

DRISHTIKON

April 2023

An outreach bulletin of IITI DRISHTI CPS Foundation

FEATURED TECHNOLOGIES

- Auto Scheduler
- Portable Diabetic Retinopathy Detector
- Smart Road Maintenance System
- Crop Disease Alert System



India's healthcare delivery system can benefit from the use of digital twin technology

Read full interview with
Dr. Deepak Agrawal,
Neurosurgeon at AIIMS,
New Delhi

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ABOUT IITI DRISHTI CPS FOUNDATION

IITI DRISHTI CPS Foundation (DRISHTI CPS in short), a Technology Innovation Hub (TIH) established at IIT Indore under the aegis of National Mission on Interdisciplinary Cyber Physical Systems (NM-ICPS), is working along the technology vertical of System Simulation, Modelling and Visualization. DRISHTI CPS is committed to fostering technology development and commercialization, skill development, startups support, and employment creation in the field of Cyber-Physical Systems. It is closely working with faculty members, researchers and students from across the country for bringing relevant technologies from laboratory to market. We involve relevant industries, state government departments, line ministries, PSUs and startups in our eco-system.

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EDITORIAL

Nurturing CPS technology development

The IITI DRISHTI CPS Foundation (hereafter DRISHTI CPS) has seen major transformations during the past year in its effort to create a CPS ecosystem. While this shift has coincided with the return of 'cautious' normalcy in our lives, the endeavors at DRISHTI CPS towards CPS technology development have targeted researchers, aspiring entrepreneurs and industries for a more pragmatic lab-to-market transition. This issue of DRISHTIKON dwells upon the endeavours of DRISHTI CPS to nurture this sustainable, reflective, and contemplative ecosystem. The issue broadly showcases four innovations under various schemes of DRISHTI CPS. These have applications in the fields of manufacturing, agriculture, health care, and road and highway infrastructure. It is truly satisfying to see most of these either at the prototyping stage or at the pre-commercialization stage. It is clear from the articles that one of the application areas of DRISHTI CPS is manufacturing, and more specifically Micro, Small, and Medium Enterprises (MSMEs) which are extremely important for our economy.

One of the articles highlights the unexplored opportunities of digitalisation in MSMEs and presents how DRISHTI CPS is bridging this gap with an emphasis on end-to-end approach comprising problem identification, technology development, and commercialising through startups. Another article on MSMEs focuses on the enormous possibilities presented by digitalization in financing. An article by one of our collaborators at the University of Cambridge demonstrates how industrial efficiency and resilience are enhanced by using collaborative digital twin technology. Our visiting industry expert has highlighted pathways for developing sustainable deep-technology products in academic contexts. This is a very intriguing topic that could potentially be of use to academic institutes that are in the process of developing a translational research ecosystem. In another article, one of our industry partners discusses DRISHTI CPS' method for skilling students and industry professionals. The interview with Dr. Deepak Agrawal of AIIMS, New Delhi, provides insights into the perspectives of end users with regard to one of the most significant priority areas of DRISHTI CPS, namely Digital Twins. The issue concludes with profiles of four incubated startups.

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Cover Picture Courtesy: Dikshant Agrawal, PLC Programmer, IITI DRISHTI CPS Foundation

FOREWORD

FROM THE CHAIRMAN



India is at the cusp of phenomenal change. The catalyst for this transformation is the convergence of the demographic dividend, opportunities facilitated by sound policies, and the social and market impact of favourable practices. Building upon the excellent research endeavours of the last decade at IIT Indore, we must embrace this change through technology driven translational research and an entrepreneurial mindset. Set up in accordance with the National Mission on Interdisciplinary Cyber Physical Systems (NM-ICPS), IITI DRISHTI CPS Foundation (DRISHTI CPS), through a dedicated team of professionals, has developed an interactive and adaptive ecosystem for easing the transition from research to entrepreneurial ventures.

Lab-to-Market, Entrepreneur-in-Residence, Women-in-Entrepreneurship, Startup Acceleration, Skill Enhancement, and Technology Development through End User Problem Statements are a few mechanisms in place at DRISHTI CPS for supporting technology development, commercialization, and entrepreneurship. The efforts to engage industry experts in technology development projects are aided by several initiatives: round table meetings with Micro, Small, and Medium-Sized Enterprises (MSMEs), Visiting Industry Professionals (VIP) and inter-hub collaborations. The aim has been to ease the bottlenecks in this transition and have DRISHTI CPS backed technologies be ready for social and market impact. Nationwide skilling programmes catering to skill enhancement and job creation have been launched. A two-day residential programme, in coordination with the Department of Higher Education, Government of Madhya Pradesh, provides another avenue for supporting innovation, entrepreneurship, and a startup culture across universities and colleges in Madhya Pradesh. It is heartening to witness this environment of technology driven transformative change infused by DRISHTI CPS in the heart of India. I am confident that the momentum gained through well-defined action will enable DRISHTI CPS to surpass its mandate under the NM-ICPS scheme by the end of this year.

Best Regards,

Prof. Suhas Joshi

Director, IIT Indore

Chairman, Board of Directors,

IITI DRISHTI CPS Foundation

STATEMENT FROM THE CEO



**MILESTONES
ACHIEVED**

35

TECHNOLOGIES DEVELOPED

476

SKILL DEVELOPMENT

320+

JOBS CREATED

21

STARTUPS SUPPORTED
AND INCUBATED

44

CPS RESEARCH BASE

150+

AFFILIATE MEMBERS

In last six months

The IITI DRISHTI CPS Foundation is on a mission to establish a sustainable ecosystem for commercializing technology ideas, producing skilled human capital, and encouraging entrepreneurship. With a strong base built over the past six months, the foundation is now focusing on scaling and sustainability to make a lasting impact.

One of the foundation's primary areas of investment is technology development, where it works with a talented pool of researchers and scientists to society's most pressing challenges. DRISHTI CPS has partnered with industry players to create a conducive environment for commercializing these technologies, which has led to successful pilots of several cutting-edge solutions in different sectors, including Healthcare, Road Infra, and MSME Digitalization.

Another significant impact area for the foundation is skilling programs for students in Tier 2 and Tier 3 institutes, creating a workforce equipped with the necessary skills to succeed in the fast-paced world of technology. The foundation is partnering with institutes across multiple regions of India and has helped create employable graduates to contribute to the development of the economy.

DRISHTI CPS is also supporting startups in their journey from building a Minimum Viable Product (MVP) to taking it to market, providing mentorship, networking opportunities, funding, and helping them navigate the complex startup journey. This has led to multiple startups successfully launching their products and services, creating jobs, and contributing to the growth of the economy.

To encourage researchers to consider technological commercialization opportunities before fully developing their projects, DRISHTI CPS is creating a mechanism for increased engagement between startups, faculty members, and industry professionals, providing continuous feedback and regular monitoring and mentorship.

DRISHTI CPS is implementing two-pronged strategies to meet the ambitious job creation goals set. The foundation is bolstering existing skilling programs around the country and establishing a network of nationwide skilling centers, cooperating closely with businesses to have its skill training approved for use in their hiring campaigns. Additionally, expanding the DRISHTI CPS and its network of partner organizations and incubators will foster the development of a large number of CPS ventures, generating new employment opportunities across the country.

Corporate Social Responsibility plays an important role in the sustainability and continuation of Not-For-Profit companies, as it plays a major role in supporting further research, innovation and support for the management of the foundation. I, on behalf of the entire team at DRISHTI CPS, would like to thank M/S Flavorite Technologies Pvt Ltd for their support to the organization through their CSR Budget.

Overall, DRISHTI CPSs' initiatives are making a substantial impact, and the foundation is poised to achieve even greater accomplishments in the future.

Aditya SG Vyas

Chief Executive Officer

FEATURED TECHNOLOGIES



An automated tool for job shop scheduling

Industry Partner: AceMicromatic MIT (AmiT)

SUPPORTED BY DRISHTI CPS UNDER ITS VARIOUS SCHEMES

When seen through the lens of industrial operations, we are faced with a myriad of problems, some of which include new orders, processing backlogs, machine breakdowns, a lack of raw materials, equipment, or workers, and a great number of other unanticipated events. Due to this, a real-world Job-shop Scheduling Problem, also known as the JSP, is considered to be one of the most difficult manufacturing challenges in the body of relevant academic research. Moreover, achieving quick and automatic scheduling is a requirement of Industry 4.0, and this must be done based on information about the available machines, their capabilities with knowledge about parts to be manufactured, and current loading status. The technology that was developed by the cohort offers a solution that is all-encompassing, responsive, and efficient for a variety of job shop scenarios. This web service for multi-strategy job scheduling uses a variety of heuristics and metaheuristics for problem resolution, taking into consideration one or more performance measurements, and applying those considerations to diverse industrial contexts. The primary goal of this tool is to provide a complete, innovative and customizable solution for JSP for MSMEs. A beta version of the tool was presented by the collaborators at the AceMicromatic Group pavilion at the IMTEX 2023 tradeshow held at Bengaluru.



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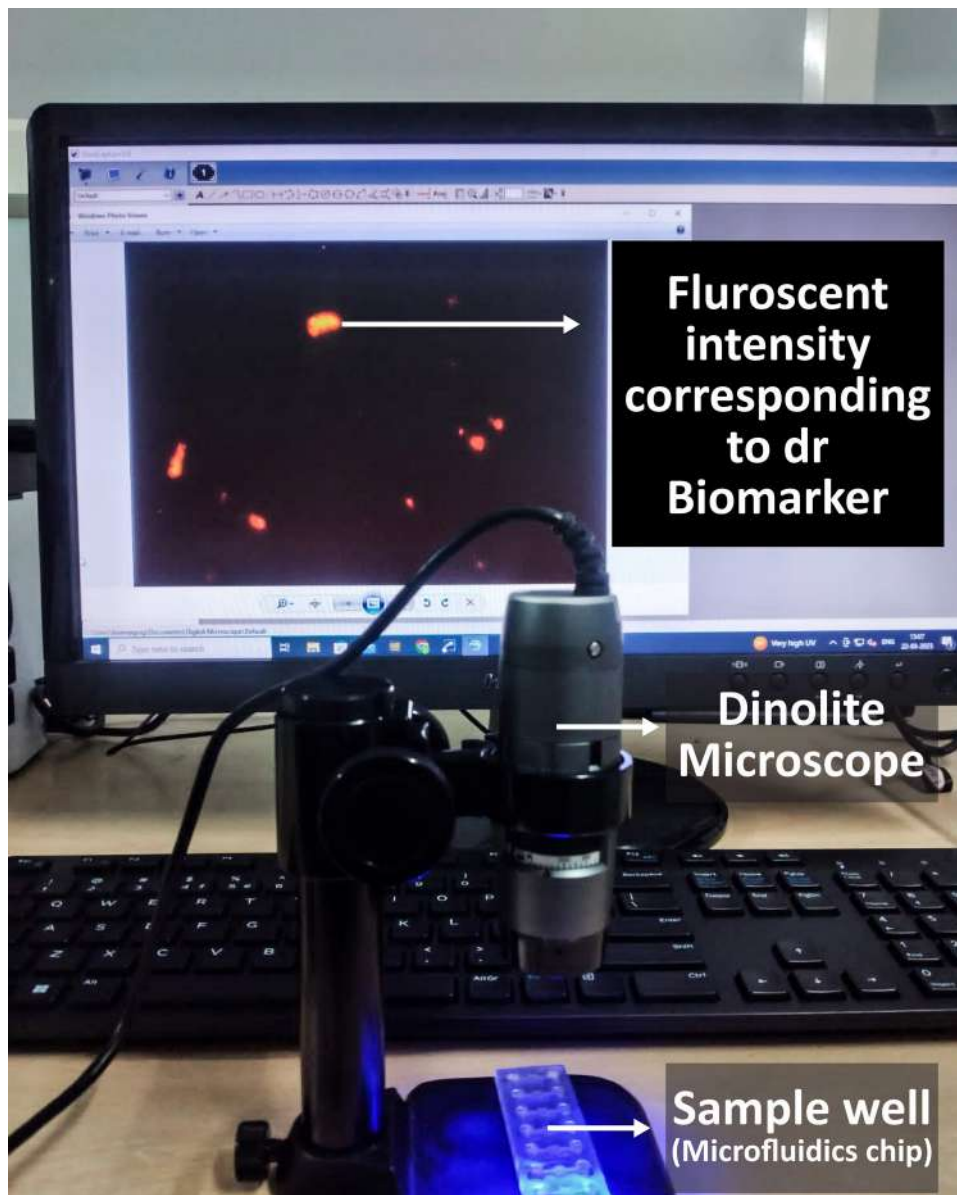
Demonstration of scheduling tool at IMTEX 2023



Portable tool for diabetic retinopathy detection

SUPPORTED BY DRISHTI CPS UNDER CHANAKYA PHD FELLOWSHIP

Diabetic Retinopathy (DR) is a common cause of preventable blindness, affecting approximately 20% of India's 25 million diabetics, with majority of cases occurring in rural areas. However, most of the treatment facilities for DR are in cities. To identify DR patients who require intervention, all patients require regular check-ups, which are currently only available in medical colleges and come at a high cost for rural population. To address this issue, a group is working on a portable imaging system linked to a smartphone application that will deliver DR biomarker results to rural clinics. The technology is based on automated data-driven modelling to screen DR patients (no-DR or mild-DR) and identify them for further evaluation and treatment with high reliability. Beta version of the technology is being tested in five districts of West Bengal with the help of health care workers, primary care clinics, medical schools, and corporate hospitals.



Imaging system for screening Diabetic Retinopathy Patients



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A low-cost intelligent system for road monitoring and maintenance for Indian roads

SUPPORTED BY DRISHTI CPS UNDER CHANAKYA CHAIR PROFESSORSHIP

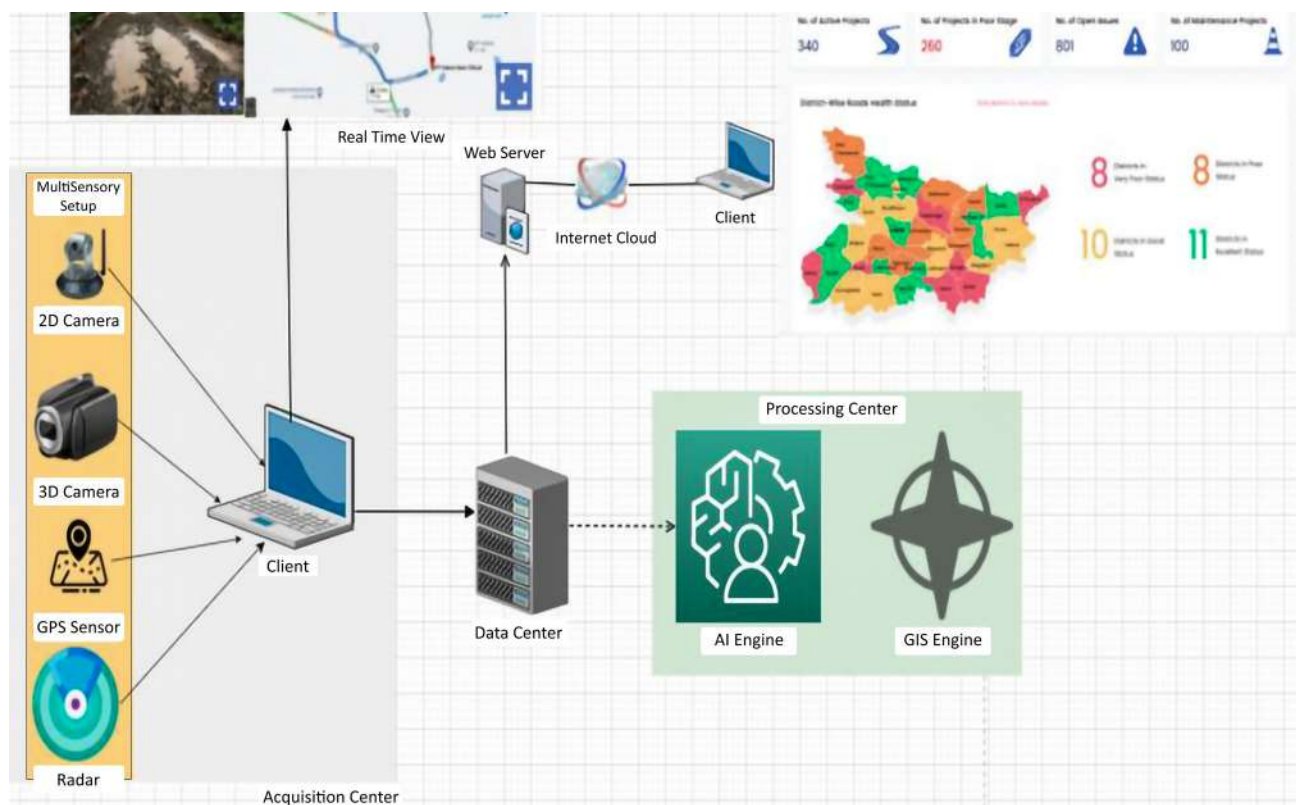


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Professor, IIT Indore

The state of a country's roads and infrastructure is critical to its economic development, and India aspires to have one of the best road networks in the world in order to increase GDP and progress towards becoming a developed nation. Maintenance, automation, and transparency are critical to achieving this goal in such a large network. Poorly maintained roads can impede mobility, slow economic growth, raise vehicle operating costs, and have an impact on safety and comfort. A self-contained, integrated solution that includes inspection, data collection, modelling, and project management can optimise road and infrastructure maintenance while lowering costs and improving quality. A low-cost integrated solution for intelligent road maintenance and monitoring is being developed specifically for Indian road conditions. The system is being built on an IoT platform with sensors and optimised communications and networking modules for distress detection and classification using advanced machine learning algorithms as well as 3D/LiDAR vision and other sensor data augmentation technologies. With recent government policies emphasising road and infrastructure maintenance and safety, DRISHTI CPS is assisting in the commercialization of this technology and contributing to India's economic growth.



Solution for Road Maintenance and Monitoring



An indigenous multi-sensor embedded disease warning system to monitor crop health

SUPPORTED BY DRISHTI CPS UNDER CHANAKYA PHD FELLOWSHIP



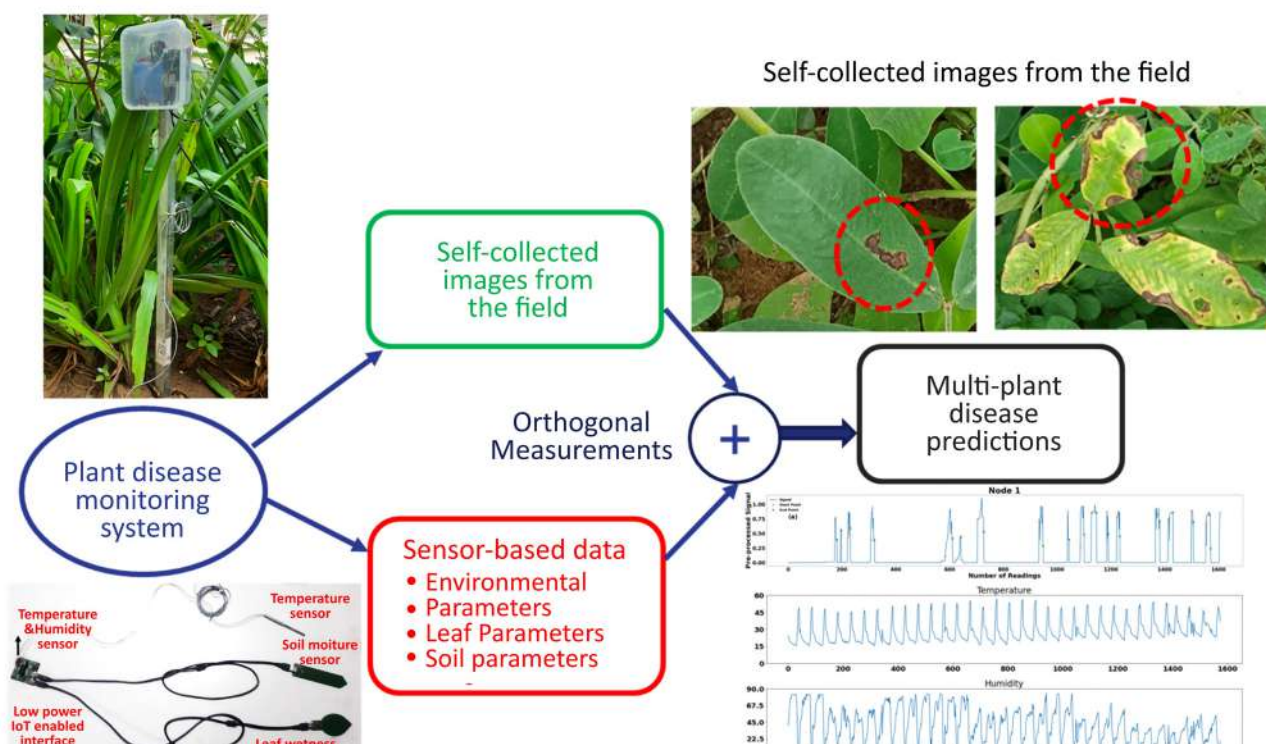
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Many diseases and insects pose a grave threat to agricultural crops and harvests. These attacks can affect crop quality, putting the livelihoods of farmers at risk. Advanced disease detection systems are essential for minimising agricultural damage, maximising crop yield, and reducing the occurrence of diseases. This technology enables farmers to take proactive measures to protect their crops by focusing on early disease detection. This indigenous multi-sensor embedded disease warning system combines sensor and image-based approaches into a single artificial intelligence/machine learning model using orthogonal measurements. The system generates time series data from the sensor and self-collected images for precise measurements. The ability to remotely monitor field parameters and establish the cause of leaf wetness, soil moisture and temperature, ambient humidity, and ambient temperature provides insights into crop health that farmers may utilise to improve irrigation and disease control strategies. The whole prototype is undergoing real-time testing for crop production systems, new generations of farmers, the agri-food business, and startups selling cutting-edge precision farming equipment.



An indigenous multi-sensor system for plant disease predictions



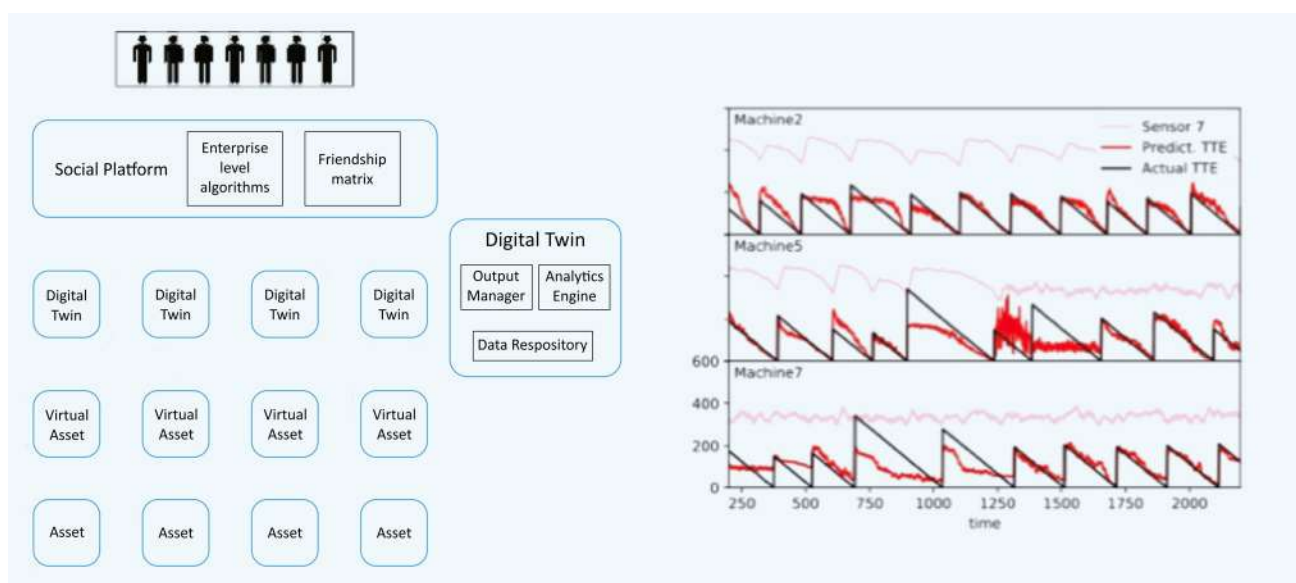
Collaborative digital twins: Improving predictive maintenance

Ajith K Parlikad, Professor, University of Cambridge, UK

“Digital Twins” can transform how data is used to improve industrial efficiency and resilience. Modern digital twins are a collection of data, models, and decision-support algorithms associated with a physical asset with an aim to improve operational effectiveness. Digital twins’ potential can be extended by embedding distributed intelligence technologies like software agents that allow machines to interact and cooperate to accomplish a system objective.

Data scarcity prohibits us from building credible asset failure prediction algorithms for highly sophisticated systems such as aeroplane engines. Traditional methods include developing a model using failure data from several other engines in the field and applying it to individual engines to anticipate failures. This general model may not operate effectively on any engine since duty cycles, operating conditions, etc. vary. Clustering engines by similarity and training models for these clusters is a reasonable approach to address this issue. However, in a dynamic context, these “clusters” can change, making it difficult to manually update them. The Asset Management Group at the University of Cambridge found that collaborative digital twins may use a purpose-built social network platform to identify engines that behave like themselves, make friends with them, and exchange data and information to enhance prediction performance.

The graph in the figure displays three engines. Machine 5 behaves as machine 2 above. These machines are friends and share data, so they can forecast problems effectively. At some point, machine 5 begins to act strangely, – perhaps it moves to a different loading cycle, and its failure prediction worsens. This machine is now behaving like machine 7. Machine 5 immediately realises this, unfriends machine 2, makes friends with machine 7, shares data with it, and learns the failure behaviour and improves its prediction performance within a few of cycles. Machines’ sharing data and expertise has huge potential. Using their digital twins, machines can collaborate to share jobs and control production sequences depending on their capability, capacity, and condition to optimise system performance. The research community is developing and testing these technologies, models, and algorithms. We need to implement and test them in actual contexts and identify the practical obstacles (e.g., standards) to acceptance.



Collaborative digital twin based prediction



Digital transformation: An unexplored opportunity for MSMEs

Bhupesh K Lad, *Professor, IIT Indore, Project Director, IITI DRISHTI CPS Foundation*

India's National Mission on Interdisciplinary Cyber Physical (NM-ICPS) is one of the most ambitious and inclusive technology programmes ever in the country. A network of 25 Technology Innovation Hubs (TIHs) has been set up to cater to different technology verticals of cyber physical systems (CPS) as part of NM-ICPS. A key sector in this is Manufacturing which is undergoing an extraordinary transformation across the world. This change, in general, described as Industry 4.0 or Smart Manufacturing represents the embodiment of Cyber Physical Systems towards smart and effective manufacturing processes and supply chain logistics.

Globally, large-scale manufacturing industries are transforming into digitally connected smart factories. These industries are implementing bespoke solutions like digital twins, automated and dynamic decision-making tools, vision-based analytics, and quality control systems in manufacturing supply chains. Micro, Small, and Medium Enterprises (MSMEs) lack resources in terms of technology, trained manpower, IT infrastructure, and resources to test, customize and implement CPS technologies on the shop floor. As ancillary units to large scale industries, MSMEs contribute to inclusive industrial development and must be an integral part of this industrial transformation. Industry 4.0 also requires digital connectivity between large-scale manufacturing industries and their MSME suppliers. This creates a natural push towards digital transformation of MSMEs.

IITI DRISHTI CPS Foundation (hereafter DRISHTI CPS) has identified traceability, process monitoring, digitalization in purchasing, real-time inventory monitoring, process quality monitoring, analytics, low-cost simulation and decision-making tools as key concerns for MSMEs. The available solutions for these concerns lack cost effectiveness. In addition to this, being non-indigenous and in languages largely foreign to the local populace makes implementing digital solutions quite challenging. This runs the risk of MSMEs being deprived of the benefits of CPS, and as a consequence, getting left behind in this rapid transformation. Globalization and fierce competition make MSMEs most vulnerable in this fast-evolving technology era. DRISHTI CPS is working extensively to build indigenous, low-cost, technology solutions to address the above concerns of MSMEs. In a recent example, DRISHTI CPS was made aware of the requirement for a low-cost traceability solution. A team of specialists worked on the problem and created the prototype which is now being tested on the shop floors of multiple MSMEs, and necessary customizations are being incorporated. The technology has been shared with a start-up for mass-scale commercialization at low cost. At DRISHTI CPS, entrepreneurship is nurtured, and the product is continuously upgraded while ensuring scalability to meet the varied expectations of MSMEs. With this end-to-end approach emanating from problem identification to mapping of available technologies is taken forward through the development of customized solutions which are commercialized through start-ups. Through this ecosystem, DRISHTI CPS aims to empower 19.66 million manufacturing MSMEs to play their part in the digital transformation while contributing to the economic and social growth of the country.





Fintech for MSME financing

Prakalp M Jain, *Co-Founder, EffoLogic Consultants Pvt Ltd*

Micro, Small & Medium Enterprises (MSMEs) are the engines of growth of the Indian economy and need faster and better access to resources. There are approximately six crore MSMEs, all of which rely on the Government and regulators for creating an Ease of Doing Business (EoDB) environment, especially in the digital realm. Recent revolutionary innovations, such as Aadhar Enabled Udyam Registration, Trade Receivables Discounting System (TReDs) based financing platforms, PSB Loans in under 60 minutes, GST based unified taxation, and others have facilitated better evaluation and delivery of credit facilities for MSMEs.

Processes such as Know Your Customer (KYC) and identity verification need further refinement and automation. Digitalization and use of technologies such as AI/ML and data analytics can enhance access to banking and financial products for small businesses operating in tier 3 and other small towns. Such technologies will further help in understanding unit level financial behaviour and improving the credit rating and scoring system. A better rating and scoring system based on financial but non-credit transactions can be created for GST registered MSMEs. Digitalization can further assist in integrating all financial and credit activities and return filing data of the segment at both the group and individual MSME level. This can help the lending system to give more weightage to cash flow generation compared to physical assets. In order to insure the risk of credit default at the individual level, AI-enabled systems can be designed to collect a small fee on each transaction/credit facility from MSMEs. Besides the technological solutions, hubs under the National Mission on Interdisciplinary Cyber Physical Systems (NMICPS) can work together to provide an integrated technology enabled platform for MSME financing in the country.

Interview with Dr. Deepak Agrawal

Neurosurgeon at AIIMS,
New Delhi



Digital Twin: An Emerging Tool in Healthcare

Q Dr. Deepak Agrawal, you pioneered medical digitalization and Digital Twins (DTs). What made you start this segment and how has it helped you?

Answer: The name “digital twins” is new, but the notion is not. My colleagues and I tried this to improve emergency care at AIIMS in New Delhi a decade ago. We created a digital twin project by monitoring medical staff stress levels with smart watches. This increased medical consistency and decreased luck. We were creating a digital twin without knowing the word. I'd think a digital twin improves healthcare delivery consistently. Since then, we've advanced. Precision medicine, preventive maintenance, and remote monitoring have been integrated to improve healthcare.

Q Doctors' main goal is to improve patient care. What are DT's main advantages?

Answer: Technology has helped in many ways, especially for major organisations like AIIMS, which sees over 10,000 patients daily. Digital twins streamlined AIIMS OPD services. The team constructed a digital model to anticipate patient load for each doctor based on past trends with 90% accuracy. Notwithstanding patient fluctuations, we kept our clinics running at full capacity. Thus, we implemented digital twin technologies to improve healthcare delivery with great success.

Q Why are digital twins being adopted in healthcare across the nation?

Answer: Good question! Hospital administrations demand high turnover, whether private or public. To optimise the patient's hospital stay, the bed should not be empty and the turnover should be higher even if it's full. Studies show that patients overstay, which may not benefit the hospital in long run. Due to a lack of equipment, surgical slots, or auxiliary services like lab and radiology examinations, patient care can be delayed. The AIIMS team is saving resources, improving efficiency and productivity, and better serving patients with digital twin technologies. This technology offers real-time inventory management, which improves patient services,

quality, and price.

Q India has become a digital economy faster than any other nation in the past eight years. How do you feel about healthcare's Digital Twin implementation challenges?

Answer. Any technological implementation has hurdles. I find data security and privacy are major hurdles for digital healthcare. Hospitals need trained people to maintain technology and equipment. Safeguarding patient data is also important. Importantly, standardisation is necessary in terms of what various solutions providers are offering. We need a common dashboard irrespective of what brand we are using. Patients need lower equipment maintenance costs to keep healthcare affordable. We need an interface to communicate with technology suppliers and doctors, who speak different languages.

Q When educational institutions of higher learning and industry come together in a working symbiotic relationship, both try to find a common ground to meet each other's needs and create a win-win situation for all. What better can we do when making a headway with this initiative and shape current innovation and commercialisation systems?

Answer. I think there is a huge scope when it comes to collaboration. I can offer you a few examples. I've worked on developing ventilators with numerous other startups, and what I've observed is that there is a lot of synergy when it comes to healthcare. When we work alone, we are constrained by our knowledge; however, when we collaborate, things suddenly become possible. For instance, I've observed that many startups from the engineering and IoT sides have a disconnect unless they have a collaborator from the healthcare domain invested in the product. In light of the fact that we have so many requests, I would say that our wish list for the digital twin concept includes things like patient care, facility maintenance, equipment upkeep, and remote patient monitoring. What we lack, in my opinion, are sensors, sensor integration, software development, and the usage of AI and ML at the back end to eventually get that product ready. IITI DRISHTI CPS Foundation will then be able to team together collaborators who have a particular area of expertise. So, these are merely turns to toss; the data that is already there can become big data through analysis, a digital twin through patient use, and so on.



Pathways for deep-technology products in academic mise-en-scène

Anuj Mathur, *Technology Consultant, IT Program Management & Application Support, VAAD Gurgaon, India*

IITs and IISc have established themselves as a beacon for academic pursuits. While there are several destinations for pursuing higher academic endeavors, the Silicon Valley is a dream destination for technology savvy geeks as it is the most successful example of academic – entrepreneurial – industrial innovation ecosystem in the world.

Under the National Mission on Interdisciplinary Cyber Physical Systems (NM-ICPS) 25 hubs have been set up to propel India as a global technology leader. The hubs, ably supported by academic institutes through the establishment of a section – 8 company, are aggressively working towards developing an eco-system that will enable knowledge generation and skill enhancement through product development and commercialization. IITI DRISHTI CPS Foundation is a technology innovation hub at IIT Indore with technology vertical of system simulation, modeling and visualization for cyber physical systems.

The path to a technical product requires a detour from an academic track. Investigators may benefit by identifying each project phase in terms of proposal, planning and requirements gathering, design, development, validation, and launch. This would help ring-fence project activities with tangible outcomes from each phase. At DRISHTI CPS, the product lifecycle starts with a quantifiable real-world problem definition (end user problem statement) to determine its scale and serve as a success metric post implementation in terms of core product and adaptability of technology across sectors. One of the initiatives launched by the DRISHTI CPS is to invite industry personnel to visit, interact with stakeholders and forge ties in identified areas. The scheme facilitates involvement of specialists across multiple domains of a product lifecycle to better orient technology development efforts.

A solution needs nurturing at varied levels. Industry recognized pathways like status reports, regular review meetings, project dashboards to communicate the health of a project are necessary to capture stakeholder attention. An academic mise-en-scène is different and care should be taken that challenges are resolved through technical reviews which may recommend a course correction or potential alternatives pathway. Investigators of projects supported by the hubs should keep in mind that a technology product will compete with other potentials and therefore definition of project milestones and their regular tracking is important.

Apart from these levers, identifying and engaging with right stakeholders for a pragmatic solution focusing on commercialization is important. For this, investigators may often have to venture out of their comfort zone.

An additional pathway for laboratory-to-market transition can be a complete buyout of the laboratory technology by domain specialists who have the resources to take it to the next level. Even in such cases, indicators in terms of quality, compliance and industry standards should be maintained. A robust and diverse support system from technological to entrepreneurial, will be reassuring to investigators as many would be venturing for a technology start-up for the first time. A word of caution is that for bleeding edge technologies, conventional way of waterfall delivery may hamper the speed of transition from laboratory-to-market, it's key that an iterative approach for such products is followed.

Economically, the cost of developing a technology outside India will always be higher than that developed in the country. The market and social impact of an Indian solution will be phenomenal. Taking advantage of the demographic dividend for deep-tech start-ups through innovation hubs in academic institutions is the best way forward for a technology driven academic – entrepreneurial – industrial ecosystem.



The approach to skilling

Venkatesh Balasubramanian, *Senior Manager Training and Marketing, SMC Corporation (India) Pvt Ltd*

Innovation is essential in today's fast-changing technology driven world. To sustain in such an innovation driven age, companies are looking for skilled human resources which becomes challenging in an interdisciplinary area such as Cyber Physical System (CPS). The need for skill development is even more pronounced for India considering its large population and demand for employment. Innovation hubs, such as IITI DRISHTI CPS Foundation, can contribute significantly to skill development in India with focus on driving innovation through a dedicated technology vertical of system simulation, modeling and visualization of CPS. The technology development and commercialization ecosystem of DRISHTI CPS is supporting the national mission on Interdisciplinary CPS by cultivating a pool of skilled human resources to drive innovation and foster economic growth in the country.

My working relationship with DRISHTI CPS has helped me gain a thorough understanding of this burgeoning ecosystem. Their CPS laboratories have state-of-the-art training facilities, particularly in smart manufacturing. DRISHTI CPS is regularly customizing the skill enhancement courses to suit industry requirements. When we co-taught a course with them, their emphasis on hands-on was evident. DRISHTI CPS has placed a heavy focus on providing participants with exhaustive practical experience for a batch size of 15 to 20 participants. Unlike other conventional skill courses, DRISHTI CPS has designed micro modules and most of these range from 30 to 40 hours with focus on personal engagement. The skill courses of DRISHTI CPS have found takers from the industry. The development of numerous skilling modules for entry-level and diploma-level participants is an additional crucial feature of their up-skilling program. These ventures are essential for effective skilling and upskilling in interdisciplinary technology areas. I am particularly pleased to learn that DRISHTI CPS is collaborating with numerous institutes, as well as national and international organizations to advance the CPS ecosystem in the country.



A joint skill course by IITI DRISHTI CPS Foundation and SMC



Incubation and acceleration

(PRAYAS, SEED SUPPORT)

In the last 6 months IITI DRISHTI CPS Foundation has emerged as one of the key destinations for deep technology startups to build, seek mentoring and launch in central India. With a focus on technology commercialization and job creation DRSIHTI CPS is establishing a close-knit network of researchers and end users with startups. At the moment 21 startups are incubated at IITI DRISHTI CPS Foundation. In this issue highlights of four startups are included.



MLWORKX

MLworkX offers a cloud-based electronics manufacturing platform called Manutrax. This platform provides a one-stop solution for organizations to develop, prototype, and mass-produce their products from the ideation phase to the mass-production phase. With Manutrax, businesses can simplify the electronics manufacturing process and make their market journey faster and cheaper. The platform offers a range of features, such as design validation, supply chain management, quality control, and logistics, making it easy for companies to get their products manufactured and delivered to customers. The online platform integrates the manufacturing activities and the supply chain thereby offering an organized one-stop solution for MSMEs and encouraging the development of IoT-enabled manufacturing units.



A2P ENERGY SOLUTIONS PRIVATE LIMITED



A2P aims to solve the issue of paddy straw burning by creating sustainable projects that convert farm-generated straw into useful products like Energy and Soil Conditioners. Their product, A2P ENERGY, offers an end-to-end business solution that connects all stakeholders in the supply chain, including access to a carbon portal. The platform utilizes Google's satellite data to collect data and identify the total available raw material in the form of biomass. A2P ENERGY's focus on technology, green energy, and supply chain management offers a comprehensive solution for a major environmental problem.

ARFICUS PRIVATE LIMITED

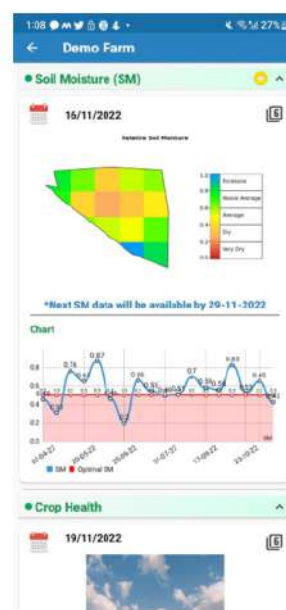


Medhini is a highly advanced AI-based SaaS Medical platform that has reduced disease diagnosis time to 53 seconds. It diagnoses over 53 highly infectious diseases, cancers, and chronic diseases with a 99.3% accuracy level. Medhini emphasizes improving the efficiency of radiologists & pathologists, Reducing Multiple tests, Reducing Diagnosing time & cost, and disease Prognosis with four verticals:-MedhX Symptom Checker, MedhX Clinical Diagnosing, MedhX Health Future Prediction Mapping, MedhX New Drug Discovery & Support

KAYASHTYA DIGITAL TECHNICAL INNOVATIONS PRIVATE LIMITED



Kayashtya Digital Technical Innovations is developing MoCult 1.0, a satellite-based software and mobile app for monitoring agricultural farms using satellite image data modelling. The app gathers data from Sentinel-2 and Sentinel-5 satellites and do predictive modelling for crop yield, quality, damage, CO₂ emission, and land degradation report over time. It provides farmers with insights and notifications for quality cultivation, as well as indicating field quality. This solution offers smart and quality agriculture management, enabling farmers to make informed decisions to increase productivity and reduce costs.





Skill development at DRISHTI CPS

IITI DRISHTI CPS Foundation organized skill development sessions for students, faculty members, laboratory staffs, industry and personnels to enhance their knowledge and skills in emerging technologies such as Cloud Computing, Industrial Automation, Digital Twin, IoT, Programming Languages and Simulation. The program aimed to provide practical knowledge and hands-on experience to participants, enabling them to improve their productivity and employability. Over the last six months, the program has made significant progress, with 476 individuals trained and equipped with the necessary skills to excel in the technology industry. Furthermore, the program has created over 300 job opportunities for these skilled individuals, demonstrating the effectiveness of the training provided by the foundation. IITI DRISHTI CPS Foundation is now working with many institutes across the country to enhance its reach with a faster pace.

SALIENT FEATURES:

3000 sq. ft. hands-on training facility	320+ Placements facilitated
Collaboration with 30+ industries	200+ Upskilling of working professionals at MNCs
Skilling with new edge technology	Training the trainers program
Trainers with 10+ years of industrial experience	Wider reach through spokes



→ Ongoing and upcoming programmes

DIAL (CPS DEDICATED INNOVATION ACCELERATOR)

The hub has planned the launch of its Dedicated Innovation Accelerator Program for Startups which have built their Minimum Viable Product and are currently seeking validation of their Technology and Business from the prospective users. The program offers Physical Incubation, support from top technologists for product improvement, technology validation and strategy for the Go to Market (GTM) of the product. It starts from a Knowledge Bootcamp that helps entrepreneurs build their financial models, understand statutory requirements, continues with Sprints to reach the next orbit in their journey through support and mentoring by DRISHTI CPS and concludes with a Demo Day for investors and probable partners. The accelerator has been planned as a program along with Neuron~Centre of Excellence of Software Technology Parks of India (STPI), Mohali.

PDF FOCUSING ON ENTREPRENEURSHIP

The postdoctoral fellowship at DRISHTI CPS has been designed keeping in mind the fact that often doctoral candidates finish the core research and development but then are bereft of funds and support to take their project to a product level. Incremental improvements and business knowledge are then necessary for them to branch out as an entrepreneur and reach the end customer of their technology. DRISHTI CPS is filling this market gap and making efforts to reduce the brain drain of postdoctoral fellows by providing them an enabling environment for the research continuation as well as support for commercialisation of their product/solution.

LAB TO MARKET (L2M)

The lab to market scheme is open to faculty members of Indian academic institutions. In our interaction with university and college faculty members, we have seen early prototypes using cutting edge technologies in the CPS space built through several government grants and other schemes. The lab to market scheme picks up projects at the prototype level and helps the innovator to build minimum viable product which can be taken to respective industry partners and startups for further improvement and commercialisation.

ACKNOWLEDGEMENT

I would like to express our heartfelt appreciation to Flavorite Technologies Private Limited, Indore, for generously supporting the National Mission for the benefit of society through a CSR grant to IITI DRISHTI CPS Foundation. We assure you that your contribution will be used in accordance with the Government of India's CSR mandate. We anticipate that you will continue to assist our foundation.

Aditya Vyas

CEO, IITI DRISHTI CPS Foundation



→ Happenings at DRISHTI CPS



IITI DRISHTI CPS Foundation signed a MoU with Indore Smart City Development Limited (ISCDL), and CIIE Initiatives (CIIEI), IIM Ahmedabad to promote entrepreneurship in the country with a focus on Madhya Pradesh



Dr. Atreyee Ghosh, Consultant-Digital Twin Technology, IITI DRISHTI CPS Foundation, delivered an expert talk on "Microalgae-based removal of contaminants of emerging concern" at an event organized by IIT Indore in association with Defence Research and Development Organisation (DRDO) on 'Characterization and Quantification of emerging contaminants'



Dr. Andrzej Romanowski, Vice-Rector, Lodz University of Technology visited IITI DRISHTI CPS Foundation to explore possibility of collaboration



Interaction with DST Team: Dr. JBV Reddy and Mr Anurag Mishra visited IITI DRISHTI CPS Foundation on 17th November 2022



E-Cell, IIT Indore and IITI DRISHTI CPS Foundation organized a session with Mr Aditya SG Vyas, CEO, DRISHTI CPS on entrepreneurship for students of IIT Indore



Mr. Amandeep Srivastava, Manager-Startup Programs, IITI DRISHTI CPS Foundation, highlighting funding options for deep tech startups during Climate Action Champion Network event organized by the U.S. Department of State, Government of the United States



A discussion among participants at National Roundtable for MSMEs on Digital Transformation focusing on Industry 4.0 organized by IITI DRISHTI CPS Foundation at IIT Indore



Visit with Prof. Jean-Pierre Raskin and Mrs Stephanie Merle from Université catholique de Louvain to India's largest BioMethanation Plant, to identify problem statements for collaboration



Mr. Aditya SG Vyas, CEO, IITI DRISHTI CPS Foundation, orienting students and faculty members about DRISHTI CPS programs at the Entrepreneurship Summit organized by Medicaps University, Indore

The Industrial Automation Leader at the Service of **Vocational Training**

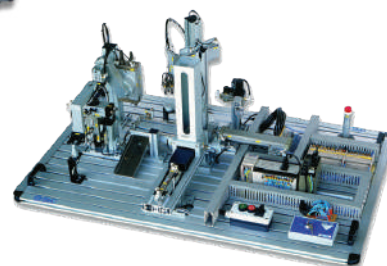
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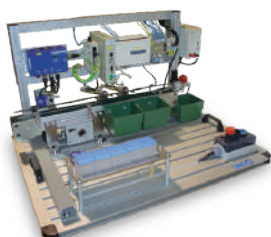


ITS-200

“SMC International Training was conceived with the specific purpose of developing training resources that improve the training and skill development of qualified technicians in the area of AUTOMATION. SMC offers a wide range of technical training courses.”

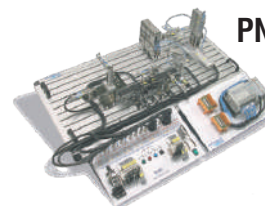


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→ Highlights about other TIHs

1. **I-Hub Foundation for Cobotics-** IHFC in collaboration with TRYST- the biggest tech fest in India and Jet Aerospace launched its first ever 1 day Drone workshop open to all which was met with super success. This 1 day hand on drone training included learning about drone making, drone flying, simulation, drone tech as well as the future of drones in today's world. Participants were awarded TRYST, IHFC and JET aerospace certificates. IHFC also sponsored collaborative robotics competitions encouraging young students to develop robots for multiple purposes in everyday life .



2. **Digitization of five museums of Rajasthan:** Five Rajasthan Government museums at the cities of Alwar, Chittorgarh, Baran, Bundi, and Bharatpur in Rajasthan are digitized and uploaded to the Rajasthan Government server. The key features are- Augmented with 360-degree, Interactive 3D models of the museum artifacts, pre-defined tours to take you through a guided experience with enhanced imagery and descriptions, easy-to-navigate controls. These Digital Museums are a step towards the future of digitizing India's rich heritage.





DRISHTIKON is a quarterly outreach bulletin of IITI DRISHTI CPS Foundation. The next issue is expected to be released in July 2023. The bulletin is widely circulated and read across the country by the industrial and academic community. Please contact us to advertise in the upcoming issue of the bulletin.



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