Technology Unleashed:
Showcased by C-DAC Technology Advancement and Proliferation (TAP) Groups

C-DAC'S PRODUCTS, SOLUTIONS & SERVICES BOOKLET 2024

(An initiative by Corporate R&D of C-DAC)

C-DAC's PRODUCTS, SOLUTIONS & **SERVICES BOOKLET 2024**

Organization **Profile**

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Secretary

सत्यमेव जयते

इलेक्ट्रॉनिकी और सूचना प्रौद्योगिकी मंत्रालय
भारत सरकार
Ministry of Electronics &
Information Technology (MeitY)
Government of India

Message

India's academic, research, industry, and startup sectors form a robust ecosystem capable of positioning the nation as a global R&D hub, specifically in Electronics, Communication, and Information Technology. Developing products, solutions, and services at scale and synergizing efforts across institutions is crucial for fortifying India's technological infrastructure and effectively meeting future needs. In this context, C-DAC's focus on technology independence will play a pivotal role in driving India's journey towards self-reliance.

Throughout its history, C-DAC has consistently acted as a catalyst in transforming R&D outcomes into usable products and solutions for the industry. From advancements in High-Performance Computing (HPC) to developments in the Digital India RISC-V (DIR-V) program for next-generation microprocessors, and now into the realms of Quantum Computing and AI, the organization has been instrumental in pioneering innovative technologies to shape the future. Through the development, deployment, and transfer of cutting-edge and time-critical products and solutions, C-DAC has been the driving force behind numerous transformative innovations across diverse technology domains.

It is commendable to witness C-DAC's ongoing efforts to realign its research activities in accordance with various key national initiatives and goals. In this context, the establishment of Technology Advancement and Proliferation (TAP) Groups within C-DAC is a notable step. The initiative of each of these TAP groups towards consolidating their products, solutions, and services, and evolving a strategic roadmap is a significant milestone.

The release of the **C-DAC Products, Solutions, and Services Booklet 2024** across thirteen pivotal technology verticals would serve as a comprehensive resource, offering insights and detailed information on the breadth of C-DAC's expertise within these domains. I congratulate C-DAC for bringing out this booklet, which highlights the portfolio of cutting-edge products, innovative solutions, and value-added services in TAP verticals, catering to the specific requirements of various sectors across the nation. I am confident that this would serve as a key resource for the central government ministries/departments as well as the state governments and their agencies to understand the various offerings of C-DAC and MeitY.

Together, let us focus on accelerating India's ascent as a global innovation powerhouse on the world stage.

(S Krishnan)

New Delhi
Dated: 4th April, 2024

आज़ादी का अमृत महोत्सव

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Power To Empower

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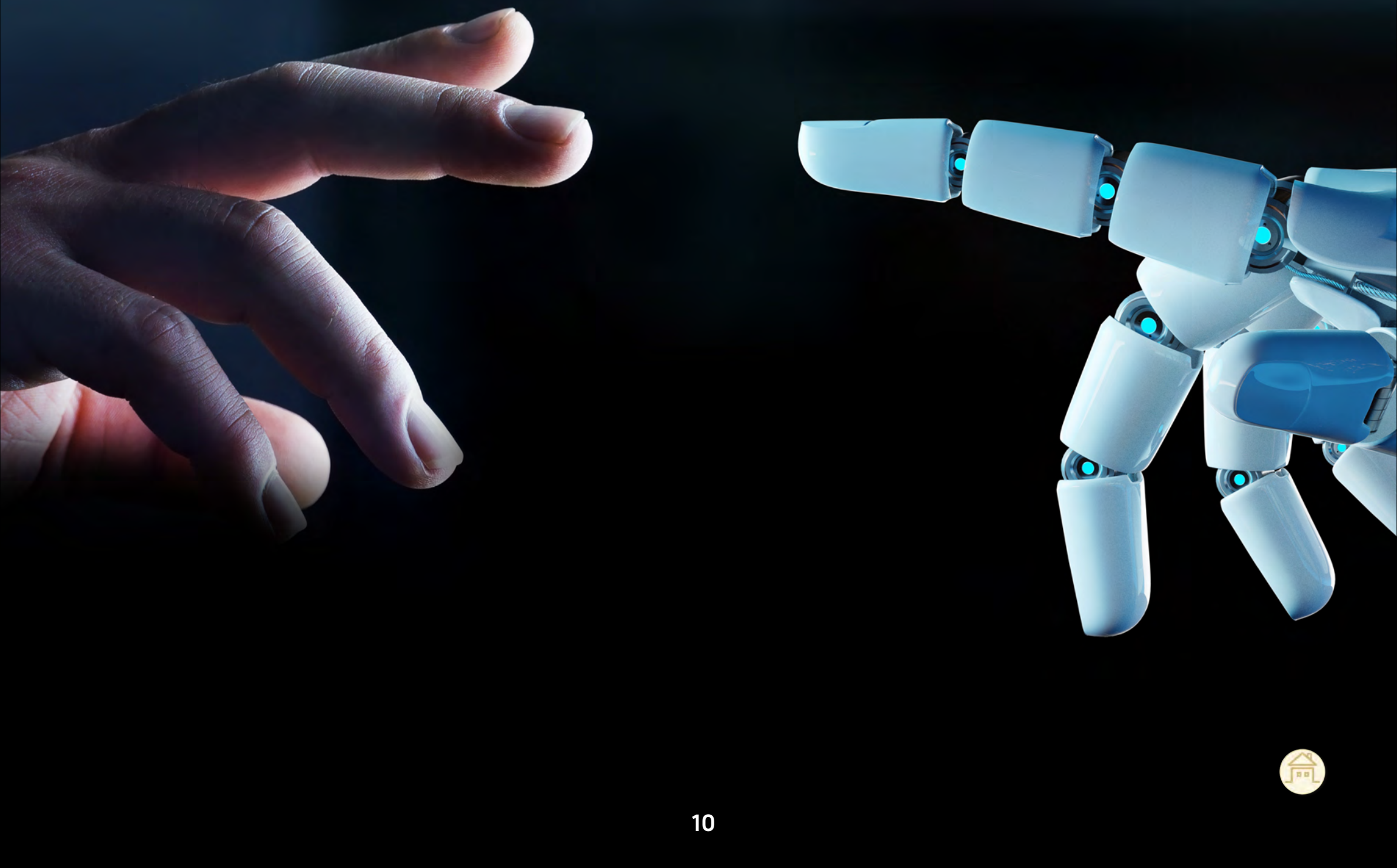

भुवनेश कुमार, आई. ए. एस.
अपर सचिव
Bhuvnesh Kumar, I.A.S.
Additional Secretary

सत्यमेव जयते

भारत सरकार
Government of India
इलेक्ट्रॉनिकी और सूचना प्रौद्योगिकी मंत्रालय
Ministry of Electronics & Information Technology
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D.O. No. .....

Dated.....

Message

As a scientific society under the Ministry of Electronics and Information Technology, Government of India, C-DAC has evolved into a leading research and development entity in the fields of Electronics and Information Technology. C-DAC has been constantly building capacities in disruptive and advanced technologies, consistently delivering high-quality products, solutions, and services.

C-DAC has significant involvement in national-level initiatives such as the National Supercomputing Mission, Digital India RISC-V (DIR-V) Microprocessor, Strategic Electronics, Quantum Computing, Unified Blockchain Framework, as well as the development of cutting-edge applications in fields like Healthcare, Agriculture, and Education.

I am happy to note that C-DAC has also developed and deployed technology solutions for various mission-critical applications of the ISRO for prestigious missions like Chandrayaan-3 and Aditya L1 etc.

I congratulate C-DAC in establishing Technological Advancement and Proliferation (TAP) groups to evolve mission mode projects, products, solutions and services in niche domains. The effort of TAP Group in bringing out a booklet that highlights C-DAC's portfolio of advanced products, innovative solutions, and value-added services is highly appreciable.

C-DAC has a strong commitment to outcome-oriented research and development. I hope that the booklet adds significant value to end-users and other stakeholders in understanding various products, solutions and services offered by C-DAC and in exploring the potential for collaboration with C-DAC.

(Bhuvnesh Kumar)
Additional Secretary


AI

Sunita Verma
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R&D in Electronics and IT
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दूरभाष / Tele:

अ० स० पत्र सं०
O.O.No. 1(1)/2023/Misc

भारत सरकार
Government of India
इलेक्ट्रॉनिकी और सूचना प्रौद्योगिकी मंत्रालय
Ministry of Electronics & Information Technology
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Website: www.meity.gov.in

दिनांक / Dated 03.04.2024

Message

In a dynamic environment characterized by rapid advancements and evolving market needs, C-DAC remains steadfast in its commitment to bolstering our national technological capabilities. Being a scientific organisation of Ministry of Electronics and Information Technology (MeitY), C-DAC plays a pivotal role in translating policies into pragmatic interventions and initiatives, thereby shaping the trajectory of Information Technology in our country.

The gist of significant projects, products, solutions, and services of C-DAC encompasses a broad spectrum of endeavours aimed at advancing technology and addressing critical societal needs. From constantly building capacities and capabilities in emerging and enabling technologies to innovating IT products and solutions across various sectors of the economy, C-DAC has been at the forefront of driving technological progress.

Notably, C-DAC has deployed cutting-edge supercomputing systems at 15 institutions, providing immense computational power to over 8000 end-users through the National Supercomputing Mission (NSM). Additionally, under the Digital India RISC-V initiative (DIR-V), C-DAC has developed the indigenous VEGA microprocessor-based SoC chip 'THEJAS32' and Rudra Servers, marking a significant stride in indigenous technology development. C-DAC's contributions extend to healthcare with the development and implementation of eSanjeevani, the World's Largest Telemedicine Platform, which has facilitated over 20 Crore teleconsultations, revolutionizing access to healthcare services. Furthermore, the organization has played a pivotal role in enhancing public safety with the development of the nationwide Emergency Response Support System (ERSS), offering a unified emergency number '112'. In the realm of space exploration,

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एक कदम स्वच्छता की ओर

ELECTRONICS INDIA

C-DAC has provided custom-made products and technology solutions for prestigious ISRO missions like Chandrayaan-3. Moreover, C-DAC's expertise extends to strategic products for Defense, Space, and Atomic Energy programs, alongside successfully handling major services such as eSign and Mobile Seva. With a focus on cybersecurity, C-DAC has undertaken projects in sectors like banking, defense, and health, safeguarding critical assets in the information age. Notably, the organization counts ISRO, DRDO, Army and the Indian Navy among its major clientele, underlining its integral role in advancing technology for national development and security.

The 'C-DAC Product and Solution Booklet 2024' is a comprehensive compilation showcasing the organization's ground-breaking innovations and impactful solutions. It serves as a testament to the commitment to excellence, collaboration, and societal impact. I am sure that readers will gain significant insights into the transformative power of technology and the pivotal role played by C-DAC in driving progress and prosperity of our country.

Sunita Verma

(Sunita Verma)

E. Magesh

Message from **Director General C-DAC**

It is with great excitement and pride that we are presenting our organization's comprehensive portfolio of cutting-edge products, innovative solutions, and value-added services. As a Scientific Society of the Ministry of Electronics and Information Technology (MeitY), Govt. of India, C-DAC has worked tirelessly to build a robust suite of offerings that solves pressing needs of the society and the nation. C-DAC has a legacy of over 36 years of experience and expertise in bringing the best offerings to market.

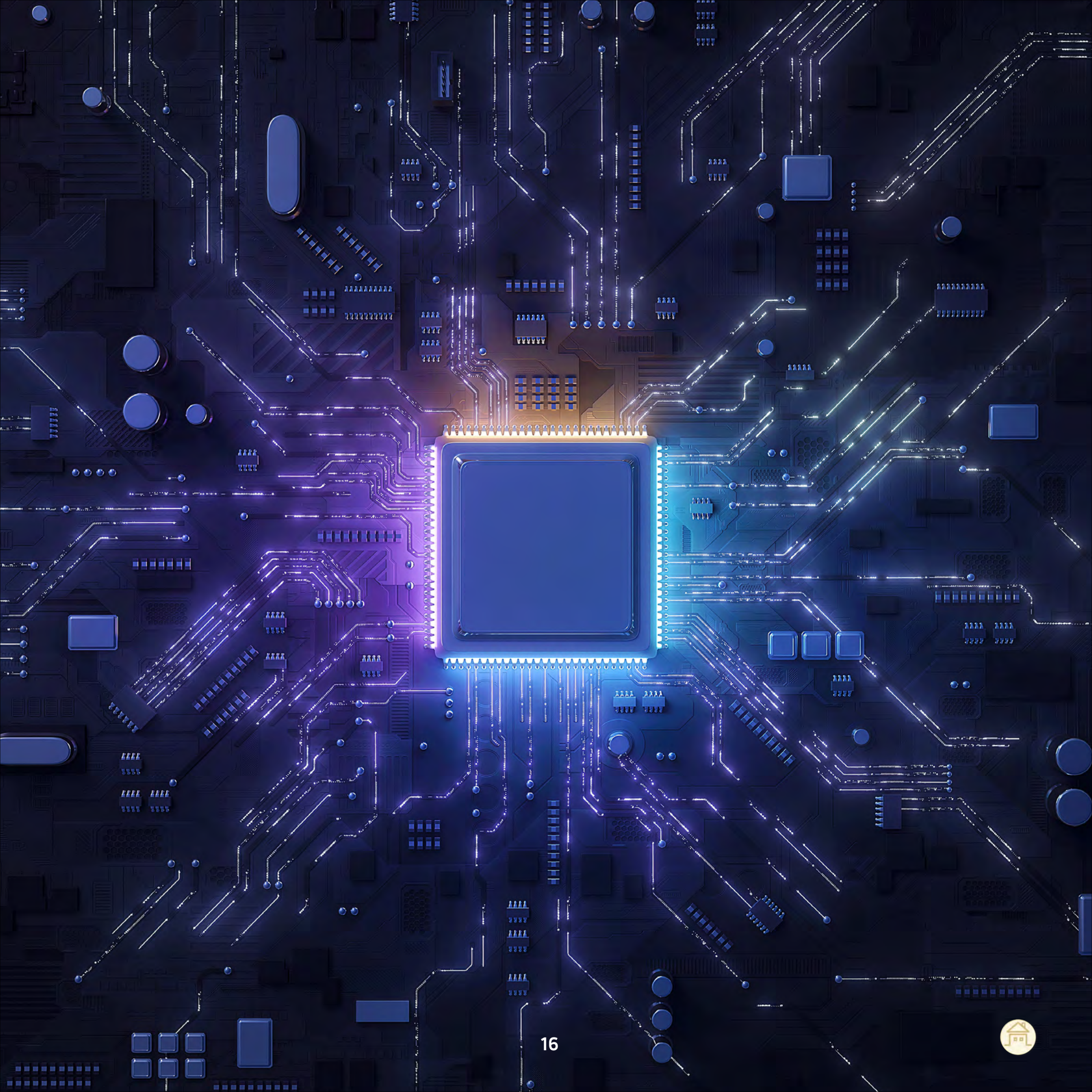
We have segregated our Products, Solutions, and Services into thirteen technology areas. Our dedication to continuous innovation, exceptional quality, and complete end-user satisfaction sets us apart. We are constantly developing new and improved offerings to meet the emerging needs of the end users.

I recognize the hard work and dedication of the Corporate R&D team and Technology Advancement and Proliferation (TAP) groups in bringing these products, solutions, and services to the market.

I encourage readers of this booklet to learn more about each of the products, solutions, and services and explore how we can help you in achieving your technology goals. Please do not hesitate to call or message us to seek any further assistance that is required. Contact details are given for each of the products, solutions, and services.

With an innovative spirit, commitment to service, and portfolio that delivers real value, we are confident in taking on the exciting challenges ahead. Our team is energized and ready to continue pushing boundaries. We are eager to forge new relationships, strengthen existing bonds, and prove ourselves as a trusted partner in our end user's success. I am proud of all we have achieved, but more importantly, I am optimistic about where we are headed. We will continue raising the bar and exploring new ways to go above and beyond for our end users.

Together, let's realize the full potential of what's possible.



Message from
Head-Corporate R&D, C-DAC

Pramod P. J.

Systematic creativity or Research has been part of human civilization for centuries. Its impact and prominence in day-to-day life have surged dramatically over the last two decades, surpassing beyond our imagination. The long wave of innovation cycles as per the theory of creative destruction has narrowed from a span of 60 years to 25, and the sixth wave, marked by Artificial Intelligence, IoT, AR/VR, Robotics, and Drones, is anticipated to alter human perceptions in a profoundly mysterious manner. As shortening of time being the sole clarified parameter within the relatively constrained future outlook, applied research by C-DAC plays a significant role.

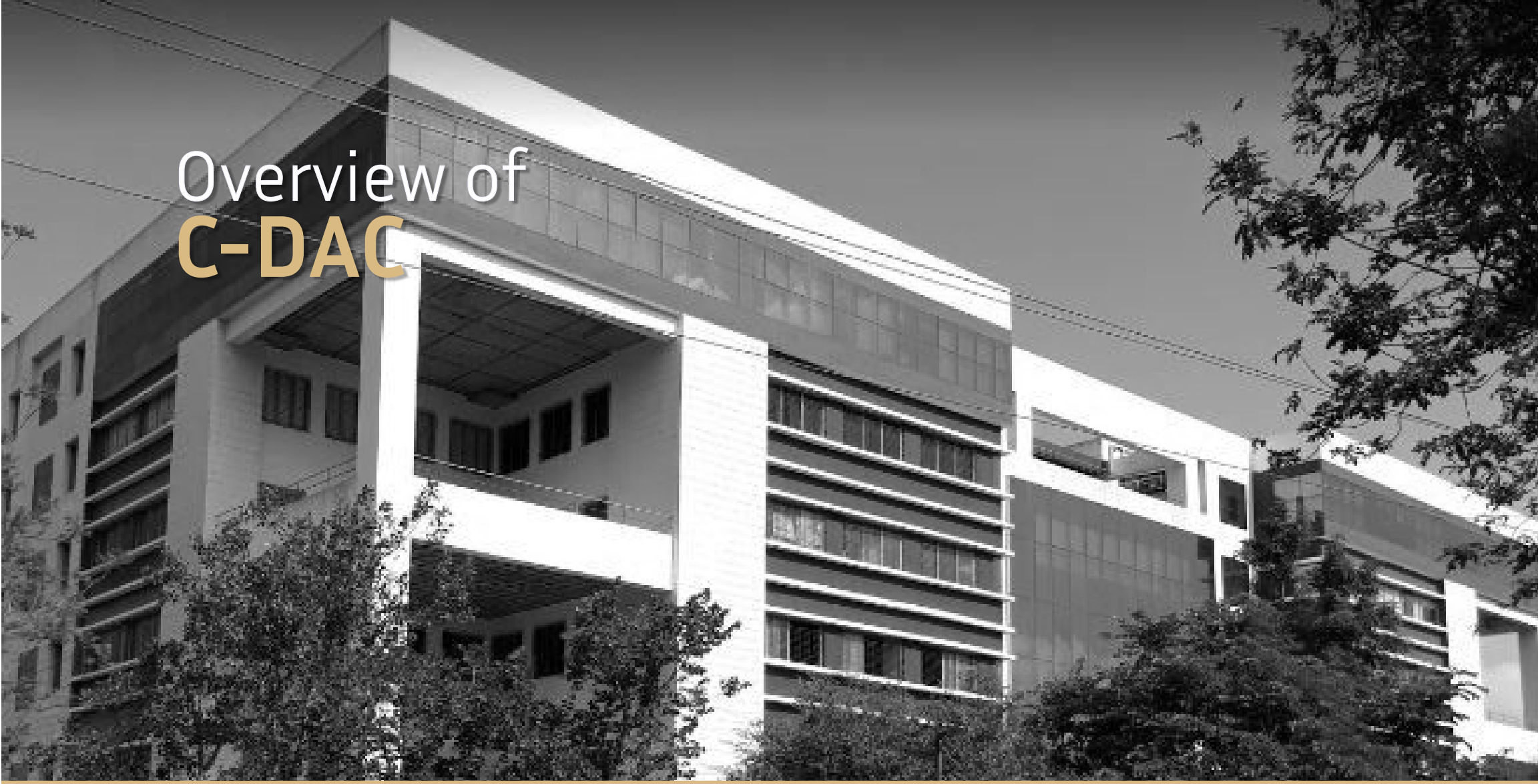
C-DAC's unique positioning with its merger with NCST, ER&DCI and CEDT has created a research and development ecosystem having design and development (Hardware, Software, and System) capabilities which forged multidisciplinary research collaborations and strategic partnerships, to undertake complex and large-scale projects, advance research and development, and promote innovation across the diverse domains of information technology and related fields.

In the last few decades, C-DAC has developed globally competitive and commercially exploitable products and solutions in emerging technologies which range from Supercomputing, Healthcare solutions, AgriTech products, Strategic Technology, DIR-V, Energy efficient Measurement systems, Power and Process control, e-Governance solutions, Cyber Security, Forensic Tools, etc. having high societal impact.

In view of bringing together this widespread portfolio of C-DAC's technologies, Corporate R&D has conceptualized constitution of Technology Advancement Proliferation (TAP) groups under the chairmanship of Director General C-DAC. This Products and Solution Booklet 2024 is an edition of showcasing of C-DAC's technological expertise in identified thirteen TAP verticals.

The major objective of this booklet is to enhance research collaborations and proliferate C-DAC's R&D achievements with the stakeholders. It offers a bouquet of C-DAC's products, solutions and services spanning across different technology verticals which are already deployed at numbers of prestigious government organizations and private industries.

We thank MeitY, DG C-DAC, Co-Chairman, Technology Directors and members of all the thirteen technology verticals for their co-operation and support in bringing out this edition of booklet.



Overview of C-DAC

C-DAC, is an autonomous scientific society of the Ministry of Electronics and Information Technology (MeitY), Government of India. It is primarily an R&D institution engaged in the design, development, and deployment of electronics and advanced Information Technology (IT) products and solutions.

Originally established to carry out research and to develop High-Performance Computers, the R&D of C-DAC has expanded to various other areas such as Quantum computing, High-Performance Computing, Microprocessor & Strategic Electronics, Health Informatics, Artificial Intelligence, Cyber Security & Cyber Forensics, Software Technologies including e-Governance, Geo-informatics, Blockchain Technologies, IoT, Education and Training related to these technologies. Presently, C-DAC has 12 centers spread over the country in the cities of Bengaluru, Chennai, Delhi, Hyderabad, Kolkata, Mohali, Mumbai, Noida, Patna, Pune, Silchar, and Thiruvananthapuram.

Mission

C-DAC's Mission statement has evolved after deep thought and in consultation with the members of C-DAC. The Mission Statement as defined below, reflects the fabric and character of C-DAC and integrates in the fulfilment of C-DAC's Vision.

Expand the frontiers of Electronics and Information Technology.

Evolve technology solutions-architectures, systems, and standards for important national problems.

Achieve rapid and effective spread of knowledge by overcoming language barriers through the application of technologies.

Share experience and know-how to help build advanced competence in the areas of Electronics and Information Technology.

Bring the benefits of Electronics and Information Technology to society.

Utilize the Intellectual Property generated by converting it into a business opportunity.

Vision

To emerge as the premier R&D institution for the design, development, and deployment of world-class electronic and IT solutions for economic and human advancement.

TECHNOLOGY ADVANCEMENT AND PROLIFERATION (TAP) GROUPS

In order to align various technical activities of C-DAC with the national initiatives, Corporate R&D has conceptualized constitution of Technology Advancement and Proliferation (TAP) Group(s), under the Chairmanship of Director General, C-DAC, to evolve technical strategies, mission-based activities and programs, capability/performance enhancement measures, guidelines and recommendations for effective advancement and proliferation of various multi-centre initiatives.

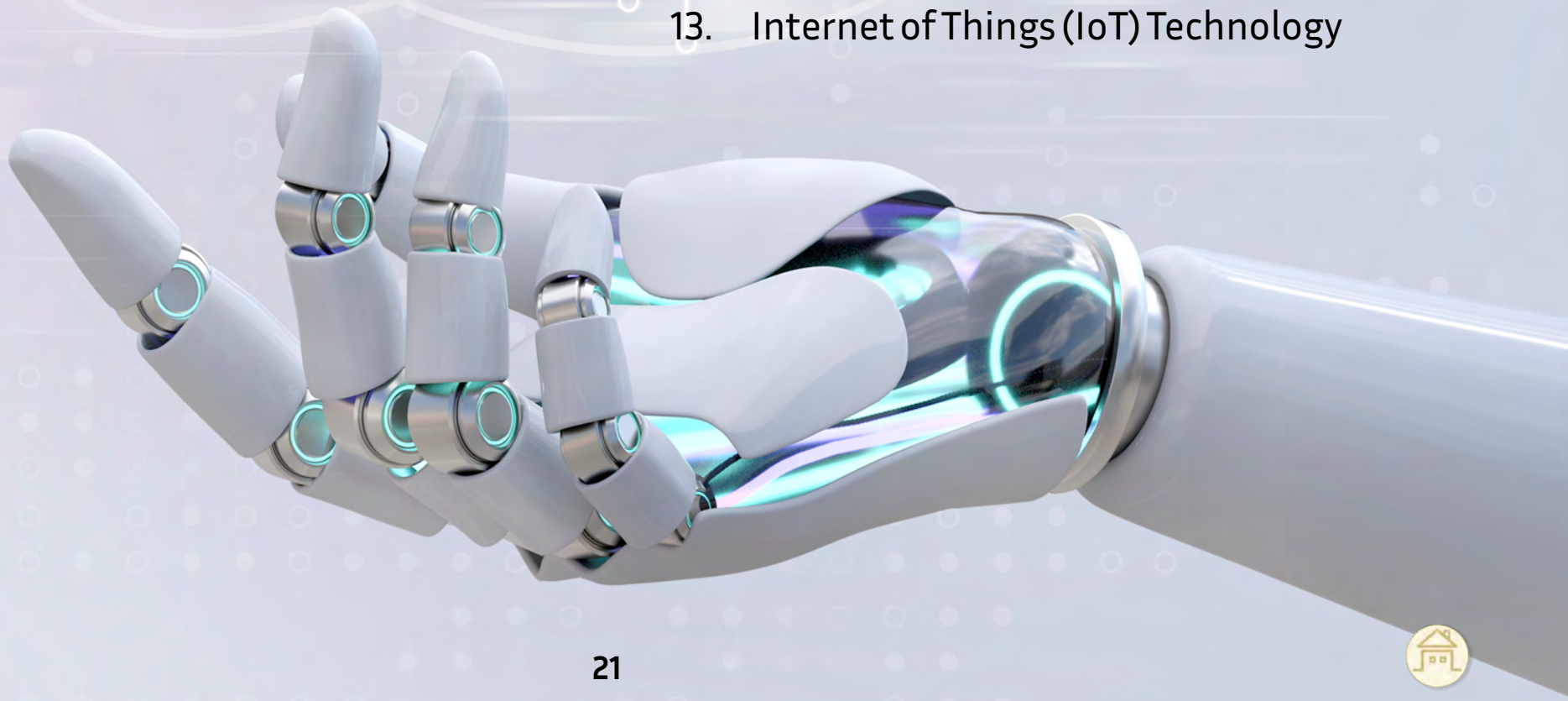
The Technology Advancement and Proliferation (TAP) Group(s) is responsible for promoting, supporting, and overseeing the advancement and proliferation of respective technology verticals within C-DAC. The TAP aims to facilitate the growth of research initiatives in respective technology verticals, enhance synergy and collaboration among researchers at C-DAC, and ensure high-quality research outputs in the identified technology with the following objectives.

- Leading Global/Domestic activity identification & Technology Forecast for respective verticals
- Conduct in-depth capability assessments (Internal/External) of the assigned technology vertical to the TAP group
- Develop/evolve a comprehensive research capability-building strategy for C-DAC in respective technology vertical
- Evolve mission-based projects/programs that are impactful and futuristic in respective technology vertical
- Enhance the Global Competitiveness of Products, Solutions, and Services in the technology vertical
- Improve coordination of Research & Development teams across C-DAC
- Develop an effective Performance Monitoring & Evaluation framework for the technology vertical
- Avoid duplication of activities carried out across centres
- Enhance research collaboration between organizations & industries including Start-ups/MSME

C-DAC's
TAP Verticals

C-DAC has consolidated its activities into the following thirteen Technology advancement and Proliferation Groups. Each of the thirteen TAP groups is focused on research and progress in the respective vertical. Each of these TAP verticals, which encompass several projects, has clearly defined objectives, scopes, implementation timelines, milestones, as well as quantifiable outcomes, including the elimination of redundancy and cross-cutting research aspects.

1. High Performance Computing (HPC)
2. Quantum Computing
3. Artificial Intelligence (AI)
4. Strategic Technology (Including Emergency/Disaster Management)
5. Digital India RISC-V (DIR-V)
6. Software Technology (including Cloud and BOSS)
7. e-Governance
8. Healthcare & Educational Technologies
9. Cyber Security
10. Automotive Technology
11. Communication Technology
12. Power Electronics & Renewable Energy
13. Internet of Things (IoT) Technology



HIGH PERFORMANCE COMPUTING (HPC)

High Performance Computing

C-DAC, started as a mission in 1988 to build our own supercomputer, has continued to live up to the nation's vision, and as we stand today, are poised to have our own Rudra based PF systems. The approach to HPC sovereignty is now well thought off and the HPC TAP has chalked out a plan for the coming five years . We are looking forward to our first 20PF HPC by end of 2024. The development efforts are in multiple fronts – C-DAC is engaged in the development of variants of Rudra HPC server platform from Intel and AMD in the short term and have DIR V based server platform in the medium term; indigenous design and development of RISC V based CPU and GPGPU are currently underway; variants of Trinetra interconnect are being built; the system software ecosystem in becoming more comprehensive with Pinaka program

Co-Chairman

Dr. S. D. Sudarsan
Executive Director
C-DAC Bengaluru
sds@cdac.in

High Performance Computing

Under build approach of National Supercomputing Mission, a phased approach is followed for building of PARAM Supercomputing systems with first phase of assembly, second phase of manufacturing and third phase of design and manufacturing of sub-systems required for the systems. This has resulted into complete indigenous PARAM Rudra Supercomputers being installed under Phase-3 of NSM with 40 PF of compute capacity. For achieving same, one of the key sub-assemblies of a supercomputer, Rudra servers are designed and developed by C-DAC. Mass manufacturing of Rudra servers is already in progress within the country. Under transfer of technology agreement, C-DAC has also transferred the Rudra Server Design to three industry partners, viz. M/s VVDN, M/s Kaynes technologies and M/s Avalon technologies. All these activities have catalized the development of entire eco-system right from design, manufacturing and userbase generation.

Now to keep the momentum of self-reliance in Supercomputing, C-DAC is gearing up to take up the next challenge of building of exascale supercomputer under proposed NSM 2.0 with optimal integration of indigenous technologies like processor, accelerator, servers, and softwares.

Technology Director

Shri Sanjay Wandhekar
Scientist G
C-DAC Pune
sanjayw@cdac.in

High Performance Computing (HPC)

RUDRA-I SERVER

Rudra-I, C-DAC's indigenous server platform with Intel Xeon 2nd generation scalable processor supporting DDR4 memory and having two expansion slots for GPU and accelerator cards.

KEY FEATURES:

- Suitable for diverse applications such as, High performance computing, cloud and edge computing and communication
- Dual socket, 2nd Gen Intel Xeon Scalable Processors (up to TDP 165W)
- 20 DDR4 DIMM slots LRDIMM, RDIMM (up to 1.28 TB)
- Support for Intel Optane Persistent Memory (NVDIMM)
- Two PCIe 3.0 x16 slots with GPU/Accelerator support
- Onboard 2 x 10Gbps ethernet Interfaces
- One additional high speed network slot (Upto 100Gbps, OCP NIC 3.0 compatible)
- One 1GbE BMC management port
  - Support for IPMI2.0
  - Support for KVM
- Support for two U.2 NVMe/SATA
- Different product SKUs available
  - 2U server with Built-in power supply (can go as standard 19" server supporting 2 GPUs)
  - 2U storage server with Built-in power supply
  - 1U servers (two servers in one chassis) with centralized Power supply
  - 2U servers (two servers in one chassis) with centralized Power supply
  - ½ width 1U with centralized Power supply
  - ½ width 2U with centralized Power supply
  - Designed to support both air-cooling and liquid cooling server configurations

DEPLOYMENTS

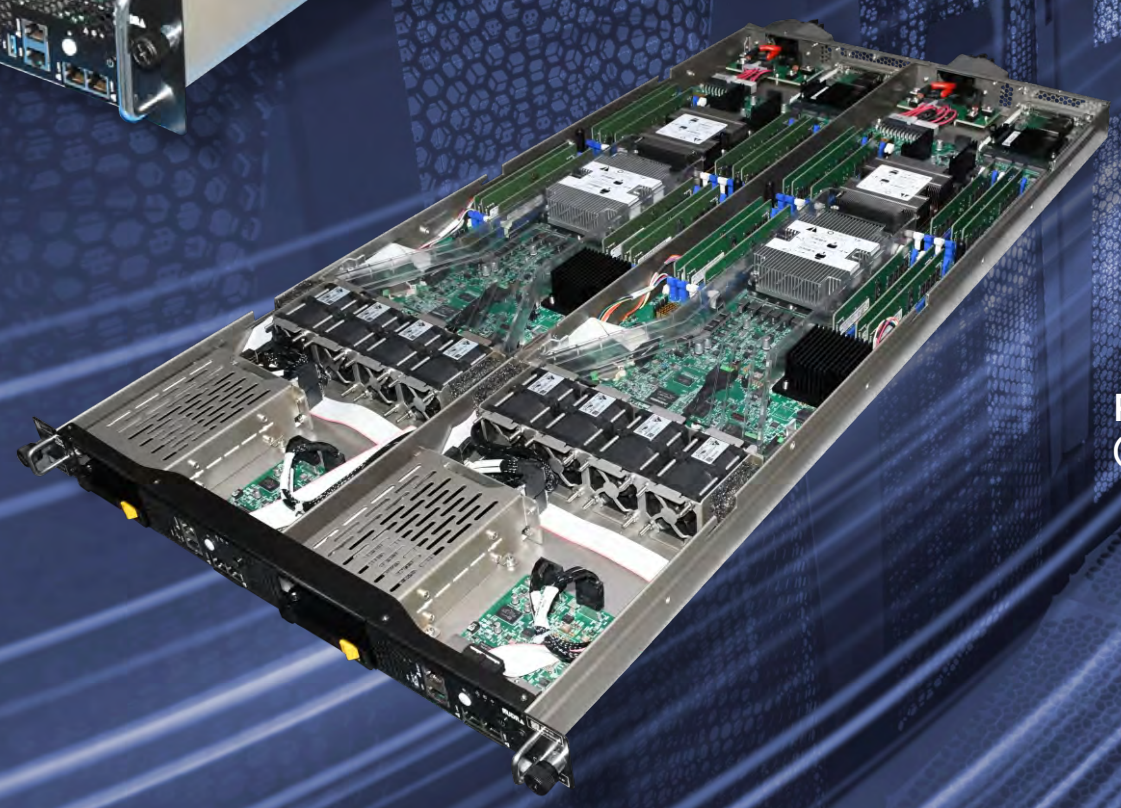
Param Rudra at C-DAC, Pune

Param Rudra at IUAC, Delhi (commissioning in progress)

Param Rudra at C-DAC, Delhi (commissioning in progress)

Param Rudra at NCRA, Pune (commissioning in progress)

Rudra 2U SKU
(2 x 1/2 width 2U servers)



Rudra 1U SKU
(2 x 1/2 width 1U servers)

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PARAM SHAVAK 2.0

PARAM SHAVAK 2.0 is a successor of PARAM SHAVAK 1.0 HPC in box solution. PARAM SHAVAK 2.0 is a ready-to-use, all-in-one tabletop HPC system powered by indigenous Rudra server and Bharat Operating System Solution (BOSS), pre-loaded with relevant system software and customized applications from selected scientific & engineering domains. The system is designed to be an enabling tool for research organizations as well as academic institutions that are on the verge of adopting HPC culture and skill sets generation.

PARAM SHAVAK 2.0 is available in three variants: PARAM Shavak HPC, PARAM Shavak DL GPU, and PARAM Shavak VR.

KEY FEATURES:

- HPC system in an all-in-one table top supercomputing solution
- Make in India HPC solution
- 8.8 TF and above computing power (with 1 number of NVIDIA A30 GPGPU card and two multicore CPUs with 24 cores per CPU)
- An outstanding solution for educational, scientific, and research organizations ready to adopt a culture of high-performance computing.
- Equipped with C-DAC's indigenously developed software technologies for HPC applications in academic and scientific domains.
- Pre-loaded with parallel programming development environment and applications.
- Customizable as per user's hardware and software requirement.
- Access to PARAM Siddhi housed at C-DAC, Pune for computations on a larger scale as per the NPSF usage policy.
- Professional trainings and demonstration are provided on demand.

PARAM SHAVAK 1.0 Deployments:

Gujarat Council on Science and Technology, Gandhinagar, Gujarat

Himachal Pradesh University, Summerhill Shimla

Data Security Council of India, Noida (UP)

Gujrat Forensic Sciences University, Gandhinagar, Gujarat

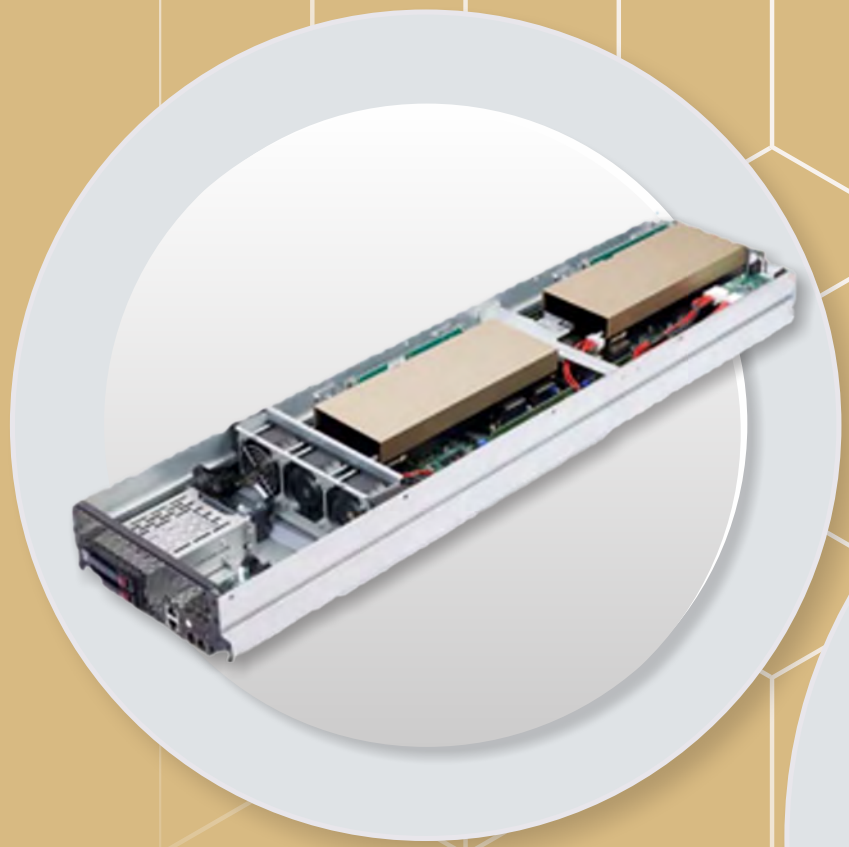
Madan Mohan Malaviya University of Technology, Gorakhpur (UP)

Motilal Nehru National Institute of Technology, Prayagraj

Data Security Council of India, Noida (UP)

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

Trident Academy of Technology, Chandrasekharpur, Bhubaneswar



RUDRA

PARAM SHAVAK

Deployments

Universidade Estadual de Ponta Grossa, Ponta Grossa PR/Brasil

Department of Physics, The Univ. of Burdwan, Golapbag Campus, Barddhaman

MINISTERIO DE EDUCACIÓN, 1060 - Ciudad Autónoma de Buenos Aires, Argentina

National Institute of Education & Technology (INET), City of Buenos Aires, Argentina

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98226 50512

PARAM RUDRA CLUSTER SOLUTION

PARAM RUDRA HPC SYSTEM SPECIFICATIONS

PARAM Rudra HPC System Specifications	
Total Performance	100 TF to Multi –Peta Flops
Base Specifications (Compute Nodes)	2 x x86 CPU 's
Master/Service/Login Nodes	As per requirement
CPU Compute Nodes	As per requirement
GPU Compute Nodes	As per requirement
Total Memory	As per requirement
Interconnect	Primary: 100 / 200 Gbps Interconnect (InfiniBand / C-DAC Trinetra) Secondary: 1 /10 Gbps Ethernet Network
Storage	As per requirement
Cooling system:	Air cooled or liquid cooled as per requirement

KEY FEATURES:

Make in India HPC solution

Solution for educational, scientific, and research organizations ready to adopt a culture of high-performance computing.

Equipped with C-DAC's indigenously developed software technologies for HPC applications in academic and scientific domains.

Pre-loaded with parallel programming development environment and applications.

Customizable as per user's hardware and software requirement.

Professional trainings and demonstration are provided on demand.

Indigenous Components of C-DAC's HPC Software Stack:

BOSS Operating System for HPC

C-CHAKSHU [v3.0]: C-Chakshu is a HPC multi cluster monitoring and Management platform which provides a unified dashboard over the web for all NSM sites with different geographic locations across India.

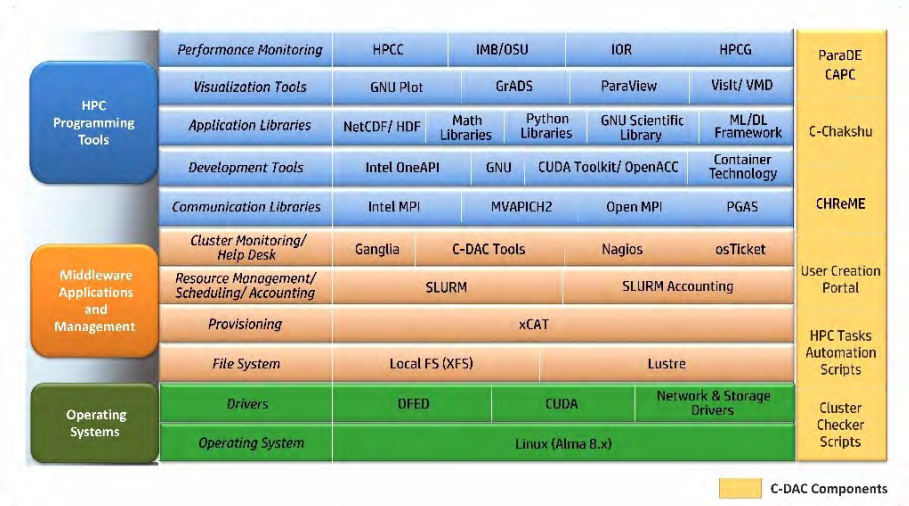
CHReME [v4.0]: C-DAC HPC Resource Management Engine portal is an end-user job submission, management and monitoring tool that works with

various schedulers or Workload Managers such as Torque, OpenPBS, Sun Grid Engine, Moab, Load leveller. It is designed to increase cluster utilisation by bringing more users to the cluster who would ordinarily stay away due to the complexity of submitting jobs to a cluster.

Parallel Development Environment (ParaDE): This is an IDE for hybrid parallel application development providing ease-of-use of HPC and mobility to users and data.

C-DAC's Automatic Parallelizing Compiler (CAPC): CAPC automatically converts sequential programs to equivalent parallel programs for the target parallel architectures.

OS Ticketing Tool [v2.0]: This is an open-source utility and we have customised it according to our requirements. It seamlessly integrates inquiries/support created via email and web-based forms into a simple easy-to-use multi-user web interface.



C-DAC's HPC Software Stack

DEPLOYMENT

IUAC, Delhi
C-DAC, Pune

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DIGITAL INDIA RISC-V (DIR-V)

Digital India RISC-V(DIR-V)

I am excited at the tremendous possibilities before us for the development, adoption and proliferation of RISC-V based products and solutions. RISC-V's open ISA offers compelling advantages and opportunities in the Indian context. Its modular design allows for easy customization and optimization of processor designs for diverse applications, including IoT devices, embedded systems, high-performance computing (HPC), and artificial intelligence (AI) workloads. This flexibility to quickly design semiconductor chips with specific power, performance, area and cost targets, is crucial for addressing India's unique technological and market demands.

The DIR-V program, envisions a future where RISC-V based SoCs and systems designed and developed under this program are integrated into various digital products we use in our daily lives. The aim is to establish India as a key supplier of RISC-V based SoCs for Servers, Mobile devices, Automotive, IoT and Microcontrollers. As a major player and key contributor to the DIR-V program, C-DAC is contributing to the proliferation of the RISC-V ecosystem with the development of VEGA series of processors and RISC-V based SoCs, various critical system and peripheral IPs and a set of development boards to accelerate adoption of the RISC-V for the design and development of state of the art solutions in multiple application domains.

As RISC-V gains traction worldwide, India has the opportunity to participate in and contribute to the global RISC-V ecosystem leading to partnerships, technology transfer, and knowledge exchange with international players, enhancing India's position in the global semiconductor landscape. We at C-DAC are thrilled at these opportunities and are fully committed to working with our partners and customers to proactively address future challenges and co-develop indigenous solutions based on RISC-V cores.

Co-Chairman

Shri Vivek Khaneja
Executive Director
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Digital India RISC-V(DIR-V)

India is marching ahead rapidly in this techade with the vision of Atmanirbhar Bharat and indigenous technology development that will cater to various local and global markets. The Digital India RISC-V (DIR-V) program by MeitY which aims to achieve self-reliance in Microprocessor Technology is very significant in this context. C-DAC has been at the forefront of this indigenous technology development with the successful development of the VEGA series of microprocessors comprising 32/64-bit, Single, Dual and Quad core high performance processor cores based on RISC-V ISA. A series of development boards and the complete ecosystem for embedded system design comprising of Board Support Packages, SDK, tool chain, plug-ins, debugger, etc has also been developed. C-DAC is also actively engaging with startups, industry and academia for development of various SoCs, Embedded systems based on the indigenous VEGA processors. Under the DIR-V Technological Vertical, we propose to develop a portfolio of various processors and SoCs based on RISC-V targeted for different applications like HPC, Industrial, Automotive, Consumer Electronics, Edge and IoT in the coming years which would accelerate our progress towards a self-reliant and developed nation.

Technology Director

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Digital India RISC-V (DIR-V)

DIR- V VEGA PROCESSOR

In furtherance of the vision of AatmaNirbharBharat and positioning India as the global hub for Electronics System Design and Manufacturing, Govt. of India MeitY launched the Digital India RISC-V (DIR-V) Program with the aim of developing a portfolio of RISC-V based Microprocessors and its compute ecosystem. The VEGA series of Processors has been developed as part of the DIR-V Program and comprises of 32/64-bit Single/Dual/Quad Core superscalar Out-of-Order high performance processor cores based on RISC-V Instruction Set Architecture along with a robust ecosystem. These indigenous microprocessors employing the state-of-the-art architecture have a performance which is at par with other commercially available processors and are amenable for various strategic/industrial/commercial applications.

VEGA Processor IP: Six processor variants are currently available in the VEGA series based on RISC-V ISA. These processors are available as soft IP.

VEGA ET1031: 32-bit 3-Stage Pipelined Single Core Processor IP
VEGA AT1051: 32-bit 5-Stage Pipelined Single Core Processor IP
VEGA AS1061: 64-bit 6-Stage Pipelined Single Core Processor IP
VEGA AS1161: 64-bit High performance 16-Stage Pipelined Single Core Processor IP
VEGA AS2161: 64-bit High performance 16-Stage Pipelined Dual Core Processor IP
VEGA AS4161: 64-bit High performance 16-Stage Pipelined Quad Core Processor IP

For details visit https://www.vegaprocessors.in/vega.php

THEJAS32 chip: THEJAS32 SoC is based on the VEGA ET1031 processor, which is a 32 bit single core in-order, 3-stage pipeline processor based on the open source RISC-V Instruction Set Architecture. THEJAS32 is a 100MHz SoC integrating several peripherals for embedded applications like Sensor fusion, loT devices, Remote sensors, electronic toys etc.

Key features of THEJAS32 SoC

Processor	: VEGA Et1031
RAM	: 256KB
UART	: 3 nos
SPI	: 4 nos
Timer	: 3 nos
PWM	: 8 nos
I2C	: 3 nos
GPIO	: 32 nos
IO voltage	: 3.3 V
Supply voltage	: 5-6 V
Frequency	: 100 MHZ

THEJAS32

For details visit https://www.vegaprocessors.in/soc/

ARIES DEVELOPMENT BOARDS

ARIES development boards: ARIES is a development platform based on THEJAS32 chip, comprising of six different boards viz. ARIES v2, ARIES v3, ARIES loT, ARIES Micro, ARIES DOT and ARIES ALPHA. These development boards are fully indigenous and “Made in India” products which are targeted for both industry and academia involving embedded system design.

ARIES v2	: THEJAS32 based Development board
ARIES v3	: THEJAS32 based Arduino compatible Development board
ARIES loT	: THEJAS32 based loT Development board
ARIES Micro	: THEJAS32 based Small form-factor Development board
ARIES DOT	: THEJAS32 based Circular form-factor Development board
ARIES ALPHA	: THEJAS32 based Multi protocol Development board

KEY FEATURES OF ARIES DEVELOPMENT BOARDS

Processor	: VEGA ET1031
RAM	: 256KB
Flash	: 2MB
UART	: 3 nos
SPI	: 3 nos
Timer	: 3 nos
PWM	: 8 nos
I2C	: 2 nos
ADC	: 4 channel
GPIO	: 32 nos
IO voltage	: 3.3 V
Supply voltage	: 5-6 V
Frequency	: 100 MHz

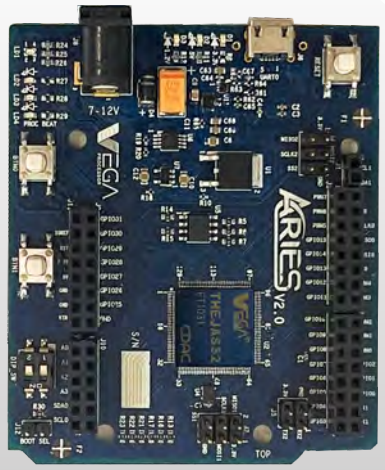
For details visit https://www.vegaprocessors.in/devboards/41

ARIES v3

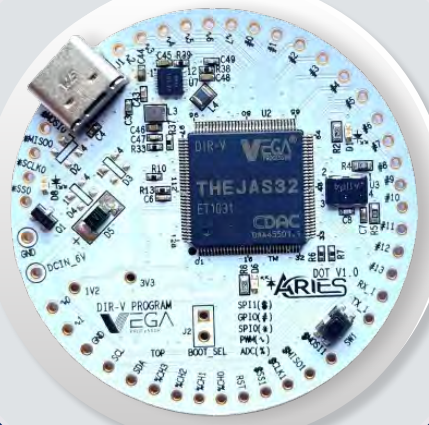
ARIES Micro

ARIES ALPHA

ARIES IoT



ARIES v2



ARIES DOT

ASTRA SYSTEM AND PERIPHERAL IPS:

C-DAC has a wide range of System and Peripheral IPs under the brand name ASTRA which are Silicon proven, comprises of the robust RTL, extensively verified and fully synthesizable technology independent IP cores which form the building blocks for an SoC implementation.

For details visit https://www.vegaprocessors.in/ipcores.php

KEY FEATURES

These products are cost competitive, high performance and fully "Made in India" products

DEPLOYMENTS:

VEGA Processor IP has been licensed to a startup.

1500+ THEJAS32 chips and ARIES development platforms sold to institutions, start-ups and individuals.

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QUANTUM COMPUTING

Quantum Computing

As we continue to chart our course in the realm of Quantum Technology, I am proud to see the strides we have made together. With multifaceted interventions ranging from simulators to accelerators, software stack to communications, and capacity building, C-DAC has firmly established its presence in this transformative field. Our dedicated teams have played a pivotal role in shaping our journey thus far. Your unwavering commitment and innovative spirit have propelled us forward, enabling us to align our efforts seamlessly with the goals of the National Quantum Mission. Looking ahead, our vision is ambitious yet clear: to build an indigenous Quantum Computer through collaborative efforts, fostering the development of all subsystems right here in India. This endeavor requires the collective expertise and dedication of each individual within our organization. Furthermore, our emphasis on algorithm and use case development reflects our commitment to exploring the boundless possibilities of Quantum Technology. I am pleased to note that our team continues to grow stronger across all centers, with new projects on the horizon. Together, we are poised to achieve even greater milestones in the days to come. Let us march forward with determination and unity, knowing that our collective efforts will shape the future of Quantum Technology not just for C-DAC, but for our nation as a whole.

Co-Chairman

Col. Asheet Kumar Nath (Retd.)
Executive Director
(Corporate Strategy and
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Quantum Computing

Technology Director

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As we continue to witness the rapid evolution of technology, it is evident that we are entering an era of unprecedented innovation and advancement. At CDAC, we are proud to be at the forefront of this transformative journey.

Our commitment to excellence in Quantum Computing is unwavering. Through the collaborative efforts of esteemed institutions such as IISc, IIT-Roorkee, and CDAC, we have developed ground-breaking products like QSim (www.qctoolkit.in). These initiatives not only advance Quantum Computing research frontiers in India but also serve as vital educational and research tools.

With a focus on leveraging indigenous technologies and solutions, we are propelling India into the forefront of this cutting-edge field. Our vision is to revolutionize industries through Quantum technologies, promising sophisticated, interconnected, and intelligent solutions.

Quantum Computing

1. Qsim -Quantum Computing Simulator Toolkit 50

QSIM -QUANTUM COMPUTING SIMULATOR TOOLKIT

QSim is one of the first initiatives in the country to address the common challenge of advancing the Quantum Computing research frontiers in India. It is the collaborative efforts involving – IISc, IIT-Roorkee and C-DAC.

QSim offers a robust Quantum Computing (QC) simulator with a GUI-based workbench that enables researchers to explore Quantum Algorithms under idealized conditions and prepare experiments for execution on real Quantum Hardware.

Qsim can serve as a vital educational and research tool, providing an excellent means to attract students and researchers to the field of Quantum Technology, while also offering a platform to acquire skills in 'programming' and 'designing' actual Quantum Hardware.

KEY FEATURES

- Density Matrix Simulator
- Simulates with Noise Parameters
- Free to Use

DEPLOYMENTS

QSim is available as a cloud service and accessible through **www.qctoolkit.in**

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STRATEGIC TECHNOLOGY

(INCLUDING EMERGENCY/DISASTER MANAGEMENT)


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Strategic Technology

(Including Emergency / Disaster Management)

In Strategic Sector, C-DAC has successfully proven its mettle in diverse ecosystems ranging from Defence and Space to Emergency Response and Disaster Management. In true spirit of Atmanirbhar Bharat, C-DAC has translated its in house R&D efforts into multiple deployments across India. C-DAC is proud to associate with ISRO in developing and supplying indigenously developed technologies for qualification tests of various stages of the ISRO mission programs including Chandrayaan and Aditya-L1 mission. The Emergency Response Support System (ERSS) is operational in all states and UTs, with the implementation of the second phase underway. Major emergency helplines are being integrated with ERSS-112. The Vehicle Tracking and Monitoring System (VTMS) from C-DAC is being implemented nationwide. Looking ahead, C-DAC aspires to be ahead of the curve with a robust roadmap aiming at a Viksit Bharat.

Co-Chairman

Shri Kalai Selvan A.
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Strategic Technology

(Including Emergency / Disaster Management)

C-DAC aims to become a best-in-class organisation through promotion of R&D in state-of-the-art technologies and processes, leading to products and solutions. C-DAC aspires to create a business model that syncretises customer centricity, knowledge management, empowerment with incentives, global outlook, and partnerships with both native and overseas organisations.

C-DAC has been a longstanding flagbearer of Atmanirbhar Bharat by virtue of having developed strategically significant indigenous systems and solutions for Defense, Space, Emergency Response, Disaster Management, and Internal Security with features like interoperability, resilience, scalability, modularity, and robustness. The list of products and solutions in this booklet stand as a testimony to C-DAC's versatile technological capabilities. During this journey, C-DAC has created diverse top-notch products and solutions, High impact research publications, IPRs besides having executed numerous large-scale projects.

We have created a five-year roadmap for the Strategic sector with Mission mode programs, in line with the Digital India future lab initiative of MeitY in the areas of AI powered Autonomous Systems, Avionics, Strategic Semiconductor technologies, Electronic Warfare systems, Sensor Technologies, NDT Systems, Next Generation Emergency and Disaster Management Systems.

Believe in ourselves and our potential is always higher than where we actually are. There is no limit to human achievement and endurance in this competitive world of technology. Ultimately the road to Goddess Lakshmi is through Goddess Saraswati i.e., our research outputs have to be translated to product-oriented business.

Technology Director

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STRATEGIC TECHNOLOGY

(Including Emergency / Disaster Management)

AVIONICS AND SPACE SYSTEMS

INDIGENOUS ENGINE CONTROLLER FOR CHEETAH AND CHETAK HELICOPTER

Indigenous Engine Controller (IEC) is a CEMILAC-certified Line Replaceable Unit (LRU) for the Turbomeca Artouste-IIIB turboshaft engine, which is being used in Cheetah and Chetak helicopters by Indian Army, Indian Navy, Indian Air Force and Indian Coastguard . This microcontroller unit has substantially enhanced the reliability of the system. It controls the start, stop and ventilation sequence of the engine.

The IEC performs the following functions:

1. VENTILATION
If the pilot opts to perform ventilation process, the IEC provides a ventilation channel for a particular time period for the process to take place and if the Fuel Pressure Switch is activated successfully then within few seconds ventilation channel is cutoff.

2. STARTING
If the pilot opts to perform starting of the engine, the IEC provides necessary channels for a particular time period (determined by the ambient temperature sensed by a temperature sensor) for the ignition and starting process to take place. Once the time period is achieved, the channel is cutoff.

3. SHUTDOWN
If the pilot opts to perform shutdown of the engine, the IEC provides a timer enabling a channel for blockage light to be illuminated. After desired time interval, the channel is cutoff.

picture courtesy:
wikipedia

KEY FEATURES

Made in India – Only indigenised solution available in India

Automatic environmental adaptive algorithm for optimal and reliable engine starts, enhancing operational readiness and strike capability against the enemy.

Microcontroller based digital control system.

Received "LoTA" Certification for manufacturing from CEMILAC.

Reverse compatible.

MIL-STD certified.

Repairing possible at the component level

Reprogrammable

Operating Voltage: 12 Volts Min: 30 Volts Max

Maximum Load Current: 10 Amps

Operating Temperature: -40°C to +85°C

Storage Temperature: -40°C to +125°C

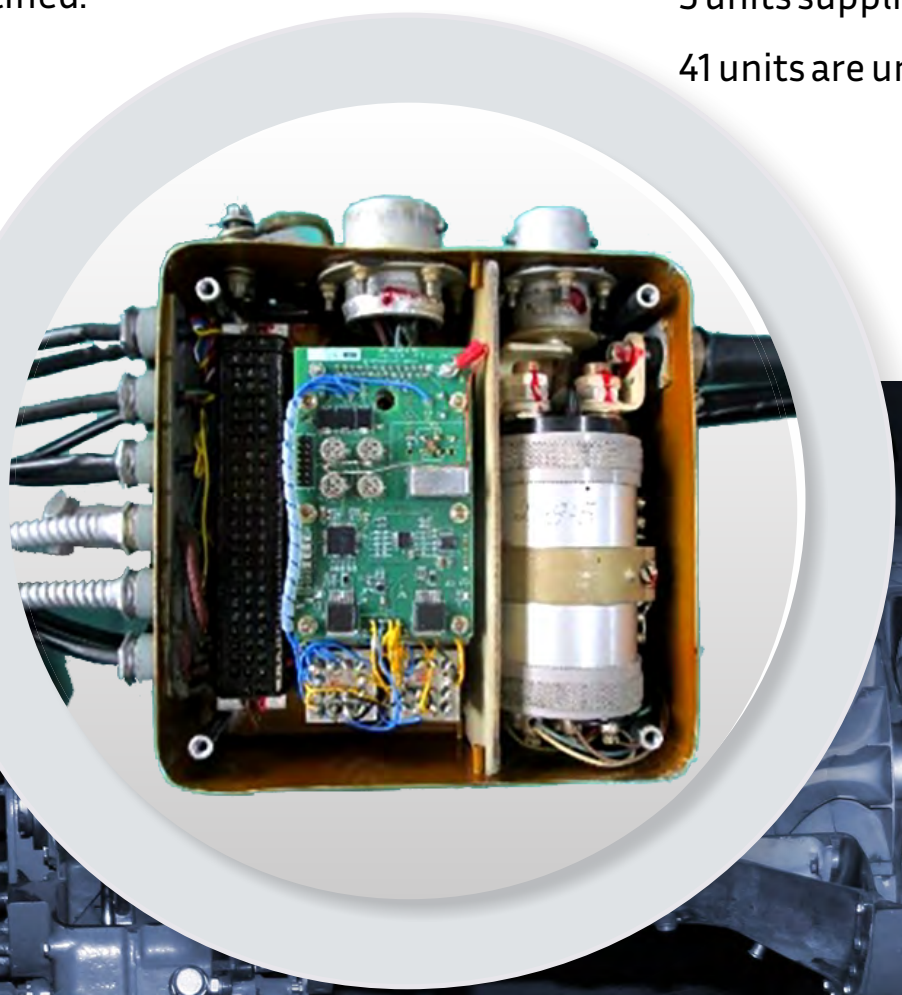
Interface: DB25 pin connector male

Reverse compatible

DEPLOYMENTS

5 units supplied and installed.

41 units are under production.



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PRECISION INSTRUMENTATION AMPLIFIER (PRIAMP)

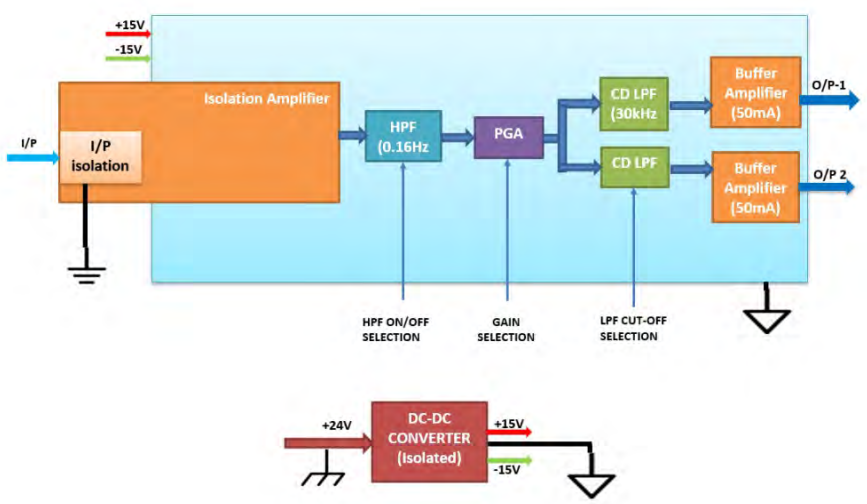
The product PRIAMP is a high accuracy instrumentation amplifier for measurement of critical parameters like thrust, pressure, displacement, firing current among others. PRIAMP is a mission critical equipment for Static Firing Testing of rockets, which was designed and developed based on the requirements provided by ISRO. The product PRIAMP was launched by Chairman, ISRO at Satish Dhawan Space Centre (SDSC SHAR), ISRO, Sriharikota on 1st September 2023.

KEY FEATURES/UNIQUE SELLING POINT OF THE PRODUCT/ SOLUTION:

Isolation:	3-way galvanic
Gain stability:	± 0.01% of FS for 24 hrs. < 100ppm/deg. C
Gain non-linearity:	≤ 0.01% of full scale
Gain Accuracy:	± 0.01 % of desired gain
Noise:	≤ 2 µV RTI at 1kHz
Filter Roll-Off :	-12dB/Octave or better
CMRR:	>130 dB @ DC
Settling Time:	± 0.01 % of final value in ≤ 30 µSec

DEPLOYMENTS

SDSC SHAR, ISRO, Sriharikota, Andhra Pradesh



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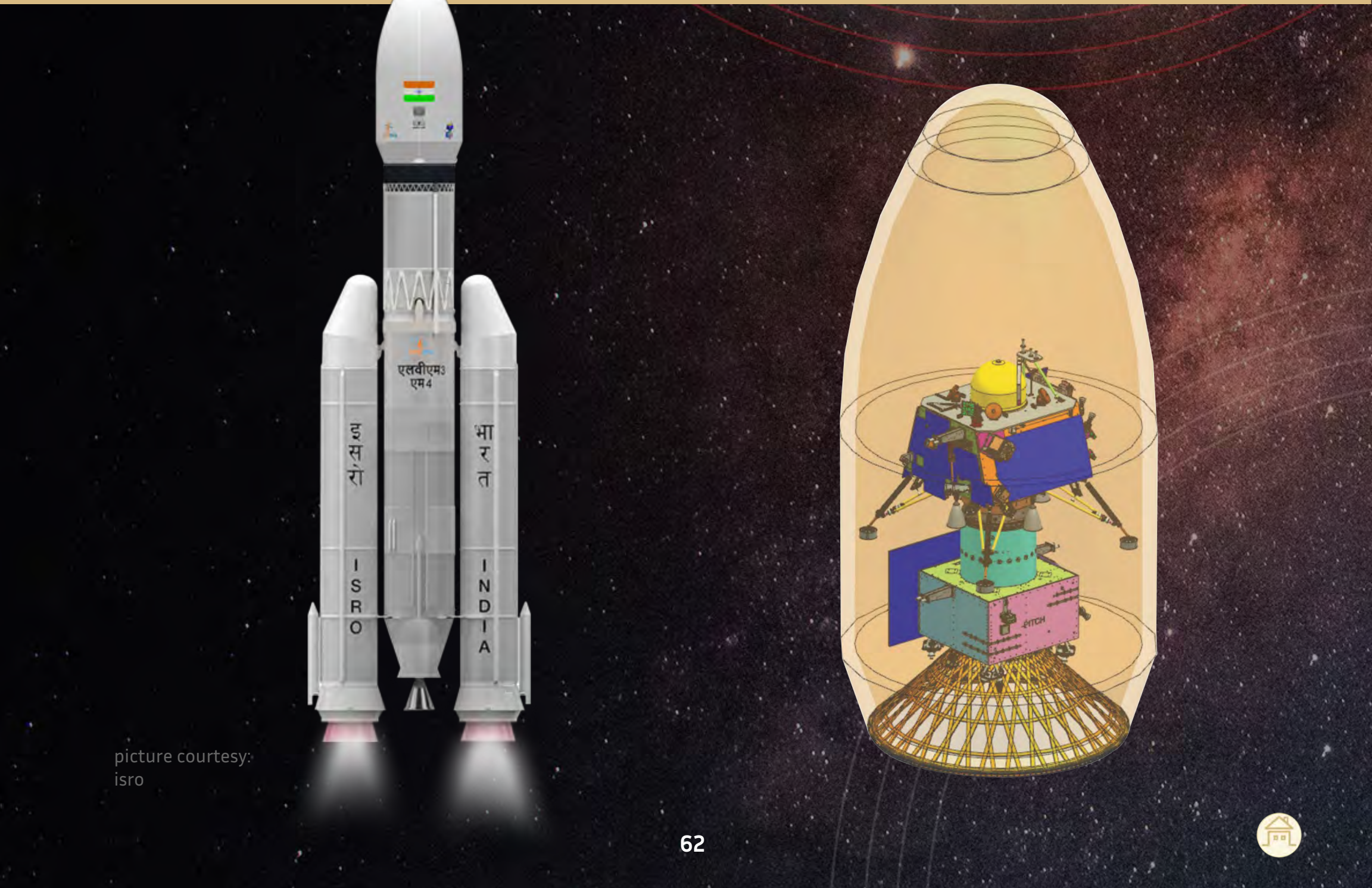
ULTRASONIC SOLID-PROPELLANT BURN RATE MEASUREMENT SYSTEM FOR ROCKETS & MISSILES

Ultrasonic Solid-propellant Burning Rate Measurement System (USBRMS) is an ultrasonic pulse-echo device for the measurement of burning rate of solid propellant specimen used for rocket motors. The system works on the principle of ultrasonic technique by repeatedly measuring the thickness of a burning propellant specimen. User can measure the burn rate of different solid propellant samples using the USBRMS and can predict the performance of solid propellant motors used in space flights and missiles. Accurate measurement of Burn Rate is very important for the prediction of trajectories of missiles and rockets. The product has been deployed in DRDO labs - HEMRL and ACEM and various test facilities of ISRO. It has achieved accuracy of more than 99% in burn rate measurement.The USBRMS includes a high pressure- high temperature (300bar, 3000deg C) burning chamber, electronics unit for data collection, laptop for data display, replay and burn rate computation.



picture courtesy:
isro

KEY FEATURES

An ultrasound technology-based system for measuring the burning rate of solid propellants

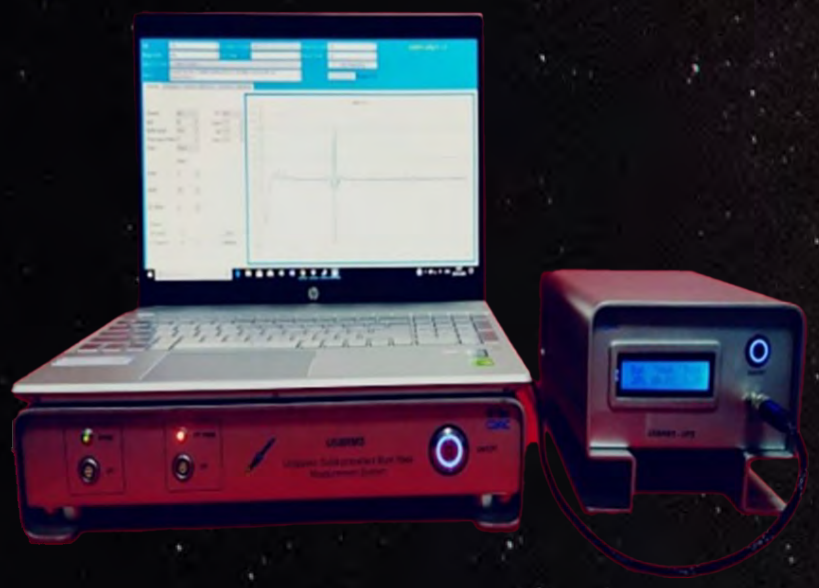
Burn Rate measurement applications

DEPLOYMENTS

12 units at various ISRO labs

1 unit at HEMRL, DRDO, Pune

1 unit at ACEM, DRDO, Nashik



USBRMS Electronics

USBRMS Burning Test Chamber

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SoUNDS – SONIC ULTRASONIC NON DESTRUCTIVE TEST SYSTEM FOR ROCKETS & MISSILES

SoUNDS is a non-Destructive Test (NDT) and Evaluation system, optimized for porous and composite materials where conventional high frequency ultrasonic NDT systems cannot meet the requirement. SoUNDS system is commonly used for inspection of materials used in rockets and space vehicles. It is a system for Non-Destructive Testing and Evaluation of materials, using Sonic and Ultrasonic frequencies. Using SoUNDS, the user can measure the velocity of a sonic-ultrasonic wave through the test specimen, and the attenuation of the wave in the material. SoUNDS can be used for detecting internal flaws in test specimens, as well as for studying the characteristics of materials under test. The low frequency operation of SoUNDS makes it suitable in situations where the common high frequency NDT system is unsuited. The system is certified for use in fire critical areas for inspection of propellant potted solid motor segments in PSLV, GSLV and for AGNI series of missiles.

The system has been in production line for over 16 years - starting with SoUNDS Mk1 in 2008 to the recent dual channel version of SoUNDS Mk3R1 in 2023

picture courtesy:
isro

KEY FEATURES

Wide operating frequency100 Hz to 400 KHz.

Programmable gain, signal amplitude and duration, customizable test creation

Transducer probes with non- metallic enclosures and internal shielding.

Frequency sweeping using different probes, Digital filtering

Manual/Auto mode triggering, different mode measurements

Remote display utility

Logging test results, Exporting data

Double shielded extra-long (20 m) cables for transducer probes to maintain safe distance of the Main electronic unit from test specimen (in explosion handling areas).

Over voltage / transient suppression at transmitter probes.

UPS with isolation from mains.

Portable Fire-retardant system enclosure cum operating console, housing Main electronics unit, LCD display, UPS and keyboard.

DEPLOYMENTS

SoUNDS Mk2 R5, IPRC, Mahendragiri

SoUNDS Mk3 R1, HEMRL, Pune

SoUNDS Mk2 R6- Advanced NDT system, VSSC Thiruvananthapuram

SoUNDSMK2R4, ASL, Hyderabad

SoUNDS Mk2 R5, VSSC, Trivandrum

SoUNDS Mk2 R3, IPRC, Mahendragiri

SoUNDSMK2R4, ASL, Hyderabad

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THERMAL CONDUCTIVITY MEASUREMENT SYSTEM FOR LIQUID PROPELLANT

Thermal Conductivity Measurement System (TCMS) is an electronic system to measure the thermal conductivity of solid and liquid specimens. The system functions on 'Transient Hotwire' technology where a copper/platinum wire is used as the primary sensor element for the thermal conductivity measurement. The TCMS V1 product is an electronic system for measuring the thermal conductivity by collecting nano-volt level signals from the hotwire sensor element. An excitation constant current source with micro-ampere level accuracy and stability also is part of the system which excites the hotwire sensor element. Primary application of the product is for the quality evaluation of various types of liquid propellants used in VSSC. The thermal conductivity of liquid propellant is an important parameter to determine its usability as fuel for various stages of the rocket launching.

KEY FEATURES

Multi-channel (8 channels), 32-bit DAQ system

Less than 500nV signal sensitivity

Constant current source with less than 100uA tolerance

High end laptop with GUI for data display, recording, replay and analysis

Applications in the field of solid and liquid thermal conductivity measurement

R&D, manufacturing and qualification of liquid propellants

DEPLOYMENTS

Deployed and installed 1 unit at VSSC, ISRO.

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ACOUSTIC EMISSION PREAMPLIFIER

C-DAC AE Preamplifier is an inline preamplifier suitable for interfacing with multichannel Acoustic Emission (AE) measurement system. C-DAC AE Preamplifier has one single ended input (BNC connector) for receiving an AE signal from the AE sensor and one output (BNC connector) for connecting to the AE measurement system. C-DAC AE Preamplifier transforms the high impedance AE signal to a low impedance signal suitable for transmitting over long cables. The AE preamplifier has a fixed gain of 40dB (typical) for amplifying the low-level AE sensor signal to a level suitable for interfacing with the ADC of the AE measurement system. It is designed to maintain highest possible signal to noise ratio in order to minimize the disturbance of unwanted signals. Using C-DAC AE Preamplifier, dynamic range >80dB can be achieved by utilizing R15 sensor. It has "light" band pass filtering to optimize sensor selectivity and noise rejection. The preamplifier module is phantom powered. The power supply and signal transmission use the same line from preamplifier to measuring system. The module operates from 28VDC (typical) power supply and consumes less than 50mA current. The C-DAC AE Preamplifier module is IP67 rated.

KEY FEATURES

- Low Noise (<4µV rms)
- Wide Bandwidth (32kHz-1100KHz)
- Wide Dynamic Range (>80dB)
- Phantom Powered
- Single Supply (28VDC Typ)
- IP 67 rated

SPECIFICATIONS

- Preamplifier Gain :40dB±1dB
- Bandwidth (-3dB) :32kHz-1100KHz
- Input Impedance :10k //15pF
- Input Type: Single ended
- Power Supply (typical):28VDC
- Operating Current:<50mA
- Dynamic Range:>80dB
- Output Voltage Max. (50Ω Load):15Vpp
- Noise (RMS rti):<4µV

DEPLOYMENTS

Supplied 12 Nos against two purchase orders to INSTEFF, VSSC, ISRO

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UNDERWATER SYSTEMS

SUBMARINE ECHO SOUNDER (SES MK1)

The Submarine Echo Sounder (SES Mk1) is a MIL-qualified navigational system designed for measuring water depth below the hull of a submarine. The transducer is fitted at the bottom hull of the submarine. This equipment is designed to meet the navigation requirements of EKM-class submarines in the Indian Navy. The system operates on the principle of ultrasonic echo sounding. It employs a dual-frequency ultrasonic transducer, with a high frequency of 210kHz for shallow water measurements up to 200 meters and a low frequency of 12kHz for deeper waters up to 6,000 meters.

The system consists of following units:

SES Master Control Unit (SMU):

Master electronic Unit integrating transmitter, receiver, DSP, and communication cards.

Digital depth display and Controls

Power Supply Unit (PSU):

Compatible with both 115V AC and 230V AC inputs.

SES Graphical Display Unit:

Graphical display of depth data

Replay of echogram Data with GPS coordinates and with data storage up to 2000Hrs.

SES LED Display Unit (SLDU):

Remote display of depth value.

SES Junction Box (SJB):

For Transducer cable interface.

Dual-Channel Ultrasound Transducer:

Dual-frequency (12kHz and 210kHz) depth measurements

picture courtesy:
indian navy

KEY FEATURES

Depth Range: up to 6000m

Transducer: Dual frequency (12kHz and 210kHz)

Mode of operation: Fully automatic, Manual, Single Ping.

Dual-Frequency Operation: Automatic/Manual frequency selection between 12 kHz and 210 kHz. 12 kHz up to 6,000m and 210 kHz 200m

Advanced Data Management: Record and replay functions are integrated into the system, allowing for detailed analysis and review of echogram data. Latitude and longitude coordinates will be saved with data. Store up to 2,000 hours of echosounder data.

Single Ping Operation: Execute quick single ping measurements, during silent mode of Submarine operation.

Captain's Key Interface: A dedicated interface allows submarine captains to directly control the start and stop of soundings.

Standards: JSS55555 and MIL461F

Graphical Interface: Separate Graphical Display module for echogram analysis and storage. 10inch touchscreen display.

DEPLOYMENTS

First proto unit were successfully fitted in INS Sindhusastra and completed UET (User Evaluation Trials). Second proto will undergo quality testing and ToT will be transferred to M/s Keltron.

Submarine Echo Sounder Mk1(SES Mk1)

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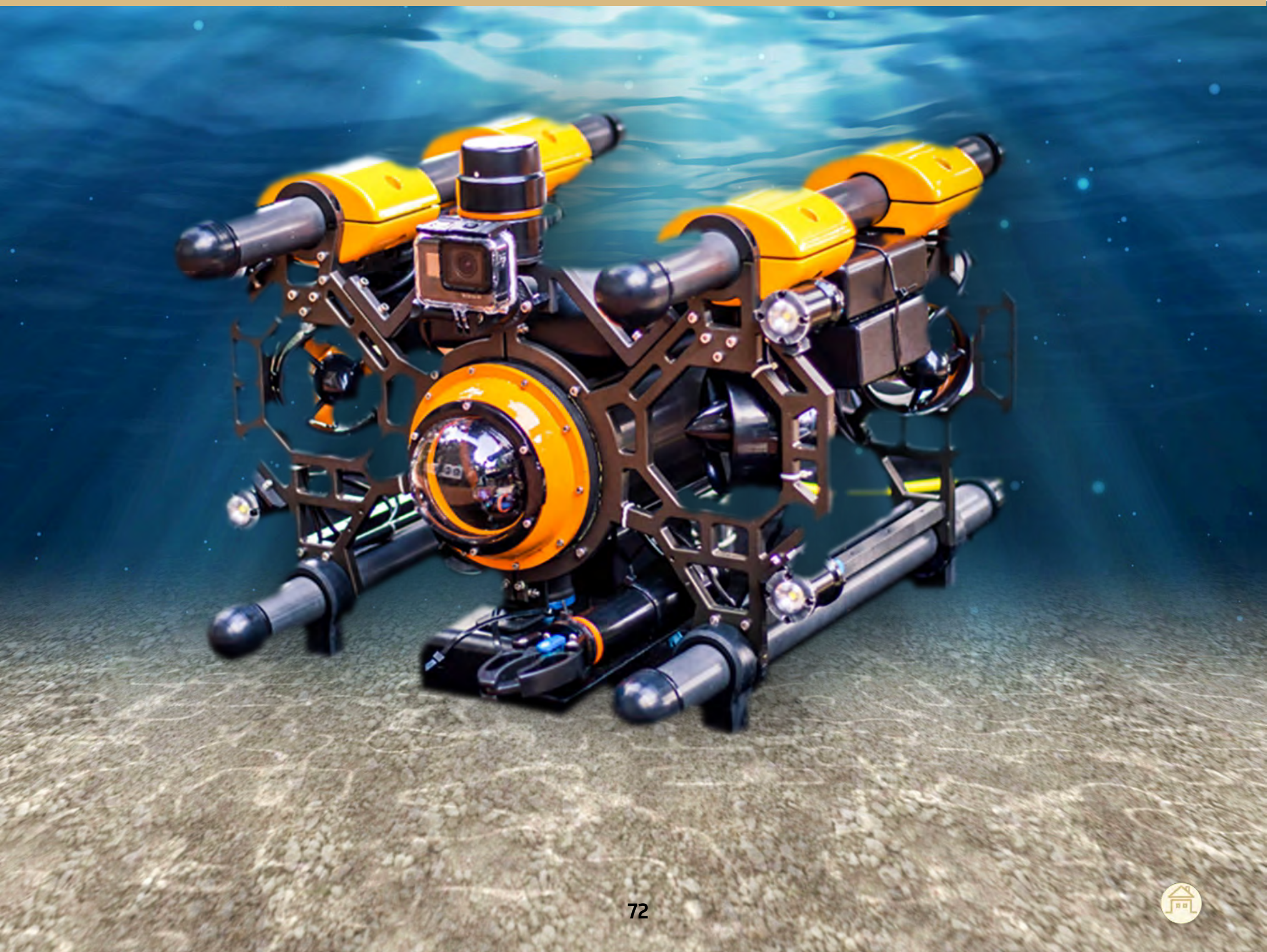
UNDERWATER DRONE

Underwater drone is a Remotely Operated tethered underwater Vehicle (ROV). It is highly manoeuvrable, and is operated by a crew either aboard a vessel/floating platform or on proximate land. It will carry multiple payloads like cameras, lights & various sensors for surveillance, navigation and inspection purpose.



KEY FEATURES

High performance versatile light work class ROV, Rugged & Compact.

Manoeuvrability with 4 Degrees of Freedom, underwater.

Easy access to the electronic system for maintenance & servicing.

Simple design, light weight construction, portable and rugged with scalable architecture.

Vectored thruster-based propulsion system with six powerful magnetically coupled DC brushless thrusters. Scalable to 8 Thruster version with 6 DOFs, with minimal structural modifications

Hard anodized aluminum 6061-T6 & HDPE based construction.

Epoxy coated R3318 Urethane foam-based buoyancy pads & neutrally buoyant tether.

Modular design & configuration to facilitate optimum payload placement for improved stability.

Overall vehicle design with low drag profile to withstand moderate water currents up to 2 Knots.

Portable & battery powered Vehicle Navigation Control Console having 27" widescreen FHD IPS display, with provision for AC IN.

Use of open-source platform for vehicle navigation and control.

Auto heading, Auto depth, Agile, Stabilize and Manual modes of operation.

Full HD Camera with Pan/Tilt

Tri-axial Gyro, Accelerometer, Magnetometer IMU sensors.

Pressure, temperature & leak detection sensors onboard for constant health monitoring.

USB, LAN interfaces.

Powered by in-house made Li-Po battery pack with balanced charging features.

Custom designed through hull penetrators for underwater electrical & electronic connections instead of costly subsea wet-mate connectors.

Specially designed water sealed underwater penetrator for onboard battery charging.

UNIQUE SELLING PREPOSITIONS

Cost effective indigenized underwater robotic vehicle system.

Customizable and re-configurable architecture.

Long term reliable Service and maintenance support.

More than 25 years legacy in underwater sensor technology.

DEPLOYMENTS

Kerala Police - Kumarakom, Kottayam District, Kerala

Crime Branch - Kottayam District, Kerala

Kerala Water Authority – Aruvikkara & Peppara Dams

Special Protection Group (SPG),NDRF,UP state police & IB – River Ganga, Varanasi, UP

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NAVAL UNDER WATER RANGES (NUWR), GOA

With the objective of keeping the acoustic and magnetic signatures of Indian naval ships to a minimum the C-DAC have commissioned Under Water Ranges in Goa, for Indian Navy. It consists of an offshore acoustic range and two offshore Degaussing ranges; connected to base station at shore, Vasco-da-Gama, Goa. One DG range is designated the Steel Ship range which is used to 'range' all steel hulled surface ships, the other DG range is designated the MCMV range and is used to 'range' glass fibre or other minesweeping vessels. Each of the three offshore sites consists of five sensor units connected to an underwater junction box via umbilical cables. Digitised signals from the underwater junction boxes are carried to shore base station via fibre optic cables.

KEY FEATURES/UNIQUE SELLING POINT OF THE PRODUCT/ SOLUTION:

- Measures Acoustic & Magnetic signature of Naval ships & submarines
- Maintains a health history database
- Integrated underwater electronics
- Subsea fibre optic communication
- Multi-channel differential Global Positioning System
- Acoustic (noise) ranging
- Magnetic modelling & degaussing
- Distributed database

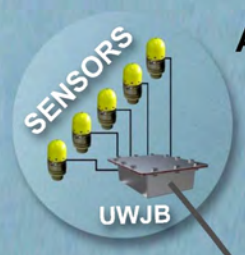
DEPLOYMENTS

Indian Navy, Goa.

Acoustic Sensor

Magnetic Sensor

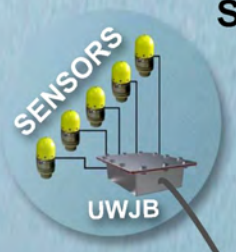
Junction Box



ACOUSTIC RANGE
Water Depth:30M

Grande Island

STEEL SHIP RANGE
Water Depth:15M

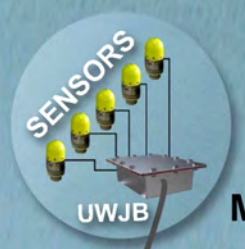


Actual Distance: 2.5 KM
Cable Length: 3.5 KM

Actual Distance: 12 KM
Cable Length: 18 KM

Actual Distance: 900 M
Cable Length: 1.5 KM

Pequeno Island



MINE COUNTER MEASURE VESSEL RANGE
Water Depth:9M

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RTB - RANGE TECHNOLOGY BUILDING

picture courtesy:
indian navy

ON-BOARD SHIP AND WATER SURFACE SYSTEMS

PANORAMA - GIS BASED MARINE WEATHER DECISION SUPPORT SYSTEM

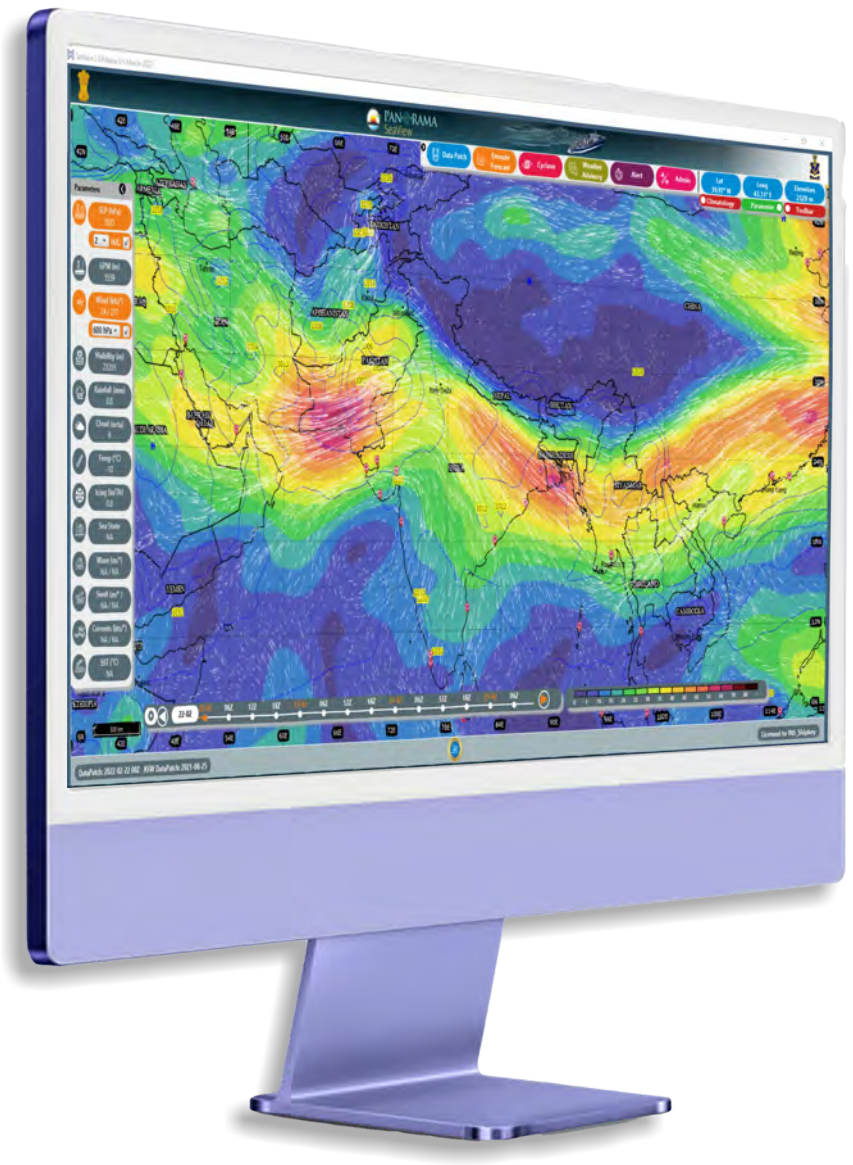
Panorama is a 'Make in India' decision support system developed for Indian Navy and was funded by Naval Research Board, DRDO. It processes numerical global weather and ocean forecasts, observational data, and satellite images and provides weather forecasts up to 10 days. The automated system facilitates real-time weather model data download from multiple sources, database management, state-of-the-art data compression, multi-parameter forecast visualization (2-D & 3-D), extreme event analysis, alerts, and real-time data dissemination to ships sailing across the globe. The system acts as an end-to-end operational decision support system.

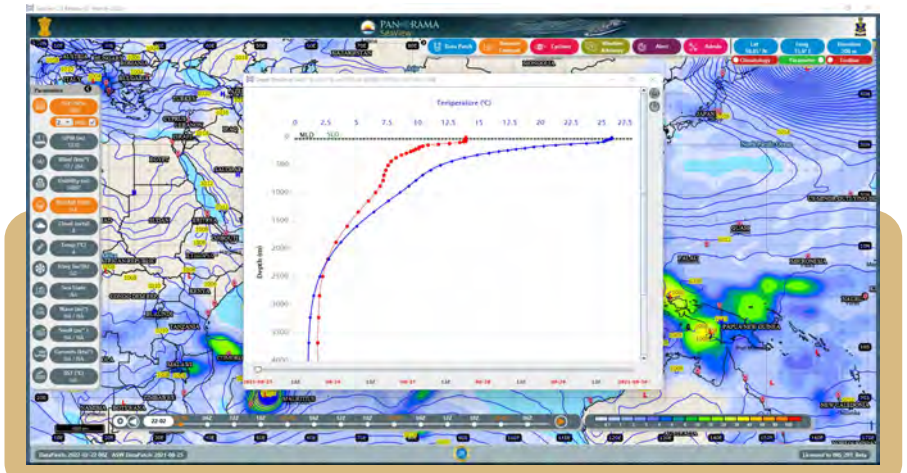
KEY FEATURES

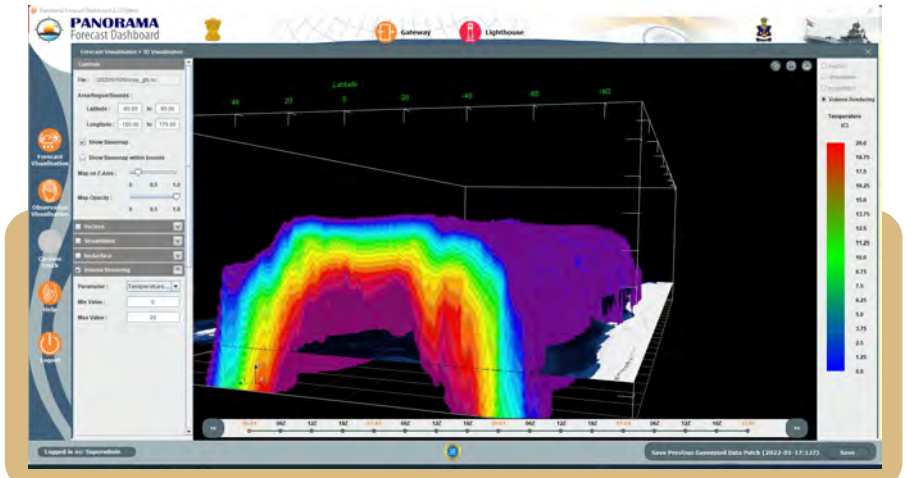
- Real time weather and marine data on board system for voyage planning
- Navigation system with enroute forecast
- Fast processing of 100+ forecast parameters and observations
- 2-D and 3-D visualization
- Extreme event advisory
- Cyclone Track and Alerts
- Integrated Climatology data of 30 + years
- Marinogram, Meteogram, Tephigram, Wind Rose
- Satellite Images, Current Profile, Depth Profile
- Real time data broadcast to Indian Naval ships sailing across the globe
- Successful deployment on 100 + Indian Naval ships & Submarines sailing across the globe
- 'AatmaNirbhar' product led to discontinuation of foreign commercial software
- Technology leap making Indian Defence self-reliant in technologies

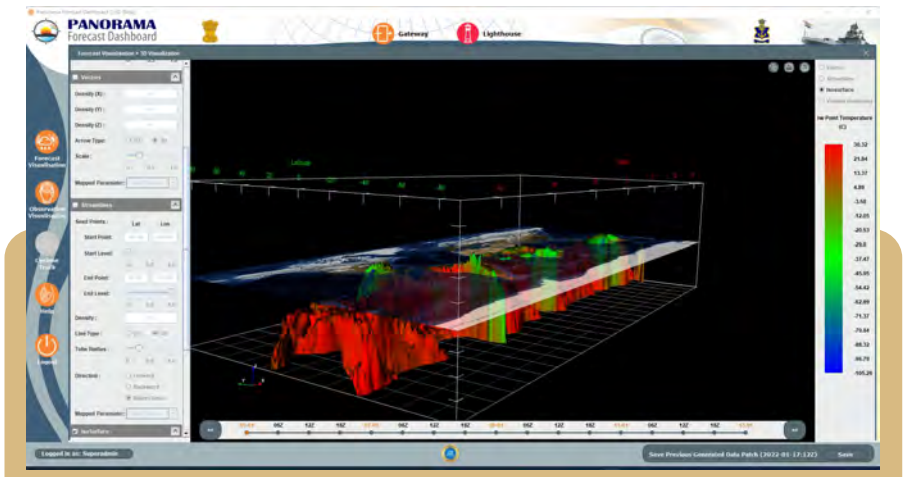
DEPLOYMENTS:

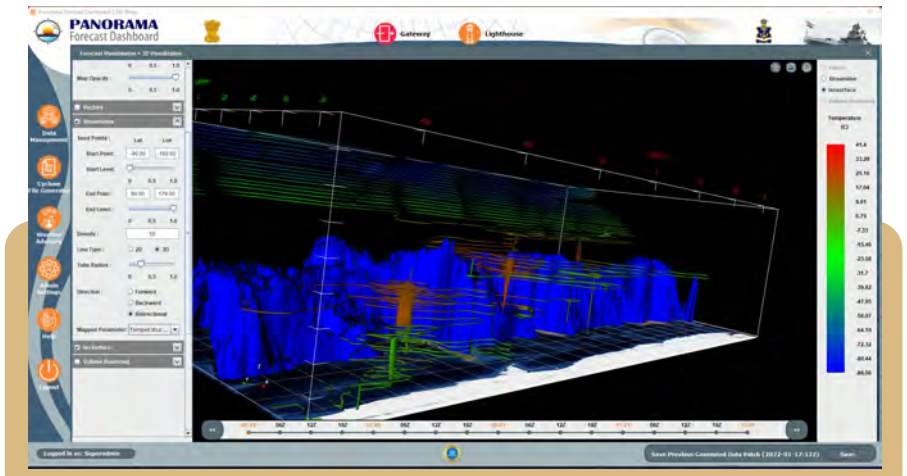
Successful deployment on 200 + Indian Naval ships & Submarines sailing across the globe.

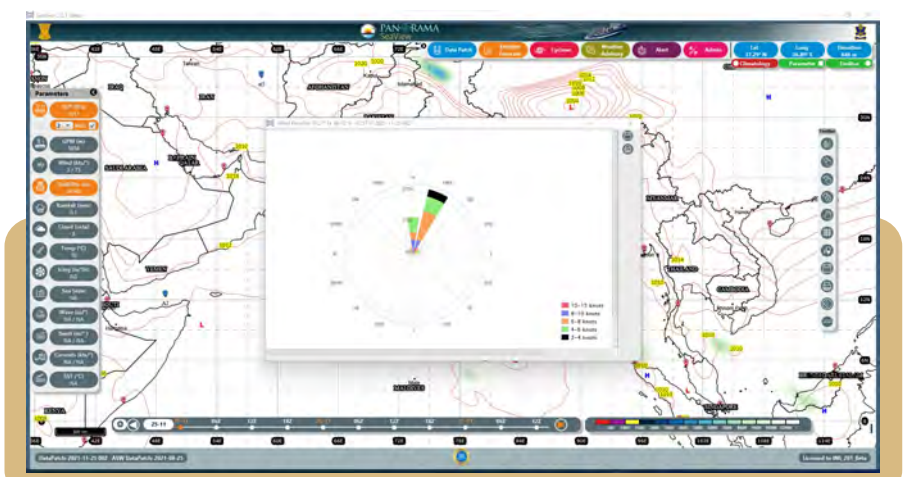












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ELECTROMAGNETIC LOG FOR NAVAL SHIPS

Electromagnetic Log (EMLOG) is a navigational equipment used to measure the speed of a ship and distance travelled by the ship. The system measures Speed Through Water (STW) of the ship. The system consists of Transducer, Master Unit, Repeater Unit and a Retransmission Unit. The Transducer is fitted at the hull of the ship such that, when excited, it generates a magnetic field which extends into the sea water. The transducer also contains two electrodes which are in contact with the sea water. When the ship moves, the water between the electrodes acts as a conductor moving in the magnetic field, and a voltage proportional to the relative speed of the ship with respect to the water is induced across the electrodes. This small voltage is picked up and processed by the Master Unit to compute and display the speed of the ship and distance travelled by the ship. The speed values from the Master Unit are displayed at various parts of the ship through Repeater Units. The Retransmission Unit convert the digital speed values from the Master Unit to various formats such as Serial, Pulse, Resolver, Async, Linvar etc.

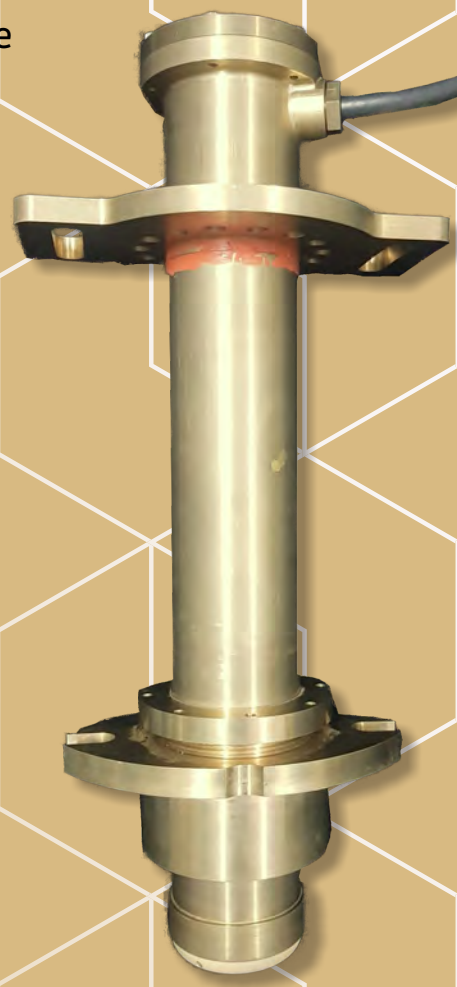
KEY FEATURES

- Speed Range: 60 Knots (Forward and Astern)
- Display Partial Distance and Total Distance
- Speed Accuracy: ± 0.2 knots up to 10 knots, ± 2% above 10 knots
- Distance Accuracy: ± 0.5 % of the measured speed or ± 0.2 NM
- DSP and Microcontroller based Modular Design
- Factory selectable operation from 230V and 115V power supply
- Compatible for single/ or dual axis flush fitting, retractable Transducers
- Facility to record raw data (factory selectable option)
- Graphic Display using Colour LCD with brightness control
- Touch screen for user inputs
- Facility to display Speed Over Ground obtained from GPS data, Engine RPM, Wind speed
- Password protected, Single touch 'Zero setting'
- Password protected, Stop watch assisted, arbitrary multi-point MMR calibration facility
- Password protected, GPS assisted, arbitrary multi-point calibration facility
- Facility to select operation basis (MMR/ GPS)
- Key-pad assisted stand-by mode operation
- Solid state relay contacts with individual factory selectable pulse rate and pulse width
- Rs422 NMEA outputs with individual factory selectable baud rate and refresh rate
- Ethernet and USB interface
- Test-CAL Box for simulating the dual channel speed signals.
- Message window to display status/ error of modules
- Module level status indication using single LED

DEPLOYMENTS

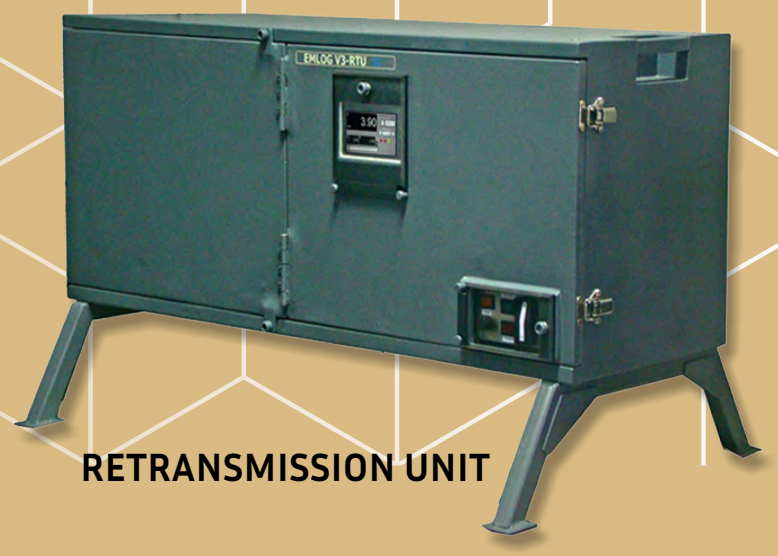
Deployed in Indian Naval Ships through Kerala State Electronics Development Corporation (KELTRON)

MASTER UNIT



TRANSDUCER

REPEATER UNIT



RETRANSMISSION UNIT

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ECHO SOUNDER FOR NAVAL SHIPS

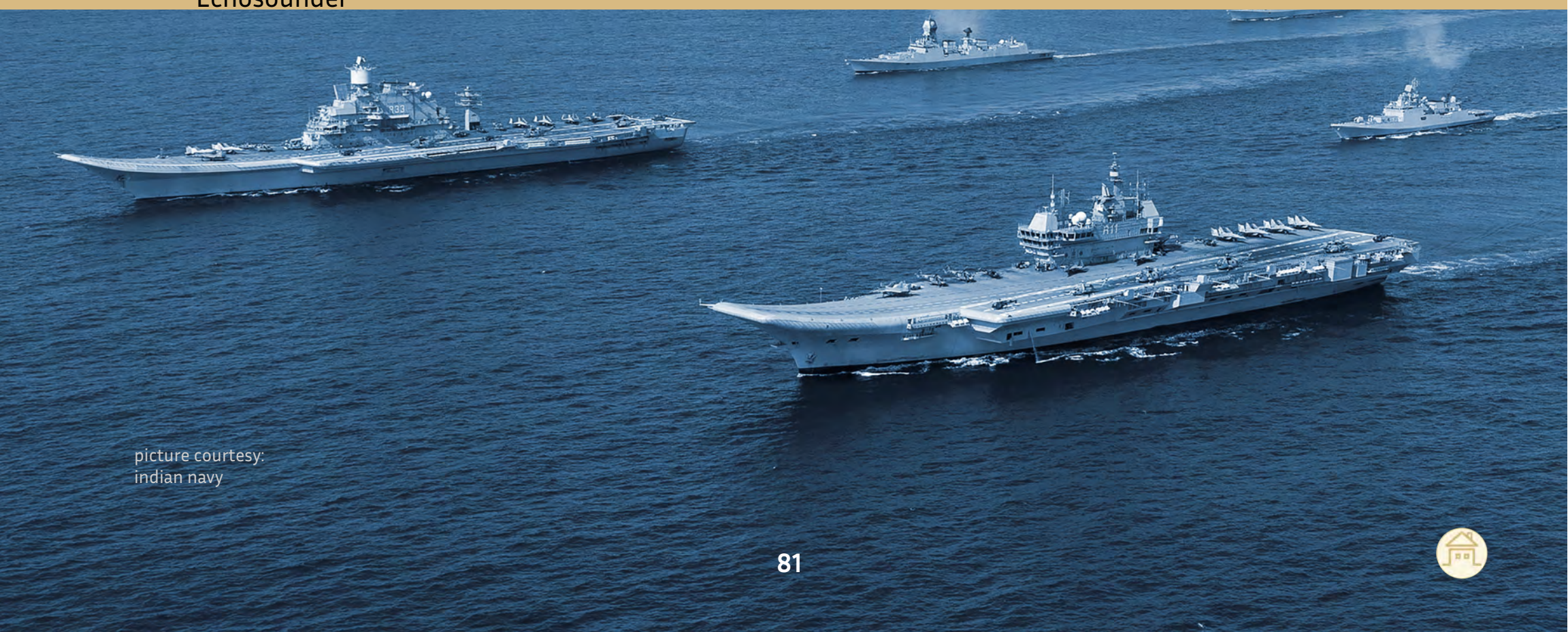
The Echo Sounder V4.1 is a MIL-qualified navigational system developed for Indian Naval ships. It is available in two configurations: a single-frequency type operating at 33kHz and a dual-frequency type operating at 33kHz and 210kHz. The system is designed with a modular form factor for easy maintenance. Internal components include the echo sounder engine with transmission, reception, and signal processing capabilities, as well as a communication module for interfacing with external systems. The system features a touchscreen LCD display with a graphical user interface (GUI), utilizing an embedded PC-based system. Additionally, two LED repeaters are included as part of the system. The Echo Sounder V4.1 offers two operating modes: INTERNAL SYNC and EXTERNAL SYNC. In INTERNAL SYNC mode, the echo sounder ping is controlled internally. In EXTERNAL SYNC mode, the ping is triggered externally, typically by the Mine Hunting SONAR systems (MHSS).

KEY FEATURES

- Maximum range 1500m.
- Two transducers of Frequencies 33kHz and 200 kHz.
- Developed as per MIL standard JSS55555.
- Single and Dual frequency option Integrated. graphical. display with touchscreen.
- Internal and external synchronization mode to sync with other sonar systems.
- Indigenously designed and developed Echosounder

DEPLOYMENTS

More than 80 numbers of echo sounders were deployed in Indian Naval Ships



picture courtesy:
indian navy

picture courtesy:
indian navy

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PRECISION VESSEL TRACKING SYSTEM (VETRA-NEO)

VETRA-Neo is an advanced DGPS positioning system equipped with a multi-frequency GNSS receiver and a high-quality UHF radio modem, capable of providing centi-meter level accuracy in RTK mode. VETRA-Neo system mainly consists of a base unit, installed at a pre-surveyed point on the land, and one or more rover units placed on the moving platform (vessel) whose position needs precise monitoring. Vessel Tracking System-Neo is developed for Indian Naval applications.

VETRA-Neo operates on the principles of Differential Global Positioning System (DGPS), a technique that enhances the accuracy of standard GPS positioning. In DGPS, the base unit serves as a stationary reference station with known coordinates, while the rover units on the moving platform receive signals from both GPS satellites and the base unit. The system compares the rover's actual position with the known position of the base, identifying and correcting any satellite signal errors, atmospheric disturbances, or clock inaccuracies. This correction information is then transmitted from the base unit to the rover units through the high-quality UHF radio modem. The rover units utilize this correction data to refine their GPS positions, significantly improving accuracy. VETRA-Neo's advanced DGPS system employs a multi-frequency GNSS receiver, allowing it to mitigate the effects of signal reflections and other sources of interference, resulting in precise positioning even in challenging environments.

VETRA-NEO

KEY FEATURES

The VETRA-Neo system consists of one base station and up to four numbers of simultaneously active mobile stations called rovers

DEPLOYMENTS

Indian Navy Naval Underwater Ranges Goa.

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PORTABLE AUTONOMOUS SURFACE VESSEL

PASV is a crew-less light weight autonomous navigation platform with long range and endurance. This can be configured with multiple sensor technologies/ equipment to fulfil the customer requirements. As Indian Regional Navigation Satellite System (IRNSS) have become more effective and affordable, advanced guidance, navigation and control systems based on IRNSS are proposed to be designed and developed for more capable, affordable, indigenous ASV platforms. The project is proposed to develop an indigenous portable Autonomous surface vehicle which includes subsystems like hull and auxiliary structural elements, propulsion mechanism and power system, GNC system, Echosounders, communication systems and control station. Interfaces will be provided for sensors like Speed log, Side scan sonar, bottom profilers, and mmWave radar.

KEY FEATURES/UNIQUE SELLING POINT OF THE PRODUCT/ SOLUTION:

Autonomous Bathymetric survey vessel with sensor suite

Inbuild Perception Sensor Suite for obstacle detection and avoidanc

DEPLOYMENTS

Deployed for bathymetric survey of Dams under Kerala Water Authority

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LAND BASED SYSTEMS

INTEGRATED ELECTRONIC WARFARE SYSTEM (IEWS)

The **Integrated Electronic Warfare System (IEWS**) is used for spectral dominance and gaining tactical and situational awareness in the battle field, allowing fast decision making coupled with commanding and controlling own assets.

The scope of the product address two broad categories, one is command & control application software and the other is Sensor Hardware applications software, which are further sub divided into following packages as listed below.

A. Command & Control Application (CCA) Software

- High-level CCA Software
- Mid-level CCA Software
- Low/Field level CCA Software

B. Sensor Hardware Software Applications

- Communication segment Applications for 1MHz to 3GHz
- Radar segment Applications 100MHz to 18GHz
- Satellite Interception Segment
- Mobile Interception System

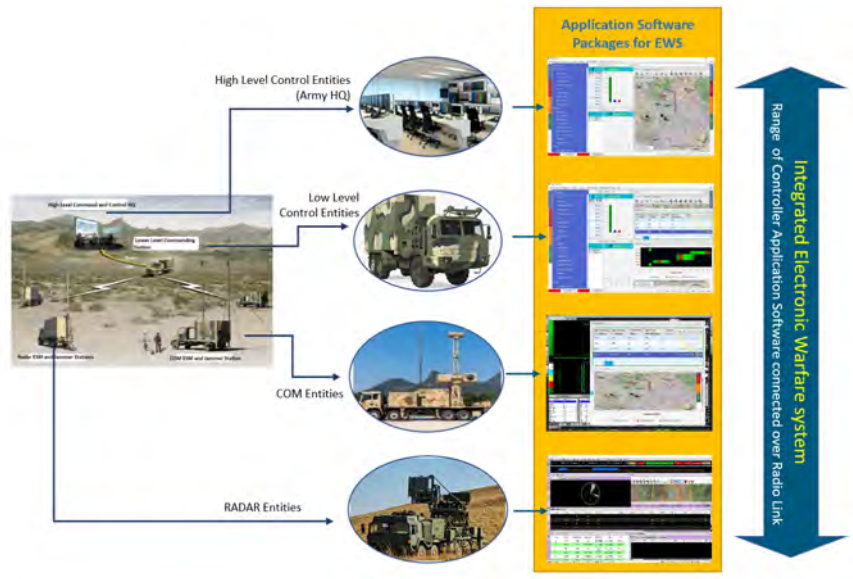
The primary purpose of the IEWS is to support the battlefield commander in tactical decision making through the collection of the enemy signal information (communication and radar) using the electronic support system. The commander could also use this information to disrupt enemy communication by deploying electronic attack capabilities.

KEY FEATURES:

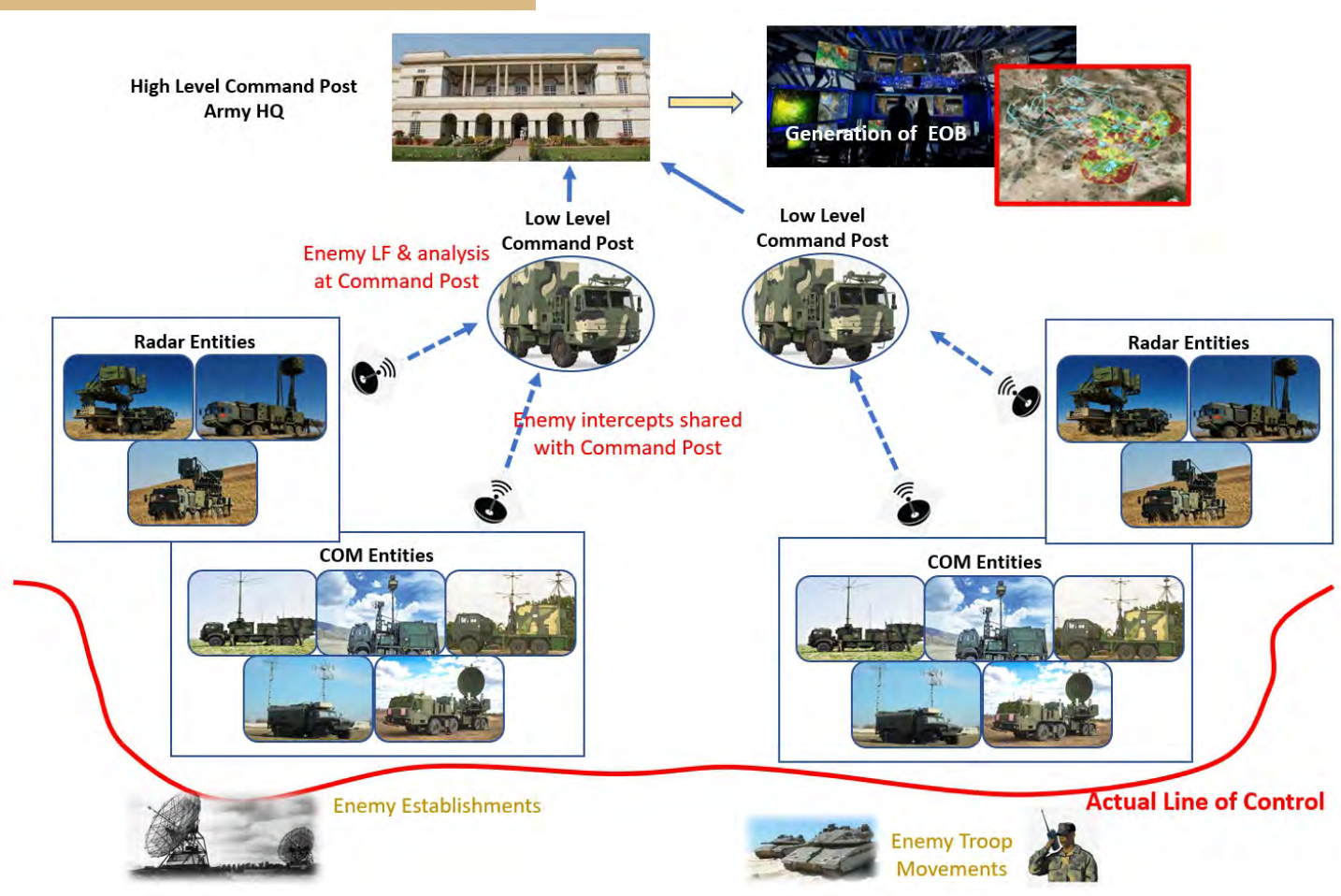
- This indigenous IEWS system solution has the following Novel features and many ofthem has been done for the first time in the country.
- Indigenous software with national level strategic importance and is in line with the "Aatmanirbhar Bharat" initiative of the Govt. of India.
- Use of Message Exchange Middleware as a component to exchange information between different entities of the hierarchical network to overcome intermittent low bandwidth patchy Radio Link.

Use of advanced architecture and design to build generic framework for future implementation and customization.
Use of CMMI L5 processes for the project execution with 3rd party external audit.
Extensive documents and stringent SDLC process compliance.
Extensive ELINT & COMINT Data Analysis support.

The indigenous productization of IEWS applications helps in maintaining the security and other information from falling into foreign agencies.



Overview of C-DAC's EWS Software Package



Deployment Hierarchy of IEW System

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ECHOSOUNDER FOR RIVER RECCE IN ARMY TANKS

Echo Sounder for River Reconnaissance is MIL-qualified indigenous equipment designed anddeveloped for measuring water depth, classifying the bottom layer, and measuring layer thickness foruse in the Armoured Engineer Reconnaissance Amphibian Vehicle of the Indian Army. It classifies thebottom layer based on its bearing strength, with main subdivisions including Rock, Sand, Clay, Mud,and Silt. Additionally, it can receive, plot, and store data from other sensors, including water currentmeter. The GUI on the graphical display unit allows user interaction, and it stores reconnaissance datafor later analysis. This product has been successfully integrated into the Indian Army's AERV tank andis being used to calculate the bearing strength needed to lay bridges in border areas. ToT of the samewas handed over to BEL.

picture courtesy:
wikepedia

KEY FEATURES

Made in India -Only indigenised solution available in India

River bottom layer classification capability

Controlled sounding with water sensor

Recce storage/replay

MIL-STD certified.

Water Depth: up to 20cm

Layer thickness: up to 1.5mtr

DEPLOYMENTS

ToT transferred to BEL

Indian Army successfully inducted.

53 units are under production/installation.

Echosounder

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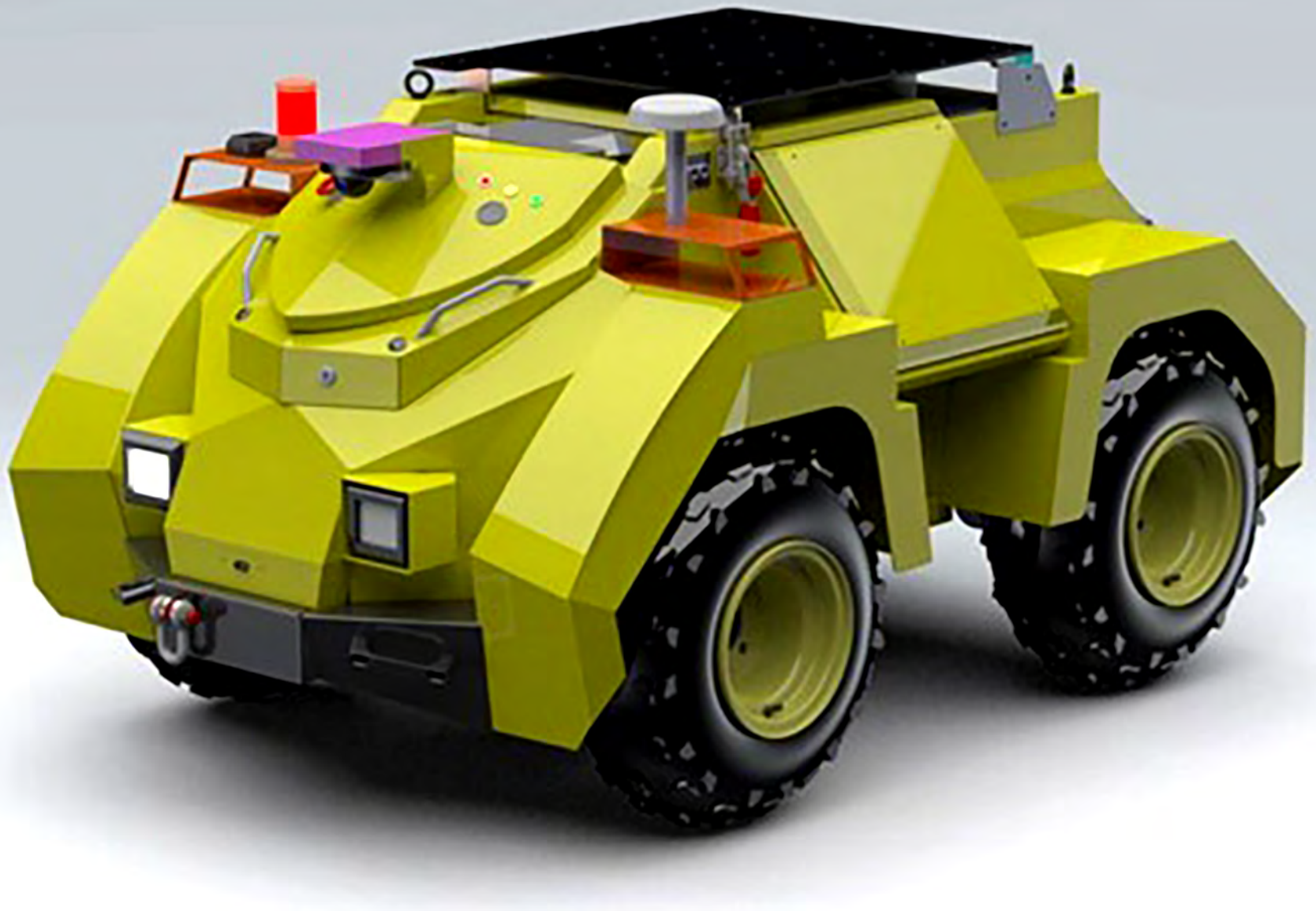
UNMANNED GROUND VEHICLE (UGV)

UGV is a robotic vehicle that operates while in contact with the ground and without an onboard human presence. UGVs can be used for many applications where it may be inconvenient, dangerous, or impossible to have a human operator present. UGV is an all-terrain land based robotic unmanned ground vehicle which is designed to handle tough environments with its rugged build, low ground pressure, and traction tires, which allow effortless mobility through soft soils, vegetation, thick muds, and steep grades. Payload mounting plates and accessible power and communication ports allow UGV to be easily customized with sensors, manipulators and other payloads to accommodate a wide variety of robotics applications like in defence, agriculture, homeland security, inspection & surveillance, and in environmental monitoring, etc.



KEY FEATURES

High performance, versatile work class unmanned ground robotic vehicle platform.

Rugged, light weight steel & aluminum construction.

Low ground pressure & traction to tackle all types of difficult terrains including steep grades and soft soils.

Powerful drive train capable of moving 100Kg payload at 20kmph, powered by 350W BLDC electric motors.

4X4 wheel driven by drive-by -wire system with skid steer maneuvering, based on Electronic Speed Controllers.

Powered by 54Ah, high density Li-Io Phosphate sealed battery pack allowing about a continuous runtime of 3-4hrs.

Expandable power options of 5V, 12V, 24V & 48V to integrate heavy payloads like manipulators and other agricultural equipment.

Special ATV wheel assemblies with independent passive scissor type suspension system, for multi-terrain applications

Can easily integrate third-party sensors and manipulators quickly with flexible payload mounting.

Easy to access power and reconfigurable I/O (Ethernet, USB, WIFI).

PC powered by Jetson Xavier Based on open-source Robot Operating System (ROS)

Lidar based obstacle avoidance.

UNIQUE SELLING PREPOSITIONS

Indigenous system, Rugged & Versatile

Fully extensible

High performance

Expandable power

ROS ready

DEPLOYMENTS

Technology Innovation Hub on Autonomous Navigation (TiHAN) Foundation-IIT Hyderabad

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ACOUSTIC GUNSHOT DETECTION SYSTEM

Acoustic Gunshot Detection System detects and conveys the location of gunfire or other weapon fire using an array of acoustic sensors. These systems can be used by military, law enforcement and security agencies to identify the direction and source of gunfire.

KEY FEATURES

Acoustic Gunshot detection systems find its aplications

- Safe City applications for law enforcement
- Border surveillance for homeland security
- Perimeter security for high security buildings
- VVIP protection
- Collecting forensic evidence after a Gunshot incident

DEPLOYMENTS

R&D Engineers, DRDO Pune

TECHNICAL SPECIFICATION

Detection Accuracy in Azimuth angle : ±3°

Detection Accuracy in Elevation angle : ±5°

Range: Up to 300meters

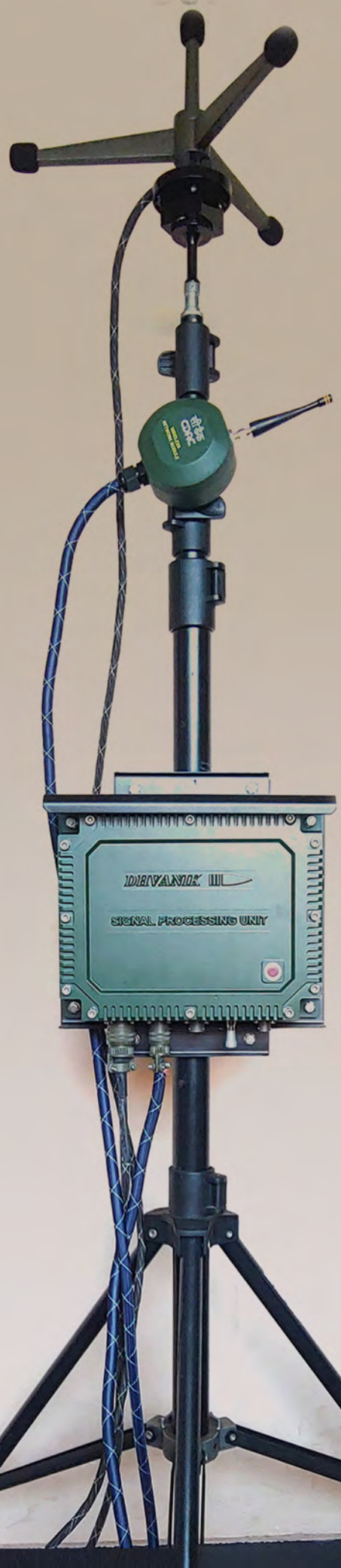
Detection Rate : Above 90%

Coverage : 360°

Power : 12VDC, < 6W for Sensor Unit.

IP rating : Ip67

Configuration : Static, Vehicle mountable and Soldier mountable



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NIRCHHARI - ULTRASONIC LEVEL SENSOR SOLUTION FOR REAL TIME REMOTE 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. The module is IP68 compatible and is made up of PVC/POM material suitable for use in chemically corrosive environments. The sensor parameters such as sensor ID, sensor location, client mobile nos, periodic measurement interval, threshold level for alert, IP address etc can be remotely configured via SMS using an android utility.

KEY FEATURES

- Built-in cellular modem
- Ultrasonic level sensing
- Battery powered for field applications
- IP68 compatible
- Remote sensor configuration using Android App

UNIQUE SELLING PREPOSITIONS

- Low cost compared to comparable existing products
- Low Power compared to comparable existing products
- Small size and weight
- Easy installation
- Patented technology
- Real time level monitoring
- Remote Sensor configuration via SMS
- Android application for sensor configuration
- IP68 Compatible
- PVC/POM material for enclosure suitable for chemically aggressive environments
- Lithium-Ion battery (3.7V Nom.) compatible

SPECIFICATIONS

- Measurement Method: Ultrasonic pulse echo
- Measurement Range: 15cm - 6meters
- Measurement Accuracy: ±6mm / 1% of Range
- Measured Parameters: Distance, Level, battery Voltage, Signal strength
- Measurement Interval (Programmable) : 180 Sec – 99999 Sec in 60 Sec increment
- Maximum no of users (SMS): 9
- Communication Interface: GSM (SMS or GPRS)
- Sensor: Ultrasonic transducer
- Frequency: 40KHz
- External Power input (DC) : 3.5V DC to 6V DC (5V DC typical)
- Operating Temperature: 0℃ to 70℃
- Enclosure& material: ABS, IP68 compatible
- Weight : 1Kg (approx.)

APPLICATIONS

Dam level monitoring

Water reservoir's level monitoring

Overhead tank level monitoring

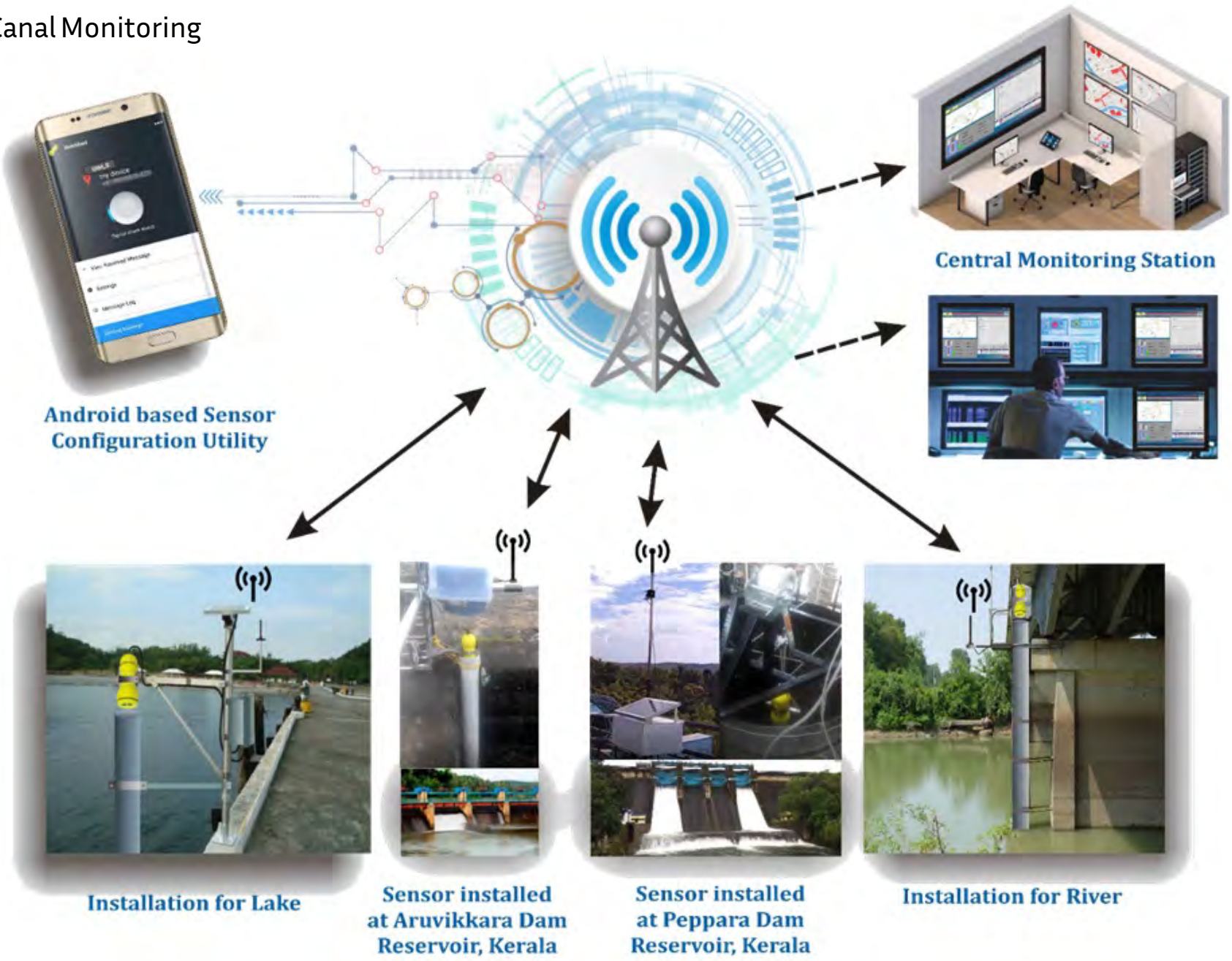
River flood monitoring

Canal Monitoring

DEPLOYMENTS

Kerala Water Authority: Aruvikkara Dam, Kerala

Kerala Water Authority: Peppara Dam, Kerala



NIRCHHARI Architecture

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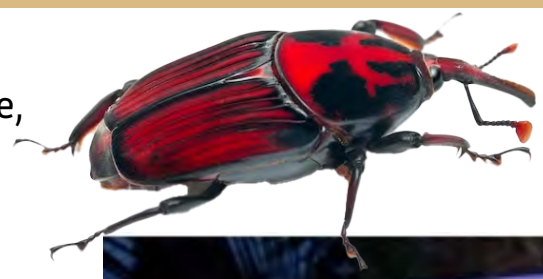
ACOUSTIC RED PALM WEEVIL DETECTOR FOR EARLY WARNING AND MITIGATION OF CROP LOSS (ARPWD)

The Acoustic Red Palm Weevil Detector (ARPWD) is a Smart, Non-invasive, Portable system for the early detection of Red Palm Weevil infestation in coconut palm trees, a destructive pest causing significant annual losses of approximately Rs.1700 crores in our country. Developed with expertise in vibration signal analysis, the ARPWD stands out as a breakthrough solution for detecting Red Palm Weevil infestation within 20 days of onset, a critical timeframe for effective intervention. This non-invasive technology ensures the preservation of palm trees by enabling timely and targeted chemical treatments. ARPWD has unique capability to detect infestation at an early stage in a large number of trees through practical and efficient methods, thus addressing a pressing need in the agricultural and farming sector. The Central Data Repository and web applications developed and maintained to complement the product, holds the historical information of infestation detected in different geographical areas, offering valuable insights to researchers and government organizations which benefits them in planning preventive and corrective actions to curb the future spread of RPW infestation. The ARPWD, as both a product and a comprehensive solution, marks a significant advancement in the field, addressing a crucial agricultural challenge with its cutting-edge technology and open data resources.

KEY FEATURES

- Detects RPW infestation at an early stage, within 20 days of infestation onset
- Non-invasive detection methodology
- Smart system, that demands minimal expertise for detection
- Compact and portable in design
- Battery operated, capable of retaining a charge for about eight hours, enabling detection among approximately eighteen trees on a single charge



DEPLOYMENTS

Privately-owned coconut plantations in Kadinamkulam, Trivandrum, Punalur, Kollam, and Kayamkulam, Alappuzha.

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EMERGENCY RESPONSE SYSTEM

ENTERPRISE APPLICATION SOFTWARE SOLUTION FOR EMERGENCY SUPPORT SERVICES AND SIMILAR HELPLINE SYSTEMS

This solution is designed to address all the Emergency Signals - Calls and requests through voice call, SMS, e-mail, panic SOS signal, web portal etc. for providing services in all kinds of emergencies across the country. It encompasses a software platform designed to fully automate the operations of State Emergency Response Centre. Originally designed and developed for **ERSS 112,** this is customized and implemented in other helplines such as Women Helpline, Child Helpline and Disaster Helpline.

KEY FEATURES

Capable of handling different emergency signals such as - voice calls, SMS, e-mail, panic SOS signal, web portal etc.

Computer Aided Dispatch system

Caller location identification using Location Based Services (LBS).

Live tracking of emergency response vehicles

Effective and efficient resource management which reduces the response time.

Call taking and Call despatching, with better situational awareness through GIS and GPS based location information.

Click to call facility with a digital catalogue of helpline services.

Secured communication with District Coordination Centre (DCC).

Continual improvement achieved through digitised feedback mechanism through WEB and SMS.

Facilitates seamless machine to machine integration with other departments and external services for service delivery

DEPLOYMENTS

ERSS 112 Solution - Deployed in Bihar, Haryana, Sikkim, Meghalaya, Odisha for Ministry of Home Affairs and respective State Police Departments

Child Helpline /Women Helpline Solution - Deployed in 36 States/UTs for Ministry of Women and Child Development

Disaster Management Solution - Deployed in 35 States/UTs for National Disaster Management Authority (NDMA)

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BIG DATA
Video Analytics
Artificial Inteligence
AI
NG112
Drone
IOT
GIS Analytics
DMR
DR on Cloud

112 INDIA MOBILE APP

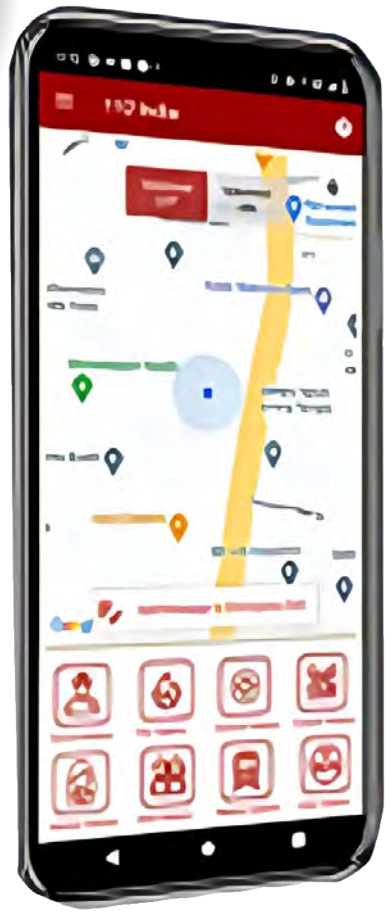
This is a mobile app that can be used for availing emergency services from ERSS - 112 in distress situations. In case of any emergencies, citizens can press SOS button to send geographic location, emergency contacts and user details, SOS messages/call to 112. The alert message sent to the control room consists of the user's address, geographic location, emergency contact details, etc. It is also provided with a SHOUT facility to get immediate help from near by volunteers. App is available in Google play store and app store.

KEY FEATURES

- Single app for multiple services
- Equips Smartphone as personal safety device
- Instant alerts with location of caller
- Real time monitoring/tracking on digital map
- Ensures 24*7 support in case of distress

NUMBER OF APP DOWNLOADS

More than 1.36 Lakhs downloads



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MOBILE DATA TERMINAL APPLICATION

This app is used in tablets/smartphones which is mounted on rescue vehicle to share emergency event details to/from 112 control rooms. The application continuously transmits vehicle location and MDT is used for event assigning, monitoring and resolution of events to mobile rescue vehicles. The App aslos provide provision for entire vehicle management, including patrol route assignment and monitoring.

KEY FEATURES

- Enhanced with GIS based spatial visualisation, which gives realistic insights about the event.
- Realtime updates about the event status, with continuous tracking and mobility of services
- Out reach of services provided by single emergency number 112
- Live Event Creation
- Intelligent Case management / Vehicle tracking platform
- Faster response to victims
- Navigation to user location
- Redundant connectivity

DEPLOYMENTS

Deployed in 13153 tablets in Ministry of Home Affairs and respective State Police Departments.

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VEHICLE TRACKING AND MONITORING SOLUTION

This solution is used to track vehicles using Global Navigation Satellite System (GNSS). With this solution vehicle department can track and monitor all public transport vehicles.

KEY FEATURES

- Intelligent and automated Location based tracking
- GIS-based Patrol Route based on geographical data
- Automated maintenance scheduler for patrol vehicles
- Real time alerts on distress and offences
- Detection of over speed and geofence violation
- Tuned to handle millions of vehicles

DEPLOYMENTS

Deployed in 5 States, for Ministry of Road Transport and Highways of India (MoRTH)

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VoIP AND EMERGENCY SIGNAL PROCESSING SOLUTION

This solution is the core module which handles all voice calls in emergency response support system. This is a VoIP based automated PBX for call management and routing. It can handle parallel calls and synchronizes with the Call Taker agent's workstation (CRM) for call recording, call queuing, call forwarding and call conferencing features.

KEY FEATURES

- Handles high call volume
- Intelligent Call Routing and Call Conferencing
- Digital logging of all voice conversations over the network.
- Automated call back for IVR dropped calls
- Live Monitoring
- Fall back Arrangement

DEPLOYMENTS

ERSS 112 Solution - - Deployed in Bihar, Haryana, Sikkim, Meghalaya, Odisha, for Ministry of Home Affairs and respective State Police Departments

Child Helpline /Women Helpline Solution - Deployed in 36 States/UTs, for Ministry of Women and Child Development

Disaster Management Solution - Deployed in 35 States/UTs for National Disaster Management Authority

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GEOGRAPHIC INFORMATION SYSTEM SOLUTION

This solution is used for GIS-Map based Navigation Support, Monitoring and tracking of Emergency Rescue Vehicles (ERV) for routing Emergency Vehicles in ERSS 112. The 112-emergency response system incorporates GIS-enabled call intake and GPS-driven call dispatching to expedite resolution and ensure quick assistance. GIS solution has capability to render high resolution digital map of the state/pan India or customized map with tools for basic navigation, searching and information gathering, asset management.

KEY FEATURES

The application can be used as web application and also can be integrated to any desktop platforms.

Hot Spot Analysis and Spatial Analysis.

Report Generation from GIS Map.

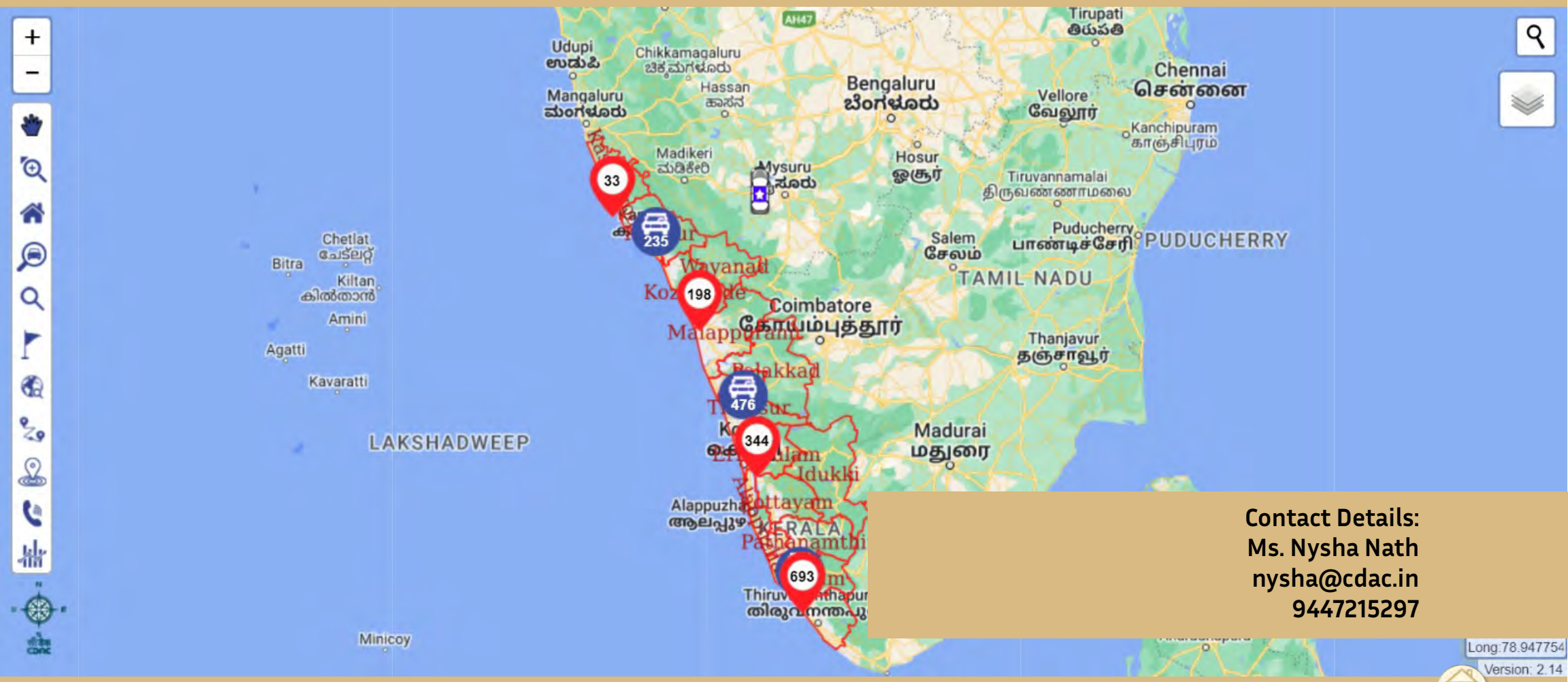
Visualize and explore spatial locations and patterns, Nearby Locations, Efficient Resource Management.

DEPLOYMENTS

ERSS 112 Solution - - Deployed in Bihar, Haryana, Sikkim, Meghalaya, Odisha Agency-Ministry of Home Affairs and respective State Police Departments

Child Helpline /Women Helpline Solution - Deployed in 36 States/UTs Agency-Ministry of Women and Child Development

Disaster Management Solution - Deployed in 35 States/UTs



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DISASTER MANAGEMENT SYSTEM

URBAN ENVIRONMENT SCIENCE TO SOCIETY (UES2S) – DECISION SUPPORT FRAMEWORK

The solution offers an integrated urban modelling and data system as a community research environment, leading to the dissemination of metadata facilities within a decision system framework for cross-sector stakeholders. This solution provides flood early warning and forecasting systems for citizens and policymakers to manage extreme rainfall, urban flooding, and maximize groundwater recharge from floodwater and rainfall, along with addressing air quality issues in India. The solution has major modules including – DataHub (Data as a service), Science Gateway (modelling platform as a service), and a Decision Support System for cross-sector end-user decisions. DataHub offers cross-sector (weather, air quality, and hydrology) data access, as well as data analytics and sharing facilities. The Science Gateway has fully automated end-to-end modelling workflows that enable the use of a variety of preconfigured weather, hydrology, air quality, and CFD models on NSM supercomputers. This allows students and researchers to focus more on science, while peripheral activities like job submission, management, result collation, visualization, validation, and verification are taken care by the system. The Decision Support System component facilitates the translation of scientific data into multi-stakeholder interactive actions.

KEY FEATURES

- Urban Database Management facilitating data localization & data interoperability
- Data Calibration, Verification and Validation
- High-Performance Computing (HPC)-enabled Automated Coupled Model Simulation Platform.
- Decision Support and Dissemination System
- Early Warnings and Advisories
- City/ Ward Level Weather, Flood, Pollution Forecast Dissemination
- GIS, web and mobile-based city environment data products customized for policymakers, municipalities, researchers, local govt, city disaster management in-charge, and citizens
- City-specific extreme scenarios repository
- Data Analytics

DEPLOYMENTS:

Pune Municipal Corporation, Water Resource Department, Government of Maharashtra

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ACCESS CONTROL AND MANAGEMENT SYSTEM

SMART CARD & BIOMETRY BASED IDENTITY AND ACCESS MANAGEMENT SYSTEM

It is a Smartcard based solution for authentication, attendance, access control and monitoring complying to the Indian Smart Card Operating System standard named SCOSTA. It caters to all the components of a Smart Card based system comprising of Smart Card Readers, Application File structures in cards and an Interactive Application.

The solution offers the dynamics of various Organizational policies and their geographically distributed offices with heterogeneous infrastructure and resource availability. The basic design philosophy adopted as maintaining the essential functionality and operation of the system in the disrupting environment like Network outage, sudden power failure and communication failure etc.

Besides this, The Smartcards are interoperable throughout the Institutional network i.e. if an employee moves from one office or even departments, his/her attendance or access control will be taken care of irrespective of the location. We have come up with a secure design of the smartcard application and user data with using 3DES authentication along with operational restriction up-to the validity period of the card.

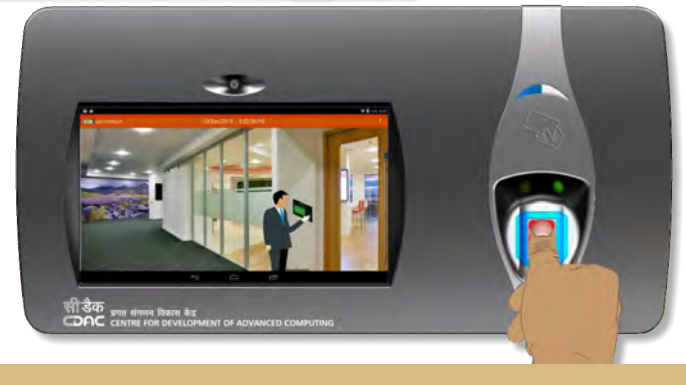
The security design is one of the unique features and based on the hierarchical model of roles and responsibilities with shared secret to minimize the risk of security compromise.

KEY FEATURES:

- Based on Open standard (SCOSTA) developed jointly with IIT Roorkee.
- Can support multiple application besides attendance like canteen, access control, desktop and server login
- More secured by advanced key management and User PIN and Biometric Authentication
- Support both offline / online mode of Operation and Data Storage
- UID Verified Finger print Enrollment for the First-time use, also supports exceptions
- Contains more information 64K including Photo
- Same card can have multiple roles / Authority
- Cryptographic Key Based System Design as per user Security Requirement
- Real-time information for all User's

DEPLOYMENTS:

Vidyasagar University
Indira Gandhi National Forest Academy (IGNFA)
ERSS Haryana
NATGRID, Delhi
Security Printing Press, Hyderabad



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ID AND ACCESS CONTROL SYSTEM

ID and Access Control System is a digital solution that is to be used for issuance of various passes in order to attain physical access into a Premise/Office/Secured Complex. These locations are considered as sensitized area and only authorized person should be allowed by taking prior approvals from competent authorities before any access is to be granted. The electronic system – a combination of hardware and software components – works cohesively in order to implement the Access Control System for issuance of Passes and Smart ID Cards to access building zones.

Complete solution has been developed based on SCOSTA (BIS Standard IS16695) having indigenously developed Smart Card Operating System, Key Management System and Application therein.

BIS Standard – IS16695- Part I and II for SCOSTA OS. This makes the product vendor Agnostic Solution.

Smart Card Solution based on different Smart Card Manufacturers.

Smart card management for managing issuance, updating and maintenance of smart cards to different types of users

Access Control - Opening of gate after ID Card authentication by reader

User Registration - The user registration module is responsible for capturing and storing all necessary user information which will be used to create their smart cards, assign zone permissions, validity for the different categories of Employees, Visitors etc.

Audit Module: Maintains a log of all activities performed in the system.

Integration with other systems: The C-DAC ID and Access Control System provides APIs for integration with various external components into the C-DAC system such as Mobile Application, UIDAI, SMS Gateway, Food Delivery, 3rd Party Applications-IRCTC etc.

Secure Channel for transferring data from C-DAC Server to Reader Server and various kinds of logs from Reader Server to C-DAC Server.

Role based Login to for various types of Users including Super admin, Employees, Visitors for a centralized interface for managing and monitoring the system, allowing the user to view and analyse access control activities, manage user accounts, and perform other tasks

Access Management – It is based on security mechanism provisioned in the card (Key, PIN, Biometrics) for all category of users based on the access privileges.

Card Inventory Management System

QR System - Design & Development of QR Code Pass for persons visiting Parliament with QR Generation, Issuance and Validation

Authority Card Issuance & Management

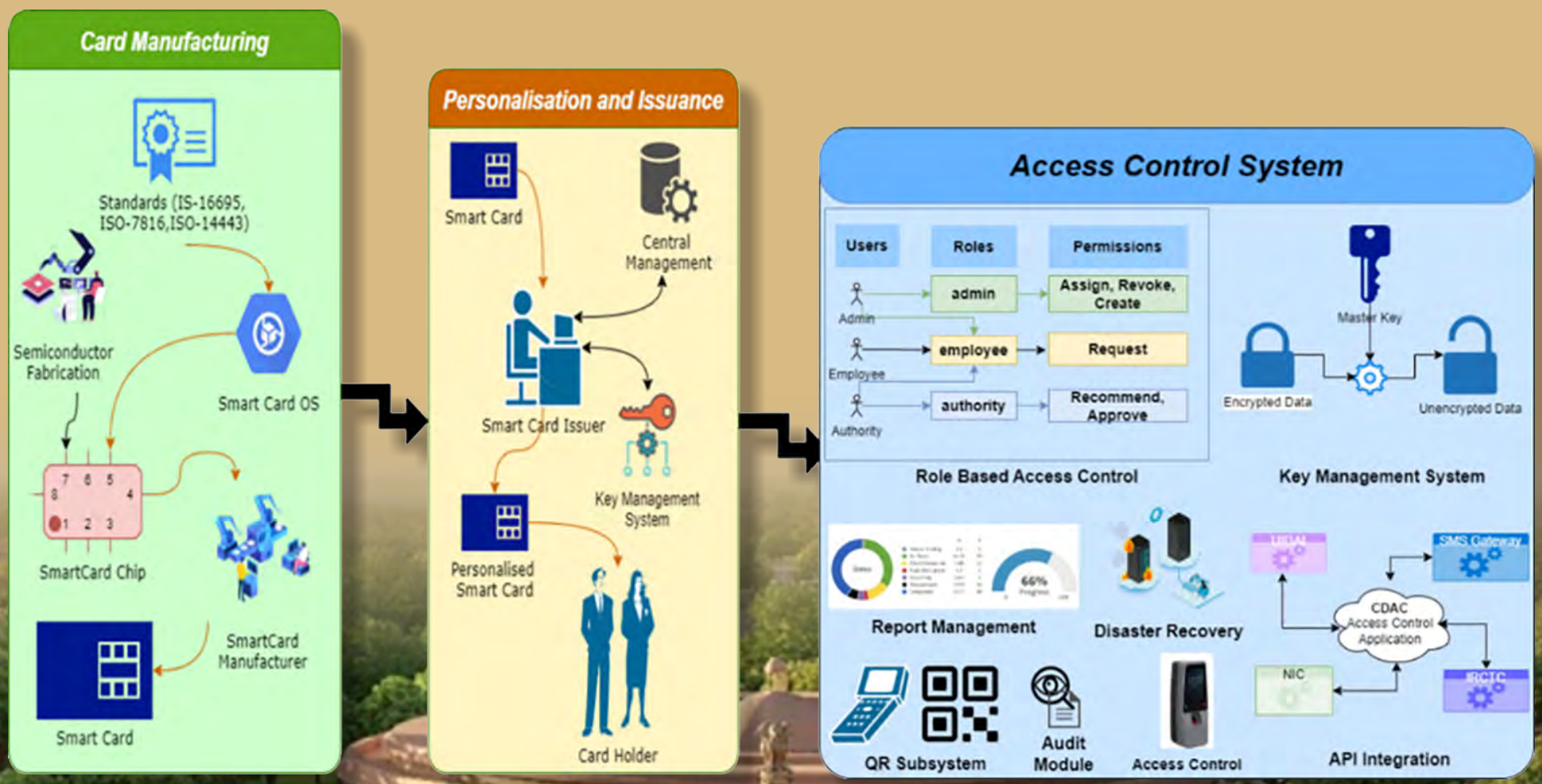
Disaster Recovery & Management

Report Management: Generate regular reports based on different types of activities performed in the system.

The product has been designed on Modular Architecture providing flexibility to customer to choose from plethora of features.

DEPLOYMENTS:

New Parliament and its various Buildings under Central Vista Project.



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Log in
Email Address
Next

AUTOMOTIVE TECHNOLOGY

Automotive Technology

In my role as Co-Chairman of the TAP Group and Centre head of C-DAC Silchar, I am thrilled to convey my thoughts for the possibilities of C-DAC contribution in the Automotive Sector. At C-DAC, we channel our relentless pursuit of innovation into revolutionizing the national research and development ecosystem and support industries in their pursuit. Utilizing HPC, Artificial Intelligence, Data Analytics, IoT, Cyber Security and other emerging technologies, C-DAC cutting-edge solutions can redefine vehicle safety, efficiency, and performance and set new industry benchmarks. From predictive maintenance to autonomous driving capabilities, C-DAC's has ample opportunities to develop novel products and solutions for this sector. Our commitment to shaping the future extends to intelligent transportation systems and eco-friendly solutions, positioning us as a driving force in the automotive landscape. Looking forward, our vision is to pioneer solutions that proactively address future challenges, ensuring C-DAC remains a trailblazer in automotive tech evolution. With unwavering commitment, expertise, and innovation, C-DAC inspires partners and customers alike, solidifying our leadership in the dynamic realm of Automotive Technology.

Co-Chairman

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Automotive Technology

The automotive software and electronics market is poised for a strong growth in the next decade. Connected, Autonomous, Shared Mobility & Electrification (CASE) are the mutually reinforcing developments in the automotive sector. The adoption of Autonomous driving and Advanced Driver Assistance Systems (AD-ADAS) shall demand availability of high-performance computers, advanced software, and high precision multimodal sensors like Light Detection and Ranging (LiDAR), fusion of thermal & CMOS sensor-based cameras, mmWave radars, IMU navigational sensors, etc. Infotainment, connectivity, security, and connected services will also grow in pace and demand for the next generation E/E architecture which will play a vital role in the evolution of Software Defined Vehicles for the future. High-performance central-computer chips, such as domain control units (DCUs) and sensors, could see the fastest technology adoption. Research to accelerate the deployment of low carbon technologies like green hydrogen and storage can be an enabler of the transition to the renewable energy system and cleaner energy carrier in automotives. C-DAC being a powerhouse for the culmination of expertise in various technologies like High Performance Computing, Advanced AI/ML based software, Semiconductor & chip design, Power electronics, ITS, IOT & sensor electronics, communication and security shall act as the nodal centre in realising the road map for the localisation needs in the automotive industry.

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Automotive Technology

5G C-V2X COMMUNICATION PLATFORM

An indigenously developed Cellular – Vehicle to Everything (C-V2X) platform comprising of On-Board Unit (OBU) and Road Side Unit (RSU) devices with the V2X communication stack, adhering to the 5G specifications for vehicular communication. are on the verge of adopting HPC culture and skill sets generation.

C-V2X On Board Unit (OBU) 1

A powerful in-vehicle device which allows vehicle to communicate with nearby vehicles and road infrastructures, enabling a plethora of cooperative applications aimed at reducing road hazard situations as well as enhancing traffic efficiency and individual driving comfort.

C-V2X Road Side Unit (RSU) 2

An edge computing device in an IP65 rated weatherproof enclosure, which supports V2X communication with nearby vehicles and road users, leading to safety and non-safety applications for intelligent transport systems.

V2X Communication Stack 3

The software v2x communication stack implemented in Yocto based Linux operating system and compliant with IEEE 1609 standard for low latency and high-speed vehicular communication requirements.

Key Features:

- Indigenous Hardware and Software System
- Comparatively low cost
- Compatible with 3GPP R15 and upgradable to 5G NR
- Capable of supporting advanced V2X use-cases like platooning, sensor sharing etc.

Deployment:

- Deployed and tested at TiHAN IIT Hyderabad test track.

2

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ONBOARD DRIVER ASSISTANCE AND WARNING SYSTEM (DAWS)

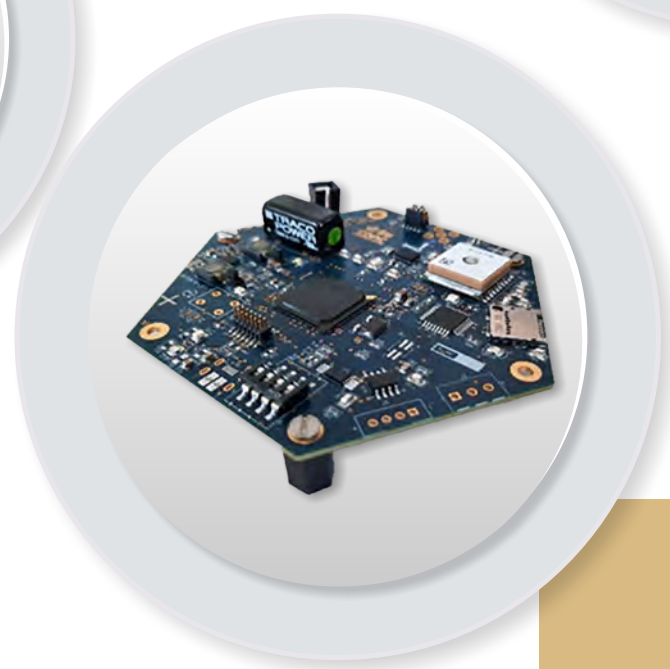
ODAWS incorporates vehicle-borne sensors for monitoring driver propensity (driving behavior) and vehicle surroundings to deliver acoustic and visual alerts for driver assistance. The positional and dynamic characteristics of surrounding vehicles are probed using mmWave radar sensors. The navigational sensor provides a precise geospatial orientation of the vehicle as well as trends in driving behavior. ODAWS software application interprets sensor data and offers real-time notifications to the driver, boosting road safety. It also includes provision for storing sensor data, which can be used for driver evaluation and grading

KEY FEATURES:

Level 0 Retrofit ADAS System

DEPLOYMENT:

This system is deployed at IIT Madras / Mahindra Research Valley Chennai.



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NCMC AND QR COMPLIANT AUTOMATIC FARE COLLECTION (AFC) SYSTEM FOR METRO OPERATORS

AFC solutions are Vendor and Bank Agnostic, designed specifically for Indian conditions where heavy footfall is the norm. It is the State of the Art, Scalable, Modular, Highly Secure, NCMC and QR Compliant AFCS with deployment at customer premises. It can be quickly customized as per the requirements of the metro operator. Our AFCS supports multiple ticketing options like NCMC cards and QR-coded tickets. Single or multiple journeys QR-coded tickets for an individual or a group may be purchased through our Mobile App "Travel Mozo".

For people not using smartphones, Single Journey Paper QR Ticket for the same day can be purchased through the Ticket office machine (TOM) at the ticket counter/customer care. AFCS offers near real-time monitoring, customized reports, and strategic business analytics.

C-DAC offers complete solution and lifecycle support to Metro Operators from Roll out to Operation and Maintenance (O&M), thus, offering complete peace of mind to metro operators.

USE CASES:

Automatic Fare Collection System for Metro Operators.

Automatic Fare Collection System for Urban Railways/ closed premises.

Key FEATURES:

Compliant with NCMC Interface Specifications and QR Specifications for transit.

Secure and Fast transactions.

Efficient fare collection systems with near real-time revenue information.

Reduced Implementation, Operation, and Maintenance costs

Faster Customization and Deployment.

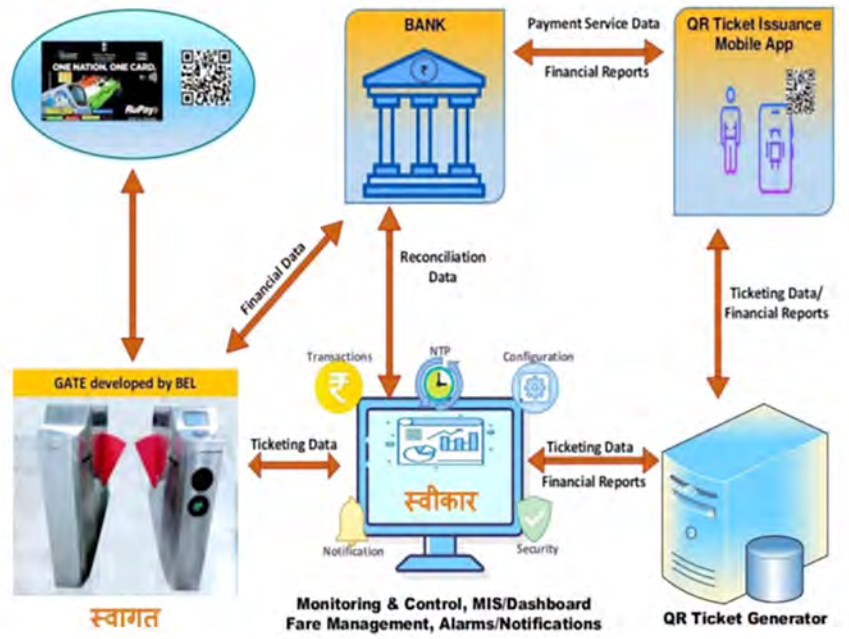
Strategic Analytics and Reports as per Requirements.

Configurable Alarms and Centralized Fault Monitoring.

Bidirectional Configurable Gates to handle traffic and special situations.

DEPLOYMENT:

Deployed at Namma Metro, Bangalore on two Stations.



Metro AFC System Architecture

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ICF
वंदेभारत
EXPRESS

QR TICKETING SYSTEM FOR TRANSIT (BUS & METRO) OPERATORS

Aligned with the Govt. of India's Smart Cities mission, the QR Ticketing System is a completely indigenous solution and addresses, three very pertinent requirements for transit operators: (i) Enabling cashless Initiatives, (ii) Reducing rush hour queues and (iii) Cost cutting by replacing tokens in Metro rails and paper tickets in Buses.

QR Ticketing offers facility of single or multiple journey QR coded tickets for an individual or group. QR Tickets may be purchased through Mobile App or Web App.

Key Offerings of QR Ticketing: Fully integrated ticketing system – Ticket Generator, Mobile & Web App with Payment Gateway integration, Public Transport Operators' (PTO's) Automatic Fare Collection (AFC) Integration, QR scanning & Validation terminal software.

KEY FEATURES:

Flexible Architecture: QR Ticketing System has an architecture that can be configured in a completely distributed fashion or in a fully centralized model.

Secure: The QR codes are securitized with Digital Signature ensuring non-repudiation.

Choice of Security Algorithms: Operators can also choose to encrypt their own tickets with their existing security algorithms.

Enables cashless initiatives, Reduces Peak hour rush, cost effective measures by doing away tokens (in metro) and paper tickets (for PTOs).

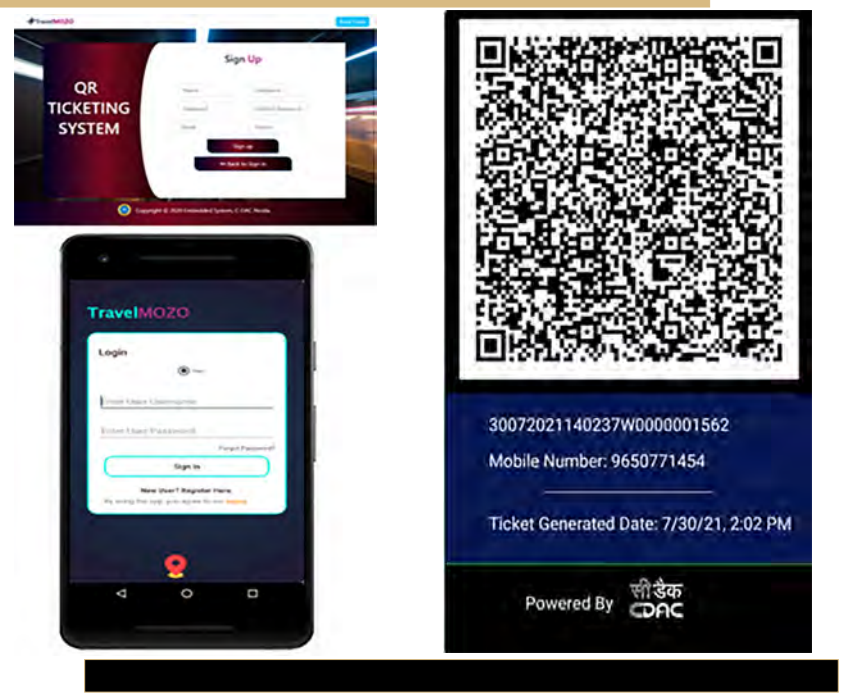
Single or multiple journey QR coded tickets for an individual or a group can be issued.

Authenticity, integrity, non-repudiation and confidentiality of the QR ticket.

QR coded tickets can be pre-booked at commuter convenience and can be validated in online/offline mode.

DEPLOYMENTS:

Deployed at Namma Metro, Bangalore at two stations.



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COMMUNICATION TECHNOLOGY

Communication Technology

Communication technology is a key enabler for many of the things that we take for granted these days. In the modern world, “being connected” has become a basic necessity, perhaps next only to food, water and shelter. In the past, the focus of communication was on exchange of information from humans to other humans. But now, communication is ubiquitous and is happening between humans, between humans and machines and between machines. We are also witnessing a paradigm shift from communication of information to communication of experiences, emotions and even skills. Fuelled by the technological advancements like 5G/6G, next gen Wi-Fi, IoT and high speed backhauls, a plethora of new use cases are also emerging. Wearable devices, autonomous vehicles, remote surgery, digital twin and holographic communication are already on the horizon. Massive convergence of various enabling technologies is a feature of all these emerging solutions. Communication systems are increasingly powered by artificial intelligence, ultra-scale integration and higher and higher levels of computing horsepower. C-DAC, having commendable strength in the above-mentioned technology domains, is uniquely positioned to take a key role in design, development and deployment of next generation communication technologies, products and solutions. I urge C-DAC fraternity to take new leads and come up with innovative solutions that would be able to address the needs of our nation's emerging communication requirements.

Co-Chairman

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Communication Technology

Keen observers of evolution of modern digital communication systems readily recognise the demands for higher and higher throughput, spectral efficiency and for reducing latency and error rates. The performance targets are being revised by orders of magnitude from one technology generation to the next. To address these demands, various technology solutions including spatial multiplexing, beamforming, directed communication, spectrum sensing & sharing, cognitive communications and exploration of hitherto unused parts of the electromagnetic spectrum are being proposed. There is also increased thrust on dynamic, resilient, covert and secure communications - more so in, but not limited to, military and strategic sectors. In addition to these, a number of novel use cases are emerging and a convergence of multiple technology streams is happening, one driving the other in tandem.

C-DAC has already been involved in development of various communication solutions for professional, military and strategic sectors in collaboration with defence labs, industries and academia. The Communication Technology TAP group aims to take these efforts to the next level and would strive for ideation, coordination and guidance in development of technologies, products and solutions addressing the emerging challenges in both commercial and strategic communications. We welcome all communication enthusiasts to be part of this effort.

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Communication Technology

1. C-DAC TETRA Network (CTN) 132

THE C-DAC TETRA NETWORK (CTN)

The C-DAC TETRA Network (CTN) is a secure, reliable, and efficient communication solution for mission-critical applications. It is based on the ETSI TETRA standard for critical communications and incorporates many of the important features required for public safety and a critical communication use case. C-DAC has indigenously developed all the infrastructure elements required for the TETRA Communication Network including the Base Stations, Mobile Stations, Gateways, and Dispatchers. The various optional components that the infrastructure contains such as the Authentication Centre, Voice Logger Radio Location Tracker, etc. provide customers the flexibility to customize their network according to their requirements. CTN is truly an Indigenously Designed Developed and Manufactured (IDDM) solution that is true to the spirit of the "Atmanirbhar Bharat" policy of Govt. of India.

CTN comprises

TETRA Base Stations - Xtreme (40W), Portable (15W) & Micro (6.3W) variants
Gateways – to ISDN/PSTN network, SIP (VoIP) network & analog radio network
User equipment – TETRA Radios, TETRA Line Station
Soft Terminal - Desktop User Terminal (DUT)
Network Management Software
Dispatcher Workstation with GIS enabled Radio Location Tracking
Voice Logger with remote client support
Authentication Centrefor secured mode of operation

The application areas of CTN includes

Police and Public safety networks
Communication system for Prison Administration
Emergency services like fire & rescue, ambulance
Disaster management
Defence and Para-military services
Railway Signalling and Communication, including metro
Industrial Automation
Coast Guard and Border Security
Seaports and airports

KEY FEATURES

Fast call set-up (as low as 300ms)
Guaranteed resource availability
Calls – Half duplex, Full duplex, Group, Broadcast, Priority, Emergency
Messaging - Individual, Group
Dispatcher functions like Dynamic Management of talk groups, Call prioritization, Call monitoring etc.
Hierarchical distribution of subscribers
Base Station fallback mode for network resilience

Three level security
- Authentication
- Air Interface Encryption
- End to End Encryption

Scalability – supports up to 999 Base Stations in a network

Interface to other communication networks through gateways

Interoperability with TETRA Radios from other OEMs

UNIQUE SELLING POINTS:

A completely indigenous technology based on an internationally accepted standard

Assures continued technical support, accessibility to the know-how, easier customization/enhancements

Supports proprietary encryption for enhanced security

A considerably economical solution in the long run A truly Indigenously Designed Developed and Manufactured (IDDM) solution

Breaks the monopoly of MNCs in Public Safety & Critical Communications segment and facilitates a competitive market

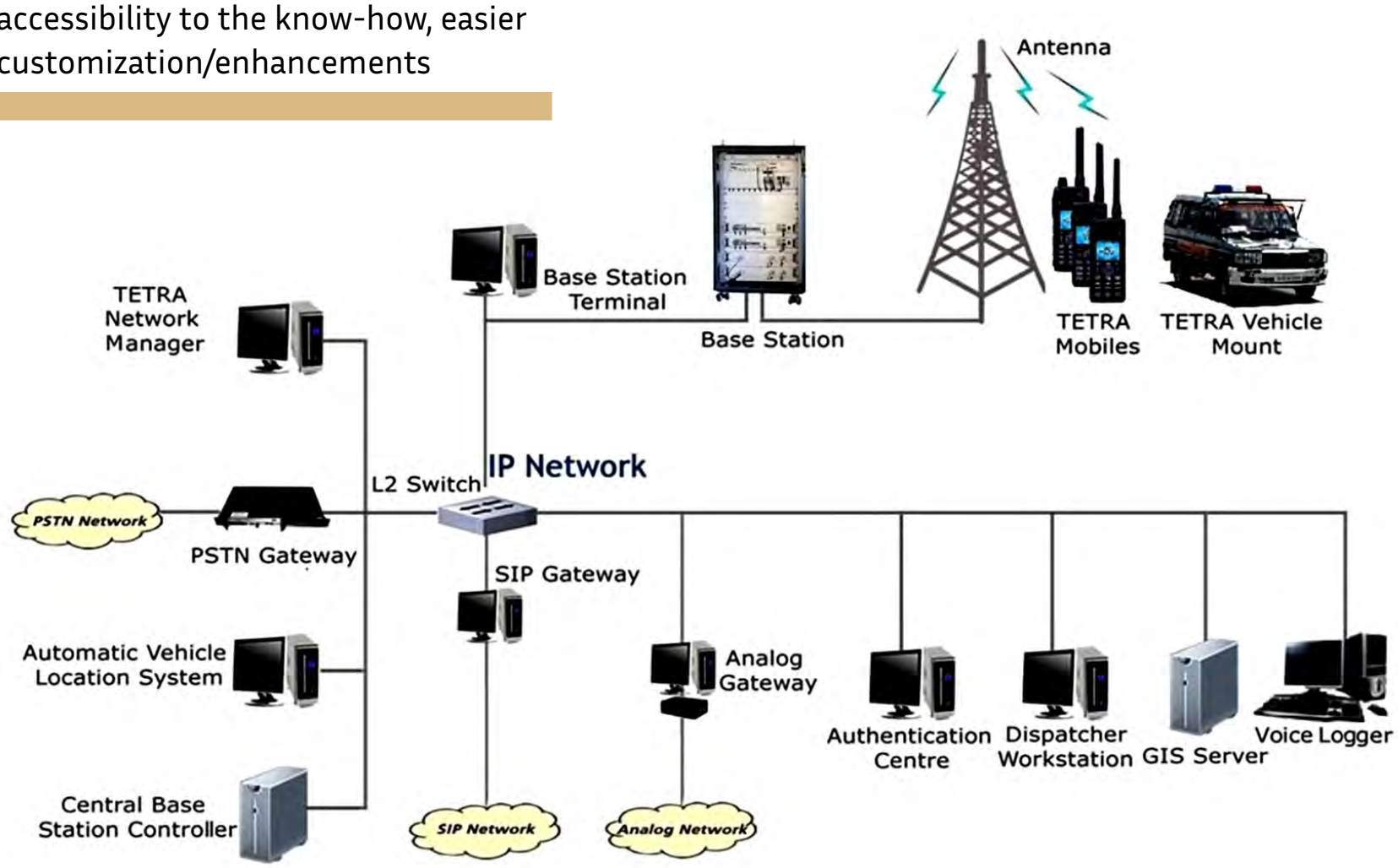
DEPLOYMENTS:

Bhabha Atomic Research Centre (BARC), Mumbai

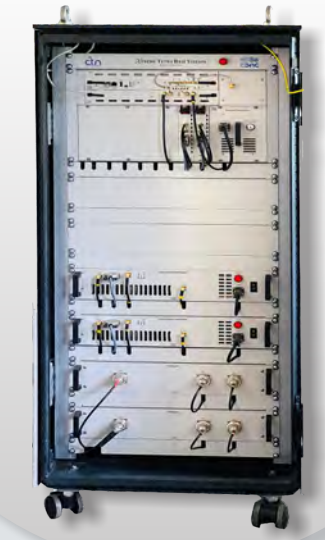
Central Prison, Thiruvananthapuram, Kerala

Central Prison, Viyyur, Thrissur, Kerala

Central Prison, Kannur, Kerala



C-DAC TETRA Network (CTN) Architecture



C-DAC TETRA NETWORK

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ARTIFICIAL INTELLIGENCE (AI)

Artificial Intelligence (AI)

Co-Chairman

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Over the last one decade, we have seen AI getting redefined again and again with changing focus. From the earlier focus on symbolic models with externalized knowledge, statistics based NN models took over the field at the turn of the last millennium. This was refined to dominant focus on deep learning models including adversarial networks, RNN, CNN and so on. This is the point where AI became a popular buzzword. We moved further into transformer architectures, and to Large Language Models and to generative AI solutions. These are threatening to change the way we live, quite like mobile phones did. And we are looking towards explainable AI, AGI and neurosymbolic AI to address the remaining short comings.

The evolution of products and solutions reflect this pattern quite clearly. Most of the work in the application space today is applying deep learning technologies to newer domains and more complex problems. Getting right kind of data in right quantity is the major challenge here. From healthcare and agriculture to education and people requiring special care, C-DAC focus has been on all these areas. And efforts are on to apply powerful techniques like AI to these areas, which promises to enhance the scope and power of solutions manifold.

The plate of opportunities for AI techniques is huge, and so is the case for working on cutting edge aspects of AI which is slated for significant growth in the immediate future. Presenting a collection of work from C-DAC, while a lot more is happening in various centres of C-DAC.

Artificial Intelligence (AI)

Artificial Intelligence (AI) holds immense potential to transform governance in India by enhancing efficiency, transparency, accountability, and citizen engagement across various sectors and domains. From driving innovation and inclusivity, AI can be a powerful tool for achieving Viksit Bharat goals to improve Healthcare including AYUSH, revolutionize Agriculture, personalize Education, enhance Defense sector among others. Let us embrace AI driven Language and Security augmentations and model AI solutions to leverage the potential of High-Performance Computing-AI Param Airawat infrastructure to build a better future for all citizens of India. As the Technology Director of Artificial Intelligence, I am committed to working in collaboration with all ministries to harness the power of Responsible AI as a force, a catalyst for change to serve humanity, enrich lives, and fulfill dreams.

Technology Director

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SHRUTLEKHAN-ADVANCE

Shrutlekhan-Advance is a cutting-edge, versatile automatic speech recognition system designed to seamlessly transcribe spoken words in real-time across multiple languages, including Hindi, Marathi, Kannada, and English. This advanced application effortlessly converts spoken language into text without the need for extensive pre-training. This remarkable technology harnesses the power of state-of-the-art AI, machine learning, and deep neural networks for its development.

USE CASES

- Efficiently transforms spoken words into written text for document preparation, email composition, and note-taking, resulting in increased overall productivity.
- Shrutlekhan-Advance enables writers to focus on creative writing by accurately converting spoken words into written form, streamlining the content creation process.
- Aids individuals, researchers and content creators by providing precise and timely transcriptions for recorded audio or speeches, facilitating detailed record-keeping.
- Bloggers and content creators enhance their workflow by quickly transcribing spoken ideas and discussions, saving time in content creation and preserving a written record for future reference.

KEY FEATURES:

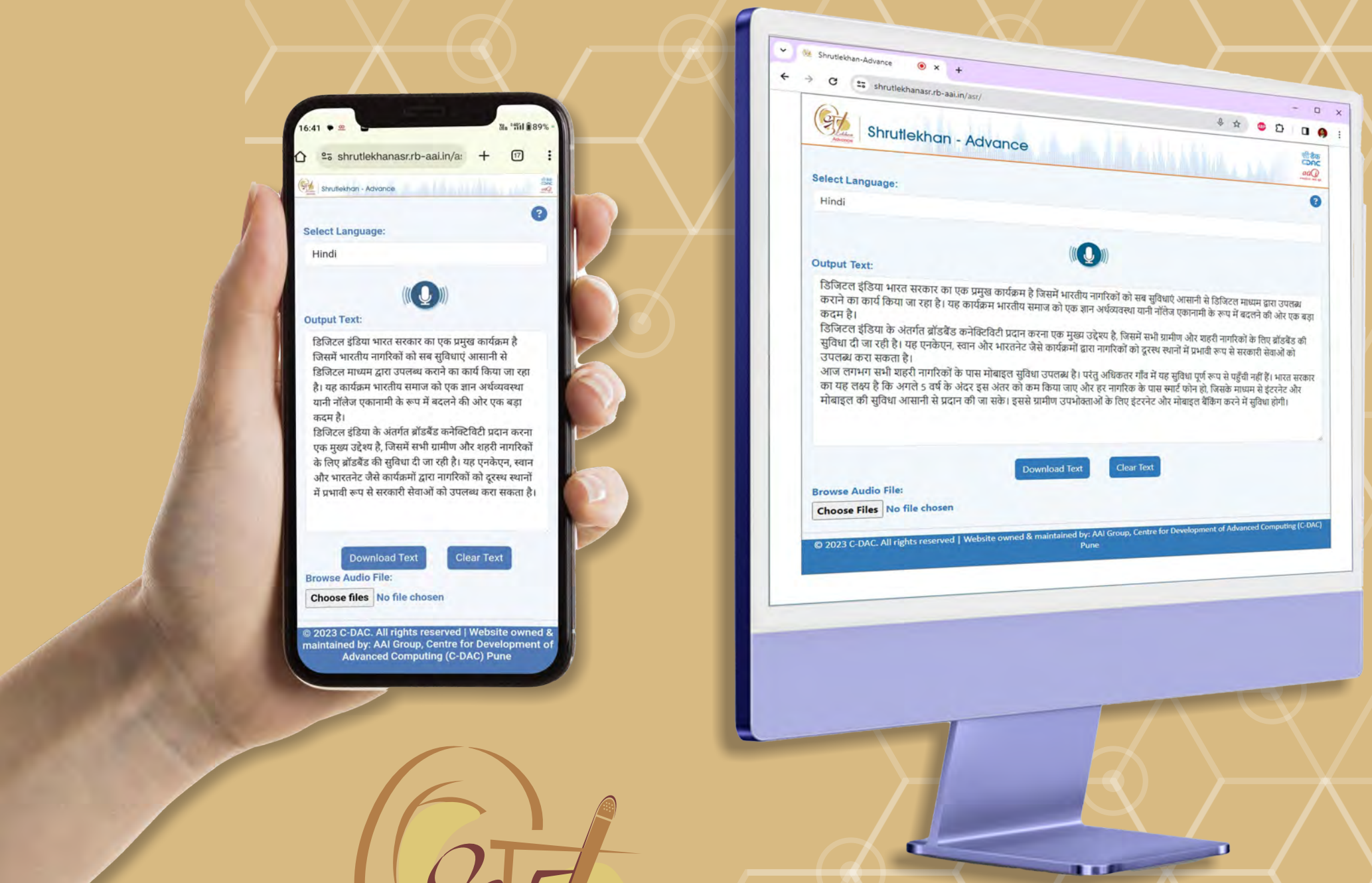
- Real time, fast and efficient online transcription
- Create instant and precise text
- Facility of Audio File Transcription
- On-the-fly punctuations and text formatting
- Ease of integration with other applications

DEPLOYMENTS:

- SEBI, Mumbai
- MHA-IB, New Delhi

Accuracy of Shrutlekhan-Advance software

The accuracy measures or evaluations of models are performed on standard datasets (IIT Madras, ULCA, Fleur) using standard evaluation technique i.e. Word Error Rate (WER) and the accuracy of the models is between 80% to 90%. However, the accuracy of models may vary depending on factors such as audio quality, speaker's accent and dialect, complexity of language, speaker's pace and tone and language proficiency.



Lekhan Advance

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CYBER SECURITY

CyberSecurity

India has made its mark as a global player in Information and Communication Technologies by successfully delivering various technologies and solutions. While transforming to Digital India, our nation has taken unique initiatives such as Digilocker, Aadhaar, UPI, Smart Cities which are well recognized globally. With these initiatives as well as the adoption of emerging & advanced technologies such as Cloud, AI/ML, Blockchain, IoT, Mobile applications & use of social media, there is an increase in the attack surface and cyber threats are continuously evolving. Government has recognized the importance of Cyber Security and taken various initiatives for protecting the IT infrastructure of the nation. C-DAC, with the support and guidance of Ministry of Electronics and Information Technology (MeitY), Government of India is actively contributing to Cyber Security ecosystem of the nation. C-DAC is playing crucial role towards carrying out R&D and develop Indigenous Solutions, IPR generation including patents & publications, establishment of labs for user agencies, offering security audit & assessment services, Education, Training and Awareness Generation.

Co-Chairman

Dr (Ms). P. R. Lakshmi Eswari
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CyberSecurity

With over two decades of experience in the domain of Cyber Security, providing products, tools, technologies and services to the nation, CDAC has touched every aspect of Cyber Security including Application security, Cloud security, Critical infrastructure security, Data security, Endpoint security, IoT (Internet of Things) security, Mobile security, Network security and Cyber Forensics. C-DAC is also into the mission of capacity building with its flagship Information Security Education and Awareness (ISEA) program. As a CERT-IN empanelled agency, C-DAC has been actively contributing to various audit and assessment efforts. Cyber Security is a continuously evolving field and CDAC is all set to keep up its indigenous products, services and technologies abreast using technologies such as Artificial Intelligence and Machine Learning to address the evolving cyber threats.

Technology Director

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Cyber Security

DARPAN VIRTUAL NETWORK SOLUTION (VNS)

Darpan Virtual Network Solution (VNS) includes both network edge platforms for Virtual Network Functions (VNFs) deployment and SDWAN capability. SDWAN allows establishing a secure communication channel over public Internet. The completely indigenous platform allows the selection of encryption algorithms for secure channel establishment. Moreover, the platform supports the secure deployment of network services such as DHCP, DNS and log analyser.

Product includes physical appliance and software solution components including

SDN enabled Next Generation Networking Hardware Platform built on COTS hardware with DHCP and DNS service

Third-party VNF deployment support

Central Network Service Orchestration Software that supports

- Virtual Infrastructure Manager
- SD WAN Manager

KEY FEATURES

Secure communication channel

Eliminates application specific hardware

Faster deployment of networks and network services

Orchestration of network services across the enterprise

Efficient utilization of hardware/network resource by sharing across different network services

Device Model and Template Management of edge boxes

IP Policy Management of edge boxes

Zero Touch Provisioning (ZTP) and Zero Touch Configuration (ZTC) of edge boxes

Inventory Management of edge boxes

VNF Orchestration

VLAN orchestration

Orchestration of platform switching capability

Performance dashboard for edge boxes

Map based Topology Management of edge boxes

DEPLOYMENTS

Field trial completed in Kerala State Wide Area Network (KSWAN)

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DARPAN NETWORK MANAGEMENT SYSTEM

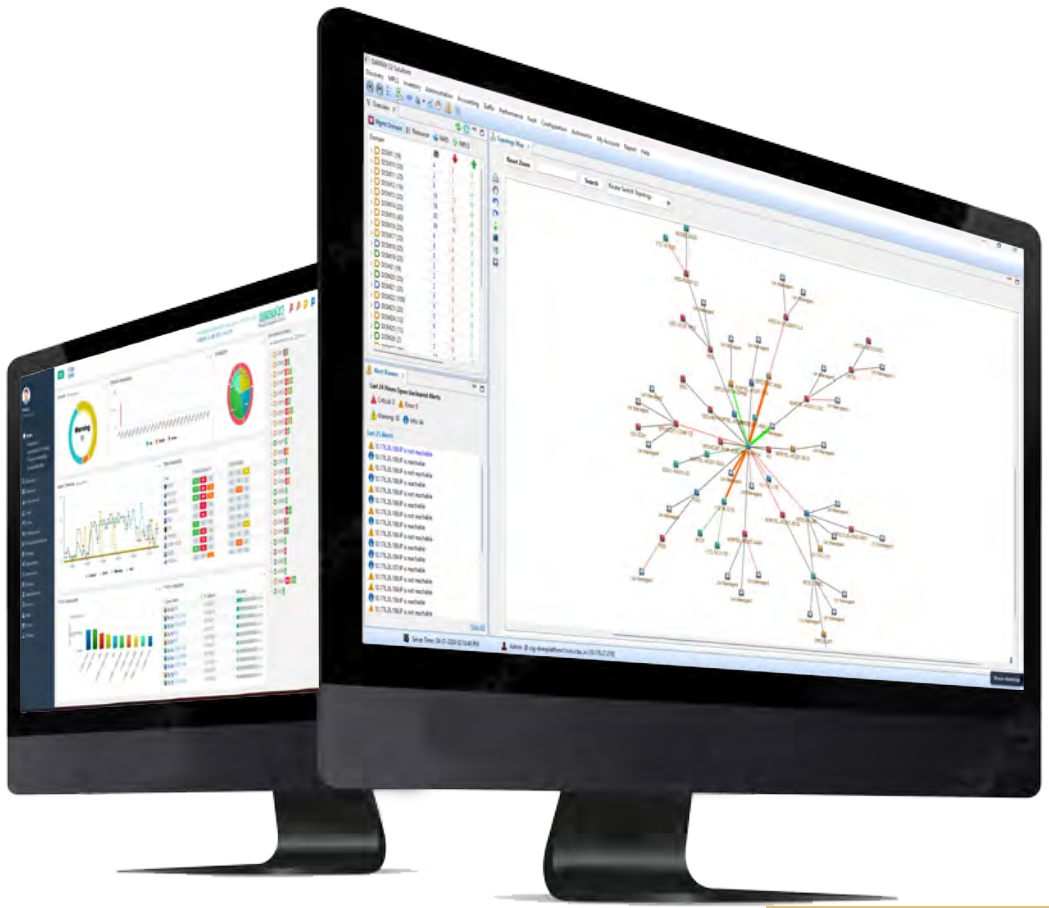
DARPAN NMS is a comprehensive vendor-agnostic Network Management solution with its state of art features covering Fault, Configuration, Accounting, Performance and Security management. DARPAN's out-of-the-box policy-based solution allows autonomic network management through its Self-Configuration, Self-Healing, Self-Optimization and Self-Protection functions. The feature rich report engine of the solution supports wide variety of near real time statistical and historical reports. DARPAN NMS' also have a variant that is specifically designed for Data Centre Management. It is deployed in many nationwide & and state-wide networks including data centres.

KEY FEATURES

- Network and Topology Discovery
- Configuration and Performance Management
- Traffic Analysis
- Event and Log Management
- SLA Management
- Server and Hypervisor management
- Storage Management
- Application and Database management
- Specifically designed feature set for State Wide Area Networks and State Data Centres.
- Service support for customization features and reports to meet unique management requirements
- Indigenously designed and developed for national mission-critical infrastructure management.

DEPLOYMENTS

- Madhya Pradesh State Wide Area Network, Bhopal
- Kerala State Wide Area Network and Kerala Data Centre, Thiruvananthapuram
- MHA Networks, New Delhi
- G20 Summit, New Delhi



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SARAN SERVICE DESK SYSTEM

SARAN Service Desk System is a Service Desk Management System designed to streamline the management of service desk tasks. It provides tools and features that assist in effectively handling customer inquiries, technical support requests, incident management, and other service-related tasks. It provides workflow and automation capabilities such as routing tasks to the appropriate teams and automating ticket escalation etc. for effective service management. It supports multiple profiles such as Incident Management, Problem Management, Configuration Management, Asset Management, and Change Management.

KEY FEATURES

SARAN Service Desk System supports multiple profiles such as Incident Management, Problem Management, Configuration Management, Asset Management and Change Management.

Multi-tenant Architecture

Customizable and Automated Workflow

Customizable ticket templates for different types of service requests

Ticket Prioritization

Rule based Service Level Agreements (SLA)

Automatic escalations

Knowledge Base

Feature rich dashboard for quick insight

Extensive search and filtering capabilities

Comprehensive Analysis and Reporting

Email/SMS Notifications

LDAP integration support for authentication

DEPLOYMENTS

PowerGrid Corporation of India Ltd., New Delhi

Madhya Pradesh State Wide Area Network, Bhopal

Kerala State Wide Area Network and Kerala Data Centre, Thiruvananthapuram

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INTRUST - AN ASSET TRACKING AND MANAGEMENT SYSTEM FOR ZERO TRUST NETWORK

InTrust is an indigenously developed asset tracking and management system essential for Zero Trust Networks. InTrust automatically keeps track of the list of assets, operating systems, services, and brings out the security posture of an organization.

InTrust derives a trust score dynamically using the parameters collected from Network and Traffic. The trust score value then decide the access to the resources as set in the organization policy. InTrust adopts a non-intrusive agent-less approach, for deriving the trust scores.

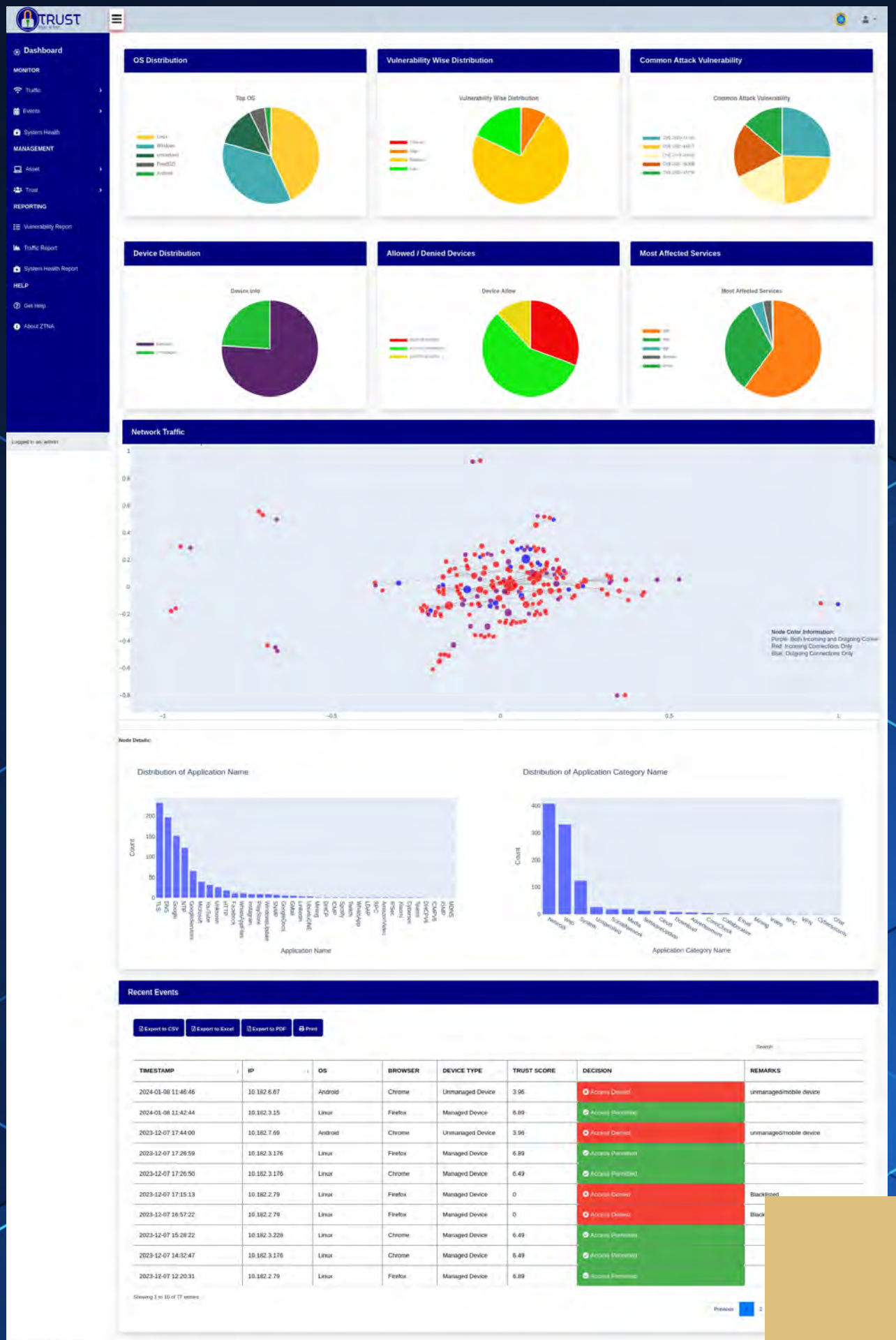
KEY FEATURES

- Automated Asset identification
- New device & Device Status detection
- Automated Vulnerability Identification & Reporting
- OS and Service wise asset distribution
- Asset Tracking & Management
- Automated trust score assessment
- Adaptive policy enforcement using trust score
- Continuous monitoring & reporting
- Device Security posture
- Agent-less implementation
- Traffic Monitoring and Anomaly detection
- Application Identification
- Intuitive Dashboard
- Custom Reports
- Alerts & Notifications
- Log and Event Management
- Web based GUI with Role based access
- System Health Monitoring and reporting

DEPLOYMENTS

Centre for Development of Telematics (C-DoT), Bangalore

C-DAC, Bangalore



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C-DAC ATTACK DATASET ANALYSIS REPOSITORY

ADAR is a complete framework for data collection and analysis for malware, suspicious URLs, and the generation of labeled datasets. It has an extensive knowledge base of labeled raw and processed datasets of Malware families & their strains, Suspicious URLs, Malicious opcodes, byte codes, API calls, Malware Images, behavior reports, exploit codes, etc., with platform-wise distribution. Its purpose is to store, analyze, and share the labeled data sets, analyze their correlation with contextual indicators of compromise, and provide threat intelligence. Its results are not only for Individuals, but also for researchers, academicians, security analyst, and government orgnizations, getting to know more about the cyber threats, applying learning algorithms and analysing them.

KEY FEATURES

A complete threat analysis under one solution including analysis of Windows, Linux, IoT binaries, Portable executables, ELFs etc. and generation of labelled datasets for security analysts, researchers and government agencies.

Raw and processed labelled datasets including malware Images, dynamic behaviour reports, API calls sequences, malicious Byte codes, malicious Opcode sequences, imports, DLL etc. for corresponding binaries and their families.

Threat Hunting through Indicator of Compromise (IoC) extraction with contextual evidence.

Threat Intel mapping with TTP as per MITRE AT&T techniques.

Easy to use dedicated dashboard that shows complete workflow/playbooks for each analysis engine (Drag & drop as per user`s selection).

It also describes the verdicts, file type, packed binaries, its strings, stripped or non-stripped binaries.

It includes advanced file search and analysis using metadata's (malware name, hash, family, IP, URL).

Similarity analysis based on standard scientific methods using common characteristics/patterns of a malware and URLs.

Download features to enable the users to download the raw dataset as well as labeled datasets.

Threat hunting through IoCs extraction that belongs to malware analysis reports, URL analysis and their contextual correlation with the knowledge base.

Reputation analysis with open-source tools for reverse engineering and dynamic analysis methods.

DEPLOYMENTS

MHA Agencies

C-DAC Mohali

C-DAC Mumbai

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CYBER THREAT MANAGEMENT SYSTEM (CTMS)

Cyber Threat Management System (CTMS), is a state-of-the-art integrated framework designed for the relentless monitoring, analysis, and mitigation of cyber threats. Built on a robust client-server architecture, CTMS leverages an array of honeypot sensors that expertly emulate your organization's attack surface, capturing cyber-attacks with unparalleled precision. The captured data is then pushed to a central collection server where sophisticated analysis engines work tirelessly to predict and mitigate threats, keeping you steps ahead of cyber adversaries. CTMS stands out with its wide range of honeypot sensors for comprehensive threat monitoring, powerful analysis engines for predictive threat intelligence, continuous attack surface enumeration, and real-time cyber threat intelligence generation. Seamlessly integrable with your existing SIEM, Firewalls, and other security tools, CTMS enhances your defensive capabilities without disrupting your current systems.

KEY FEATURES

Array of analysis engines for threat prediction.

Engines for continuous attack surface enumeration & risk calculation.

India Specific Cyber Threat Intelligence.

Threat mitigation through real time cyber threat intelligence generation.

Integrable with SIEM, firewalls & other security tools through REST API.0

Unified single dashboard for visualization, monitoring and management.

DEPLOYMENTS

MHA Agencies

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C-DAC-HONEYPOT FRAMEWORK (CHF)

C-DAC Honeypot Framework (CHF), is an innovative and sophisticated cybersecurity solution meticulously crafted through years of dedicated research, development, and experimentation. Designed to attract and capture cyber-attacks, CHF employs honeypots that emulate an array of system configurations and vulnerabilities, making it an essential tool for developing robust detection and mitigation mechanisms. This advanced framework addresses the critical need for dynamic, cost-effective, and manageable honeypot solutions, setting new standards in the industry.

Raspberry Pi

Desktop

Honeyspot sensors

KEY FEATURES

Automated Honeypot Management: Streamlines the hosting and management of honeypots with efficient automation.

Cost-Effective Deployment: Reduces hardware costs significantly, offering an economical solution for large-scale honeypot deployment.

Mobility and Portability: Features a portable design with wireless connectivity and battery backup, ensuring easy deployment anywhere.

Diverse Device Profile Emulation: Capable of emulating a broad range of IT device profiles for comprehensive cyber threat detection.

Dynamic Honeypot Configuration: Adapts honeypot settings in real-time to capture emerging cyber-attack trends effectively.

Scalable Honeypot Engine: Utilizes advanced techniques for scalable and efficient emulation of network protocols and vulnerabilities.

Integrated Customized Hardware: Combines a raspberry-pi-based platform with essential peripherals for enhanced reliability and user-friendliness.

Container Technology Utilization: Leverages container technology to run multiple honeypot instances on a single board, optimizing resource usage.

Inbuilt Power Backup: Equipped with a UPS and rechargeable battery to ensure uninterrupted operation during power outages.

Versatile Deployment Options: Suitable for both internal and external network deployment, offering operational flexibility.

Customized Hardware Platform: Features a user-friendly touchscreen and efficient charging system for sustained performance.

Low-Interaction Honeypots: Specializes in creating low-interaction honeypots for capturing a wide array of cyber threats.

DEPLOYMENTS:

Various Strategic deployments in MHA agencies

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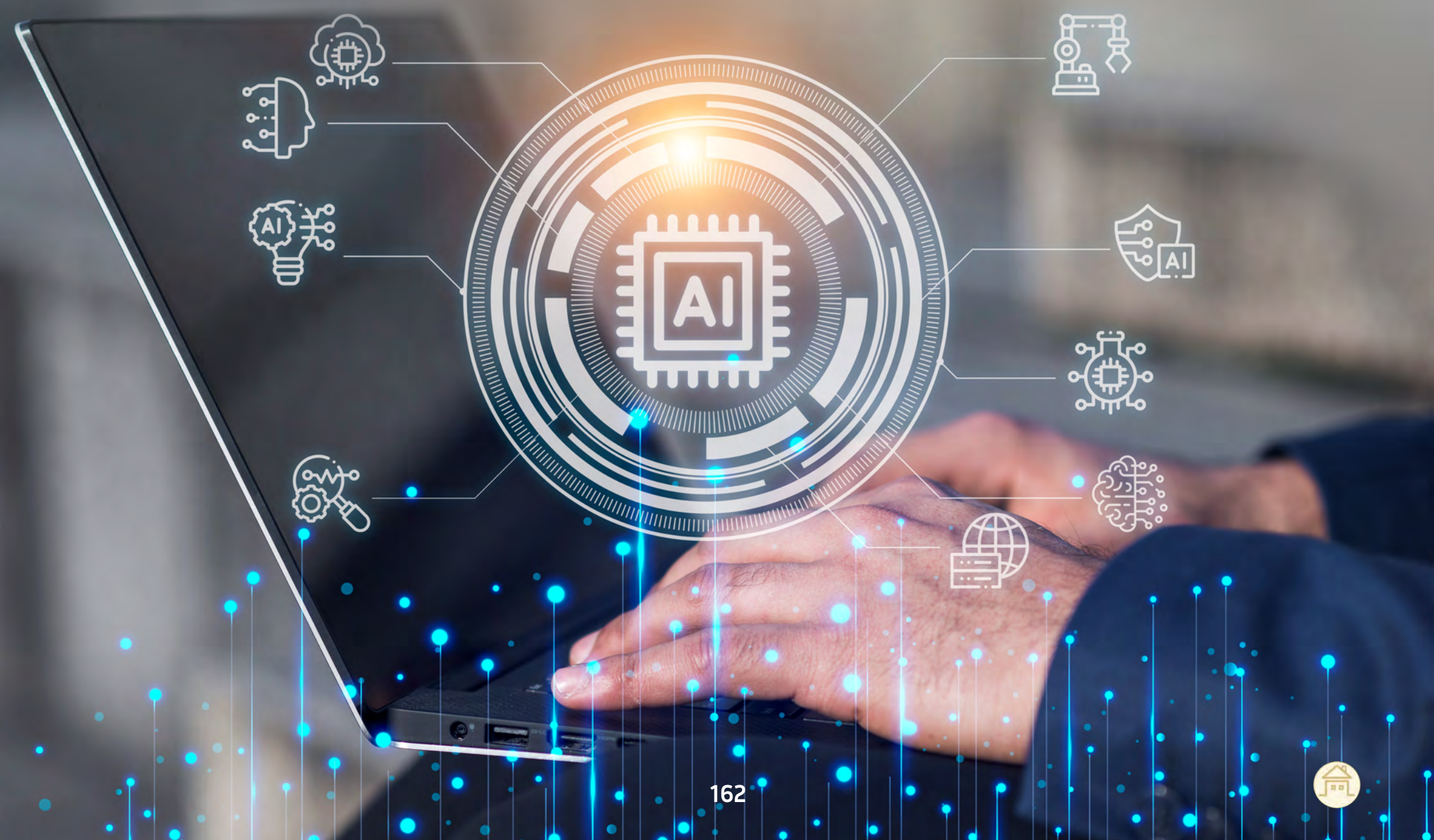
C-DAC SMART HONEYPOT

The C-DAC Smart Honeypot is an AI-driven cybersecurity system that creates a dynamic and interactive environment to trap potential cyber attackers. Using advanced algorithms, it learns from each interaction, dynamically choosing the most effective responses to provoke further engagement. This smart system offers a proactive and adaptive approach to cyber defense.



KEY FEATURES

Adaptive Threat Response: Real-time adaptation to evolving cyber threats.

Advanced Learning Algorithms: Utilizes deep learning and reinforcement learning for intelligent response modification.

Proactive Attack Engagement: Engages with potential attackers to collect valuable intelligence.

Real-Time Data Analysis: Continuous analysis for rapid response to new threats.

Centralized Intelligence: A core engine for centralized learning and response optimization.

High Precision in Threat Detection: Enhanced ability to detect and counter sophisticated attacks.

Automated Strategy Refinement: Continuous improvement of defense strategies based on interaction learnings.

Comprehensive Threat Analysis: In-depth analysis capabilities, including malware monitoring.

Scalable and Integrated Solutions: Scalability across various network sizes and seamless integration with existing systems.

DEPLOYMENTS

Multiple strategic deployments in MHA agencies

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INDIAN EARLY WARNING & RESPONSE SYSTEM

C-DAC-IEWRS solution is a first line of defense against large-scale cyberattacks targeting the Indian Cyber Space. The attack data collected on Distributed Honeypot Network act as a feed to generate early warning of emerging cyber-attacks on-network services.

KEY FEATURES

Situational Awareness and Risk Perception: Through attack surface enumeration, it provides comprehensive situational awareness and assessment of cyber risks.

Generates early warning for unknown attacks

Automated Response: Capable of flattening the infection curve of vulnerable assets through automated responses.

Indigenous Honeypot Development: Features honeypots specifically developed for SCADA, WEB, and IoT domains.

Attack Mitigation: Utilizes India-specific threat intelligence in actionable formats, integrable with Next-Generation Firewalls for effective attack mitigation.

DEPLOYMENTS

Various strategic deployments in MHA agencies

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C-DAC SIEM

CDACSIEM solution is a data aggregator that gathers immense amounts of log data from the entire networked environment, normalizes and applies analytics, consolidates, and provides complete security visibility to the SOC analyst. The CDACSIEM solution enables security analysts to protect the organization's digital assets and IT systems more effectively and efficiently.

The primary function of the CDACSIEM is to analyze the logs coming from various sources (NGFW, WAF, Server, Access, Mail, End points etc.) and detect any malicious activity that communicates over HTTP/ HTTPS, including websites, API endpoints, networks, and serverless functions. Patterns are analyzed, which are obtained from different logs, and the information is provided to the required security concerned. Based on the logs' analysis, a repository of all the suspicious IPs and URLs is being maintained. The CTI report is in standard actionable formats such as STIX/TAXII format so that the information can be shared with other security devices /organizations /frameworks.

The system supports all types of end nodes for log collection:

NGFW & WAF Logs
Syslog Server Logs
Access Logs (Apache, IIS, Tomcat etc.)
Mail server Logs, Secure Web Gateway, DNS Server, Squid Proxy Server
Databases logs (SQL, MariaDB, PostGre SQL, etc.)
Active Directory/LDAP
Endpoint Protection (Anti-malware, HIPs, Application Control)
Routers and Switches
Servers - Web, App, DB, Email etc.
IoT & OT logs

KEY FEATURES

Log Collection

Real time Monitoring

Threat Intelligence (30+ Threat Feeds)

Alerting Mechanism

User Entity & Behaviour Analytics (UEBA)

Alert Correlation

Compliance Reporting (NIST, PCI-DSS & HIPPA)

Dashboard and Visualization

Adherence to the MITRE ATT&CK framework

Log Forensics

Automated Vulnerability Scanner

Asset discovery and management

Ticket Management System

DEPLOYMENTS

India Trade Promotion Organization (ITPO), Delhi

MHA Agencies, Delhi

Murmugao Port Trust, Goa

Punjab National Bank, HQ, Delhi

Panjab University, Chandigarh

Research Centre Imarat, Hyderabad

C-DAC Centres (10)

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INTELLIGENT MALWARE DETECTION FRAMEWORK

Intelligent Malware Detection Framework (IMDF) detects and classifies malware based on featured and featureless approaches. The developed framework is of the first kind, which can characterize the malicious programs with the least dependence on domain expert analysis, such as code reverse engineering using debuggers & disassembles or resource-intensive dynamic execution of malware. Moreover, it provides detection & classification of various platforms-based (Microsoft Windows, Linux, IoT, SCADA) malware. Different National Agencies are actively using the developed system.

KEY FEATURES

AI-led smart detection of malware.

Computer vision-based algorithms to detect and predict malware threats.

Several Neural Network models are employed to establish a robust capability for detecting and classifying malware.

Natural language processing (NLP) techniques to categorize malware.

Cyber-attacks (Malwares, URLs and associated IoCs) detection and recognition in real-time with minimal human interaction using artificial intelligence.

Lesser cost and time complexity in malware detection.

Static code sequences & Dynamic API call sequences-based malware detector to characterize malware behaviour.

Visual based malware detection using Deep Learning methods

Able to detect Obfuscated/Packed/non packed malicious programs.

Similarity analysis algorithm to characterize & detect unknown malwares.

Semantic behaviour analysis using Control flow Graph (CFG) based estimation of malware hash attributes.

DEPLOYMENTS

MHA Agencies

C-DAC Mohali

C-DAC Mumbai

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STEGOCHECK V6.0: A SIGNATURE BASED STEGANALYSIS SOFTWARE PACKAGE

StegoCheck is an indigenous signature based steganalysis software package which can accept total 17 different File Formats and can analyze 89 numbers of freeware/ shareware steganography tools.

KEY FEATURES

89 different steganalysis modules are available.

GPU enabled Dictionary Attack for cryptographically strong Steganography Tool - S-Tools V 2.0

GPU enabled 2 Feature Augmented Password Cracking Modules for two cryptographically strong Steganography Tools (S-Tools V2.0, Secure Engine V 2.0)

Comparison reveals that it is at par with other products available in the market.

DEPLOYMENTS

MHA agencies and State Police Departments.

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STEGSCAN V2.0

StegScan V2.0 is a digital forensic analytical tool which searches for artifacts into the Microsoft windows registry or in the file system based on user choice having features like Plug and play mode of operation, Ensuring no write operation on the storage media and identifying the presence of more than 10,000 steganography/watermarking/ cryptographic tools within a storage device.

KEY FEATURES

StegScan is an indigenous product developed which can cater the needs of the LEAs of India.

It can handle 10,000+ signature (includes Steganography, Cryptography & Digital Watermarking Tools).

DEPLOYMENTS

MHA agencies

State Police Departments

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GENERATION OF IN-HOUSE SECURE AND TRUSTED ELLIPTIC CURVE (GHOST)

Ghost is Cryptographically Secure and Trusted Elliptic Curve Generation tool indigenously developed by C-DAC . These elliptic curves can be used in SSL / PKI / Authentication / Digital Signing etc. applications. Ghost as an application provides estimates for computational investment as well as the probabilistic idea on the computational resources required for generating elliptic curves. Ghost is designed and developed in consideration with the needs of strategic requirements, especially for defence forces and other strategic industries.

KEY FEATURES

GHOST is aimed for strategic applications

Indigenously developed cryptographic tool

Novel trust evaluation criteria for elliptic curve

New criteria in security verification of elliptic curve

Provision to verify foreign elliptic curve w.r.t. its cryptographic security and trust evaluation

Intelligent Prediction Panel for prediction of computational investment in randomly drawing elliptic curve

Gives idea about quantum attack resiliency on the selected field size of elliptic curve

Comprehensive technical report

Recommendation of secure and trusted elliptic curve for cryptography

·Thorough documentation

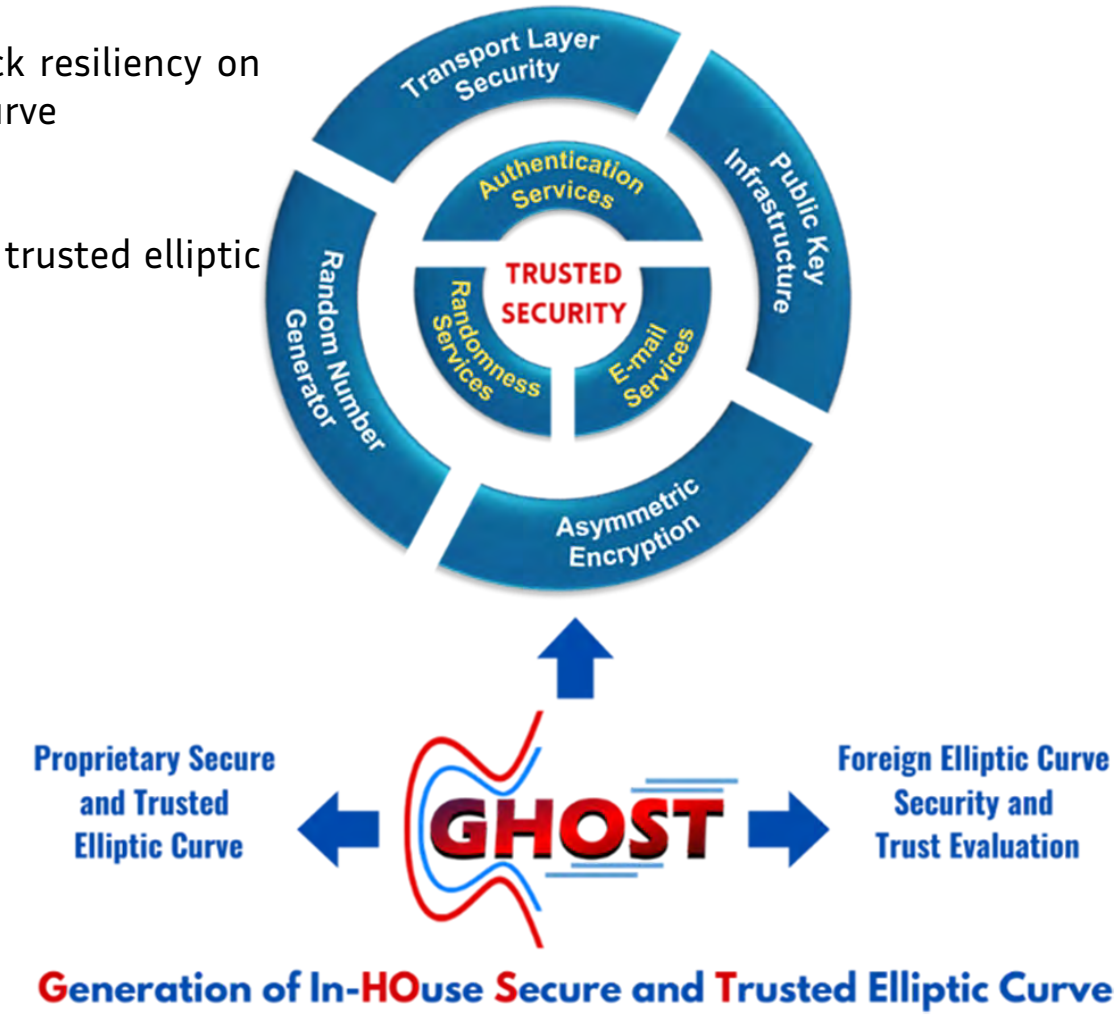
Transparent source code

GHOST curves for standardization

GHOST curve based Indigenous Public Key Infrastructure (GhostPKI) for enterprise applications

DEPLOYMENTS

Strategic agencies- Defence



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BLOCKCHAIN BASED DOMICILE CERTIFICATE STORAGE AND VERIFICATION SYSTEM

The primary objective of the Blockchain based Domicile Certificate Storage and Verification System is to establish secure, tamperproof method for verifying authenticity and integrity of documents/certificates. This system leverages the unique characteristics of blockchain technology to address various challenges associated with the traditional document/certificate verification process. The system has a provision for both single and bulk certificate storage and verification. The system can be integrated with the certificate generation application for storing certificates into blockchain using REST API's. Apart from REST API, the single /bulk storage and verification can be done through portal also.

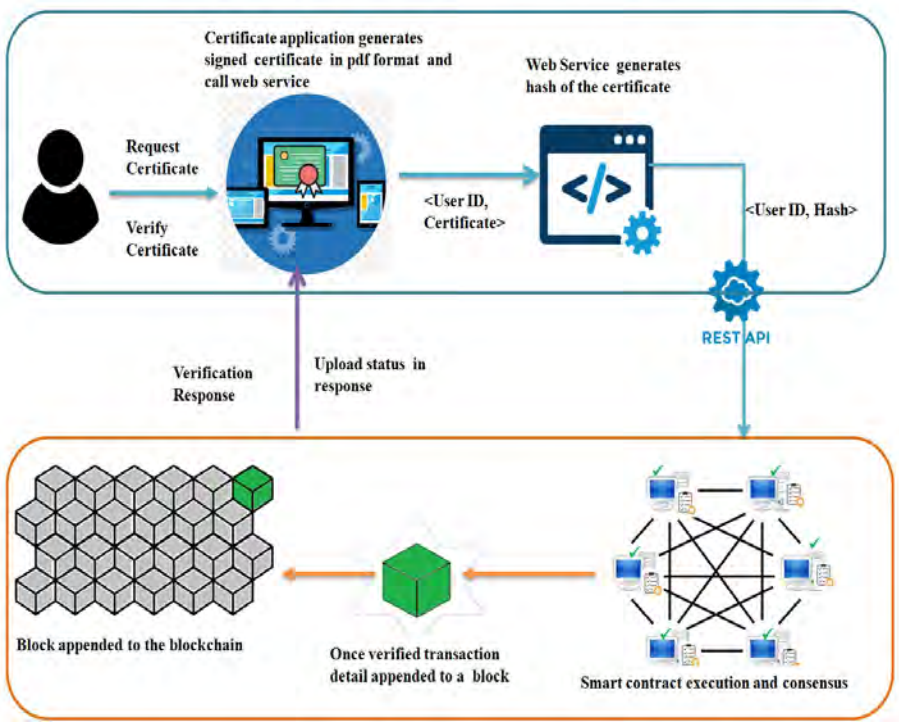
KEY FEATURES

- Tamperproof storage of certificate in blockchain
- Easy to detect genuineness of certificate
- Combat forgery and misuse of certificates

DEPLOYMENTS

Blockchain based Domicile Certificate Storage and Verification System is deployed at a State Data Centre

Blockchain Based Certificate Storage and Verification Architecture



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M-KAVACH 2

M-Kavach 2 is a comprehensive mobile device security solution addressing emerging threats related to Android based mobile devices. The major emphasis is on advising the users against security misconfigurations, detection of hidden/banned apps and scanning the device for potential malicious apps installed on the user's mobile device. M-Kavach 2 is also available as a SDK for integration with existing applications.

KEY FEATURES

Threat Analyzer - Detects potential malicious apps on the user's device using a machine learning based model

Security Advisor - This feature gives the users a holistic security status of the device. It checks the status of various critical parameters of the user's devices such as device root status, Wi-Fi connectivity, USB debugging status, hotspot status etc.

Detection of Hidden/Banned Apps - This feature identifies the existence of any such applications on the user's device and further analyses these applications to identify any potential threat they pose to the device.

App Latest Update Statistics – This feature notifies the user of the apps not updated or not being used for longer durations and apps having sudden spikes in the data and active time usage.

Adware Scanner - This feature scans all the applications installed on the device and notifies the user of the adware installed on the device.

UNIQUE SELLING POINTS

Lightweight ML model for performing threat analysis

Provides security without taking any critical permissions

Provides usage statistics and update statistics of all apps installed on the device

Easy integration of the solution with any third-party application

DEPLOYMENTS

Published in the Google Playstore & MSeva App store with a total of 1.5M+ downloads.

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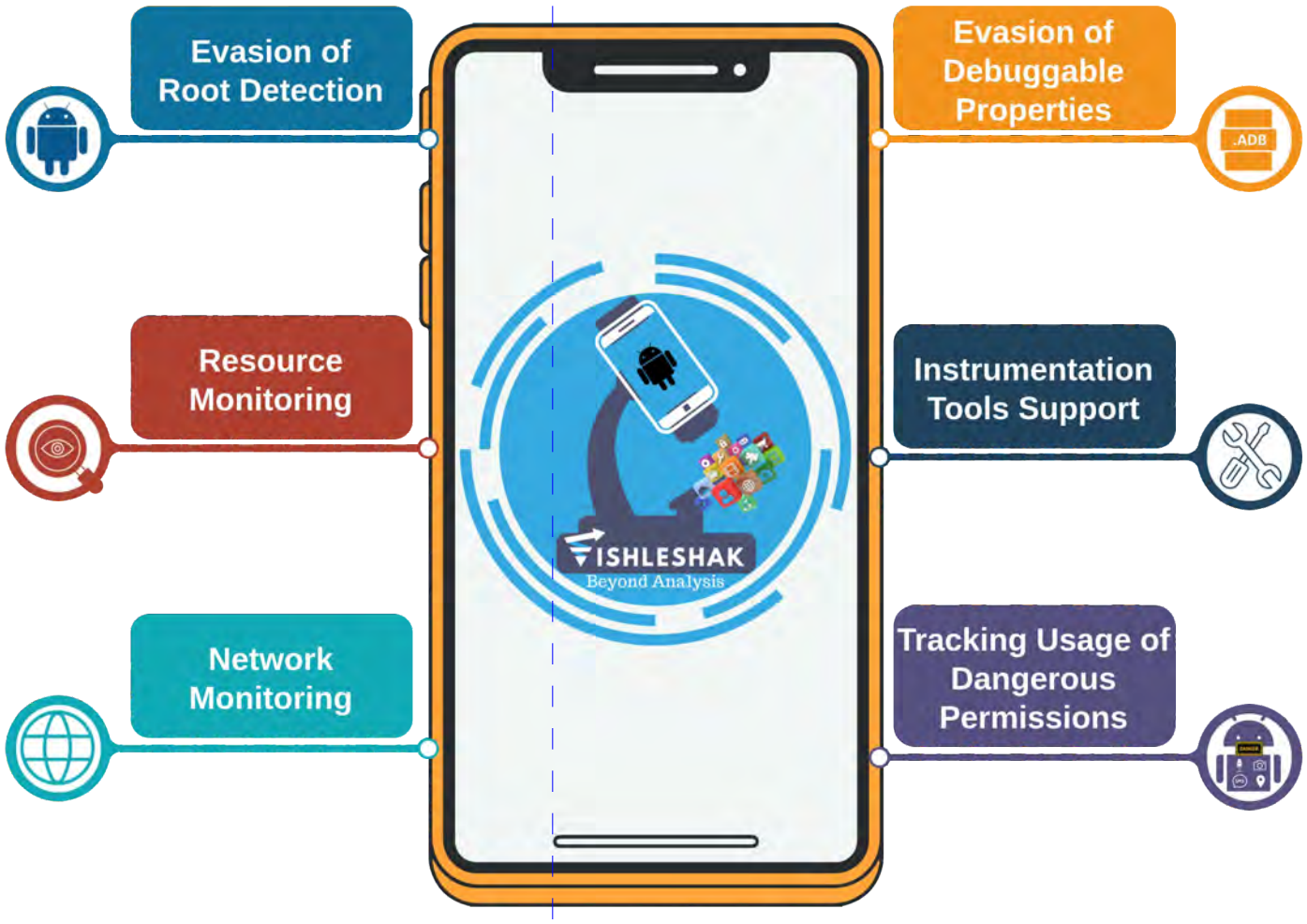
VISHLESHAK

Past one decade has witnessed a multi-fold increase in the volume of malicious apps which seem to have outnumbered the benign apps. The major target of these apps is to misuse the critical resources of the mobile devices, get remote access to the devices & steal critical user data. Hence, there is a need to analyze these apps in order to assess the threats posed by them. But unfortunately, strong Android anti-reversing defences & code obfuscation are hindering the scope of performing analysis on these apps. This has motivated the team for the development of Vishleshak, an Android based platform to bypass these strong anti-reversing defences and get insights into these apps.



KEY FEATURES

- Evasion of root detection
- Evasion of debuggable properties
- Resource access monitoring
- Supports instrumentation tools
- Monitor app specific network endpoint communications
- Tracking usage of dangerous permissions
- Interactive Dashboard

DEPLOYMENTS

Solution deployed at MHA agencies, MeitY, Defence and other Startegic Agencies

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CYBERCHECK

CyberCheck is a web based forensic data recovery and analysis tool to enable Law Enforcement Officers to quickly and efficiently analyse digital evidence files such as of hard disks, USB drives and other storage media. The tool has a simple to use web browser-based user interface which can be used by multiple users concurrently.

KEY FEATURES

Processes TrueBack, EnCase, Raw images and Virtual Disk images: VDI, VHD & VMDK.

Supports the analysis of file systems such as FAT, exFAT, NTFS, Linux EXT, UFS, HFS & YAFFS2.

Recovers deleted files, folders and partitions. File hash and file signature-based analysis options.

Data carving from disk, slack areas, unallocated areas and files.

Preview of disk & volumes.

File metadata extraction.

Disk indexing and fuzzy searching.

Advanced Timeline analysis.

Known good file filtering using NSRL dataset.

Overwritten and signature mismatch file detection.

Password protected file detection.

Registry analysis.

Thumbnail extraction from thumbcache database.

Recycle Bin data extraction.

Link file analysis.

Windows 10 artifacts extraction.

ShellBag analysis.

Browser forensics.

Feature-rich bulk file export.

Bookmarking and report generation.

Evidence hash verification.

File hash computation.

Evidence conversion to RAW image.

Web browser-based user interface supporting concurrent users.

Multiple case analysis support.

USP:

Advanced Timeline Analysis: - The timeline analysis of CyberCheck supports filtering based on file metadata and various combination of filtering criteria.

Fuzzy Search: - Fuzzy search feature of CyberCheck helps to match keywords in documents that may have typos.

Stop and continue in index search: - The data indexer in CyberCheck can be paused and resumed later. This helps the analyst to start the analysis early if needed.

Concurrent user support: - With the web browser-based user interface, CyberCheck supports multiple users at the same time.

DEPLOYMENTS

Banking & Financial Sector, MHA agencies, LEAs, Foreign agencies, Govt departments, Educational Institutes

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WIN-LIFT

Win-LiFT is a Windows Live Forensics Tool consisting of ImagerBuilder, Imager and Analyzer. Live Forensics involves acquisition of volatile data from the Suspect's machine and analysis of the acquired data. Win-LiFT enables volatile data acquisition using Win-LiFTImager and analysis of the same using Win-LiFTAnalyzer.

Win-LiFT can also be used for Cyber Forensics Triage data collection and analysis to retrieve the details of recently executed processes, recently accessed files and other in-memory artefacts like Internet artefacts, Encryption Keys and Process-tree. In addition to Physical Memory Analysis and Triage, the tool is capable of retrieving important evidence by acquiring and analysing non-volatile data such as Browser Files, Registry Files, Event Log Files and Windows 10 artefact files.

KEY FEATURES

Win-LiFTImager

- Captures following volatile/non-volatile artifacts from Windows Systems
- Physical Memory content
- Collects Information regarding
- System/Process/Network/File System Details/Others
- Registry Files, Browser Files, Event Log Files

Win-LiFTImager

Browser Cache, RecentFileCache, ShimCache, Amcache

Windows 10 artifact files - SRUM, Photos, Picture Password etc

Snapshot of Desktop Screen

Hashing of all acquired files, Log and Report Generation

Minimal tampering ensured by file system level reconstruction of files

Win-LiFTAnalyzer

Advanced Memory Analysis from Windows 7/10

Running Process details

Process Reconstruction

Bitlocker Key Reconstruction

Internet Usage based Information

MFT Records

Structural Analysis of Reconstructed Executables

Forensic Data Carving

Event Log Analysis

Browser /Cache Forensics of Chrome/Firefox/Mozilla/Safari/Edge/IE

Detailed Report Generation

Independent Loading /Analysis of Memory dump

Hash Verification of acquired files

List/Tree/Summary/Gallery View

Text-Hex (Raw files)/Parent-Child (Running processes) View

UNIQUE SELLING POINTS

Based on Live Forensics Procedure and ensures minimal tampering of the Suspect's machine

Advanced Memory Analysis with Process Reconstruction and Encryption Key Recovery

Loading of Physical Memory dump, Browser Files, Event Log Files, Registry Files alone

Non-volatile data acquisition and analysis for correlating with the volatile data to get a complete picture of ongoing activities

DEPLOYMENTS

MHA agencies, Educational Institutions, Banks etc

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ADVIK CDR ANALYZER

Advik Call Data Record Analyzer is a Windows-based CDR analysis tool which generates a comprehensive report of frequency statistics including service provider details and subscriber details (SDR) of CDR Numbers. The tool has a facility to transfer the CDR logs provided by various service providers to the database. The CDRs are converted into a standard format for better analysis and the converted data is loaded into the database. The converted data available in the database are processed effectively and displayed to the investigating officer in various views for better analysis.

KEY FEATURES

- Seize and Acquire CDR Logs
- Support to import SDR
- Customisable Preset facility for single click data import
- Call Flow Visualizer
- Smart grid Data Filters
- Customisable Filters
- Advanced Search with scripting support
- Filter History
- New Number Analysis
- Timeline Analysis
- Frequency Analysis
- Link Analyzer
- Geo-Analyzer
- Suspect List
- IMEI Analysis
- Customizable Reports
- Group Analysis
- Preliminary CDR Analysis
- Geo-Fencing

Advik CDR Analyzer

DEPLOYMENTS

- MHA agencies, Educational Institutions, Banks etc

USP:

- Case based analysis
- Customisable Report
- Create and Save Queries as Filters
- Filter History (Nested Filters)
- Same data multiple views
- Customisable Filters
- Online Tutorials
- Acquire & Authenticate CDRS

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PHOTO EXAMINER

PhotoExaminer is a Microsoft Windows-based cyber forensic application for classifying, enhancing, analyzing and generating the reports of image and video evidences. It provides nested search and filter options to reduce the overall dataset of digital images to only the relevant images.

KEY FEATURES

Data Carving - Images and Videos.

Extract metadata of images and videos.

Skin colour image detection.

Image classification with filters.

Increase Resolution of thumbnails and small images.

Enhance dark images.

Basic image enhancements

Error Level Analysis

Hidden Pixel Identification

Thumbnail Mismatch Identification

Filter for identifying face images.

Video Source Camera Identification.

Supports MOV, MP4, AVI, JPEG, PNG, BMP and TIFF

Customisable Report.

USP

Metadata Analysis: Image metadata contains key information for checking the authenticity of the image. Photo Examiner provides an organized metadata viewer with searching, filtering and sorting features.

Source Camera Identification: A video or an image can be compared against another video or set of images to know if it is taken using a suspected camera even if it is a different camera with same make and model.

Image Super Resolution: Increases the resolution of the image up to 4x times the height and the width.

Report: Comprehensive report with case details, hash values of evidence file, metadata information and results of filtering, enhancement and analysis.

Photo Examiner

DEPLOYMENTS

Educational Institutions , Cyberforensics labs

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TRUE IMAGER

TrueImager is a high speed, light weight, portable disk imaging hardware solution with battery backup support. The unit is capable of performing Hashing, Imaging and Cloning operations of source storage media and performs Wiping and Formatting of Destination disk. The unit also has all Advanced disk Imaging features.

KEY FEATURES

- Hash, Image, Clone of source disk
- Wipe and format of Destination disk
- Image Verify & Restore facility
- Disk Browsing
- Multi-tasking
- Unique Selling Points
- Battery back up support for 5 hours
- Parallel Imaging facility
- Auto Shut down facility
- Dual theme display

DEPLOYMENTS

- Educational Institutions , Cyberforensics labs

USP:

- Battery back up support for 5 hours
- Parallel Imaging facility
- Auto Shut down facility
- Dual theme display

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TRUE TRAVELLER

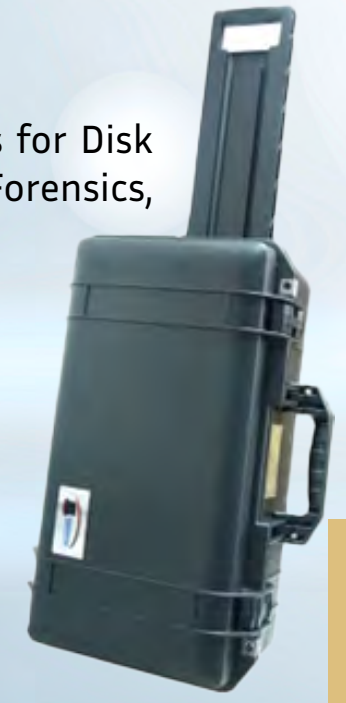
TrueTraveller is a portable forensic kit and is a complete solution for performing digital forensics Seizure, Acquisition and Analysis. The kit includes a laptop installed with digital forensics software tools and an integrated disk imaging hardware solution with battery backup. The kit can be easily carried out for on- location forensic investigations.

KEY FEATURES

- Easily portable kit with Trolley support
- Disk imaging hardware tool capable of performing multi-tasking
- SATA & USB ports for interfacing destination media
- Includes Write Blockers for SATA, IDE, USB disks
- Includes adapters for IDE, memory cards, m-SATA & µ-SATA disks
- Includes Win-LiFT for Live forensics and Net Force Suite for Network forensics
- Includes CyberCheck Suite for Disk Image Analysis and Advik for CDR Analysis
- Includes hardware dongle for SIM card seizure and acquisition

USP:

- Only portable kit which includes tools for Disk forensics, Mobile Forensics, Network Forensics, Photo Forensics & CDR Analysis



DEPLOYMENTS:

- Educational Institutions
- Cyberforensics labs
- Law Enforcement Agencies

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MOBILECHECK

MobileCheck is a mobile phone forensic solution for Basic phones, Feature Phones, Smart phones, GPS Devices, and memory cards. MobileCheck supports acquisition, analysis and reporting of evidence from mobile devices. The major tools in the MobileCheck solution are Imager, Analyser and SmartPASSeR.

KEY FEATURES

- Supports Android and iPhones.
- Supports LogicalBackup, APK Downgrade, Physical and Cloud data acquisition.
- Recovers Phone Artefacts – Contacts, SMS, Call logs etc.
- Data recovery of Social apps – WhatsApp, Telegram, Signal etc.
- Recovery of File system and deleted data
- Supports Cloud data analysis – Gmail, Google drive, Twitter
- Supports TimeLine and Link analysis
- Supports Custom ReportGeneration

DEPLOYMENTS

- LEAs, Govt agencies, State & Central Departments, Educational Institutions
- Society for Electronic Transactions and Security (SETS)

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E-GLANCER

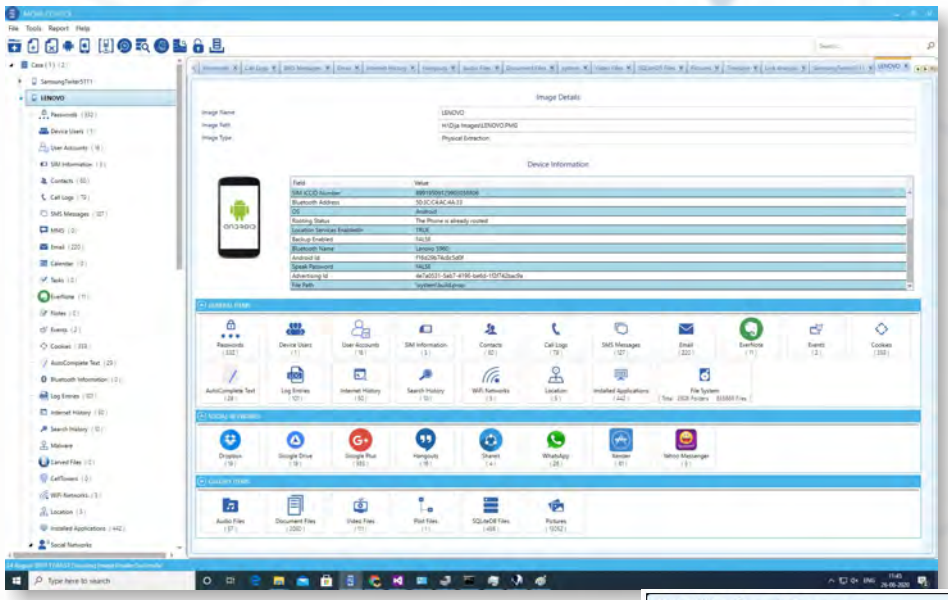
eGlancer is the Digital Forensic Kiosk (DFK) for quick forensic preview and imaging of evidential data from Smart phones, SIM Cards, Hard disks, Pen drives and SD Cards. DFK can be stationed at various transit points such as Airports, Seaports, Railway Stations and at Police Station Houses. The authorised officer can conduct primary and swift analysis of digital data within the gadget and confiscate the device, if traces of evidential information is found. The easy-to-use interface allows investigators to examine the gadgets quickly and efficiently. Forensic images of suspicious devices can be further transferred to a storage media for detailed analysis

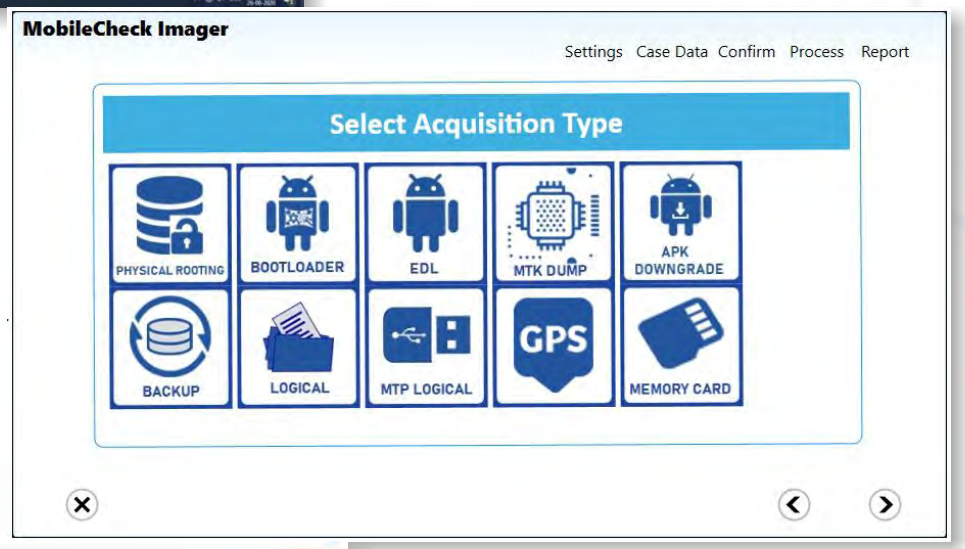
KEY FEATURES

- First Responder's hardware solution for forensic preview
- Supports Android and iOS phones with dedicated ports for connection
- Social networking chat data capturing from Android smart phones
- Supports SIM Cards with various form factors (Micro, Mini, Nano)
- Built-in write protected ports for connecting hard disks with IDE, SAS, SATA3.0, USB3.0, FireWire and PCI-e interfaces
- Preview of documents, pictures, audio and video files

DEPLOYMENTS

- ToT to Keltron, Trivandrum.





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BLOCKCHAIN-AS-A-SERVICE (BaaS)

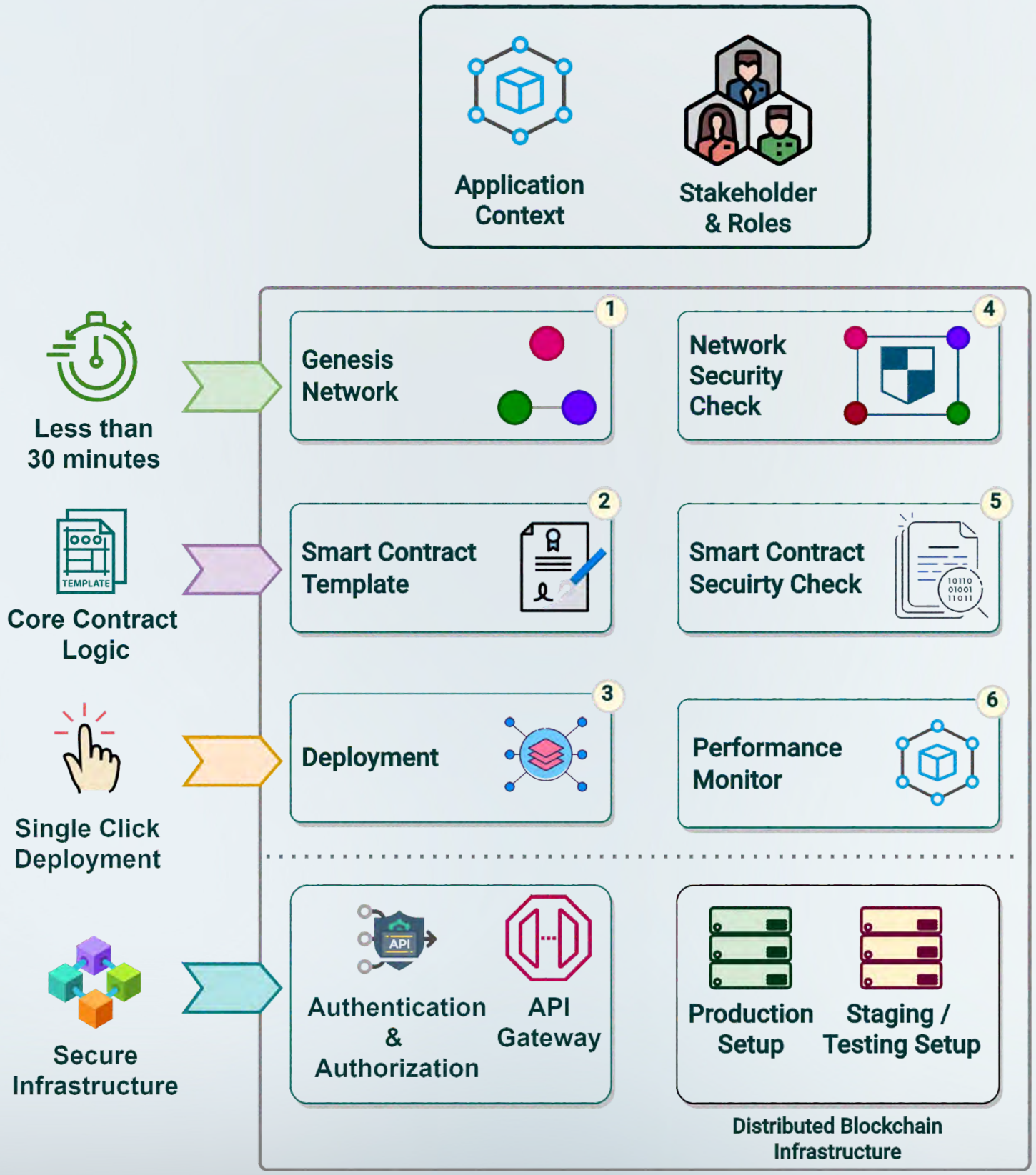
National Blockchain Framework (NBF) Blockchain as a Service – Technology Stack has been designed and developed with several components such as dashboard for automated network setup, generic smart contract layer (templates and design patterns), authentication and authorization functions and indigenously developed certifying authority. Generic Open APIs for accessing blockchain functionality are provided for easy integration with the applications. The technology stack of NBF has Smart Contract Library for different application domains such as Supply chain, Medical Insurance, Asset Management and Drug Track & Trace. Security vulnerability assessment test suites for auditing smart contracts is included

KEY FEATURES

- Rapid end-to-end Blockchain Application development
- Hardened and security audited Hyperledger Fabric Docker images
- Smart Contract Templates for various domains
- Secure APIs to access Blockchain
- Node management
- Blockchain Explorer
- Log management at various levels
- Blockchain configuration for easy integration with any external application
- Support for Bring Your Own Infrastructure
- Support for e-Pramaan and e-Sign service integration

DEPLOYMENTS

BaaS is hosted on Geographically distributed infrastructure and various applications are developed and deployed using BaaS in collaboration with Government departments.



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HEALTHCARE AND EDUCATIONAL TECHNOLOGIES


HEALTH CARE
MEDICAL
MEDICINE

Healthcare & Educational Technologies

C-DAC's exceptional prowess in healthcare and education emphasize their significance for our nation's development. Besides other numerous contributions, C-DAC's innovation and relentless pursuit to excellence has produced country's largest Hospital Management Information System by improving quality of healthcare, reduce medical errors, reduce healthcare costs, increase administrative efficiency, and expand access to affordable healthcare; and the world's largest telemedicine platform, a primary healthcare innovation that bridges the digital health divide by extending the reach of quality health services to the masses in the country living in rural areas and in the isolated of parts of the country. In education domain, C-DAC holds the distinction of being the country's oldest and most successful skills development setup in the electronics and ICT domain. In addition to conducting wide range of training programmes in the areas of Information, Communication and Electronics technologies, C-DAC also develops ICT tools and technologies for modern methods of imparting education and training to masses. Aligned with Digital India's vision, C-DAC is equipping countless individuals with essential digital skills, and simultaneously empowering patients and medical practitioners through innovative healthcare technologies.

Co-Chairman

Shri V. K. Sharma
Scientist G and Centre Head
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Health care & Educational Technologies

As a pioneering force in Healthcare and Educational Technologies, C-DAC has profoundly impacted millions of lives through its innovative solutions, which are centred around cutting-edge technologies. These offerings have catalysed systemic transformations in health systems and are fostering excellence in educational technologies, to benefit industries such as defence and IT, among others. C-DAC's solutions are crafted by experts who are recognized as reference points in these technology horizons. United across C-DAC, we are navigating a course towards a future where stakeholders in these socially relevant sectors are empowered for a brighter tomorrow for all, in India and beyond.

Technology Director

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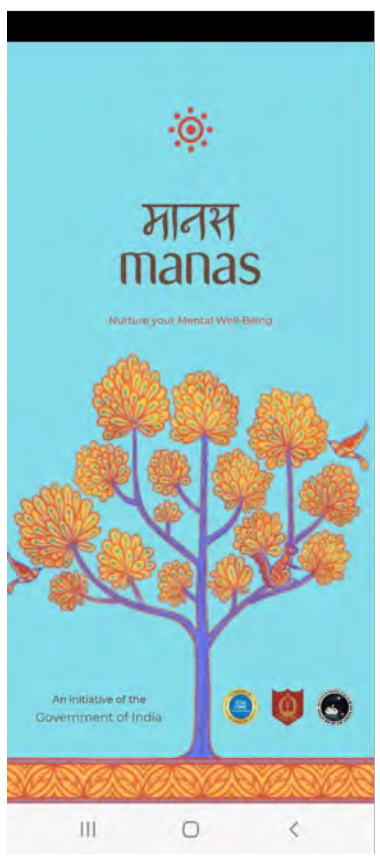
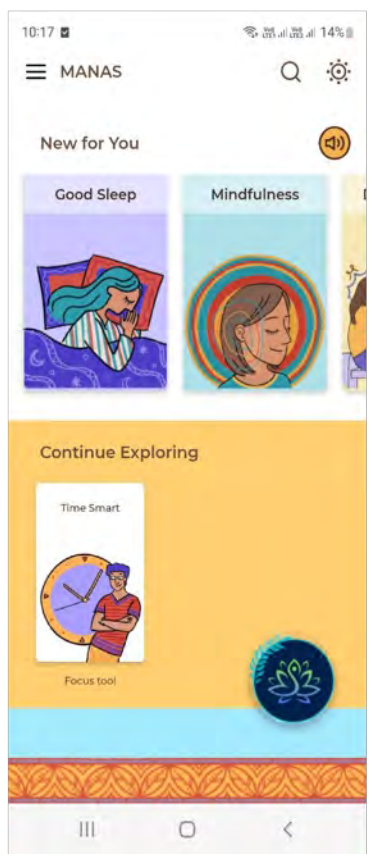
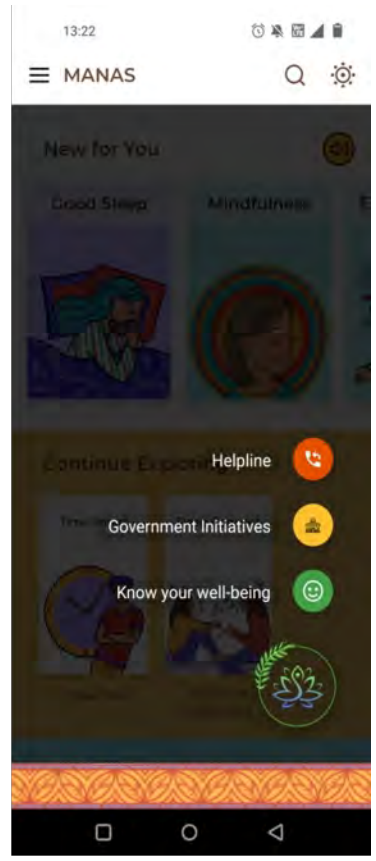
Healthcare and Educational Technologies

MENTAL HEALTH AND NORMALCY AUGMENTATION SYSTEM (MANAS)

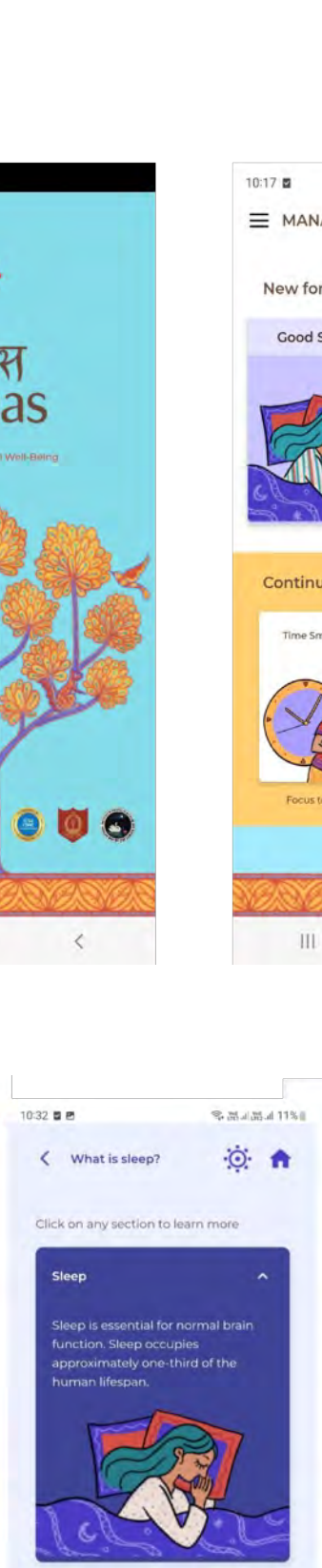
MANAS is a comprehensive, scalable, and national digital wellbeing platform, initiated by O/o Principal Scientific Advisor, Govt. of India to augment mental well-being of Indian citizens for the age group of 15 to 35 years. MANAS citizen app has support for bilingual responsive user-friendly interface, plug and play architecture to integrate scientific and evidence based mental wellbeing contents developed by NIMHANS Bengaluru and AFMC Pune. MANAS dashboard is developed for content work flow management and visualization board for exploratory statistical analysis. MANAS platform is currently deployed on NIC public cloud.



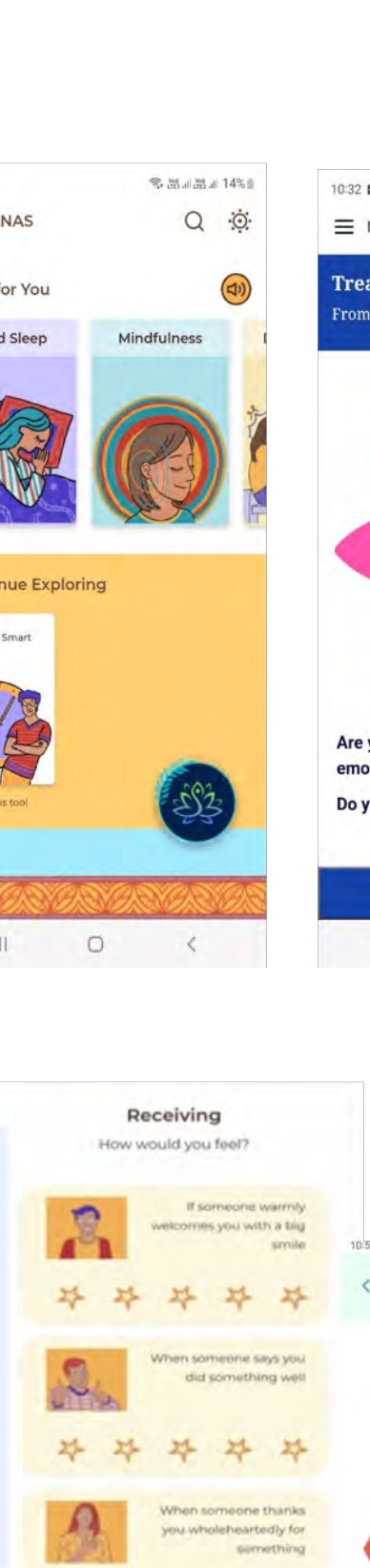




TIME SMART

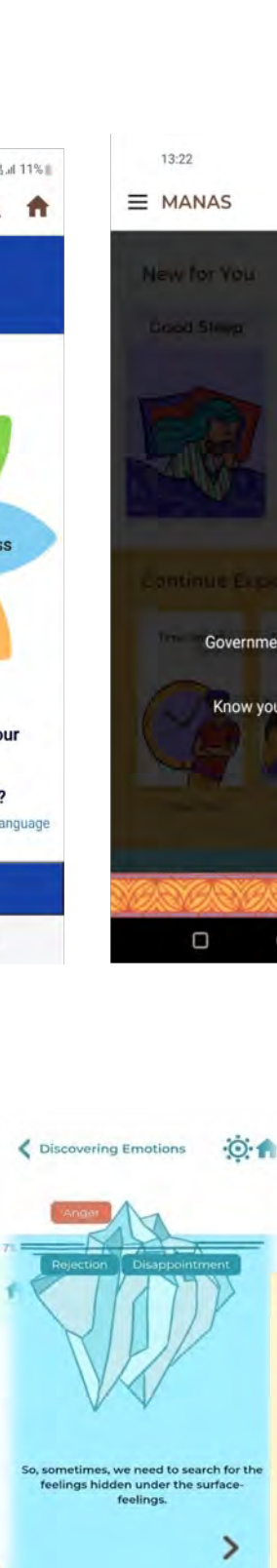


GOOD SLEEP

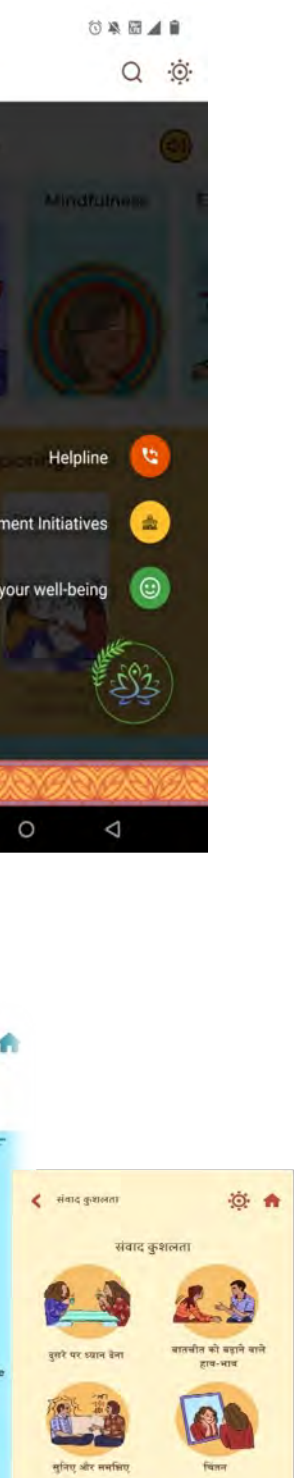


DEEP CONNECT

MINDFULNESS



EMOTION WISE



SOCIAL CONNECTEDNESS

KEY FEATURES

Integrated with mental wellness modules (Emotion wise and social connectedness, Good Sleep, Mindfulness, Time smart, Deep connect)

Deployment of MANAS App and dashboard utilizing an open scalable architecture to cater for expansion without compromising privacy and data security.

MANAS App supports both Android and iOS platform.

Self-evaluation module enables users to assess their own mental well-being using WHO scale

MANAS dashboard for content workflow management to upload, review and validate new mental wellness modules, data visualization and content module wise analytics.

Plug and play architecture for seamless integration of contents into mobile app.

DEPLOYMENTS

Deployed in MUHS Nasik Maharastra, CIP Ranchi Jharkhand.

Currently available to public in both Android and Apple play stores.

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e SANJEEVANI

eSanjeevani is a cutting-edge cloud-based telemedicine platform, designed to transcend geographical limitations, facilitates remote consultations between healthcare providers and patients. eSanjeevani has been implemented nationally for the Ministry of Health and Family Welfare (MoHFW) as National Telemedicine Service. It has emerged as the world's largest telemedicine implementation in primary healthcare. eSanjeevani has served 230 million patients till April 2024.

This innovative digital health platform facilitates remote consultations between healthcare providers and patients, breaking down barriers to healthcare access, for rural as well as urban masses. Its user-friendly interface and seamless connectivity made it a lifeline, especially during the COVID-19 pandemic, allowing individuals to consult with healthcare professionals from the safety and confines of their homes. eSanjeevani operates in two variants: a) "Doctor-to-Doctor" (assisted) model, enhancing the reach of specialized healthcare services to rural regions, and b) "Patient-to-Doctor" model, offering outpatient services to individuals remotely.

eSanjeevani's scalable and secure architecture ensures platform's reliability even during peak usage. This advanced technology allows eSanjeevani to conduct upto a million consultations daily. eSanjeevani aligns with various national health initiatives, such as Ayushman Bharat Digital Mission, National Tele-mental Health Program and Collaborative Digital Diagnosis System, creating an integrated healthcare ecosystem.

eSanjeevani
National Telemedicine Service

KEY FEATURES

- Microservices architecture based real-time teleconsultations with healthcare professionals
- Seamless sharing of health records in real-time
- Convenient follow-up consultations for continuous care
- Prescription enabled (generic drugs)
- Timely SMS-based notifications for appointment reminders and updates
- Al-driven Clinical Decision Support System (CDSS) for enhanced diagnostic accuracy
- Integration with Ayushman Bharat Digital Mission (ABDM)
- Secure & Scalable technology
- Unified & Multilingual interface for improved accessibility
- Seamless interfacing with diagnostic devices for wireless import of results (Point-of-Care Tests (PoCTs) and Rapid Diagnostic Tests (RDTS)
- Comprehensive dashboard for users & policy makers
- Modelled on Electronic Health Record (EHR) and Telemedicine Practice Guidelines of GoI
- Implementation of SNOMED-CT and generic drug nomenclature standards
- Adherence to Guidelines for Indian Government Websites (GIGW) to ensure accessibility and user-friendly experience

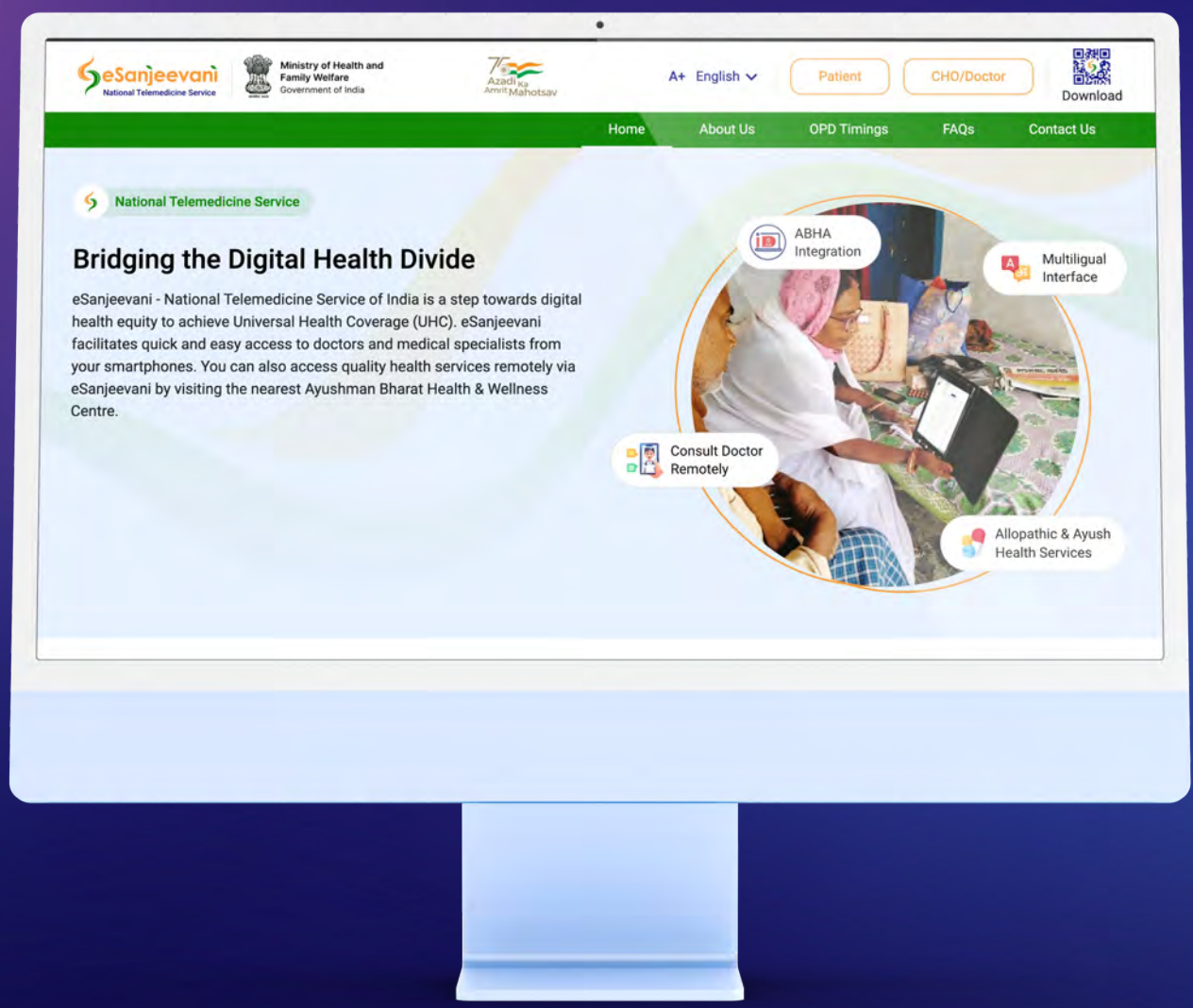
DEPLOYMENTS

Ministry of Health & Family Welfare

ESIC, Ministry of Labour and Employment

CGHS, Ministry of Health & Family Welfare

Ministry of Defence (SeHAT OPD)



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e-RAKTKOSH – A BLOOD BANK MANAGEMENT SYSTEM

e-RaktKosh is a national platform for information about Blood Banks and Blood availability across India. It is a one nation one platform for information on Blood Centers and Blood Stock Availability across in India. Currently more than 3900 blood banks are using e-RaktKosh platform either for updating stock information or end to end Blood Banks Management System.

It is a comprehensive IT solution attempting to connect, digitize and streamline the work flow of blood banks across India. It helps to ensure Drug & Cosmetic Act, NACO (National AIDS Control Organization), standards and guidelines to ensure the quality of blood This also compromises of Citizen centric portal and Mobile Apps which helps to locate the blood availability in emergency situations. A donor and patient repository is created which will help the donors as well as the recipients.

It has following components

- A standard compliant Centralized Blood Bank Management System (BBMS) including a stringent rule based enforcing mechanism
- A location aware citizen centric portal (www.eraktkosh.in)
- Mobile applications

The product is established as Digital Public Infrastructure for Indian Blood Banks. The product is ready to roll out in other countries for the automation of the blood banks.

KEY FEATURES

Adhere to Blood Banks Acts and Guidelines

Compliance to Health Standards and ABDM Milestones

Interface with Blood Bank Equipment's

Real time blood stock availability, Nearest Blood Bank Location and Blood Donation Camps information.

Donor Management System for identifying, tracking and blocking donors based on donor's health, donation history etc. My Donation profile also helps citizens in maintaining their donor profile.

Generation of Donor Certificate

A centralized Blood Bank Management System for keeping track of the blood stock across numerous blood banks.

Integrated with National Portals like NIC ORS, UMANG Platform, PayTM, Arogya Setu and various state dashboards

Features such as blood grouping, TTI screening, antibody screening, component preparation, cross matching, issue of compatible blood and blood components etc. as per the defined processes and rules.

Generation of rare blood group donor registries and the generation of regular repeat donors. State-wise / District-wise donor repository

Integrated with third party blood bank management system

ABHA generation and linkage with Donor Profile

Integrated with e-Parichay and e-Pramaan for single sign on of Govt. Portals

Statistical Analysis and dashboards

DEPLOYMENTS

4000 Blood Banks all over India

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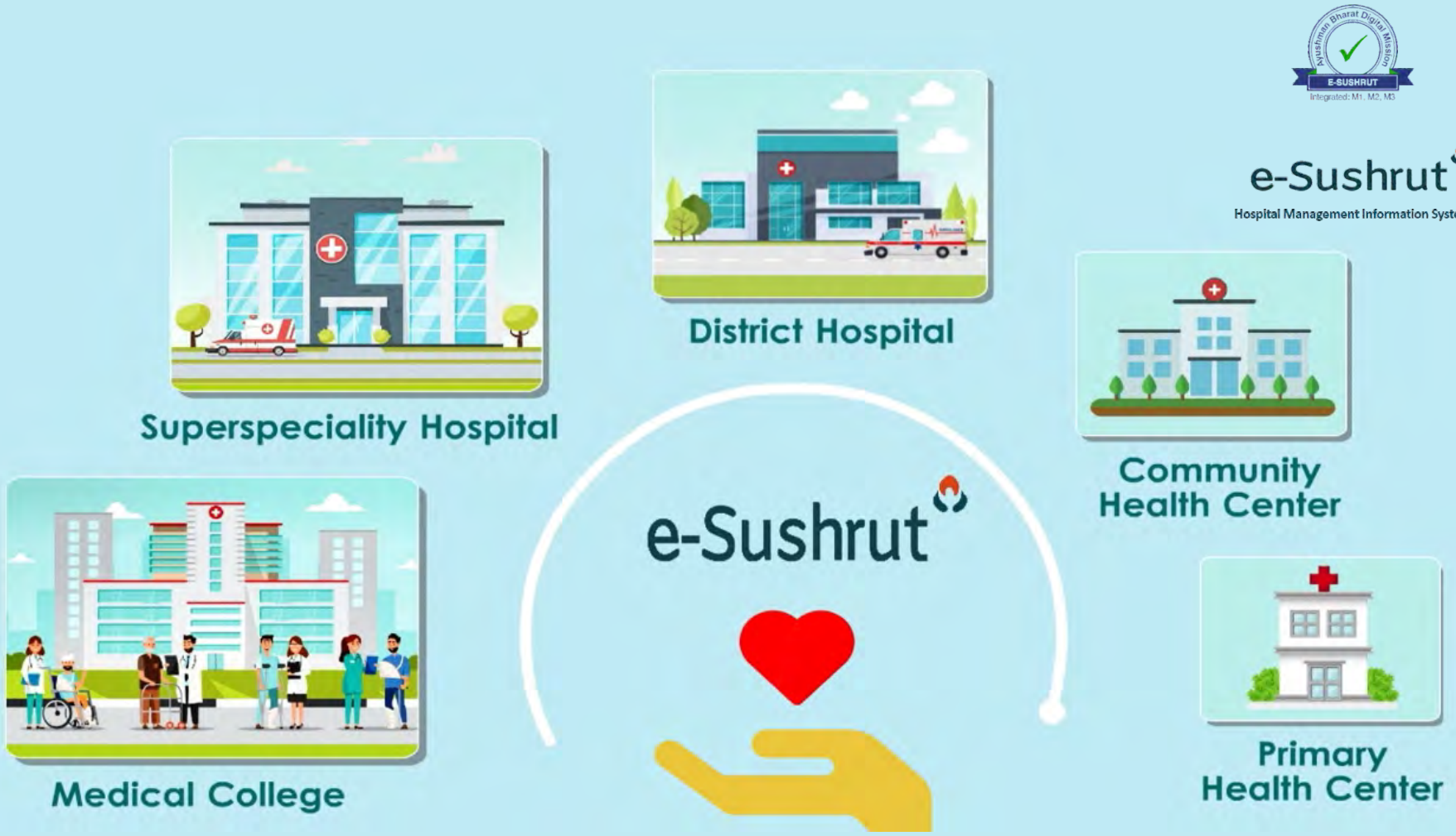
e-Sushrut Generation 6i – A Hospital Management Information System

"e-Sushrut", a Hospital Management Information System (HMIS) is a major step towards adapting technology to improve healthcare. Its main objective is to provide healthcare services to the masses by leveraging computing power at low cost. The beneficiary hospital shall use the Hospital Management Information System (HMIS) as a service and shall not undergo the challenges posed by technology, administration and implementation in computerization. e-Sushrut, Hospital Management Information System (HMIS) was initiated as a solution for digitization of clinical and back-office workflows in a hospital or medical facility. e-Sushrut incorporates an integrated computerized clinical information system for improved hospital administration and patient healthcare. It provides an accurate, electronically stored medical record of the patient.

In its present incarnation as e-Sushrut G6i, it supports diverse workflows with the broad objective of enabling standardized and efficient healthcare service delivery at all levels (Medical College Hospitals, DHs, CHC, and PHCs).

With the launch of Ayushman Bharat Digital Mission – ABDM, e-Sushrut is one of the first application compliant to ABDM Building Blocks and has achieved all three milestones. ABDM not only enables e-Sushrut to exchange the Electronic Medical Records among hospitals but also create the repository of clinical data. A data warehouse of such records enables opportunity to analyse and interpret the data, enabling the predictive analysis in the health domain, assisted by artificial intelligence and machine learning components.



KEY FEATURES

- Compliance to Health Standards EHR-2016, FHIR and ABDM Building Blocks
- Clinical Speciality Specific workflows and templates
- Accessible via Tablets and Mobile devices for ubiquitous usages with Voice to Text entry support.
- Citizen Centric Mobile App for Tele-consultation, Appointments and Lab Report
- Integration with various third-party applications and Govt. Programs for seamless automation and digitalization of Health Records.
- Facility for various modes of digital payment's

Over the years, e-Sushrut has evolved as a comprehensive HMIS ERP solution to support multiple state-wide implementations as well as super specialty hospitals requirements.

DEPLOYMENTS

Super Specialty Deployments

AIIMS Patna, AIIMS Raebareli, AIIMS Mangalagiri, AIIMS Raipur, AIIMS Nagpur, AIIMS Bhubaneswar, AIIMS Bathinda, AIIMS Gorakhpur, AIIMS Kalyani, AIIMS Deogarh, AIIMS Bhopal, AIIMS Rajkot, AIIMS Bibinagar, AIMS Guwahati, AIIMS Jodhpur, IGIMS Patna, GIMS Greater Noida, NIMS Hyderabad, PGIMER Chandigarh

State Wide Deployments

State of Arunachal Pradesh, State of Goa, State of Himachal Pradesh, State of Maharashtra, State of Punjab, State of Odisha, State of Sikkim, State of Telangana, State of Tamilnadu, State of Uttar Pradesh

PSU Health Facility Deployment

Indian Railways, NHPC and SAIL

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AAKANKSHA RADIATION TREATMENT PLANNING SYSTEM FOR BRACHYTHERAPY MACHINES

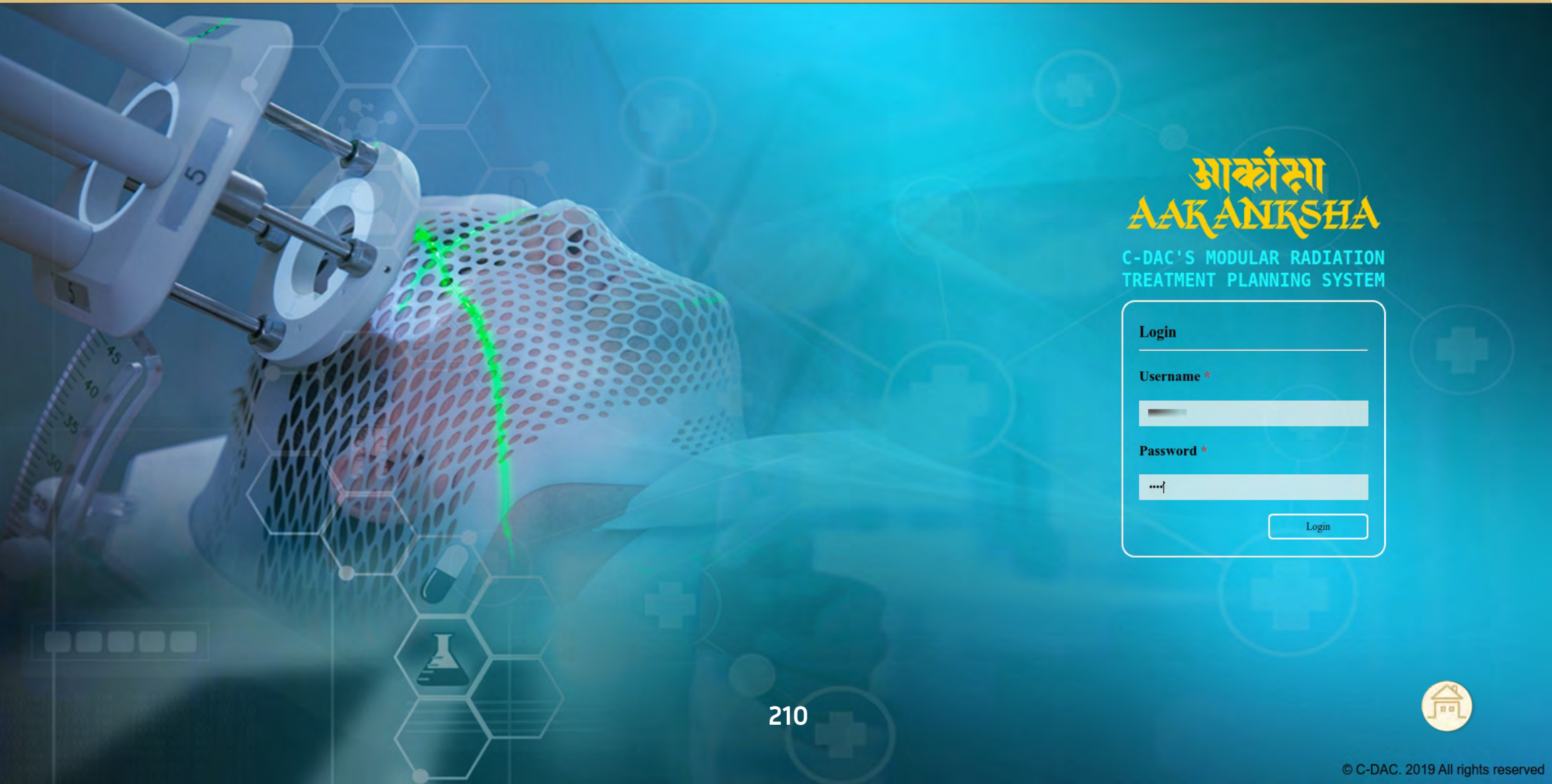
Radiation oncology involves treating cancer patients using different irradiation techniques. Aakanksha Radiation Treatment Planning is an indigenous Radiation TPS solution for generating personalized radiation treatment plans for HDR Brachytherapy machines. The system covers the entire spectrum of treatment planning and complies with DICOM and IEC- 61217 standards. The system includes a contouring station, planning station, Dose calculation and optimization, DVH, user-friendly machine and source management, and interactive dashboard. The system is tested, verified, and validated by the team at BARC and TMH. The system is currently integrated with Karkanidon, an indigenous HDR Brachytherapy machine, and deployed at TMH, Mumbai.

KEY FEATURES

- Comprehensive end-to-end Radiation Planning
- Faster and accurate Dose calculations and optimization
- DICOM Standard compliant & follows IEC-61217
- Open-source, Modular, easy-to-use solution
- Suitable for a wide range of applicators
- No Vendor locking
- Indigenous Radiation TPS solution - Make in India

DEPLOYMENTS

Tata Memorial Centre, Mumbai.



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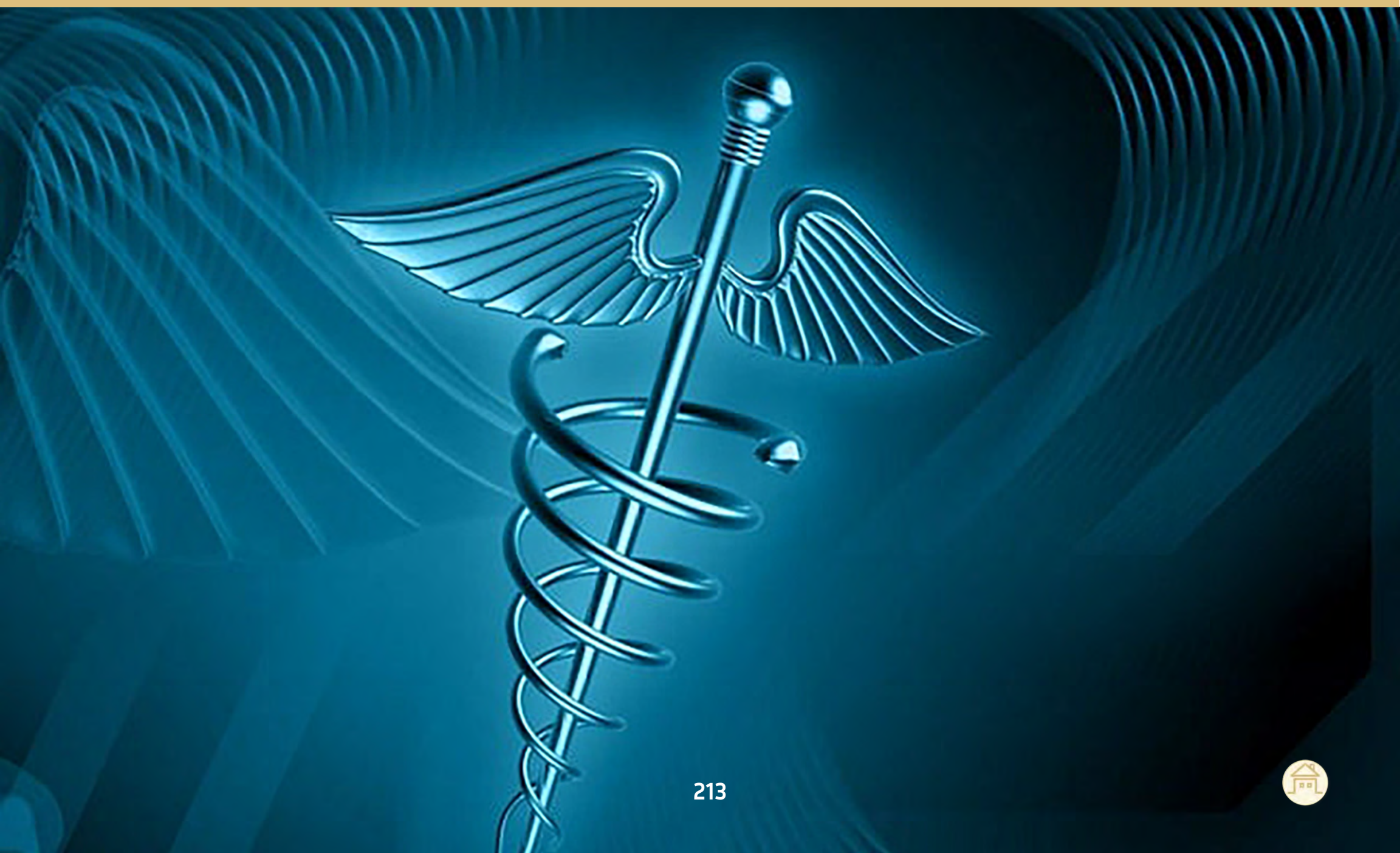
AAKANKSHA
आकांक्षा

C-DAC'S MODULAR RADIATION TREATMENT PLANNING SYSTEM

MERCURY™ NIMBUS NEO

Mercury™ Nimbus Neo suite is an enterprise-grade 5G & cloud-enabled comprehensive Telehealth solution deployable over Cloud / Data Centres / In-premise. The solution is highly available, scalable and secure with a user-friendly interface to carry out day to day clinical record keeping and tele-consultation operations. Mercury™ suite offers low cost, highly maintainable solution for healthcare deprived citizens of the nation dwelling in remote areas.

Modules/sub systems of suite Mercury™ Nimbus Neo includes; Mercury™ solution to offer EHR/EMR and Telehealth services. Mercury™ for Android for view medical records and provide advice by specialities. Mercury™ Remote Module to continue operations at remote centres despite disruption in connectivity. Mercury™ CollabMedImaging for Real-time Collaboration on Medical Images. Mercury™ for VR Education & Training Platform to provide an interactive field experience for medical students/trainees. Mercury™ Cloud Repository for archiving medical data




Temperature
95
SPO2
136
Systolic BP
105
Systolic BP
83
Heart Rate
76

KEY FEATURES

Supports various Telehealth interactions like patient-to-doctor, doctor with multiple clinics, groups of clinicians, clinicians with specialist, and hospital-to-hospital.

Comprehensive in-built EMR / EHR framework covers clinical events/modalities/specialities spanning the patient's lifetime.

Tunned for modern communication technologies such as 5G/4G/BB-VPN. High-speed and ultra-reliable interaction and communication over 5G network.

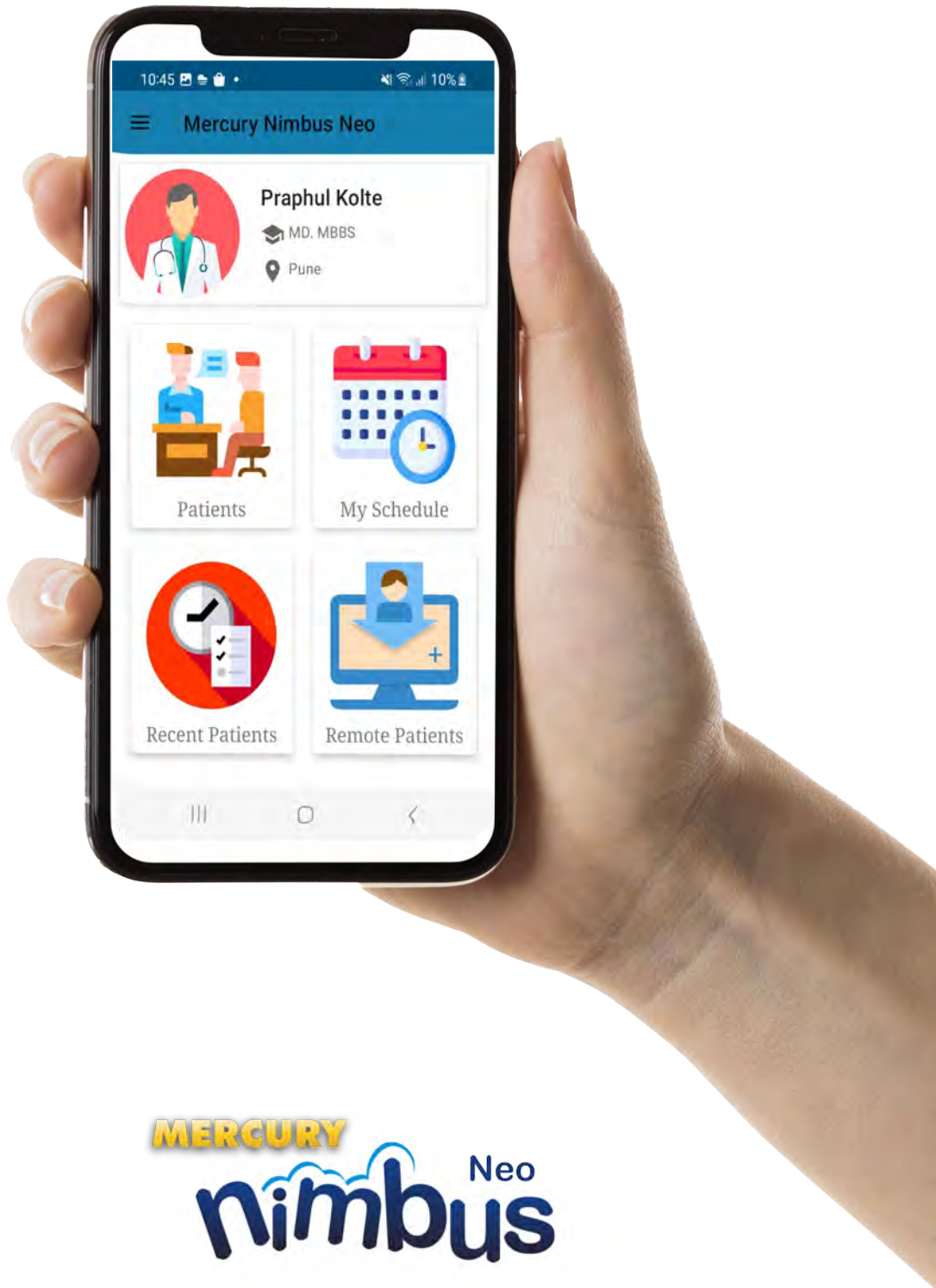
Device Interfacing with large range of off-the-shelf medical and IT devices.

TeleICU Vital Signs Monitoring through dashboard and alert management,

Interoperable with other Health Informatics solutions as support medical standards and terminologies (SNOMED CT, ICD, DICOM, HL7 & Drug codes).

Other major features like; A/V Conferencing & Recording, PACS integration, Medical Imaging, Appointment Booking, Offline Data Transfer, Multilingual etc.

Robust Security and Role-based Access Control. Scalability options for load-balancing and clustering.



DEPLOYMENTS

National Thermal Power Corporation (NTPC) Limited, 19 locations across the India

Government of Odisha, 36 Telemedicine sites, and 13 eICU across Odisha State

Government Medical College, Jammu along with 10 remote locations in J&K

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AYUSOFT

Ayusoft is an end-to-end software solution for practice, research and training of Ayurveda, for health and treatment advice. Wide range of applications of Ayusoft include:

Constitution (Physiological and Psychological) and Tissue Quality Assessment
Disease Diagnostics & Treatment
Diet & Lifestyle Advice
Personal Information Management System
Multimedia based Encyclopaedia
Textual & Graphical Analytical Report Tool

DEPLOYMENTS

Parul Institute of Ayurved & Research

Ashokrao Mane Ayurvedic Medical College

NRCVEE, Indian Institute of Technology (I.I.T.), Delhi, India

KEY FEATURES

Integrated system offering multiple interconnected applications under the same umbrella

Systematic examination tool as per classical Ayurvedic guidelines

Investigations, Case Analysis etc. according to practical clinical needs and research challenges

A High-End Query Database with Multidimensional search utility

System addressing heterogeneous needs of various user categories like Hospitals, Practitioners, Researchers

Offers human expert analysis with human-independent analysis

Applications as well as data can be plugged into AyuSoft to help you customize the tool to your specific needs aided by automated data loading and customized textual and graphical report generation capabilities

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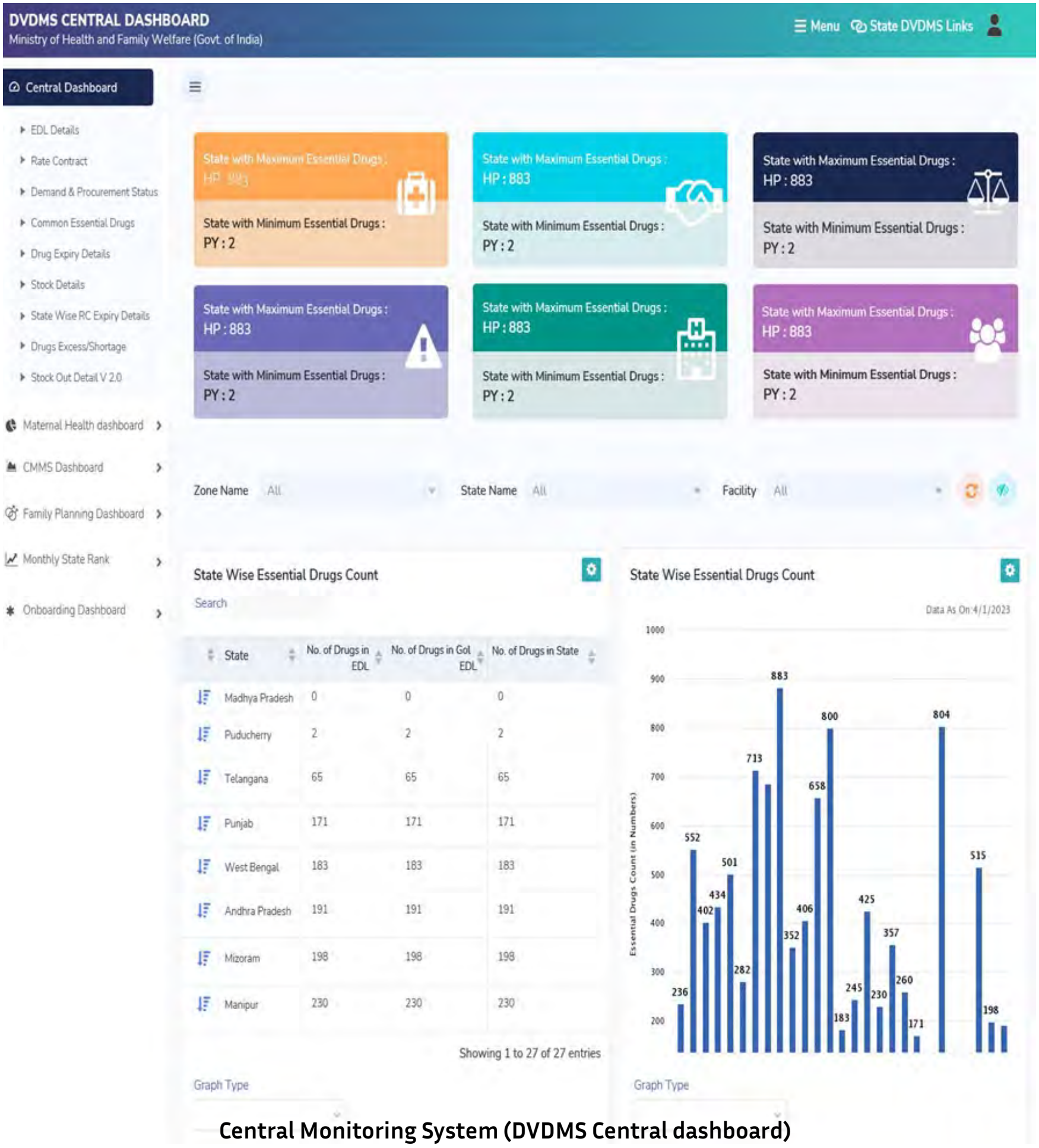
e-AUSHADHI-DRUGS AND VACCINE DISTRIBUTION MANAGEMENT SYSTEM

"e-Aushadhi", Drugs and Vaccine Distribution Management System (DVDMS) is a major step towards adapting technology to improve distribution of drugs, vaccines and sutures. Its main objective is to provide services to the masses by leveraging computing power at low cost.

e-Aushadhi is a software solution designed to efficiently handle the various aspects of drug and vaccine management within healthcare organizations, pharmaceutical companies, or public health agencies. This system is crucial for maintaining accurate records, ensuring regulatory compliance, and enhancing overall safety and effectiveness in the distribution and administration of drugs and vaccines.

This solution has brought about a great impact in the area of public health, which has aided in analysing disease patterns and tracking disease outbreaks and transmission to improve public health surveillance and speed of response.

e-Aushadhi deployments in India has reached to 18 States, 06 Union Territories, 05 National Programs under the Ministry of Health and Family Welfare, 01 Program under the DGAFMS, Ministry of Defence and 02 Programs under Insurance Medical Services.



Central Monitoring System (DVDMS Central dashboard)

KEY FEATURES

- Web Based Architecture
- Role Based Access
- Visual Analytics
- GS1 Compliance bar code standards
- MDDS Compliance
- SMS and Email facility to the users
- Dashboard & Drill Down functionality to help in monitoring of drugs, to provide statistic on multiple parameters.
- Comprehensive Audit Trail & Audit Log
- Compliance to Digital Signature
- Interactive User Manual

Over the years, DVDMS has evolved as a comprehensive Supply Chain Management to support multiple state-wide implementations as per requirements.

In its present incarnation as e-Aushadhi, it supports diverse workflows with the broad objective of enabling standardized and efficient distribution of drugs delivery at all levels (Medical College Hospitals, DHs, CHC, and PHCs).

CENTRAL MONITORING SYSTEM (DVDMS CENTRAL DASHBOARD)

Using Central dashboard all states and UT's data could monitor at a glance which provides an array of visualization involving tabular and various graphical representation of the current (snap shot) and historical trends of key performance indicator to enable data based informed decisions.

DEPLOYMENTS

State Implementation

Rajasthan, Gujarat, Telangana, Bihar, Madhya Pradesh, Maharashtra, Punjab, Andhra Pradesh, Uttar Pradesh, Uttarakhand, Himachal Pradesh, Jharkhand, Assam, Arunachal Pradesh, Manipur, Mizoram, Nagaland, Odisha.

Union territories (UT) Implementation

Jammu & Kashmir, Puducherry, Lakshadweep, Andaman & Nicobar Island, Chandigarh, Ladakh.

National Program and other Implementation

Central Tuberculosis Division MoHFW, Family Planning Division MoHFW, Central Medical Services Society MoHFW, Medical Store Organisation MoHFW, DGAFMS Ministry of Defence, Directorate of Insurance Medical Services Andhra Pradesh, Directorate of Insurance Medical Services Telangana, Directorate of Medical Education and Research Maharashtra, Central Dashboard-MoHFW.

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PARIKSHAK (AN AUTOMATED PROGRAM GRADING AND ANALYSIS TOOL)

Parikshak is an Automated Program Grading and Analysis tool. It allows teachers to conduct programming exams in online mode, with auto-evaluation of student programming assignments, analysis after programming tests, etc. Parikshak can significantly reduce the load of the faculty and give timely feedback to students, thereby leading to smooth and efficient handling of programming assignments/exams.

KEY FEATURES

- Online GUI for Administrator, Teacher and Student
- Supports programs written in Java, C, C++, Perl, PHP and Python
- Three types of problems supported:
  - Write complete program
  - Complete the snippet
  - Debug the program
- Instant feedback to students during and after the test
- Plagiarism detection of students' submission
- Question Banking facility
- Live monitoring of exams & assignments
- Common environment for programming in different languages

DEPLOYMENTS

- Securities and Exchange Board of India (SEBI) - Mumbai
- ProtoTech Solutions and Services Pvt. Ltd. - Pune
- Hopscotch - Bangalore
- C-DAC (Recruitment and lab tests)
- Varank Tech Private Limited - Mumbai
- D-mart - Mumbai
- Shah & Anchor Kutchhi Engineering College - Mumbai

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OBJECTIVE RESPONSES IMAGE BASED CAPTURE (OBRIC)

Objective Responses Image based Capture (OBRIC) is a web-based system for processing of objective type tests conducted using specially designed answer sheets. OBRIC can process scanned images of response sheets (and does not require a special OMR scanner) and display processed output as per user requirement. It uses image processing to identify ovals and shading within the oval.

KEY FEATURES

- Fast and effective solution for multiple choice-based exams and data collection.
- Saves time and money.
  - Tests can be conducted on a normal A4 size paper.
  - Response sheet can be scanned for further processing using a normal scanner.
- Fully configurable.
  - Response sheets can be customized.
  - Output of processed sheets can be configured.
- Sophisticated Diagnostics Module to handle errors in scanned response sheets.
- Result Analysis and Attendance verification module also included.
- Web-based solution.

DEPLOYMENTS

- Indian Coast Guard (ICG)
- C-DAC Mumbai Recruitment Exams
- National Institute For Research In Reproductive and Child Health (NIRRH)
- Advanced Centre for Treatment, Research and Education in Cancer
- (ACTREC)

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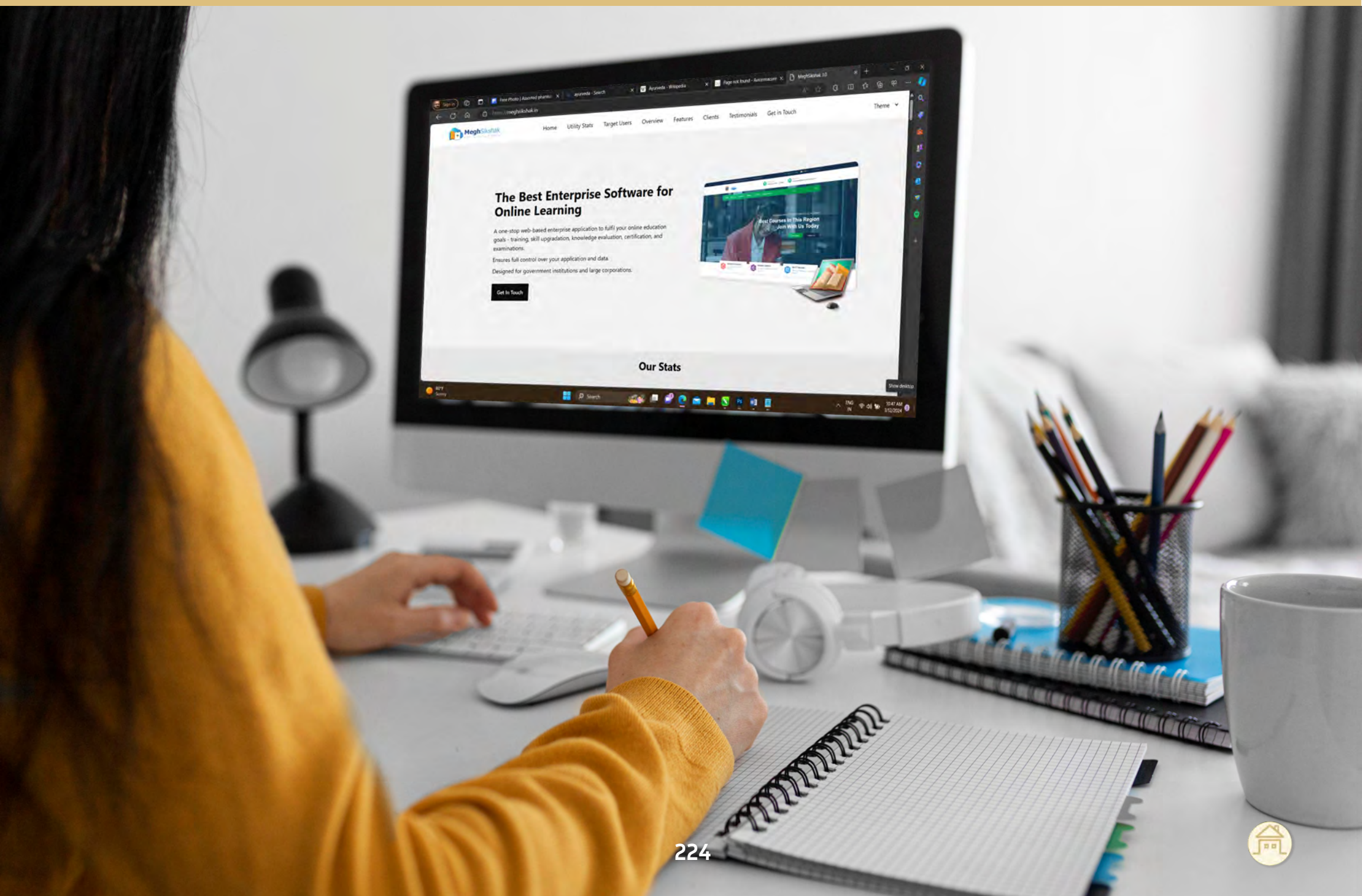
MEGHSISHAK

MeghSikshak is an indigenously developed e-learning platform that can be used for offering online courses and implement capacity building programs. It is a versatile tool that serves multiple needs of delivering online education for skill upgradation, capacity building, training, campaigns, credential programs, knowledge enhancement, etc. It supports user management, course management, content delivery, assessment, discussion forum, certificate generation, analytics and other communication & collaboration services. For more details, please visit https://meghsikshak.in



KEY FEATURES

- Offered on Cloud or On-Premise
- Easy Customizations
- Seamless Integrations
- Secure and Scalable
- Intuitive User Interface
- Standards Compliance
- Secure Registration & Login
- Multilingual Application
- Conditional Course Delivery and Learner Progress Tracking
- Announcements, Notifications and Discussion forum
- Course Feedback & Review
- Subjective and Objective Assessment
- Easy Administration and Analytics
- Virtual Labs
- Capture the Flag

DEPLOYMENTS

- National Forensic Sciences University, Ministry of Home Affairs, Gandhinagar, Gujrat.
- College of Military Engineering, Pune, Maharashtra
- Biju Patnaik State Police Academy, Bhubaneshwar, Odisha
- Punjab Police Academy, Phillaur, Punjab
- Centre for Materials for Electronics Technology, Hyderabad, Telangana
- Department of Post, PTC Mysuru, Government of India
- National Defence University, Ulaanbaatar, Mongolia
- Kerala Police Academy, Thrissur, Kerala
- CAKES Platform, C-DAC Corporate HRD, Pune, Maharashtra
- Chariot Platform, C-DAC Hyderabad, Telangana

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EDUCATION AND TRAINING SOFTWARE SUITE

An end-to-end integrated web-based software solution taking care of all educational activities right from student selection, the learning journey until industry placement. The suite consists of training products and services for entrance exam registration, exam conduction, lab assessments, feedback assessment, analytics and visualization dashboards, placement management, payment management and administration, identity access management, and learning management. A system automates the manual processes of carrying out placements, gathering feedbacks etc.

KEY FEATURES

User authentication, authorization, and role management

Adaptive and Collaborative Learning environment

Bulk import and management features

Centralized repositories for storing and organizing resources

Assessment and grading tools in LMS

Extensive feedback feature based on set indexes

A user-centric web platform with data analytics and reporting capabilities for several departments and user groups.

Customized reporting

Analytics and visualization of learning data across the learner's journey

DEPLOYMENTS

Deployed and used for Post Graduate Diploma Courses at ACTS, Pune: ACTS Website, Online Feedback System, eMulyankan, ePariksha, Placement Management System, Online Registration System

Ministry of External Affairs funded the project for establishing the Centre of Excellence and our solutions has been deployed at several international fronts hosting Centre of Excellence at Alofi Niue, Cook Island, Guyana, Nauru, Nus Apia Samoa, Suva Fiji, Port Vila Vanuatu, Laos, Cambodia, Myanmar, Vietnam, Papua New Guinea, Kazakhstan, Solomon Island: eMentor, ePariksha

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LEARNING MANAGEMENT SYSTEM (LMS)

Learning management System (LMS) is a web based, self-managed, configurable, highly-flexible, and feature-rich platform supporting the key pedagogical principles with advanced educational technologies and standards. In addition to multi-media content hosting and support, it has integrated virtual lab with access to remote lab systems. It has all standard features of an LMS i.e. User Management, Course Authoring, Assessment and Quizzing, Collaboration and Communication and Reporting. The LMS is equipped with Advanced Distributed Learning (ADL) through SCORM (Sharable Content Object Reference Model) and xAPI (Experience API) to track user data and provide sub-APIs to access and store information about state and content of the user. Additionally, it supports Learning Tool Interoperability (LTI) and acts as 'LTI Consumer' and 'LTI Provider' both.

KEY FEATURES

- Modern and easy to use interface
- Personalized Dashboards
- Multimedia integration
- Collaborative Tools and Activities
- Progress Tracking
- Secure Authentication & Mass Enrolment
- Course Creation, Authoring & Backups
- Management of user roles and permissions
- Community sourced plug-in-based management
- Reporting & logs

DEPLOYMENTS

Deployed at ACTS, Pune for Future skills Prime Project and other allied activities at ACTS

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BOSS BASED STUDENT ASSESSMENT SOLUTION

C-DAC has developed and implemented a complete suite of BOSS Based student Assessment solutions to test the level and learning outcomes of students at all standards.

KEY FEATURES

Operational Scheduling for HiTech lab software. Creation, management and interface for digital calendar.

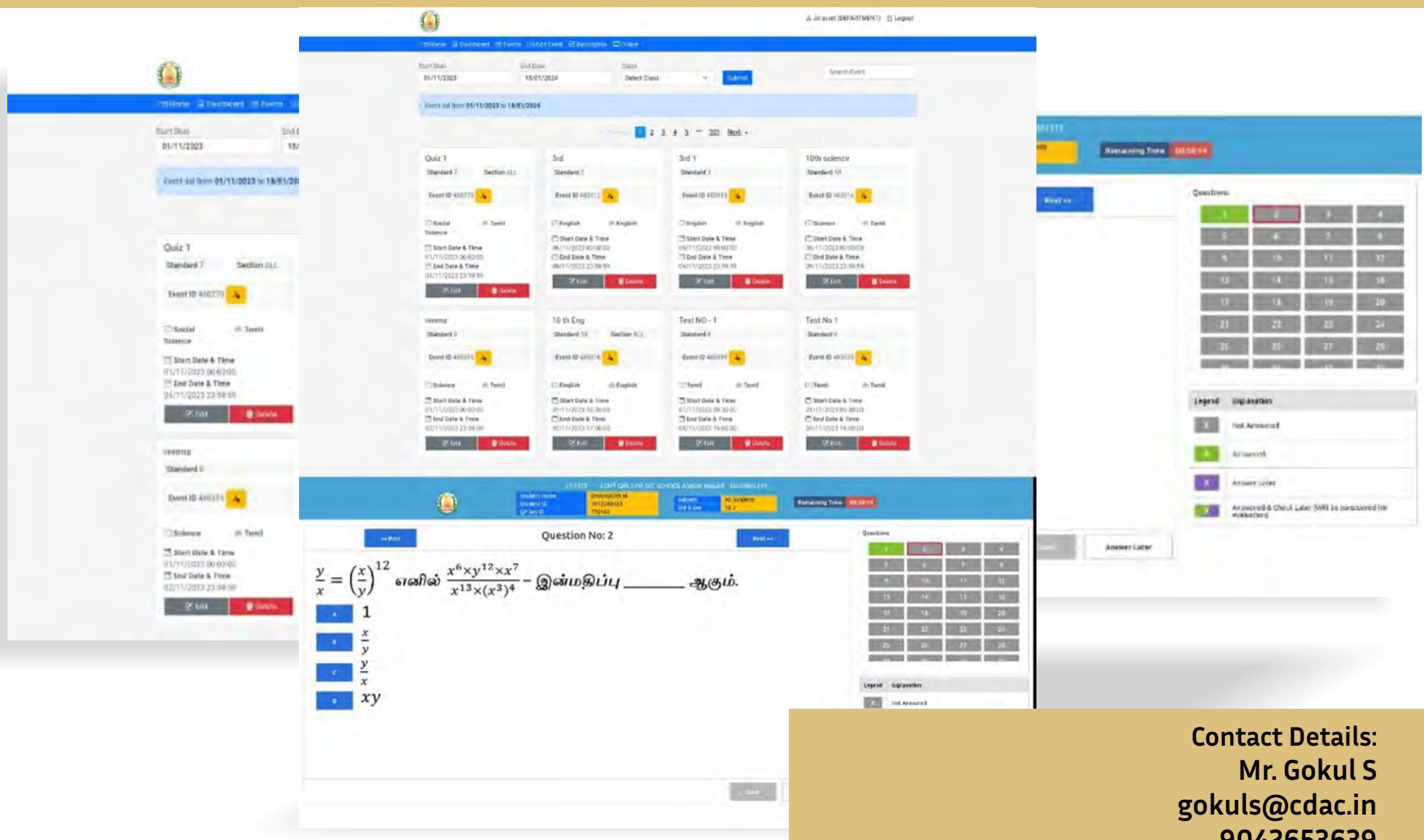
Centralised Exam system management system.

Integrated Exam management and conduction system.

Complete operational, management and analytics dashboard with reporting and alerting modules.

DEPLOYMENTS

Tamilnadu School Education department, Samagra Shiksha.



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INTEGRATED SCHOOL MANAGEMENT SYSTEM (ISMS)

ISMS is an integrated platform for all the aspects of a school for seamless operation from admission and fee payment to the scheduling of courses, monitoring performance of students and teachers. The purpose of the system is to streamline the functioning of all the schools under the control of the Directorate of Education, thus improving the quality of education being delivered.

Key Features/ Unique Selling Point of the Product/ Solution

The Integrated School Management System would cover the following modules:

Academics & Examination Management

Students Management

Teacher's Training

School Profile

Communication Management

Learning Outcome Assessment Module: Performance Assessment Curricular Activities (PACE)

Basic Reading & Numerical Ability Assessment Module

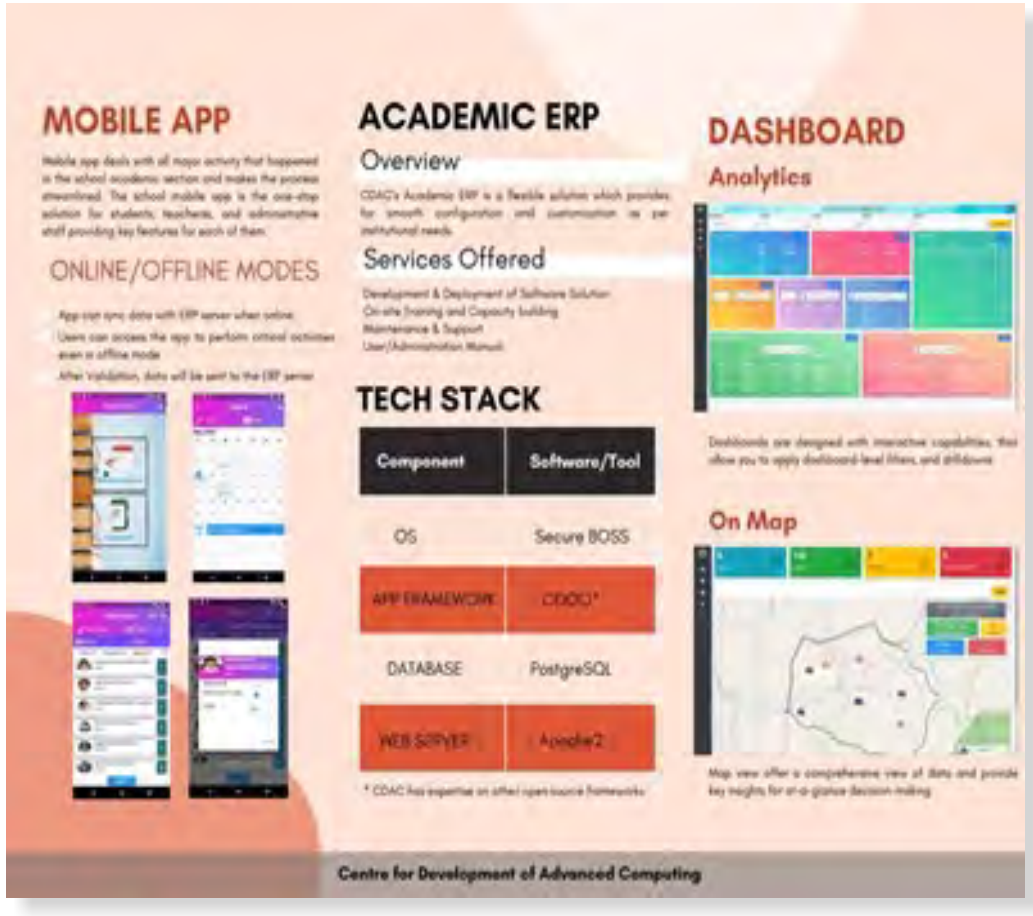
Career Counselling

Mobile Application

Reporting

Dashboard

Dynamic Web Portal



DEPLOYMENTS

School Education, Dadra and Nagar Haveli and Daman and Diu (DNHDD).

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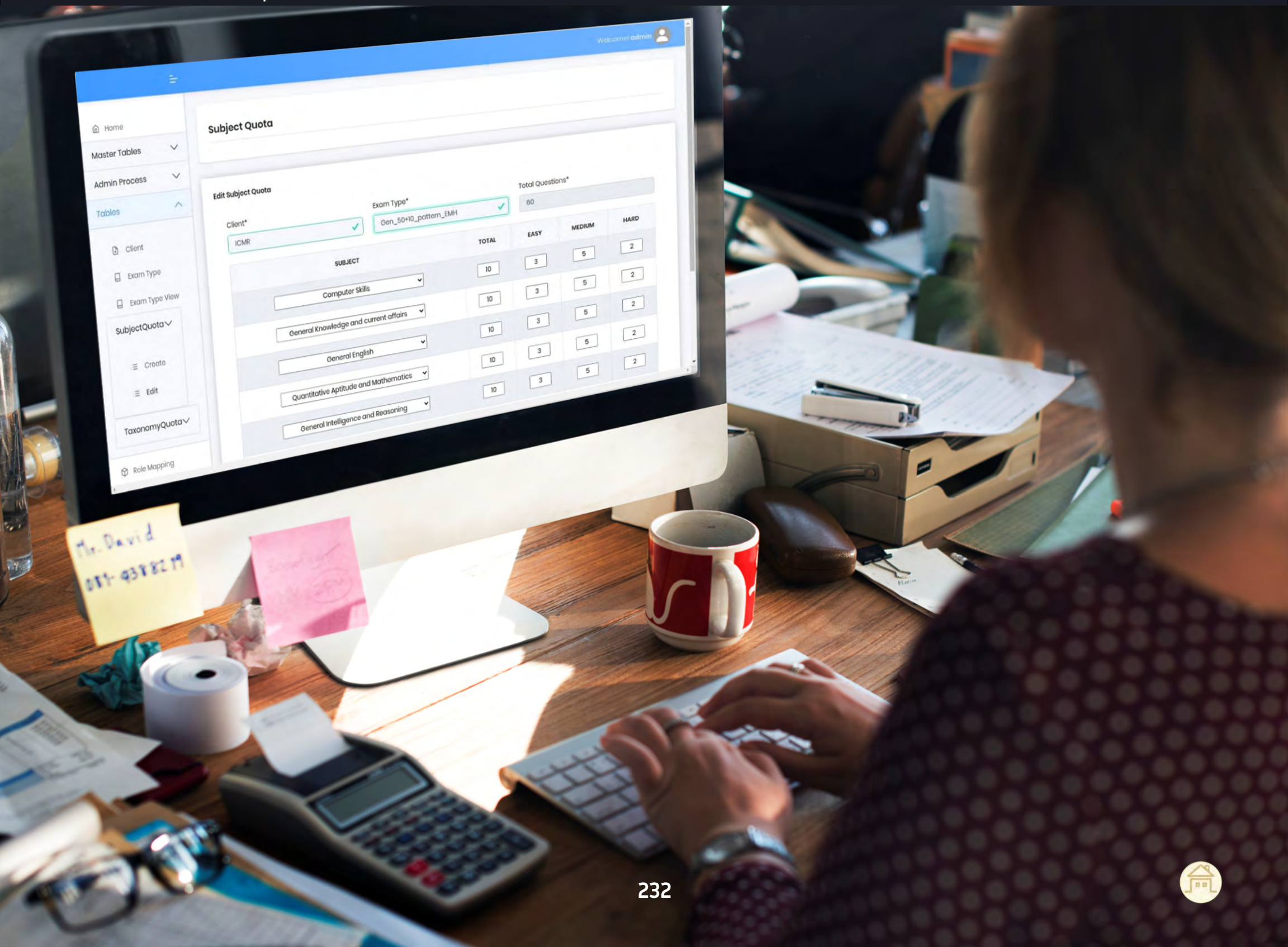
QUESTION BANK CREATION AND CURATION TOOL

A question creation and curation tool is a valuable resource designed to streamline the process of generating thoughtful and effective questions. It allows users to craft questions that are clear, relevant, and tailored to their specific needs. Additionally, the tool often includes features for organizing and categorizing questions, making it easier to manage large sets of inquiries. By providing a structured framework for question creation, these tools contribute to the development of assessments. Overall, a question creation and curation tool is an essential asset for education department.



KEY FEATURES

Design custom taxonomy

Create question

Multilevel curation process.

Analytics and Dashboard.

Detect duplicate question.

Role based access control.

Reporting

DEPLOYMENTS

Tamilnadu school education, Samagra shiksha.

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GAMIFIED LEARNING AND ASSESSMENT MANAGEMENT SYSTEM (GLAMS)

The GLAMS (Gamified Learning and Assessment Management System) is an innovative platform designed to transform the digital learning and assessment process into a more engaging and interactive experience tailored specifically for the millennial generation. It leverages the compelling aspects of gaming to assess and enhance various skills. The system is crafted to enable effective skill development through a game-like, collaborative learning environment.

GLAMS aims to boost participants' knowledge and cognitive abilities, including processing capacity, speed, innovation, risk-taking, and perseverance. It also focuses on pinpointing educational gaps through detailed profiling of its users, who could be students or professional candidates. This gamified approach is intended to motivate active learners and inspire and involve less engaged ones, offering a dynamic and enjoyable way to learn and grow.

KEY FEATURES

- Comprehensive Learning, Revision, and Assessments Framework
- Effectiveness and acceptance of new learnings
- Profiling of learners/candidates (gap identifications)
- Reduced Stress Environment During Assessment/Learning
- Better Retention of Knowledge Imparted to Learners

DEPLOYMENTS

Army Public School-Patna

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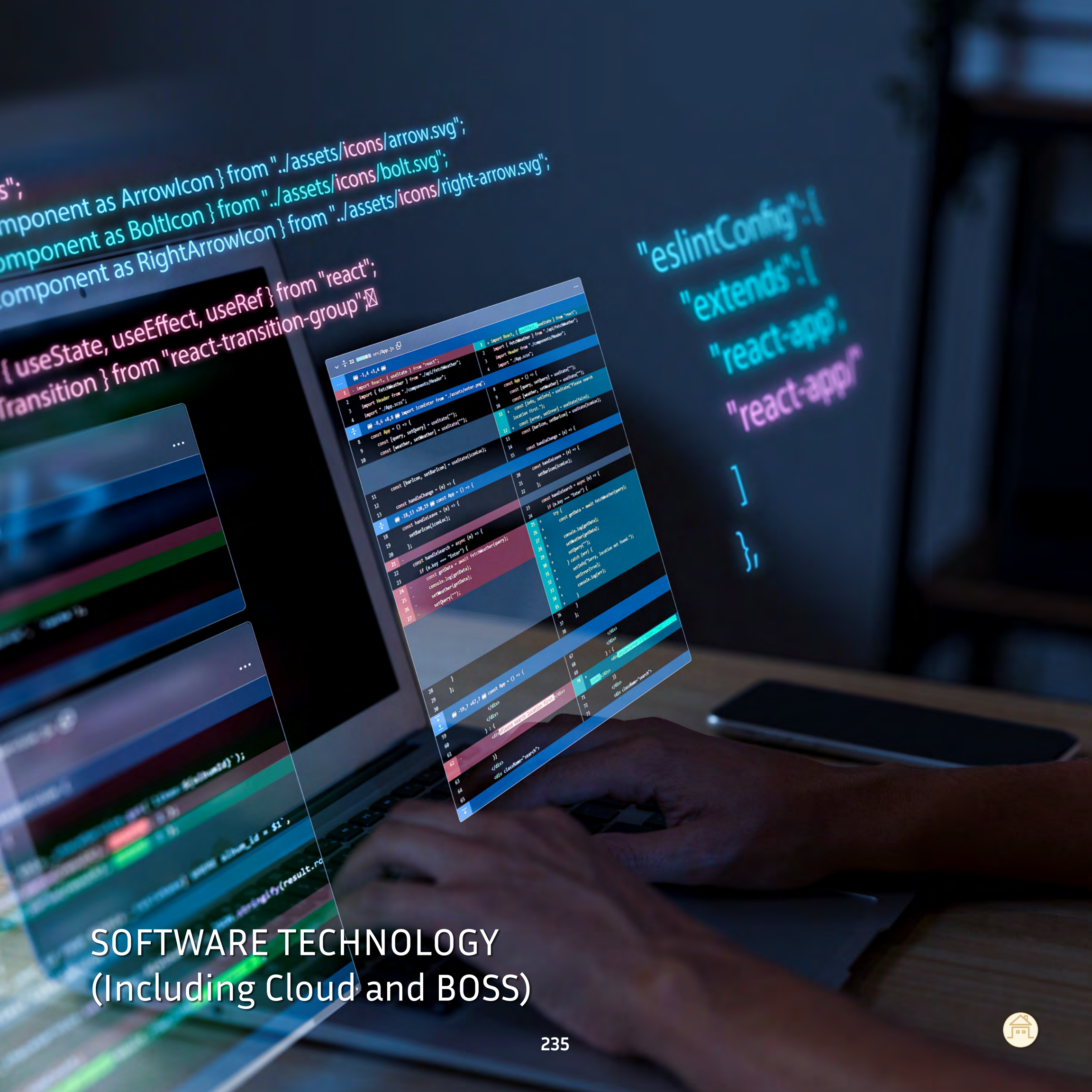
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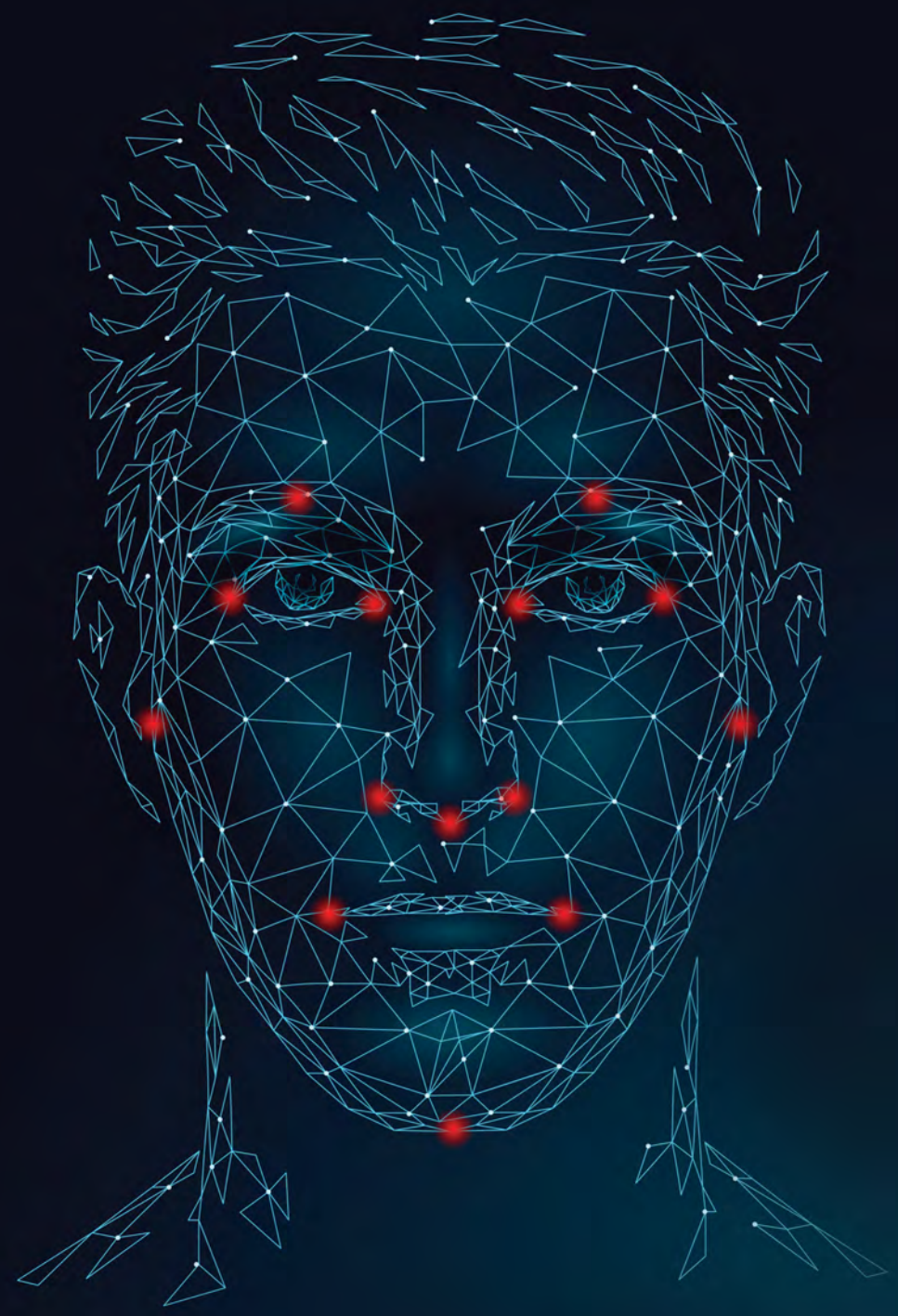
SOFTWARE TECHNOLOGY
(Including Cloud and BOSS)



Software Technology

(Including Cloud and BOSS)

E-governance solutions play a crucial role in improving government services and increasing transparency and accessibility for citizens. Further, research in several areas , whether AI or Brain Computer interface, finally has to translate into a software based product that will be the tangible output. C-DAC is making significant strides in various software technology domains, providing indigenous solutions that cater to a wide range of requirements including e-governance, authentication, security, cloud, and management.

C-DAC's focus on developing indigenous solutions across these software technology domains demonstrates our commitment to innovation and excellence, ultimately contributing to the advancement of society and the nation as a whole. Going forward, newer methods like LLM-assisted development, low-code/No Code platforms or microservice architectures should take primacy as we lead the way in secure, efficient and process driven development.

Co-Chairman

Shri L. R. Prakash
Scientist G
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Software Technology

(Including Cloud and BOSS)

Software technologies is one of the areas where C-DAC has put its strong mark. From cloud, to educational solutions, e-governance to security, authentication, management solutions to cryptography in all these wide application domains C-DAC has done quality development through its indigenous solutions.

In this first booklet on “Products and Solutions” we are happy to share some of C-DAC's solutions from software technology that are ready to use and simplify development and life. In this edition we bring solutions from the domains of e-governance, authentication, security, cloud, management.

All these solutions are indigenously developed catering G2C, G2B or B2B requirements.

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Software Technology

(Including Cloud and BOSS)

AADHAAR DATA VAULT

Data protection and privacy have always been a concern for individuals when they're involved in the various processes happening within the government structure. The existence of certain data always poses risks to the citizens' privacy, and most importantly, information that contains personal identity numbers. The Aadhaar number is one such identity for which its secure management while availing various Government services has always been a concern.

Therefore, UIDAI mandates the secure storage of residents' Aadhaar numbers in a separate repository known as 'Aadhaar Data Vault'. All government departments offering citizen services and using the Aadhaar number in their application workflows are required to use the Aadhaar Data Vault for secure management of Aadhaar numbers and related data.

By establishing Aadhaar Data Vault, UIDAI aims to enhance the security and privacy of residents' Aadhaar information, thereby reinforcing the overall integrity and trustworthiness of the Aadhaar ecosystem. Aadhaar Data Vault can be tailored to specific needs.

DEPLOYMENTS

Deployed at Indian Oil Corporation Limited

KEY FEATURES

Flexibility to choose unique or multiple reference key generation to refer to one Aadhaar Number.

Secure and seamless integration with the existing applications through REST API.

Transaction statistics through a Dashboard.

Support for batch migration of existing Aadhaar Numbers.

Logical portioning of the data and assigned with the dedicated repository, in case of multiple entities using it as a centralized vault.

MIS and Billing.

The solution is customizable to extend the secure storage of other identities and their associated data.

The solution can be deployed as a centralized identity registry for the secure management of Personal Identity Information (PII).

Can be tailored to meet specific needs.

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e-Pramaan is a unique nationwide initiative that enables Single Sign On (SSO) and e-Authentication for government applications. e-Pramaan supports both Open Id Connect (OIDC) and Security Assertion Markup Language (SAML 2.0) standards. Departments can choose various multi-factor authentication techniques and ID proof verification options to secure their applications.

KEY FEATURES

Identity proof verification: e-Pramaan enables Identity Verification of users using the KYC APIs of Aadhaar, Driving License and PAN currently. This maps the virtual identities with the physical person.

2-way authentication: Service are registered on e-Pramaan only after the verification, so the user is assured that the services she is accessing is authentic and not a phishing one.

Unified user directory: With unified user directory, departments get a common user base which reduces their efforts for inducting new users.

Reduction in cost, time and development efforts: As various factors of authentication can be configured at runtime by the service, the efforts required for developing, testing and releasing are eliminated.

Seamless migration to upgraded authentication techniques:C-DAC is continuously working towards bringing the latest authentication mechanisms on e-Pramaan. This gives services a wide range of options to choose from based on data sensitivity, user competency etc.

Flexible authentication chaining schemes: Services have the flexibility to choose various combinations of authentication types.

Role based access management: e-Pramaan offers role-based authorization to services. Services can create and assign roles to the users of their system which is passed on in the SSO token.

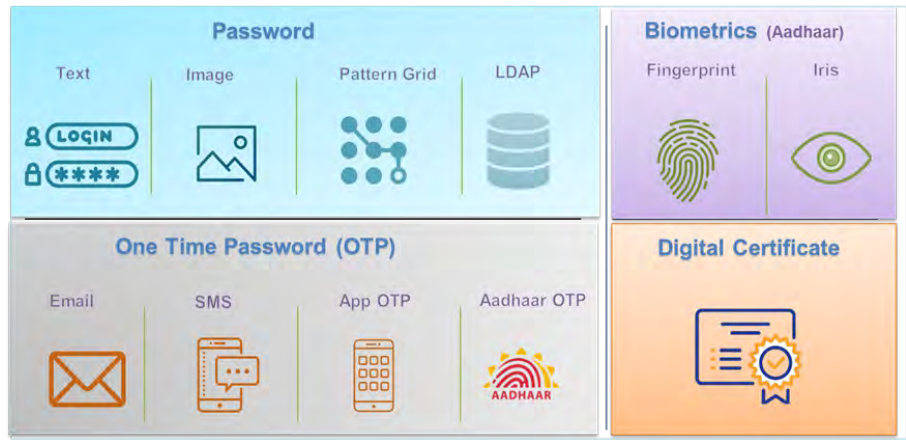
Fraud management control: e-Pramaan monitors user behavior based on IP address, OS, and the browser. Any anomalies found in the behavior are notified immediately to the authentic user through email.

Multi-device multi-platform support: Support for web and mobile applications with API for multiple technologies.

DEPLOYMENTS

NIC Cloud, Delhi for National SSO Service

Centre for e-Governance (CeG), Karnataka



e-Pramaan

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Building Nextgen Authentication

e-Pramaan
National Single Sign On

e-Pramaan is a National Single Sign On service that offers multi-factor authentication and identity verification services. It enables users to access various government services in a safe and secure manner.

MEGHDOOT CLOUD SUITE

Meghdoot Cloud suite is a comprehensive free and open-source cloud suite. The suite is carved from OpenStack along with other solutions and inhouse developments. This Cloud suite transforms the conventional data centre into a Cloud offering Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and provision for offering Software as a Service (SaaS) with ease of management and operations.

KEY FEATURES

Unified dashboard for Cloud operations and management customizable for Client business plan

Automated deployment of the stack

Enhanced operation functionalities including monitoring, metering

Inbuilt high availability, backup and disaster recovery solutions

Support for multiple hypervisors and heterogeneous environments

Integrated enterprise SIEM / security solutions

UNIQUE SELLING POINTS

The suite encompasses solutions on a plug and play architecture

The suite ensures customization to meet the business needs of clients

Enhancements on features and functionalities, since the suite adheres to open standards

Architecting the Cloud, deployment, customization, enhancements, management, operations, support and training are directly provided by the OEM (The Cloud Suite design and development group), thereby ensuring high degree of reliability.

Deployments:

Tamizh Megam Cloud at Tamil Nadu StateData Centre (TNSDC), Chennai.

Tamil Nadu Disaster Recovery Centre (TNDRC), Trichirapalli.

Defence Services Staff College (DSSC), Wellington.

Indian Financial Technology and AlliedServices (IFTAS), Hyderabad & Mumbai.

Ashoka University, Sonipat, Haryana.

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QUESTION BANK MANAGEMENT AND QUESTION PAPER SET GENERATOR SYSTEM

In the dynamic landscape of Computer based tests, the need for a robust and efficient Question Bank system is paramount. Question Bank and Question Paper Generator System is a cutting-edge Comprehensive solution designed to streamline and enhance the Question paper generation process. This system is meticulously crafted to cater to the diverse needs of CBTs like providing a centralized repository of high-quality questions spanning various topics and difficulty levels. The Question Bank system also facilitates the generation of question paper sets according to specified blueprints, incorporating quotas based on subject, topic, and difficulty levels, while seamlessly incorporating randomization.

KEY FEATURES

Question Creation, Curation, Translation and Review

Taxonomy Design and update

QP Blueprint Design and update

Single Click Question Paper generator

Bulk Import of Questions from 3rd party / vendors

Teacher / Professor Registration

Profile and Role Management

Reports

DEPLOYMENTS

Directorate of Manpower Planning and Recruitment – Indian Navy (DMPR-IN) – IHQ-MoD (Navy), New Delhi.

Tamil Nadu School Education Dept, Samagra Shiksha

C-DAC Chennai (for Recruitment exams – Computer Based Tests)

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ADVANCED FACE RECOGNITION SOFTWARE

Advanced face recognition system is a solution developed for Law Enforcement Agencies. One of the agencies is Tamil Nadu Police. As on today there are more than 55, 00,000 facial images available in the Advanced Face Recognition Software (AFRS) system to search from. Total 2750+ police stations having 60,000 active users with approx. 5,000+ concurrent users are accessing the system. As on today total 60, 000, 00+ queries made with average search time 6 sec/image.

KEY FEATURES

Accuracy is comparable with state-of-the-art implementation benchmark.

Encouraging success stories.

Small feature size.

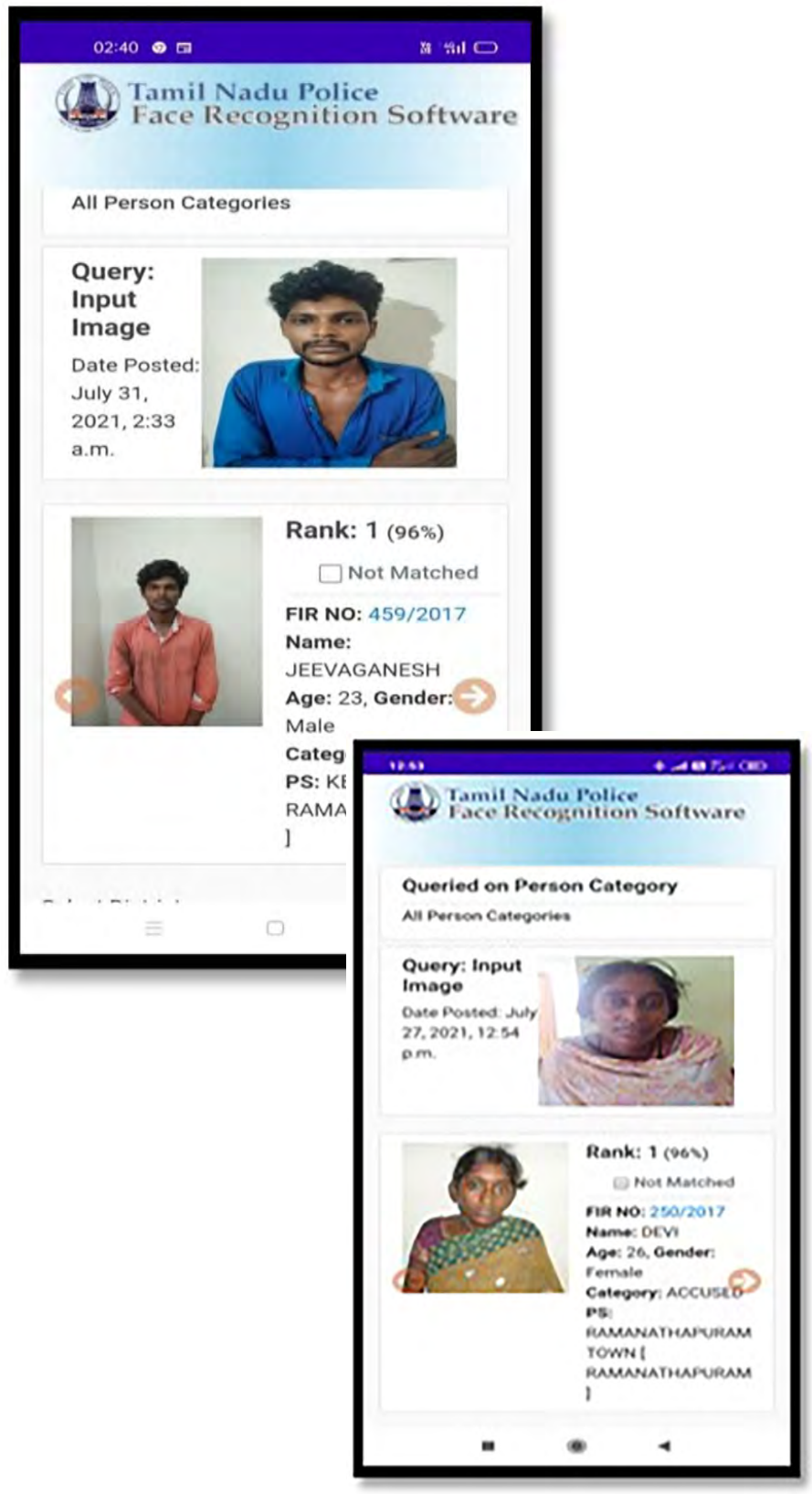
Automatic face detection and quality checking made it robust.

Can handle wide range of pose variations (+/- 20 degree for both in plane and out-of-plane).

Can tolerate deformation caused by 6 standard expressions (anger, disgust, fear, happiness, sadness & surprise).

Suitable for making tailor-made solution & can be integrated with any existing standard databases using tailor-made ETL.

Updated & latest open-source framework is used for development, which made the solution cost effective for both implementation as well as maintenance.



DEPLOYMENTS

State Crime Records Bureau, Tamil Nadu Police.

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BOSS GNU/LINUX

BOSS (Bharat Operating System Solutions) GNU/Linux is an Indian Linux distribution based on Debian and Redhat Linux, developed by C-DAC (Centre for Development of Advanced Computing).

The BOSS Linux has been released in various flavors for different purposes:

BOSS Desktop: Designed for personal, home, and official use.
EduBOSS: Designed for schools and the education community.
BOSS Advanced Server: The server-oriented edition.
BOSS MOOL: A specialized edition provides the Linux kernel with minimal core Object Oriented Components.
Secure Enterprise Solution for Defence.
BOSS for High Performance Computing
Secure Exam OS.

BOSS 10 Desktop:
The Latest BOSS 10.0 Desktop distribution integrates the Cinnamon Desktop Environment, providing user-friendly interface with Windows 11 and open-source themes, offers robust support for Indian languages and a diverse range of software options.

BOSS for HPC:
The BOSS server distribution, derived from Red Hat, designed to fulfill the needs of High-Performance Computing (HPC).

Secure BOSS Enterprise Solution:
The BOSS Enterprise solution provides a range of customized deployments specifically designed to meet the needs of secure environments, including defense.

DEPLOYMENTS:

With over 6.5 million deployments, BOSS has been extensively adopted across India in various government departments, defense sectors, educational institutions, and other organizations.

Army, navy, DGQA, ICG, DSSC wellington,TN Schools, MCEME IDS, ELCOT, SFC, DSCC Bhopal, Government of Tamil Nadu, Kerala, Punjab, Haryana, chhattisgarh.

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e-GOVERNANCE


GOVERNMENT
SEARCHING PROCESS.....100%

e-Governance

EGovernance is all about weaving the technologies into the very fabric of government functions and processes to achieve a significant transformation towards greater accessibility, efficiency, and transparency. This integration of digital tools and systems is designed to streamline government operations, improve public services, and cultivate a more inclusive society that can accommodate the needs of a population of 1.4 billion. The Digital India initiative, initiated to advance e-governance, aims to transform India into a digitally empowered society and a knowledge-driven economy. It emphasizes developing broadband infrastructure, ensuring universal mobile connectivity, and digitizing government services.

C-DAC has played a crucial role in enhancing the effectiveness and growth of e-governance in India through its focus on innovation and the creation of state-of-the-art technologies. The contributions of C-DAC have not only improved the delivery of public services but also fostered digital inclusion, making sure that technological benefits are accessible to every segment of the society. C-DAC's significant achievements in e-governance include developments in Public Key Infrastructure (PKI), cybersecurity, authentication systems, language technologies, educational technologies and digital literacy, healthcare, e-governance platforms, and the establishment of various e-governance standards.

Co-Chairman

Shri Aditya Kumar Sinha
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e-Governance

Technology Director

Shri Rishi Prakash
Scientist F
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I am delighted to extend a warm welcome as we embark on an inspiring journey toward transforming governance systems through the innovative power of technology. As the Technology Director, it fills me with pride to witness the convergence of innovation and governance in today's digital landscape.

Our arsenal comprises a comprehensive suite of systems and solutions leveraging open-source technologies poised to revolutionize the delivery of e-services. The potential is limitless, encompassing cutting-edge scalable workflow-based Office and School ERP systems, customized Licensing solutions, advanced Data Analytics and GIS platforms, along with robust accessibility features for differently-abled individuals and user-friendly interfaces for the masses.

Our skilled teams foster pioneering systems, marked by innovation and commitment to secure, resilient solutions. Together, we've crafted efficient, equitable, and inclusive systems. Explore our latest offerings in the subsequent pages.

Thank you for your attention and interest.

eGovernance

“CENTRALIZED WEAVERS DEMOGRAPHICS DATABASE APPLICATION” FOR WEAVERS AND ARTISANS

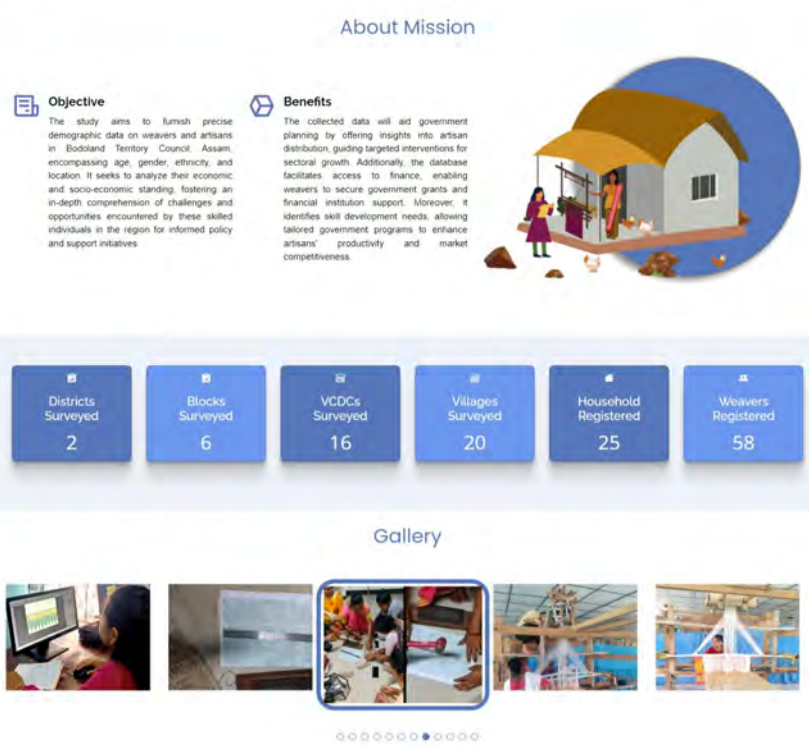
A centralized Demographics Database Application with Geo-tagging has been developed for weavers and artisans in Bodoland Territory Council, Assam. The database, accessible through web and mobile apps, provides detailed demographic data, aiding government planning, targeted interventions, and access to finance. It identifies skill development needs for tailored programs, fostering sectoral growth and market competitiveness.

KEY FEATURES

- Comprehensive Demographic Data Collection
- Secure Registration and Verification
- Hierarchical Data Approval Workflow
- Unique ID Generation
- Geographic Concentration of Weaving Activities
- Audit Trail and Role Management

DEPLOYMENTS

The application (bodolandartisans.in) has recently been hosted in Cloud-based VPS and is used by government officials as well as the weavers of BTC, Assam.



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WEB BASED DATA REPOSITORY, RETRIEVAL AND ANALYTICS PLATFORM FOR FOODBORNE DISEASES

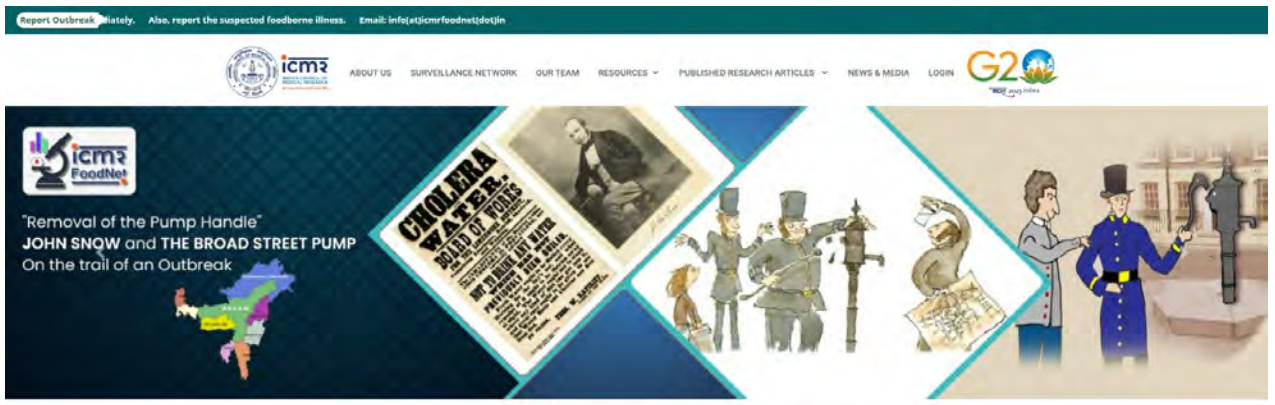
Web-based Data Repository, Retrieval, and Analytical Platform (ICMR-FoodNet) for ICMR to understand the epidemiology of foodborne diseases of public health importance across North Eastern states has been developed. The prime objective is to identify major pathogens present in food items and water sources by collecting samples from food markets, hospitals, and local communities for routine surveillance and subsequent analysis required to investigate major outbreaks.

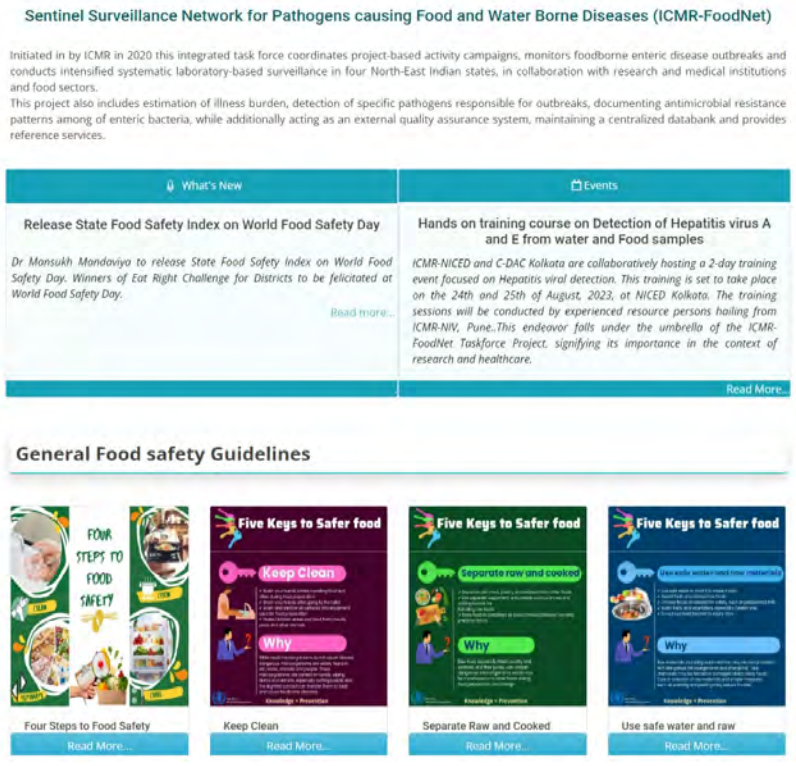
KEY FEATURES

- Comprehensive Surveillance
- Advanced Data Management
- Real-time Data Collection
- Analytic Insights

DEPLOYMENTS

The web-based application (www.icmrfoodnet.in) and the food net-mobile have been deployed in a VPS and have been hosted since August 2022. They are being used by researchers, scientists, public health, and food safety officials.





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WEB-BASED INTEGRATED OFFICE AUTOMATION SYSTEM

iWS, a web-based, integrated Office Automation System with Enterprise Document and Content Management System, is a tailor-made, low-cost workflow solution integrating the departments following the rules and norms of CARICDM in order to achieve automated office environment. The solution offers process re-engineering that is applied at various process levels wherever necessary ensuring accountability of uncompleted tasks. It significantly aims at improving the operational efficiency of the implementing organization by transitioning to a "Less Paper Office". The solution is customizable, configurable and user friendly.

KEY FEATURES

- Role based access control allowing Workflow design with document approval system
- Workflow modification by the authorized user
- In-built file tracking, performance monitoring throughout hierarchy, process status reporting
- Minimal data entry stations and master data management, user management
- Auto-generation of note-sheets, sanction letters, customized reports
- Generation of physical files on-the-fly from digital files
- Dashboard for Secretariat
- Audit Trail
- Disaster recovery and backup facility, etc

DEPLOYMENTS

Deployed at CARICOM Secretariat, Georgetown, Guyana.

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WEB-BASED DATA ANALYTICS & VISUALIZATION SOLUTION FOR LANGUAGE CENSUS DATA

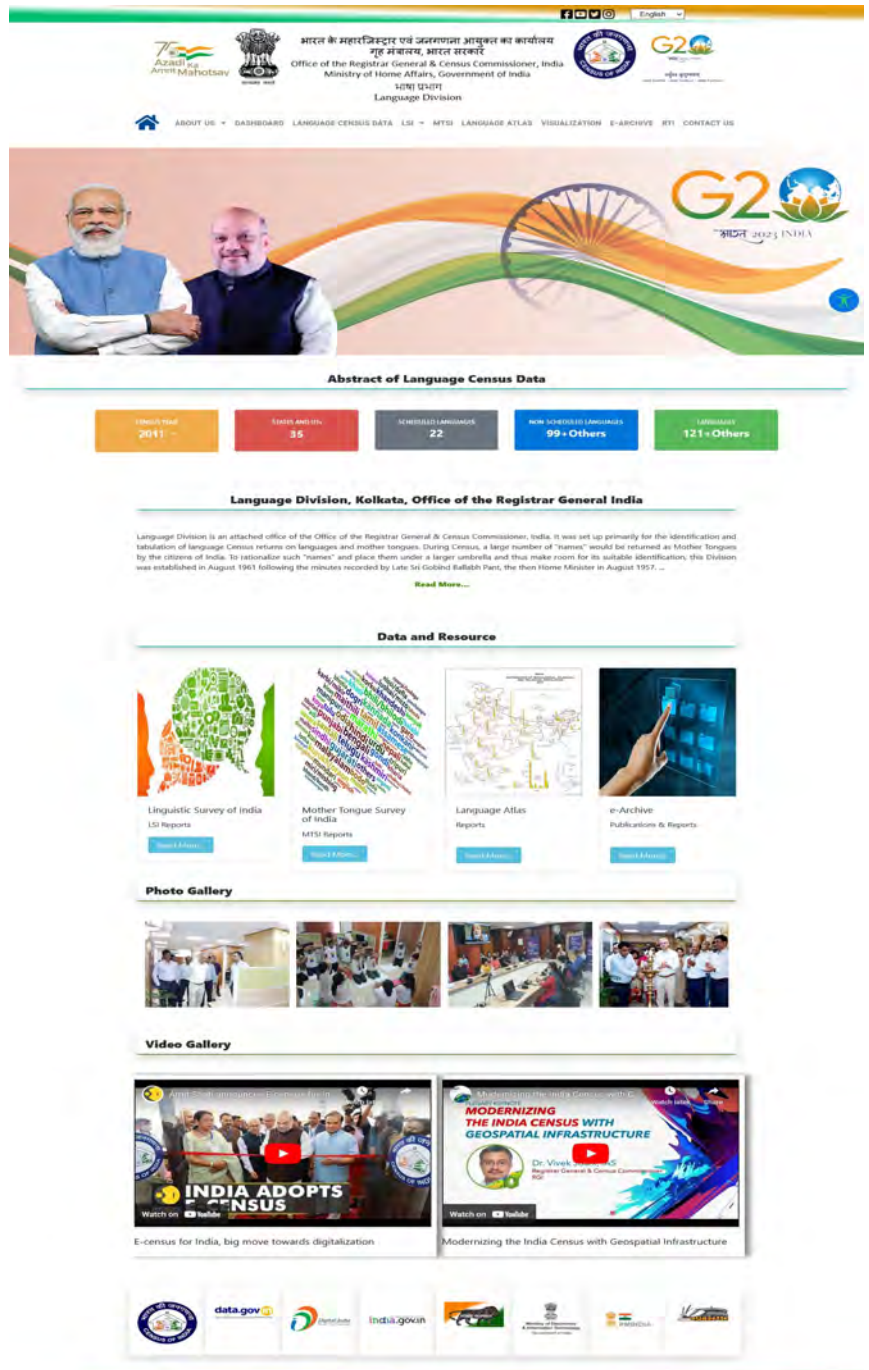
Data Analytics & Visualization solution is a tailor-made, low-cost, web-based solution integrating census data with real-time data-bed offering analytics and visualization comprising interactive echarts, emaps enabling easy decision support. The solution offers mapping of unstructured data into structured schema.

KEY FEATURES

- Interactive visualization.
- Data representation in dynamic maps.
- Data analysis (upto district level).
- Dynamic Report extraction in multiple formats.
- Audio search and streaming.
- Video search and streaming.
- Repository building and Retrieval System.
- Content Management System (CMS).
- eArchive.

DEPLOYMENTS

Deployed at National Data Centre, Office of the Registrar General India, Ministry of Home Affairs, Govt. of India (https://language.census.gov.in)



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ONLINE IMPLEMENTATION OF GOVT. SCHEMES FOR PROMOTION OF LIBRARY SERVICES

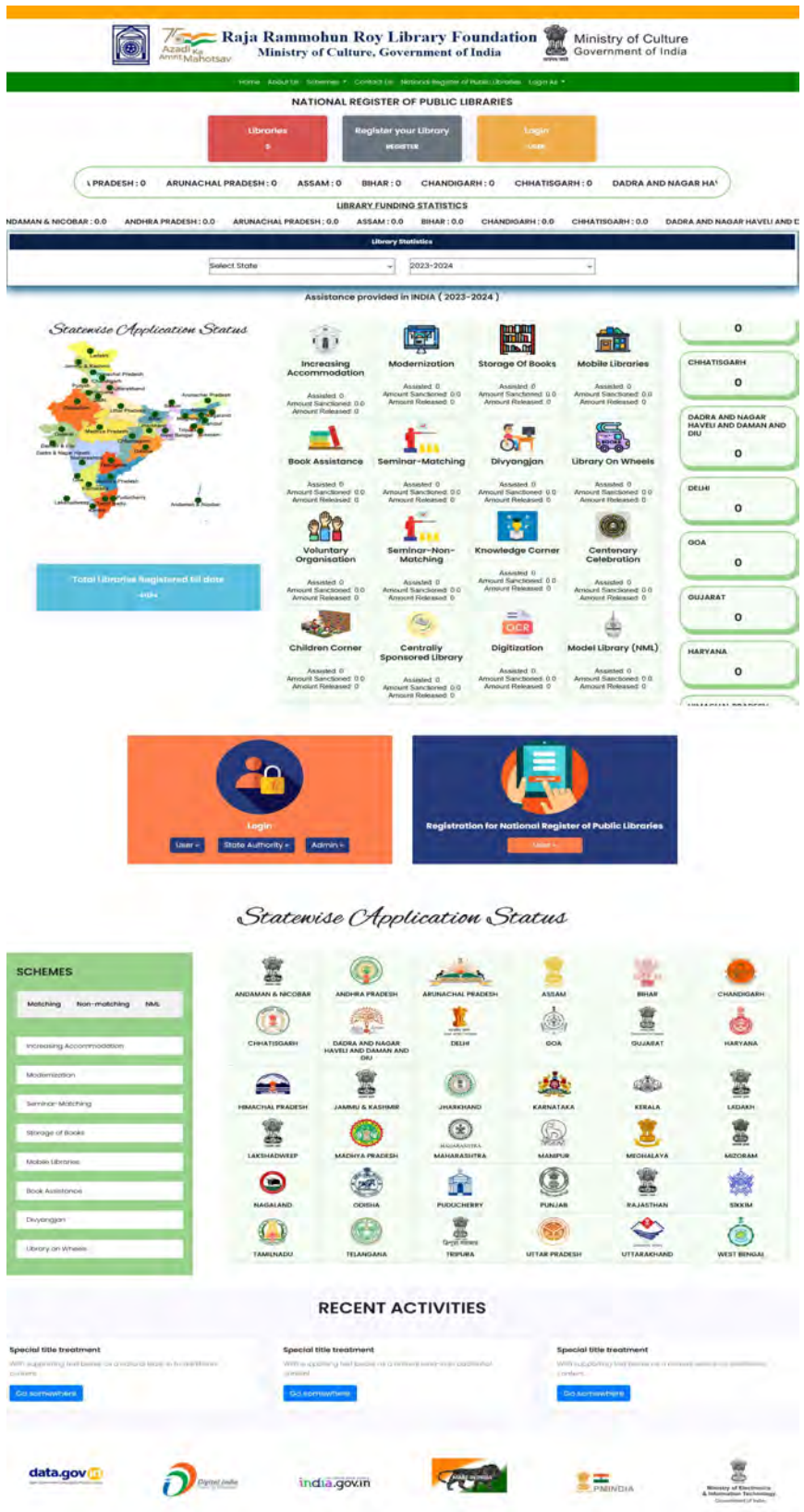
eGovernance application for implementation of Govt. Schemes for promotion of Library Services. It caters to online submission of application, recommendation, authorization, processing, sanctioning, fund accounting, monitoring of status of applications and other related functionalities for providing funds to the State/UT Library authorities, Libraries, etc.

KEY FEATURES

- Online application for various schemes by user agencies and subsequent approval process.
- User Registration and approval.
- Enterprise-wide process workflow.
- Dashboard having Status update of tasks.
- Alert generation through dashboard.
- Workflow-based electronic document approval system.
- Generation of Reports

DEPLOYMENTS

Deployed at NIC Cloud for Raja Rammohun Roy Library Foundation, Ministry of Culture, Govt. of India.



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WOOD BASED INDUSTRIES LICENSING SYSTEM

WBILS – A Wood Based Industries Licensing System is a web-based solution which automates the process of issuance of WBI license to establish a WBI unit. A WBI license is a document / certificate that gives permission to the applicant (person seeking to open a WBI unit) to commence business in a particular area/location.

The WBILS can help to manage the applications related to the New Unit License, Renewal of License of the Existing Unit, Change of Ownership and Relocation of Unit. The applicant in requirement of a new WBI License can submit the application online to the State Level Committee along with all the necessary documents. The applicant can apply for different machinery type such as Saw, Veneer, Plywood, Peeler, Boiler, Chipper etc. It streamlines the management process and the update status of the application is available on the portal.

The application is highly customizable and flexible. The web solution also provides features viz-a-viz online storage and security of data with report generation features. It also facilitates & addresses the entire gamut of activities without time and cost overruns and with the best contemporary technology and possible quality.

KEY FEATURES

- Automation of the procedures and processes of granting licenses to the applicants under various categories
- Flexible end-to-end solution: submission of an application, payment, verification, issuance of license
- Convenience to government administration and citizens with effective e-Services
- Tracks and monitors the entire life cycle of new and existing licenses
- Transparency
- Avoids redundancy/duplicity
- Audit trails for session records
- Dashboard for decision makers

DEPLOYMENTS

Successfully running in Forest Department Haryana, Uttar Pradesh and Punjab, Recently, Forest Department, West Bengal

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WEB BASED SOLUTION FOR AVAILING SUBSIDY ON MICRO IRRIGATION SYSTEMS

This solution is designed to promptly address the needs of farmers and facilitates the online submission and processing of applications for subsidies on micro irrigation systems (Sprinkler and Drip systems). The software provides electronic services through a web application, ensuring convenient access and delivering efficient, transparent, and cost-effective services. The overarching objective is to promote the adoption of modern irrigation techniques, such as drip and sprinkler irrigation, to optimize the efficient utilization of surface and groundwater resources. Specifically, the online process involves the registration of farmer applications, progressing them through various stages, overseeing implementation, and ultimately disbursing funds or assistance to farmers (beneficiaries).

KEY FEATURES

Automation of the procedures and processes of granting approval for installation of MI system under various system categories

Flexible end-to-end solution

Track and monitor the entire life cycle of the application

Dynamic report generation

Transparency in the overall process

Avoids redundancy/duplicity

Logs are preserved to safeguard against unauthorized access to data.

Dashboard for decision makers

DEPLOYMENTS

Department of Soil and Conservation, Punjab

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eAKADAMIK - A UNIFIED ACADEMIC SOLUTION AND E-COUNSELING & STUDENT ENROLLMENT SOLUTION

eAkadamik is a comprehensive and user-friendly academic ERP solution that can automate and streamline administrative and academic processes for educational institutions of all sizes. It helps institutions improve efficiency, reduce costs, and enhance the educational experience for students, faculty, and administrators.

KEY FEATURES

Performance Evaluation and Bench marking.

User Feedback and Validation for Building Trust and Credibility.

Showcasing Core Features and identifying product improvement areas.

Identifying Use Cases and Success Stories for Market Validation.

DEPLOYMENTS

The 1st Version deployed on May 2016 and 2nd Version deployed on 2020 at various locations, as below

The Punjab State Board of Technical Education & Industrial Training
Himachal Pradesh Takniki Shiksha Board (PAT, LEET, Pharmacy & ITI),
Punjab Engineering College (PEC), Sector 12, Chandigarh
University Institute of Engineering & Technology (UIET), Punjab University, Sector 25, Chandigarh
Chandigarh College of Engineering and Technology (CCET), Sector 26, Chandigarh
Panjab University Swami Sarvanand Giri Regional Centre (PUSSGRC), Hoshiarpur, Punjab

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9888530544

eRERA - SINGLE WINDOW PLATFORM FOR REGULATORY AUTHORITIES

eRERA is an online platform to facilitate the registration and regulation processes mandated by the RERA authorities. It provides comprehensive information, including guidelines for developers, agents, and buyers, as well as the necessary forms and procedures for registration. The effectiveness of a system is maintaining trust, accountability, and customer satisfaction.

Here are some key features and system as: Evaluation Management, Tracking Management, Enforcement Management, Promoter & Project Management, Real Estate Agent Management, eCourt (eCourt Room, eAdmin), File & Record Management, Notices and Alerts by any Electronic media Management, Complaint Registration Management, Redressal Grievance Information Management, Admin Management Module, Hit & Visitor Counter Management, Audit Trails, Project GIS Management & Online Payment Management.

KEY FEATURES

Ensure fair practise, protect stakeholders and maintain trust.

Protect the interest of buyers.

Fast-track complaint redressal mechanism system.

Boost investments in real estate sector.

Customer Centricity and Compliances.

Evaluation and Checklist Mechanism.

DEPLOYMENTS

Real Estate Regulatory Authority, Punjab

Real Estate Appellate Tribunal, Punjab

Real Estate Regulatory Authority, NCT of Delhi

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eMULAZIM - EFILE, HR, PAYROLL, INVENTORY & VISITOR MANAGEMENT SYSTEM

eMulazim is a solution with offerings and features as user interface, scalability, integration capabilities, and security features.

Here are some key features and system as:

- Human Resource Management System
- eFile& Dak Management
- Store Inventory/ Procurement Management
- Payroll Management
- Travel and Transport
- Violation
- Rewards, Appraisal System
- Visitor Management System

Deployments:

- ERSS Haryana, Centralized eFile System for All C-DAC and CMET.

Key Features:

Performance Evaluation and Benchmarking.
User Feedback and Validation for Building Trust and Credibility.
Identifying Use Cases and Success Stories for Market Validation.

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e-BIS: AN INTEGRATED SOLUTIONS FOR BUREAU OF INDIAN STANDARDS (BIS)

e-BIS portal is an online platform that is governed by the Bureau of Indian Standards (BIS). It is a one-stop portal for all services related to standards, conformity assessment and quality assurance in India. The portal provides a variety of services including: Information on Indian Standards, Conformity Assessment Services, Training and Capacity Building, Consumer Engagement etc. The e-BIS portal is a valuable resource for businesses, consumers and anyone who is interested in standards and quality assurance in India. It is a convenient and efficient way to access information, services and support from BIS.

Hallmarking Unique Identification (HUID) system on Jewellery/Artifacts has automated the entire Hallmarking process workflow consisting of Jeweller, Receiving/Dispatch, QM, XRF, Sampling, Assaying, HUID generation Desk. HUID system facilitated compliance to mandatory Gold Jewellery Hallmarking scheme of Government of India to protect consumer Interest. It is a single window system for Jewellers, Assaying & Hallmarking centres, Government Officials and Consumers. A six-digit unique HUID number is assigned to each Hallmarked Jewellery of precious metal which ensures track and trace of the entire Hallmarking process & purity etc. Consumers can verify HUID details like Purity, Article description, name of Jeweller and AHC etc. through BIS care app.

KEY FEATURES

Prevention of sale of fake/spurious hallmarked jewellery/products

Traceability of each hallmarked article uniquely through the pedigree of

Visibility of the data across stakeholder and consumers

Authentication through multichannel (Mobile Apps & Portal)

e-BIS SERVICES

Product Certification (ISI Mark) and Certificate of Conformity (COC)

Hallmark Unique Identification (HUID)

Jeweller Certification

Assaying and Hallmarking Centre

Surveillance Planning

Mobile App based Surveillance

Foreign Manufacturers Certification Scheme

INTEGRATION WITH OTHER SERVICES

National Single Window System (NSWS)

Government e Marketplace (GeM)

PRAYAS

Laboratory Information Management System (LIMS)

Standard Formulation of Bureau of Indian Standards

BIS Care

DEPLOYMENTS

Bureau of Indian Standards and handling total 359079 active users.

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ELECTRONIC PROJECT PROPOSAL MANAGEMENT SYSTEM (E-PPMS)

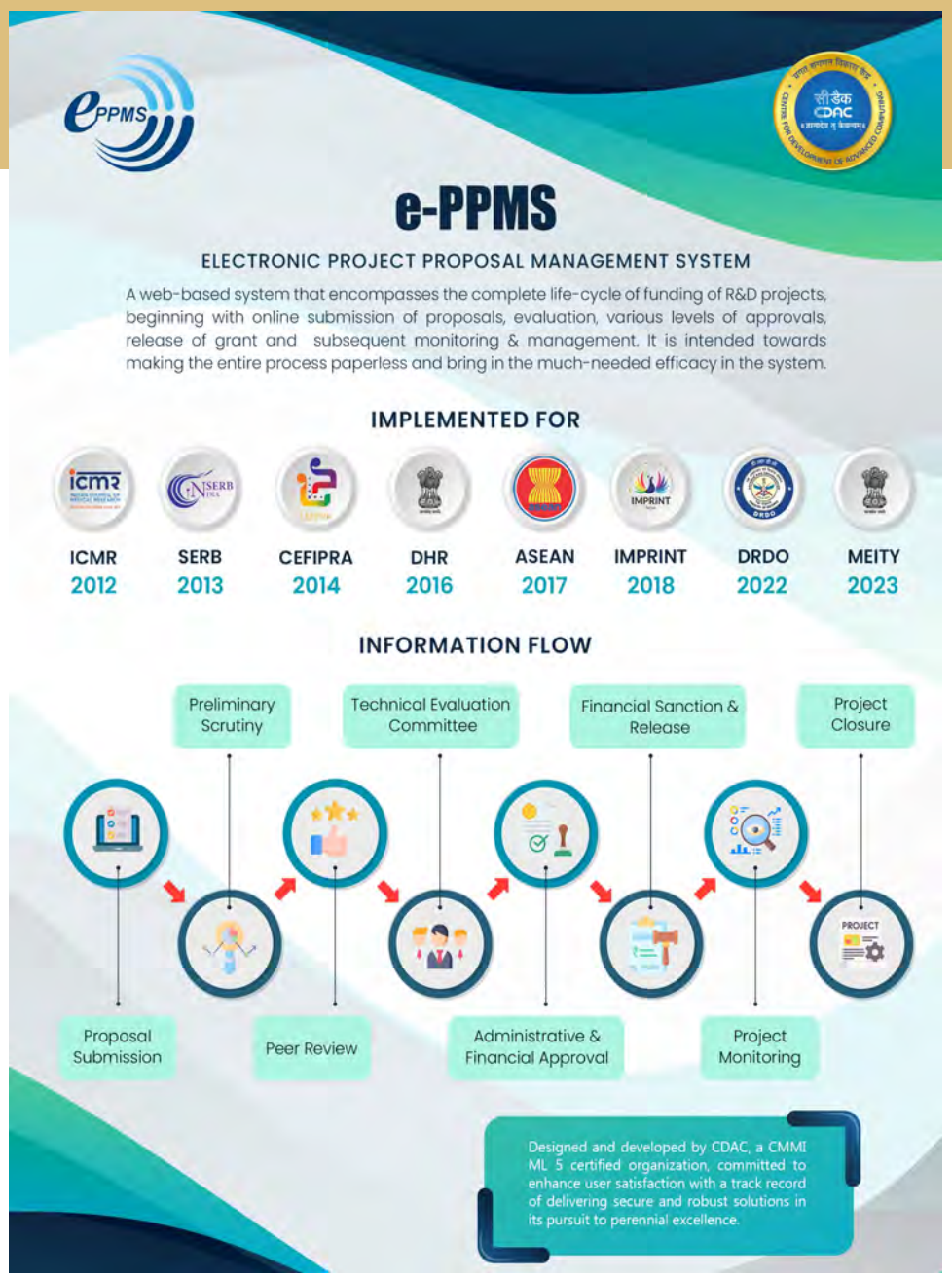
A web-based system that encompasses the complete life-cycle of funding of R&D projects, beginning with online submission of proposals, evaluation, various levels of approvals, release of grant and subsequent monitoring & management. It is intended towards making the entire process paperless and bring-in the much-needed efficacy in the system.

DEPLOYMENTS

DRDO, New Delhi

MeitY, New Delhi

SERB, New Delhi



KEY FEATURES

A complete solution for the agencies providing grant-in-aid (starting from proposal submission to project closure).

Developed using latest open-source technologies.

Based on Responsive GUI.

Interactive dashboards for all stakeholders.

Role-based access to the users.

Configurable workflow.

In-built communication module.

Newsletter.

Automated alerts, reminders and notification to the stakeholders.

Integrated with MobileSeva.

Supports free-text search on the proposal data to find duplicate proposal.

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HALLMARKING HUID SYSTEM

Hallmarking Unique Identity (HUID) system on Jewelry/Artefacts has automated the entire Hallmarking process workflow consisting of Jeweller, Receiving/Dispatch, QM, XRF, Sampling, Assaying, HUID generation Desk. HUID system facilitated compliance to mandatory Gold Jewelry Hallmarking scheme of Government of India to protect consumer Interest.

It is a single window system for Jewellers, Assaying & Hallmarking centers, Government Officials and Consumers. A six-digit unique HUID number is assigned to each Hallmarked Jewelry of precious metal which ensures track and trace of entire Hallmarking process & purity etc. Consumers can verify HUID details like Purity, Article description, name of Jeweller and AHC etc. through BIS care app.

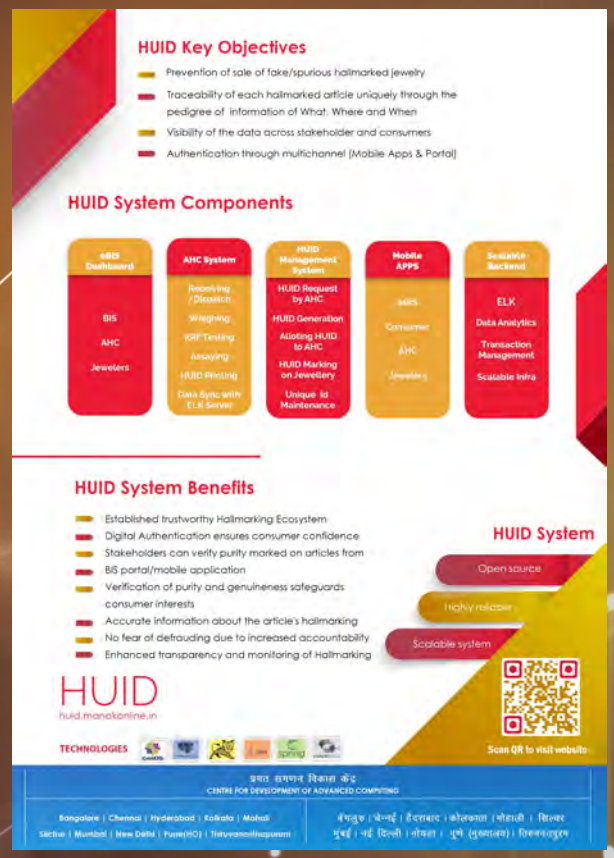
More than 23 crores of HUID have been generated through the System since its launch in July 2021.

KEY FEATURES

- Open Source
- Average 5 lakh+ daily HUID generation
- System works 24*7
- Online request and receipt of Jewellery and alert to concerned users.
- Role based access.
- User based dashboard.
- Traceability of HUID
- Consumer can verify HUID instantly with the help of Mobile App.
- Enforcement officials have real time
- access to Hallmarking activity

DEPLOYMENTS

- Deployed for Bureau of Indian Standards (BIS), New Delhi



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SHAALA DARPAN: AN END-TO-END E-GOVERNANCE SOLUTION FOR SCHOOL AND OFFICE AUTOMATION

Shaala Darpan is an end-to-end e-Governance solution for school and office automation. Shaala Darpan has been developed using Open-Source technologies thus doing away with high licensing costs of proprietary software. The solution has been developed in substantially lower costs as compared to market trends.

Shaala Darpan helps in

Ease of doing business through efficient Processing and easy access to the citizens and officers

Better transparency due to informed decision making through analytical reports

Seamless flow of data.

The system has the following pluggable components that can interact with each other:

School Information and Management System for complete school automation
Bilingual Content Management Portal for information dissemination
Employee ERP to manage the day-to-day activities of all employees
Budget & Finance management system
Grievance Management System
Alumni Portal
Inventory & Store management system
Hostel & Mess information system
Analytical Dashboards

Shaala Darpan lays the foundation for collaboration beyond class rooms, provides rich knowledge store of assignments and projects, enables improvised connect among the various users of the schools.

KEY FEATURES

An IT enabled collaborative platform for all stake holders of the Samiti

Role Based Access to ensure secured use of the functionalities in the system

Multi-centric modules covering all the Vidyalaya and offices of the Samiti

Analytical dashboards to the management of the Samiti

Workflow enabled approval flow on functionalities

In-built communication system

Interactive reports and dashboards

Scalable architecture for easy use by any school.

DEPLOYMENTS

Shaala Darpan has been successfully implemented in all the 649 Schools, 8 Regional Offices, 8 Navodaya Leadership Institutes and the Head Quarter of Navodaya Vidyalaya Samiti.

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INTEGRATED FINANCIAL ACCOUNTING SYSTEM

Integrated Financial Accounting System operates on Accrual accounting principles, featuring workflow capabilities. It's expertly architected to encompass both financial and non-financial processes, seamlessly processing a variety of financial transactions. The system is tightly integrated with other key systems, such as Stores Inventory and Personnel Management ensuring data integrity and incorporating effective controls.

KEY FEATURES

Automation and Efficiency: The system automates the generation of ledgers, reports, and statutory schedules, streamlining financial processes and saving time.

Comprehensive Taxation Management: Handles various aspects of GST and IT taxation reporting, reconciliation, ensuring compliance with tax regulations.

Advanced Features: Incorporates features like workflow for document forwarding and reversal, parallel accounting, common chart of accounts, cost center accounting, profit center accounting, and more for enhanced functionality.

Mass Data Processing: Provides provision for mass data input, allowing efficient handling of datasets

Payment Processing: Enables the generation of payment lists based on criteria, processing of payment instructions/documents at once, and includes features like cheque printing, payment advice printing, and voucher printing.

Tax Compliance: Handles intricate tax calculations such as Tax Deducted at Source (TDS), Tax Collected at Source (TCS), and Goods and Services Tax (GST) processes.

GST e-Invoicing Integration: Auto-populates invoice details in the GST e-invoice system, simplifying compliance with GST regulations.

Security and Audit Trails: Implements robust security features such as digital signatures and audit trails for enhanced data integrity and accountability.

Time-Saving Automation: Automates labour and time-intensive tasks such as audits, tax preparation, and bank reconciliation, boosting overall operational efficiency.

DEPLOYMENTS

Konkan Railway Corporation Limited.

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WORKS AND ACCOUNTS MANAGEMENT INFORMATION SYSTEM (WAMIS)

WAMIS is a generic public Infrastructure project Management and Monitoring framework which has been designed and developed with a view to aid the line departments involved in the creation and maintenance of public infrastructure assets towards enhancing their planning & operational efficiency leading to effective service delivery. The solution encompasses the entire lifecycle management of a typical construction project from its inception to its final completion in the form of various modules and tools.

Modules in WAMIS

- Accounts Management
- Works & Billing Management system
- Mobile based Inspections
- Comprehensive Decision Support Tool: WAMIS Analytics

KEY FEATURES

WAMIS, offers a robust solution for near real-time reconciliation of Revenue & Expenditure, enhancing fiscal consolidation.

With a generic framework, automated processes, and integration capabilities with allied departments, WAMIS Analytics provides an efficient decision support tool for monitoring and tracking project progress, consolidating data for an enterprise-level snapshot, making it a fast and adaptable solution for diverse departments based on CPWD codal provisions.

The WAMIS solution prioritizes security through robust measures, ensuring data integrity and confidentiality.

Its workflow features optimize processes, providing an efficient and transparent project management structure.

Comprehensive audit trails track all activities, enhancing accountability and compliance.

The integration of digital signatures adds an extra layer of security, validating the authenticity of transactions and documents within the system.

WAMIS is designed with broad device compatibility, ensuring seamless access and functionality across various devices such as desktops, laptops, tablets, and smartphones.

WAMIS enhances user flexibility and accessibility, allowing stakeholders to interact with the system from different devices without compromising usability or performance.

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POWER ELECTRONICS AND RENEWABLE ENERGY

Power Electronics & Renewable Energy

Power Electronics has got critical role in the country's Industrial economy through sustainable energy and quality power solutions. C-DAC considers Power Electronics and Renewable energy equally important along with High Power Computing (HPC) technologies and major activities like National Mission on Power Electronics Technologies (NaMPET) have been taken up in a big way for more than a decade. Technology R&D, technology deployments and Transfer of technologies to Industries and start-ups are successfully being carried out. State of the art indigenous technologies need to be implemented in a wider scale for Government of India ambitious goal of making India a dominant player in Power Electronics, Renewable Energy, E-mobility etc. through design and make in India programs. C-DAC got unique expertise to provide comprehensive solutions in Power Electronics and Renewable energy applications.

Co-Chairman

Shri. N. K. Jain
Scientist G and Centre Head
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Power Electronics & Renewable Energy

Power Electronics plays an important role in sustainable energy generation, quality of power systems, ecofriendly transportation etc. Acceptance of power electronics as a key technology to solve energy challenges has caused many countries to launch large R&D programmes.

National Mission on Power Electronics Technologies (NaMPET) is such a mission mode activity for more than a decade addressing Technology R&D, technology deployments and Transfer of technologies to Industries and startups. Indigenous technology development for 5 Mega Watt propulsion system for Indian Railways is in final stage of approval. C-DAC indigenous VCU technology, crossed 300 Cr worth manufacturing and implemented in 1800 trains. First VEGA based embedded application ie. Smart energy meter PoC is demonstrated and activity initiated to make it a certified product for about a dozen ToT partners. Comprehensive solution for AC public Charger along with mobile app is ready for ToT. Sonar power amplifier development for NPOL is in final stage of development. First indigenous Power system Real-time Simulator being custom developed for IISc, Bangalore. 1000kW Solar PV power plant with C-DAC technology commissioned in Idukki. Power System automation and advanced battery cell technologies are also being addressed. Establishment of Centre of Excellence (CoE) for Products Based on Li-ion Cells (Post-Cell) support this very effectively. C-DAC got unique expertise to provide comprehensive solutions in Power Electronics and Renewable energy applications.

Technology Director

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Power Electronics & Renewable Energy

VEHICLE CONTROL UNIT (VCU) FOR 3 PHASE ROLLING STOCK APPLICATION

VCU is the real-time supervisory controller of 3 Phase electric locomotive conforming to IEC-61375 standard, the proto units were validated in field for more than 5 Lakhs km, presently implemented in WAG9, WAP7 & WAP5 class locos, having 5 ToT partner industries with over 1600 locomotives running across the country with C-DAC VCU technology. The technology and products include VCU Hardware rack, Rolling Stock Application software, Loco Simulator, Loco Interface and Configuration Unit, PCB Test Jig, VCU-TCN Monitoring Tool.

The ongoing activities including VCU handholding with Railway board for next 5 years. Railway Board has taken initiative to approve follow up activities on VCU technology and Rail propulsion technology to C-DAC. C-DAC is now an integral part of the railway forums due to the success of VCU technology development and deployment and also has established partnerships with manufacturing industries for further rail related technology development. CLW has given approval of Transfer of Technology (ToT) for the TCN based VCU developed by C-DAC and M/s BHEL Bangalore.

KEY FEATURES

The VCUs with open bus architecture that can address component obsolescence in future. CPU boards could be upgraded as and when the current CPUs become obsolete. I/Os and applications can remain the same. The physical location of VCUs and the connection points for the I/Os are maintained for legacy VCU replacement.

ISAGRAF GUI for the entry of rolling stock application.

Visualization software tool to run on laptop/ standard PC to observe the process variables.

Diagnostic software with analysis tool and monitor software to upload the diagnostic memory to a standard PC/ laptop PC

MVB and WTB controller as per IEC-61375 standard

CAN based interface for VCU IO systems

Network Management Software

SOFTWARE FEATURES

QNX realtime RTOS

Supports ISaGRAF Graphical Programming

Train Communication network Protocol

Configuration and monitoring tool for VCU

3-phase electric loco control simulator

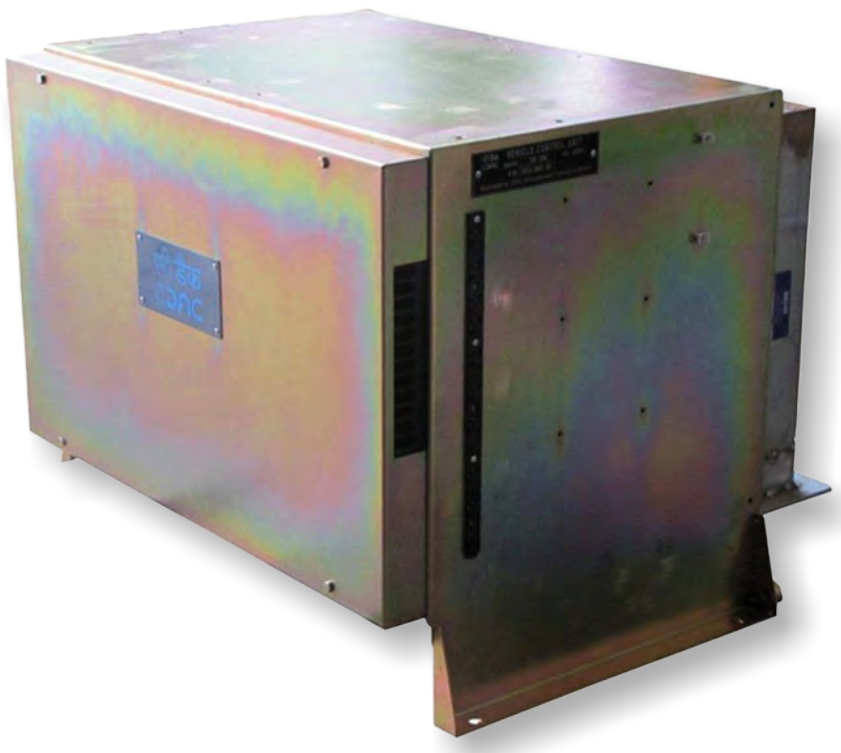
DEPLOYMENTS

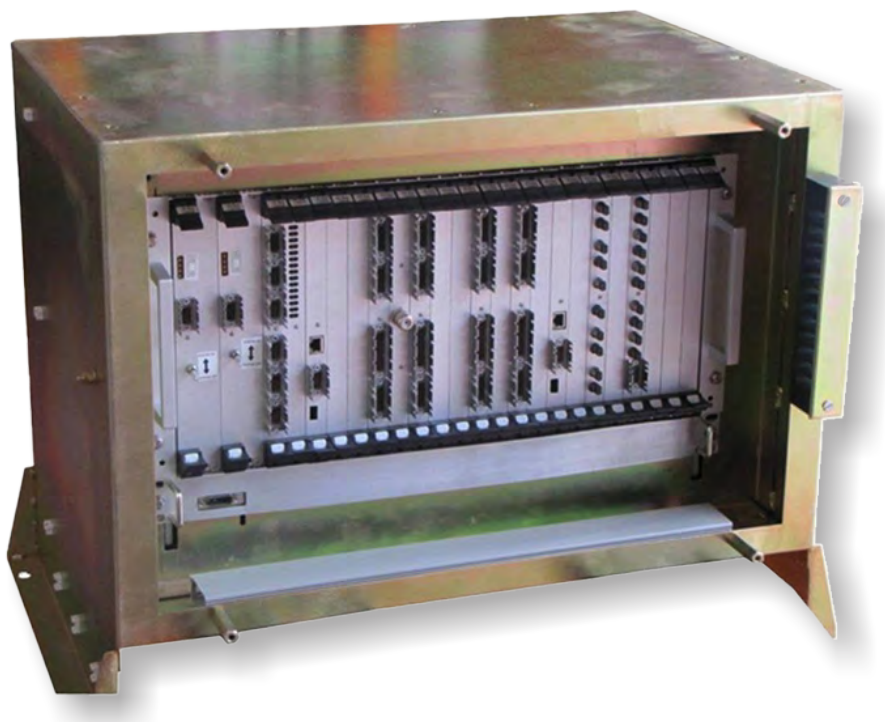
M/s Crompton Greaves Ltd, Mumbai.

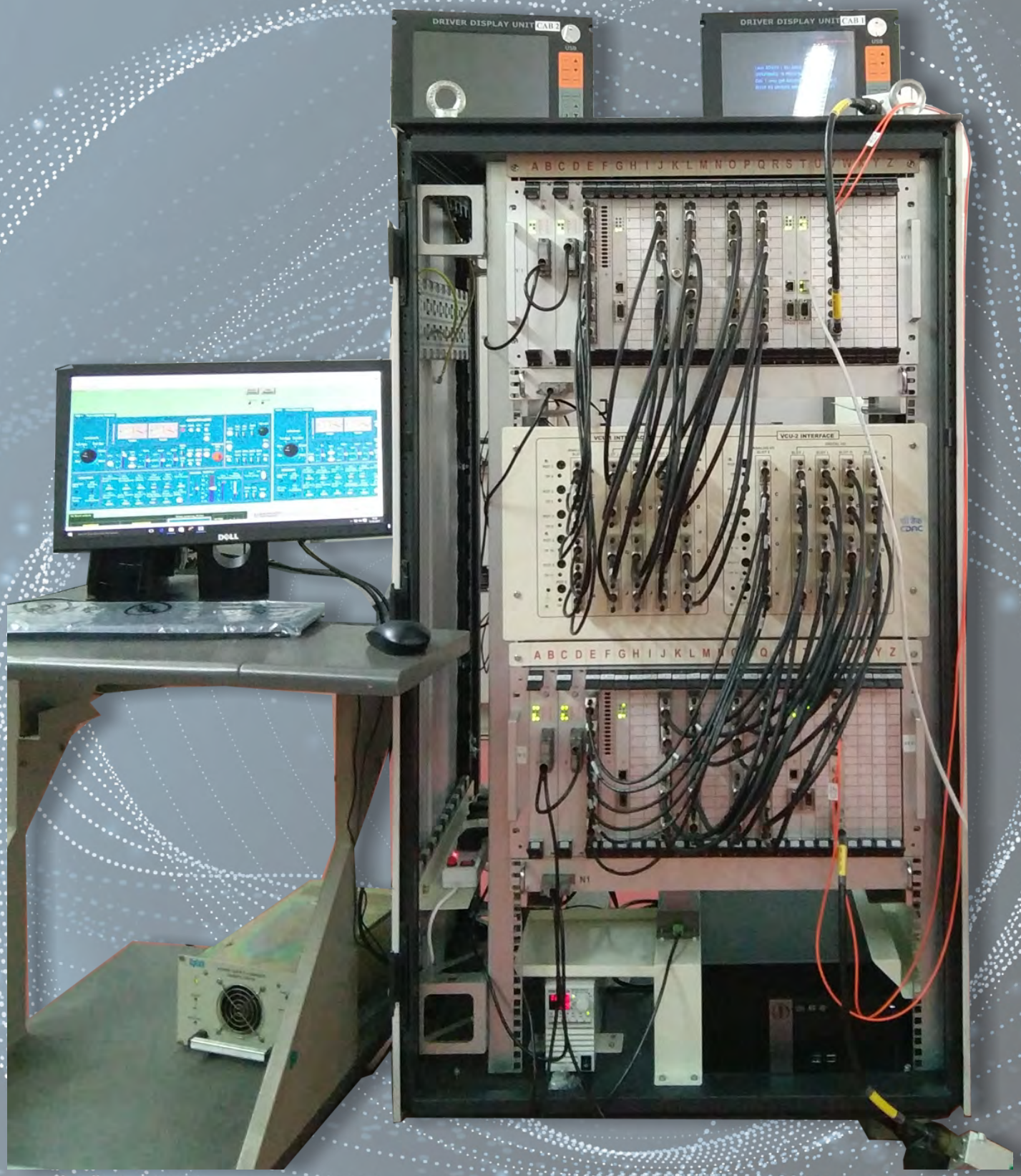
M/s ABB India Ltd, Bangalore.

M/s Autometers Aliiance Ltd., Noida

M/s Delta.







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SMART ENERGY METERS FOR INDIAN POWER NETWORK

Energy meters based on Indian standards and suitable for Advanced Metering Infrastructure (AMI). Compatible with smart grid communication technologies and supports distributed generation (DG).

This innovative two-chip architecture incorporates high-precision metering ICs that comply with metrology standards such as IEC62052-11, IEC62053-21, and IEC62053-23. The design features three analog channels for single-phase applications and seven analog channels for three-phase applications. Additionally, a separate 16-bit microcontroller, equipped with built-in IrDA, RTC, and LCD drivers, facilitates communication, datalogging, and display functionalities. To ensure cost-effectiveness, low-cost shunt and CTs are utilized for current measurements, while voltage divider technology is employed for voltage measurements. Cost reduction is further achieved by limiting the PCBs to two layers, and the inclusion of a common port supports various communication modems.

KEY FEATURES

Forward metering/net metering- To help consumers to get payment for the energy generated by them through solar power plants or other distributed generation methods.

Open protocol (DLMS)- Device Language Message Specification, a generalised concept for abstract modelling of communication entities, used for meter communication

Integrated communication module- Configurable for GSM/Wi-Fi, IrDA/Bluetooth

Remote firmware upgrades

Remote load connect/ disconnect facility

Anti- tamper – Anti tamper and fraud detection will be done immediately

Security- Password protected user login and parameter settings

Algorithms – Contains algorithms for energy calculation and management, theft detection, data logging etc.

DEPLOYMENTS

GEPDEC Energy Pvt Ltd, Noida

Acceptance Re Innovation Technology Pvt Ltd, Bangalore

Karunya IT Solutions Pvt. Ltd, Gwalior

Boltron Telesystems Pvt. Ltd., Hyderabad

Pragati Electrocoms Pvt. Ltd., Haryana

Tekisa Systems Pvt. Ltd, Haryana

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MICROGRID FOR GREEN ENERGY VILLAGES

Microgrid is a localized group of interconnected energy resources and loads which can either operate as an off-grid system or in a grid connected environment. Off-grid is an idyllic solution for providing reliable power for rural areas were central grid is not a choice both geographically and economically.

KEY FEATURES

- Microgrid solution suitable for ON grid and OFF grid mode of operation
- Power rating from a few kWs to MW
- Solar PV, WEG, micro-hydel, biomass generators etc. can be interfaced to the power conditioning system
- Battery manager for Lead Acid/Li-ion
- Remote monitoring facility
- Power for general community requirements like water pumping/purifying, telecom power supply, EV charging station etc
- Integrated Low Voltage DC architecture for special needs and safe operation
- Back up DG set
- Net Energy metering

DEPLOYMENTS

Elephant Rehabilitation Centre, Kottor, Thiruvananthapuram

Kerala Forest and Wildlife Department, Kerala

Puravayal Tribal Settlement, Marayoor, Idukki,Kerala

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GRID CONNECTED POWER CONDITIONING UNIT FOR KW TO MW SCALE SOLAR PHOTOVOLTAIC POWER PLANTS

Solar PV is considered to be the promise of tomorrow for meeting the ever-increasing energy demand, with least or no effect on the ecology. The products are indigenously developed solar power converters for solar PV ranging from kW to MW power. The power converters with different converter topologies from single stage to multi stage converters are used as per the power rating and application.

KEY FEATURES

- Anti-islanding protection
- Active and reactive power ramping control
- Intelligent Maximum Power Point Tracking
- Filter and control scheme for improved current quality
- Power quality improvement with harmonic compensation
- Low Voltage Ride Through with reactive power support
- Harmonic performance as per IEEE 519:1992
- Protection schemes implemented as per IEEE 1547:2003
- Remote monitoring and data logging
- Improved reliability and redundancy

DEPLOYMENTS

- Seebpore Solar Power station, Jamuria, West Bengal
- West Bengal Renewable Energy Development Agency (WBREDA)
- C-DAC Innovation Park, Pune, Maharashtra
- Smart Renewable energy park
- Agency for New and Renewable Energy Research and Technology (ANERT)

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STATCOM: STATIC COMPENSATORS FOR POWER QUALITY IMPROVEMENT

STATCOMs are inverter-based solutions used for compensation of reactive power, harmonic currents, unbalance currents and neutral currents caused by reactive and non – linear loads. STATCOMs are realised with current controlled PWM voltage source inverters connected to grid through an interconnecting impedance. Inverters are constructed with advanced switching devices like IGBTs. When compared to conventional power quality solutions like switched capacitors and tuned filters, STATCOMs feature excellent dynamic performance under fluctuating load conditions, increased life, better efficiency, insensitiveness to grid frequency etc. Solutions for single phase, 3-phase 3- wire and 3-phase 4-wire are available for transfer of technology.

KEY FEATURES

- Reactive power compensation to maintain grid side PF unity
- Harmonic current compensation as per IEEE 519-1992 standard with in the current rating of the STATCOM
- Unbalance current compensation
- Neutral current compensation

DEPLOYMENTS

- Exceltech, India
- Trinity Energy Systems.
- Hindustan Latex Ltd., Thiruvananthapuram: Three phase three wire two level inverter based 300kVAR(2X150kVAR) STATCOM for reactive power compensation
- PK Steel castings(P) Ltd, Kozikode: Three phase three wire three level inverter based 500kVAR STATCOM for harmonics compensation and three phase three wire two level inverter based 250kVAR STATCOM for reactive power compensation
- IT Park Thiruvananthapuram: Three phase four wire two level inverter based 2MVAR(4X500kVAR) STATCOM for reactive power, harmonics, unbalance and neutral current compensation
- D'Seamens Furniture Industry, Chullimanoor, Thiruvananthapuram: Three phase three wire two level inverter based 50kVAR STATCOM for reactive power compensation
- Distribution Transformer, KSEBL, Balabhavan, Thiruvananthapuram: Three phase three wire two level inverter based 50kVAR STATCOM for reactive power compensation

Single Phase STATCOM

Rating (typical)	:	5A @ 230V, 50 Hz AC input
Configuration controlled inverter	:	Single Phase, full bridge IPM/IGBT PWM
Switching frequency	:	10 kHz
Control	:	DSP based digital control
Cooling	:	Forced air cooling

3 Phase 3 wire STATCOM

Rating (typical)	:	500 kVA, 415V 3 Phase, 3 Wire
Configuration inverter	:	3 Phase, full bridge IGBT PWM controlled
Switching frequency	:	10 kHz
Control	:	Using DSP/FPGA based digital controller
Cooling	:	Forced air cooling
Panel fabrication	:	Suitable for indoor deployment
User interface	:	Graphic LCD and Keypad
Protections over temp.	:	Over current, short circuit, over voltage (AC/DC),

3 Phase 4 wire STATCOM

Rating (typical)	:	500 kVA, 415V 3 Phase, 4 Wire
Configuration	:	3 Phase, 4 leg IGBT PWM controlled inverter
Switching frequency	:	10 kHz
Control	:	Using DSP/FPGA based digital controller
Cooling	:	Forced air cooling
Panel fabrication	:	Suitable for indoor deployment
User interface	:	Graphic LCD and Keypad
Protections over temp.	:	Over current, short circuit, over voltage (AC/DC),

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INTERNET OF THINGS (IoT)TECHNOLOGY

Internet of Things (IoT) Technology

Co-Chairman

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C-DAC has been relentlessly pursuing leadership position in various areas of emerging technologies. In the area of IoT, multiple programs are being pursued at the cutting edge of technology. A core team with members across CDAC is working to ensure shared understanding and collective strength at a deeper level. The team has prepared a 5 year roadmap covering traditional as well as Industrial IoT addressing applications in thematic areas including water, energy, healthcare, cybersecurity, agriculture, automotive (including drone and transport), defence, and environment sectors.

To leverage the collective knowledge and domain specialisations, collaboration with academia, R&D institutions, industry & civic agencies, standards institutions & Government agencies have been established and activities are carried out in partnership.

Under capacity building, C-DAC has contributed greatly under Future Skills PRIME, PGDIoT, PGDESD, and through other training programs like FDP. Academia and R&D institutions have been supported through our IoT Research Kits, Indus IoT, IndusCopter, etc. Products like hearing aid have been taken by industry through ToT.

Internet of Things (IoT) Technology

Accelerated pace of tech-revolution is thrusting us into a realm, imagined in science-fiction. The embedded systems of yesteryears are now 'Smart: Sophisticated, always connected and intelligent'. By seamlessly connecting everyday objects with the power of internet, AI and other digital technologies; 'IoT' is revolutionizing almost everything we live, work, and interact with. In this exciting domain, C-DAC is working towards a commanding presence in enabling smart cities, smart homes, smart agriculture, and so on. Our efforts are focused on developing indigenous technologies, products and solutions. As with great power comes great responsibility. We are also at the forefront of addressing challenges of 'IOT security' and Human resource development in the field. As the world embraces the emerging new tech-order, together, we look forward to propel India at the forefront of 'smart, connected and efficient' world for generations to come.

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Internet of Things (IoT) Technology

IOT RESEARCH LAB KIT

IoT Research lab kit contains BLE mote, WiFi mote, Ubimote, IoT Gateway, Indus board and Ubisense. Main objective of this kit is to provide a platform for the students, faculties and research scholars to explore different aspects of IoT and develop different useful applications.

KEY FEATURES

BLE mote is compliant with latest version and have generic sensor interface which works with beacon. It has an efficient crypto engine for security management.

WiFi mote is compliant with IEEE 802.11 b/g/n with TCP/IP stack and supports various security protocols.

Ubimote is a high-performance wireless communication module compliant with IEEE 802.15.4 with rechargeable lithium battery. It has generic sensor interface which makes it enabled with Contiki, Zigbee and 6LoWPAN stack.

Wireless IP Network Gateway for Zigbee (WINGZ) is gateway which provides interface to connect to any Personal Area Network (PAN) to IP networks.

Ubisense is the generic sensor board to sense different physical parameter with different types of sensors such as temperature, humidity, light intensity, buzzer, proximity, etc.

Indus (Innovation, Development & Up-Skilling) is a IoT development kit which primarily focus to help students, professionals, and hobbyists to get started to build prototyping their IoT based ideas. It is equipped with ARM cortex MCU with floating point unit supporting DSP operations and onboard sensors/actuators.

IoT Gateway

Ubisense

DEPLOYMENTS

Geetanjali College of Engineering and Technology, Hyderabad

National Institute of Electronics & Information Technology (NIELIT), Aurangabad

Teachers Tree Solutions (Yashwantrao Chavhan College), Nagpur

National Institute of Electronics & Information Technology (NIELIT), Chennai

Rajkiya Engineering College, Uttar Pradesh

Dibrugarh University, Assam

Rajarambapu Institute of Technology, Sangli

Aditya Institute of Technology and Management, Tekkali

INS Valsura, Gujarat

Gopalan College of Engineering, Bangalore

Government Arts College, Udumalpet, Tamilnadu

Indian Institute of Technology (IIT), Bombay

Sai Ram Engineering College, Chennai

Thanthai Periyar College, Vellore

Sree Chitra Thirunal College of Engineering, Thiruvananthapuram

Malviya National Institute of Technology (MNIT), Jaipur

JJ College of Engineering and Technology, Trichy

Kalaignarkarunanidhi Institute of Technology, Coimbatore

Scientific Analysis Group, New Delhi

Amrita Vishwa Vidyapeetham, Bangalore

Ubimote

BLE mote

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SURAKSHA MITR

C-DAC has designed, developed and implemented AIS 140 based vehicle tracking and monitoring platform, “Suraksha-Mitr”. Suraksha Mitr is a state-of-art high performance, highly scalable IoT platform capable of handling lakhs of vehicles. This platform and Control Room Operations was launched in Kerala on 16th October 2018 by the honourable Transport Minister of Kerala. This platform is currently handling more than 4 lakhs of vehicles which is one of the largest IoT implementations in India.

The prime objectives of Suraksha-Mitr are to enhance road safety and passenger safety (especially women passengers). In public service vehicles tracking device and multiple panic buttons are provided for drivers and passengers and this is integrated with ERSS (Emergency Response and Support System). In case of any distress the crew or passenger can press the panic, button and alert will be forwarded to Control Rooms and ERSS.

C-DAC has enhanced the system to include features to improve road safety like Automated Offence Detection, Driver Warning System, Driving Pattern Analysis, AI based device management, GIS Analysis etc. The system is currently being used for enhancing road safety and passenger safety.

KEY FEATURES

One of the largest IoT platforms in India

First software in India for tracking and monitoring of public vehicles for Safety and Enforcement

AIS-140 compatible, ARAI Certified

Security Certified as per CERT-IN guidelines

Public safety

Panic button, Tilt and Impact sensors, Over-speed alarms

Integration with ERSS

Nearest aid detection and alerting for emergency response

Centralized monitoring & implementation of enforcement rules.

Automated Enforcement/Offence Detection

Smart Enforcement - Mobile App

24 X 7 automated monitoring and reporting

Real time alerts on offence detection and emergency situations

Inbuilt GIS map engine

Scalable Architecture, can monitor lakhs of vehicles

State-of-the-art dash boards & Reports for better decision making

Automated Faulty Device Detection and Monitoring

Co-existence of enforcement, safety and business

Can be extended to be used for Bus Information System (BIS) and Passenger Information System (PIS)

Facility to provide data for mobile app development for external app developers

DEPLOYMENTS

Himachal Pradesh Department of Transport

Transport Department, Govt of West Bengal

Transport Department, Govt of Meghalaya

Transport Department, Govt of Karnataka

SURAKSHA - MITR

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TECHNOLOGY WISE -C-DAC SERVICES

CYBER SECURITY

MANAGED SECURITY SERVICES (MSS)

Managed Security Services provides 24x7 security monitoring to organizations across verticals with a centralized security monitoring system, enabling to detect & respond to any cyber security incident. Services offered shall eliminate the need for large capital and manpower investment for an in-house Security Operations Centre (SOC)

KEY FEATURES

- First and only MSSP from Govt. sector in the country with different Models
- SOC-as-Service – No capital cost & subscription based
- Build & Operate – C-DAC shall implement security solution on client premises (Turn key). Managed remotely (subscription)
- Managed Security - SOC already exists. Managed remotely (subscription)

DEPLOYMENTS

- Ports
- State Data Centres
- Electricity Distribution Companies

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INCIDENT RESPONSE AS A SERVICE

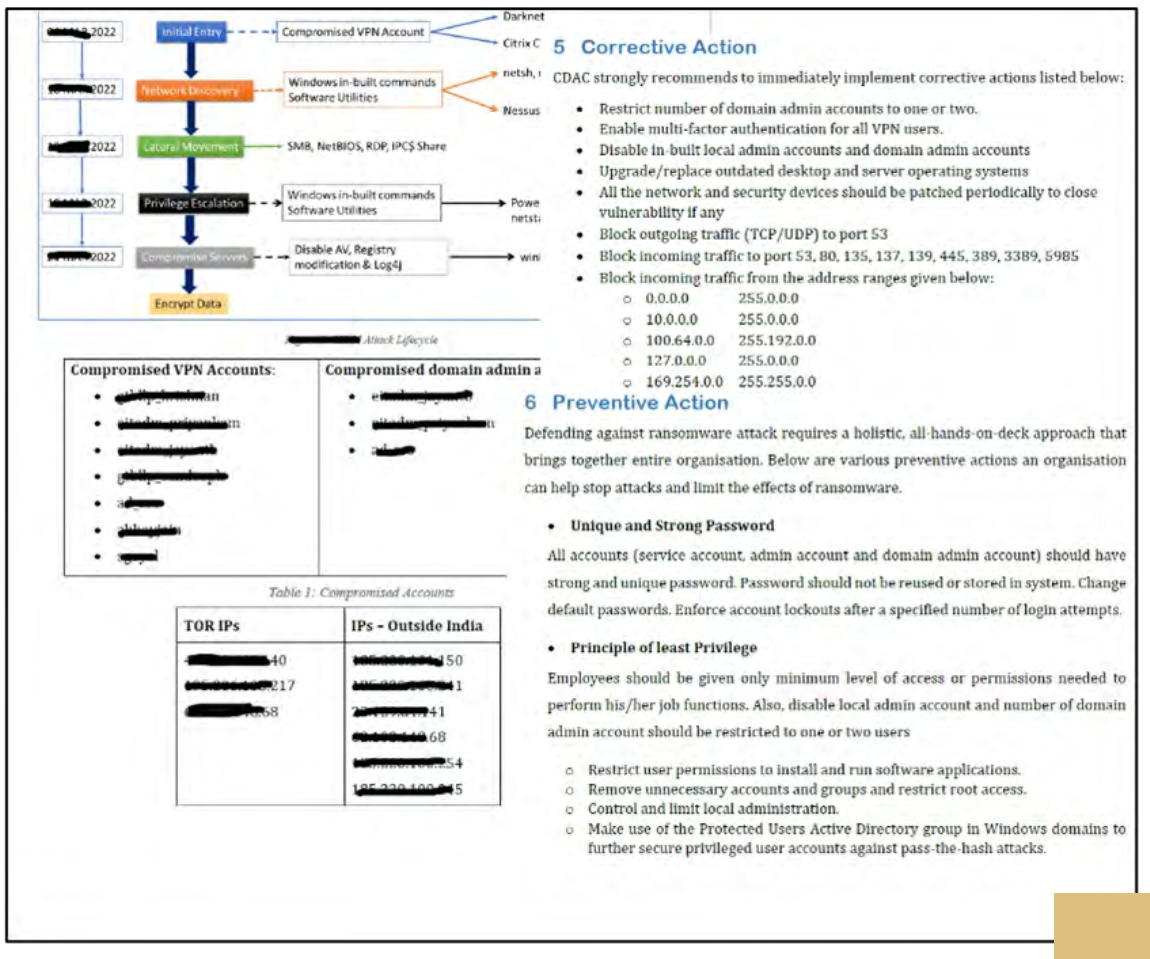
Incident response as a service helps an organization to effectively respond to a security incident promptly. As part of the service, C-DAC shall collect relevant artefacts (logs, forensic images and PCAPS if available) and perform root cause analysis. The incident analysis report provides details about the vulnerability exploited by the adversary and remediation to prevent similar incident in the future.

KEY FEATURES

- Only agency in the Govt. Sector.
- Provides detail root cause analysis with exploited vulnerability
- Provides recommendations to improve the cyber security posture
- Provides remediation to prevent similar attacks in the future

DEPLOYMENTS

- Government organisations
- Banking & Financial Sector
- State Electricity Boards
- Superspeciality Hospitals



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URL ANALYSIS AS A SERVICE

URL analysis as a Service used at the forefront of cybersecurity defense, offering dynamic and interactive systems that engage attackers directly. Unlike passive systems, our honeypots actively lure cyber threats into controlled environments where their behaviors can be studied without risk to real assets. Attackers mainly target users with vulnerable browsers, thus inducting client-side attacks through various exploitation means, where dynamic client-side JavaScript is most instrumental. It performs multi-facet inspection of web pages, which includes DOM parsing to identify suspicious DOM elements, including hidden iframes and malicious links, JavaScript analysis to detect obfuscation and malicious behavior using function-call profiling based on supervised learning, tracking dynamic domain redirects and scanning for suspicious patterns.

KEY FEATURES

Browser-independent solution for detection of malicious URLs and malware collection (Multi-Browser Support)

Client-Server Analysis Framework to detect malicious URLs based on persistent state changes during active URL visit.

Hybrid Low & High Interaction honey client Solution based on Artificial Intelligence & Machine Learning Techniques.

Emulated Browser to detect Malicious Websites in Low interaction based on Static Analysis.

Real Active Browser dynamic analysis to detect Malicious websites with attack data capture in High Interaction Honey client.

Malicious JavaScript Analysis, Detection and Collection

Configurable multi-profile (OS-browser image) Solution

Active URL hunt with integrated web-crawler

Analysis & Detection of Suspicious DOM Elements

DEPLOYMENTS

MHA agencies

C-DAC-Mohali

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SECURITY AUDIT AND CONSULTANCY SERVICES

C-DAC has been empanelled by Cert-In since 2014 and has maintained its empanelment since then. C-DAC specializes in conducting comprehensive cyber audits and offers various security services to government agencies across sectors such as Defence, Finance, Oil & Natural Gas and others in energy sector, Space, Transportation, Information & Broadcasting, Information and Communication, Public Essential Services and Utilities, and Law Enforcement & Security.

KEY FEATURES

C-DAC conducts various audit and assessment activities including vulnerability assessments and penetration testing on web applications, mobile applications, IT/CT network infrastructure, web services, thick client applications, desktop applications, Blockchain, and source code review; consultancy services for ISMS 27001. The services also extend to OT, ICS/SCADA Infrastructure, IoT, and Telecom infrastructure assessments. Compliance audits and services are provided to organizations to meet the requirements of various regulatory bodies such as UIDAI, CCA/eSign, RBI, and Cert-In. These services are offered by all C-DAC centres.

Specialized audits such as Forensic Audit for Incident Analysis, Threat Hunting, SOC/SIEM Gap Analysis, Process Audit, Policy Gap Assessment, Architecture Review, Framework-based Audit and Abuse-based Audit, Compliance based audit are also offered by C-DAC.

DEPLOYMENTS

The services are employed by more than 200 organizations spanning diverse sectors such as banking, energy, telecom, power and governmental operations.

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C-DAC CYBER THREAT INTELLIGENCE (CTI)

C-DAC has embarked on an innovative Cyber Threat Intelligence (CTI) initiative, leveraging a network of over 600 honeypots deployed across India to capture and analyze cyber threats specific to the Indian cyberspace. This effort has yielded a highly valuable CTI feed, which offers near real-time support for popular CTI formats and focuses primarily on India-specific threats. Esteemed organizations of Defence & Home affairs are already utilizing this threat feed, a testament to its relevance and accuracy. With a daily capture of 1.5 million hits, resulting in around 10,000 threat feeds, the initiative provides deep insights into the evolving threat landscape. C-DAC is considering integrating this rich data into its Attack Prevention Systems used in the mission critical projects to enhance cybersecurity defenses and adopt a more proactive approach to threat mitigation. The collaboration aims to strengthen C-DAC's cybersecurity posture significantly, with the C-DAC team providing full support for the integration process.

KEY FEATURES

Total 1.5 million hits on daily basis

Generates 10k Feeds on a daily basis

CERT-In integrated C-DAC Threat Feed

Largest contributor of Malwares to National Malware Repository

Providing Threat Intel Feeds

Early detection of Many cyber attacks (I.e. Log4J,Redis vulnerability etc

Low False Positives

Real time Attack capturing & CTI generation

Capability to detect & Label the Novel attacks

CTI Triage

India Specific CTI

DEPLOYMENTS

MHA agencies, Strategic Agencies

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NATIONAL ATTACK SURFACE ENUMERATION SYSTEM

The National attack surface enumeration system is designed to precisely assess and enumerate the publicly exposed IT infrastructure in Indian cyberspace. It identifies configurations, vulnerabilities, and ownership details of IT assets, playing a crucial role in threat monitoring and early warning systems.

KEY FEATURES

Continuous Cyber Space Enumeration: Regularly updates the database of cyber space assets.

Web, IoT, & SCADA Device Enumeration: Focuses on various device types including web, IoT, and SCADA systems.

IPV4 Network Compatibility: Specifically enumerates devices on IPV4 networks.

Fast and Legal Information Gathering: Ensures rapid data collection within legal frameworks.

Region and Device-Specific Enumeration: Tailored to specific regions, devices, and the country.

Detailed Device Configuration and CVE Augmentation: Collects device configurations and supplements them with CVE and other relevant details.

Owner Contact Details Collection: Gathers device owner contact information.

Data Search and Query Interface: Provides an interface for focused data extraction.

Time-Stamped and Upgradable Database: Ensures database is current and can be updated.

Scalable and Complex Relationship Handling: Manages large-scale data and complex relationships.

Web-Based Data Retrieval and Visualization Interface: Facilitates easy data access and visualization.

Data Sharing Provision: Allows for data sharing between relevant entities.

DEPLOYMENTS

Strategic deployments in MHA agencies

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CONSULTANCY – SOC IMPLEMENTATION AND SECURE NETWORK ARCHITECTURE

C-DAC supports organizations to establish on premise Security Operation Centre (SOC) to meet their requirements by deriving technical specifications and evaluating technical proposals as part of the bid. C-DAC also provides support in improving the security posture of the clients in terms of technology and process.

KEY FEATURES

- Only agency from Govt. sector providing consultancy for SOC
- Experience in setting up of multiple SOCs including state and national level
- Experience in improving the security posture of multiple verticals such as hospital, bank, state data center, IT enterprise, etc.

DEPLOYMENTS

- Kerala State IT Mission
- Indian Spices Board
- Cochin International Airport Limited (CIAL)
- Kerala e-Health Mission

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CONSULTING AND IMPLEMENTATION SERVICES FOR CYBER SECURITY ARCHITECTURE (CSA)

This service aims to provide up-to-date information on current and developing cybersecurity threats and vulnerabilities in order to promote the adoption of information security standards, processes, methods, best practices, and tools. By offering specialized training and increasing awareness, we build local capacity to manage cyber risks. Ultimately, securing cyberspace will create trust in the electronic environment.

KEY FEATURES

Establishment of Cyber Security Incident Response Team (CSIRT)

Building a Security Operation Centre (SOC).

Awareness and training program for Government officials for Cyber Security.

Cyber Security Assessment of Critical IT Infrastructure available in Government Departments.

Formation of CMG (Crisis Management Group) and CMC (Crisis Management Cell) for Cyber Crisis Management Plan (CCMP)

Establishment of Security Architecture Framework (SAF) for operation of CSIRT and SOC.

Help Desk Support for CSA operations.

DEPLOYMENTS

Electronics Corporation of Tamil Nadu (ELCOT), Chennai

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SOFTWARE TECHNOLOGY (Including Cloud and BOSS)

Software Technology

(Including Cloud and BOSS)

1. CADET - C-DAC Adaptable Recruitment Portal Recruitment Application as a Service

CADET - C-DAC ADAPTABLE RECRUITMENT PORTAL RECRUITMENT APPLICATION AS A SERVICE

e-Recruitment Portal is offered as a service for advertising vacancies directly by organizations and manage the potential applications received through the portal. More information can be found out at URL: https://recruit-jobs.in

KEY FEATURES

- Easily configurable and customizable by organizations
- Password less login to candidates and manage the dashboard
- Dashboards to HR to management their recruitments
- Plug and play Payment Gateway
- Extension of advertisement for selected posts only if required
- Protection to Applicants data through encryption
- Multiple recruitments can be hosted on the same platform at the same time

DEPLOYMENTS

Offered as Service to Centre for Materials for Electronics Technology (CMET), C-DAC Chennai.

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ARTIFICIAL INTELLIGENCE (AI)

AIRAWAT – PARAM Siddhi AI

(AIRAWAT-PSAI)

AIRAWAT –
PARAM Siddhi AI
(AIRAWAT-PSAI)

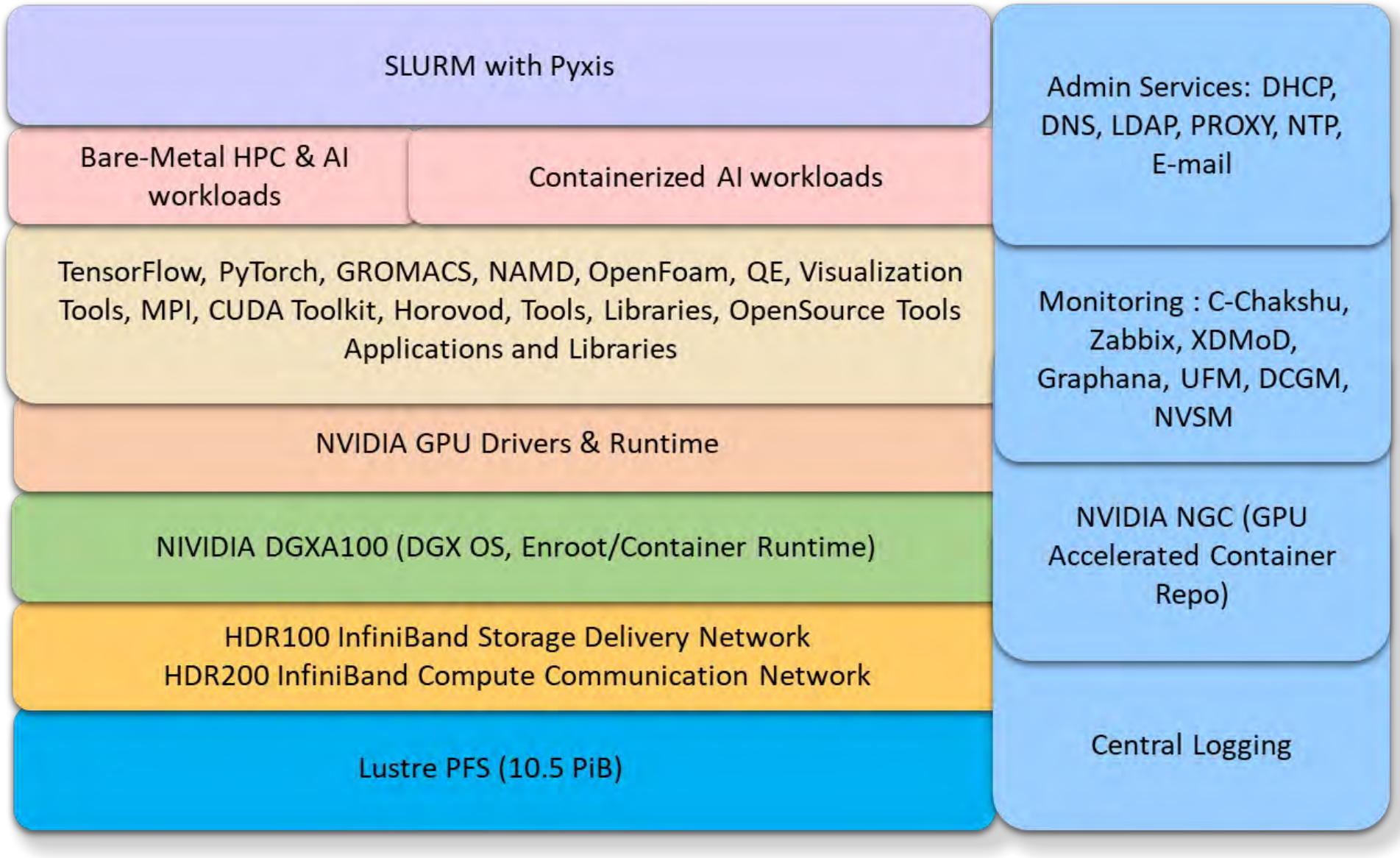
AIRAWAT-PARAM Siddhi AI (AIRAWAT-PSAI)

AIRAWAT-PARAM Siddhi AI (AIRAWAT-PSAI) stands as a flagship initiative of the Ministry of Electronics and Information Technology (MeitY), Government of India, and led by Center for Development of Advanced Computing (C-DAC)

Designed and commissioned by C-DAC, the converged HPC-AI dense GPU infrastructure has compute capacity of 410 AI PF (13.17 PF DP). It secured 75th position in Top500 Global Supercomputing List, putting India on top of AI Supercomputing nations worldwide. Currently, the system is operational under the aegis of National PARAM Supercomputing Facility (NPSF, C-DAC) at Pune.

NVIDIA DGX-A100 Compute Nodes	**82** (20992 CPU cores)
Total host (Compute Node) memory	**82 TB** (82 nodes * 1 TB per node)
NVIDIA A100-40GB Tensor Core GPUs	**656** (82 nodes * 8 GPUs per node)
Total GPU Memory	**26.24 TB** (82 Nodes * 8 GPUs per node * 40 GB Per GPU)
Mellanox 200Gb/s HDR InfiniBand Switch having 320Tb/s aggregate switch throughput (Compute Communication)	**800 Ports**
Mellanox 200Gb/s HDR InfiniBand Switches (Storage Delivery)	**10 Switches * 40 ports per switch**
PFS based storage (Network attached) @250 GB/Sec, 4M IOPS	**10.5 PiB** (2 Tier Storage)

AIRAWAT-PSAI System Specifications



AIRAWAT-PSAI System Software Stack

	GPU Charges (NVIDIA A100)						Storage Charges	Registration Charges
Type of Organization	GPU	Hourly (INR/GPU/Hr)	1 Month Reserved	3 Month Reserved	6 Month Reserved	12Month Reserved	One Month	**One Year**
R&D Govt./ Academia/PSU/ Startup	1XA100		₹70,080 hour (40% discount)	₹2,03,232 ₹92.8 per hour (42% discount)	₹3,85,440 ₹88 per hour (45% discount)	₹7,00,800 ₹80 per hour (50% discount)	Allocation of 1 TB @ Rs ₹350 per month	**₹30,000**
Industry	**1XA100**	**₹170**	**₹74,460** **hour (40% discount)**	**₹2,15,934** **₹98.6 per hour (42% discount)**	**₹4,09,530** **₹93.5 per hour (45% discount)**	**₹7,44,600** **85 per hour (50% discount)**	**Allocation of 1 TB @ Rs ₹350 per month**	**₹30,000**

AIRAWAT PSAI Charging Model

Note:

NPSF employs differential charging policy to the Affiliates from 1) Government R&D and academic institutions, 2) Industries/startups/MSME.

Charges for any special type of usage or situation not mentioned in this document will be decided on a case-to-case basis by C-DAC.

Charges will be communicated to prospective users based on their requirements

We are poised to offer HPC-AI compute power on cloud, a revolution in the Super Computing history as a service to give impetus to the National Scientific and Technology roadmaps. This will empower the start-ups, industry, academia and research institutes to position India as global hub of innovation. It will provide secure, flexible, scalable and holistic solution with assured quality technical expertise

URL: https://airawat-psai.cdac.in/

KEY FEATURES

High-Power Computing, anywhere: Access 410 AI-PetaFlop compute power (13.17 PF DP) anytime, anywhere.

NVIDIA A100 GPUs: Energy-efficient, high-performance cluster with 650+ GPUs available in cluster mode.

High-Speed Interconnect: Benefit from a high-bandwidth, low-latency interconnect (1.6 Tb/Sec per node to-node bandwidth).

Effortless AI Optimization: Availability of optimized AI models to save time and effort in development.

Support for NGC containers for AI/ML/NLP/CV/DS workloads. Economize on licensing expenses

Adaptable Workloads, Your Choice: Support a variety of HPC/Al workloads and ML/DL frameworks based on your preferences.

Automated Workflow: Streamline work with automated job scheduling, boost productivity.

Foster Innovation: Accelerate engineering output, foster science & tech innovations.

Massive Storage & Secure Environment: 10.5 PB multi-tiered storage (250 GB/Sec bandwidth & 4 M IOPs) & multi-tenant highly secure, isolated data protection.

Robust Service Delivery: Ensure seamless resource consumption and service delivery over NKN, backed by failover leased lines for uninterrupted business continuity.

Transparent Pricing: Competitive pricing with no hidden charges, ensuring cost-effectiveness.

Incentives to Startups: There would be no charges levied for first 1000GPUs Hrs valid for Six Months. Said period of six months, for any Startup, will commence from the date when C-DAC provides access to AIRAWAT-PSAI to that particular startup.

DEPLOYMENT

The system is deployed at National PARAM Supercomputing Facility (NPSF), C-DAC, Pune and went operational in June 2023

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HEALTHCARE AND EDUCATIONAL TECHNOLOGIES

Healthcare and Educational Technologies

1. Online Examination and Result Processing System

2. Answer Sheet Evaluation System (ASES)

ONLINE EXAMINATION AND RESULT PROCESSING SYSTEM

The Online Examination and Result Processing System is used for conduct of exam and result generation. It is an image based, LAN based, secure and scalable examination system which works on question paper approach. Question paper approach eliminates dependency on question bank for fetching questions and facilitates conduct of exam even in short duration of time. Also, as exam system is LAN based, this is especially useful for conduct of exam in remote locations where Internet is an issue.

KEY FEATURES

Exam in LAN environment

Question Paper (QP) based

i. Supports question paper set concept and Section based Question paper

ii. Supports conduct of multiple papers simultaneously

iii. Support Question and option shuffling

Registration data, QP, Response file -AES 256 bit encrypted

QP independent of Language & font

Automatic time management

Random Seating allotment

Effective Exam Dashboard

Audit trail maintained

Components of the system include

1. Authoring tool for generation of encrypted Question paper
2. Biometric Attendance system for capturing biometric details (fingerprint and photo) of candidates at exam centre
3. Exam software for the conduct of exam
4. Result Processing system for attendance

DEPLOYMENTS

Indian Air Force for AFCAT and Agniveer Vayu (STAR) exam

Indian Coast Guard for CGCAT and CGEPT exam

Indian Navy for INET Exam

Rajasthan Housing Board

AIIMS Rajkot

Online Examination for ICMR institutes

Andaman & Nicobar Administration

Nation Institute of Biologicals

C-DAC Recruitment exam

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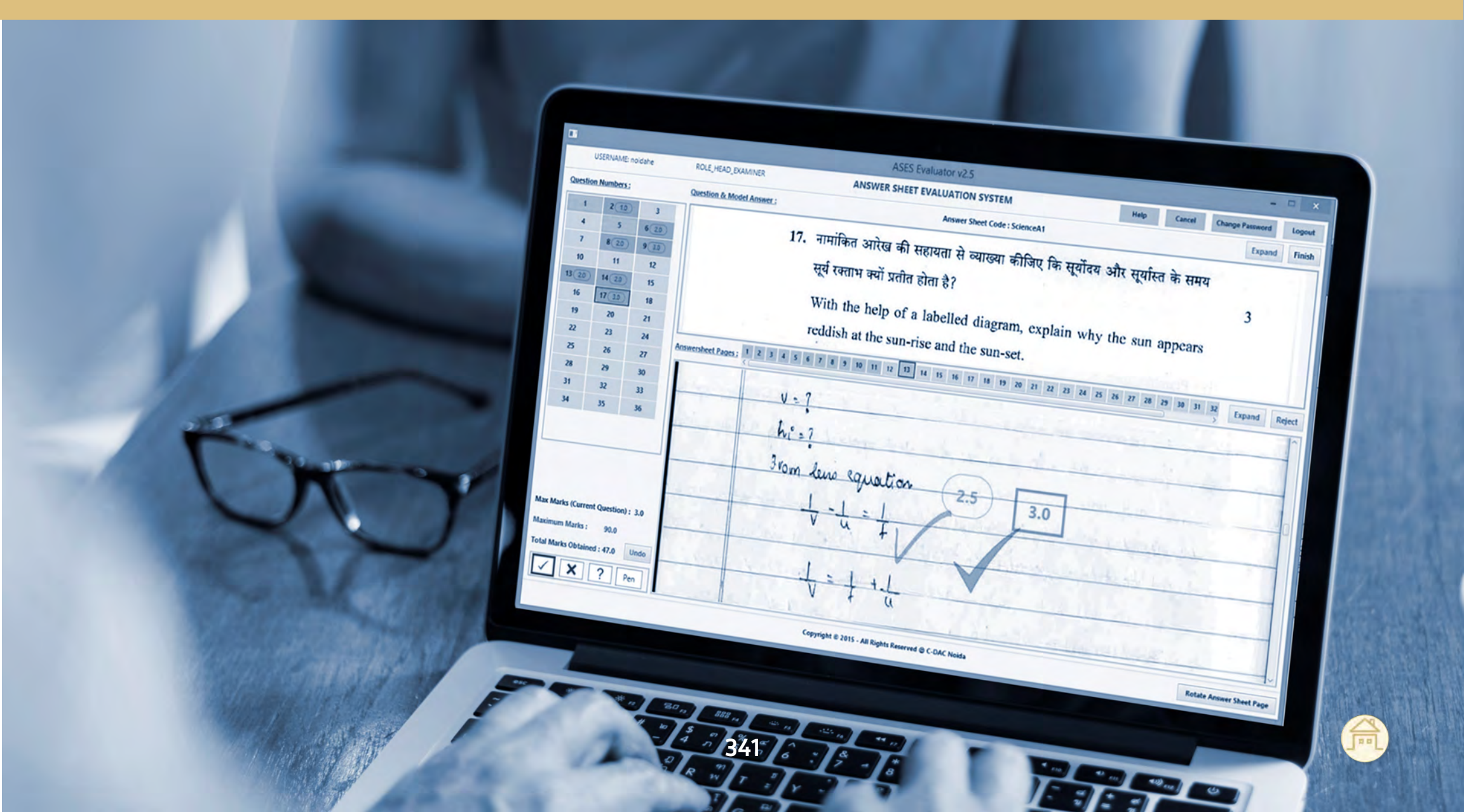
ANSWER SHEET EVALUATION SYSTEM (ASES)

Answer Sheet Evaluation System (ASES) facilitates digital evaluation of Answer sheets by Examiners in a controlled environment. All the annotation and marks given by evaluator and re-evaluator are stored along with answer sheet in the PDF format which can be used for post evaluation queries.

ASES consists of four main components:

- Cropping Tool – This is a standalone tool used to crop Question Paper and/or Model Answer PDF.
- Central Interface – Various users like Admin, Head Examiner use the central interface to manage the overall administrative activities related to answer sheet evaluation like master data creation, mapping head examiner to centre, mapping examiners to head examiner, answer sheet allotment, data download and upload etc.
- Head Examiner Interface - To manage evaluation of answer sheets at the centre like allotting answer sheets to examiners, revaluation of answer sheets etc.
- Evaluation Utility- It is used by Examiners/Head Examiner to evaluate/re-evaluate allotted answer sheets. Various annotation like ✓ , **X**, Comments, pen, etc are available in the utility



KEY FEATURES

- Evaluation by Evaluators in controlled LAN environment
- Facility to view Model Answer and Question to examiners.
- Free from marking and calculation issues.
- Ensures no skipping of answer sheet pages.
- Facility to re-evaluate the evaluated answer sheet
- Evaluated / Re-evaluated answer sheets are preserved in PDF containing annotations and marks.
- Facility to track evaluation status of allocated answer sheets

DEPLOYMENTS

Enize Infotech for digital evaluation of subjective answer sheets of Maharishi Patanjali Sanskrit Sansthan.

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INTERNET OF THINGS (IoT) TECHNOLOGY

Internet of Things (IoT) Technology

1. Blended Learning Program for IoT

BLENDED LEARNING PROGRAM FOR IOT

As the demand for IoT based products and solutions are high, there is a requirement for organizations to have the right talent to build these products and solutions. C-DAC in collaboration with IEEE has designed an IoT Blended Learning Program, keeping in mind the current trends and the need for in-depth technical content to address the skill gap. The IoT Program is categorized into three levels: Node, Gateway & Cloud. At the node level, the courses are designed to help learners understand Embedded Systems and work with sensors and actuators, wired & wireless connectivity. As part of gateway level, the courses address Linux, which is one of the most popular OS that is widely used in gateway level devices and IoT protocols that help is communicating with the devices and the cloud. Finally, level three courses deal with cloud technologies, web applications, database management, and mobile application development. This complete suite of courses helps the learner to understand, design, and develop prototypes & solutions to some of the real-world problems. The hands-on exercises are specifically designed as needed as part of some of the courses.

KEY FEATURES

IEEE Blended Learning Program is an indigenous, unique eLearning resource designed and developed by the IEEE volunteers and industry experts. Through the use of a blended-learning model which includes highly immersive e-learning combined with hand-on experience through e-labs and use case-based webinars, IEEE BLP offers skill-building courses in technology and allied courses to the needs of technical learners in academia and industry.

DEPLOYMENTS

More than 15,000 + learners have accessed the C-DAC – IEEE Blended learning program in IoT technology PAN India across Universities and Colleges

E-Learning Standards and Compliance

In Learning and Development area, IEEE Blended Learning content qualifies the eLearning standards and compliance:

Best Use of Blended Learning

Best Advance in Custom Content

Best Results of a Learning Program

Best Advance in Competencies and Skill Development

- Learn component to understand concepts in a highly interactive manner
- Practice component to learn how to apply concepts in a simulation / case study environment. Here, the learner solves a multi-step problem using a systematic, guided approach to understand application of concepts
- Assessment component to self-assess with review quizzes
- Adaptive Test component at the end of the course for a thorough evaluation about the learning and its outcome. This includes:

  Recall

  Analysis

  Application of concepts

  Problem solving skills

IEEE

https://blended-learning.ieee.org

IEEE blended learning PROGRAM
Learn – Apply – Build

EMBEDDED COMPUTING FOR IOT SYSTEMS

About Course

The course covers the basic functionality of any embedded system. Since ARM has become a defacto standard used across almost all embedded systems, we've used ARM Cortex architecture to explain basic computing concepts important for Embedded systems. Learn to design and deliver low power devices

Features

The course will provide you with an introduction to embedded systems, explain the ARM Cortex M4 Processor core architecture in details, build an understanding of Embedded programming basics in Assembly and finally cover Exceptions, Interrupts and low power design techniques.

Immersive eLearning
Online modules accessible anytime, anywhere

Hands on Labs
eLabs for hands on labs experience

Insightful analytics
Regular assessments to track yo

PRE -REQUISITES

- Basic understanding of C Language
- Basic knowledge in electronics is helpful but not mandatory
- No prior knowledge about the Internet of Things is required

https://blended-learning.ieee.org | info-blp@ieee.org

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Corporate Communication/Corporate R&D/2024