnosis

Supercomputing Systems and Facilities

PARAM Yuva II

Since its commissioning in February 2013 at C-DAC's National PARAM Supercomputing Facility (NPSF), PARAM Yuva II has been widely used by scientists and engineers for research. More than 4, 46,068 jobs have been processed by PARAM Yuva II till March, 2020. 1204 users including 286 PhD scholars across 115 institutions executed their jobs on PARAM Yuva II for their scientific research covering a large number of cross functional domains. More than 53 PhD scholars completed their PhD and more than 375 publications have been published with the use of the system.

PARAM AMBAR

PARAM AMBAR Supercomputing facility is designed and installed at NARL Gadanki, Andhra Pradesh by C-DAC. It consists of 196 compute nodes and 8 GPU nodes with peak computing capacity of 1.658 PFs performance. The system is using system software stack developed by C-DAC. 7,863 jobs have been processed by PARAM AMBAR till March 2020.

PARAM AMBAR Supercomputing facility at NARL

PARAM Shavak

During the year, C-DAC released PARAM ShavakSristhi which is a Supercomputing-in-a-Box solution equipped with x86 based latest processing architecture along with high memory, specifically designed to address the challenges of computation, modeling and simulation of bioinformatics and agricultural research. With C-DAC indigenous

Launch of "PARAM Sristhi" on January 11, 2020 at Dr PDKV, Akola, by Shri Sanjay Dhotre, Hon'ble Union Minister of State for E&IT, Communications & Human Resource Development, GOI

software stack and application tools named TANGO and ANVAYA in built, it delivers unprecedented performance upto 17 TFs of double precision performance and enhanced application scalability.

C-DAC also upgraded Shavak HPC, Shavak DL and Shavak VR with equivalent software stacks. The systems were installed at IIT Hyderabad, Madan Mohan Malviya University of Technology Gorakhpur, NIT Silchar, SBI Mumbai, Gujarat Forensic Science University and Motilal Nehru National Institute of Technology.

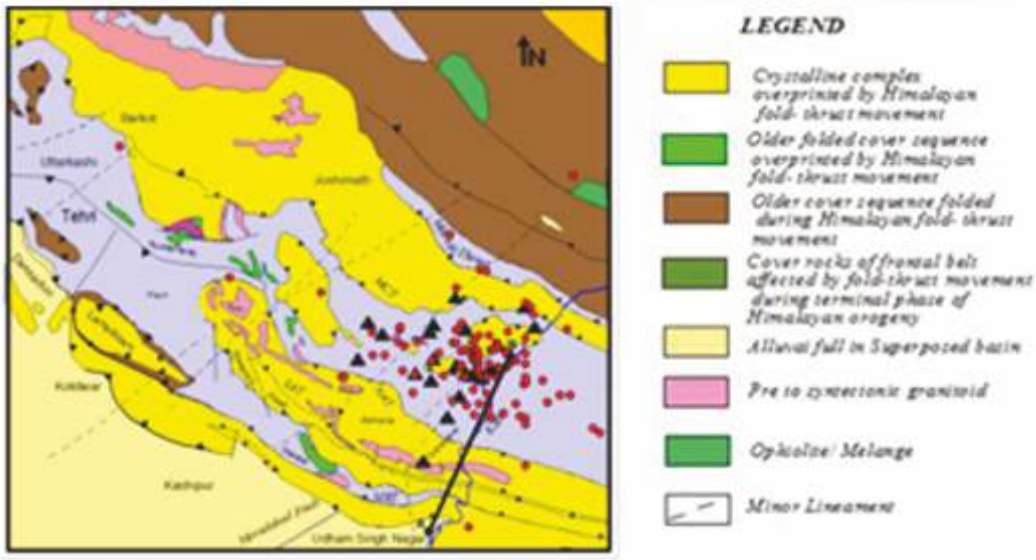
Upgradation and Maintenance of HPC Facility at ICAR-IASRI, New Delhi

C-DAC upgraded the HPC facility at Indian Agricultural Statistics Research Institute (IASRI) cluster, New Delhiand has been maintaining the same. C-DAC has also installed and ported 120+ HPC applications in agriculture and bioinformatics, 82 HPC applications in agriculture and bioinformatics at NBPGR - Pusa cluster, 10 HPC Applications at NBAIM - Mau cluster, 30 HPC Applications at NBAGR- Karnal cluster and 13 Applications at IASRI-SMP1 Server and SMP2 Server. C-DAC has configured 25 Bio-informatics applications interfaced with Altair's PAS portal. It has customized and deployed C-DAC's C-CHAKSHU with PBSPro resource manager on IASRI HPC System, New Delhi.

HPC Applications

Large Scale Model of the Himalayan Crust and its effect on strong Ground Motion

This initiative is aimed to provide a reliable model of subsurface of the Himalayan crust using high frequency data. The model will be used to model the response of site amplification that can be further used to simulate actual strong ground motion at various sites in the central seismic gap region.



Black solid line AB represents the study line in Kumaon Himalaya

MET Forecast and Decision Support System for MET Data Dissemination

A decision support system is being developed for preparation and dissemination of weather data to aid the defence officers according to their area of operations or area of interest (areas/ locations)

UrbAirIndia 2.0: A Decision Support System for Indian Urban Air Quality Management

An upgraded Web-based UrbAirIndia2.0 is being developed that will have a mechanism to automate various data resources, built in Indian cities GIS database and uniform standardized Indian urban air quality data interpretations and enhanced analysis features.

WRF-Chem Model for understanding feedback mechanism of aerosols on clouds and Rainfall

WRF-Chem model is being used to investigate aerosol effects on clouds and precipitation (invigoration/ suppression) for drought, normal, active, break and high aerosol loading phases and quantify contribution of each physical process.

Near-Real Time Fire Emission Estimation and Fire Forecasting System for Delhi Air Quality

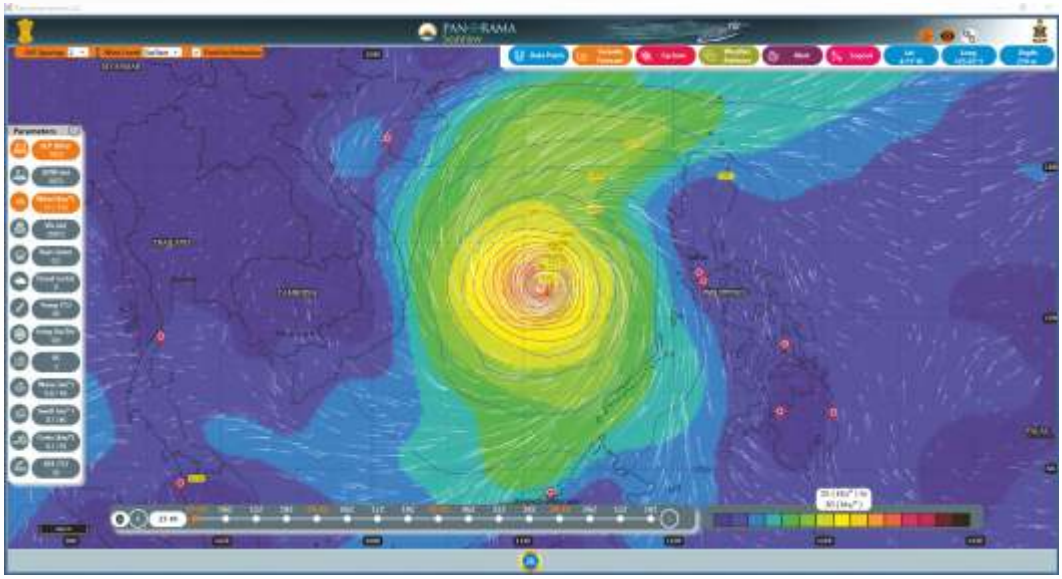
The extent of fire emitted pollutants from North-West region of India contributes to already severe pollution in Delhi and the heavily populated regions located downwind of the fires which need to be addressed. The main outcome of the initiativewill be development of high-resolution (10 km x 10 km) emission inventory for crop residue burning over Northern region of India and development of decision making algorithm for near real time fire emission estimation and fire forecasting based on MODIS and VIIRS satellite data observations.

Forest Fire Spread Model in Sikkim Himalayas using HPC System

A model is being experimented using CFD for carrying out simulation studies of fire spread in forest area. The simulation of combustion processes, as well as atmospheric dynamics, represents a challenge for forest fire scenarios because of the various involved scales, from the scale of the individual flames to the larger regional scale. Most of the available models use Large Eddy Simulation (LES) to account forest fire spread which itself is computationally intensive. The proposed research aims at experimentation with both CFD and non-CFD models and use them appropriately for fire spread simulation.

Panorama - Marine Forecast Visualization System

Panorama - Marine Forecast Visualization System provides naval vessels with high resolution weather forecasts for optimal voyage planning. It enables user-friendly on-board 2D and 3D visualization of atmosphere as well as ocean forecast for 10 days.Panorama phase II is currentlyunder progresson completion and deployment of Panorama in all naval ships of Indian Navy during Panorama Phase 1. Some of the deliverables ofPanorama-II include Advanced Marine Forecast Visualization System (MFVS), MFVS lite version for friendly foreign navies, Advanced Forecast Dashboard, Integrated 3-D Visualization, Advanced Data Compression/ Decompression etc.



Panorama-Marine Forecast Visualization System

Grid Computing and Cloud Computing

Fast, Flexible HPC framework to Accelerate NGS Genomics data analysis

In collaboration with National Institute of Bio Medical Genomics, C-DAC is implementing an initiativewhich aims to deliver a highly flexible HPC aware analysis framework for rapid processing of massively parallel high throughput sequence data. The analysis framework would allow researchers to directly login to framework and access NGS analysis pipelines on demand.

Setup of Grid Prototype at VSSC Trivandrum

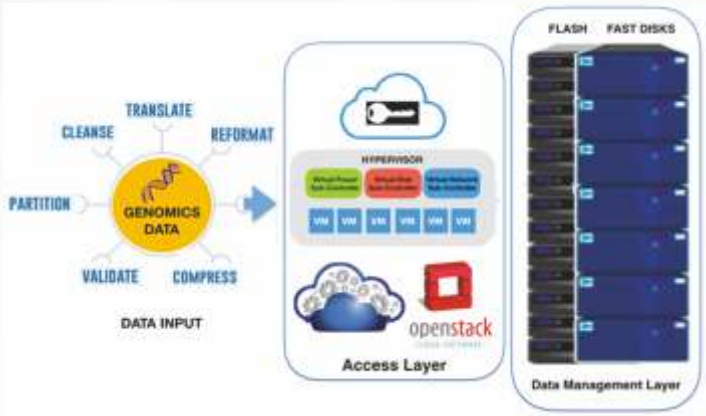
A prototype grid computing infrastructure was deployed at VSSC Trivandrum for parallel execution of Multifrontal Massively Parallel Sparse direct Solver (MUMPS) with VSSC's FEAST (Finite Element Analysis of Structures) software.

GenoVault: A Cloud based Genomics Repository

GenoVault is a centralized Genomic repository for researchers using private cloud infrastructure. It is implemented using OpenStack Swift for Object Storage solution of genomic data both for archival and retrieval along with analytical engines. It has enormous importance in healthcare and is of great use in personalized medicine. Data types and formats of available public domain repositories such as Short Read Archive (SRA) at NCBI, European Nucleotide Archive at EBI were analyzed. The product is developed as part of DBT initiative and will be deployed at DBT centres.

Meghdoot - Software Suite for building Cloud Computing Environment

Meghdoot is a comprehensive cloud suite developed by C-DAC that constitutes free and open source tools across all layers of cloud. During the year, existing Meghdoot Cloud suite based on OpenStack was enhanced with OpenStack Train version and integration of cloud suite was carried out. Establishment of Indian Banking Community Cloud was carried out for Indian Financial Technology & Allied Services (IFTAS) at Mumbai and Hyderabad Data Centre. Customization, Enhancement, Integration and Implementation of Cloud in Tamil Nadu Disaster Recovery Centre (TNDRC), Tiruchirappalli with Meghdoot Cloud suite as Proof of Concept was also accomplished. Provisioning Cloud services for Office of Accountant General, Chennai is also being carried out.



Genovault – Cloud based centralized Genomic repository

Big Data and Analytics

VIVIDHA

VIVIDHA, a Variant Analysis and Visualization Interface for Dynamic High-throughput Applications, is a computational methodology deployable on cloud-based big data clusters that enables large scale variant analysis. Highly relevant in this era of precision and personalized Genomics, it enables timely discovery of variants in large cohorts thereby aiding in genotype-phenotype association studies. The product is developed as a part of NSM initiative and will be deployed on the NSM software repository under NSM-PPM software stack.

VIVIDHA Capabilities

Artificial Intelligence, Language Computing & Heritage Computing

Artificial Intelligence and Machine Learning play a vital role in various technologies that has huge impact on our lives. During the year, some of the key areas that C-DAC has worked on include Translation and Transliteration, Internationalized Domain Names (IDNs), Multilingual Mobile Applications, Speech Technologies, e-Learning technologies, Optical Character Recognition (OCR) to name a few. Multilingual and Heritage systems are developed using AI and Machine Learning.

Language Computing and Speech Technologies

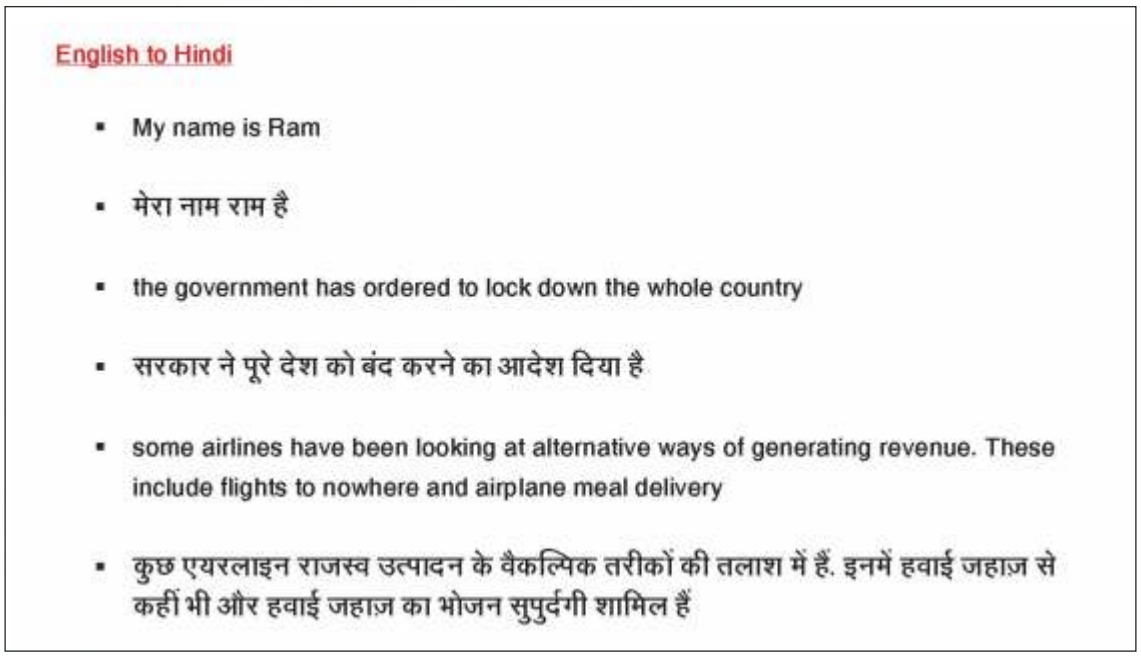
Translation and Transliteration Technologies

Mantra-Rajya Sabha

MANTRA-Rajya Sabha is a MAchiNe assisted Translation Tool to facilitate the translation of documents pertaining to the Upper House of the Parliament of India from English to Hindi. This system effectively translates the daily proceedings of Rajya Sabha documents. It has been used for translating documents from English to Hindi language of Rajya Sabha proceedings of Papers to be laid on the Table (PLOT), List of Business (LOB), Bulletin Part-I, Bulletin Part-II and Synopsis with an accuracy more than 90%.The system maintains the CR (Camera Ready) format such as bold, italics, underline, tables, indent, etc. of the English document while generating the Hindi document and the system is being used in the Session regularly and during the Parliamentary Session Nos. 249,250 and 251.

Neural Machine Translation

C-DAC has developed a "GIST Translation Engine", which enables automated translations of the text from one language to another language. This engine is designed using Deep Learning techniques and has been trained on data from generic domain. Currently the system can translate the text from English to Hindi and Hindi to English. This is being used in Localization Project Management Framework.



Input and output of Hindi to English Translation

Indian Language to English Address Translation

C-DAC has developed a Web Service for translation of addresses from Indian languages to English. This is a part of a larger suite of Transliteration/Translation services, which also includes English to Indian Language Address Translation as well as English to IL transliteration and vice versa.Currently, it supports the following languages: Hindi, Marathi, Konkani, Gujarati, Bangla, Oriya, Punjabi, Tamil, Telugu, Malayalam, and Kannada.

Hindi	154, दीनदयाल उपाध्याय स्मारक की ओर , देव पुरी , मेरठ	154, towrds dindayal upadhayay smarak, dev puri, meerut
Marathi	प्रगति,168/13,मझगांव रोड,नूर बागच्यापाशी,मुंबई	Pragati, 168/13,mazgaon road, near noor baag, mumbai
Konkani	कारापुर साखळी, कारापुर एगोच्या लागसार, गोवा, दिवचल	Karapur sakhali, adjacent to karapur egro, goa, bicholim
Gujarati	ઘરમાળ મોતી પાસે,તા.ડિસા,ડિસા,ગુજરાત	Near gharmal moti, taa. Disa, disa, Gujarat
Punjabi	ਬੱਧਾਣੀ ਵਿੱਚ, ਰੇਲਵੇ ਸਟੇਸ਼ਨ ,ਦੇ ਪੂਰਬ ਰਾਹੀ - ਪਠਾਨਕੋਟ,ਪੰਜਾਬ	in badhani, to the east of railway station, rahi - pathankot, punjab
Bengali	4/1 রানি রশমোনী গার্ডেন লেন,শিব মন্দির ছাড়িয়ে,কলকাতা,ওয়েষ্ট বেঙ্গল	4/1 rani rashmoni garden lane, beyond shib mandir, kolkata, west bengal
Odia	961 (a) ଫରେଷ୍ଟ ପାର୍କ ଭୁବନେଶ୍ୱର,ଭାରତୀ ଟାୱର ନିକଟରେ,ଓଡିଶା	961 (a) forest park bhubaneswar, near bharati tower, odisha
Tamil	5,பவேர் ஹாஉஸ் சாலை,பவர் ஹௌஸ் அர,கே,மத,ரை,தமிழ்நாட,	5, power house salai, near powar house, madurai, tamilnadu
Malayalam	ബോസ് നഗർ,സ്കൂളയ്ക്ക് അടുത്ത്,കടവന്ത്ര,കൊച്ചിൻ-20,എറണാകുളം,കേരള	Bos nagar, near school, katavantr, cochin-20, ernakulam, Kerala
Kannada	ಇ ಬ್ಲೋಕ,#25,ಸ್ಟುಡೇಂಟ್ಸ ಹಾಸ್ಟೆಲ್ ನ ಹಿಂದೆ, ಇಇಸೇ, ಬೆಂಗಳೂರು, ಕರ್ನಾಟಕ	e block, #25, behind students hostel, iise, bangalore, karnataka

Reverse Address Translation in various languages

Deployment and Integration of Transliteration web API solution in Passport Seva Project (PSP)

C-DAC has developed and provided Names and Address transliteration solution along with onscreen keyboard for typing in Hindi to Ministry of External Affairs, Govt. of India. Transliteration service is successfully hosted at PSP servers and integrated with Passport application and also Pilot run successfully completed in Lucknow.

Transliteration API toolkit for ICJS (Interoperable Criminal Justice System) portal

Cross-lingual Name variant search was developed for searching by name in ICJS portal under NCRB (National Crime Records Bureau)to fetch out the English name variants and local language variants. Transliteration toolkit is integrated in ICJS Elastic search application for achieving cross-lingual name search for 10 Indian languages (Hindi, Gujarati, Punjabi, Kannada, Assamese, Tamil, Telugu, Malayalam, Marathi, Urdu).

Translation Memory based system -कंठस्थ

It is a Translation memory system based translation system that allows a translator to reuse the already translated segments Training on Kanthasth was imparted to 26 Ministries and their Departments of Government of India under Training of Trainer (TOT) Programme.

Indian Sign Language Solution for e-Learning

The system is developed for enhancing learning based on parts of speech for normal and specially-abled students on Indian Sign Language. Modules are based on Indian Sign Language for Twenty (20) Domains with around Fifty (50) hand signs in each. The modules cover noun, verb, adjective etc. The languages supported are in English and Bengali.

Internationalized Domain Names (IDNs)

Internationalized Domain Names (IDNs) rollout in 8 more languages

Growth of the websites in local languages has direct bearing with the development of content in local languages. Depiction of an address on Internet (Uniform Resource Locator -URL) of the website in local language will further go a long way in ensuring inclusive growth of Internet. The domain names in local languages called Internationalized Domain Names (IDNs) enable common users to navigate through the Internet in their local languages. A domain name e.g. in Hindi, would look like "सीडैक.भारत"written in Devanagari. During the year eight more languages have been enabled for the same. The languages are Kannada, Oriya, Assamese, Sanskrit, Santali, Kashmiri, Sindhi and Malayalam.

Speech Technologies

Shrutlekhan-Advance

Shrutlekhan-Advance is a general purpose large vocabulary continuous automatic speech recognition system for Hindi and Marathi languages. It transcribes the spoken words into text. It is a fully hybrid approach based software that uses AI, machine learning and Deep Neural Network technology. It is a web and mobile based real time speaker independent speech transcription system.

Web and Mobile version of Shrutlekhan-Advance

Pravachak-Advance

Pravachak-advance is a text to speech system for Hindi and Marathi language. The system converts text into speech by employing advanced machine learning techniques. It is a particularly interdisciplinary field of speech involving acoustics, linguistics, computer science and signal processing.

Web and Mobile version of Pravackah-Advance

Digital Audio Recording and Webcasting System

Digital Audio Recording and on-Demand Audio Webcast of Assembly Proceedings System is a web (intranet) based solution for reporters at assembly to listen ongoing & archived proceedings. The system creates and webcast the digitally compressed audio files. This facilitates recording the audio proceedings in the Digital format and making available to the Reporters.

Framework to Integrate Text to Speech Synthesis System (TTS) into websites

This framework provides mechanism to integrate TTS (Indian Languages and Indian English) in a very easy way. It has been integrated into more than 12 government websites for read aloud the content of website and highlight the text being spoken.

Multilingual Mobile Applications

e-Mahashabdkosh on mobile (Android and iOS)

e-Mahashabdkosh is a domain based Bilingual and Bidirectional English-Hindi pronouncing dictionary. It contains the Hindi equivalent terms of English root words and vice versa. The details of words include description in Hindi as well as in English, usages, pronunciation of the root words. The mobile Apps can be downloaded from Google's Play store for Android devices and from Apple's app store for iOS devices.

e-Mahashabdkosh mobile application

ePOSHAN

ePOSHAN is amobile based multilingual attendance, networking and knowledge sharing platform for Integrated Child Development Services (ICDS) functionaries of Narmada district (Gujarat). Accessed through a mobile app, ePOSHAN is made available in Gujarati, has a geolocation based attendance monitoring feature, works seamlessly both offline and online and enables knowledge sharing and networking among Anganwadi workers and the district women and child development department to share learning resources, best practices and broadcast key messages to the complete ICDS functionaries in just a click. The app also facilitates citizens to locate nearby Anganwadis and provide feedback on its services to the district administration.

e-Poshan mobile application

eVanbandhu

eVanbandhu is a mobile based digital catalogue of tribal schemes in Gujarati to enable citizens to check their eligibility and access and share scheme information for better utility. A provision to apply for the schemes and also connect with the Tribal Development Department of Government of Gujarat has also been made available.

e-Vanbandhu mobile application

Optical Character Recognition (OCR)

PAN/AADHAAR Number OCR

Optical Character Recognition is a widespread technology to recognize text inside images, such as scanned documents and photos. The captured image will be passed to the OCR recognition which returns the Card Number in textual form.This is being customized for use by banks to carry out Customer KYC through video online. PAN card number image will be converted to digital text using OCR.

Software as a service for OCR system for Odia Documents Images

C-DAC has worked to improve the accuracy of Odia OCR and to provide Odia OCR services to Government of Odisha to make the classical books available in editable format. This included OCR engine optimization, handling deprecated character and mapping them to currently used practices, language model based post-processing techniques for the correction of output and experimenting with latest neural techniques

Digital Preservation and Heritage Computing

SMART Museum

IoT has started reshaping the traditional museums into a futuristic, smart and creative place giving an ethnic touch to its time-honored values. Internet of Museum Things (IoMT) comprises the connected world of antiquities, artifacts and other heritage things. These connected artifacts, antiquities create an intelligent, interactive and informative platform and facilitates enhanced user experience. Key Features of this pilot system include - Interactive Museum Exhibits (IME), Visitor Activity Tracking, Antiquity Tracking System (Environmental and Physical), Internet of Cultural Things (IoCT) Middle-ware and Suitable images of product/solution.

Establishment of Rail heritage Document Centre

C-DAC has established Rail Heritage Document Centre at Tiruchirappalli which undertakes activities such as - Converting the printed documents (reports, maps, drawings, books and other documentation) available at NRM, New Delhi and RM, Tiruchirappalli in digital format for storage and archival purpose, Making them accessible through search facility based on metadata information and full text search, Making the information delivery through user friendly interface supported on web browser for accessing through different devices like PC/Laptop, mobiles and Information kiosk.

North East Heritage Portal

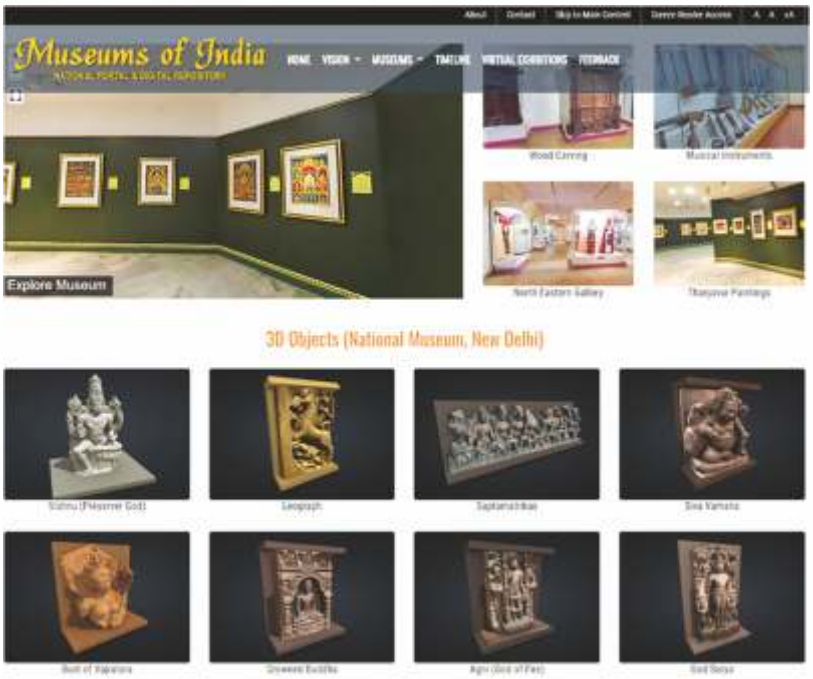
The beta version of North-East Heritage portal (NE portal) has been developed and deployed by C-DAC. It is hosted for the north east heritage institutions which provides integrated search and retrieval over various digitized

collections from museums, archives and libraries from north east states. Sampled data, 3D digitized objects received from Manipur State Museum, SrimantaSankardevKalakshetra Museum, Assam State Museum and Loktak Folklore Museum are made availableonthe portal.

North East Heritage Portal

Upgradation of Museums of India Portal platforms

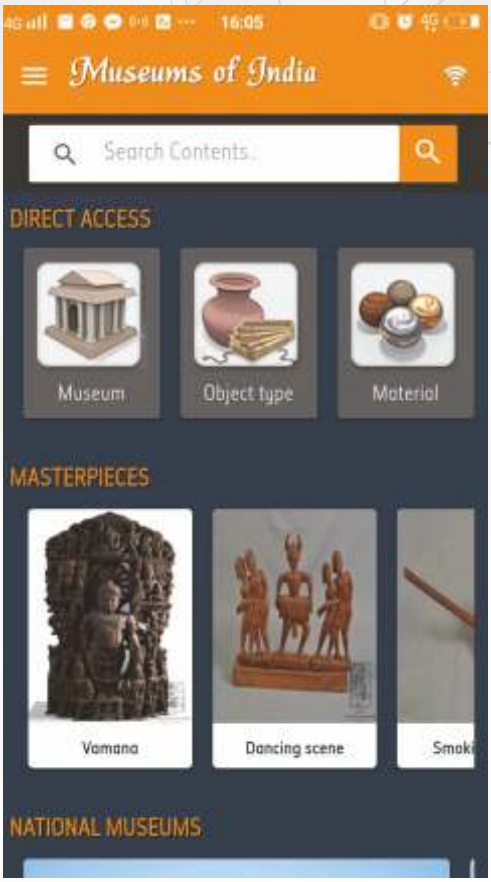
C-DAC has upgraded the National Portal and Digital Repository for Museums of India with many new features and developed a specialized Mobile App for tourists and visitors.The Museums of India portal (www.museumsofindia.gov.in) provides access to digitized collections of national museums. The portal is now upgraded - which includes 360° Panorama for museum galleries, interactive 3D objects digitized using photogrammetry technique and enhanced search & retrieval.



Museums of India Portal with 360° Panoramas and 3D Objects

Development of Museums of India Mobile App

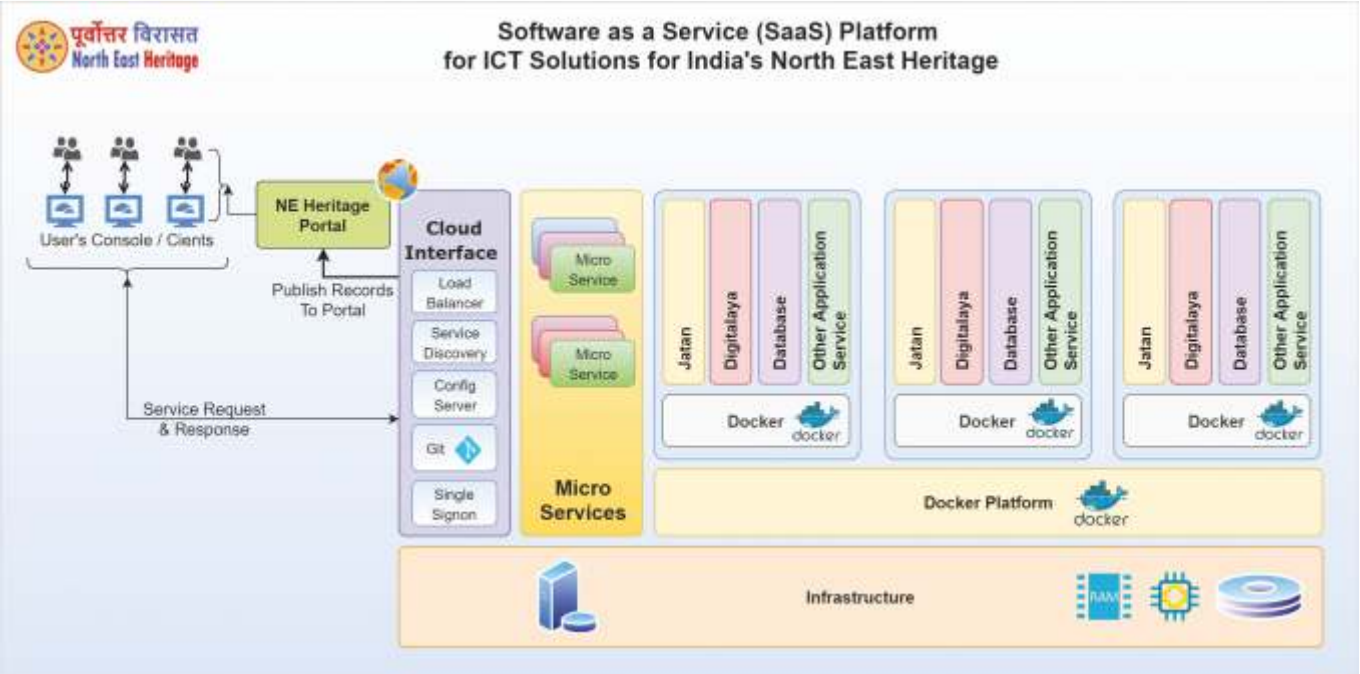
The Museums of India Mobile App is developed for tourists and visitors, which enables them to access for the historical information and digitized collections by the national museums. Mobile users can search & retrieve digitized objects from various national museums, view objects by their category type, share the content on social media and get the announcements of seminars, lectures and exhibitions organized in the national museums.



Mobile application of Museums of India

Digital Preservation as a Service (DPaaS)

As a step towards developing the Digital Preservation as a Service (DPaaS) on Cloud Platform, pre-configured containerized software solutions, namely JATAN: Virtual Museum Builder and DIGITALAYA: e-Library & Archival System are being offered as Software as a Service (SaaS) for the museums, archives and heritage institutions in North East states.



Heritage Solutions over SaaS Platform

Professional Electronics, VLSI, Embedded Systems and Quantum Computing

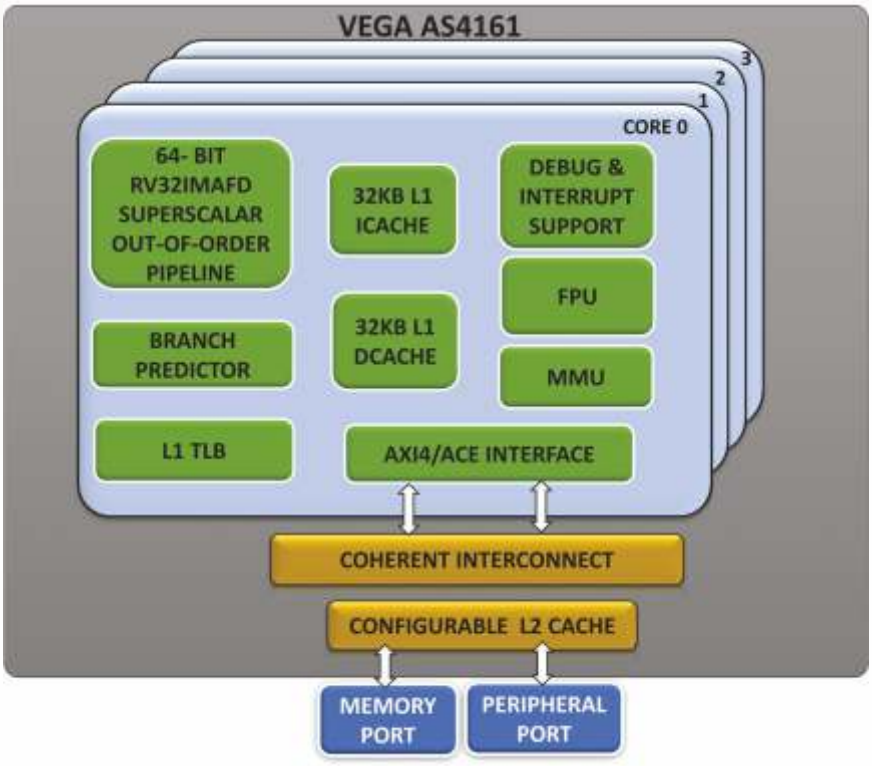
C-DAC with its expertise in the design, development and implementation of VLSI Systems, IoT solutions, microprocessor, microcontroller and DSP hardware and software technologies is working towards various national level initiatives/projects that have large scale commercial potential. Key areas of focus under Professional Electronics include Smart System Solutions, Security and Surveillance, Quantum Computing, Medical Electronics, Agri-Electronics, Industrial Automation Systems, Power Electronics, Strategic Electronics and Intelligent Transportation Systems.

National Level Initiatives

Microprocessor Development Programme (MDP)

"Microprocessor Development Programme" funded by MeitY is executed over two phases. As part of Phase-I, C-DAC has developed a 64-bit Quad core Processor validated on an FPGA platform, Linux booted and standard benchmark programs and applications executed successfully.

Presently, as a part of Phase-II, C-DAC is involved in design, implementation and fabrication of SoC ASICs based on the 64-bit Processor targeting embedded applications. The complete ecosystem including reference boards, BSPs and SDK will also be made available



64-bit Quad Core Microprocessor

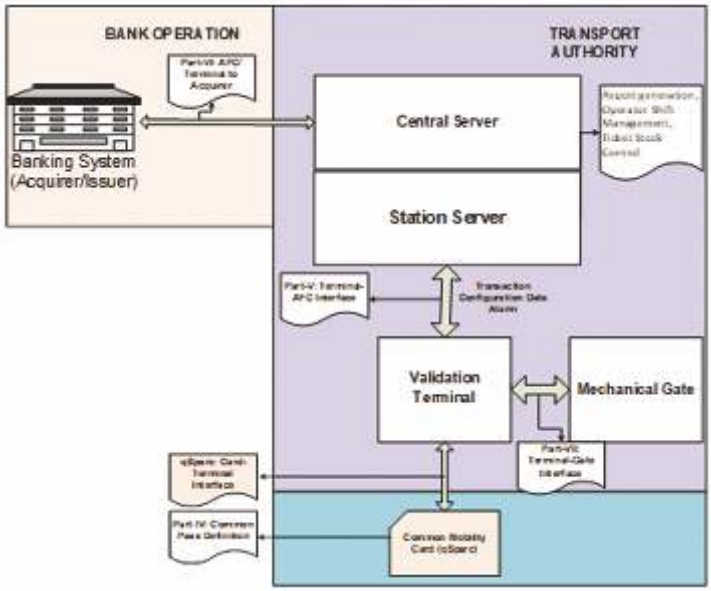
Emergency Response Support System (ERSS)

Emergency Response Support System (ERSS) is an initiative of Ministry of Home Affairs, Government of India with a vision to launch a nationwide, unified emergency response system with a single emergency number '112', for all types of distress calls from across the country. The emergency signal can be a Voice call to 112, SMS to 112, Email to 112, Panic SoS message to 112 or a Social Media alert to 112. Distress signals sent from any part of a State will be centrally received at the 'Public Safety Answering Point' (PSAP), intelligently processed by the backend system and delivered to multiple support services (Police, Health, Fire, Disaster Management, Railways etc.) to rush to the service requestor within 'Golden Hours' of the incident. C-DAC has successfully developed highly scalable and robust

solution including software modules for signal distribution, GIS data analysis, image/video transmission, tracking / navigation and GIS Maps, mainly using Free and Open Source Software (FOSS).'112 India App' with Shout facility, enables a handy tool, common across the country, for women to seek help from neighboring first-responders even before any Emergency service agents arrive. Now, ERSS is successfully operationalized in 22 States and 7 Union Territories.

Sweekar – Automatic Fare Collection System (AFC) using the National Common Mobility Card (NCMC)

National Common Mobility Card (NCMC) is a regular debit/credit card equipped with an additional wallet functionality that can be used for low value payments like Metros, BRT etc. across various cities. AFC system under NCMC follows Common Standards with no vendor lock-in for any components, is Compliant with NCMC Card Online/Offline Transactions, supports improved and efficient low-cost fare collection system for transit operators with real time revenue information and report generation, has decentralized and scalable architecture based on requirements and supports multi-city, multi-operator environment. Field Trials at Delhi Metro Rail Corporation (DMRC) have been successfully completed. Field trials in Mumbai BEST and Bangalore Metro are under progress.



NCMC based AFC Ecosystem for Metro Rail

Smart System Solutions

Indoor Environmental Quality Monitoring Node

Indoor environment quality sensor is a WiFi enabled wall-mountable node that monitors critical indoor ambient parameters such as temperature, relative humidity, light intensity, carbon dioxide concentration and PM2.5/PM10 dust particle concentrations. The indoor comfort analysis is performed on the data collected from each of the sensor nodes and the data is visualized on a dashboard.

Indoor Environmental Quality Monitoring Node

Environmental Pollution Monitoring Device

C-DAC has developed a portable environment pollution monitoring device that monitors criteria parameters such as NO2, SO2, CO and PM2.5/PM10 dust particle concentrations along with ambient temperature and relative humidity. The system collects the air quality data and sends the data to the server through MQTT over GSM communication. The data collected from the air quality monitoring device can be visualized on a dashboard with appropriate AQI analysis.

NIRCHHARI - Ultrasonic Level Sensor for Water level monitoring

NIRCHHARI is an ultrasonic level sensor solution for the real time remote level monitoring of dams, canals, rivers, lakes, water reservoirs etc. NIRCHHARI measures the level information at periodic intervals and sends the information as SMS/GPRS messages through the inbuilt GSM interface. Level Sensor also sends the current sensor depth, battery level and signal strength information. Level Sensor module is Lithium Ion battery compatible and can be powered from external DC power supply for long duration operation.

NIRCHHARI - Ultrasonic Level Sensor

Transportation Systems

Adaptive Traffic Signaling in Hubli-Dharwad Bus Rapid Transit System (BRTS) corridor

C-DAC's Adaptive Traffic Control Signal solution has been implemented in 32 intersections and 2 pedestrian mid-blocks in Hubli-Dharwad BRTS corridor. Traffic Management Centre at City Mobility Centre, Hubli has also been setup for the remote monitoring and management of traffic signals. Transit Signal Priority (TSP) has been implemented for BRTS buses to reduce delay at intersections and overall travel time. Shri M. Venkaiah Naidu, Hon'ble Vice President of India inaugurated the system on February 4, 2020 in the presence of other Union Ministers & State Ministers.

Traffic signal and controller installed in Hubli

IOT Solution and Sensing

Forest Fire Detection in India's North East States

The solution monitors forest areas prone to fires, by making use of wireless sensor networks and Drone. Sensors monitor environmental parameters at the onset and during an outbreak of a forest fire. Upon detection of the outbreak of a fire, it employs drones to identify the location, to gather real time pictorial information about the extent of fire. The data collected from the drones and WSN can be visualized in a dashboard. Pilot solution has been deployed at Kolasib, Mizoram during February, 2020.

Forest Fire Wireless Sensor Node

Suraksha Mitr - Vehicle Tracking and Monitoring Platform

"Suraksha-Mitr" is the vehicle tracking and monitoring platform compatible with the AIS-140 standards mandated by Ministry of Road Transport and Highways (MoRTH). It is a high performance scalable vehicle tracking and monitoring platform which is capable of handling lakhs of vehicles and can be scaled to higher numbers when needed. Suraksha-Mitr enhances the safety of passengers in public passenger vehicles. It supports the transport department for enforcement activities such as over-speed, trip-curtailment etc. Salient features include ARAI & CERT-IN Certified, Integrated with Vahan and ERSS, Real time alerts on offence detection and Inbuilt GIS map engine.

Medical Electronics

KarkatNirnayYantra - An IR imaging Based Cancer Detection System

KarkatNirnay Yantra is based on a novel method towards development of Breast cancer screening system using Rotational Thermographic Imaging, Color based infrared image processing and Feed Forward Back propagation classifier in Machine Learning. The system offers a technique for complete imaging through noncontact and non-invasive way. KarkatNirnay Yantra system has been deployed at Cachar Cancer Hospital, Silchar in September 2019.

MR Image Visualization under Indigenous Magnetic Resonance Imaging (IMRI)

Magnetic Resonance Image Visualization is a sub-module under the initiative "Indigenous Magnetic Resonance Imaging (IMRI) – A National Mission better known as "Swadeshi ChumbakiyaAnunaadChitran –EkRashtriyaAbhiyaan) (SCAN - ERA)". The National Mission programme in the area of Medical Imagining Equipment (SCAN-ERA) intends to enhance indigenous technology development at low cost, affordable and state-of-art 1.5 Tesla MRI machines in order to meet the huge requirements of such machines in our country. SCAN-ERA is a multi-institutional programme involving research, development, deployment and technology transfer for production of such MRI machines.

Solutions for Strategic Sector

USBRMS - Ultrasonic Solid-Propellant Burn Rate Measurement System

USBRMS system is an ultrasound technology based system for measuring the burning rate of solid propellants. The system consists of an ultrasonic transducer, a pressure transducer, electronic unit, application software and a laptop. The system works on the principle of ultrasonic technique by repeated measurement of the thickness of a burning

propellant specimen. The product has been deployed in various laboratories of key government agency and has successfully conducted more than 1000 burning tests with 100% success rate.

Ultrasonic Solid-Propellant Burn Rate Measurement System

Underwater Drone

Underwater drone is a Remotely Operated tethered underwater Vehicle (ROV). It is highly maneuverable, and is operated by a crew either aboard a vessel/floating platform or on proximate land. The system shall carry multiple payloads like cameras, lights & various sensors for surveillance, navigation and inspection purpose. Underwater Drone was exhibited at the India Defexpo 2020, during January 2020. During the year, underwater drone has been successfully deployed at various locations for field trials and on-site demonstrations.

Underwater Drone

Navigation Control Console

Automated Test Equipment for ISRO - Inertial Reference Unit (IRU 900)

Automated Test Equipment (ATE) for Inertial Reference Unit (IRU) is a checkout system for testing IRU – which is a self-contained strap-down redundant attitude sensing unit. It consists of three independent channels, each of which provides two axes of output information as incremental angle. The ATE has a custom designed Hardware and software to power and operate the DUT, supports 1553 and serial interface, acquires telemetry inputs, rate processing, evaluate the subsystem performance, has safety interlocks and automatically generates test results in report form. The ATE caters to the requirement of test and evaluation of the Inertial Reference Unit used by ISRO.

Airport Entry Permit (AEP) Card Key Management System (KMS)

The solution offers Biometric Access Control System for issuance of biometric enabled smart card based Aerodrome Entry Permit (AEP) for secured and regulated access by employees/staff to restricted areas at all aerodromes across the country. Shri Hardeep Singh Puri, Minister of State (Independent Charge) for Civil Aviation launched the Biometric enabled Centralized Access Control System (CACS) on December 30, 2019 in New Delhi.

Agri-Electronics

Electronic Vision & Electronic Tongue System for Estimation of Cooking Quality of Rice

The solution eliminates manual process for estimating cooking quality of rice by implementing computerized digital image analysis technique involving the use of portable flatbed scanner to objectively measure the rate of dispersion during Alkali Spreading Value (ASV) testing. Key components include Anna-Scan - An Image Analysis Software for Estimation of Cooking Quality (Alkali Spreading Value) of Rice and Electronic-Tongue for Measurement of Alkali Spreading Value for Assessment of Cooking Quality of Rice. The system has been deployed at NRRI, Cuttak and BCKV, Mohanpur, West Bengal.

Autonomous Multipurpose Agricultural Robotic Platform

C-DAC in collaboration with Indian Institute of Technology (IIT) Kharagpur, Birsa Agricultural University (BAU) Ranchi and Kumaraguru College of Technology (KCT) Coimbatore is developing battery powered/ Hybrid (Fuel and battery based) autonomous Multipurpose Field Robotic Platform (MFRP) to carry out complex process of paddy farming.

Solutions for Power Sector

National Mission on Power Electronics Technology (NaMPET)

NAMPET Phase-III focuses on various activities including e-mobility charging solutions, advanced EV drives, Planar Magnetic components, Energy efficient power distribution for Houseboat, and deployment of 25kW Microgrid for rural electrification. A consortium of leading academic Institutes including IISc, Bangalore has been formulated to initiate research activities in Wide Band Gap (WBG) device based Power Electronics systems. As a part of this initiative, an Industrial conclave on e-mobility has been conducted and fourshort term courses have been conducted with the association of Academic Institutes at various locations.

Naap-e: Single Phase Smart Energy meter

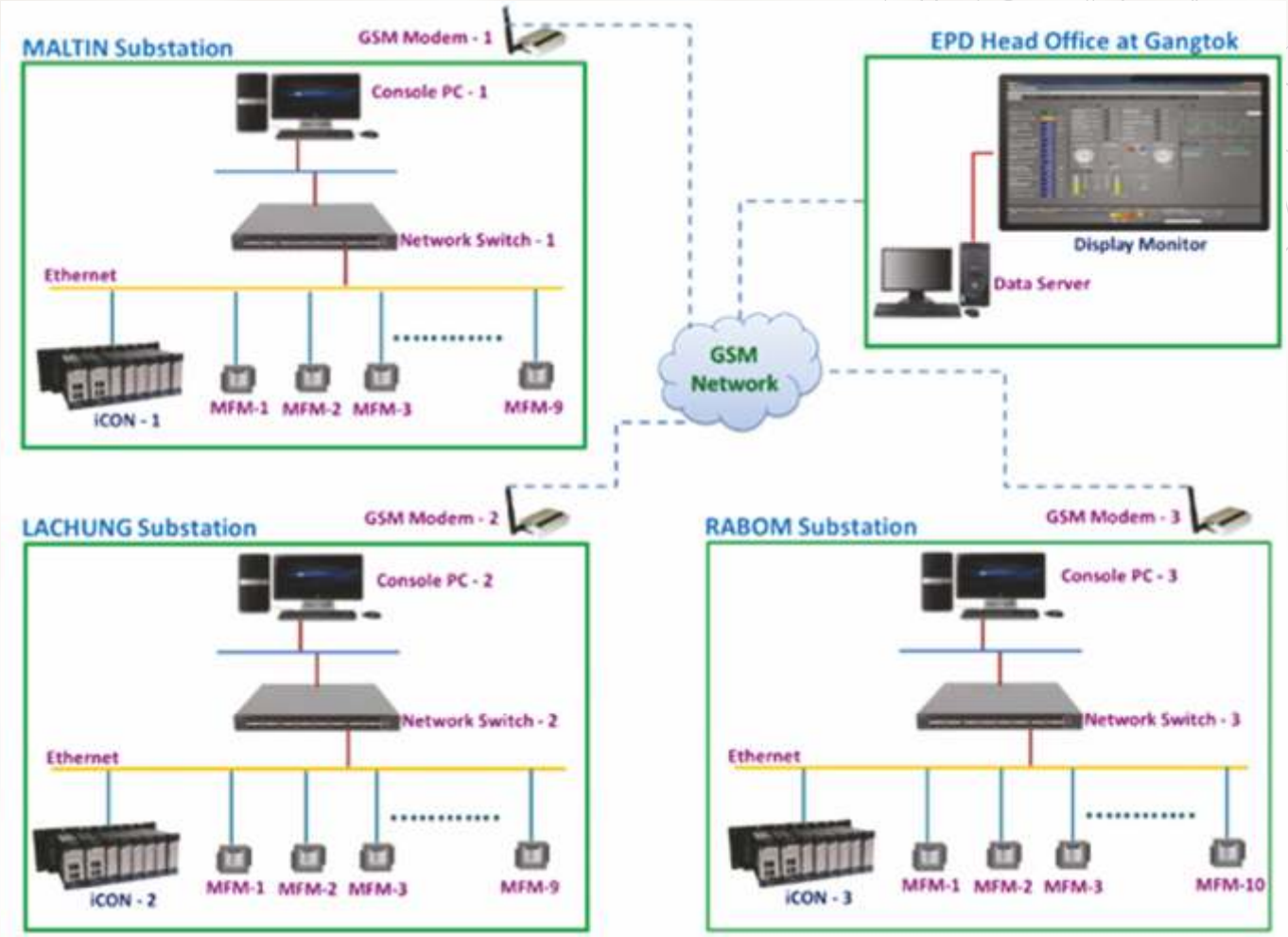
Smart Energy meter, developed jointly by C-DAC and BEL, Bangalore, is targeted for single phase domestic power segment. It enables automated reading of meters and helps in enhanced load predictions. It supports data exchange for Reading Tariff and Load Control as per BIS IS15959 and is functionally compatible with DLMS-COSEM.

Naap-e: Single Phase Smart Energy Meter

Major Activities in Thematic Areas

Distributed Substation SCADA Automation System

Distributed SCADA Substation Automation System developed by C-DAC includes indigenously developed Industrial CONtroller, iCON and Industrial Range Open SCADA software, iROSE which are developed under ASTeC programme along with third party made Multi-Function Meters (MFMs) which can handle different types of electrical inputs/outputs while preserving compact structure. The system has been deployed at Rabom, Maltin and Lachung substations of Energy and Power Department (EPD), Govt. of Sikkim in February 2020.



Distributed Substation SCADA Automation System implemented at North Sikkim

Grid tied Solar Photovoltaic Power Plant

C-DAC has developed grid connected Solar Photovoltaic power plant with indigenous technology which is scalable according to the requirement, modular Converters for addition of power capacity, modular architecture suitable for onsite replacement / maintenance, extensive monitoring system - local and remote, reliability & protection requirement and fail-safe design. The solution offers power rating from a few kWs to MW, remote monitoring facility, anti-islanding detection and protection as per IEEE 929-2000 standard, ride through Faulty and disturbed grid conditions, reactive power dispatch capability upto full rating and Active and Reactive Power/Energy metering. Potential user agencies include RE promoting agencies, Utility companies, Public offices, educational institutions, Public housing projects and Office buildings.

Major Activities in Thematic Areas

Capacity Development

Chip Centre for Special Manpower Development Programme

SMDP-C2SD program aims to brings in a culture of System on Chip / System designing by developing working prototypes with societal applications. Chip Centre established at C-DAC enables fabrication of chips developed by Resource Centres and Participating institutes of SMDP-C2SD program by means of Multi Project Wafer (MPW) services provided by Semi-Conductor Laboratory (SCL), Chandigarh. Under the program, validation, Reticle floor planning for MPW, Packaging of Dies, wafer dicing plans, wafer bonding diagrams for 70 designs has been done. Tape out of IEEE 754-2008 Floating Point Unit (FPU) ASIC and Advanced Encryption Standard (AES) Encryptor as a prototype Chip to establish the Physical design flow with SCL 180nm and dispatch of 29 Designs to institutes has also been completed.

General Purpose Interface Board

General purpose interface board has been developed by C-DAC that can be used with Arduino uno, Arduino mega, Arduino nano, Arduino Pro mini, stm32 nucleo board, stm32 discovery board, Rasberry Pi etc. Any microcontroller-based board can be easily interfaced with peripheral board and supports Quick prototype development. The product is available for sale in GEM portal.

Quantum Computing

Centre of Excellence in Quantum Technology

C-DAC in collaboration with IISc Bangalore and RRI Bangalore is setting up Centre of Excellence in Quantum Technology. Key objectives include development of quantum computation hardware, quantum communication hardware, study leading to the demonstration of quantum sensing technology and related work leading to quantum algorithms, quantum simulator incorporating noisy gates, QKD protocols and post-quantum cryptography. C-DAC is developing the FPGA based system to interface with quantum processors, Python based software interface for the quantum measurement hardware.

Quantum Computing Toolkit

In association with IISc Bengaluru and IIT Roorkee, C-DAC is developing a quantum-computing toolkit to build the capability/capacity in QC research in the nation. It will comprise of QC Toolkit including simulator & workbench, QC Course and QC capacity building.

Capacity Building Program

C-DAC in collaboration with academia and industry has conducted various capacity building programs on Quantum Computing. The introductory workshop organized in July 2019 in collaboration with industry included Quantum computing basics with QLM functionalities. During Quantum learning workshop conducted in collaboration with DRDO in September 2019 experts from C-DAC, DRDO and Academia delivered the lectures along with hands-on session on quantum simulator. Various algorithms like Grover, FFT and others were demonstrated using AQASM as well as Python based codes. Advanced workshop/Training program on Quantum Simulator was conducted in November 2019 in collaboration with industry.

Software Technologies including FOSS

C-DAC designs, develops and deploys various software solutions in the areas of e-Governance, Free and Open Source Software (FOSS), E-Learning, Social Development etc. under Software Technologies Including FOSS thematic area. The activities carried out by C-DAC during the year in this thematic area are mentioned below.

e-Governance Solutions

e- Governance Platforms and Frameworks

e-Pramaan: A National e-Authentication Service along with Aadhaar

e-Pramaan (https://epramaan.gov.in/) is a uniform standard based national e-authentication service developed by C-DAC to authenticate users of various Government services in a safe and secure manner for accessing services through desktop as well as mobile. It provides various authentication mechanisms such as password based, OTP based, digital certificate (IndianCAs) based and biometric (fingerprint, iris) based. Another major component of e-Pramaan is Aadhaar Ecosystem. During the year, 26 departments were integrated and 1.89Crores transactions were completed as part of this initiative. Total 265 departments have been integrated and 10.52 Crores transactions have been completed as part of this initiative till March, 2020.

eSangam: e-Governance Services Integration Framework

eSangam is a Service Oriented Architecture (SOA) based constellation of National and State eGovernance Service Delivery Gateways. C-DAC being the implementation agency, is also the Gateway Service Provider for Meity, Govt. of India. The transaction count for various eSangam related services during the year was 1,26,08,185 and Total transaction count for various eSangam related services till March 31, 2020 was 8,45,43,862.

Mobile Service Delivery Gateway Phase III

As part of government's m-Governance initiative, Mobile Seva centralized infrastructure platform was created by C-DAC for enabling Government departments to offer the public services through mobile devices. MSDG Phase III encompasses an extended Platform of Mobile Seva with Mobile Service Delivery Gateway architecture and further enhancements. It is having Service Oriented Architecture with core components such as MSDG Platform, SMS Gateway, USSD Gateway, IVRS, AppStore (with more than 900 Apps) and many more. During the year, 237 departments/agencies were integrated under this platform.

" I don't have the slightest doubt...
that let us take this as an opportunity
that India will become a big centre of
`Made in India apps' with all the segmented
requirements which we have.
If we start thinking on those lines, it is all doable."

Shri Ravi Shankar Prasad
Hon'ble Minister Law & Justice,
Communications and Electronics
& Information Technology
Chairperson, Governing Council, C-DAC

e-Governance Standards and Guidelines

C-DAC is carrying out an initiative for preparing e-Governance standards, guidelines, and frameworks, to make government services accessible to common man, through common service delivery outlets ensuring efficiency,

transparency and reliability of such services at affordable costs. This involves formulation and review of the Standards, Guidelines and Frameworks supported by Research and development, Promotion, Training and Capacity building, Conformity Assessment and Supporting tools and technologies for e-Governance. The initiative is funded by Ministry of Electronics and Information Technology [MeitY] along with Standardization Testing and Quality Certification (STQC).

e-Governance Applications and Services

National Roll out of e-Services of Election Commission of India (ECI)

C-DAC developed and deployed the services for the Electors Verification Programme (EVP) which was launched by Hon'ble Chief Election Commissioner Shri. Sunil Arora on September 1, 2019. During the launch the new version of National Voters' Service Portal (www.nvsp.in) was inaugurated which has facility for verifying the elector's details, providing family information, Interactive forms, etc. New version of ERONet was released for all states and UTs with new features and UI for enhancing the automated process of electoral roll management starting from elector registration, field verification of electors, form processing, decision support system for Electoral registration officers and providing extensive integrated value-added services. Final publication for the General Election 2019 was carried out by all states and UTs using the ER Printing tool developed by C-DAC. C-DAC also provided the solution for generating encrypted QR code based Bilingual Voter Slips (English and Hindi) for General Election to the Legislative Assembly of NCT of Delhi, 2020. It facilitated faster identification of the voters at 13,750 polling stations with about 1.46 crore eligible voter in every polling station of Delhi.

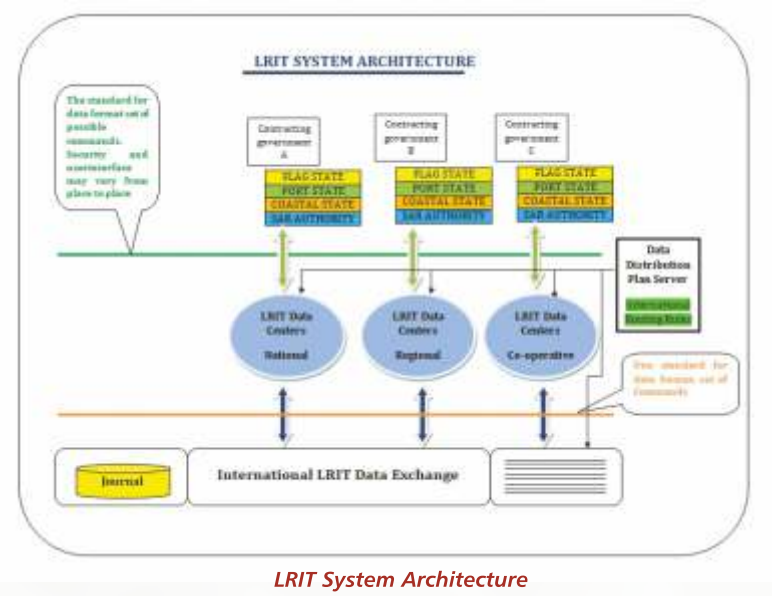
Unified Portal for EPFO and Application Software for Pradhan Mantri RojgarProtsahan Yojana

Unified Portal application caters to the business needs of Employee Provident Fund Organization (EPFO) in providing timely service to its large number of stakeholders i.e., 120 offices across India, around 6 lakh active establishments in filing monthly PF, pension and EDLI remittances to the tune of Rs. 14000 crores and for around 4 Crore active contributing members. The Pradhan Mantri Rojgar Prothsahan Yojana (PMRPY) scheme's implementation, another major IT initiative has disbursed funds close to Rs. 8000 Crore to around 1.5 lakh benefited establishments using EPFO Portal. During the year Jammu, Srinagar and Leh PF offices, establishments and members were on-boarded onto the Unified Portal. Unified Portal was integrated with National Career Services (NCS) portal enabling Establishment to register with NCS.

Long-Range Identification and Tracking System

Long-Range Identification and Tracking (LRIT) system provides global identification and tracking of ships. This consists of the ship borne LRIT information transmitting equipment, Communication Service Provider(s), Application Service Provider(s), LRIT Data Centre(s), including any related Vessel Monitoring System(s), LRIT Data Distribution Plan and the International LRIT Data Exchange. During the year, C-DAC was engagedin Implementation of LRIT system for Directorate General of Shipping (DGS), India to develop Indian National Data Centre (NDC) and extend the

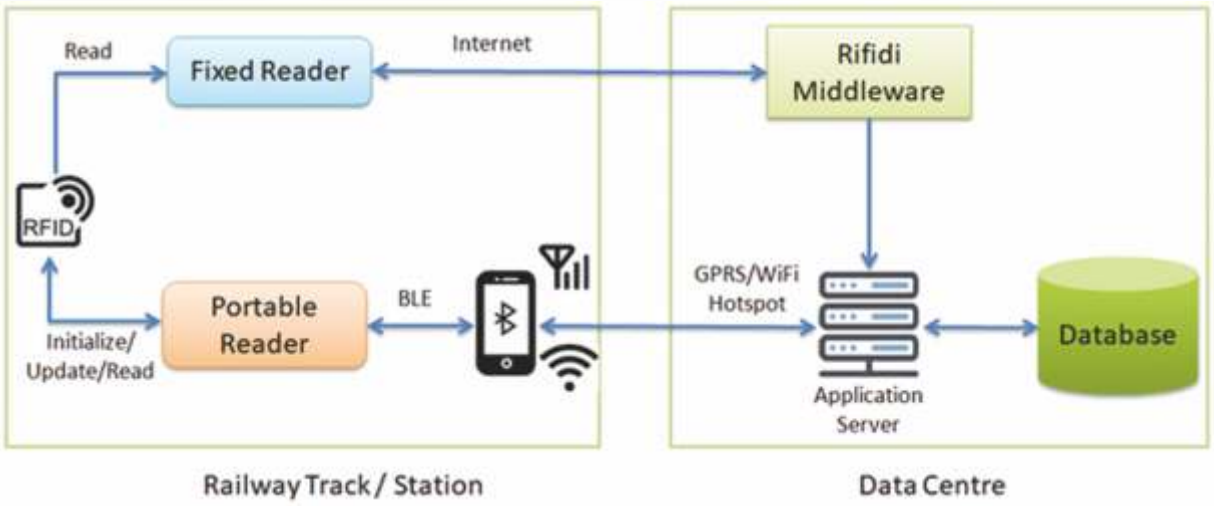
services for neighboring countries (Viz. Maldives, Mauritius, Bangladesh, Myanmar etc.). The initiative has gone live on January 30, 2020 and is under Operation and Maintenance Phase.



LRIT System Architecture

Software solution for Implementation of RFID initiative for Indian Railways

The solution developed by C-DAC for implementation of RFID initiative for Indian Railways, is based on Free and Open Source based RFID middleware that incorporates relevant GS1's standard protocols. RFID reader reads Electronic Product Code (EPC) data associated with railway assets such as wagons, locomotives and coaches. This EPC data is parsed as per Centre for Railway Information Systems (CRIS), Ministry of Railways, Government of India tag guidelines and is stored in database. The solution has been deployed at FARIDABAD railway station for capturing live train data of RAJDHANI EXPRESS and is being used by CRIS.



RFID Architecture

GeoSevak - Online Geospatial Transaction System

Online Geospatial Transaction System is being customized for PMGSY National GIS under PMGSY III. It can access base maps from external sources such as ISRO's Bhuvan and OpenStreetMap. The existing spatial features can be modified and new spatial features can be added. It would help in achieving spatial accuracy, essential for planning, development and decision making.

e-Hastakshar – C-DAC's eSign Service

As part of Government's Digital India Initiative, C-DAC has developed e-Hastakshar – C-DAC's eSign service that facilitates instant signing of documents online by citizens in a legally acceptable form. Through e-Hastakshar, C-DAC offers hassle-free fully paperless citizen services and convenience to users. More than 72 lacs signatures have been offered for various agencies till March 31, 2020.

Electronic Project Proposal Management System (e-PPMS)

C-DAC has developed a solution called electronic Project Proposal Management System (e-PPMS) to manage the life cycle of funded research projects, enable researchers to make online submission of proposals, carry out technical evaluation of proposals, financial approvals and tracking of status of proposals etc. During the year, e-PPMS system was customized for Science and Engineering Research Board (SERB) for online submission of proposals under National Mission on Interdisciplinary Cyber Physical System (NMICPS). System was made operational on November19, 2019.

Manakonline – Web based System for BIS

Manakonlinefacilitates online application submission and grant of licenses. This role-based solution also facilitates payments, scrutiny, inspection, testing and post-grant of license operations such as renewal of licenses, inclusion of varieties, surveillance etc. It provides extensive monitoring, reporting, and audit trails facilitated with e-Communication using SMS, emails, and efficient query management for applicants. During the year 4152 licenses were granted and Rs. 706 Cr. total payment was received. A mobile app named "BIS Certified Products" for consumers was launched by Shri Ram Vilas Paswan,Hon'ble Minister for Consumer Affairs on August 30, 2019.

Systems and Solutions for various State Governments and Agencies

- Enterprise Management Solution (EMS) was implemented to manage and monitor all IT assets for Education Department of Tamil Nadu Government.
- e-Monitoring System was developed for effective management and operations of Panchayat Raj Engineering Department (PRED), an engineering wing of Panchayat Raj and Rural Development Department, Government of Telangana.
- e-RERA Portal for Punjab Real Estate Regulatory Authority, Government of Punjab was developed to facilitate various processes such as monitoring, tracking, registrations, enforcements, notifications, fast-track redressal mechanism, records data etc. for Real Estate Regulatory Authority(RERA) acts implementation in Punjab.
- Settlement & Management of Pool Accounts for DSM, Ancillary &AGC (SAMPADA) solution was developed for bill payments and settlement between registered entities for Western Region Load Despatch centre (WRLDC).
- Revamping of the existing Financial and Accounting system to adopt latest digitization technologies for receivables and payments of Konkan Railway Corporation Ltd (KRCL) that aims at improving the delivery of services and achieving operational performances.
- Web based solution for the First Time Charging (FTC) workflow of an equipment was customized and deployed at North Eastern Regional Load Despatch Center (NERLDC), Shillong.

Free and Open Source Software Solutions (FOSS)

BOSS 8.0

Bharat Operating System Solutions (BOSS) GNU/Linux has been developed by C-DAC for enhancing the use of Free/Open source software throughout India for Desktops, Laptops, Tablets, Servers that supports various architectures such as Intel / AMD / 32 bit & 64 bit systems. BOSS 8.0 features include Cinnamon Desktop Environment, all in one control panel, localization, coupled with LibreOffice suite, support for wide range of peripherals, and plug and play for USB devices.The developed solution is available in https://bosslinux.in. During the year, as part of TamilNaduHiTech School lab initiative, around 90,000 systems were deployed with custom BOSS Linux desktop and 6000 BOSS servers were installed and configured in various government secondary and higher secondary schools across TamilNadu.

Secure BOSS OS for Defence Services Staff College (DSSC)

C-DAC is carrying out an initiative to develop a customized secure BOSS Linux Operating System to be deployed in the secure terminals and other systems across Defence Services Staff College (DSSC). It is provisioned to run Windows based Surveykshak GIS application on Secure BOSS in kiosk mode. It is integrated with domain server, policy management server, network authentication server and log management server.

BOSS Mail Server

BOSS Mail server is a secure mailing solution deployed on the BOSS Server. It is provided with high availability and users can send or receive mails by accessing the mailing solution using a web browser or mail clients such as thunderbird, evolution, outlook express etc. Mail server communication between the server and client is fully encrypted and secured using Simple Authentication and Security Layer (SASL) Protocol and Transport Layer Security. During the year, BOSS Mail Server was deployed in Accountant General Office, Chennai and Tamil Nadu Government for the Cyber Security Architecture for Tamil Nadu (CSA-TN) initiative.

E-learning

Rollout of Online Labs for Schools

C-DAC in collaboration with Amrita University has developed Online Labs (OLabs) covering experiments of Physics, Chemistry, Maths, Biology and English for class 9th -12th. During the year, C-DAC conducted around 128 workshops/trainings and trained 3280 teachers from 613 schools of different State boards. A total of around 29,343 teachers covering around 8,454 schools all over India have been trained by both C-DAC and Amrita University through physical training and via video conferencing.

Aircraft Simulation Training Programme of Fighter Aircraft

C-DAC carried out an initiative to serve the Indian Air Force by using immersive technology to develop a simulator for the training of pilots to enhance their pre-flight skills as per IAF standard. The idea behind this initiative is to save the lives of our warriors in cost and time effective way. This initiative helps the pilots to learn various steps/sequences required for on ground testing of Aircraft. It also prompts/warns if the user does not follow the sequence of steps. Presently, this simulator is being used by High Grounds, Airforce Station Chandigarh for training purposes.

Training Simulator

ICT for Social Development

Vikaspedia

Vikaspedia is a multilingual, multi-sectoral knowledge portal developed by C-DAC to empower poor and under-served communities through provision of information, products and services in all 22 scheduled languages of the country, besides English. During the year, utility of Vikaspedia as a knowledge platform for Aspirational districts was taken up in 60 aspirational districts covering 8 states. 51 capacity building workshops on digital content access and sharing in Indian languages covering 4250 master trainers were organized in 50 aspirational districts in association with district administration. About 50 lakhs citizens were reached through various ICT media to promote government schemes across the country. A multilingual catalogue of government programmes and schemes that enable citizens to check their eligibility of various government schemes, was also made available.

Cyber Security & Cyber Forensics

C-DAC continued its R&D efforts in Cyber Security and Cyber Forensics addressing various challenges pertaining to identity management, proactive threat analysis, cyber forensics, blockchain based solution, security testing and wide scale awareness generation across the country. Some of the significant achievements including solutions, products, tools developed under this thematic area during the year are listed below:

Identity Management System

Visitors Flux Monitoring & Analytics System (PoC)

A Visitor Flux monitoring & analytics system is designed and developed using AI-ML techniques and a prototype is deployed for banking sector to count number of visitors and to track movement of visitors through their office. This eliminates the turnstile which is currently there to log people in/out. Dashboard enables to see various statistics including footfalls at any given point of time.

Visitor Flux Monitoring System

ANETRA

ANETRA is an artificial Intelligence based face identification system. This system is capable of detecting a person's face and identify the name of a person (by displaying on a screen), if already registered in the system. System is designed as a portable handheld device, with a small form factor of 8.3 x 6.5 x 2.5 inches and support IPV4 and IPV6, along with Attendance recording and management.

ANETRA - Face Identification System

Proactive Threat Analysis

Cyber Threat Management System (CTMS)

CTMS is a framework for large scale attack data capturing, collection and analysis. This framework comprises of four modules (a) Capturing (b) Collection & Enrichment (c) Analysis & Cyber Threat Intelligence Generation and (d) Threat Intelligence Portal consisting of Configuration, Management & threat dissemination. The system is being leveraged for generation of cyber threat intelligence from captured and collected attack data from across various sectors including Government, Financial agencies, Service Providers, R&D Organizations and Academic Institutions.

Cyber Threat Management System Dashboard

Cyber Forensics

Cyber Forensic Labs

C-DAC as part of its Resource Centre for Cyber Forensics (RCCF) has continued to provide its services by setting up cyber forensics labs for Kerala police, Regional Forensic Science Laboratory Kochi, Department of Commercial Taxes, Cyber Police Station at Thrissur & Kozhikode and CDTI Hyderabad with its indigenous tools and other third-party tools.

Cyber Forensics Lab : Mobile Device Forensics

DIGIFAI Toolset

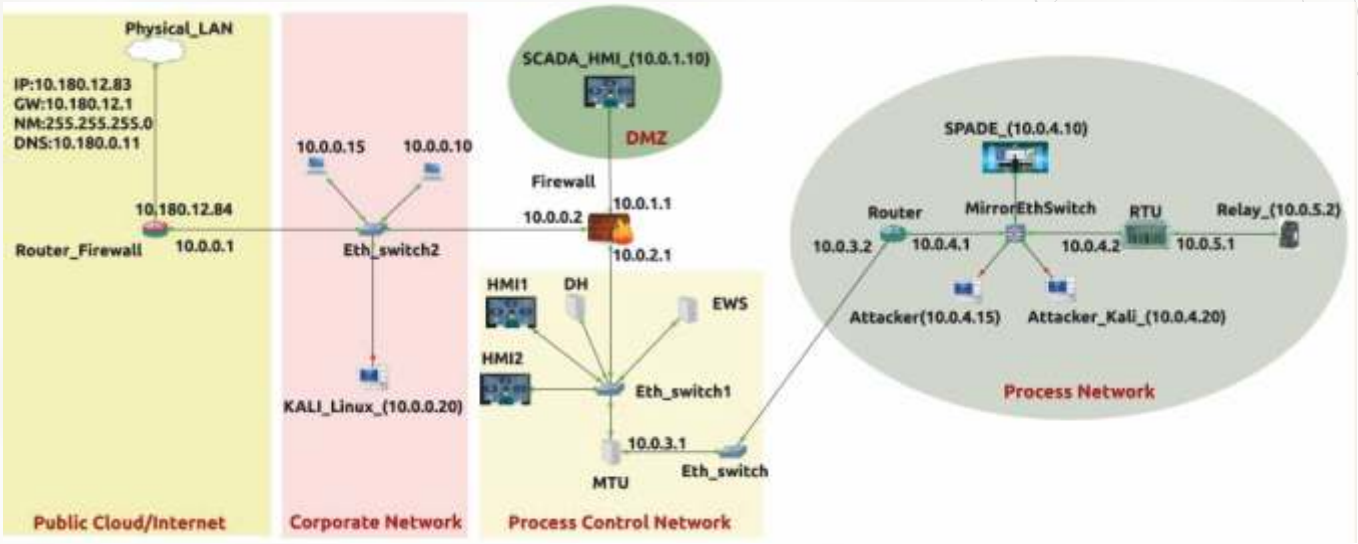
C-DAC has developed an AI based Toolset, DIGIFAI, having three major components: (a) Machine Learning based Text analytics Tools (DIGITEXT) for analyzing suicide notes considering various psycholinguistic patterns / emotional tones extracted from the note and provides Authorship Attribution; (b) Image Processing Based Document Forensic Tools (DIGIDOC) which identifies / validates author from a given unknown query document which is an image of a scanned

handwritten document. It has built-in capabilities to verify the signature of a particular person; and (c) Monitoring of Violence and provoking Activity in Cyber Space by DIGIMONITOR.

SCADA Security

Live-Virtual-Constructive Hybrid Testbed

C-DAC has evolved Live-Virtual-Constructive (LVC) hybrid testbed to overcome the limitations of physical, simulation, virtualization or emulation approaches for SCADA testbed. Physical testbeds is based on replicating existing SCADA systems and simulated testbed is through modelling the SCADA system through simulated environment. In LVC based hybrid testbed approach, SCADA components can be replicated physically, virtualized, emulated or simulated. This is to present a realistic testbed for cyber security purposes.

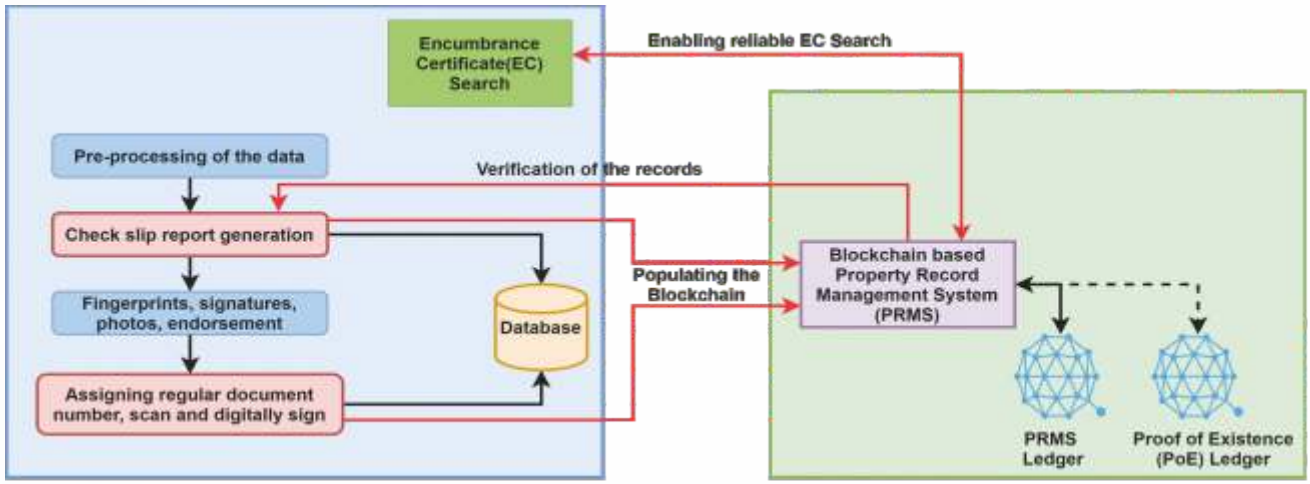


Live-Virtual-Constructive (LVC) hybrid SCADA testbed

Blockchain based Solutions

Blockchain based Property Record Management System (PRMS)

C-DAC has designed and developed Blockchain based Property Record Management System (PRMS) which aims to curb the real-world challenges faced with property registration such as double registration, fake documents and insider threats using Blockchain Technology.



Blockchain Process flow for PRMS

Blockchain based PRMS application is designed by taking the benefits of Blockchain Technology into existing workflow of property registration application of Telangana State. The scope of the PRMS is to store the property registration details such as seller, buyer, property and witness details in Blockchain, verify the title ownership at the time of property registration and provide tamper evident & reliable encumbrance search from the Blockchain data. It is deployed at Shamshabad district of Telangana State and Live transactions are being recorded on PRMS Blockchain from January 2019 onwards.

Blockchain based Educational Certificate Management System

Blockchain plays a significant role in enabling trust, transparency and security. Considering the importance of Certificate Verification and limitations of Existing Educational Certificate Verification Process, C-DAC has developed a Blockchain based Educational Certificate Management System.It has the features such as verification of Authenticity and Integrity, Easy sharing of certificates to Certificate Receivers (such as Recruiters, Universities etc.), Instant Certificate Verification from Blockchain and Immediate issue of duplicate certificates in case of loss or damage.

Standards, Services & Training

An Ecosystem for active Participation in Internet Standard Organizations

Indian Internet Research and Engineering Forum (IIREF) was established by C-DAC. A community of members interested in contribution to the evolution of Internet were encouraged, guided and supported through awareness programs, brainstorming sessions, fellowships and through an International Conference. Contributions were made in Internet drafts relating to Security Protocols.

Information Security Services

As a CERT-In empanelled organization, C-DAC continues to offer Vulnerability Assessment and Penetration Testing (VA/PT), security testing and auditing services for Government and Private organizations. C-DAC is actively involved in carrying out Network VA/PT, Web Application Penetration Testing & Mobile Application Penetration Testing, e-Sign Compliance Audit services, Audits for Aadhaar compliant services etc. During this year, C-DAC has executed a total of 281 Security audit projects and issued safe to host certificates.

Security Dashboard

C-DAC had designed & developed Security Dashboard and SSL Extractor which includes Cyber Security Policy Framework & Security Organogram, Secure Programming Practices, prerequisite for website development & deployment, Linux & Windows Server Hardening, Checklist / Guidelines for Hardening the Routers / Switches & Firewall and Cloud Services Guidelines / Checklists (including SOPs & Policies).

Information Security Education & Awareness (ISEA)

Information Security Education & Awareness (ISEA) Project Phase II - National Level Awareness Campaign, is being implemented through 52 institutions for academic activities which include 4 Information Security Research & Development Centres (ISRDC), 7 Resource Centres (RC) and 41 Participating Institutes (PI) in three categories. 16 implementing agencies with one coordinating agency for training Government Officials. Under ISEA, 53051 candidates have been trained/under-going training in various formal/non-formal courses. 9183 members were trained through various short term courses through direct trainings/e-Learning mode under Government Officers training. Organized 6 Master Trainers Training programs covering 156 Teachers. Total 302 awareness workshops were conducted covering 63048 participants. Organized 3 Cyber safety and security awareness weeks in three states. 77 (including 4 AIR Programs and 13 DD programs) programs were organized through network of experts. 6 editions of news-letters were published.

Health Informatics

Healthcare Informatics Technology helps to improve quality of healthcare, reduce medical errors, reduce healthcare costs, increase administrative efficiency and expand access to affordable healthcare. Being a core competency area, C-DAC has developed several required tools, technologies and healthcare solutions for use of medical practitioners, hospitals, vendors and ultimately - the citizens of India. This thematic area comprises of activities related to Healthcare Solutions, Health Information Systems and Healthcare standards. The activities carried out by C-DAC during the year in this thematic area are briefly covered below.

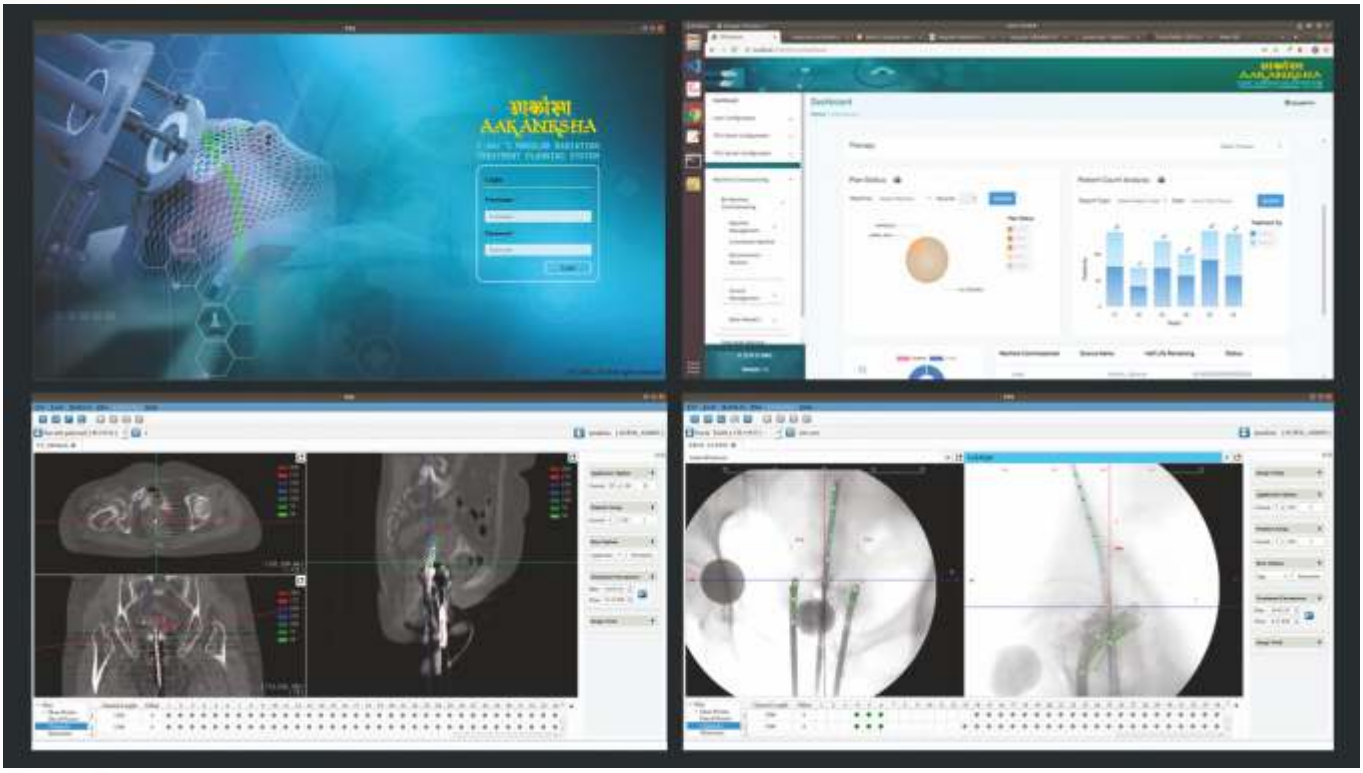
Healthcare Solutions

eSanjeevaniAB

eSanjeevaniAB – Integrated Telemedicine (for Doctor to Doctor teleconsultations under Ayushman Bharat) - eSanjeevani with in-built video conferencing and wireless import of test results and physiological parameters is a flagship telemedicine solution and has been selected by Ministry of Health and Family Welfare, Govt. of India for PAN India rollout at 1.55 Lakh Ayushman Bharat - Health and Wellness Centres (AB-HWCs). Currently, the initiative for hosting of web services for up to 3000 Health and Wellness Centres (HWCs) is under way resulting in capacity building through training, software development and call centre support.

AAKANKSHA - Radiation Treatment Planning System

C-DAC has developed Aakanksha an indigenous cancer Radiation Treatment Planning System (TPS) for Tele cobalt and High Dose Rate (HDR) Brachytherapy machines, manufactured in India. This is a "Make in India" Software for "Make in India" Radiotherapy Machines. TPS provides radiation experts visual tools and controlled workflow to ensure treatment efficacy and patient safety by assisting in planning approach path, radiation level and exposure, etc. The system was deployed at Tata Memorial Centre on pilot basis for verification and validation of the system for dosimetry, overall planning process, accuracy and efficacy of treatment planning.



AAKANKSHA - indigenous cancer Radiation Treatment Planning System

Mercury™ Nimbus Suite

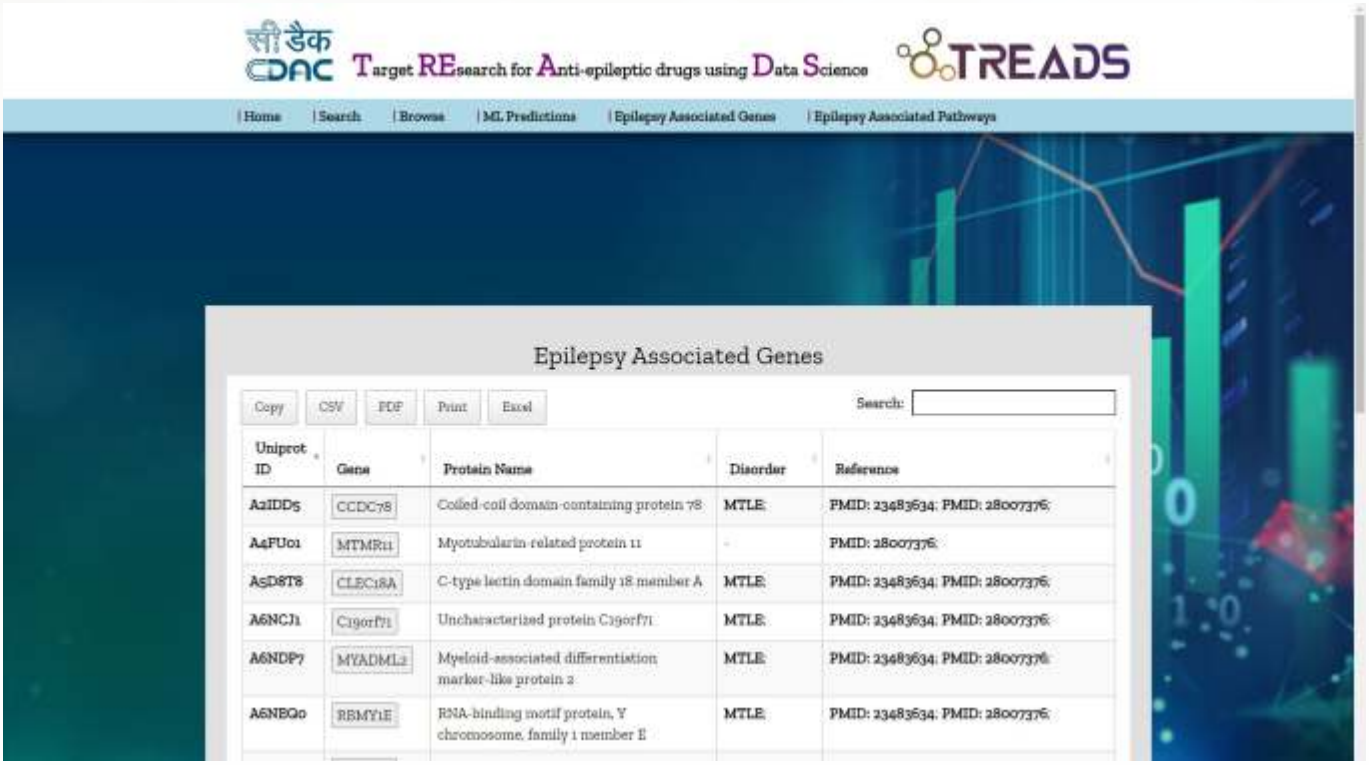
Mercury™ Nimbus Telemedicine solution extends healthcare services to remote locations using Information Technology and digital health platform. It offers variety of Electronic Medical Records/ Electronic Health Record (EMR/EHR) functions, telemedicine features, integration with devices, tools and services for providing healthcare services to patients. The solution is being used by Odisha Government, NTPC Limited and ESIC among the others. More than 20,000 institutional consultations (Doctor-to-Doctor-to-Patient) and over 600 medical trainings have been conducted in recent times. Mercury™ Nimbus solution has been deployed at NTPC Data Centre, Noida and 03 remote healthcare centres of NTPC located across India.

Mobile Telemedicine System for Tribal Care Wayanad

C-DAC has implemented two Mobile Telemedicine systems in Wayanad district of Kerala specifically for Tribal Care with support from Sree Chitra Tirunal Institute of Medical Sciences and Technology, Government of India. The mobile telemedicine systems are vehicle based and are equipped with all necessary diagnostic equipment. The Electronic Medical Records (EMR) of patient are captured using SNOMED CT & DICOM international standard templates and the same EMR is transferred from mobile telemedicine units to the specialty Hospitals on real time using integrated 4G connectivity.

TREADS: Target REsearch for Anti-epileptic drugs using Data Science

TREADS is a tool developed by C-DAC to identify potential drug targets for Epilepsy using data science and machine learning techniques. The tool has been developed as part of an initiative - "Advanced Epilepsy Research – a multi-disciplinary approach" in collaboration with AIIMS Delhi, University of Delhi, IIT Delhi and NIAS Bangalorehttp://treads-aer.cdacb.in/



TREADS tool for identifying drug target for Epilepsy

Artificial Intelligence in Oncology

The initiative has been jointly conceived by C-DAC and All Indian Institute of Medical Sciences (AIIMS), New Delhi. The objective is to establish a methodology for early detection of cancer by interrogating the medical and non-medical data sets using AI technology. It will help in detection, feature extraction, characterization of cancer and prediction of patient prognosis.

Low Cost Automated System for Screening of Cervical Cancer [CerviSCAN-II]

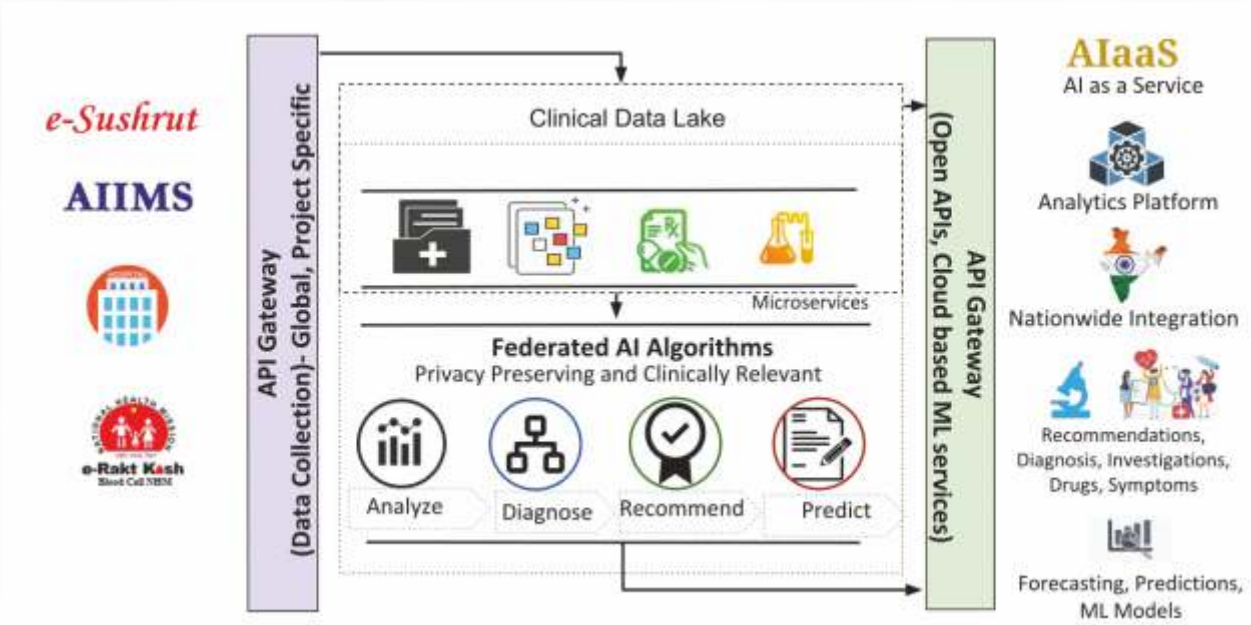
C-DAC in collaboration with four premier cancer care institutes in the country namely RCC-Thiruvananthapuram, NICPR-Noida, Dr. BBCI-Guwahati and RCC-Agartala has developed various cost-effective AI assisted solution for automated screening of cervical cancer which include the RotoScanner – Automated Specimen Stainer and DigiSmear – Automated Slide Digitizer.

Chest X-Ray Image Processing Solution for Computer Aided Diagnosis

The Chest X-Ray Computer Aided Diagnosis Software is an artificial intelligence basedengine that can help in Chest X-Ray Computer Aided Diagnosis. The functionality includes Chest X-Ray disease classification and generation of heat map visualization showing disease affected regions. The initiative has been carried out in collaboration with Cachar Cancer Hospital and Research Centre, Silchar, Assam and Mahalakshmi Multispecialty Hospital, Porur, Chennai.

ML Based System to Assist Medical Practitioners

The solution is a machine learning based system for diseases, that suggests possible treatment, advice and diagnosis, based on patient demographics (age, gender, location), seasons, symptoms, examination, history of present illness and past treatments. The suggestions are ranked by probability of outcome to indicate the confidence of the system in the suggested value against the input fields. This will result in an anonymized labelled dataset that is suitable for processing by AI algorithms and incorporation of the same in live environment through its integration via Open API's with HMIS.



ML Based System to Assist Medical Practitioners

Health Standards

SNOMED CT Toolkit (CSNOtk) v5.5

C-DAC's SNOMED CT Toolkit, CSNOtk v5.5 provides the APIs and software tools for simple and rapid integration of SNOMED CT in healthcare applications. It supports OpenJDK 1.8.0 and new APIs for querying Drug Information Service. The toolkit is distributed as free and open source software under Apache v2.0 license and is available for download on C-DAC website.

Common Drug Codes for India

Common Drug Codes for India is a set of files that integrate with SNOMED CT Global Medical Terminology files and content for use in any data entry, analysis or record exchange systems that adheres to MoH&FW notified Electronic Health Record Standards for India 2016 guidelines. This release aims to familiarize affiliates and SNOMED CT implementors to the format and model ofthe national drug extension.

Medical Informatics Software Development Kit (SDK)

C-DAC's Medical Informatics Standards Software Development Kit v1.0 for Continuity of Care Document (CCD) is a toolkit that provides APIs to enable integration of HL7/ASTM's Continuity of Care Document (CCD) Release 1 standard in healthcare applications. The solution is distributed as free and open source software. Medical Informatics Software Development Kit for ASTM/HL7 Continuity of Care Document standard was launched during C-DAC Tech Conclave held on April 05, 2019.

AyurPrakriti Web API

AyurPrakriti Web API is an effort towards making available the Ayurved concept of Prakriti over the internet and standardizing its usage across web and mobile apps. It is a cost-effective solution which provides an extensive questionnaire that is patient specific and this enables the application to provide lifestyle advice.

Health Information Systems

e-Sushrut – Hospital Management Information System (HMIS)

C-DAC has indigenously designed and developed the "e-Sushrut", a full-fledged Hospital Management Information System that provides an indispensable mechanism for digitizing and streamlining the workflow of hospital services.

AIIMS Central Dashboard

During this year PMSSY division of MoH&FW has recognized e-Sushrut HMIS as the solution for new upcoming AIIMS under PMSSY. Subsequently AIIMS Raebareli, Raipur, Nagpur, Bhatinda andBhubneshwar has adopted e-Sushrut HMIS. C-DAC is carrying out deployment and implementation of e-Sushrut HMIS for;

- State of Punjab towards State wide rollout of e-Sushrut HMIS
- Acharya Harihar Regional Cancer Center (AHRCC), Cuttack
- Sardar Vallabhbhai Patel Post Graduate Institute of Pediatrics (SVPPGIP), Cuttack

e-Aushadhi – Drug and Vaccine Distribution Management System (DVDMS)

C-DAC's "e-Aushadhi" is a Supply Chain Management System for the distribution &supply of drugs and vaccines in the healthcare system of the country. During this year C-DAC has initiated deployment of e-Aushadhi in State of Assam. With inclusion of Assam e-Aushadhi is currently operational in 18 States of India for Free Drug and Vaccine Distribution under NHM. The solution has also been implemented under 05 National Programmes of the MoHFW.

e-RaktKosh – Blood Bank Management System (BBMS)

e-RaktKosh (an initiative from MoH&FW) is a centralized blood bank management system. The solution streamlines the standard operating procedures, guidelines and workflow of blood banks in accordance to National AIDS Control Organisation (NACO) and National Accreditation Board for Hospitals & Healthcare Providers (NABH) guidelines. It has reached more than 1,900 blood banks in 32 States / UTs across the country.

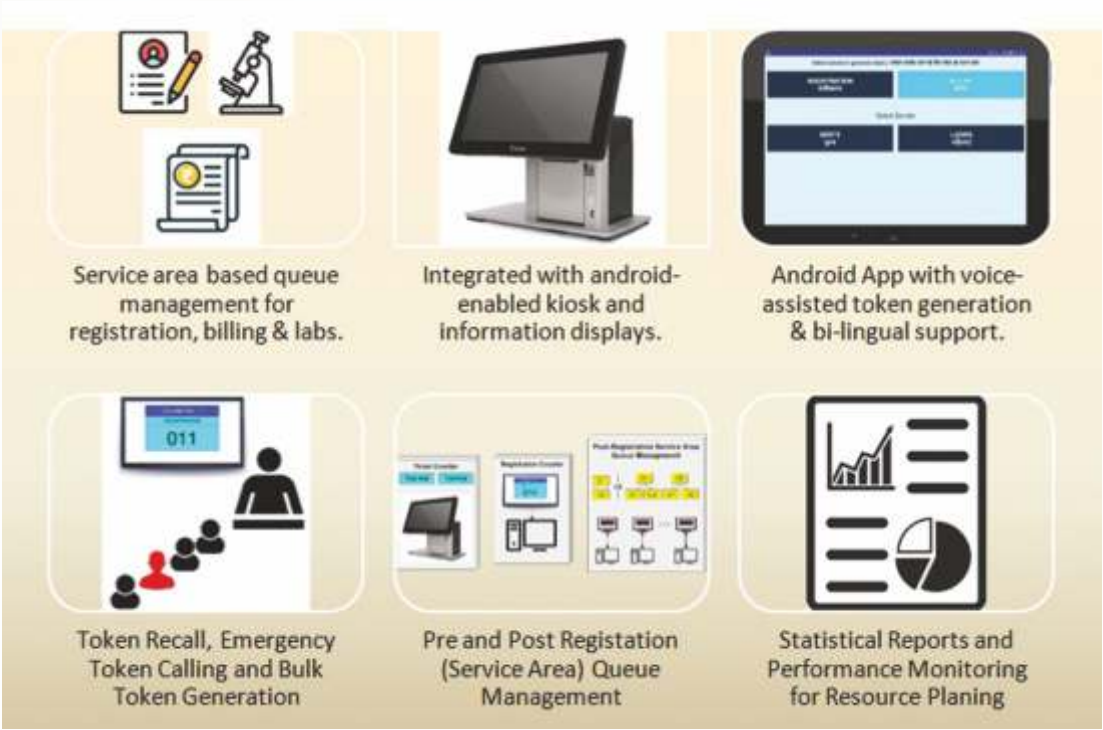
e-RaktKosh Blood Bank Management System Dashboard

Student Life Cycle Management System (SLCMS) for Medical Institutions

Student Life Cycle Management System is a SaaS based web application which caters to the growing need of Medical Colleges to manage their student data along with related services. The aim of this system is to cover the complete lifecycle of a student and alumnus. The software has been deployed in Mahatma Gandhi Institute of Medical Sciences (MGIMS) Sewagram Wardha.

Integrated Patient Queue Management System for HMIS

The Patient Queue Management System is designed for hospitals allowing them to reduce patient queue length (reducing patient wait time) at hospital service areas (such as registration, billing, lab test, pharmacy counters etc.) and increase the operational efficiency. The system has multiple components including Android based token generation apps for kiosks and mobiles, socket-based interfaces for counter information displays on smart TVs, HMIS Integrated queue manager desk and responsive token consumption interfaces integrated with the HMIS modules. A pilot deployment of the system has been carried out in AIIMS Mangalgiri.



Integrated Patient Queue Management System for HMIS

Beneficiary Identification System & AM I Eligible portal

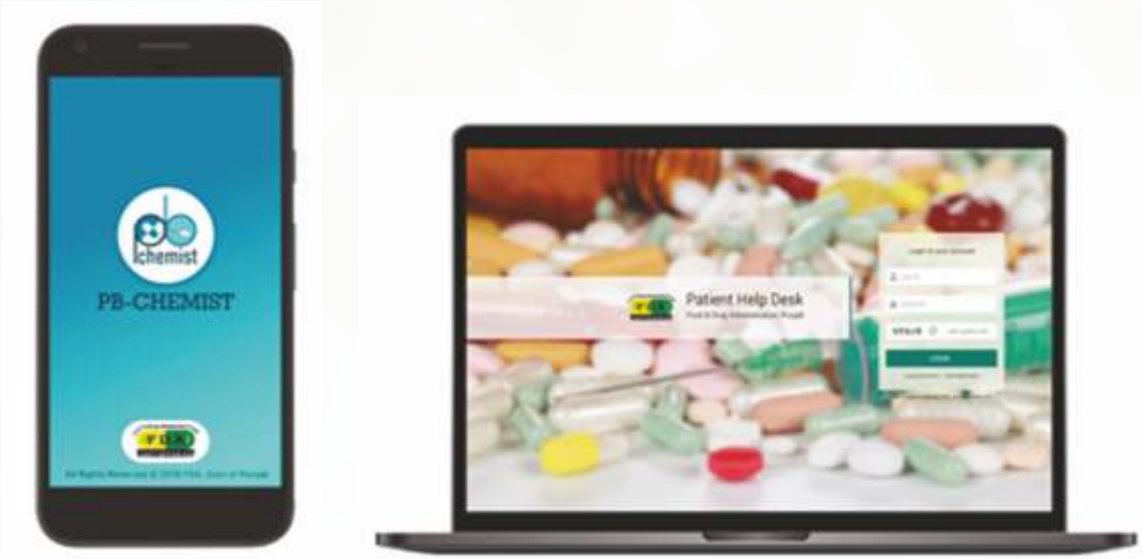
Ayushman Bharat -A National Health Protection Mission (AB-NHPM) is providing financial protection (Swasthya Suraksha) to rural and urban families as per the latest Socio-Economic Caste Census (SECC) data comprising of more than 50 crore beneficiaries. "Am I Eligible" search portal provides eligibility data under the Ayushman Bharat Yojana by simply entering citizen details such as mobile number, ration card number (ADCD), SECC name and RSBY URN.

National Ethics Committee Registry for Biomedical Health Research (NECRBHR)

The Ethics Committee (EC) is responsible for scientific and ethical review of research proposals. All biomedical and health research involving human participants should be conducted in accordance with the basic and general ethical principles in harmonization with the ICMR National Ethical Guidelines for Biomedical and Health Research. C-DAC has developed a portal that enables applicants to submit the application online for registration and after scrutiny, its permission is issued. This portal was made live on September 15, 2019. More than 540 applications have been submitted and 138 provisional certificates have been issued so far.

Online Drug Information and Monitoring System

This application has been developed by C-DAC in order to ensure maximum reach of information and services through user friendly, responsive and interactive interface. This initiative brings all chemists under one roof for free use of FDA Web Application and Mobile Apps.



Online Drug Information and Monitoring System

Lab Process Automation Software for Indian Pharmacopeia Labs (IPC Lab)

This software has been developed and customized as per Indian Pharmacopoeia Laboratory. It is used to automate the entire workflow for testing of Medical Products (Drugs, Vaccine, Cosmetic and Medical Devices) in order to meet the quality specifications. The system has the facility to receive sample entry, test specification management, sample registration, barcode generation, test result entry, report generation and configurable approval workflow for different sample type and easy to use. The specifications of the test are under the guidelines of pharmacopeia.

Integrated Validation of Export of Drugs and its Authentication (iVEDA)

iVEDA is an initiative of the Ministry of Commerce & Industry developed by Pharmexcil with technical support from C-DAC for facilitating the implementation of Track and Trace for Pharmaceutical products, instituted by the Commerce Ministry. During the year various workshops with Pharmaceutical Industry have been organized at Noida, Mumbai, Ahmedabad, Hyderabad and Chandigarh in order to train users on IVEDA portal and to collect feedback to make the system seamless and more user-friendly.

Education and Training

C-DAC's Education and Training group has been developing the skilled resources as part of Skill India initiative through its Post Graduate Diploma as well as Post Graduate Degree awarding programmes for its internal human resources needs of Research and Development activities as well as IT industry. These skill enhancement ICT training courses are imparted by C-DAC training centres as well as Authorised Training Centres spread across India.

"One Nation One Digital Platform will ensure equitable, accessible, affordable and quality education for all"

Shri Dhotre Sanjay Shamrao
Hon'ble Minister of State for Human Resources Development, Communications, Electronics and Information Technology
Deputy Chairperson, Governing Council, C-DAC

C-DAC's education and training division is involved in the following activities:

- Post Graduate Diploma courses in ICT
- Industry-academia collaborative programmes
- Education and Training Technologies
- Comprehensive Recruitment System
- IT &Skill Development programmes for Capacity Building

Following are the major activities carried out under these categories during the year:

Post Graduate Diploma courses in ICT

C-DAC Advanced Computing Training School (ACTS) has trained and placed students in 13 Post Graduate Diploma Courses (NSQF level 8 course) through a network of over 30 C-DAC training centres and Authorized Training Centres located in pan India. The Advanced Computing Training School (ACTS) of C-DAC offers following 6 months PG Diploma courses, conducted twice in a year.

- PG Diploma in Embedded Systems Design (PG-DESD)
- PG Diploma in Systems Software Development (PG-DSSD)
- PG Diploma in Advanced Computing (PG-DAC)
- PG Diploma in IT Infrastructure, Systems and Security (PG-DITISS)
- PG Diploma in Advanced Secure Software Development (PG-DASSD)
- PG Diploma in VLSI Design (PG-DVLSI)
- PG Diploma in Artificial Intelligence (PG-DAI)
- PG Diploma in Big Data Analytics (PG – DBDA)
- PG Diploma in Mobile Computing (PG-DMC)
- PG Diploma in Biomedical Instrumentation and Health Informatics (PG-DBIHI)
- PG Diploma in HPC System Administration (PG-DHPCSA)
- PG Diploma in Geo-Informatics (PG-DGI)
- PG Diploma in Internet of Things (PG-DIOT)

During the year, C-DAC has trained 6512 students in Post Graduate Diploma courses inducted through the national level C-DAC Common Admission Test (CCAT). Over 80% of these trained and certified students are placed in the leading IT and Electronics companies through the National Common Campus Placement Programmes (NCCPP).

Launch of Post Graduate Diploma in Artificial Intelligence (PG-DAI)

The first pilot batch of Post Graduate Diploma in Artificial Intelligence (PG-DAI) was launched in August 2019. The PG-DAI course syllabus comprises of modules such as, Deep Neural Networks, Machine Learning, Data Analytics, Reinforcement Learning, Natural Language Programming (NLP) and Machine Vision. These courses focus on skills needed in Emerging Technologies and requirements of IT industry.

Industry-Academia collaborative programmes

Post Graduate Degree Awarding Programme

C-DAC conducted M. Tech programmes in Artificial Intelligence and Machine Learning and Advanced Computing and Data Science; in collaboration with Vellore Institute of Technology, Chennai and Sandip University, Nasik. C-DAC also conducted M. Tech (IT, CSE, VLSI), MBA (IT) and MCA programmes, approved by All India Council for Technical Education (AICTE), Delhi and affiliated with Guru Gobind Singh Indraprastha University (GGSIPU), Delhi. The overall objective of these programmes is to generate synergy between education, research and product development.

A total of 164 students completed their respective formal degree programme and most of them got placements in reputed companies of IT and Electronics sector.

Integrated Diploma and certificate courses

C-DAC has conducted the integrated Diploma in IT Architecture (DITA) for the Engineering students of CV Raman College of Engineering, Bhubaneswar. The first batch of DITA course was completed and placements were organized. Certificate course in Internet of Things (IoT) was also conducted for the engineering students of Sandip University, Nasik as part of vocational training.

Education and Training Technologies

Process Automation for Competitive Exams (PACE)

Process Automation for Competitive Exams focuses on competitive exams such asGraduate Aptitude Test in Engineering (GATE), Joint Admission Test for Masters (JAM), All India Institute of Medical Science - AIIMS (PG, MBBS, BSc Nursing), National Board of Examination (NBE). PACE does automation of various stages such as candidate registration, online application filling, application scrutiny, exam centre allocation, admit card generation, result processing, score-card generation, choice filling, application scrutiny for admission, seat counselling.Using this software, C-DAC has conducted recruitment process for more than 11.38 Lakh candidates in the year 2019 -20.

Online Examination System- AFCAT and CASB/STAR

C-DAC is using Comprehensive Recruitment System for Air Force Common Admission Test (AFCAT) and Central Airmen Selection Board (CASB/STAR) using its indigenously developed series of solutions equipped with latest technologies to bring more transparency, convenience and security in their recruitment processes. In the complete recruitment process, different modules are involved such as Website, Registration, Question Authoring, Pre-Exam, Post-Exam, 'Exam-Execution and Management' and Result Processing. Using this software, C-DAC has conducted recruitment process for more than 12.42 Lakh candidates in the year 2019 -20.

eAkadamik – Solution for academic institutions

eAkadamik has been developed for the effective management of departments, faculty and students. The system supports role-based access and helps in assigning subjects/courses, managing attendance, exam-marking, assignments etc. Online counselling and management of candidates with online Payment is also supported. The solution is deployed at University Institute of Engineering and Technology Chandigarh, University Institute of Engineering and Technology Hoshiarpur, Chandigarh college for engineering and Technology Chandigarh, Punjab

Engineering College (PEC) Chandigarh, Universal Group of Institutions Lalru and Punjab School Board of Technical Education.

Shaala Darpan

Shaala Darpan is an end to end e-Governance school automation and management system developed by C-DAC. It has been implemented at Navodaya Vidyalaya Samiti to enable automation of all activities of the country's largest residential schooling system under a single umbrella - 636 schools, 8 Regional Offices, 8 Navodaya Leadership Institutes (NLIs) and Head Quarter. It serves as a single integrated platform for information sharing and knowledge dissemination for about 22000 employees and over 2 lakh students across schools and offices of Navodaya Vidyalaya Samiti. This was launched by Shri. Sanjay Dhotre, Hon'ble Minister of State, Communications and Electronics & Information Technology, Govt. of India on November 06, 2019 at New Delhi.

Shaala Darpan - school automation and management system

IT Skill Development programmes for Capacity Building

Capacity building in the areas of Electronic Product Design and Production Technology

Under this initiative, C-DAC carried out capacity building in terms of R&D capabilities, offering PhD, MTech/MS level programs, short term skill oriented and non-formal courses etc., in the areas of electronic product design and production technology. Under this initiative, state of the art laboratories were established for the Electronic Product Design and Prototyping activities. The initiative was completed on May 31, 2019. Overall, a total of 4,238 candidates including engineering graduates, faculty and ITI/polytechnic students were trained. The major programmes under this initiative include Faculty Updation Programs, Short Term Certificate Courses (STCC) program, Skill Development Programmes (SDP), PG diploma and M. Tech programmes.

National Level Training Programme under ICPS Programme of DST

This initiative is to impart training to the faculty, scholars and PG/UG students in the emerging fields of artificial intelligence, robotics, Internet of things, big data analytics, cyber security and data sciences under interdisciplinary cyber physical systems. Participants were majorly from schedule caste and schedule tribe community.

Awareness programme for SC/ST students at School level under ICPS programme

This initiativeis to bring awareness about the latest emerging technologies particularly the ICPS thematic areas among the students at school level for SC/ST candidates. Following districts of West Bengal state were selected for this training program viz. Malda, Murshidabad, Nadia, Birbhum and Dakshin Dinajpur. An experimental kit - IoT Network Driven Apparatus (INDRA) demonstrating ICPS technologies have been distributed to every school for practical understanding of the same.

An experimental kit - IoT Network Driven Apparatus (INDRA)

Industrial Automation and Robotics training programme

The program on Advanced Diploma in Industrial Automation and Robotics (ADIR) has been designed as a skill building program, focusing on laying strong foundation to groom graduate engineers in the field of automation/robotics. In order to meet the increasing demand for robot interventions in industrial workplace,C-DAC has developed state-of-art resource facilities with the objective of teaching industrial automation systems using Programmable Logic Controllers (PLCs), Supervisory control and data acquisition (SCADA)/ Human-Machine Interface (HMI), Data-acquisition boards, Machine vision, robots and related software.

Skill Development and Enhancing Employability for SC/ST Candidates.

This initiative envisages to generate trained workforce of SC/ST Category in IT/ITeS Sector and helps them to reorient themselves in the light of emerging employment opportunities. This would also take into account Job-roles/ National Occupational Standards (NOS) in IT/ITeS Sector, which would specify the standard of performance, knowledge and understanding, along with mechanisms for assessment and certification.

PMGDISHA

C-DAC continues to participate in PMGDISHA program as assessment and certifying agency. PMGDISHA is a central government's initiative of digital literacy program in the country. The aim of the initiative is to make at least one person in each household digitally literate to interact with digital world such as digital payment and e-government services. C-DAC centres have started this operation since November, 2017 and during the year 2019-20, C-DAC has proctored more than 32.24 lakh citizens across the country.

C-DAC's Mission Mode Programmes

C-DAC has crafted its strategic practical roadmap keeping in perspective the paradigm shift in the global technological ecosystem and ever-dynamic area of national ICT scenario. Accordingly, the roadmap has been devised with four-pronged approach based on the Core as HPC & Cloud., viz. Futuristic Research, Applied R& D, Applications and Services covering 28 thrust areas.

"HPC-AI Convergence enables better scalability and enhanced efficiency for data analytics, accelerating inferencing capabilities."

Dr. Hemant Darbari,
Director General, C-DAC

Towards realization of the roadmap, six mission mode programmes were evolved to research, develop and deliver the futuristic technologies/solutions. Verticals for all the six missions along with activities/projects, deliverables and timelines have been firmed up.

Exascale Computing Mission

Inline with the Government of India's "Make-in-India" Initiative, C-DAC is actively pursuing research, design, development and deployment of infrastructure, applications, and capacity building under National Supercomputing Mission (NSM). Building Exascale Capable Systems is the key enabler for accelerating Scientific Discovery and Innovation. Exascale Mission shall capitalize these efforts and further leverage the HPC-AI Converged Approach towards building next generation exascale systems. The Exascale Mission shall nucleate untapped areas such as materials science, Earth science, energy assurance, fundamental science, biology and medicine, engineering design, and national securitywhich are of immediate global importance.

Key elements of Exascale Computing include HPC Systems Design, HPC interconnect & network design, HPC System Software & Middleware, devising special purpose computing and addressing challenges pertaining to power consumption and reliability. This mission focuses on Exascale systems Design & Architecture and HPC Product Development, HPC server board design and development, Exascale system deployment, management and human resource development, Exascale Data centre design & application services, Exascale communication software stack and software stack for indigenous server boards, Exascale high-speed interconnect design and development, Special purpose machines, Exascale system software stack and libraries, Exascale system application development (Bio-Informatics), Exascale system application development (Earth Sciences) and Exascale storage development.

Microprocessor and Professional Electronics

Under the umbrella of "AtmaNirbhar Bharat", towards Self-Reliance, development of indigenous Microprocessor is of national importance. C-DAC has embarked this Mission towards development of indigenous Microprocessor development along with necessary ecosystem for product developments. In addition, C-DAC, with its expertise in Professional Electronics, focuses on development of solutions for Next Generation Communication Technologies, Strategic Electronics and solutions and Power Electronics.

Key elements of of this mission include development of processors such as RISC-V processor, Exascale processor development and HPC-AI Converged processor. In Next generation communication RF Frontend, Physical layer and Link layer communication technologies, Software Defined Radio and Cognitive Radio shall be developed. For Strategic sector solutions such as autonomous systems, acoustic & ultrasound technologies, sensor technologies and solutions for defence. In power electronics, development next generation power devices & converters, MEMS sensors, e-Mobility power electronics and real-time simulations and hybrid energy source and storage solutions shall be carried.

Quantum Computing

Quantum Computing is gaining traction with advancements in materials science and computer science. Realizing the importance of the area and its applications including quantum cryptography, C-DAC has evolved this mission that focuses on Quantum Computer Development, Quantum Communication, Quantum Key Distribution, Post Quantum Cryptography and Quantum Resistant Cryptography, Quantum Sensing, Quantum Computing Simulation, and Quantum Algorithms and Applications.

Key activities under this mission shall be development of quantum simulator, quantum computing algorithms, establishment of quantum communication environment, experimentation of quantum key distribution for IoT and SDN environments and quantum sensing & development of smart sensors.

Artificial Intelligence and Language Computing

As our nation embarks upon its most revolutionary phase of Digital Transformation, multitudes of reformative and transformative changes under the Digital India Vision of India. Language Computing is the key aspect towards realization of the same. With its proven expertise over the decades, C-DAC is well positioned to pursue pioneering research in Language Technology dissolving the language barriers. This shall include development of Intelligent Systems based on combination of Big Data Analytics, Cloud Computing, Machine-to-Machine communication, Robotics and the Internet of Things (IoT) to learn, operate and accomplish.

This mission focuses on Natural Language Processing Systems, National Level Natural Language Processing (NLP) Frameworks, Speech Technologies & Systems, IE/IR Applications, Accessibility and Brain Computer Interface, Signal, Image and Video Processing, AR-VR, Digital Preservation, Robotics, AI Applications and HPC-AI Infrastructure Development.

IoE and Dependable and Secure Computing

India is witnessing considerable increase of digitization enabled by prolific use of internet and Smartphone across the globe. Advancements in technologies such as IoT, SDN and 5G are the key enablers for usage of the same by critical sectors. However, there is also a growing concern on the rapidly growing threat-ecosystem. This requires dynamic self-healing based approaches to ensure security and safety of the environment. In view of the same, C-DAC has prepared a three-pronged approach involving, innovative defense mechanisms, novel deterrence methods and effective response & recovery.

This mission focuses on R&D pertaining to light weight cryptography, Homomorphic encryption, PKI, Privacy enabled technologies, Zero thrust architecture, Blockchain protocols, IoT security authentication, Cloud & Edge security, AI based anomaly detection, Cyber Forensics and SCADA Security.

GenNext Applied Computing

In line with the key national initiatives such as Digital India, Digital Health Mission, Skill India, Smart cities, National Education Policy, Agriculture Policy, Smart grid and Digital payments, C-DAC has craved this Mission. This mission encompasses common technological elements such as GIS based services, Image Processing, Blockchain enabled trust environment, Immersive & Interactive technologies, AI & Analytics, Multi-lingual computing, Security framework and High-Performance Compute Infrastructure.

Key focus areas of this mission include development of next generation application for several sectors such as Smart cities, Health Informatics, Agriculture, Education, Energy, Banking & Finance, Strategic sector and e-Governance. Further, the mission shall addresses aspects pertaining to Interoperability & seamless integration and contributions to specific standards.

Outreach Initiatives

Products Services & Outreach team has been formed to enable comprehensive dissemination and leveraging of novel business opportunities through efficacious outreach. Its mandate is to steer multi center consortia projects of commercial nature, curate effective strategies and methodologies to go to market so as to unravel the immense wealth generation potential.

To enhance C-DAC's foot print various engagement models have been conceived keeping the commercialization policy approved by governing council in mind which will catalyze all centers to take their products and service to the market in a systematic and organized manner. This will reap rich dividends and ensure successful monetization of our research and innovations.

Towards wide scale proliferation of technologies, solutions and services, C-DAC has evolved strategy by way of announcing Intent of Association (IOA) and Expression of Interest (EoI) for collaborative innovation and channel partners respectively. The same is implemented with approval from the CDAC's Governing Council.

Intent of Association (IOA) for Collaborative Innovation

The objective of IoA is to pool resources with organizations in ICTE areas for Collaborative Innovation. Such entities with their expertise in related areas should be poised to explore new avenues jointly. The interested agencies should be suitably equipped to co-create along with C-DAC and provide the requisite resource (finances) for proposed solutions research. Once the collaborative R&D shapes up based on the strengths of each party into a product/solution, the revenue will be shared based on present valuation of the technology and value added to it for making commercial product/solution.

In order to meet the stated objective, C-DAC invited proposals from the Companies (including private limited companies, PSUs, MSMEs and start-ups), R&D institutions (comprising academia, research institutes, R&D organizations and companies), Firms, Partnership Firms, Trusts and Societies working in niche technologies in India and having requisite expertise in R&D/contract research for doing collaborative innovation. Many organizations applied through this channel and are working in close conjunction with various C-DAC centers for innovative technologies.

Expression of Interest (EoI) for Channel Partners

The objective of the EoI is to empanel suitable organizations as Channel Partners, in order to enhance the footprint of C-DAC by way of increased deployment/sale/outreach of its products/solutions /services/technologies categorized under various thematic areas given below as an indicative reference:

High Performance Computing, Cyber Security & Cyber Forensics, Health Sector, Professional Electronics, Agriculture, e-Governance Solutions, Language Computing Solutions, Education & Training, Operating Systems

In order to meet the stated objective, C-DAC invited expression of interest for empanelment of Channel Partners, who have adequate experience and carried out similar type of work, for wide scale deployments of solutions, system integration, customization, liaising with public/private entities, business development & promotion, sales & support, collaborative application oriented R&D, etc. C-DAC has received proposals towards the same & were evaluated for possible empanelment.

Expression of Interest for Technology and Development Partners

Expression of Interest for Technology & Development Partners was published for identifying agencies to execute various large scale business project undertaken by C-DAC which entails development, testing, implementation, maintenance and support of software systems.

Other Initiatives included identifying and hosting various success stories of projects executed by C-DAC. PS&O also conceived, populating and curating Blog section on C-DAC home page, LinkedIn platform, youTube channel for dissemination of information. Pan India PS&O team consolidated of products, solution, technologies for presentation to Office of the PSA, Minister of State of MeitY, National Security Council Secretariat (NSCS) and other dignitaries from time to time. Showcasing of Cyber Security tools to MeitY for exploration of possibility of productization of R&D outcomes developed under CSR&D Projects. Participated in CII event - CPSEs Forum on Scaling up R&D Investment. Facilitated publishing of C-DAC product on GeM platform for increased outreach. Presented C-DAC's technologies on various platforms like Accelerating Growth of New India's Innovations (AGNIi) and Ministry of Housing and Urban Affairs for various initiatives in Smartcity domain. Conducted seminars for dissemination of C-DAC upcoming technologies primarily focusing on eSign and blockchain. The team also enabled collaborative projects across centers for revenue generation was facilitated from business perspective.

Resources, Facilitation Services and Initiatives

International Collaborations/Initiatives

1. Collaborated with OHSL USA, PSNC Poland, Chalmers University Sweden, Notre Dame University USA for the collaborative cloud network useful for research related with cancer research
2. Collaborated with OHSL USA, National Cancer Institute (NCI), USA, SAMEER, TMC, AIIMS, University of California San Francisco, USA, SLAC National Accelerator Laboratory, USA, Massachusetts General Hospital and Harvard Medical School USA for Cancer Treatment planning using FPGA.
3. Collaborated with World Health Organization (WHO) for Enhancement, Support and Maintenance of Information Sharing Platform for SEARN among 11 members of Southeast Asia region
4. With support from Ministry of External Affairs (MEA), C-DAC extends its expertise in ICT to collaborating nations and nurtures their ICT centres. During the year, the following activities were carried out as part of this initiative:
    - Completed Installation and commissioning of IT Infrastructure at National Institute of Posts, Telecommunications and Information Communication Technology (NIPTICT), Cambodia, under the project "Setting up of Centre of Excellence in Software Development and Training (CESDT) in Cambodia, Lao PDR, Myanmar & Vietnam and appropriate accreditation to these training courses by C-DAC".
    - Completed training on the emerging IT areas viz. Cyber Security, Big Data, Internet of Things (IoT) and Ubiquitous computing under the project "Setting up of Centre of Excellence in IT at Technopark Casablanca, Morocco".
    - Completed training and ICT Workshops on e-Commerce and Cloud Computing under the project "Setting up of Centre of Excellence in IT at Al Azhar University Cairo, Egypt".
    - Completed Installation and commissioning of IT Infrastructure at Centre of Excellence IT at Fiji National University under the project "India – Fiji Centre of Excellence in IT (CEIT) at FNU in Suva".
    - Completed installation of IT Infrastructure and delivery of Courseware at CEIT at Yaren, Nauru. for imparting IT Training Programme in Nauru under the project "India-Nauru Centre of Excellence in IT (CEIT) at Yaren"
    - Completed installation of IT Infrastructure and delivery of Courseware and Reference Books at CEIT at University of South Pacific, Government of Cook Islands under the project "India-Nauru Centre of Excellence in IT (CEIT) at Yaren under the project "India – Cook Islands Centre of Excellence in IT (CEIT) at USP in Rarotonga".
    - Completed the training in Big Data Technologies, Ethical Hacking/Information Security at Namibia University of Science and Technology (NUST), Windhoek in Namibia under the project "Setting up of India - Namibia Centre of Excellence in ICT & HPC at NUST in Windhoek".
    - Completed training of master trainers from Centre of Excellence ITs (CEITs) in Egypt, Kazakhstan, Morocco and Syria, Guyana, Palestine and Turkmenistan under the project "Special course for training of master trainers from CEITs in several countries setup by C-DAC".
    - Completed the training on Open Source Software at India-Ghana Kofi Annan Centre of Excellence in ICT (AITI-KACE) at Bolgatanga, Ghana under the project "Capacity building in Research, Development & Innovation in ICT & Electronics through AITI-KACE by C-DAC".

- Completed advanced training of Master trainers and delivery of IT Infrastructure and Courseware at Vanuatu Institute of Public Administration under the project "India – Vanuatu Centre of Excellence in IT (CEIT) at Port Vila".
- Completed installation of entire IT Hardware and Software for setting up of CEIT, Guyana and training programmes on Network Security, Linux System Administration and Data Communication & Networking, Information Technology & Advanced Web Technology under the project "India – Guyana Centre of Excellence in IT (CEIT) at Guyana".
- Completed installation of IT Infrastructure and training of Master Trainers at National University of Samoa under the project "India – Samoa Centre of Excellence in IT (CEIT) at Apia".
- Completed installation of IT Infrastructure at Centre of Excellence in Nieu under the project "India – Niue Centre of Excellence in IT (CEIT) at Alofi".
- Completed training of Master trainers from Jordan in Cyber Security Course under the project, "Setting up of NexGen Centre of Excellence in IT at Hashemite Kingdom of Jordan".
- Completed training of participants from 41 countries in niche areas of e-Governance Application Development, Big Data Analytics, IOT and IT Fundamentals and System Administration under the project, "International Training under Indian Technical and Economic Cooperation (ITEC) scheme".
- Completed training of participants from 14 countries in the area of Specialised Programme on e-Governance Application Development under the project, "International Training under Indian African Forum Summit (IAFS III) scheme".

Patents

Patents Awarded

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3. "Method and device for Estimating Sound Recognition Score (SRS) of a subject", Vishnu Venugopal Ambika, GopakumarGopinathan Nair, Krishnakumar Rao, Sanjeeva Rao, Biju CheriyanOommen, Patent No. US 10,299,705 B2, USA.

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1. "An Automatic Carbon Sequestration Estimation System and Method to estimate the amount of Sequestrated CO2", Vaibhav Pratap Singh, Haribabu P, N. Sarat Chandra Babu, Bindhumadhava B S, G L Gangaprasad, Chinese patent application No. 201910589326 dated July 2, 2019.
2. "Method and System for Authenticating a user using a Personal Authentication Device (PAD)", Sreekanth Sarala Narayan, Nobby Varghese, Vaibhav Pratap Singh, Gopinath P., Uttam Kumar, Kaushik Nanda, Indu Sasidharan, Karthika Venkatesan, Haribabu P, Chinese patent application No. 20190585905.2 dtd. July 01, 2019.
3. "Dynamic nShield System based SCADA Device Security", Rajesh Kalluri, Yeswanth MV, R. K. Senthil Kumar, B. S. Bindhumadhava, Ganga Prasad, Patent No. 201911053061 dtd. December 20, 2019.
4. "A system for measuring of alkali spreading value in rice and a method thereof", Abhra Pal, Amitava Akuli, Gopinath Bej, Tamal Dey, Sabyasachi Majumdar, Suparna Parua Biswas, Tapas Sutradhar, Subhankar Mukherjee, Jayanta Kumar Roy, Rabindranath Kanjilal, Dr. Nabarun Bhattacharyya, Patent Application No. 201931054777 dated December 31, 2019.

Copyrights

Copyrights Awarded

1. "Anna-Scan: An Image Analysis Software for Estimation of Cooking Quality (Alkali Spreading Value) of Rice", Abhra Pal, Sabyasachi Majumdar, Tamal Dey, Gopinath Bej, Rishin Banerjee, Tapas Sutradhar, Amitava Akuli, Dr. Nabarun Bhattacharyya, Copyright Registration No. SW-12889/2019 dated October 03, 2019.
2. "Infrared Based Breast Cancer Screening Software", Asok Bandyopadhyay, Himanka Shekhar Mondal, Amit Chaudhuri, Copyright Registration No. SW-12853/2019 dtd. September 3, 2019.
3. "Online Signature Verification System (OSVS)",Asok Bandyopadhyay, Abhisek Hazra, Amit Chaudhuri, Copyright Registration Number - SW-12800/2019, India, dtd. September 09, 2019.
4. "iIndent", Mina H.K. Desai, Niladri Sekhar Saha, Argha De, Sankha Nath Ghosh, Arghya Ghosh, Shampa Dey, Copyright Registration No. W-12813/2019 dated September 12, 2019.
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Awards/Recognitions

1. C-DAC's efforts in the design, development and maintenance of Online Management, Monitoring and Accounting System (OMMAS) for Pradhan Mantri Gram Sadak Yojana (PMGSY) was awarded for "Outstanding support in development and maintenance of OMMAS". The award was presented by the Hon'ble Minister Shri Narendra Singh Tomar, Minister of Rural Development on 19th December 2019 at an event hosted at C Subramanyam Auditorium, NASC, Pusa, New Delhi.

2. C-DAC received Dr. A. P. J. Abdul Kalam HPC Award – 2019 for its outstanding contributions towards HPC field in presence of Dr. Rajeevan, Secretary, MoES on July 06, 2019 at Indian Institute of Tropical Metrology (IITM), Pune.

3. C-DAC received NASSCOM-DSCI Excellence Awards 2019 (Special Jury Recognition) for its Concerted efforts in raising Information Security Awareness and creating extraordinary mass outreach. Shri Ajay Sawhney, Secretary, MeitY, Government of India presented the Award at Delhi on December 5, 2019.

4. C-DAC received FICCI Healthcare Excellence Award, 2019 for Central Dashboard for Drug & Vaccine Distribution Management System (DVDMS) in presence of Mr. M Damodaran, Former Chairman, SEBI (Awards Jury Chair) on August 20, 2019 at Delhi.

5. C-DAC received Dr P C Ganesh Sundaram Award for contributions in the development of Machine Translation system. The award was given in 47th All India Conference of Dravidian Linguists & International Symposium on Language Endangerment in presence of Prof. H. M. Maheshwaraiah, Vice Chancellor, Central University of Karnataka, Gulbarga during June 20-22, 2019.

6. Telecom Sector Skill Council has recognized the efforts of C-DAC towards enhancing the skill ecosystem through itscontribution in the Training Centre by felicitating with the Telecom Manthan Award 2019 for "Outstanding Contribution" on 28th June, 2019 at New Delhi. Dr. Hemant Darbari, Director General, C-DAC received the award from Major General P. N. Monga.

7. C-DAC received National Award for e-Governance 2019-2020 (Silver) for Excellence in Government Process during 23rd National Conference on e-Governance held at Mumbai during February 7-8, 2020.

Events/Conferences

1. e-MahashabdkoshApp in Hindi on mobile was launched by Hon'ble Home Minister of India Shri Amit Shah in presence of Hon'ble MoS of Home Affairs, Shri Nityanand Rai and Shri G. Krishan Reddy on 14th September, 2019 at Vigyan Bhavan, New Delhi.

Launch of e-MahashabdkoshApp in Hindi by Shri Amit Shah, Hon'ble Home Minister of India

2. Exascale Computing Symposium was conducted on January 10, 2020 at C-DAC, Pune asa part of 'HPC-AI Convergence Year'.

Exascale Computing Symposium at C-DAC Pune

3. First Consultative meeting on National Mission on Quantum technologies was held on 1st October 2019 at Indian Institute of Science Education and Research (IISER), Pune.

First Consultative meeting on National Mission on Quantum technologies

4. Awareness Events on "Internet Protocols and Standards" was conducted to create awareness about Internet Protocols and Standards amongst the Academicians and Industry People at various academic institutions during the year.

Awareness Event on "Internet Protocols and Standards"

5. Drugs and Vaccine Distribution Management System(DVDMS) for Arunachal Pradesh was launched by Shri AloLibang, Hon'ble Minister Health & Family Welfare, Govt. of Arunachal Pradesh on August 10, 2019.

6. SNOMED CT (CSNOtk v5.5) toolkit was inaugurated by Col. A.K. Nath (Retd.), Executive Director, C-DAC, Pune and Prof. S. Sadagopan, Director, IIIT- Bangalore on November 22, 2019 during NRCeS Users' Meet – Winter 2019 event, in Bangalore.

7. C-DAC participated in Marathi Conclave organized by FICCI-Indian language Internet Alliance at Pune on May 6, 2019. This event was supported by C-DAC and organized in association with Facebook, Maharashtra Times, Your Story.

Participation of C-DAC in Marathi Conclave at Pune

8. Workshop on "Big Data Technologies and Machine Learning - 2019" for industry, academia, scientific and research communities was conducted at C-DAC Bangalore during December 2-6, 2019.
9. Instruction Enhancement Programme (IEP) on PCB Design Methodologies was conducted to enable SMDP-C2SD participating institutes to prototype the design at C-DAC Bangalore during June 10-14, 2019.
10. Workshop on Blockchain Technology and its applications was conducted in collaboration with JNTU, Hyderabad during July 18-19, 2019 at JNTU, Hyderabad.
11. Workshop on Blockchain Technology and its applications for Government users was conducted at MeitY, New Delhi on October 3, 2019.
12. National Seminar on Blockchain and e-Sign technology and its applications for Government users was conducted at Hyderabad on February 26, 2020.

13. Training Programme on Android Security was conducted for officials of CR Rao Institute, Hyderabad during April 8-10, 2019.
14. Regional seminar for North Eastern Region was conducted in collaboration with National Medicinal Plants Board, New Delhi to sensitise and build capacities of Medicinal and Aromatic Plants Stakeholders on utility of eCHARAK platform at Indian Institute of Entrepreneurship, Guwahati, Assam on December 4, 2019.
15. Technology dissemination and user awareness workshop for Digitally Inclusive SMART Sericulture was conducted in collaboration with Department of PaschimanchalUnnayan Affairs, Bidhannagar, Kolkata, West Bengal at Office of the District Magistrate, Bankura, West Bengal on April 3, 2019.
16. Release of Handbooks, Posters, Stickers byShri Sanjeev Chopra, Principal Secretary, Home Department, Govt. of Odisha as part of Cyber Safety and Security awareness week at Bhubaneswar on 6thJanuary, 2020.

Release of Handbooks, Posters, Stickers as part of Cyber Safety and Security awareness week

17. ATAL workshop on Cyber Security was conducted at C-DAC, Kolkata during October 21-25, 2019 to spread awareness on several thematic areas including Cyber Security.

ATAL workshop on Cyber Security at C-DAC Kolkata

18. Organized 2ndInternational Conference on "Futuristic Trends in Networks and Computing Technologies(FTNCT-2019)" jointly with Jaypee University of Information Technology, Waknaghat, Himachal Pradesh at C-DAC Mohali during November 22-23, 2019.

2nd International Conference on "Futuristic Trends in Networks and Computing Technologies (FTNCT-2019)" at C-DAC Mohali

19. DST sponsored training program on "Big Data Management & Comprehensive Analysis" for Scientists and Technologists working in the Government Departments was conducted at C-DAC Mohali during November 18-22, 2019.

Training program on "Big Data Management & Comprehensive Analysis" at C-DAC Mohali

20. Specialized training program on "Scalable Attack data capturing and analysis framework for Cyber Threat Intelligence generation" was conducted during March 11-16, 2020at CERT-In, New Delhi.
21. International Conference on Evolving Technologies for Computing, Communication and Smart World (ETCCS-2020) in collaboration with Southern Federal University, Russia and Jan Wyzykowski University, Poland was conducted at C-DAC Noida during January 31 – February 1, 2020.
22. Workshop on Digital Literacy and Cyber Safety Awareness for children of National Institute of Public Cooperation and Child Development under Ministry of Women and Child Development was conducted at New Delhi on December 19, 2019.23.Smart Registration under Compulsory Registration Scheme was launched by Shri Ajay Sawhney, Secretary,MeitY, Mrs. SurinaRajan, Director General, BIS at India Habitat Centre on April 3, 2019.

Launch of Smart Registration under Compulsory Registration Scheme

24. Workshop to showcase the feature and work flow in Manakonline and further enhancements required was conducted in collaboration with BIS at C-DAC Noida on December 27-28, 2019 and at BIS, New Delhi on February 27-28, 2020.

25. Shaala Darpan for Navodaya Vidyalaya Samiti developed by C-DAC was launched by Hon'ble Union Minister of State Human Resource Development, Communications and Information Technology, Shri. Sanjay Dhotre at New Delhi on November 6, 2019.

Launch of Shaala Darpan portal for Navodaya Vidyalaya Samiti

26. Memorandum of Understanding (MoU) was signed by Dr. Hemant Darbari, Director General, C-DAC and Shri. Dhananjaya A. Tambe, Deputy Managing Director & Chief Information Officer, State Bank of India (SBI) on 9th October, 2019.

Signing of MoU between C-DAC and State Bank of India

27. Accelerating Biology 2020 Symposium SNiPs to SPINS was organized at Indian Institute of Science Education and Research (IISER), Pune on February 4-6, 2020.

Accelerating Biology 2020 Symposium - SNiPs to SPINS

28. Workshop on Education for High Performance Computing (EduHiPC-2019) was conducted in collaboration with Tennessee Tech University, USA at Hyderabad on December 17, 2019.
29. ACM Winter School on High Performance Computing Conference was conducted at IIT Kanpur in collaboration with ACM India and IIT Kanpur during December 5-11, 2019.
30. National Seminar on "ICT Solutions for India's Northeast Heritage" was organized on September 25, 2019 at NEHU, Shillong to present and jointly explore the possibility of leveraging the ICT solutions to transform and promote the cultural heritage and tourism in the North-eastern states of India.
31. "संस्कृतसंज्ञानिकी : Knowledge Technology for Sanskrit - R&D Prospects" conference was conducted in collaboration with TDIL, MeitY at Bharatiya Vidya Bhavan,New Delhi on October 11, 2019.
32. Technical workshop for Senior Technology Officials of State Bank of India (SBI) was conducted at C-DAC, Pune on October 23, 2019.

Technical workshop for Senior Technology Officials of State Bank of India at C-DAC Pune

33. C-DAC participated in "Defence Expo 2020" at Lucknow, UP during February 5-9, 2020.

Participation of C-DAC in "Defence Expo 2020" at Lucknow, UP

34. Universal Acceptance of Multilingual Internet conference for awareness and proliferation of Universal Acceptance (UA) activity was conducted in collaboration with Internet and Mobile Association of India [IAMAI] at C-DAC Pune on September 6, 2019.

35. Awareness seminar on e-Hastakshar (C-DAC's eSign service) for Senior officer of IT and other departments of Assam Government was conducted at IT Department, Govt. of Assam on February 25, 2020.

Awareness seminar on e-Hastakshar (C-DAC's eSign service) for Senior officer of IT and other departments of Assam Government

36. AI Hackathon 2019 was conducted at C-DAC Pune in collaboration with NVIDIA during July 10, 2019 to September 30, 2019.

AI Hackathon 2019 at C-DAC Pune

37. Quantum Simulator Training was conducted in collaboration with ATOS and DRDO at C-DAC Pune during July, September and November 2019.

38. NRCeS Users' Meet - Summer 19 and Winter 19 were organized towards implementation of EHR standards at C-DAC Pune on May 24, 2019 and IIIT Bangalore on November 22, 2019.

NRCeS Users' Meet

39. National Seminar on "ICT Solutions for North East Heritage" was conducted for technology demonstration and as an opportunity for stakeholder meeting at NEHU Shillong on September 25, 2019.

National Seminar on "ICT Solutions for North East Heritage"

40. Workshop on "ICT Solutions for North East Artisans and Entrepreneurs of Handloom and Handicraft" was conducted for technology demonstration and as an opportunity for stakeholder meeting at Directorate of Handloom & Textiles, Guwahati on March 12, 2020.

Workshop on "ICT Solutions for North East Artisans and Entrepreneurs of Handloom and Handicraft"

41. Workshop for demonstration of Enhanced Cyber Forensics Tools to Law Enforcement Agencies was conducted at CeG Hall, New Delhi on December 16, 2019.
42. Commemoration of the 150thbirth anniversary of Mahatma Gandhi was celebrated at C-DAC on October 2, 2019.

Commemoration of the 150th birth Anniversary of Mahatma Gandhi

43. Adaptive Traffic Signaling in Hubli-Dharwad BRTS corridor was inaugurated by the Hon'ble Vice President of India, Shri M. Venkaiah Naidu in the presence of other Union Ministers & State Ministers on February 4, 2020.

Inauguration of Adaptive Traffic Signalling of Hubli-Dharwad BRTS corridor by Shri M. Venkaiah Naidu, Hon'ble Vice President of India

44. Emergency Response Support System (ERSS) was Inaugurated by Shri Pramod Sawant, Honorable Chief Minister of Goa on October 9, 2019 for Goa State.

Launch of Emergency Response Support System (ERSS) for Goa

45. Emergency Response Support System (ERSS) for Delhi was inaugurated on September 25, 2019 by Shri G. Kishan Reddy, Hon'ble Minister of State, Home Affairs, Govt. of India.

Launch of Emergency Response Support System (ERSS) for Delhi

46. Emergency Response Support System (ERSS) for the Mizoram state was inaugurated by Mizoram Home Minister, Pu Lalchamliana at Aizawl SP Office, on August 13, 2019.

Launch of Emergency Response Support System (ERSS) for Mizoram

47. Emergency Response Support System (ERSS) for the Tripura state was inaugurated by Honorable Chief Minister of Tripura, Shri Biplab Kumar Deb on December 10, 2019.

Launch of Emergency Response Support System (ERSS) for Tripura

Research Papers/Publications

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2. Janaki C , et al., "Unity and diversity among viral kinases", Gene, Vol. 723, Issue 10 January 2020, 144134, 2020.
3. LagineniMahendra, Rajesh Kalluri, R.K.Senthil Kumar, B.S.Bindhumadhava and Ganga Prasad, "SCADA Research Lab kit for Educational Institutes", IETE Journal of Education, Vol. 60, Issue 1, 2019.
4. Anoop Kumar Pandey, Balaji Rajendran and Kumari Roshni V S, "AutoAdd: Automated Bootstrapping of an IoT Device on a Network", S N Computer Science Journal, Vol. 1, Issue January 2020, 2020.
5. Sanjay Adiwal, Akanksha Gupta, Balaji Rajendran and Bindhumadhava B S, "A Secure Methodology for Filtering Spam & Malware in Email System and Secure Email Testbed Setup", Proceedings of the International Conference on Evolving Technologies for Computing, Communication and Smart World (ETCCS 2020), Springer LNEE, C-DAC Noida, 2020.
6. Jitendra Kumar, SanthanaVijayan A, Janet B, Balaji Rajendran and Bindhumadhava B S, "Phishing Website Classification and Detection Using Machine Learning", Proceedings of the International Conference on Computer Communication and Information, IEEE Xplore, Coimbatore, 2020.
7. Jitendra Kumar, SanthanaVijayan A, Balaji Rajendran and Bindhumadhava B S, "An Adaptive Neural Network for Email Spam Classification", Proceedings of the International Conference on Information Processing, IEEE Xplore, Bangalore, 2019.
8. Gopinath Palaniappan, Sangeetha S, Balaji Rajendran, Sanjay, Shubham Goyal and Bindhumadhava B S, "Malicious Domain Detection Using Machine Learning on Domain Name Features, Host-based Features and Web-based Features ", Proceedings of the International Conference on Computing and Network Communications, Elsevier Procedia, Trivandrum , 2019.
9. Balaji Rajendran, Anoop Kumar Pandey and Kumari Roshni V S, "A Blockchain Approach for Financial Reputation", Proceedings of the International Conference on Frontiers of Intelligent Computing: Theory and Applications, Springer, Vietnam, 2020.
10. Balaji Rajendran, Gopinath Palaniappan, Sanjay Adiwal, Shubham Goyal and Bindhumadhava BS, "Reducing RTT of DNS Query Resolution using RFC 7706", A Whitepaper, DNS Security Workshop, Centre of Excellence in DNS Security, January 2020.
11. Sukeshini, et al., "Big Data Analytics and Machine Learning Technologies for HPC Applications", International Conference on Evolving Technologies in Computing, Communication and Smart-World (ETCCS-2020)", Noida, 2020.
12. Manavalan, "Experiments on identifying Damaged Street Poles through Remote Sensing and Image Processing Techniques", International Conference on Electrical, Communication, Electronics, Instrumentation and Computing (ICECEIC-2019), Kanchi, Tamil Nadu, 2020
13. Shrivastava, Swapnil, et al., "Market Intelligence for Agricultural Commodities using Forecasting and Deep Learning Techniques", 7th International Conference on Big Data Analytics (BDA-2019), Springer, Ahmedabad, 2019.
14. Manavalan, NISAR Real Time data processing – A Simple and Futuristic View, International Conference on Big Data, Machine Learning, and Applications (BigDML 2019), NIT-Silchar, India, 2019.
15. Shrivastava, Swapnil, et al., "A Framework for Next Generation Agricultural Marketing System in Indian Context", 5th IEEE international Women in Engineering Conference on Electrical and Computer Engineering (WIECON-2019), IEEE, Bangalore, 2019.
16. Manavalan, "Drone Remote Sensing Technology for the Sustainable water resources management of small scale water bodies", International Conference on Innovative Trends in Civil Engineering for Sustainable Development (ITCSD – 2019), NIT-Warangal, 2019.
17. Ved, Mohit, et al., "Big Data Analytics in Telecommunication using state-of-the-art Big Data Framework in a Distributed Computing Environment: A Case Study", 43rd Annual Computer Software and Applications Conference (COMPSAC), IEEE, Milwaukee, WI, USA, 2019.

18. Aneesh Raveendran, Sandra Jean, Mervin J., Vivian D. and David Selvakumar, "A Novel Parametrized Fused Division and Square- Root POSIT Arithmetic Architecture", 33rd International Conference on VLSI Design (VLSID), IEEE, Bangalore, 2020.
19. Aneesh Raveendran, Vinay Kumar, D. Vivian and David Selvakumar, "Functional Simulation Verification of RISC-V Instruction Set Based High-Level Language Modeled FPU", 23rd International Symposium on VLSI Design and Test, Springer, Indore, 2019.
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21. Venkata Reddy K, Simranjeet Singh C, Vivian Desalphine and David Selvakumar, "A Low Latency Montgomery Modular Exponentiation", 3rd International Conference on Computing and Network Communications (CoCoNET), Elsevier, Trivandrum, 2019.
22. Deepika HV and Mangala N, "Development Environment for Hybrid Applicationson Heterogeneous Clusters", 9th International Conference on Advanced Computing, IEEE, Tiruchirappalli, 2019.
23. N Muraleedharan, Anna Thomas, S Indu and BS Bindhumadhava, "A Traffic Monitoring and Policy Enforcement Framework for HTTP", Proceedings of Third ISEA Conference on Security and Privacy (ISEA-ISAP), 2020.
24. SidharthaDodla, LagineniMahendra, Katta Jaganmohan, R. K. Senthil Kumar and B.S. Bindhumadhava, "Wireless Real-time Meter Data Acquisition System", TENCON, IEEE Region 10 International Conference, IEEExplore, Kochi, 2019.
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29. Tapas Saini, Priyanka Wawdhane, Anoop Kumar and E Magesh, "Face tracker assisted multi-person face recognition in surveillance videos", Evolving Technologies for Computing, Communication and Smart World (ETCCS-2020), Springer, C-DAC Noida, 2020
30. Kar, Saumita, BipanTudu, Arun Jana and Rajib Bandyopadhyay, ""FT-NIR spectroscopy coupled with multivariate analysis for detection of starch adulteration in turmeric powder", Food Additives & Contaminants: Part A 36, no. 6 (2019), Vol A 36, Issue 6, 2019.
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33. Ghosh, S., BipanTudu, Nabarun Bhattacharyya and Rajib Bandyopadhyay, "A recurrent Elman network in conjunction with an electronic nose for fast prediction of optimum fermentation time of black tea", Neural Computing and Applications, no. 2, Vol. 31, Issue 2, 2019.
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44. Aritra Ray and Hena Ray, "Comparative Study on Different Machine Learning Techniques for Heart Disease Prediction", 2nd IEEE International Conference on Emerging Smart Computing and Informatics ESCI 2020, January 2020.
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96. Manisha Mantri, R. Rajamenakshi and Gaur Sunder, "The futures of e-Health - Social, ethical and legal challenges", Festsaal, International and interdisciplinary conference, Humboldt Graduate School, Berlin, April 29-30, 2019.
97. Suresh Sharma, Achyut Patil, Manisha Mantri and Gaur Sunder, "Building Standardized and Interoperable Prescription Records in Telemedicine, CPOE, EMR & EHR Systems", Proceedings of 15th International Conference of Telemedicine Society of India (Telemedicon 2019), New Delhi, November 29- December 1, 2019.
98. Nilesh Rathi, Shailendra Singh Narwariya and Gaur Sunder, "Ideal Workplace for Telemedicine Setup", Proceedings of 15th International Conference of Telemedicine Society of India (Telemedicon 2019), New Delhi, November 29- December 1, 2019.
99. Yumnam Kirani Singh and Debasish Deb, "Detection of Fire Regions from a Video Image Frames in YCbCrColor Model", International Journal of Recent Technology and Engineering (IJRTE), Volume 8, Issue 3, September, 2019.

100. Yumnam Kirani Singh, "Performing Binary Logical Operation in Decimal Arithmetic", ADBU Journal of Engineering and Technology, Volume 8, Issue 1, 2019.
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103. Das, Abhijit, et al., "Above Ground Biomass Estimation of Son Beel using Landsat 8 OLI", ICICRS 2019, IEEE, CV Raman College of Engineering, Bhubaneshwar, Orissa, 2019.
104. Yumnam Kirani Singh and VanlalHruaia, "Halftone based Face Recognition using SVM", Third International Conference on Advanced Informatics and Computing Research, Association for Computing Machinery, New York, United States, Himachal Pradesh, 2019.
105. Yumnam Kirani Singh and VanlalHruaia, "Performance Evaluation of Different Halftone Kernels for Binary Face Recognition", 1st International Conference on Innovation in Modern Science and Technology, ICIMSAT-2019, Springer, Siliguri, West Bengal, 2019.
106. Yumnam Kirani Singh, "A Lightweight Exchangeable Encryption Scheme for IoT devices based on Vigenere Cipher and MLS Keystream", Evolving Technologies for Computing, Communication and Smart World (ETCCS-2020), Springer, C-DAC Noida, 2020.
107. Debasish Deb, Dr. Kirani Singh, L. Mahendra and Sagorika Raj Chakraborty, "Security Analysis of MITM Attacks on SCADA Network", Machine Learning, Image Processing, Network Security and Data Science (Communications in Computer and Information Science book series (CCIS), Volume 1241, Springer Professional Singapore, National Institute of Technology Silchar, 2020.
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109. Sudeep Balan, Joseph Mathew, Lajitha C S, Sreedhanya L R and Vijaya Bhaskara Rao, "Design Methodology for Developing a future-proof IEC 61850 based Intelligent Electronic Device", IEEE, TENCON 2019, Kochi , 17-20 October 2019.
110. Abhir Raj Metkar, K Arun Krishnan and Pratheesh H, "Automatic Control of Two Low Pressure Boilers in Sugar Plant", Sixth Indian Control Conference 2019, IEEE Control System Society, IIT Hyderabad, 2019.
111. Haneesh Sankar T P, Hari Krsihnan B and Rajesh KR, "Realisation of Electronic Unit for Ultrasonic Solid-propellant Burn Rate Measurement System", IEEE ISED 2019, International Conference on Embedded Computing and System Design, IEEE, Kerala, 2019.
112. Karthika.P, Prakash.R and Divya D.S, "Development Of Error Compensation Method and Algorithm in Dead Reckoning for Improving Precision of GPS Navigation", International Journal of Innovations in Engineering Research and Technology [IJIERT], Novateur Publications, ISSN: 2394-3696 VOLUME 6, ISSUE 5, May 2019.
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116. Anupama P, Rakesh G, Jithin S and Lekshmi G, "Design of a highly accurate data acquisition device for thermal imaging based early detection of breast cancer", IEEE TENCON 2019, Kochi,2019.
117. Sneha Soney, C. Balan, Priya P. Sajan and Elizabeth Rose Lalson, "I2P Forensic Analysis", International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, Volume-8 Issue-6, 2020.
118. Jayan V, "Yanthravivarthanam", Malayalam Computing-parimithikalumsadhyathakalum, Kerala Bhasha Institute, Trivandrum, ISBN:978-81-200-4617-7, 2019.
119. Jayan V, "Markodi, Mavilan Tribal language – Is it a Tulu Extension or a New Language?", 47th National Conference on Dravidian Linguistics and International conference on Endangered Languages, Dravidian Linguistics News, Gulbarga, 2019.

Invited Talks

1. Dr. Balaji Rajendran, "Blockchain for Decentralized Internet", International Conference on Advances in Computing, and Communication Engineering, Coimbatore, 6 April 2019.
2. Dr. Balaji Rajendran, "Application and Data Security Using PKI", CISO Deep Drive Training, Bangalore, 30 May 2019.
3. Dr. Balaji Rajendran, "Connected, Security & Smart: Rising Expectations", LPSC, ISRO, Bangalore, 3 July 2019.
4. Dr. Balaji Rajendran, "DNS Security", National Workshop on Cyber Security for Critical Infrastructure (CSCI), SETS Chennai, 28 September 2019.
5. Dr. Balaji Rajendran, "Cryptography, Digital Signature, and TLS", CISO Deep Drive Training, Bangalore, 26November 2019.
6. Dr. Balaji Rajendran, "PKI and Blockchain for Trust in IoT", Training Program, IETE Bangalore, 4February 2020.
7. Kaushik Nanda, "Wireless Sensor Networks", LITD27 BIS IoT Standardization committee meeting and workshop organized by Bureau of Indian Standards, Ministry of Consumer Affairs, Govt of India, C-DAC, Bangalore, 31 October 2019.
8. Kaushik Nanda, "Internet of Things Applications", IETE Workshop on IoT, IETE, Bangalore, 15 September 2019.
9. Shweta N M, "IoT Protocols", IETE Workshop on IoT", IETE, Bangalore, 15 Sep 2019.
10. Shweta N M, "Architecture and Physical components of IoT", Internship and Training program in IoT, IETE, Bangalore, 17January 2020.
11. Vaibhav Pratap Singh, "Introduction to IoT", IETE Workshop on IoT, IETE, Bangalore, 15 September 2019.
12. Vaibhav Pratap Singh, "IoT Sense and Connectivity", IEEE and Future skills online webinar series, Bangalore, 2April 2019.
13. TulasiDwarakanathV.,"Embedded Systems for IoT", Internship and Training program, IETE, Bangalore, 21 January 2020.
14. Hari Babu P., "IoT security", International Cyber Security Forum 2019,Curitiba, Parana, Brazil, 26 June 2019.
15. Hari Babu P, "Agricultural Case Study using IoT", IETE internship Workshop, IETE, Bangalore, 3February 2020.
16. Divya MG, "Trends in Supercomputing", Tech day & Orientation Program, CDOT, Bangalore, 30 July 2019.
17. Divya MG, "Trends in Supercomputers and Application", Oxford Engineering College, Bangalore, 29 February 2020.
18. Swapnil Shrivastava, "Big Data Analytics Framework", "Big Data Analytics Framework" for Indian Army at Conference on Big Data, AI & OSNIT, DG IA office, Delhi, 21 May, 2019
19. Mohit Ved, "Big Data Analytics and Machine Learning", Ramco Institute of Technology (RIT), Rajapalayam, Tamil Nadu, 5July, 2019
20. Mohit Ved, "Big Data Analytics in Telecommunication", "Big Data Analytics in Telecommunication using State-of-the-art Big Data Framework in a Distributed Computing Environment: A Case Study" at 2019 IEEE 43rd Annual Computer Software and Applications Conference (COMPSAC), Milwaukee, WI, USA, 17 July, 2019.
21. Swapnil Shrivastava, "Big Data Analytics, Environment and Human Health", "Big Data Analytics, Environment and Human Health" a Workshop on Environmental Modelling: Resolving Complexes for Predictable Tomorrow, NEERI, Nagpur, 07-08 August, 2019.
22. Priyanka Sharma, "HPC Requirements for Big Data Analytics","HPC Requirements for Big Data Analytics", Workshop on seeking inputs from HPC Applications groups towards the planning of Next Generation HPC system", C-DAC Pune, 16October 2019.
23. Mohit Ved - through VC, "Big Data processing using Hadoop", "Big Data processing using Hadoop" for "Big Data Management & Comprehensive Analysis" program, C-DAC, Mohali, 21November, 2019.
24. Swapnil Shrivastava, "Analytics using Apache Spark", "Analytics using Apache Spark" at "Big Data Management & Comprehensive Analysis" training programme, C-DAC, Mohali, 21 November, 2019.
25. Ramesh Naidu L., "Towards trustworthy deep learning – Attacks, Defences and Evaluation", "Towards trustworthy deep learning - Attacks, Defences and Evaluation" at National Workshop on "Deep Learning for Cyber Security", SETS, Chennai, 07 March, 2020.

26. Vivian Desalphine, "Advanced Verilog HDL/Case Study", Guest lecture for M. Tech. (VLSI Design) students, VIT-Chennai, 2 March, 2020.
27. Muraleedharan N., "Network Security: Challenges and Approaches", Faculty Development Program on Cyber Security, Dayananda Sagar College of Arts, Science and Commerce, 20 February 2020.
28. Dr. N. S. Sreekanth, "ICT for Special Education", Workshop organized Inclusive Practices in Regular Schools, Indian Army -AWA- 12th-Corps -Southern command, Jodhpur, 3 April 2019.
29. Dr. N. S. Sreekanth, "Mathematics for AI and Machine Learning", one day workshop on Mathematics in Industry organized by PES University on PES University, Bangalore, 22 June 2019.
30. Dr. N. S. Sreekanth, "Mathematics for AI and ML", Two days workshop on Artificial Intelligence and Data Analytics- The Future", Dayanadasagar College of Engineering, 25 November 2019.
31. S Irene, "Similarity Learning using CNN", National Workshop on Deep Learning for Cyber Security, Society for Electronic Transactions and Security (SETS), Chennai, 6 March 2020.
32. Harikrishnan V. S., "Image Processing and Deep Learning", Invited Guest Lecture on Recent Technical Advancements, SA Engineering College, 31 January 2020.
33. K. Vijay Kumar, "Data Science & Path to Artificial Intelligence", Workshop on the development of IT Monitoring tool under Access Benefit Sharing (ABS) partnership project between GIZ and NBA, Hotel Turyaa, OMR, Chennai, 19-24 January, 2020.
34. K. Vijay Kumar, "IT Monitoring System", Workshop Webinar on Access Benefit Sharing and IT Monitoring Tool in India, Online Webinar, 12 February, 2020.
35. Dr. S.V.Srikanth, "Use of IoT in Agriculture", ICT for Agriculture Development, MANAGE, Hyderabad, April, 2019.
36. Lakshmi Eswari, "Importance of Endpoint Security", National Workshop on Cryptology and Data Security, IIT, Bhilai, 27-29 May 2019.
37. Lakshmi Eswari, "Trends in End Point Security", Cyber Security and Artificial Intelligence, CR Rao (AIMSCS), Hyderabad, 6 June 2019.
38. Mahesh U. Patil, "Cyber Security in Power Systems", Power System Logistic Conclave, NERLDC, POSOCO, Shillong, 7 June 2019.
39. Lakshmi Eswari, "Blockchain Technology and its Importance in Governance", Induction program for MeitY officials, C-DAC Noida, 17 June 2019.
40. Jyostna.G, "Face off with tools and technologies on Blockchain", Thematic Workshop on Emerging Technologies, MCRHRD IT, Hyderabad, 26 July 2019.
41. Lakshmi Eswari and Jyostna, "C-DAC's Property Record Management System Application", Annual Digital Identity Management 2019, ISB, Hyderabad, 12 October 2019.
42. G Jyostna, "Blockchain Technology", 94th Foundation Course (FC) for All India Services (AIS) and Central Civil Services (CCS) Officers, MCRHRD IT, Hyderabad, 22 November 2019.
43. Dr.S.V.Srikanth, "IoT for Defence", IoT & Its Applications in Defence", RCI, DRDO, Hyderabad, 2 December, 2019.
44. M. Kumar, "Mobile Apps in Agriculture & Apps Development Concepts", Training programme on " Improving governance in Agriculture" for Officials / scientists of various departments, KVKs, ICAR institutes and SAUs, 02-06 December, 2019.
45. Dr.S.V.Srikanth, "IoT Architecture, Protocols and I-P-P model", Wireless Sensor Networks and Internet of Things, CVR Engineering College, Hyderabad, 12 -14 December2019.
46. Mahesh U Patil, "Hands-on Training on Machine Learning", Machine Learning Workshop, Modern Engineering College, Pune, 24 January 2020.
47. Raza Sikander, "Use cases of Blockchain", Seminar on e-Sign, e-Pramaan, and use cases for blockchain technologies, C-DAC Silchar, 25 February 2020
48. Ravikishore, "Introduction to Blockchain Technology", One day national seminar on blockchain and e-Sign, C-DAC Hyderabad, 26 February 2020.
49. Sireesha, "PoE and Property Record Management System", One day national seminar on blockchain and e-Sign, C-DAC Hyderabad, 26 February 2020.

50. Ravikishore, "Architecture of Hyperledger Fabric and use cases", Blockchain and DLT Workshop, Symbiosis Institute of Technology, Lavale, Pune, 27-31 January 2020.
51. Ravikishore, "Architecture of Hyperledger Fabric and C-DAC's use cases", Faculty Development Program / Govt. Officials Training on Blockchain Technology, VJTI Mumbai, 30 September 2019 to 4 October 2019.
52. Dr. S. V. Srikanth, "Internet of Things (IoT) in Agriculture and Allied Sector", Application of RS and GIS in Agricultural Development, MANAGE, Hyderabad, 13 February, 2020.
53. Dr.S.V.Srikanth, "Internet of Things (IoT) in Agriculture and Allied Sector", Improving e-Governance in Agriculture, MANAGE, Hyderabad, 27 September, 2019.
54. Tapas Saini, "AI/ML technologies", Two-day preparatory courseware for Expert Level Training, IIT Guwahati, 11-12 October 2019.
55. Tapas Saini, "Deep learning-based Face Biometrics", National Workshop on Deep Learning for Cyber Security, SETS Chennai, 6 March 2020.
56. Sagar Chavan, "LoRa Communication", IoT& Its Applications in Defence, RCI, DRDO, Hyderabad, 4 December, 2019
57. Santosh Sam Koshy, "IoT for Agriculture", IEEE Webinar, 28 February, 2020.
58. Santosh Sam Koshy, "IoT for Agriculture", Agrinets 2020, Kolkata, 04 January, 2020.
59. Santosh Sam Koshy, "IoT for Agriculture", Future Technology trends and Opportunities in India, TIFAC, Webinar, 26 March, 2020.
60. Ch A S Murty, "Cyber Safety and Security Awareness workshop", West Bengal Higher education Institutions, North Bengal University, Siliguri, West Bengal, 28 January, 2020.
61. Ch A S Murty, "Cyber Safety and Security Awareness workshop", West Bengal Higher education Institutions, Rabindra Tirtha Complex, Kolkata, 31 January 2020.
62. Ch A S Murty, "Cyber Safety and Security Awareness workshop", Indian Army officials, Army Station Bagdorga, Siliguri, 29 January,2020.
63. Ch A S Murty, "Cyber Safety and Security Awareness workshop", Bhubaneshwar (BBSR) Awareness week 2020, Bhubaneshwar Police Dept, 5 January,2020.
64. Ch A S Murty, "Cyber Safety and Security Awareness workshop", Cyberabad Commissionerate, Gachibowli, 17 February, 2020.
65. Ch A S Murty, "Cyber Safety and Security Awareness workshop", Army Officials and Children, SANJOG @ IIT, Madras, 8 June, 2019.
66. Ch A S Murty, "Cyber Safety and Security Awareness workshop", AIR officials, CAW Secunderabad, 14 June, 2019.
67. Indraveni K, "Safety Measures - Devices and online Transactions", NCERT-NIE, Online Session, 27 February 2019.
68. Indraveni K, "Web application security, web hosting and hardening web servers", Cyber Security Training program, CR Rao Institute, April 2019.
69. Nandeeshwar. B., "Information Security", Information Security for Master Trainers, KV Begumpet, Hyderabad, TS, 22 January, 2019.
70. Nandeeshwar. B., "Network Security", Cyber Security Training Program, CR Rao Institute, University of Hyderabad, TS, 18-19 February, 2019.
71. Nandeeshwar. B., "Information Security – Online, Internet and Mobile Security", CISF Unit Bhilai Steel Plant, Bhilai, Chhattisgarh, 18 October, 2019.
72. Nandeeshwar. B., "Role of ISPs in Development of Integrated Digital Infrastructure", School of Planning and Architecture, Vijayawada, Andhra Pradesh, 30 October, 2019.
73. Nandeeshwar. B., "Cyber Security", National Information and Cyber Security Conference, "Indur Engineering College, Siddipet, Telangana, 18 February, 2020.
74. Tyeb Naushad, "Network Security", Information Security for Air warfare Employees, CAW, Secunderabad, TS, 19 February 2020.
75. Tyeb Naushad, "Cyber Security and It's Importance", Telangana Police Children's Summer Camp, Rachakonda Hyderabad Police, 19 May 2019.

76. Tyeb Naushad, "Cyber Security Training: PC Security, Wireless Security, Hands-on Browser Security, Mobile Security, Different Virus Security and Its threats, etc.", Cyber Security Awareness training, Mazagon Dock Shipbuilders Ltd. Mumbai, 28-29 May, 2019.
77. Tyeb Naushad, "Mobile Security", CISF Unit for Singareni Officers, Ramgundam, Telangana, 12 June 2019.
78. Tyeb Naushad, "Cyber Security", Information Security and It's Various Threats, CAW, Secunderabad, TS, 30 August 2019.
79. Tyeb Naushad, "Cyber Security lecture covering issues like threat and vulnerabilities, implications, social media, modern day financial transactions, etc." Cyber Security Awareness, CAW, Secunderabad, TS, 4 October 2019.
80. Tyeb Naushad, "Information Security Training for DRDO Officers", Network Security and It's Counter measures, C-DAC Hyderabad, 26-28 February 2020.
81. Tyeb Naushad, "Training on Cyber Security", Network Security and Its Importance, DIQA, Bengaluru, 09-11 March 2020
82. Vijayalakshmi B, "ICTs for Agriculture Development", Training for Post graduate students of Agricultural Universities, National Institute of Agriculture Extension Management (MANAGE), Hyderabad, 03 May 2019.
83. M. Kumar, "IT, Social Media & Mobile Apps", 3 Day ToT Programme in association with Nehru Yuva Kendra Sangathan, Ministry of Youth Affairs and Sports, Government of India, APHRDI, Bapatla, AP, 6 September, 2019.
84. Vijayalakshmi B., "Vikaspedia: Agricultural Knowledge Management Portal", Training for officials of Agriculture, Horticulture and Scientists of SAU and KVKs, National Institute of Agriculture Extension Management (MANAGE), Hyderabad, 11 December 2019.
85. Vijayalakshmi B., "C-DAC initiatives in Agriculture", ICAR – Short course - training programme on "Agriculture media skills for extension professionals, Professor Jayashankar Telangana State Agricultural University, Hyderabad, 24 January 2020.
86. Balram Chauhan, "eCHARAK – a networking platform for MAP stakeholders", ASU&H Drug Regulators, Industry personnel and other stakeholders meet, Central University, Hyderabad, 29 May 2019.
87. Balram Chauhan, "Utility of eCHARAK for forward-backward linkages in MAP sector, Buyer-seller meet of MAPs CRIUM, Hyderabad, 22 January 2020.
88. M. Kumar, "Mobile Applications in Agriculture & Allied Sectors", New Dimensions in ICTs and Knowledge Management in Agriculture, National Institute of Agricultural Extension Management, (MANAGE) Hyderabad, 12 March 2020.
89. Joyanta Basu, "Research Trends in Speech & Language Technology and Case Studies", One day Workshop on Research Trends on AI-ML, Kalyani Government Engineering College, 22 April 2019.
90. Joyanta Basu, "ICT Enabled Assistive Aids for Persons with Disabilities", National Conference on Assistive Aids for Persons with Disabilities, PJB Auditorium ISI, Kolkata, 22 November 2019.
91. Joyanta Basu, "Modern ICT enabled solutions with Data Management for Research and Development", 2nd International Conference on Information Systems & Management Science (ISMS) 2019, Tripura University, 6 December 2019.
92. Subhankar Mukherjee, "Current trend of research for IoT Applications with demonstration", 7th Doctoral Symposium on Advanced Computing and Security Systems (ACSS), Annual event organized by the University of Calcutta in collaboration with Ca Foscari University, Venice, Italy and Bialystok, University of Technology, Poland, Kolkata, 28-29 February, 2020.
93. Dr. Souvik Pal and Subhankar Mukherjee, "Digital India and C-DAC Initiatives", Training Program for the Officers of Rajasthan Accounts Services, Vinod Gupta School of Management, IIT, Kanpur, 23 February, 2020.
94. Subhankar Mukherjee & Dr. Souvik Pal, "Biosensing system and its application in agriculture and demonstration of Electrochemical System (E-Tongue)", Workshop on Green Technologies, Uluberia Institute of Technology, Uluberia, 15 January, 2020.
95. Dr. Nabarun Bhattacharyya, "Inaugural speech as 'Chief Guest', Inauguration program of our Bio-Electrochemical Laboratory, UIT, Uluberia, Uluberia Institute of Technology, Uluberia, 20 November, 2020.
96. Amitava Akuli, "Quality Assessment of Agricultural Produces – A Machine Vision Approach Digital Image Processing and Its Application in Agriculture", A refresher course on "Instrumentation and Automation",

sponsored by the University Grants Commission (UGC) - Human Resource Development Center, Instrumentation and Electronics Engineering, Jadavpur University, Kolkata, 17 December, 2019.

97. Amitava Akuli, "Quality Assaying Instruments for Food Grains and Spices", One day workshop on "Scaling-up trade through e-NAM", Hotel Clarks Avadh, Lucknow, Uttar Pradesh, 25 February, 2019.
98. Amitava Akuli, "Quality Assaying Instruments For e-NAM", One day workshop and users on e-NAM, Directorate of Marketing & Inspection, Faridabad (Haryana), 20 July 2019.
99. Dr. Amit Chaudhuri, "Cyber Security-The National Initiatives and Challenges in Research, Development and Training", Cyber Security Conclave, ITC Sonar, 25 April, 2019.
100. Anupam Chanda, "Cybercrime and fraud in international trade", FIEO, FIEO ER Conference room, Kolkata, 16 May, 2019.
101. Sourav Mitra and Anupam Chanda, "Security Issues in Cashless Transactions", Television Show on Muskil Asan, Doorda-rshan Kendra, Kolkata, 13 June 2019.
102. Asok Bandyopadhyay, "Information Security and Biometric", Invited talk at Trident University, TridentUniversity, Bhuban-eswar, 09 July 2019.
103. Asok Bandyopadhyay, "Information Security & Cyber Security", Invited talk at ONGC, Saltlake, ONGC Saltlake, 01 August 2019.
104. Asok Bandyopadhyay, "Information Security & Cyber Security", Invited talk at Angul for Cyber Lab Office of SP, Angul, Odisha, 13 August 2019.
105. Anupam Chanda, "Cyber Security and Financial Fraud", FIEO, FIEO ER Conference room, Kolkata, 3 September 2019.
106. AbhisekHazra, "Introduction to Cyber Security & Forensics", Invited Talk on Information Security, Team 6 Wing (Signal), Barrackpore Air Force Base, 05 November 2019.
107. Asok Bandyopadhyay, "Cyber Security and Cyber Forensic", Invited talk at CISF Headquarter, CISF Headquarter, Kolkata, 28 January 2020.
108. Abhisek Hazra, "New Trends in Cyber Security & Cyber Crimes", Cyber Security Observation week, BSF Head quarters, South Bengal Frontiers, 11 February 2020.
109. Asok Bandyopadhyay, "Cyber Security and Cyber Forensic", Invited talk for NCSM Curator Orientation, Program C-DAC, Kolkata, 12 February 2020.
110. Sanjay Madan, "Attack Data Capturing & Malware Analysis", AICTE-Training and Learning (ATAL) sponsored FDP on Cyber Security from December 2-6, 2019, Punjab Engineering College, Chandigarh, 6 December, 2019.
111. Rakesh Sehgal, "Cyber Threat Management& Analysis", ISEA training (Preparatory Courseware For Advanced Level Training), IIT Guwahati, 17 October 2019.
112. Rakesh Sehgal, Honeypot Technologies, Bootcamp Training Cyber Analytics, NCIIPC Ayanagar, New Delhi, 09 October 2019.
113. Sanjeev Kumar, Malware Analysis, Bootcamp Training for Cyber Analytics, NCIIPC Ayanagar, New Delhi, 10 October 2019.
114. Pranaw Kumar, "Development Journey of Indian Language TTS and ASR", Summer School on Speech Signal Processing, Dhirubhai Ambani Institute of Information and Communication, Gandhi Nagar Ahmedabad, 8 July 2019.
115. Pranaw Kumar, "Indian Language Text to Speech Synthesis System", Speech workshop for startups, MeitY, New Delhi, 25 June 2019.
116. Pranaw Kumar, "UNICODE and Speech Based Human Machine Interaction", Hindi Workshop, Doordarshan Kendra, Worli, Mumbai, 22 January 2020.
117. Pranaw Kumar, "Introduction to Language Computing", Refresher Course for Faculties, Mumbai University, Kalina Campus, 7 March 2020.
118. Amol Bole, "Fundamentals, Tools, Techniques and methodology of speech recognition", Faculty Development Workshop, Sanjivani College of Engineering, Kopargaon, 2 December 2019.
119. Amol Bole, "Introduction to Automatic Speech Recognition System", Refresher Course for Faculties, Mumbai University, Kalina Campus, 7 March 2020.
120. Priyesh Ranjan, "Enhancing SNOMED CT Based Clinical Data Entry via Doctor Desk LITE", SNOMEDCT Expo 2019, Kuala Lumpur, Malaysia, 31 October – 01 November 2019.

121. Sumit Soman, "Standardization of Biosignals in BCI systems: Needs & Challenges", IEEE Systems Man & Cybernetics Conference (SMC 2019), Bari, Italy, 06 October 2019.
122. Sumit Soman, "Machine Learning: A Tutorial", 20th International Conference on Intelligent Systems Applications to Power Systems (ISAP)-2019, IIT Delhi, 11 December 2019.
123. Siddharth Srivastava, "Deep Learning and Image Processing", Workshop on AI and Deep Learning, VIGNAN University, Guntur, 24 November 2019.
124. Siddharth Srivastava, "Big data and NoSQL", Indian Institute of Information Technology SriCity, 15 April 2019
125. Navneet Jain, "ITEC Portal", 55thITEC Day celebrations, PravasiBharatiya Kendra, New Delhi, 7 October, 2019
126. Tushar Patnaik, "Ethical issues in Document image processing in Indian Language", Ethical issues in Research, JIIT Noida, 27-28 July, 2019.
127. Tushar Patnaik, "Importance of Odia script and improvement in Unicode", Consultation on Preparing Indian Languages for the Digital Age: A Multidisciplinary Agenda, Constitution Club of India, Delhi, 20 February, 2020.
128. Tushar Patnaik, "Improvement of character segment in Odia Script", Use of Scientific and Technical Terminology in Science and Technology, IGNOU Delhi, 25-26 November 2019.
129. Rajesh Kumar Kushwaha, Technology to Leverage Services for Improved Mobility, 12th Annual Urban Mobility India (UMI) Conference-cum-Exhibition, Indira Gandhi Pratishthan, Lucknow, 15-17 November, 2019.
130. Geetanjali Gadre, "Processor Architecture and C-DAC's HPC Systems", Invited talk to B.Tech. Computer Science & Engineering, MIT- World Peace University, Pune, 3 September 2019.
131. Dr. Rajendra Joshi, "Scientific and Engineering Applications for Exascale Computing", Exascale computing symposium: A C-DAC "HPC & AI Convergence year", C-DAC, Pune, 10 January 2020.
132. Dr.Sanjay Kadam, "Parallel Computing and MPI", Parallel Computing Summer School (PCSS) 2019, NSM College of Engineering, Pune, May 27 -31 2019.
133. Dr. Sanjay Kadam, "HPC Architectures, MPI programming, OpenMP and Matlab", Computer Programming & Applications Course (AMTC Course), Meteorological Training Institute, IMD, Pune, 04 -26 June 2019.
134. Dr. Sanjay Kadam, "Advancing from Serial Computing to Parallel Computing" and "Scientific Application (Parallel Image Processing) - Overview/Case-Study", One Day Workshop on High Performance Computing – NSM, ACTS, C-DAC, Pune, 08 June 2019.
135. Dr. Sanjay Kadam, "Image Processing for AYUSH professionals", One Day Workshop on High Performance Computing – NSM, C-DAC, Pune, 01 July 2019.
136. Dr. Sanjay Kadam, "Parallel Image Processing", 5-day Workshop on Super Computing – NSM, IIT, BHU, 23 -27 September 2019.
137. Dr. Sanjay Kadam, "Parallel Image Processing", HPC workshop for ACTS students, C-DAC, Pune, 23 November 2019.
138. Dr. Sanjay Kadam, "Artificial Nural Networks", Department of Bioinformatics, Savitribai Phule Pune University, November - 2019
139. Dr. Sanjay Kadam, "OpenMP", MIT, Pune, 03 December 2019.
140. Dr. Sanjay Kadam, "Image Processing, Computer Vision and Neural Computing", ATAL sponsored Workshop on Smart Robots, IIIT, Pune, 07 December 2019.
141. Dr. Sanjay Kadam, "Machine Learning - An Overview", Pre-Conference workshop on National Conference on Emerging Trends, Challenges and Opportunities in Data Mining and Information Security NTCOMIS-2020, IMED (MCA Programme), Bharati Vidyapeeth, Pune, 16 –18, January 2020.
142. Dr. Sanjay Kadam, "Computer Vision and Deep Learning (Keynote session presentation)", 2nd IEEE International Conference on Emerging Smart Computing &Informatics (ICESCI)-2020, AISSMS Institute of Information Technology, Pune, 12 March 2020.
143. Shashi Pal Singh, "Tools and Technology for Hindi", Committee of Parliament on Official Language, Aurangabad, 21 January 2019
144. Shashi Pal Singh, "Lectures on tools and Technique for Indian Language", SIDBI Rajbhasha Adhikari Sammelan, Lucknow, 21-22 October 2019.
145. Shashi Pal Singh, "Machine assisted Translation Tools and Technique", CHTI Workshop on Hindi tools, Central Hindi Training Institute, Pune, 25 July 2019.

146. Shashi Pal Singh, "Kanthasth", Workshop on Kanthasth for Goverment officials, New Delhi, 25 September 2019 and 11 November 2020
147. Shashi Pal Singh, "Scientific Lectures in field of NLP and Translation Memory", Workshop on Rajbhasha and IT Tools, Ghaziabad, 29 May 2019.
148. Lakshmi Panat, "Applications of AI in Healthcare", 1st Annual Conference of Research society of Smt. KashibaiNavale Medical College and General Hospital (SKNMC & GH), Sinhagad, Pune, 18 February 2020.
149. Dr. Manish P. Kale, "Forecasting landuse/landcover", Orientation program on "Spatial Data Analytics and Current Trends, Symbiosis Institute of Geoinformatics, Pune, May, 2019.
150. Dr. Manish P. Kale, "Topic-Biodiversity Characterisation at Landscape Level", Advanced Geospatial Winter School focusing on Biodiversity, Bharti Vidyapeeth institute of Environment Education and Research, 23 December 2019.
151. Shailendra Singh Narwariya, "Demonstration & discussion on Telemedicine Software", Proceedings of 8th Annual Conference of The Telemedicine Society of India (TSI), Odisha Chapter (Odisha telecon 2019), Sunabeda, Odisha, 14 April, 2019
152. Gaur Sunder, "Health IT Policy in India", 9th International Conference on Transforming Healthcare with IT (THIT), Hyderabad, 14 September, 2019
153. Gaur Sunder, "Govt. of India initiatives in the era of Digital Health", JSS Hospital Mysuru, 15 October, 2019.
154. Achyut Patil, "Standards in Telemedicine & NDHB", 15th International Conference of Telemedicine Society of India (Telemedicon 2019), New Delhi, 29 November - 01 December, 2019.
155. Shailendra Singh Narwariya, "C-DAC's Experiences in Tele-Consultation, Tele-CME, and eICU in India", 15th International Conference of Telemedicine Society of India (Telemedicon 2019), New Delhi, 29 November - 1 December, 2019.
156. Sayali Pophalkar, "EHR Standard and its Evaluation & Certification, SNOMED CT National Extension", AccessHealth and NRCeSStartup Bootcamp, Pune, 17 January, 2020.
157. Manisha Mantri, "Data Analytics in Healthcare: Challenges and Concerns", SPPU Sponsored State Level Faculty Development Program on Data Science in Health Analytics for Swasth Bharat, VIT College, Pune, 17 January, 2020.
158. Gaur Sunder, "Affordable Innovation in Healthcare", KUTUHAL 2020, SP College, Pune, 9 February, 2020.
159. Gaur Sunder, "Ethical Legal and Social Issues (ELSI) in Healthcare IT (through web-conferencing)", 5th IIMA International Conference on Advances in Healthcare Management Services, IIM Ahmedabad, 14 February, 2020.
160. Dr. Ganesh Karajkhede, "Learnings from AyuSoft", AYUSH for Future Health Challenges-Strengthening trans-disciplinary research, Savitribai Phule Pune University, Pune, 29 November 2019.
161. Dr. Ganesh Karajkhede, "Use of Bioinformatics in Ayurveda, AyuSoft", Use of Bioinformatics in Ayurveda on B.M.Kankanawadi Ayurveda College Belgavi, 28 & 29 February 2020.
162. Abhijit Das, "Information Security Education & Awareness", Information Security Education & Awareness program, CISF Guwahati Airport, Shrimanta Shankar Academy and Axel Public School InGuwahati, Date-14th May 2019, 15 May 2019.
163. Deepak R.U., ""CerviSCAN: The road ahead to automated Pap smear screening", Indo-Swedish Seminar on Analytical Cell Biology and Machine Learning in Cancer Research, RCC, Thiruvananthapuram, 13 May 2019.
164. Saravanakumar A., "Modern Trends in Power Electronics and Drives", Faculty Development Programme, College of Engineering, Trivandrum, 02 July 2019.
165. Saravanakumar A., "Recent trends in Electrical Engineering and Technology", National conference, SCMS School of Engineering & Technology, Angamali, 05 July 2019.
166. Jayan V., "Machine Learning", Faculty Development Program, LBS College of Engineering, Kasaragod, 11 July 2019.
167. Vidya V., "Deep Learning for Predictive Analytics", Faculty Development Programme, Saint Gaits Engineering College, Kottayam, 18 October 2019.
168. Shobana Devi P and Vidya V, "Deep Learning with Python", Tech Fest, LBS Institute of Technology, 25 October 2019

169. Binu PJ, Adoption of EHR Standards in Telemedicine system, NRCeS Users' Meet - Winter 2019, IIIT-B, Bangalore, Karnataka, 22 November, 2019
170. Satheesh G, "C-DAC Solutions for Smart Cities", ACMA Technology Summit & Award 2019, Mumbai, 25 November, 2019.
171. Saravana Kumar A., "Implementation of Microgrid for Indian Villages", Green Energy for smart living Renewable Energy (KREEPA Expo 2019), Kochi, 2 November 2019.
172. Chandrasekar V., "Knowledge Exchange Symposium on E-mobility", E-mobility symposium organized by Kerala State Transport Department and Sree Chitra College of Engineering under Ministry of Transport, Government of Kerala, Mascot Hotel, Thiruvananthapuram, 28 October 2019.
173. Aby Joseph, "Microgrid Technology", National Power Electronics Conference (NPEC) 2019, NIT, Trichy.
174. Ramesh P, "Poster presentation on Novel Boost Converter Topology and Application", NPEC 2019, NIT, Trichy.
175. Saravanakumar A., "Poster presentation on Reliability of Power Electronics Systems for Remote microgrid application", NPEC 2019, NIT, Trichy.
176. Aby Joseph, "Technical presentation on Distributed Generation Systems", NaMPET Short Term course, MNIT, Jaipur, 27-31 December, 2019.
177. Jayan V, "Machine Learning Concepts", Invited Talk, LBS College of Engineering, 4 January 2020.
178. Benoy Gopal, "Emerging Trends in Engineering and Technology", 10th International conference "ICETET-2K20", Cape Institute of Technology Tirunelveli.
179. Jerry Daniel J., "Safety Alert Systems using Dedicated Short-Range Communication for on Road Vehicles", International Workshop on "Vehicular Communication for Enhanced Road Safety", IIIT, Delhi, 27 July 2019.
180. Lijo Thomas, "IETF contribution through Collaborative Research Project on IIoT", Awareness program on Internet Protocols and Standards, Government College of Engineering, Barton Hill, Trivandrum, 26 August 2019.
181. J Jerry Daniel, "IoT Products and Applications developed by C-DAC", Faculty Development Program on IoT, S.C.T College of Engineering, Trivandrum, 22 July 2019.
182. Shalu R, "Realization of IoT using 6tisch networks", Faculty Development Program on IoT, S.C.T College of Engineering, Trivandrum, 22 July 2019.
183. Lijo Thomas, "IETF contribution through Collaborative Research Project on IIoT", Faculty Development Program on IoT, S.C.T College of Engineering, Trivandrum, 22 July 2019.
184. Raja Singh B. and Sujimon K. T., "Intelligent Distributed SCADA Automation System for North Sikkim substations", Energy & Power Department Staff (AEs, JEs & Operators) Training Cell, Govt. of Sikkim, EPD North Sikkim – Chungthang subdivision, 12-14, March 2020.
185. Nabeel Koya, "Cyber Crime Investigations & Forensics", IRS Officers Workshop, DTRTI Bangalore, 27 January 2019.
186. Nabeel Koya, "Digital Forensics", Workshop of Police Officers of rank SP and above, Police Head Quarters, Puducherry, 12 June 2019.
187. Satheesh Kumar S., "Digital Forensics", National Conference on Cyber Intelligence, Cyber Forensics and Investigation, JNAN VIKAS MANDAL College, Mumbai, 22 March 2019.
188. Satheesh Kumar S., "Trends in Mobile Forensics", National conference of Chiefs of Anti-Terrorist Squads (ATS)/Special Task Forces (STF), National Investigation Agency (NIA), New Delhi, 15 October 2019.
189. Satheesh Kumar S., "An Insight into the Recent Trends and Challenges in Cyber Security", Faculty Development Programme, ERDCIIT, Thiruvananthapuram, 12 June 2019.
190. R. Ananthalakshmi Ammal, "Cyber Crimes & Security", Monthly Lecture Series, Vikram Sarabhai Space Centre (VSSC), Thiruvananthapuram, 26 June 2019.
191. R Ananthalakshmi Ammal, "Cyber Security for Financial Sector", Information Security Awareness Programme for Officers of SBI, SBI Head Quarters, Thiruvananthapuram, 26 November 2019.
192. R Ananthalakshmi Ammal, "Trends in Cyber Security", Computer Science Lecture Series, Mohandas Engineering College, Thiruvananthapuram, 2 September 2019.

Human Resource Development

C-DAC has a very strong embeded appetite for excellence which as a driving force behind most of its actions. Human resource department is very prompt on recognizing the impacts and responding. In the longer term, considering the need of organizational culture to be aligned with organizational mission and strategy, C-DAC has come up with many new HR initiatives and successfully implemented. HRD teams across the C-DAC centres has taken the lead role and after a careful assessment of the strengths, weaknesses, opportunities and threats (SWOT) have strategized the HR development initiatives which will compliment C-DAC for its sustained development.

Achievements:

1. Centralised Training for S&T members and Non S&T members – Continuous development of Human Resources fostering their engagement by imparting training to employees both S&T and Non S&T.Imparted 3352 man days of training during the year.
2. CAKES: Launch of C-DAC Accelerated Knowledge Enhancement Scheme (CAKES) – 4 SLICEs successfully completed and imparted 2203 man-days of training through this platform
3. Knowledge Assimilation in Pieces (KAP): Knowledge sharing platform where in employees can upload Learning Objects (LO) in the area of their expertise. This will motivate and inspire the members to move for action.

HRD Initiatives:

1. **Adjunct Scientist Scheme (CDAC-ADS):** This scheme is aimed to identify motivated and experienced researchers for contributing in research in C-DAC thematic areas.
2. **HR Function Appraisal (HRFA):** The identified members visit the each centre to assess the HR processes with reference to rules/ regulations /OMs /Guidelines issued from time to time and make observation of records and process followed to identify the best practices to implement across other centres and suggest room for improvment.
3. **Annual Individual Performance Review (AIPR):** To bring in increased visibility to the employees those who are contributing to the organisation, resulting more accurate recognition and opportunities for both S&T and Non S&T employees.
4. **Internship Scheme:** To fetch young talent from premiere educational institutes like IIT/NIT and C-DAC institutes for R&D in emerging areas of C-DAC's interest as part fulfilment of their academic course. C-DAC also gains fresh perspectives on emerging areas and problem solving.

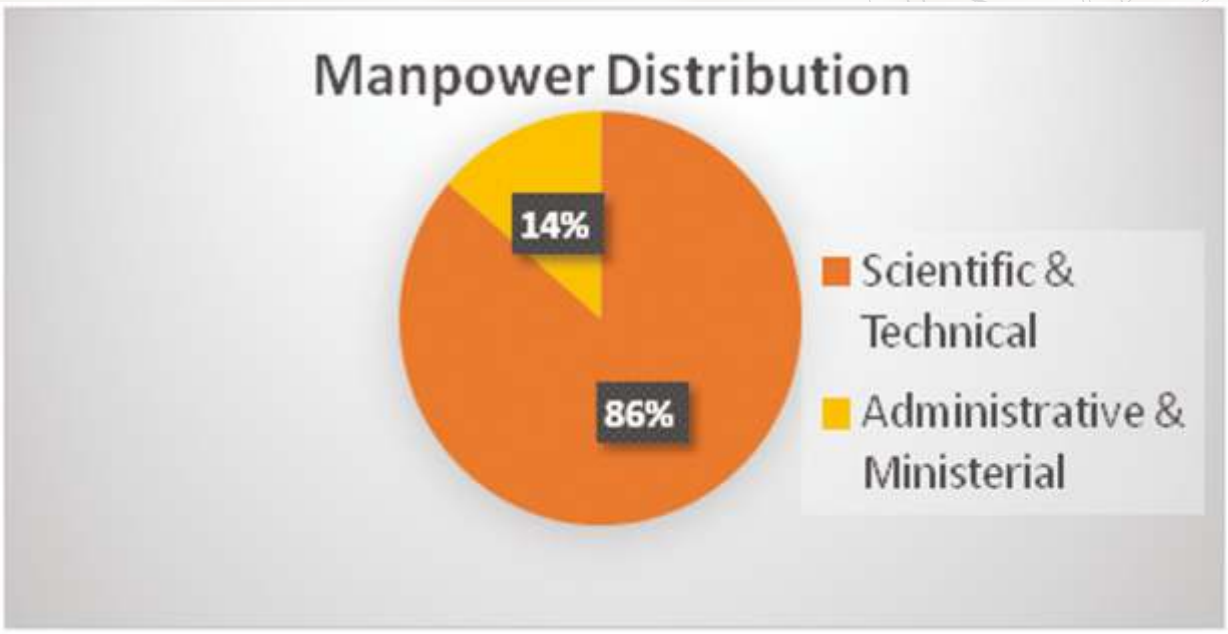
Initiatives on card:

1. **C-DAC Adjunct Engineer (CAE) Scheme:** This scheme is aimed to identify experienced industry driven engineers for bringing in process driven product and services approach along with research in C-DAC.
2. **HR Handbook:** A comprehensive hand book comprising of all rules and regulations for better employment administration and increased awareness among employees.
3. **Project Resources Allocation Matrix (PRAM):** Objective is to create centralise manpower pool/ matrix based on Skill Set of the employee and this is useful for Projects, Under-utilised employees can be utilised in overall C-DAC.
4. **Leader Speak:** An expression of our Leaders/Senior officer to influence and shape the way our employees feel and think. This will motivate and inspire the juniors to move for action.
5. **Leadership Coaching:** Senior officers to perform well in their new role, such training shall give a new perspective and focus to the officers. This initiative will help in developing emerging leaders of organisation.
6. **IHRMS Enhancement:** To introduce Automation of Annual Performance Appraisal Report (APAR), RTI Archives and Foreign Tour & Travels.
7. **Digital Repository of Legal Matters:** To create centralised repository for all legal cases of C-DAC, it will help in great extent to prepare the appropriate reply (functionally & legal vetting) in time bound manner and maintain the similar stand across C-DAC centres.

Manpower Distribution:

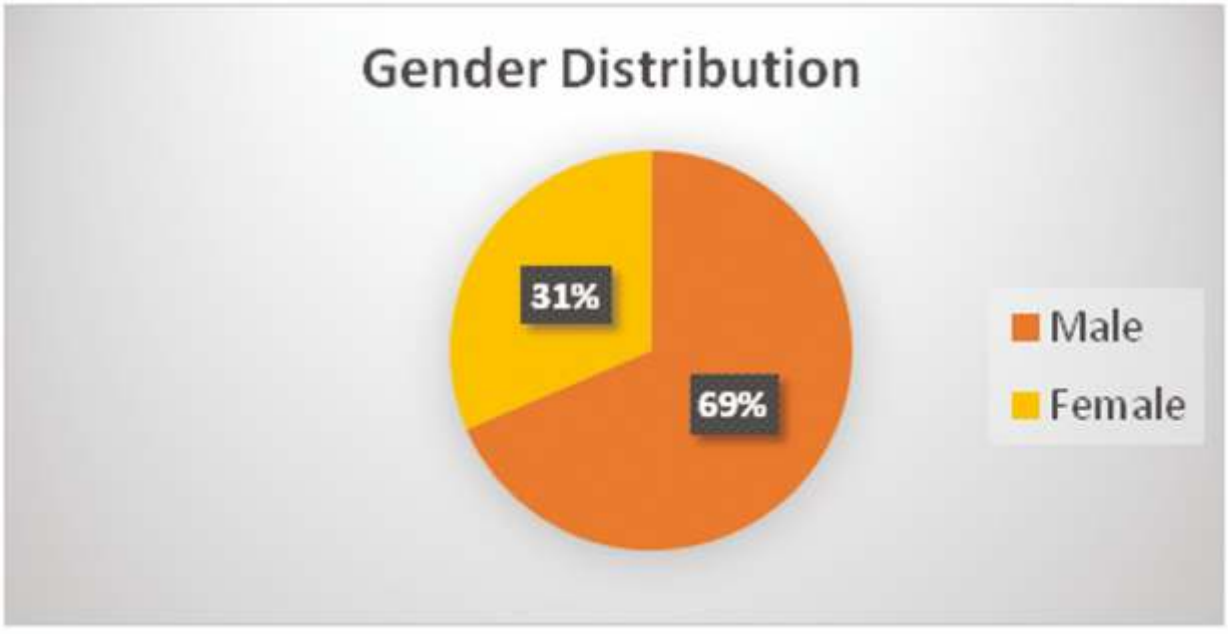
Functional Distribution :

C-DAC has 3017 employees as on March 2020, spread across 11 centres and Corporate Office. The functional composition of the workforce is as shown below:



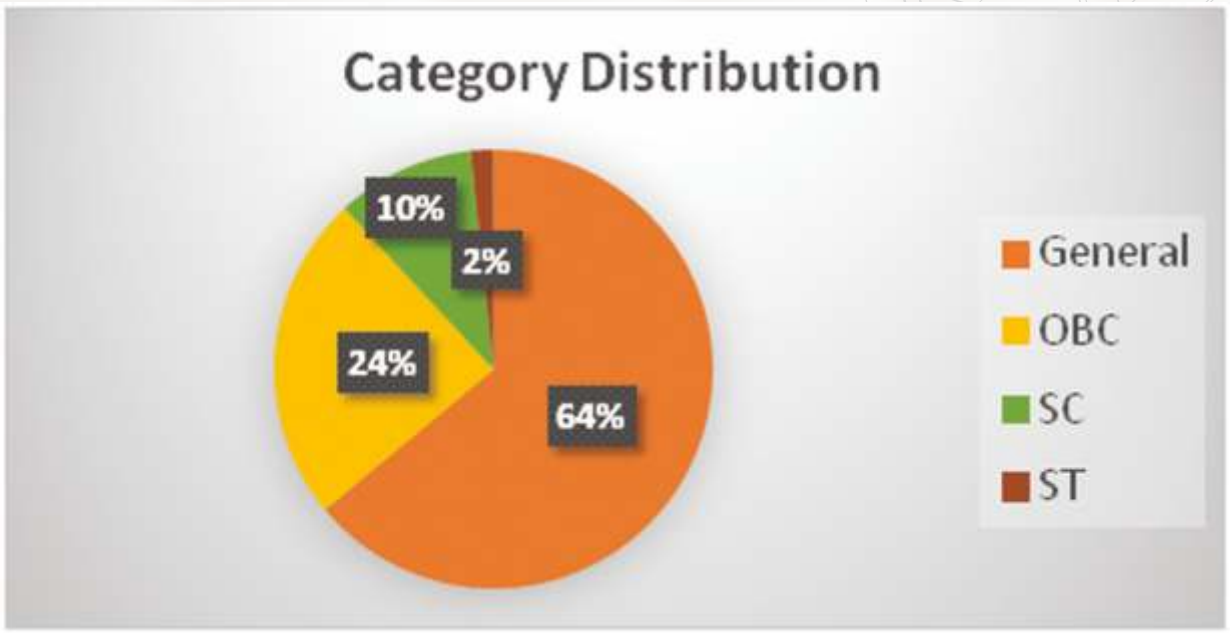
Gender Distribution:

C-DAC has been paying due attention to gender inclusion in employment. Female employees account for 31 percent of the total C-DAC workforce which is higher than national average in the sector. The proportion of women in the senior executive positions also is encouraging in C-DAC.



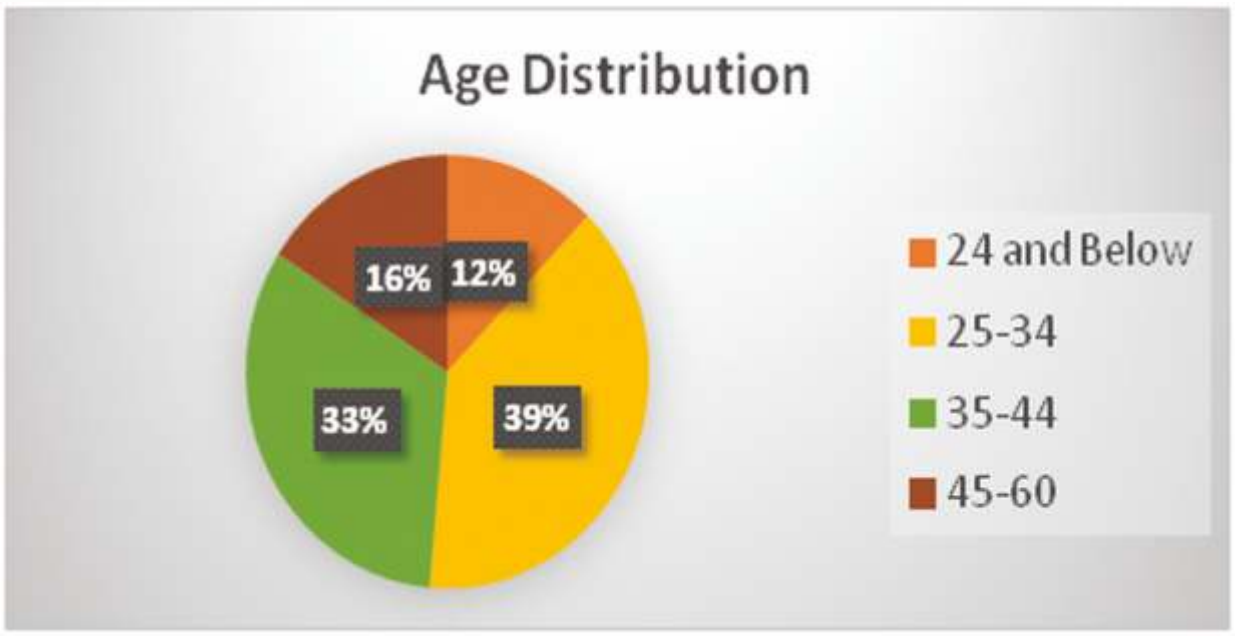
Category Distribution:

As a law-abiding model employer, C-DAC has ensured adequate representation of Scheduled Caste (SC), Scheduled Tribes (ST) and OBC members. C-DAC obliges the national priority in fair terms and has significant representation of the reserved categories. It is pertinent to note that Group A S&T positions are exempted from the purview of reservation orders.



Age Distribution:

Since C-DAC always retained itself in the growth and expanding track, it retains an impressive age distribution among its employees. 51 percent of the employees are below the age of 35 years.



Legal

The C-DAC Legal Department renders effective legal Advice in defending cases, reports and correspondence, drafting reply, review of legal documents, as required from time to time.
The Department advise in the matter of preferring of appeals in the various Courts and Tribunals, taking recourse to other legal remedies.

Key Activities are as follows:

- All centres of C-DAC and Corporate office has a Legal cell, which take up all the Legal issues relating to employees of C-DAC, vendor and other parties.
- During the financial year (April 19 – March20) approx. 15 court cases were dealt at various CATs, High Courts, Tribunals, Courts and Arbitrators etc. These cases are mostly related to service matters of C-DAC centres.
- In addition to above, Legal Cell also draft/vet various MoUs / Agreements to be signed with various stake holders. During the year (April 19 – March 20), more than 123 MoUs / Agreements were vetted / drafted by Legal Cell.
- Corporate Legal Cell coordinates with MeitY, Advocates and Centres for the court cases and provides valuable inputs supported by relevant judgments pronounced by various courts of India.

RTI

C-DAC is a Public Authority as provided in section 2(h) of the RTI Act. Request for information under RTI Act can either be filed at any of the locations of C-DAC or can be submitted online through the portal rtionline.gov.in. Mandatory disclosures as per the guidelines of section Sec 4(1)(b) have been published in the RTI module on C-DAC's website. The same is updated on monthly basis.

During the financial year 2019-20, total 235 applications were received which were duly processed.

Report of Vigilance activity during the year 2019 -20

During the year 2019-20, 2 complaints have been disposed off and 2 complaints are under investigations. These complaints were mainly related to misconduct, irregularities in tender process, Irregularities in appointments and outsourcing of faculty positions.

In the year 2019, as per the guidelines of the Central Vigilance Commission, Vigilance Awareness Week was observed in all C–DAC centres from 28th October to 2nd November 2019. During this Week 1001 employees, 377 customers and 585 citizens have taken integrity pledge on the theme of "Integrity- A way of life" and also online pledge through the website "https://pledge.cvc.nic.in/" hosted by Central Vigilance Commission. All C-DAC Centre have organized the Vigilance Awareness Week by conducting activities e.g. Essay writing, On-line quizzes, Short speech, Cartoon competition, various seminars/workshops.

During this week C-DAC Pune released the website **https://vcs.cdac.in** for online vigilance clearance certificate by Employees of Centre.

Smt. Sunita Verma, Scientist 'G', MeitY & CVO C-DAC visited C-DAC Noida and addressed the employees of Centre on theme of "Integrity- A way of life" during Vigilance Awareness Week.

Financials

Handing over the audited balance sheet of C-DAC to Dr. Hemant Darbari, Director General, C-DAC by the Auditors

INDEPENDENT AUDITOR'S REPORT

To,
The Members,
Center for Development of Advance Computing,
C-Dac Innovation Park, 2nd Floor, Panchavati,
Pashan, Pune-411008

Report on the Consolidated Financial Statements

Opinion

We have audited the accompanying Consolidated financial statements of **Center For Development of Advance Computing (C-DAC)** (Hereafter referred as "C-DAC") which comprise the consolidated Balance sheet as at March 31, 2020 and the consolidated Income and Expenditure Account and consolidated Receipts and Payments Accounts for the year then ended, and summary of significant accounting policies and other explanatory information (hereinafter referred to as "the consolidated financial statements") in which are incorporated the Returns for the year ended on that date audited by the Centre auditors of the Centre's of the C-DAC located at (Bangalore, Chennai, Delhi, Hyderabad, Kolkata, Mohali, Noida, Thiruvananthapuram).

In our opinion and to the best of our information and according to the explanations given to us, and based on the consideration of reports of the Centre auditors on separate financial statements of the Centre's referred to in the Other Matters paragraph below, the aforesaid consolidated financial statements give the information in the manner so required to the extent applicable and give true and fair view in conformity with the accounting principles generally accepted in India, of the state of affairs of the C-DAC as at March 31, 2020, and its surplus and its receipts and payments for the year ended on that date.

Basis for Opinion

We conducted audit in accordance with standards on auditing issued by institute of Chartered Accountants of India. Our responsibilities under those Standards are further described in the Auditor's Responsibilities for the Audit of the Consolidated Financial Statements section of our report. We are independent of the C-DAC in accordance with the Code of Ethics issued by the Institute of Chartered Accountants of India (ICAI) together with

the independence requirements that are relevant to our audit of the consolidated financial statements under the provisions of the Act and the Rules made there under, and we have fulfilled our other ethical responsibilities in accordance with these requirements and the ICAI's Code of Ethics. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion on the consolidated financial statements.

Emphasis of Matter

(i) We draw attention to note 19.5.1 (Pune Centre) to Schedule 18 to the Consolidated Financial Statements, Accordingly to which all the payments/accruals under these projects grants are shown under components and consumables (Expenditure) in 2019-20 in the schedule 7 and hence CWIP of Rs. 1821.75 Lakhs which was capitalised as CWIP in 2018-19 has appropriately been transferred to components and consumables (expenditure) during the current year. Due to this, in the consolidated financial statements, the total fixed assets (gross block) of project grants as on 31.03.2019 amounting to Rs 22,838.84 lakhs (Pune Centre Rs. 8,163.95 Lakhs) is reduced by Rs 1821.75 lacs in FY 2019-20 in schedule 7. As these are project grants, have no impact on income or expenditure statement for FY 2018-2019 and FY 2019-2020.

(ii) **Financial Reporting Framework** - The C-DAC being scientific society having its own financial reporting framework including disclosure of notes to account. The accounting policies which are adopted by C-DAC are as per accounting standard except 1.1 and 4.2 of Schedule 17 to the Consolidated Financial Statements.

Further to above, we draw attention to note 17 to Schedule 18 to the Consolidated Financial Statements where Management of C-DAC is of the opinion that C-DAC being a scientific society and not a listed company and therefore the reporting requirements as per Accounting Standard 3 on Cash flow statement, Accounting Standard 17 on Segment Reporting, Accounting Standard 18 on Related Party Disclosures and Accounting Standard 26 in respect of Intangible Assets are not applicable to them.

Our opinion is not modified in respect of these above matters.

Other Matters

(a) We did not audit the Standalone financial statements of Eight (8) Centre's included in the C-DAC whose financial statements reflect total assets of Rs. 857.69 Crores as at March 31, 2020 and total revenues of Rs.271.21 Crores for the year ended on that date, as considered in the respective standalone financial statements of the Centre's. The financial statements of these Centre's have been audited by the Centre auditors whose reports have been furnished to us, and our opinion is based solely on the amounts and disclosures in the report of such Centre auditors.

(b) Balance of Debtors, Creditors, Current Assets, Loans & Advances and Current Liabilities are subject to confirmation and further reconciliation. The extent of adjustment that may arise and their effect on accounts is not ascertainable at this stage.

(c) **Merger of Societies with C-DAC** - We draw attention to note 1 to Schedule 18, where the Assets, Liabilities and Other obligations at the book value as on December 15, 2002 are merged in C-DAC in respect of the societies viz. Electronics Research And Development Centre at Kolkata, Noida, Thiruvananthapuram, National Centre for Software Technology Mumbai, and Centre For Electronics Design And Technology of India, Mohali, due to merger of these Societies in C-DAC as per the Government of India orders. The process for transfer of title deeds of Immovable properties in the name of C-DAC of the above Centre's is under process. No liability towards expenses such as stamp duty, taxes and other expenses (if any) is provided for. The same will be accounted for in the year of payment if any

Our opinion on the consolidated financial statements above and our report on Other Requirements below, is not modified in respect of the above matters with respect to our reliance on the work done and the reports of the Centre auditors.

Management's Responsibility for the Consolidated Financial Statements

The C-DAC's management is responsible for the preparation of these consolidated financial statements that give a true and fair view of the consolidated financial position, consolidated financial performance and consolidated receipts and payments of the C-DAC in accordance with the accounting principal generally accepted in India.

The respective management of the Centre's included in the C-DAC are responsible for maintenance of adequate accounting records, safeguarding the assets of the C-DAC, for preventing and detecting frauds and other irregularities, selection and application of appropriate accounting policies; making judgments and estimates that are reasonable and prudent; and design, implementation and maintenance of adequate internal controls, that were operating effectively for ensuring the accuracy and completeness of the accounting records, relevant to the preparation and presentation of the consolidated financial statements that give a true and fair view and are free from material misstatement, whether due to fraud or error.

In preparing the consolidated financial statements, the respective management of the Centre's included in the C-DAC are responsible for assessing the C-DAC's ability to continue as a going concern and using the going concern basis of accounting unless management either intends to liquidate the C-DAC or to cease operations, or has no realistic alternative but to do so.

The respective management of the Centre's included in the C-DAC Consolidated Financial Statements are also responsible for overseeing the financial reporting process of the C-DAC Centre's.

Auditor's Responsibilities for the Audit of the Consolidated Financial Statements

Our objectives are to obtain reasonable assurance about whether the consolidated financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with

Standard on Auditing (referred as SAs) will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these consolidated financial statements.

As part of an audit in accordance with SAs, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the consolidated financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal controls.

- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.

- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the ability of the C-DAC to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the consolidated financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's However, future events or conditions may cause the C-DAC to cease to continue as a going concern.

- Evaluate the overall presentation, structure and content of the consolidated financial statements, including the disclosures, and whether the consolidated financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

- Obtain sufficient appropriate audit evidence regarding the financial information of the entities or business activities within the C-DAC to express an opinion on the consolidated financial statements. We are responsible for the direction, supervision and performance of the audit of the financial statements of such entities included in the consolidated financial.

Materiality is the magnitude of misstatements in the consolidated financial statements that, individually or in aggregate, makes it probable that the economic decisions of a reasonably knowledgeable user of the financial statements may be influenced. We consider quantitative

materiality and qualitative factors in (i) planning the scope of our audit work and in evaluating the results of our work; and (ii) to evaluate the effect of any identified misstatements in the financial statements.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

We also provide those charged with governance with a statement that we have complied with relevant ethical requirements regarding independence, and to communicate with them all relationships and other matters that may reasonably be thought to bear on our independence, and where applicable, related safeguards.

We did not audit the Standalone financial statements of Eight (8) Centre's included in the C-DAC. The financial statements of these Centre's have been audited by the Centre auditors whose reports have been furnished to us, and our opinion is based solely on the amounts and disclosures in the report of such Centre auditors.

Report on Other Requirements

Based on our audit and on the consideration of the report of the Centre auditors on separate financial statements, referred in the Other Matters paragraph above we report, to the extent applicable, that:

(a) We have sought and obtained all the information and explanations which to the best of our knowledge and belief were necessary for the purposes of our audit of the aforesaid consolidated financial statements.

(b) In our opinion, proper books of account relating to preparation of the aforesaid consolidated financial statements have been kept and proper returns adequate for the purposes of our audit have been received from the Centre's not visited so far as it appears from our examination of those books, returns and the reports of the auditors.

(c) The reports on the accounts of the Centre offices included in the C-DAC audited by Centre auditors have been sent to us and have been properly dealt for preparing this report.

(d) The consolidated Balance sheet, the consolidated Income and Expenditure Account and consolidated Receipts and Payments Accounts Statement dealt with by this Report are in agreement with the relevant books of account maintained for the purpose of preparation of the consolidated financial statements received by us from the Centre's not visited.

(e) Reporting on the adequacy of Internal Financial Control Over Financial Reporting of the C-DAC and the operating effectiveness of such controls, is not applicable.

(f) With respect to the other matters to be included in the Auditor's Report, in our opinion and to the best of our information and according to the explanations given to us:

i. The consolidated financial statements disclose the impact of pending litigations on the consolidated financial position of the C-DAC.

ii. The C-DAC did not have any material foreseeable losses on long-term contracts including derivative contracts.

iii. There were no amounts which were required to be transferred to the Investor Education and Protection Fund by the C-DAC and its Centre's incorporated in India

For Udyen Jain & Associates,
Chartered Accountants
Firm Registration No.116336W

Sandeep Soni
Partner
M. No. 124971
UDIN: **20124971AAAAFO8871**

Place:Pune

Date: November 10, 2020

CONSOLIDATED BALANCE SHEET AS AT 31st March 2020

Amount in ₹

Particulars	Schedule	2019-20	2018-19
CORPUS/CAPITAL FUND AND LIABILITIES			
Corpus/Capital Fund	1	3,79,25,43,494	3,20,56,98,850
Reserves and Surplus	2	2,55,92,70,364	2,72,69,16,043
Earmarked and Endowment Funds	3	7,91,85,15,220	2,49,78,53,175
Secured Loan from Bank		-	-
Current Liabilities and Provisions	4	4,62,09,82,956	3,08,87,72,720
Branch & Divisions		-	-
Total		**18,89,13,12,034**	**11,51,92,40,788**
ASSETS			
Fixed Assets			
Acquired out of Own Funds	5	35,56,93,018	34,79,33,556
Acquired out of Grant in Aid	6	1,91,50,31,242	1,92,24,59,014
Acquired out of Project Grants	7	64,42,39,123	80,44,57,030
Investments-Others		5,05,000	5,05,000
Current Assets, Loans & Advances	8	15,97,58,43,651	8,44,38,86,188
Miscellaneous Expenditure		-	-
Total		**18,89,13,12,034**	**11,51,92,40,788**
		-	**-**
Summary of significant accounting policies	17		
See accompanying notes forming part of financial statements	18		

CA Raghu Bhargava
Director Finance

Sunil Misar
Registrar (I/C)

Dr. Hemant Darbari
Director General

AS PER OUR REPORT OF EVEN DATE
FOR AND ON BEHALF OF
M/S. UDYEN JAIN & ASSOCIATES (FRN: 116336W)
CHARTERED ACCOUNTANTS

CA Sandeep Soni
Partner (M.No.124971)
UDIN : 19124971AAAAAN5662
Place : Pune , Date : 10-Nov-2020

Consolidated Income and Expenditure Account for the year ending 31st March 2020

Amount in ₹

Particulars	Schedule	2019-20	2018-19
INCOME			
Income from Sales/Services	9	3,16,42,14,393	2,63,33,24,637
Grants/Subsidies	10	1,19,27,17,956	1,00,13,13,084
Fees/Subscription	11	91,45,07,007	87,20,05,834
Interest Earned	12	25,19,32,428	19,06,94,713
Other Income	13	51,92,619	56,50,225
Prior Period Income		2,16,63,592	21,05,908
Increase/(decrease) in stock of Finished Goods and Work-in-progress	14	48,03,49,989	21,96,46,522
TOTAL (A)		**6,03,05,77,984**	**4,92,47,40,923**
EXPENDITURE			
Establishment Expenses	15	2,89,09,22,433	2,91,10,72,879
Other Administrative Expenses	16	2,48,78,91,592	1,85,36,73,962
Prior Period Expenses		26,18,659	1,88,55,732
Depreciation (corresponding to Schedule 5)		4,81,11,112	4,22,48,646
TOTAL (B)		**5,42,95,43,796**	**4,82,58,51,219**
Transferred to / (from) Balance of Mission Grants		-	-
BALANCE BEING SURPLUS/(DEFICIT) CARRIED TO CORPUS/CAPITAL FUND		**60,10,34,188**	**9,88,89,704**
Summary of significant accounting policies	17		
See accompanying notes forming part of financial statements	18		

CA Raghu Bhargava
Director Finance

Sunil Misar
Registrar (I/C)

Dr. Hemant Darbari
Director General

AS PER OUR REPORT OF EVEN DATE
FOR AND ON BEHALF OF
M/S. UDYEN JAIN & ASSOCIATES (FRN: 116336W)
CHARTERED ACCOUNTANTS

CA Sandeep Soni
Partner (M.No.124971)
UDIN : 19124971AAAAAN5662
Place : Pune , Date : 10-Nov-2020

Centre for Development of Advanced Computing, Pune
CONSOLIDATED ANNUAL ACCOUNTS 2019-20

Amount in ₹

Particulars	2019-20	2018-19

Schedule 1 - Corpus/Capital Fund

Balance as at the beginning of the year	3,20,56,98,850	3,05,81,43,692
Add: Surplus as per Income & Expenditure Account	60,10,34,188	9,88,89,704
Less : Own contribution to Core / Projects and Other Adjustments / Transfers	1,41,89,544	(4,86,65,454)
Less : Corporate Office Contribution	-	-
Balance as at the year - end	**3,79,25,43,494**	**3,20,56,98,850**

Schedule 2 - Reserves and Surplus

1. Capital Reserve :		
As per last Account	2,72,69,16,043	2,29,63,44,138
Addition during the year	7,75,18,913	67,06,40,824
Less : Deductions during the year	24,51,64,592	24,00,68,919
Total	**2,55,92,70,364**	**2,72,69,16,043**

Schedule 3 - Earmarked/Endowment Funds

1. Balance of Core Grants		
a) Opening balance of the funds	-	-
b) Additions to the Funds		
I) Donations/Grants	1,20,00,00,000	1,00,00,00,000
II) Income from Investments made on account of funds	-	-
III) Other additions (C-DAC Contribution and Other Income)	68,258	61,61,255
Total (b)	1,20,00,68,258	1,00,61,61,255
Total (a)+(b)	1,20,00,68,258	1,00,61,61,255
c) Utilization/Expenditure towards objectives of funds		
I) Capital Expenditure		
Fixed Assets	73,18,974	47,69,705
Others	-	-
Total I	73,18,974	47,69,705
II) Revenue Expenditure		
Salaries, Wages and Allowances etc.	1,16,40,34,424	94,40,50,187
Componants, Consumables and Other Direct Expenses	8,85,748	13,70,430
Travel	39,40,425	84,11,838
Contingencies, Overheads and Other Administrative Expenditure	2,38,88,688	4,75,59,095
Total II	1,19,27,49,284	1,00,13,91,550
Total (c)	1,20,00,68,258	1,00,61,61,255
Net Balance as at Year - End (a+b-c) Total 1	-	-
Projects wise Allocated Core Grant Projects (Details as per Annexure 1)		
d) Opening balance	(23,27,02,736)	4,43,97,112
e) Additions to the Funds		
I) Donations/Grants	-	(3,13,513)
II) Income from Investments made on account of	-	1,15,220
III) Other additions (C-DAC Contribution and Other	3,69,87,781	(4,72,14,924)
Total (e)	3,69,87,781	(4,74,13,217)
Total (d)+(e)	(19,57,14,955)	(30,16,105)

Centre for Development of Advanced Computing, Pune
CONSOLIDATED ANNUAL ACCOUNTS 2019-20

Amount in ₹

Particulars	2019-20	2018-19
f) Utilization/Expenditure towards objectives of		
I) Capital Expenditure		
Fixed Assets	1,97,74,965	17,84,34,570
Others	-	-
Total I	1,97,74,965	17,84,34,570
II) Revenue Expenditure		
Salaries, Wages and Allowances etc.	-	2,07,31,704
Componants, Consumables and Other Direct Expenses	-	45,95,003
Travel	-	90,55,034
Contingencies, Overheads and Other Administrative Expenditure	-	1,10,12,199
Total II	-	4,53,93,940
Total Expenditure (f)	1,97,74,965	22,38,28,510
g) Refund / Transfer and Other Adjustments	33,73,000	58,58,121
Net Balance as at Year - End (d+e-f-g) Total 2	(21,88,62,920)	(23,27,02,736)
Core Grant Balance as at Year - End (Total 1 + Total 2) Total 3	(21,88,62,920)	(23,27,02,736)
2. Grants for Funded Projects (Details as per Annexure 2)		
a) Opening balance of the funds	2,72,46,71,708	1,84,46,03,972
b) Additions to the Funds		
I) Donations/Grants	8,71,29,62,781	2,74,56,72,538
II) Income from Investments made on account of funds	28,02,90,510	9,89,60,574
III) Other additions (C-DAC Contribution and Other Income)	9,47,77,692	4,40,10,959
Total (b)	9,08,80,30,983	2,88,86,44,071
Total (a)+(b)	11,81,27,02,691	4,73,32,48,043
c) Utilization/Expenditure towards objectives of funds		
I) Capital Expenditure		
Fixed Assets	23,35,98,315	48,75,05,199
Others	-	-
Total I	23,35,98,315	48,75,05,199
II) Revenue Expenditure		
Salaries, Wages and Allowances etc.	99,87,76,513	82,71,46,054
Componants, Consumables and Other Direct Expenses	1,83,22,29,045	21,13,71,609
Travel	6,76,24,193	7,17,96,445
Contingencies, Overheads and Other Administrative Expenditure	34,88,61,246	20,79,87,179
Total II	3,24,74,90,997	1,31,83,01,287
Total (c)	3,48,10,89,312	1,80,58,06,486
d) Refund / Transfer and Other Adjustments	20,00,87,825	20,27,69,850
Net Balance as at Year - End (a+b-c-d) Total 4	8,13,15,25,554	2,72,46,71,707
3. Employee and Other Funds:		
As per last Account	58,84,204	55,25,824
Addition during the year	1,47,560	5,36,236
Less : Deductions during the year	1,79,177	1,77,856
Total (5)	58,52,587	58,84,204
Grand Total (Total 3+ Total 4+Total 5)	**7,91,85,15,220**	**2,49,78,53,175**

Annexure 1 of Schedule 3 **Projects wise Allocated Core Grant**

(Attached to and forming an integral part of Balance Sheet)

Amount in ₹

Sr.No.	Name of the Project	Opening Balance	Grants Received During the year	Interest Earned	Other Income & CDAC's Contribution During the year	Capital Expenditure	Salary, Wages Allowances etc.	Componants, Consumables and Other Direct Expenses	Travel	Contingencies, Overheads and Other Administrative Expenditure	Total Expenses	Refund / Transfer & Other Adjustments	Closing Balance
1	Building Fund	(23,60,75,736)	-	-	3,69,87,781	1,97,74,965	-	-	-	-	1,97,74,965	-	(21,88,62,920)
2	North East Projects	33,73,000	-	-	-	-	-	-	-	-	-	33,73,000	-
3	C-DAC Silchar	-	-	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total	**(23,27,02,736)**	**-**	**-**	**3,69,87,781**	**1,97,74,965**	**-**	**-**	**-**	**-**	**1,97,74,965**	**33,73,000**	**(21,88,62,920)**

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CDAC

Centre for Development of Advanced Computing, Pune
CONSOLIDATED ANNUAL ACCOUNTS 2019-20

Annexure 2 of Schedule 3 **Funded Projects**
(Attached to and forming an integral part of Balance Sheet)

Amount in ₹

Sr.No.	Name of the Project	Opening Balance	Grants Received During the year	Interest Earned	Other Income & CDAC's Contribution During the year	Capital Expenditure	Salary, Wages Allowances etc.	Componants, Consumables and Other Direct Expenses	Travel	Contingencies , Overheads and Other Administrative Expenditure	Total Expenses	Refund / Transfer & Other Adjustments	Closing Balance
1	**Bangalore Centre**												
	MeitY Projects	1,35,33,924	9,73,22,210	6,62,454	-	1,40,54,860	2,86,64,914	1,32,38,891	41,20,228	1,47,79,065	7,48,57,958	35,65,514	3,30,95,116
	Other Agency Projects	5,79,308	29,58,400	28,835	-	2,45,208	18,49,498	13,22,686	38,388	3,67,826	38,23,606	1,05,153	(3,62,216)
	Total Bangalore Centre	1,41,13,232	10,02,80,610	6,91,289	-	1,43,00,068	3,05,14,412	1,45,61,577	41,58,616	1,51,46,891	7,86,81,564	36,70,667	3,27,32,900
2	**Chennai Centre**												
	MeitY Projects	(22,67,595)	3,85,23,000	2,80,328	-	19,95,901	82,03,109	20,86,898	14,95,523	14,79,939	1,52,61,370	-	2,12,74,363
	Other Agency Projects	-	-	-	-	-	-	-	-	-	-	-	-
	Total Chennai Centre	(22,67,595)	3,85,23,000	2,80,328	-	19,95,901	82,03,109	20,86,898	14,95,523	14,79,939	1,52,61,370	-	2,12,74,363
3	**Corporate Office**												
	MeitY Projects	-	-	-	-	-	-	-	-	-	-	-	-
	Other Agency Projects	2,85,00,000	5,85,00,000	11,94,561	-	-	-	-	-	-	-	-	8,81,94,561
	Total Corporate Office	2,85,00,000	5,85,00,000	11,94,561	-	-	-	-	-	-	-	-	8,81,94,561
4	**Delhi Centre**												
	MeitY Projects	76,65,145	2,17,04,180	2,19,348	-	-	90,03,718	32,59,367	31,267	24,99,567	1,47,93,919	1,36,882	1,46,57,872
	Other Agency Projects	13,66,13,510	27,94,07,359	17,484	-	-	4,39,70,384	15,03,02,325	54,82,488	8,26,251	20,05,81,448	5,83,75,163	15,70,81,742
	Total Delhi Centre	14,42,78,655	30,11,11,539	2,36,832	-	-	5,29,74,102	15,35,61,692	55,13,755	33,25,818	21,53,75,367	5,85,12,045	17,17,39,614
5	**Hyderabad Centre**												
	MeitY Projects	11,25,01,312	29,60,09,343	1,16,87,162	407	57,19,896	4,34,14,565	16,56,334	30,65,828	3,96,72,661	9,35,29,284	5,58,68,700	27,08,00,240
	Other Agency Projects	14,64,94,032	4,34,81,910	61,27,834	-	4,06,31,887	4,40,11,461	1,30,557	48,45,894	37,96,392	9,34,16,191	6,86,200	10,20,01,385
	Total Hyderabad Centre	25,89,95,344	33,94,91,253	1,78,14,996	407	4,63,51,783	8,74,26,026	17,86,891	79,11,722	4,34,69,053	18,69,45,475	5,65,54,900	37,28,01,625
6	**Kolkata Centre**												
	MeitY Projects	1,25,95,440	10,02,20,000	2,17,686	-	5,89,773	2,05,23,847	1,59,33,876	30,48,969	42,18,015	4,43,14,480	3,04,209	6,84,14,437
	Other Agency Projects	4,01,49,335	16,14,23,900	4,25,786	-	46,03,944	7,41,83,709	5,04,50,924	89,74,577	12,22,368	13,94,35,522	5,81,485	6,19,82,014
	Total Kolkata Centre	5,27,44,775	26,16,43,900	6,43,472	-	51,93,717	9,47,07,556	6,63,84,800	1,20,23,546	54,40,383	18,37,50,002	8,85,694	13,03,96,451
7	**Mohali Centre**												
	MeitY Projects	1,29,58,636	3,16,26,850	7,03,196	1,66,947	36,68,224	1,74,42,711	60,36,937	8,93,870	21,48,317	3,01,90,059	10,95,771	1,41,69,799
	Other Agency Projects	81,65,297	11,13,76,533	4,01,527	27,537	4,77,755	1,02,58,795	32,62,292	11,66,805	24,96,360	1,76,62,007	84,058	10,22,24,829
	Total Mohali Centre	2,11,23,933	14,30,03,383	11,04,723	1,94,484	41,45,979	2,77,01,506	92,99,229	20,60,675	46,44,677	4,78,52,066	11,79,829	11,63,94,628
8	**Mumbai Centre**												
	MeitY Projects	10,77,83,557	11,65,13,276	7,65,140	-	1,06,37,087	3,39,01,897	1,67,98,160	6,59,864	21,63,330	6,41,60,338	15,97,24,736	11,76,899
	Other Agency Projects	(3,26,429)	-	-	-	-	-	-	-	-	-	-	(3,26,429)
	Total Mumbai Centre	10,74,57,128	11,65,13,276	7,65,140	-	1,06,37,087	3,39,01,897	1,67,98,160	6,59,864	21,63,330	6,41,60,338	15,97,24,736	8,50,470
9	**Noida Centre**												
	MeitY Projects	1,07,40,698	57,56,33,773	41,02,923	-	61,76,803	3,00,78,854	35,14,383	27,84,668	50,12,770	4,75,67,478	(31,84,434)	54,60,94,350
	Other Agency Projects	(7,53,15,712)	13,97,63,219	10,55,051	-	2,49,929	4,93,15,130	32,03,835	90,000	1,19,56,079	6,48,14,973	-	6,87,585
	Total Noida Centre	(6,45,75,014)	71,53,96,992	51,57,974	-	64,26,732	7,93,93,984	67,18,218	28,74,668	1,69,68,849	11,23,82,451	(31,84,434)	54,67,81,935
10	**Pune Centre**												
	MeitY Projects	57,58,43,623	2,03,02,50,000	7,20,83,049	-	7,25,20,434	28,48,09,875	14,41,21,113	1,46,08,154	7,74,14,827	59,34,74,403	4,12,52,702	2,04,34,49,567
	Other Agency Projects	1,25,46,03,678	4,01,60,85,960	16,89,64,033	6,98,801	6,63,474	5,86,69,387	1,38,51,32,280	35,23,446	1,23,46,996	1,46,03,35,583	(12,87,98,980)	4,10,88,15,869
	Total Pune Centre	1,83,04,47,301	6,04,63,35,960	24,10,47,082	6,98,801	7,31,83,908	34,34,79,262	1,52,92,53,393	1,81,31,600	8,97,61,823	2,05,38,09,986	(8,75,46,278)	6,15,22,65,436
11	**Thiruvananthapuram Centre**												
	MeitY Projects	28,84,21,571	54,57,82,000	95,00,753	9,38,84,000	6,37,00,006	21,55,15,498	1,42,54,381	1,04,54,928	16,27,08,233	46,66,33,046	1,02,16,357	46,07,38,921
	Other Agency Projects	4,54,32,376	4,63,80,868	18,53,360	-	76,63,134	2,49,59,161	1,75,23,806	23,39,296	37,52,250	5,62,37,647	74,309	3,73,54,648
	Total Thiruvananthapuram Centre	33,38,53,947	59,21,62,868	1,13,54,113	9,38,84,000	7,13,63,140	24,04,74,659	3,17,78,187	1,27,94,224	16,64,60,483	52,28,70,693	1,02,90,666	49,80,93,569
	Total MeitY Projects	**1,13,97,76,312**	**3,85,35,84,632**	**10,02,22,039**	**9,40,51,354**	**17,90,62,984**	**69,15,58,988**	**22,09,00,340**	**4,11,63,299**	**31,20,96,724**	**1,44,47,82,335**	**26,89,80,437**	**3,47,38,71,566**
	Total Other Agency Projects	**1,58,48,95,395**	**4,85,93,78,149**	**18,00,68,471**	**7,26,338**	**5,45,35,331**	**30,72,17,525**	**1,61,13,28,705**	**2,64,60,894**	**3,67,64,522**	**2,03,63,06,977**	**(6,88,92,612)**	**4,65,76,53,988**
	Grand Total	**2,72,46,71,707**	**8,71,29,62,781**	**28,02,90,510**	**9,47,77,692**	**23,35,98,315**	**99,87,76,513**	**1,83,22,29,045**	**6,76,24,193**	**34,88,61,246**	**3,48,10,89,312**	**20,00,87,825**	**8,13,15,25,554**

Amount in ₹

Particulars	2019-20	2018-19
Schedule 4 - Current Liabilities and Provisions		
A. Current Liabilities		
1. Trade Payables (For Goods and Others)	73,24,61,165	62,26,42,934
2. Advances Received		
a) Advances Received from Parties	2,15,53,68,532	1,18,16,28,503
b) Fees Received in Advance	12,000	12,000
c) AMC Charges Received in Advance	-	-
d) Other Income Received in Advance	19,07,05,335	7,42,80,631
3. Statutory Liabilities		
a) Members CPF Recovery Payable	1,12,84,271	4,42,84,333
b) Members VPF Payable	10,82,284	58,71,003
c) Members CPF Loan Recovery Payable	3,311	3,311
d) Members Benevolent Fund Payable	5,18,914	10,88,854
e) Members CGEIS/Group Insurance Payable	1,42,176	36,315
f) Members Other Recoveries Payable	6,23,961	6,44,918
g) C-DAC's Contribution to CPF Payable	1,57,47,392	5,70,52,135
h) Gratuity Payable	16,47,12,982	14,23,18,825
i) Leave Salary and Pension Contribution Payable	37,52,43,029	20,28,04,047
j) Members Income Tax Payable	2,31,69,737	9,18,92,369
k) Tax Deducted at Source Payable	93,44,064	1,21,13,265
l) Profession Tax Payable	3,37,322	3,41,474
m) Service Tax Payable	-	2,20,16,411
n) CGST Payable	(36,72,657)	91,03,544
o) SGST Payable	(36,72,658)	91,09,526
p) IGST Payable	2,50,95,691	5,03,45,585
q) UTGST Payable	-	-
r) Reverse charge GST Payable	1,13,374	11,220
4. Other Current Liabilities		
a) Unpaid Salaries	1,15,77,169	1,59,14,157
b) Library Deposits Payable	90,450	91,450
c) Other Security Deposits Payable	7,72,17,101	2,99,81,041
d) Earnest Money Deposit Contractors Payable	4,17,32,630	1,41,87,736
e) Retention Deposit Contractors	1,50,53,528	1,29,77,138
f) Refund of Course Fees Due	1,36,51,421	10,78,515
g) ATC's & Others Share in Fees Payable	12,14,726	37,61,915
h) Other Current Liabilities	54,75,33,261	26,86,26,610
Total (A)	4,40,66,90,511	2,87,42,19,765
B. Provisions		
1. Others (Specify)		
a) Provisions / Accrued Liabilities for Expenses	21,42,92,445	21,45,52,955
Total (B)	21,42,92,445	21,45,52,955
Total (A)+(B)	**4,62,09,82,956**	**3,08,87,72,720**

Schedule-5 FIXED ASSETS Acquired out of own funds
(Attached to and forming an integral part of Balance Sheet)

Amount in ₹

		Gross Block						Depreciation					Net Block	
Sr. No.	Particulars	Cost/Valuation as on beginning of the year	Additions During the Year			Deletion/ Adjustments During the Year	Cost/Valuation as on end of the year	Depreciation as at beginning of the year	Depreciation Written Back	Depreciation Rate	Depreciation for Current Year	Total Depreciation up to the year end	WDV (Closing)	WDV (Opening)
			On or Before 30th September	After 30th September	Total Additions during the year									
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Land													
	a) Freehold	3,21,67,475	-	-	-	-	3,21,67,475	-	-	0%	-	-	3,21,67,475	3,21,67,475
	b) Leasehold	17,18,15,714	3,80,909	-	3,80,909	-	17,21,96,623	2,02,22,799	-	0%	6,97,292	2,09,20,091	15,12,76,532	15,15,92,915
2	Building													
	a) On Freehold Land	91,18,277	-	-	-	-	91,18,277	53,87,438	-	10%	3,73,084	57,60,522	33,57,755	37,30,839
	b) On Leasehold Land	10,89,53,874	-	-	-	-	10,89,53,874	8,57,38,473	-	10%	23,21,540	8,80,60,013	2,08,93,861	2,32,15,401
	c) Ownership Flats/Premises	3,97,26,295	-	-	-	-	3,97,26,295	3,24,93,351	-	10%	7,23,294	3,32,16,645	65,09,650	72,32,944
	d) Superstructures on Land not belonging to the entity	1,47,34,869	-	-	-	-	1,47,34,869	1,32,87,912	-	10%	1,44,696	1,34,32,608	13,02,261	14,46,957
3	Plant, Machinery and Equipments	7,09,40,986	1,16,617	35,300	1,51,917	-	7,10,92,903	5,42,98,808	-	15%	25,19,114	5,68,17,922	1,42,74,981	1,66,42,178
4	Vehicles	1,85,53,415	6,93,781	42,27,164	49,20,945	16,59,692	2,18,14,668	1,04,99,851	13,22,068	15%	18,95,533	1,10,73,316	1,07,41,352	80,53,564
5	Furniture & Fixtures	9,63,89,463	17,02,128	14,69,099	31,71,227	-	9,95,60,690	7,11,19,676	-	10%	28,44,101	7,39,63,777	2,55,96,913	2,52,69,786
6	Office Equipments	4,37,18,997	25,23,724	19,01,076	44,24,800	7,18,574	4,74,25,223	2,80,64,567	6,95,208	15%	30,08,377	3,03,77,736	1,70,47,487	1,56,54,430
7	Air Conditioning Equipments	3,54,81,693	2,05,227	6,73,213	8,78,440	3,74,765	3,59,85,368	2,86,19,188	3,27,014	15%	11,53,980	2,94,46,154	65,39,213	68,62,505
8	Computer Peripherals	38,41,79,819	1,49,97,915	2,34,72,172	3,84,70,087	12,62,365	42,13,87,541	34,85,02,974	12,55,141	40%	2,96,55,881	37,69,03,714	4,44,83,826	3,56,76,844
9	Electrical Installations	6,31,69,916	20,93,566	15,24,251	36,17,817	10,54,568	6,57,33,165	4,65,67,788	5,29,243	10%	19,69,464	4,80,08,009	1,77,25,155	1,66,02,128
10	Electronic Tools & Lab Equipments	83,03,055	5,19,260	1,25,061	6,44,321	-	89,47,376	64,47,228	-	15%	3,75,022	68,22,250	21,25,126	18,55,827
11	Library Books	1,54,21,505	97,300	54,155	1,51,455	2,273	1,55,70,687	1,51,03,350	2,270	40%	1,87,843	1,52,88,923	2,81,764	3,18,155
12	Copyright Know-how	66,950	-	-	-	-	66,950	65,375	-	25%	394	65,769	1,181	1,575
13	Other Fixed Assets	69,78,572	-	-	-	300	69,78,272	53,68,539	250	15%	2,41,497	56,09,786	13,68,486	16,10,033
	Total	**1,11,97,20,875**	**2,33,30,427**	**3,34,81,491**	**5,68,11,918**	**50,72,537**	**1,17,14,60,256**	**77,17,87,317**	**41,31,194**		**4,81,11,112**	**81,57,67,235**	**35,56,93,018**	**34,79,33,556**
	Capital Work-in-progress	-	-	-	-	-	-	-	-		-	-	-	-
	Grand Total	**1,11,97,20,875**	**2,33,30,427**	**3,34,81,491**	**5,68,11,918**	**50,72,537**	**1,17,14,60,256**	**77,17,87,317**	**41,31,194**		**4,81,11,112**	**81,57,67,235**	**35,56,93,018**	**34,79,33,556**
	Previous Year	**1,06,90,31,670**	**2,46,56,280**	**3,62,38,073**	**6,08,94,353**	**1,02,05,148**	**1,11,97,20,875**	**73,36,10,317**	**40,71,646**		**4,22,48,646**	**77,17,87,317**	**34,79,33,556**	**33,54,21,352**

Schedule-6 FIXED ASSETS Acquired out of Grant-In-Aid
(Attached to and forming an integral part of Balance Sheet)

Amount in ₹

		Gross Block						Depreciation					Net Block	
Sr. No.	Particulars	Cost/Valuation as on beginning of the year	Additions During the Year			Deletion/Adjustments During the Year	Cost/Valuation as on end of the year	Depreciation as at beginning of the year	Depreciation Written Back	Depreciation Rate	Depreciation for Current Year	Total Depreciation up to the year end	WDV (Closing)	WDV (Opening)
			On or Before 30th September	After 30th September	Total Additions during the year									
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Land													
	a) Freehold	49,04,850	-	-	-	-	49,04,850	-	-	0%	-	-	49,04,850	49,04,850
	b) Leasehold	1,67,45,711	-	-	-	-	1,67,45,711	26,94,732	-	0%	1,71,770	28,66,502	1,38,79,209	1,40,50,979
2	Building													
	a) On Freehold Land	21,83,15,715	3,80,366	92,950	4,73,316	-	21,87,89,031	11,07,15,154	-	10%	1,08,07,388	12,15,22,542	9,72,66,489	10,76,00,561
	b) On Leasehold Land	13,27,01,184	-	-	-	-	13,27,01,184	10,40,03,586	-	10%	28,69,760	10,68,73,346	2,58,27,838	2,86,97,598
	c) Ownership Flats/Premises	33,41,269	-	-	-	-	33,41,269	29,73,453	-	10%	36,782	30,10,235	3,31,034	3,67,816
	d) Superstructures on Land not belonging to the entity	-	-	-	-	-	-	-	-	10%	-	-	-	-
3	Plant, Machinery and Equipments	9,30,62,048	-	-	-	20,42,765	9,10,19,283	7,89,56,374	19,58,951	15%	21,03,279	7,91,00,702	1,19,18,581	1,41,05,674
4	Vehicles	1,00,13,336	-	-	-	-	1,00,13,336	89,92,607	-	15%	1,53,110	91,45,717	8,67,619	10,20,729
5	Furniture & Fixtures	12,49,08,047	1,31,79,313	2,33,613	1,34,12,926	6,29,888	13,76,91,085	8,91,74,144	5,52,850	10%	49,06,980	9,35,28,274	4,41,62,811	3,57,33,903
6	Office Equipments	5,33,71,007	82,908	2,17,434	3,00,342	10,19,586	5,26,51,763	4,44,40,903	9,76,824	15%	13,78,153	4,48,42,232	78,09,531	89,30,104
7	Air Conditioning Equipments	5,33,24,357	-	-	-	98,411	5,32,25,946	4,26,11,895	98,214	15%	16,06,839	4,41,20,520	91,05,426	1,07,12,462
8	Computer Peripherals	1,12,61,27,992	11,07,589	36,27,079	47,34,668	4,00,00,920	1,09,08,61,740	1,11,49,85,861	3,99,82,891	40%	60,75,142	1,08,10,78,112	97,83,628	1,11,42,131
9	Electrical Installations	6,48,34,944	-	34,86,973	34,86,973	24,171	6,82,97,746	4,84,76,009	22,323	10%	19,84,405	5,04,38,091	1,78,59,655	1,63,58,935
10	Electronic Tools & Lab Equipments	10,19,45,901	-	-	-	-	10,19,45,901	8,69,68,129	-	15%	22,46,665	8,92,14,794	1,27,31,107	1,49,77,772
11	Library Books	3,99,40,457	380	8,368	8,748	-	3,99,49,205	3,98,80,126	-	40%	27,630	3,99,07,756	41,449	60,331
12	Copyright Know-how	4,40,660	-	-	-	-	4,40,660	4,40,641	-	25%	5	4,40,646	14	19
13	Other Fixed Assets	71,73,125	4,018	2,798	6,816	-	71,79,941	61,54,599	-	15%	1,53,803	63,08,402	8,71,539	10,18,526
	Total	**2,05,11,50,603**	**1,47,54,574**	**76,69,215**	**2,24,23,789**	**4,38,15,741**	**2,02,97,58,651**	**1,78,14,68,213**	**4,35,92,053**		**3,45,21,711**	**1,77,23,97,871**	**25,73,60,780**	**26,96,82,390**
	Capital Work-in-progress	1,65,27,76,624	5,07,463	43,86,375	48,93,838	-	**1,65,76,70,462**	-	-		-	-	1,65,76,70,462	1,65,27,76,624
	Grand Total	**3,70,39,27,227**	**1,52,62,037**	**1,20,55,590**	**2,73,17,627**	**4,38,15,741**	**3,68,74,29,113**	**1,78,14,68,213**	**4,35,92,053**		**3,45,21,711**	**1,77,23,97,871**	**1,91,50,31,242**	**1,92,24,59,014**
	Previous Year	3,67,74,31,525	6,36,56,296	13,62,66,084	19,99,22,380	17,34,26,678	3,70,39,27,227	1,90,10,14,925	15,67,08,573		3,71,61,860	1,78,14,68,213	1,92,24,59,014	1,77,64,16,600

Schedule-7 FIXED ASSETS Acquired out of Project Grants
(Attached to and forming an integral part of Balance Sheet)

Amount in ₹

		Gross Block						Depreciation					Net Block	
Sr.No.	Name of the Project	Cost/Valuation as on beginning of the year	Additions During the Year			Deletion/Adjustments During the Year	Cost/Valuation as on end of the year	Depreciation as at beginning of the year	Depreciation Written Back	Depreciation Rate	Depreciation for Current Year	Total Depreciation up to the year end	WDV (Closing)	WDV (Opening)
			On or Before 30th September	After 30th September	Total Additions during the year									
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Bangalore Centre Project Assets	33,63,65,396	82,12,719	60,87,349	1,43,00,068	-	35,06,65,464	30,06,20,617	-		1,47,91,754	31,54,12,371	3,52,53,093	3,57,44,779
2	Chennai Centre Project Assets	9,16,33,737	13,57,139	6,38,762	19,95,901	-	9,36,29,638	8,15,62,744	-		26,21,569	8,41,84,313	94,45,325	1,00,70,993
3	Corporate Project Assets	-	-	-	-	-	-	-	-		-	-	-	-
4	Delhi Centre Project Assets	15,72,623	-	-	-	-	15,72,623	15,66,764	-		935	15,67,699	4,924	5,859
5	Hyderabad Centre Project Assets	26,19,81,392	1,79,02,863	2,84,48,920	4,63,51,783	-	30,83,33,175	20,99,86,923	-		3,46,72,917	24,46,59,840	6,36,73,335	5,19,94,469
6	Kolkata Centre Project Assets	2,71,48,133	-	5,89,773	5,89,773	-	2,77,37,906	2,20,61,591	-		22,70,526	2,43,32,117	34,05,789	50,86,542
7	Mohali Centre Project Assets	10,24,07,103	5,82,749	35,63,230	41,45,979	-	10,65,53,082	8,84,43,529	-		49,19,115	9,33,62,644	1,31,90,438	1,39,63,574
8	Mumbai Centre Project Assets	30,57,27,467	57,27,012	49,10,075	1,06,37,087	-	31,63,64,554	28,29,75,375	-		87,26,100	29,17,01,475	2,46,63,079	2,27,52,092
9	Noida Centre Project Assets	9,60,44,463	2,34,478	61,92,254	64,26,732	-	10,24,71,195	7,80,17,351	-		57,16,360	8,37,33,711	1,87,37,483	1,80,27,112
10	Pune Centre Project Assets	63,42,19,201	36,39,594	6,95,44,314	7,31,83,908	-	70,74,03,109	54,29,69,295	-		6,51,42,089	60,81,11,384	9,92,91,726	9,12,49,906
11	Thiruvananthapuram Centre Project Assets	73,11,02,854	3,02,79,154	4,10,83,987	7,13,63,141	2,21,931	80,22,44,064	35,85,77,900	85,340		7,17,81,517	43,02,74,077	37,19,69,987	37,25,24,954
	Total	**2,58,82,02,369**	**6,79,35,708**	**16,10,58,664**	**22,89,94,371**	**2,21,931**	**2,81,69,74,810**	**1,96,67,82,089**	**85,340**		**21,06,42,882**	**2,17,73,39,631**	**63,96,35,179**	**62,14,20,280**
	Capital Work-in-progress	**18,30,36,750**	**-**	**46,03,944**	**46,03,944**	**18,30,36,750**	**46,03,944**	**-**	**-**		**-**	**-**	**46,03,944**	**18,30,36,750**
	Grand Total	**2,77,12,39,119**	**6,79,35,708**	**16,56,62,608**	**23,35,98,315**	**18,32,58,681**	**2,82,15,78,754**	**1,96,67,82,089**	**85,340**		**21,06,42,882**	**2,17,73,39,631**	**64,42,39,123**	**80,44,57,030**
	Previous Year	**2,28,38,83,807**	**10,56,65,123**	**38,18,40,076**	**48,75,05,199**	**1,49,887**	**2,77,12,39,119**	**1,76,39,56,268**	**81,237**		**20,29,07,059**	**1,96,67,82,089**	**80,44,57,030**	**51,99,27,539**

Amount in ₹

Particulars	2019-20	2018-19
Schedule 8 - Current Assets, Loans and Advances		
A. Current Assets		
1. Inventories :		
a) Stock in trade		
Finished Goods	70,18,72,582	21,94,90,775
Work-in-progress	1,05,008	1,42,124
Raw Material	13,30,862	20,95,756
b) Stock of Course Material	15,19,242	27,49,050
2. Sundry Debtors		
Trade Receivables	1,23,31,79,970	1,36,88,19,679
Less: Provision for Bad and Doubtful Debts	26,94,62,254	25,31,37,579
	96,37,17,716	1,11,56,82,100
3. Cash balances in hand (including cheques/drafts and imprest)	69,638	99,475
4. Bank Balances		
a) With Scheduled Banks		
On Deposit Accounts (includes margin money)	11,71,60,77,779	4,54,35,84,097
On Savings/Current Account	1,54,56,82,528	1,79,21,25,476
b) Funds/Goods in Transit	75,058	1,04,054
5. Post Office-Savings Accounts	3,171	316
Total (A)	14,93,04,53,584	7,67,60,73,223
B. Loans, Advances and Other Assets		
1. Loans		
a) Staff	63,11,218	67,84,825
b) Other (Specify)	9,06,937	-
2. Advances and other amounts recoverable in cash or in kind or for value to be received		
a) On Capital Account	3,60,13,256	2,59,24,000
b) Prepayments (Advances to Suppliers)	7,43,12,342	8,66,51,259
c) To Employees	1,23,31,371	94,48,829
d) To Others	19,50,63,438	56,51,527
3. Income Accrued		
a) On Investments from Earmarked/Endowment Funds	-	-
b) On Bank Deposits	25,96,14,120	8,63,69,114
c) Others		
I) Course Fee Receivable	8,87,575	2,05,475
ii) Receivable from Guest House Receipts	-	-
iii) Other Grants Receivables	68,08,000	22,83,80,000
4. Claims Receivable		
a) Insurance Claims Lodged but not received	-	-
b) Cliams due but not received	6,25,354	6,25,354
c) Income Tax Deducted at Source	20,32,73,991	13,16,55,932
d) Sales Tax / VAT Refund Due	2,61,290	3,48,811
e) CGST Receivable	1,50,03,997	30,54,308
f) SGST Receivable	1,50,03,997	30,61,162
g) IGST Receivable	2,93,76,595	98,42,227
h) UTGST Receivable	-	-
i) Reverse Charge GST Receivable	6,502	14,738
j) Input Tax Credit GST Receivable	1,97,38,546	-
k) GST Paid on Advance Receipt	4,91,03,112	1,39,87,702
l) Receivable from PF Trust	-	-
m) Other Receivables	74,70,658	5,60,82,084
5. Prepaid Expenses		
a) Insurance	14,82,325	14,31,956
b) Other Expenses	98,25,032	1,03,49,740

Amount in ₹

Particulars	2019-20	2018-19
6. Deposits (Assets)		
a) Telephone Deposit	12,30,637	12,54,187
b) Lease Rent Deposit	4,02,78,792	4,30,31,066
c) Other Deposits	2,65,47,230	2,65,53,106
d) Security Deposit	1,40,85,937	1,24,44,248
e) EMD / Tender Deposit	1,98,27,815	46,61,315
7. Differed Expenses		
a) Unutilised Modvat / Cenvat	-	-
Total (B)	1,04,53,90,067	76,78,12,965
Total (A+B)	**15,97,58,43,651**	**8,44,38,86,188**

Schedule 9 - Income from Sales/Services

1. Income from Sales		
a) Sale of Finished Goods	77,54,86,141	33,16,75,092
b) Sale of Raw Material	-	-
c) Sale of Scraps	2,63,851	4,81,705
2. Income from Services		
a) Software Development Charges	81,82,29,087	48,06,20,025
b) Others (Specify)	-	-
AMC Charges Received	2,51,57,652	1,47,01,214
Consultancy Charges / Service Charges	1,47,26,04,207	1,70,14,09,867
TOT Fees Received	20,20,000	2,60,72,000
Royalty Received	13,55,100	26,34,890
Data Charges	6,82,23,355	7,57,29,844
3. Inter Unit / Inter Branch Sales / (Purchases)	8,75,000	-
Total	**3,16,42,14,393**	**2,63,33,24,637**

Schedule 10 - Grants/Subsdies
(Irrevocable Grants & Subsdies Received)

1. Central Government	1,20,00,00,000	1,00,00,00,000
2. Others (Specify)		
a) C-DAC's own Contribution and Other Adjustments	36,930	60,82,789
3. Less : Amount utilised for Capital Expenditure in the current year transferred to Capital Reserve	73,18,974	47,69,705
Total	**1,19,27,17,956**	**1,00,13,13,084**

Schedule 11 - Fees/Subscriptions
(Accounting Policies towards each item are to be disclosed)

1. Entrance Fees	-	-
2. Course Fees	83,84,98,891	79,68,12,744
3. Corporate Training Fees	90,89,213	1,25,32,717
4. Annual Fees/Subscriptions	1,08,57,624	1,31,25,481
5. Authorization Fees	-	-
6. Others (Specify)	-	-
a) Virtual Centre Processing Fees	-	-
b) Admission Cancellation Fees	24,47,966	40,32,407
c) Examination Fees	3,26,25,287	2,74,54,816
d) Late Fee	14,989	48,638
e) Registration Fees / Project Fee	11,98,591	15,05,836
f) Students Hostel Fees	1,97,74,446	1,64,93,195
TOTAL	**91,45,07,007**	**87,20,05,834**

Amount in ₹

Particulars	2019-20	2018-19
Schedule 12 - Interest Received		
1. On Term Deposits		
a) With Scheduled Banks	23,55,47,872	17,05,35,028
2. On Savings Accounts		
a) With Scheduled Banks	1,61,18,127	1,93,80,466
3. On Loans		
a) Employees/Staff	2,66,429	7,79,219
Total	**25,19,32,428**	**19,06,94,713**
Schedule 13 - Other Income		
1. Profit on Sale/Disposal of Assets		
a) Owned Assets	1,05,674	(1,61,410)
b) Assets acquired out of grants, or received free of cost	-	-
2. Exports Incentives Realized	-	-
3. Fees for Miscellaneous Services	8,30,779	8,05,419
4. Miscellaneous Income	42,56,166	50,06,216
Total	**51,92,619**	**56,50,225**
Schedule 14 - Increase/(Decrease) In Stock of Finished Goods & Work-In-Progress		
a) Closing Stock		
Finished Goods	70,18,72,582	21,94,90,775
Work-in-progress	1,05,008	1,42,124
Raw Material	13,30,862	20,95,755
Loose Tools	-	-
Course Material Stock	15,19,242	27,49,050
b) Less : Opening Stock		
Finished Goods	21,94,90,775	24,46,760
Work-in-progress	1,42,124	1,50,440
Raw Material	20,95,756	17,15,677
Loose Tools	-	-
Course Material Stock	27,49,050	5,18,305
Total (a-b)	**48,03,49,989**	**21,96,46,522**
Schedule 15 - Establishment Expenses		
a) Salaries & Wages	1,98,16,94,849	2,01,86,25,606
b) Allowances & Bonus		
Awards & Prizes	4,52,337	1,88,205
Bonus	-	-
Canteen Facility	2,35,32,692	3,56,60,953
Hire Charges - Contractual Services	13,04,22,962	12,02,63,911
Lease Rent for Employees Quarters	-	-
Leave Travel Concession	57,50,295	2,06,41,426
Medical Reimbursement	9,30,51,104	10,44,02,503
Members Medical & Accident Insurance Expenses	5,82,082	5,49,290
Misc. Allowances and Other Reimbursements	2,12,56,940	1,54,50,577
Staff Recruitment Expenses	46,80,510	30,19,024
Staff Training Expenses	22,27,903	19,09,400
Transfer & Relocation Expenses	63,020	1,76,338
c) Contribution to Provident Fund	18,98,89,896	19,27,13,843
d) Staff Welfare Expenses	39,99,806	59,54,636
e) Expenses on Employees Retirement and Terminal Benefits	-	-
Gratuity	19,94,47,816	26,66,09,663
Leave Encashment	13,27,15,100	7,45,46,956
Leave Salary & Pension Contribution	10,10,62,197	5,02,59,456
f) Others	92,924	1,01,092
Total	**2,89,09,22,433**	**2,91,10,72,879**

Amount in ₹

Particulars	2019-20	2018-19
Schedule 16 - Other Administrative Expenses		
a) Purchases	1,13,12,32,739	42,75,23,400
b) Direct Expenses		
Consumables	2,19,73,171	1,80,22,654
Design and Development Charges	9,68,010	5,01,674
Excise/Custom Duty/Service Tax Paid	22,13,853	41,53,472
Freight and Handling Expenses	15,95,657	1,11,260
Labour Charges	-	1,200
Liquidated Damages	-	2,13,750
Material Insurance Expenses	1,38,192	1,22,395
Other Packing Charges	32,500	1,23,470
Royalty and Support Fees	-	-
Software Development Consultancy Charges	1,01,90,800	41,99,352
Technical Service Charges	37,55,94,534	44,50,60,751
Warehouse Charges	-	1,03,200
c) Expenses on Courses		
Advertisement Expenses	1,22,65,651	83,65,250
ATC's Share in Fees	23,70,79,319	21,51,20,677
Awards & Prizes	-	24,376
Campus Interview Expenses	68,53,858	19,32,006
Course Material Production Expenses	3,18,80,157	4,02,08,259
Data Entry & Scanning Expenses	-	-
Examination Expenses	67,97,165	41,74,782
Faculty Members Expenses	3,53,66,904	3,27,57,705
Other Course Related Expenses	7,56,82,879	7,26,01,692
Printing of Forms & Prospectus	67,053	2,13,628
Students Hostel Expenses	40,61,964	50,67,997
d) Administrative Expenses		
Administrative Charges on Provident Fund	69,85,876	72,56,174
Asset Hire Charges	28,94,895	23,44,249
Auditors Remuneration	13,11,649	12,29,451
Bank Charges and Commission	21,38,104	13,92,530
C-DAC's Contribution to Funded Projects	2,29,92,721	2,18,36,871
Cultural Program Expenses	24,51,642	9,00,651
Development Contracts and Spon. Project Expenses	13,19,848	80,26,847
Electricity, Power and Water Charges	8,57,93,658	7,72,23,805
Entertainment/Hospitality Expenses	31,00,180	15,37,463
Foreign Exchange Fluctuation	(2,83,789)	(4,42,072)
Gifts and Presentation	3,39,094	4,53,304
Insurance	17,67,988	16,49,577
Interest Paid	13,04,927	33,10,066
Irrecoverable Balances Written-off/(Written-back)	2,35,273	(2,40,735)
Legal & Professional Charges	1,43,49,163	1,39,83,970
Miscellaneous Expenses	23,57,997	16,14,206
Office Expenses	1,20,91,795	81,00,565
Postage, Telephone & Communication Charges	1,32,97,381	1,69,38,417
Printing and Stationery	72,46,284	77,41,583
Provision for Bad and Doubtful Debts/Advances	1,76,98,675	2,11,60,856
Rent, Rates and Taxes	3,85,24,215	4,12,72,982
CGST Paid	2,14,580	4,99,716
SGST Paid	10,445	14,495
IGST Paid	7,855	-
UTGST Paid	-	-
Reverse Charge GST Paid	-	-
Service Hire Charges	9,80,28,108	12,20,31,192
Subscription of Periodicals & Newspapers	19,05,945	21,15,901
Tender Expenses	1,02,070	44,872
Training Expenses	19,58,762	8,04,737
Transit Quarter & Guest House Expenses	24,41,008	28,06,552
Transportation Charges	2,82,042	1,01,160
Vehicles Hire, Running and Maintenance	91,24,018	77,44,555

Amount in ₹

Particulars	2019-20	2018-19
e) Repairs and Maintenance		
Air Conditioning Equipments	40,90,792	73,34,485
Building	94,90,032	1,04,03,158
Computers	50,93,673	51,57,337
Electrical Fittings	1,69,65,620	1,96,33,776
Furniture and Fixtures	23,96,506	11,81,145
Garden Maintenance	10,81,710	19,23,862
Lab Equipments	2,23,739	1,54,787
Office Equipments	22,66,106	22,26,469
Other Assets	31,17,245	31,59,392
f) Travelling and Conveyance Expenses		
Inland Travel Expenses		
Director	49,17,871	39,11,931
Members	11,42,34,405	12,68,96,175
Others	30,78,685	29,26,844
Foreign Travel Expenses		
Director	4,28,195	7,43,325
Members	18,04,690	33,25,088
Others	-	-
Conveyance Expenses	78,818	-
g) Selling Distribution and Business Promotion Expenses		
Advertisement Expenses	25,06,777	12,93,015
Expenses on Exhibition, Seminars/Workshops	93,23,609	47,58,345
Distribution Expenses	5,94,789	13,98,780
Product Literature & Brochures Expenses	-	-
Other Sales Promotion Expenses	2,11,515	31,89,158
h) Corporate Office Expenses	-	-
i) Other Expenses	-	-
Total Other Administrative Expenses	**2,48,78,91,592**	**1,85,36,73,962**

Schedule 17: Significant Accounting Policies:

1. **Accounting Convention**

The financial statements are prepared under the historical cost convention C-DAC follows Mercantile System of Accounting and recognizes Income and Expenditure on Accrual basis except otherwise stated, and the following items, due to their peculiar nature are recognized otherwise:

1.1. The course fees of Diploma in Advanced Computing and other Courses commencing before the end of financial year and the duration of which falls beyond the financial year are recognized entirely in the year under audit. In respect of these courses, entire expenditure of course material and agreed proportionate share of the Authorized Training Centers (ATCs) is also accounted for in the year under audit.

1.2. Bonus is accounted for on Cash Basis.

1.3. Expenditure incurred on incomplete Software Development Projects is expensed out in the year of incurrence.

2. **Revenue Recognition**

2.1. Sales are recognized as net of Trade Discount, Sales Returns and Excise Duty, but including Goods and Services Tax.

2.2. Software Development Charges are recognized on the basis of Terms of Individual Contract and / or as per Phases of completion.

2.3. The income in respect of Annual Maintenance Contract is recognized on accrual basis and as per the terms of individual contracts entered into with parties.

2.4. Income in respect of consultancy charges/service charges is recognized on accrual basis and on the basis of terms of individual contracts entered into with the parties.

2.5. Grants in aid received from the government are treated as income to the extent of net of capital expenditure incurred during the year.

2.6. Interest and other miscellaneous incomes are accounted for on accrual basis.

3. **Fixed Assets**

3.1 Actual cost of fixed assets acquired is accounted for as per the terms of purchase order; any recovery is netted off to the cost of the asset and all expenses directly attributable to the acquisition and installation of the fixed assets are capitalized.

3.2 Fixed Assets are stated at Cost less Accumulated Depreciation.

3.3 Direct Material Cost with respect to major Fixed Assets developed in-house is capitalized along with manpower and Overhead costs. The Manpower and Overhead costs are charged on basis of man-days spent on the development of Assets as ascertained by the Management. Cost of prototype incurred in the process is charged to Revenue.

3.4 Costs incurred on Assets, which are in process of acquisition, or installation or development is treated as Capital WIP.

3.5 Fixed Assets created out of Sponsored Project Grants and lying at project site are not capitalized and shown as consumables under revenue expenditure.

4. **Depreciation**

4.1. The ownership of assets acquired out of Mission Grants & Sponsored Projects Grants rests with the respective funding agencies. However, depreciation is charged on the WDV basis on all assets including on those acquired out of Mission and Sponsored Project Grants. The Written-Down Value of the said assets is represented by an equivalent amount of Capital Reserve.

4.2. All additions to Fixed Assets are depreciated at full rates irrespective of the date of acquisition. Depreciation is charged at the rates prescribed by the Income Tax Act 1961.

5. Inventory Valuation

The inventories are valued and certified by the Management as under :-

5.1. Components, Raw Materials and Loose Tools in stock are valued at cost or net realizable value whichever is lower.

5.2. Work in Progress and Finished Goods are valued at cost.

5.3. Course Material stock is valued at landed cost. The course material, which is outdated due to change in the syllabus, is shown at nil value.

6. Deferred Expenditure on Projects

The expenditure incurred on incomplete business projects for which income is to be recognized in the ensuing period is deferred.

7. Foreign Currency Transaction

7.1. Transactions denominated in foreign currency are accounted at the exchange rate prevailing on the date of transaction and difference between the date of transaction and payment/receipt are accounted for as income or expenditure as the case may be.

7.2. Current assets and current liabilities denominated in foreign currency are converted at the exchange rate prevailing as at the year-end and the resultant gain/loss is adjusted to revenue account. Contingent liabilities denominated in foreign currency are converted at the exchange rate prevailing as at the year-end.

8. Retirement Benefits

Retirement benefits in respect of Provident Fund, Pension Fund, Gratuity and Leave Encashment has been provided for on accrual basis.

9. Other Policies

All other Accounting Policies are generally consistent with normally accepted accounting practices.

CA Raghu Bhargava	**Sunil Misar**	**Dr. Hemant Darbari**
Director Finance	Registrar (I/C)	Director General

For Udyen Jain & Associates,Firm Registration No.116336W
Chartered Accountants

Sandeep Soni
Partner (M.No.124971)
UDIN :20124971AAAAFO8871
Date: 10th November, 2020
Place: Pune

Schedule 18: Notes to Accounts

1. Merger of Societies with C-DAC

The Assets, Liabilities and Other obligations at the book value as on December 15, 2002 are merged in C-DAC in respect of the societies viz. Electronics Research And Development Centre at Kolkata, Noida, Thiruvananthapuram, National Centre for Software Technology Mumbai, and Centre For Electronics Design And Technology of India, Mohali, due to merger of these Societies in C-DAC as per the Government of India orders.

The process for transfer of title deeds of Immovable properties in the name of C-DAC of the above centres is under process. No liability towards expenses such as stamp duty, taxes and other expenses (if any)is provided for. The same will be accounted for in the year of payment if any.

2. Capital Commitment

Capital Commitments not provided for ₹26,448.85 Lakhs (Previous year₹8,528.92 Lakhs).

3. Sponsored Projects

Balance of Core Grant Projects as per Annexure 1 of Schedule 3 to the Balance Sheet includes unutilized grants amounting to ₹0.00 Lakhs (Previous year ₹33.73 Lakhs) and ₹2188.63 Lakhs (Previous year ₹2360.76 Lakhs) grants receivable on account of expenditure incurred in anticipation of release of grants on projects.

Balance of unutilized Funded Projects grants as per Annexure 2 of Schedule 3 to the Balance Sheet includes unutilized grants amounting to ₹83,102.02 Lakhs (Previous year ₹30444.50 Lakhs) and ₹1,786.77 Lakhs (Previous year ₹3,197.79 Lakhs) grants receivable on account of expenditure incurred in anticipation of release of grants on projects.

4. Contingent Liabilities

4.1. Against Bank Guarantees:₹989.78 Lakhs (Previous year ₹1,626.46 Lakhs)

4.2. Against Letter of Credit ₹33.00 Lakhs. (Previous year ₹ Nil Lakhs)

4.3. Against Liquidated Damages:₹ Nil Lakhs (Previous year ₹2.14 Lakhs)

4.4. Against Sales Tax:₹11.21 Lakhs (Previous year ₹77.69 Lakhs)

4.5. Against Service Tax: ₹60.01 Lakhs (Previous year ₹123.00 Lakhs)

4.6. Sales Tax / VAT Assessments are completed up to financial year 2015-16 for Pune, 2016-17 for Noida, 2017-18 for Bengaluru, Chennai, Mohali and Thiruvananthapuram. No assessment is pending for Corporate, Delhi, Hyderabad, Kolkata and Mumbai centres.

4.7. Cases related to staff at various centres are pending at various levels for which the liability cannot be assessed.

5. Statutory Liabilities

The entire income of C-DAC is exempt u/s 10(21) being a scientific research association notified u/s 35(1)(ii) of the Income Tax Act, 1961. Hence no provision for income tax has been made.

6. Foreign Currency Transactions

6.1 Imports: Total Rupee value of imports (CIF) during the year is as follows:

(₹in Lakhs)

Centre	Raw Material / Components	Capital Goods	Total
Current Year	797.94	330.59	1,128.53
Previous Year	391.49	819.51	1,211.00

6.2 Expenditure in foreign currency for Travel: ₹42.88 Lakhs. (Previous Year ₹ 54.45 Lakhs)

6.3 Other Expenditure in foreign currency: ₹303.65Lakhs (Previous Year ₹77.78 Lakhs)

6.4 Earnings in Foreign Exchange: Total Earnings in Foreign Exchange during the year are as follows.

Currency	Current Year	Previous Year
US Dollars	540.00	560.00
Euro	13,000.00	0.00
Total Value in ₹ (In Lakhs)	10.38	0.36

7. Remuneration to Statutory Auditors (Including Branch Auditors)

(₹ in Lakhs)

Particulars	Current Year	Previous Year
Audit Fees (Exclusive of GST)	3.19	3.19

8. Interest received on grants is treated as liability. Expenses on the core/sponsored projects are charged to respective project and not routed through Income & Expenditure Account.

9. Fixed Assets: The depreciation on the assets purchased out of grants is debited to Capital Reserve.

10. Current Assets and Current Liabilities

10.1 Balances of Debtors, Creditors, Receivables and Payables are subject to adjustments, writing off and confirmation and reconciliation from parties.

10.2 The amount outstanding for more than three years has been provided for as Bad and Doubtful Debts except the amount realized till date & the amount realizable from the existing customers. In the opinion of Management, the said provision is adequate.

10.3 Out of debtors outstanding for more than three years for ₹2,919.20 Lakhs (Previous year ₹2,763.44 Lakhs) a provision of ₹2,694.62 Lakhs (Previous year ₹2,531.37 Lakhs) has been made up to 31st March 2020. Provision for ₹224.58 Lakhs (Previous year ₹232.07 Lakhs) has not been made {Mumbai ₹0.00 Lakhs (Previous year ₹85.19 Lakhs), Noida ₹163.37 Lakhs (Previous year ₹85.67 Lakhs) and Mohali ₹61.21 Lakhs (Previous year ₹61.21 Lakhs) as they are for ongoing projects / parties and the management of the C-DAC is of the opinion that the same will be realized shortly.

Age wise Analysis of Sundry Debtors is as follows:

(₹ in Lakhs)

Centre Name	Less than 6 months	More Than 6 months	More Than 1 year	More Than 2 years	More Than 3 years	Total
Bengaluru	52.88	8.11	4.28	0.28	170.88	236.43
Chennai	171.03	4.43	51.92	0.00	0.00	227.38
Delhi	10.46	46.41	0.00	0.00	136.79	193.66
Hyderabad	92.86	29.38	10.64	10.80	0.00	143.68
Kolkata	104.99	49.75	244.55	29.86	37.32	466.47
Mohali	282.52	69.39	25.54	1.85	81.27	460.57
Mumbai	711.13	11.18	271.10	119.19	517.95	1630.55
Noida	2651.04	291.01	447.71	409.06	798.64	4597.46
Pune	1654.54	24.09	253.37	336.10	1119.16	3387.26
Thiruvananthapuram	510.14	76.12	139.40	205.49	57.19	988.34
Total	6241.59	609.87	1448.51	1112.63	2919.20	12331.80
Previous Year	6327.77	2021.77	2196.49	378.72	2763.44	13688.19

11. Accounting of grants is made on accrual basis. The Core Grants & expenditure related to Core Grants (net off capital expenditure) is routed through Income & Expenditure account.

12. Physical Verification

Physical verification of Fixed Assets/ stores (except Corporate Office, Mumbai, Pune and Thiruvananthapuram Centres due to COVID-19 pandemic) has been carried out during the year. Reconciliation of some of the centers is in progress.

13. Internal Audit / Internal Control Systems

C-DAC has an internal control system, which is commensurate with the size and financial transactions. Internal audit is being conducted by external auditors during the year.

14. Employee Benefits

Employees benefits with respect to Gratuity and Leave encashment has been paid/provided as per provisions of Accounting Standard I5 Employee Benefits based on the actuarial valuation /demand as per policy except as given in notes to accounts of centres .

15. Lease Obligations

Lease rent of₹239.25 Lakhs (Previous year ₹351.45 Lakhs) for various premises are debited under the various heads of Income and Expenditure Account for the period under audit as per the Accounting Standard 19 Leases.

16. Impairment of Assets

As per Accounting Standard 28 Impairment of Assets, fixed assets are reviewed for impairment and there is no impairment of assets during the year, as the carrying amount of the assets are less than the realizable value.

17. Other Discloser Requirements

The Management of C-DAC is of the opinion that C-DAC being a scientific society and not a listed company and therefore the reporting requirements as per Accounting Standard 3 on Cash flow statement, Accounting Standard 17 on Segment Reporting, Accounting Standard 18 on Related Party Disclosures and Accounting Standard 26 in respect of Intangible Assets are not applicable.

18. Advances paid to employees include ₹2.22 Lakhs as advances paid to Director General (Previous Year ₹1.76 Lakhs).

19. Centre Specific Notes

19.1. Delhi Centre

No liability has been provided for in respect of civil suit of recovery for ₹322.98 Lakhs filed by M/s IBILT Technology Ltd in DIPP's IPO Project with an outlay of ₹2340 Lakhs, since the case is under examination with Hon'ble High Court, Delhi.

19.2. Hyderabad Centre

No provision was made towards service tax of ₹15.98 Lakhs and penalty of ₹100 per day for the year 2004-05. CESTAT has made decision in favor of CDAC. Being grieved by the order Service Tax Department has gone in Appeal against the CESTAT order to Hon'ble Supreme Court for which the decision is pending.

19.3. Mumbai Centre

19.3.1. The Law Secretary cum Appellate Authority has given an award for increase in the rent from 01-04-1995 till the date of vacation of premises(01-11-2013) of Air India located at Nariman point, Mumbai, for an amount along with interest at the rate of 6% till 30-06-2017 is ₹2,607.00 Lakhs and the Interest at the rate of 12% p.a. from July 2017 onwards for which no provision has been made in the books of accounts as the case is referred to MeitY for settling this dispute through Administrative Mechanism for Resolution of Central Public Sector Enterprises Dispute (AMRCD).

19.3.2. As per the actuarial valuation, total outstanding liability in respect of Pension Fund is ₹3,880.00 Lakhs, against which ₹3,277.00 Lakhs has been provided in the books of accounts (Fund Value ₹795 Lakhs plus cumulative provision ₹2,482.00 lakhs) as on 31st March 2020. Provision for ₹603.00 Lakhs has not been made due to short receipt of Grant in Aid.

19.3.3. Conveyance Deed for the office and residential buildings in Mumbai has not been executed by the Bombay Housing & Area Development Board (BH&ADB), though the Centre has made the payment towards the acquisition of the said assets. The possession for the office building and the residential buildings has been obtained from BH&ADB from 1st April, 1986 and 1st June, 1986, respectively.

19.3.4. The Centre has undertaken Software Development Project of ECGC ERP Revamp (2nd Phase) from ECGC Limited at a total project cost of ₹11,000 Lakhs (excl. GST) for a period of 3 years w.e.f., March-2019. An amount of ₹1650 Lakhs (15% of project cost) has been received on “on approval of proposal” and ₹1350.00 Lakhs are accounted as Business Income for FY 2019-20.

19.4. Noida Centre

Two projects shown in earmarked fund namely NAVIC GPS and Future Skills (PRIME) project. Under NAVIC project, an advance of ₹600.00 Lakhs is given to two parties (M/s Manjeera Digital Systems Pvt. Ltd., Hyderabad & M/s Accord Software & Systems Pvt. Ltd, Bengaluru) which are shown as advance to others. Similarly, under Future Skills (PRIME) project, ₹200.00 Lakhs has been given as advance to M/s NASSCOM and ₹30.00 Lakhs to CDAC, Hyderabad, which has been shown as advance to others and accordingly not shown as expenditure in project.

19.5. Pune Centre

19.5.1. Under National Supercomputing Mission (NSM) Project as per the MOU between C-DAC and the respective institutes, C-DAC will Supply/ install, commission and operate HPC Facility along with data centre at host Institution from NSM Project funds. Host institution will be the sole custodian of HPC systems during and after installation and commissioning. The ownership of the assets vests with MeitY,(Govt. of India). The payment released during the year for supply/installation and commissioning of the HPC system at various institutes is accordingly booked under components and consumables (expenditure) in the NSM project and the amount of capital work in progress (CWIP) booked in FY 2018-19 of ₹1821.75 Lakhs paid for HPC system at BHU Varanasi is appropriately transferred to components and consumables during the year. Due to this, in the financial statements, the total fixed assets (Gross Block) of project grants as on 31st March 2019 amounting to ₹8163.95 Lakhs in schedule 8 (in consolidated Financial statements ₹22838.84 Lakhs in schedule 7) is reduced by ₹1821.75 Lakhs in FY 2019-20. As these are project grants, have no impact on income & expenditure statement for the FY 2018-19 and FY 2019-20.

19.5.2. Activities of ACTS, Pune are shifted from Bio-Informatics Building, Pune University Campus to Thube Park, Shivajinagar, Pune, in 2004-2005 and then to NSG-IT park, Aundh, Pune in 2008-09. Some of the fixed assets could not be shifted to this premises with the WDV of ₹2.36 Lakhs (Previous year ₹3.14 Lakhs) and ₹23.56 Lakhs (Previous year ₹26.28 Lakhs) respectively as on 31st March 2020.

19.5.3. "Memorandum of Understanding" (MOU) or "Leave and License Agreement", as the case may be, entered into with University of Pune and Small Industries Development Institute (SIDI) regarding transfer of rights to use and develop immovable properties viz. Main Building, NPSF Building and assets therein respectively are not registered.

19.5.4. Funds belonging to CDAC Employees Benevolent Fund funds are not separately invested as on 31st March 2020.

19.5.5. No provision is made for the Advances to employees of ₹35.77 Lakhs (Previous year ₹9.45 Lakhs) against various claims, which will be booked during the financial year 2019-20. Since most of the claims will directly be debited to the Projects / Grants.

19.5.6. Inventory of Finished Goods of ₹674.23 Lakhs has been delivered to Delhi Police, as some refurbishment work is pending as on 31-03-2020, we have not submitted any Utilization Certificate/ Sales Invoice for the delivered items. Hence, we have shown it as an inventory.

19.5.7. Due to COVID-19 situation, Management has decided to continue February 2020 batch through online mode in place of regular classes and students have been given option to switch to online classes from regular batch with 15% reduction in fees. If students do not wish to join online class, in such cases 50% fees will be refunded. Accordingly, as per option received CDAC have made provision of ₹294.01 Lakhs for 15% fees to be refunded to students towards online classes and ₹12.90 Lakhs for 50% fees to be refunded to students towards withdrawal of admission from February-2020 batch.

19.6. Thiruvananthapuram Centre

19.6.1. Advances includes the amount paid to M/s. Eworkz, Los Angels, USA, ₹25.41 Lakhs (Previous year ₹25.41 Lakhs) for the supply and installation of a LCD based video wall system at police control room Kochi and the customs duty paid to clear the consignment. Since the Indian agent of the party has not come forward for the installation of the system, Centre has taken action to recover the advance through legal recourse.

19.6.2. Land on which the main building at Vellayambalam of the Centre is situated is on lease from Government of Kerala, but no lease deed has been registered so far and the land has not been assigned in favor of C-DAC's name. In the absence of specific demand, lease rent has not been provided in the books of account.

20. The consolidated Balance Sheet and consolidated Income & Expenditure account are prepared based on the Audited Annual Accounts received from the centres.

21. Centre-wise Financial Performance and details of Assets and Liabilities, Income & Expenditure is attached as Annexure 18(A) and 18(B). The details of assets procured and expenses incurred from NE funds received for Silchar Centre is given in Annexure 1 of schedule 3.

22. Current year figures from audited financial statements of Centre's are regrouped wherever necessary in preparation of consolidated financial statements. Previous year's figures are regrouped, rearranged and reclassified wherever necessary.

23. Figures in the Financial Statements are rounded off to nearest Indian rupees.

CA Raghu Bhargava	**Sunil Misar**	**Dr. Hemant Darbari**
Director Finance	Registrar (I/C)	Director General

For Udyen Jain & Associates, Firm Registration No.116336W
Chartered Accountants

Sandeep Soni
Partner (M.No.124971)
UDIN : 20124971AAAAFO8871
Date : 10th November, 2020
Place: Pune

Annexure 18(A): FINANCIAL PERFORMANCE OF C-DAC FOR THE FINANCIAL YEAR 2019-2020

(Attached to and forming an integral part of Balance Sheet)

Amount in Lakhs

S.No	Particulars	Total	Bangalore	Chennai	Corporate	Delhi	Hyderabad	Kolkata	Mohali	Mumbai	Noida	Pune	TVM
A	**OPENING BALANCE**												
(i)	**Grant -in- Aid: Core Grant Projects**	**(2327.03)**											
	GIA General	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Core Grant Projects	(2327.03)	0.00	0.00	33.73	(862.75)	6.92	0.00	0.00	0.00	0.00	(1002.93)	(502.00)
(ii)	**Grant for Sponsored Projects**	**27246.71**											
	MeitY	11397.76	135.34	(22.67)	0.00	76.65	1125.02	125.94	129.58	1077.84	107.41	5758.43	2884.22
	Other Agencies	15848.95	5.79	0.00	285.00	1366.14	1464.94	401.49	81.65	(3.26)	(753.15)	12546.03	454.32
B	**RECEIPTS & INCOME**												
(i)	**Grant -in- Aid**	**12000.00**											
	GIA General	12000.00	1442.65	466.35	830.00	204.55	404.95	527.40	635.85	669.00	975.70	3863.60	1979.95
	Core Grant Projects	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(ii)	**Grant for Sponsored Projects**	**87129.62**											
	MeitY	38535.84	973.22	385.23	0.00	217.04	2960.09	1002.20	316.27	1165.13	5756.34	20302.50	5457.82
	Other Agencies	48593.78	29.58	0.00	585.00	2794.07	434.82	1614.24	1113.77	0.00	1397.63	40160.86	463.81
(iii)	**Revenue Earnings**	**40787.21**											
	Training	14806.65	932.94	48.79	0.00	0.00	514.93	12.70	625.92	514.19	1747.90	10221.78	187.50
	Commercial	25980.56	165.90	1300.30	0.00	193.88	479.43	843.82	325.18	5415.87	4553.13	10080.38	2622.68
(iv)	**Interest, Other Income & C-DAC Contribution**	**370.55**											
	GIA General	0.68	0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.00	(0.01)	0.00	0.31
	Core Grant Projects	369.87	0.00	0.00	0.00	131.79	10.10	0.00	0.00	0.00	0.00	227.98	0.00
		3750.68											
	MeitY Spon Projects	1942.73	6.62	2.80	0.00	2.19	116.88	2.18	8.70	7.65	41.03	720.83	1033.85
	Spon. By Other Agencies	1807.95	0.29	0.00	11.95	0.17	61.28	4.26	4.29	0.00	10.55	1696.63	18.53
		7591.39											
	Training	1470.35	123.97	1.74	42.39	0.00	173.40	0.45	389.33	6.42	345.59	363.43	23.62
	Commercial	6121.04	(5.36)	0.00	47.74	112.78	0.00	119.86	46.20	66.59	352.60	1138.74	4241.89
	TOTAL (A+B)	**176549.13**	**3810.94**	**2182.54**	**1835.81**	**4236.51**	**7752.76**	**4654.54**	**3677.12**	**8919.43**	**14534.72**	**106078.26**	**18866.50**
C	**REVENUE Expenditure**												
(i)	**Expenditure from Grant-In-Aid**	**11927.49**											
	GIA General	**11927.49**											
	Establishment Expenses	11640.34	1442.88	466.34	685.20	204.55	322.89	521.93	637.79	666.81	975.70	3736.30	1979.95
	Other Administrative Expenses	287.15	0.00	0.00	127.47	0.00	82.06	5.47	0.00	0.00	0.00	71.84	0.31
	Core Grant Projects	**0.00**											
	Establishment Expenses	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Other Administrative Expenses	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(ii)	**Expenditure on Sponsored Projects**	**32474.90**											
	MeitY Total Expenses	**12657.20**											
	Establishment Expenses	6915.60	286.65	82.03	0.00	90.04	434.15	205.24	174.43	339.02	300.79	2848.10	2155.15
	Other Administrative Expenses	5741.60	321.38	50.62	0.00	57.90	443.95	232.01	90.79	196.21	113.12	2361.44	1874.18
	Other Agencies Total Expenses	**19817.70**											
	Establishment Expenses	3072.16	18.49	0.00	0.00	439.70	440.11	741.84	102.59	0.00	493.15	586.69	249.59
	Other Administrative Expenses	16745.54	17.29	0.00	0.00	1566.11	87.73	606.48	69.25	0.00	152.50	14010.03	236.15
(iii)	**Other Revenue Expenditure**	**42368.24**											
	Training Total Expenses	**11851.93**											
	Establishment Expenses	3212.56	584.67	24.00	0.00	0.00	108.91	6.78	472.21	129.46	735.13	659.35	492.05
	Other Administrative Expenses	8639.37	484.96	17.56	0.00	0.00	198.14	6.16	270.19	79.87	857.40	6661.86	63.23
	Commercial Total Expenses	**30516.31**											
	Establishment Expenses	14056.31	45.55	660.87	23.62	124.20	93.75	556.88	371.06	2416.31	2914.37	3282.04	3567.66
	Other Administrative Expenses	16460.00	70.62	478.97	24.18	109.79	61.55	291.67	95.05	2697.92	528.58	7331.47	4770.20
	TOTAL C	**86770.63**	**3272.49**	**1780.39**	**860.47**	**2592.29**	**2273.24**	**3174.46**	**2283.36**	**6525.60**	**7070.74**	**41549.12**	**15388.47**

Annexure 18(A): FINANCIAL PERFORMANCE OF C-DAC FOR THE FINANCIAL YEAR 2019-2020

(Attached to and forming an integral part of Balance Sheet)

Amount in Lakhs

S.No	Particulars	Total	Bangalore	Chennai	Corporate	Delhi	Hyderabad	Kolkata	Mohali	Mumbai	Noida	Pune	TVM
D	**CAPITAL Expenditure**												
(i)	**Expenditure from GIA for Core R&D**	**270.94**											
	GIA General	73.19	(0.23)	0.01	17.33	0.00	0.00	0.00	(1.56)	2.19	(0.01)	55.46	0.00
	Core Grant Projects	197.75	0.00	(0.00)	0.00	139.75	17.02	0.00	0.00	0.00	0.00	40.98	0.00
(ii)	**Expenditure from GIA for Sponsored Proj.**	**2335.99**											
	MeitY	1790.63	140.55	19.96	0.00	0.00	57.20	5.90	36.68	106.37	61.77	725.20	637.00
	Other Agencies	545.35	2.45	0.00	0.00	0.00	406.32	46.04	4.78	0.00	2.50	6.63	76.63
(iii)	**Expenditure from Own Funds**	**568.11**											
	Training	252.60	36.44	0.00	0.00	0.00	14.50	0.00	7.77	0.40	18.01	163.55	11.93
	Commercial	315.51	0.96	0.97	0.00	5.83	0.00	22.06	0.00	77.03	124.22	21.14	63.30
	TOTAL D	**3175.03**	**180.17**	**20.94**	**17.33**	**145.58**	**495.04**	**74.00**	**47.67**	**185.99**	**206.49**	**1012.96**	**788.86**
E	**REFUND / TRANSFER OTHER ADJUSTMENTS**												
(i)	**From GIA for Core R&D**	**33.73**											
	GIA General	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Core Grant Projects	33.73	0.00	0.00	33.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(ii)	**From Sponsored Projects**	**2000.88**											
	MeitY	2689.82	35.66	0.00	0.00	1.37	558.69	3.04	10.96	1597.25	(31.84)	412.53	102.16
	Other Agencies	(688.94)	1.05	0.00	0.00	583.75	6.86	5.81	0.84	0.00	0.00	(1287.99)	0.74
	TOTAL (E)	**2034.61**	**36.71**	**0.00**	**33.73**	**585.12**	**565.55**	**8.85**	**11.80**	**1597.25**	**(31.84)**	**(875.46)**	**102.90**
F	**TOTAL Expenditure (C+D+E)**	**91980.27**	**3489.37**	**1801.33**	**911.53**	**3322.99**	**3333.83**	**3257.31**	**2342.83**	**8308.84**	**7245.39**	**41686.62**	**16280.23**
G	**Unspent Balance / Surplus / Deficit (A+B-F)**												
(i)	**Grant -in- Aid**	**(2188.63)**											
	GIA General	(0.00)	(0.00)	(0.00)	(0.00)	0.00	0.00	0.00	0.00	0.00	0.00	(0.00)	(0.00)
	Core Grant Projects	(2188.63)	0.00	0.00	0.00	(870.71)	0.00	0.00	0.00	0.00	0.00	(815.92)	(502.00)
(ii)	**Sponsored Projects**	**81315.26**											
	MeitY	34738.69	330.94	212.74	0.00	146.57	2707.99	684.14	141.70	11.77	5460.94	20434.50	4607.40
	Other Agencies	46576.57	(3.62)	0.00	881.95	1570.82	1020.02	619.82	1022.25	(3.26)	6.87	41088.17	373.55
(iii)	**Other**	**6010.34**											
	Training	4425.05	(12.72)	8.97	42.39	0.00	381.29	0.21	272.85	311.27	500.96	3263.99	(344.16)
	Commercial	1585.29	44.36	160.46	(0.06)	72.67	324.13	115.13	(94.73)	368.23	1462.78	605.61	(1473.29)

Annexure 18(B):

CENTRE WISE BALANCE SHEET AS AT 31st March 2020

(Attached to and forming an integral part of Balance Sheet)

Amount in Lakhs

Particulars	Total	Bangalore	Chennai	Corporate	Delhi	Hyderabad	Kolkata	Mohali	Mumbai	Noida	Pune	TVM
CORPUS/CAPITAL FUND AND LIABILITIES												
Corpus/Capital Fund	37,925.44	2,354.99	18.47	1,752.45	2,001.85	3,151.81	1,943.31	4,033.33	(674.22)	14,507.87	9,086.26	(250.69)
Reserves and Surplus	25,592.70	528.47	133.23	19.80	2,796.07	1,692.41	344.19	216.57	311.20	531.94	9,668.77	9,350.06
Earmarked and Endowment Funds	79,185.15	329.37	213.42	881.95	847.29	3,728.02	1,303.96	1,163.95	9.91	5,467.82	60,760.54	4,478.93
Current Liabilities and Provisions	46,209.83	428.92	83.91	7.41	714.27	408.22	465.71	222.63	3,987.94	3,028.22	17,631.67	19,230.92
Branch & Divisions	0.00	411.64	91.22	(1,078.14)	(172.05)	(223.04)	(267.57)	(141.51)	6.78	294.15	772.11	306.39
Total	**1,88,913.12**	**4,053.39**	**540.25**	**1,583.47**	**6,187.43**	**8,757.42**	**3,789.60**	**5,494.97**	**3,641.61**	**23,830.00**	**97,919.35**	**33,115.61**
ASSETS	-	-	-	-	-	-	-	-	-	-	-	-
Fixed Assets												
Acquired out of Own Funds	3,556.93	502.38	9.34	-	236.53	70.67	106.47	130.53	88.76	1,042.95	1,219.48	149.82
Acquired out of Grant in Aid	19,150.31	175.94	38.78	19.80	2,796.02	1,055.68	264.09	84.67	64.57	344.56	8,675.85	5,630.36
Acquired out of Project Grants	6,442.39	352.53	94.45	-	0.05	636.73	80.10	131.90	246.63	187.37	992.92	3,719.70
Investments-Others	5.05	-	-	-	-	-	-	-	-	5.05	-	-
Current Assets, Loans, Advances etc.	1,59,758.44	3,022.54	397.68	1,563.67	3,154.83	6,994.34	3,338.94	5,147.87	3,241.65	22,250.07	87,031.10	23,615.73
Total	**1,88,913.12**	**4,053.39**	**540.25**	**1,583.47**	**6,187.43**	**8,757.42**	**3,789.60**	**5,494.97**	**3,641.61**	**23,830.00**	**97,919.35**	**33,115.61**

CENTRE WISE INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st March 2020

Amount in Lakhs

Particulars	Total	Bangalore	Chennai	Corporate	Delhi	Hyderabad	Kolkata	Mohali	Mumbai	Noida	Pune	TVM
INCOME												
Income from Sales/Services	31,642.14	229.96	1,300.30	0.00	193.88	489.53	843.82	763.34	5,415.87	5,096.13	14,669.36	2,639.94
Grants/Subsdies	11,927.18	1,442.88	466.33	812.67	204.55	404.95	527.40	637.79	666.81	975.70	3,808.14	1,979.95
Fees/Subscription	9,145.07	868.87	48.79	-	-	504.83	12.70	187.75	514.19	1,204.91	5,632.79	170.23
Interest Earned	2,519.32	127.88	1.74	89.62	108.95	171.66	121.42	219.39	43.94	692.14	759.42	183.17
Other Income	51.93	0.14	-	0.50	2.16	1.75	(1.11)	12.63	13.75	6.54	1.72	13.86
Prior Period Income	216.64	-	-	-	1.66	-	-	203.52	15.32	(0.49)	(3.38)	-
Increase/(decrease) in stock of Finished Goods and Work-in-progress	4,803.49	(9.40)	(0.00)	-	-	-	-	-	-	-	744.41	4,068.49
Total	**60,305.78**	**2,660.33**	**1,817.16**	**902.79**	**511.21**	**1,572.72**	**1,504.23**	**2,024.42**	**6,669.88**	**7,974.93**	**25,612.46**	**9,055.64**
EXPENDITURE												
Establishment Expenses	28,909.22	2,073.10	1,151.20	708.81	328.75	525.55	1,085.60	1,481.06	3,212.59	4,625.21	7,677.69	6,039.66
Other Administrative Expenses	24,878.92	517.98	494.59	151.19	102.13	322.83	269.71	310.93	2,740.96	1,248.92	13,921.29	4,798.37
Prior Period Expenses	26.19	-	0.04	0.46	0.97	4.15	-	25.59	3.22	(26.86)	18.59	0.02
Depreciation (corresponding to Schedule 5)	481.11	37.60	1.89	0.00	6.69	14.77	33.59	28.72	33.61	163.91	125.29	35.04
Total	54,295.44	2,628.68	1,647.73	860.46	438.54	867.30	1,388.90	1,846.30	5,990.38	6,011.18	21,742.86	10,873.09
Transferred to / (from) Balance of Core Grants	-	-	-	-	-	-	-	-	-	-	-	-
SURPLUS / (DEFICIT)	**6,010.34**	**31.65**	**169.43**	**42.33**	**72.67**	**705.42**	**115.33**	**178.12**	**679.50**	**1,963.75**	**3,869.60**	**(1,817.45)**

Consolidated Receipts and Payments for the year ended 31st March 2020

Amount in ₹ *Amount in ₹*

Receipts	2019-20	2018-19	Payments	2019-20	2018-19
I. Opening Balance			**I. Expenses**		
a) Cash on hand	99,475	1,28,121	a) Establishment Expenses	1,13,81,22,079	1,39,74,42,878
b) Bank Balances			b) Administrative Expenses	68,29,14,228	72,49,65,840
i) In Savings/Current Accounts	1,79,21,25,476	1,44,26,85,999	c) Payment made to Creditors for Goods and Others	3,63,03,83,071	1,98,63,25,782
II. Grants Received			**II. Payments made against funds for various projects**	27,02,05,091	17,21,41,958
a) From Government of India	1,17,09,06,957	1,00,66,74,701	(Name of the Fund or Project along with the particulars of payment made for each project shown in separate schedule)		
b) Grant and Other Income Received for Projects	8,43,56,97,691	2,22,18,24,950	**III. Investments and Deposits made Progress**	10,63,57,22,169	3,94,94,72,469
III. Income from Encashment of FDRs	3,45,27,56,607	2,99,61,35,977			
IV. Interest Received			a) Purchase of Fixed Assets	3,72,97,148	2,22,10,472
a) On Bank Deposits	25,27,46,708	15,93,99,157	b) Expenditure on Capital Work in Progress	7,96,240	6,12,12,890
b) Loans and Advances	1,81,38,768	7,44,467	**V. Refund of Surplus money/loans**	-	20,00,000
V. Other Income (Specify)			**VI. Finance Charges (Interest)**	27,284	10,959
a) Previous years Income recovered	5,39,271	37,25,973	**VII. Other Payments (Specify)**	-	-
b) Advances Received from Customers	1,16,48,42,345	12,08,18,079	a) Deposit (Assets)	21,48,83,476	1,44,60,978
d) Fees/Subscription & Direct Income	1,18,44,47,183	1,11,41,21,577	b) Loans and Advances	56,77,82,593	24,98,81,367
e) Other Income	51,16,13,628	48,44,01,401	c) Previous years outstanding payments	2,24,53,33,611	1,32,76,94,510
f) Amount Received from Debtors	3,02,66,68,490	2,07,90,55,485	d) Prepaid Expenses	98,45,082	1,02,32,778
g) Loans and Advances Recovered	17,82,05,299	3,06,74,733	e) Branch and Divisions	2,69,97,25,362	2,32,88,45,186
VI. Amount Borrowed			f) Deposits (Liabilities) Refunded	3,79,61,649	20,67,69,448
Branch and Divisions	2,43,68,90,221	2,45,78,87,411	**VIII. Closing Balance**		
Bank Loan	-	-			
VII. Any Other Receipt (Give Details)			a) Cash on hand	5,526	99,475
a) Deposits (Liabilities)	9,10,09,018	12,76,14,435	b) Bank Balances		
b) Addition to Reserve Fund	-	-	i) In Savings Accounts	1,54,56,82,528	1,79,21,25,476
Total	**23,71,66,87,137**	**14,24,58,92,466**	**Total**	**23,71,66,87,137**	**14,24,58,92,466**
	-	-			

AS PER OUR REPORT OF EVEN DATE
FOR AND ON BEHALF OF
M/S. UDYEN JAIN & ASSOCIATES (FRN: 116336W)
CHARTERED ACCOUNTANTS

CA Raghu Bhargava
Director Finance
Pune

Sunil Misar
Registrar (I/C)

Dr. Hemant Darbari
Director General

CA Sandeep Soni
Partner (M.No.124971)
UDIN : 19124971AAAAAN5662
Place : Pune , Date : 10-Nov-2020

High Performance Computing Facilities under National Supercomputing Mission (NSM)

Emergency Response Support System (ERSS) was inaugurated
by Shri Amit Shah, Hon'ble Union Home Minister of India, at Chandigarh.

Visit of Shri Sanjay Dhotre, Hon'ble Minister of State for HRD,
Communications, Electronics & IT, C-DAC, Noida.


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