



विज्ञान एवं प्रौद्योगिकी विभाग  
DEPARTMENT OF  
SCIENCE & TECHNOLOGY

सत्यमेव जयते



National Mission on  
Interdisciplinary Cyber-Physical  
Systems (NM-ICPS)

# NATIONAL MISSION ON INTERDISCIPLINARY CYBER-PHYSICAL SYSTEMS

QUARTERLY BULLETIN  
JANUARY 2025



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## About

# National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS)

The Union Cabinet has approved the National Mission on Interdisciplinary Cyber-Physical Systems (NM- ICPS) in December 2018 at a total outlay of Rs.3660 Crores for a period of five years to be implemented by Department of Science and Technology (DST).

Under the NM-ICPS, 25 Technology Innovation Hubs (TIHs) have been established in reputed institutes across the country, out of which 23 TIHs are active at present. Each hub is a Section-8 Company, an independent entity within the Host Institute and has been assigned a Technology Vertical in the areas of advanced technologies such as Artificial Intelligence and Machine Learning; Technologies for Internet of Things & Internet of Everything; Data Banks & Data Services, Data Analysis; Robotics & Autonomous Systems; Cyber Security and Cyber Security for Physical Infrastructure; Quantum technologies etc.

The Mission aims at development of technology platforms to carry out R&D, translational research, product development, incubating & supporting start-ups as well as commercialization. The Mission is being implemented with all the TIHs undertaking activities under the following four major categories

- 1. Technology Development**
- 2. Entrepreneurship Development**
- 3. Human Resource Development**
- 4. International Collaborations.**

### Objectives of the Mission

1. Technology Development, translational research and commercialization in CPS
2. Adoption of CPS technologies to address India specific National / Regional issues
3. Produce Next Generation skilled manpower
4. Catalyze Translational Research
5. Accelerate entrepreneurship and start-up ecosystem development in CPS technologies
6. Give impetus to advanced research in CPS technologies and higher education in Science
7. Bring India at par with other advanced countries and derive several direct and indirect benefits.

NM-ICPS is a comprehensive mission that brings together Academia, Industry, Government and International Organizations. The mission has created an ecosystem that fosters entrepreneurship, develops next generation skilled manpower, catalyses translational research and promotes the commercialization of CPS technologies. NM-ICPS is an ambitious initiative that has the potential to transform key sectors of the Indian economy like healthcare, transportation, education, infrastructure & defence and make them more efficient, safe, and sustainable to place India at par with other advanced countries.



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# IIT Palakkad Technology Ihub Foundation, IIT Palakkad

## HUB OVERVIEW

IIT Palakkad Technology IHUB Foundation (IPTIF) works on Intelligent Collaborative Systems (ICS). It aims to create a strong foundation and a seamless ecosystem for Cyber-Physical Systems, attracting available nationwide potential and harnessing expertise to foster research innovation, technology, and product development. IPTIF is dedicated to enabling a vibrant innovation ecosystem by providing a reliable platform for developing technologies on ICS, with special focus on energy and safety domains, by innovators, entrepreneurs and startups to engage in activities that create value for the local, national, and international ecosystem.

## PROJECT UPDATES

Automatic Visual Inspection  
System (AVIS)

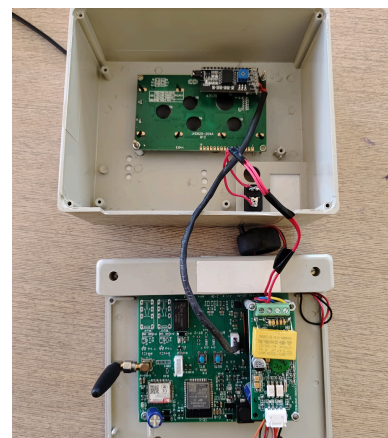


### Real-time Defect Detection for Smart Manufacturing

The TIH has developed an innovative Automatic Visual Inspection System (AVIS) solution for Real-time Defect Detection in Smart Manufacturing. The developed solution utilizes a camera and edge computing device to detect various types of anomalies and defects in products. This enables real-time monitoring and analysis, allowing for swift action to be taken. The major technologies employed are camera-based inspection, edge computing for real-time processing and analysis, advanced algorithms for defect detection (Surface, dimensional, colour or texture, patterns etc.) & data security.

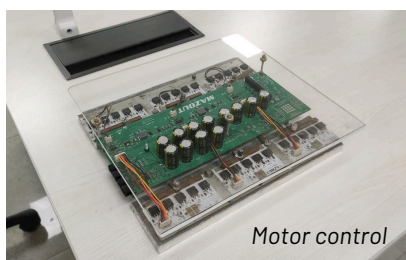
### Block Chain Powered Smart Energy Meter

A smart energy meter integrating blockchain and cloud to improve security, transparency, and automation is designed and fabricated under the TIH. Blockchain-powered smart energy meters provide accurate, secure, and transparent energy consumption tracking and billing. The integration of blockchain technology enables real-time data recording and supports decentralized energy trading among consumers.



Smart Energy Meter

## STARTUP UPDATES



Motor control

### X1 - Integrated power electronics for electric vehicles

Mazout electric Pvt. Ltd., an incubated startup under the TIH has developed X1, an integrated motor control and vehicle control for electric two- and three- wheelers used for urban mobility, making any electric vehicle a smart and connected vehicle. As opposed to multiple Electronic Control Unit (ECUs) used in EVs, X1 replaces them all with a single unit making it software-defined and tamper proof.



# BITS BioCYTiH Foundation, BITS Pilani

## HUB OVERVIEW

BITS BioCyTiH Foundation is a Sec-8 Company of BITS Pilani that aims to foster Research, Innovation, Skill Development & Training in Bio-CPS through mentoring and nurturing startups and entrepreneurs, and industry-academia collaborations to undertake cutting edge research and provide affordable solutions in the areas of healthcare, agriculture, water and environment.

## PROJECT UPDATES



Cognition Tracking

### Mobile/Web and AR-VR Based cognition tracking

The TIH is developing mobile/web and AR-VR based cognition tracking, analysis, and rehabilitation for healthy and cognitively impaired which endeavors to develop immersive goal-oriented games for real-world cognitive evaluation, validated against traditional methods. Two pilot studies (young and older cohorts) have been completed with promising results, alongside collaborations with two hospitals for clinical testing. The games assess decision-making, memory, and daily activities, offering user-friendly tools to empower timely interventions and improve dementia care.

## STARTUP UPDATES

### Rhema Innovations Pvt. Ltd.

The incubated startup under the TIH has developed an innovative wearable device that converts Speech to Tactile patterns. This is a unique first of its kind solution globally with a proven technology. The device interprets audio (spoken words) in real time and transforms it into tactile patterns for users to feel. When speaking to someone with hearing disability in the normal language, the tactile device analyses real-time audio inputs and outputs it into a digital format for the user to understand and communicate.



Wearable Device

## SKILL DEVELOPMENT

BITS BioCyTiH Foundation hosted the 2nd edition of Goa Innovation & Startup Times (GIST-24) . The event featured keynote lectures on AI & System Security, environment-focused startups, panels discussion on local innovations and on science, policy and environment. Women entrepreneurs showcased their ideas over a pitching session.



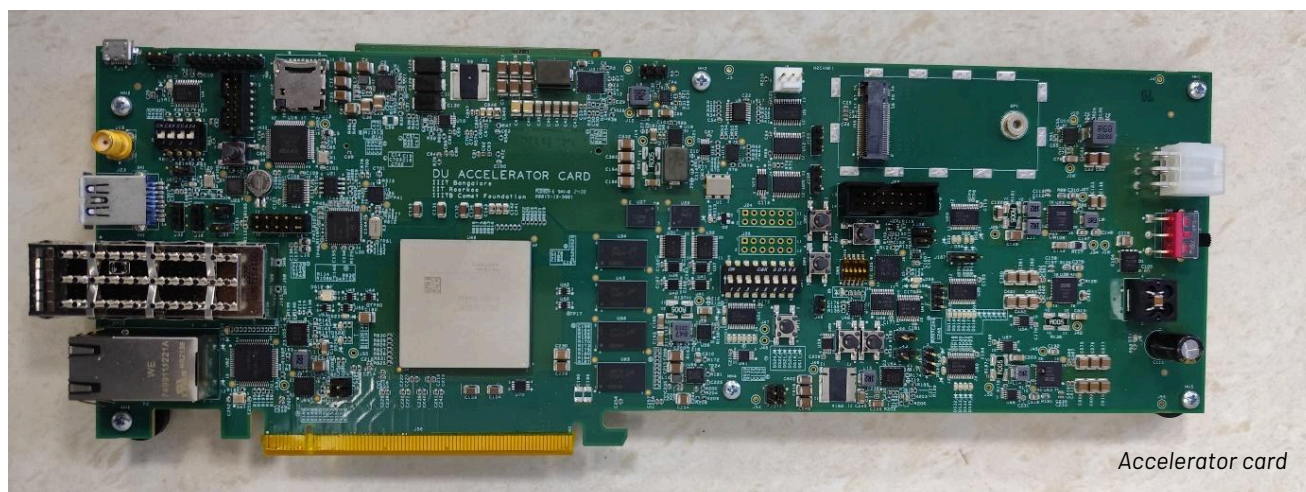


## IIITB COMET Foundation, IIIT Bangalore

### HUB OVERVIEW

IIITB COMET Foundation is set up to spearhead innovations in the next generation of communication systems, indigenously develop technologies to power 5G communication address the critical demand of seamlessly connecting people, businesses & industries, and lay the foundations for 6G networks. IIITB COMET Foundation initially is focusing on the verticals of 5G infrastructure as well as 5G applications such as Industrial IoT, eHealth, education, automotive V2X, AI/ML and AR/VR.

### PROJECT UPDATES



Accelerator card

#### Accelerator card for ORAN-based distributed unit

As part of an ongoing activity of the TIH to develop a 5G-Advanced ORAN massive MIMO base station, an accelerator card to run critical physical layer functions as part of the distributed unit (DU) of the base station has been developed. This accelerator card can be integrated with any server that runs the DU functions of a base station.

### SKILL DEVELOPMENT



Outreach sessions

IIITB COMET Foundation has initiated a certificate course on Future Wireless Communications to train the students/researchers on various facets of Wireless communication.

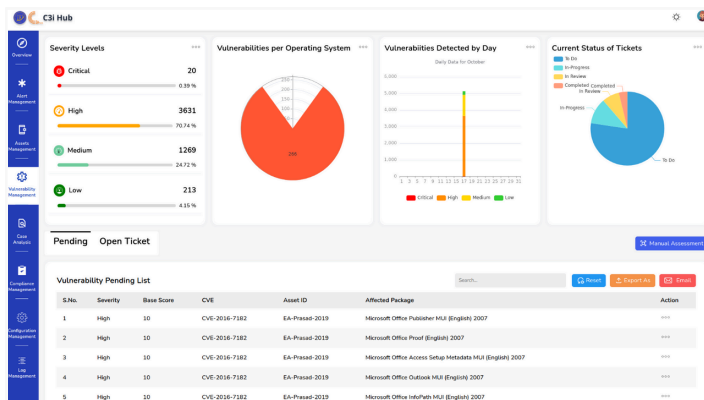
# IHUB NTIHAC FOUNDATION, IIT Kanpur



## HUB OVERVIEW

C3iHub (Cybersecurity and Cybersecurity for Cyber-Physical Systems Innovation Hub) addresses cybersecurity issues of the cyber-physical systems and devises technologies for their protection. C3iHub focuses on verticals: critical infrastructure-security, automotive-security, UAV-security, tamper-proof data storage and cybercrime prevention, and associated horizontal layers: hardware security, network security, firmware security, etc.

## PROJECT UPDATES



Vulnerability Management Dashboard: IPA SOC

### Deployment of SOC at Indian Ports Association (IPA)

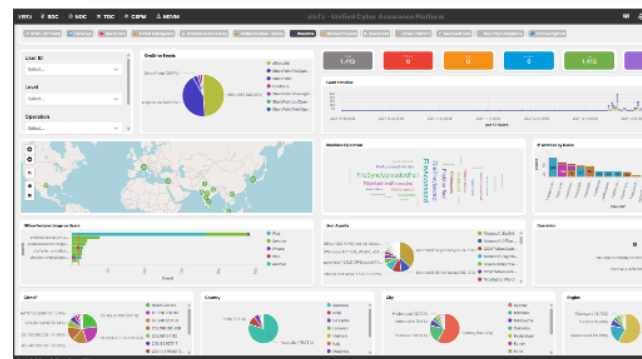
C3iHub updated IT SOC at IPA that was initially installed in 2022. It was updated with Asset Management, Alert Management, Case Management, Vulnerability Management & Configuration Management platforms. The updated version offers improved detection and reporting of any vulnerabilities based on severity, exposure, reachability and asset criticality.

## STARTUP UPDATES

### Product launch of Startups

C3iHub's Conference on Emerging Trends in Cybersecurity (CCETC), showcased launch of products by six Start-ups incubated under the TIH, which are as follows:

- Ansh Tech Labs: Strotapanga (OSINT search engine)
- Cyber Chakra Technology: Chakra Imager (Digital Forensic Imager),
- Level 7 infosec Pvt Ltd: AccuRecon (Reconnaissance Tool),
- Hommi Technovations: Smart home ecosystem,
- xloTz Pvt Ltd: Cloud Security Posture management
- SecureDApp: SecureWatch (Web3 Threat Detection).



xloTz Cloud Security Posture Management

## SKILL DEVELOPMENT

### Cybersecurity Training to Police Forces & Army Personnel

C3iHub launched "Cyber Commando Training Program", a specialized six-month residential course. This initiative, developed in collaboration with the Union Home Ministry and the Indian Cybercrime Coordination Centre (I4C) under MHA, is designed to equip police forces with advanced cybersecurity skills.



# IITM Pravartak Technologies Foundation, IIT Madras

## HUB OVERVIEW

IITM Pravartak Technologies Foundation is the Technology Innovation Hub (TIH) of IIT Madras. IITM Pravartak focuses on new knowledge in SNACS through extensive and application-oriented research and gladly prepares young India for the next generation of world-class technologies. IITM Pravartak contributes to the areas of national priority such as health care, agriculture, education, infrastructure and upskilling, including targeted training for economically weaker sections.

## STARTUP UPDATES



### Folium Sensing Private Limited

Incubated at IITM Pravartak, Folium Sensing Private Limited, leverages optical fibre-based distributed sensing to enable real-time monitoring of acoustics, temperature, and strain over vast areas. By converting standard fibre optic cables into high-precision sensors, their systems deliver unparalleled insights for applications such as leak detection, structural health monitoring, and border security. This scalable, non-invasive technology ensures cost-effective, accurate, and long-range performance, making it ideal for industries requiring robust and reliable sensing solutions.

## INTERNATIONAL COLLABORATIONS

IITM Pravartak Technologies Foundation has collaborated with GKK Consultants Sdn Bhd, Malaysia to deliver job-enabling courses to universities in Malaysia as part of the Government of Malaysia’s initiative to drive the Digital Economy across the country through the established Malaysia-India Digital Council. This collaboration will offer comprehensive training on Semi-Conductor IC Design and other technologies such as AI/ML, data science etc.



Collaboration with GKK consultants



# Divyasampark iHUB Roorkee for Devices Materials & Technology Foundation, IIT Roorkee



## HUB OVERVIEW

iHUB DivyaSampark at IIT Roorkee is a Technology Innovation Hub that aims to enable innovative ecosystem in CPS and becoming the source for the next generation of digital technologies, products and services by promoting translational research, enhancing core competencies, capacity building, training to provide solutions for national strategic sectors and becoming a key contributor to 'Digital India' and 'AatmaNirbhar Bharat'. The Hub is working as a networked platform, acting as a cushion between different stakeholders like researchers, industry, start-ups, policymakers, investors (Angel, VC, PE) and opening doors for global partnerships to push the boundaries of innovation.

## STARTUP UPDATES



Theranutilus nanorobots

### Theranutilus nanorobots

Theranutilus, a startup supported under the TIH has earned a spot among the top 50 DeepTech Startups in India 2024, by NASSCOM EMERGE 50. This pioneering deep-tech startup is leveraging nanorobotics to tackle critical medical challenges such as Dental hypersensitivity, Root canal reinfection, Cancer theragnostic. Theranutilus' nanorobots are magnetically propelled microscopic machines, engineered to operate with nanoscale precision, delivering groundbreaking solutions at the cellular level. This recognition highlights its transformative contributions to healthcare innovation.

### Behave Neu: Revolutionizing Learning with Neuroscience and Technology

Behave Neu, a transformative innovation by Nexactly AI Solutions, a startup supported under the TIH, integrates neuroscience, technology, and gamification to enhance focus, memory, and creativity in young minds. Through advanced Brain-Computer Interface (BCI) games, Behave Neu makes learning both engaging and impactful.

## COLLABORATIONS

iHUB Divyasampark has partnered with the Automotive and Allied Research and Technology Innovations (AARTI) Foundation to drive sustainability and innovation in the Industry 4.0 era. AARTI, a Center of Excellence (CoE) and Industry Accelerator at IIT Roorkee, represents a collaborative effort involving IIT Roorkee, the Ministry of Heavy Industries (MHI), and the International Centre for Automotive Technology (ICAT).

This collaboration is focused on:

- Advancing cutting-edge automotive technologies and research
- Building a robust ecosystem for startups, innovators, and industries
- Promoting skill development to empower the workforce of the future



Collaboration with AARTI Foundation



IIT Ropar Technology & Innovation Foundation, IIT Ropar

HUB OVERVIEW

The goal of the iHub is development of technologies to support environmentally sustainable and profitable agriculture, quality food for all, and the preservation of biodiversity. It aims at providing technological solutions to he Agricultural & Water related issues through deployment of CPS in Food Processing, Rural Development, Fisheries, Textiles, Electronics, Fertilizer, Atomic Energy etc.

PROJECT UPDATES

Development of Bluetooth Low Energy (BLE) Gateway:

IIT Ropar-TIF AWaDH has advanced the Bluetooth Low Energy (BLE) Gateway, further enhancing its capabilities for real-time data monitoring across industrial applications. The system now integrates with BLE sensors to capture critical data like temperature, humidity, and motion, securely transmitting it to a cloud platform. With improved connectivity options (4G, Wi-Fi, and LAN) and a communication range of up to 1 km, it supports over 100 nodes. The updated BLE Gateway is energy-efficient, scalable, and ideal for diverse environments, making it a powerful tool for sectors like agriculture, healthcare, and logistics.



BLE Gateway

STARTUP UPDATES



Navariti Innovation

Navariti Innovation Pvt. Ltd.

The incubated Startup under the TIH Navariti Innovation's HELIOT.AI transforms farming with AI IoT-powered solutions like microclimate monitoring, pest alerts, and water-saving irrigation. With 150+ installations, Navariti drives 15-20% yield enhancement, 20% cost savings, and climate-smart farming across India.

SKILL DEVELOPMENT

AWaDH at IIT Ropar hosted a Farmers Engagement Session to demonstrate innovations in agriculture. Over 50 farmers were trained on advanced technologies, including MoohSense, Nanobubble Technology, and Soil Health Monitoring, empowering them with tools for sustainable farming.



Farmers Engagement Session

# Technology Innovation in Exploration & Mining Foundation, IIT(ISM) Dhanbad



## HUB OVERVIEW

Technology Innovation in Exploration & Mining (TEXMiN), the Mining Technology Innovation Hub has been set by Gol at IIT (ISM) Dhanbad, under the National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS), to undertake Technology Development, Capacity Building, and promote Innovation & spur Start up-eco-system in the mining sector to achieve 3S Mining (Safe, Smart, and Sustainable Mining), leading to Mining 4.0.

## PROJECT UPDATES

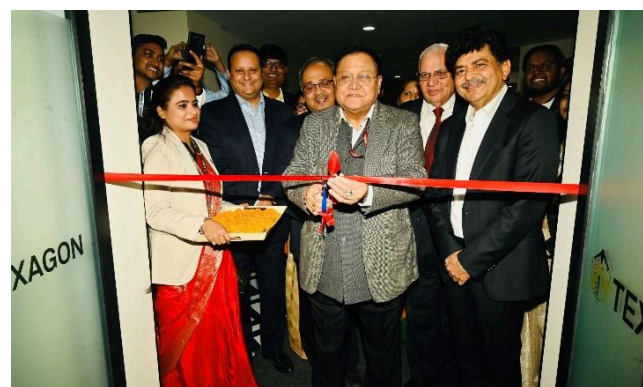


TEXMiN, in collaboration with C-DAC and another industry partner, has developed AI-AQMS (AIRPravah)—a cutting-edge Air Quality Monitoring System. AIRPravah tracks harmful pollutants such as SO<sub>2</sub>, NO<sub>2</sub>, PM<sub>10</sub>, Pm<sub>2.5</sub>, Pm<sub>1.0</sub>, O<sub>3</sub>, CO, CO<sub>2</sub>, and O<sub>3</sub> with AQI while leveraging AI-powered predictions to create safer, cleaner, and more sustainable mining environments.

## COLLABORATIONS



TEXMiN has partnered with Web Werks to harness the power of cyber-physical systems and high-performance computing, revolutionizing the mining industry and accelerating Zetta-scale High-Performance Computing in India.



### HxGN CoE and GeoSM Lab

TEXMiN inaugurated two state-of-the-art facilities —the HxGN Center of Excellence and GeoSM Lab





## IIIT-H Data I-Hub Foundation, IIIT Hyderabad

### HUB OVERVIEW

The TIH is dedicated to enhancing national research and deploying solution in data banks, data services, and data analytics. The Hub aims at putting together large-scale datasets as well as developing solutions based on such datasets through applied research. The research is primarily focused towards creating the highest global academic standards for the betterment of society.

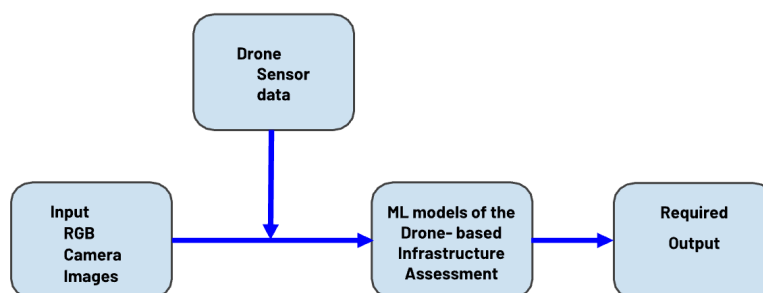
### PROJECT UPDATES

#### Drone-based Infrastructure Assessment

The TIH has made some significant strides in the "Drone-based Infrastructure Assessment" project in collaboration with Council of Scientific and Industrial Research-Central Building Research Institute. The project utilizes UAVs with remote sensing and computer vision to efficiently evaluate structural vulnerabilities, enabling faster, cost-effective damage assessment and disaster management before events like earthquakes. This uses RGB drone images, drone sensor data, and ML-based processing to assess key structural parameters for seismic risk.

The project aims to automate the estimation of seven ML-based modules:

- Window Detection Module
- Storey Count Estimation
- Roof Area Estimation
- Roof Layout & Occupancy Estimation
- Distance between Adjacent Buildings
- Crack Detection
- Building Tilt / Slope Estimation



Pipeline of all seven ML-based modules

### SKILL DEVELOPMENT



Course on AI for Medical Professionals

The TIH completed the 12-week online certification course: "AI for Medical Professionals" in collaboration with National Academy of Medical Sciences (NAMS) wherein 141 participants were trained.

The TIH organized a 2-week course on AI and ML for DRDO Scientists which equipped the researchers with cutting-edge knowledge in AI and ML to address critical challenges.

# IIT Bhilai Innovation and Technology Foundation, IIT Bhilai



## HUB OVERVIEW

IIT Bhilai Innovation and Technology Foundation (IBITF) operates in Fintech arena focusing on identifying impactful solutions leveraging emerging technologies like Blockchain, IoT, AI/ML, and e-payments, with a primary emphasis on applying these technologies to the Agriculture and MediTech sectors.

## PROJECT UPDATES



Solar based E-rickshaw smart charging infrastructure

The TIH has developed solar based E-rickshaw smart charging infrastructure and route optimization platform which provides Solar power EV charging access, reducing carbon emissions, UPI-enabled payment integration, automated power control, and real-time monitoring. The solution with multilingual mobile APP provides seamless experience for EV-Rikshaw owners, offering flexible payment options and the ability to locate nearby charging stations. Users can send charging requests to station owners, track progress in real-time, and receive updates on expected waiting status. The app supports both online payments (credit/debit, UPI, wallet) and cash on-site for convenience, ensuring users have an accessible and hassle-free charging experience. The TIH has collaborated with Chhattisgarh State Renewable Energy Development Agency (CREDA), Chhattisgarh for deployment of the technology.

## SKILL DEVELOPMENT

IIT Bhilai Innovation and Technology Foundation (IBITF) and the Reserve Bank of India (RBI), hosted an outreach program focused on Central Bank Digital Currency (CBDC). The event featured basic appraisal about India's initiatives for digital e-rupee, open issues regarding deployment of CBDC in remote locations. Also, the potential deep tech interventions to address the such issues were brain-stormed upon.



Program at CBDC





# I-DAPT Hub Foundation, IIT(BHU) Varanasi

## HUB OVERVIEW

I-DAPT Hub Foundation at IIT (BHU), Varanasi was set up to address the emerging needs of the country in the area of Interdisciplinary Data Analytics and Predictive Technologies (I-DAPT). I-DAPT Hub Foundation aims to use the interdisciplinary nature of data analytics and predictive technology to achieve the mission of modernization of socio-technical systems and existing services with disruptive innovations and inventions of novel products, processes and technologies. I-DAPT Hub Foundation at IIT (BHU) is presently working on five thrust areas i.e. Telecommunications, Power, Road Transport and Highways, Defence Research and Development, and Health and Family Welfare.

## PROJECT UPDATES

### Intelligent Cyber-physical Systems for Air Borne Signature Monitoring

Project: Logistics 4.0 Intelligent Fruit Status Monitoring System for Shipment

Project: Intelligent Vehicular Pollution Monitoring System (iVPMS)

**Salient features:**

- Non-selective Gas Sensors
- 8/16 element Sensor Array
- Cartridge type array module
- Re-configurable Sensing
- Modular architecture
- Embedded intelligence
- ppb to ppm range performance
- Stand-alone or Networkable
- Manual & auto calibration
- USEPA – EU Reporting
- Plug & play, 2A, 230V AC - Solar
- CO, SOx, NOx, O<sub>3</sub> & 14+ gases
- Latitude, Longitude, Altitude
- Temperature, Humidity
- Laser PM 1.0, 2.5, 10.0
- 64 GB SDC
- 2G, 3G, 4G, 5G / Wi-Fi / LoRA
- NEMA 4X / IP67 Cabinet
- Fully customizable
- Mass production compatible
- Low-cost Fast Fabrication

### Pawan Santari (The Air Guard)

I-DAPT Hub Foundation has developed a demonstrable prototype of a real-time onboard vehicular exhaust gas monitoring system. This system uses the signature pattern analysis of the volatile organic compounds (VOCs) using artificial intelligence (AI) based algorithms. The core technology, the “पवन संतरी (Air Guard)” has been tested over variety of real-time volatile organic compounds (VOC) based applications such as real-time monitoring of perishable fruits in transit, Classification of organically and chemically ripened fruits, Fish freshness estimation, Monitoring of food processing stages during real-time cooking processes. Recently, the technology has also been tested for the development of “Digital Twin of a Chemical Plant and a Smart City, in a consortium project with CDAC and NCL-Pune.

### Local Rainfall Prediction and Alerting system

The TIH has developed Local Rainfall Prediction and Alerting system, a progressive solution for weather monitoring at a particular place and making the data available over the internet to prevent unnecessary damage caused to the harvested agricultural crops. The system monitors environmental parameters including temperature, humidity, and wind speed, generates data in real time. Information can be accessed through an application, enabling accurate and prompt decision-making.

Local Rainfall Prediction and Alerting system

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IIT (BHU) Varanasi

Data Analytics & Predictive Technologies

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# TIH Foundation for IoT & IOE, IIT Bombay



## HUB OVERVIEW

The goal of the TIH is to create a self-sustaining IoT and IoE entrepreneurship ecosystem, increase Technology Readiness Levels (TRLs) in IoT R&D to build and commercialize reliable IoT products. Technology developments are currently aligned with the needs of the industry and has also developed a uniquely structured four-level IoT course.

## PROJECT UPDATES

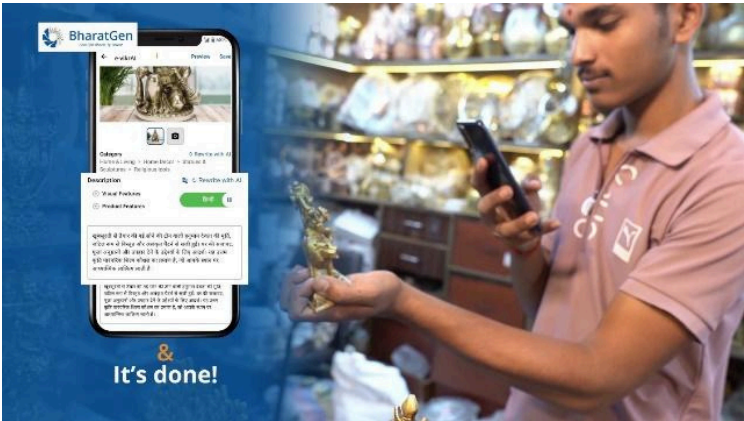
### BharatGen

A flagship Generative AI initiative under the TIH, BharatGen is making steady strides toward its core goals. As part of its early efforts, BharatGen has developed prototypes to demonstrate the foundational technological capabilities under development.

**KrishiSathi (an agribot)** integrates advanced conversational AI to provide personalized, voice-based advisories in Hindi for crop lifecycle management, showcasing the potential of speech-based AI in agriculture.



KrishiSathi



e-Vikrai application

Similarly, the **e-Vikrai** application leverages image-centric AI models to automate ecommerce product cataloging, demonstrating capabilities in computer vision and conversational AI. These prototypes underscore BharatGen's commitment to developing cutting-edge generative AI technologies with tremendous potential for impact through practical, real-world applications.

### Tow fish testing

Tow fish for detecting leaks in the oil pipelines is being developed under the TIH with Indian Oil Corporation Limited (IOCL). External Pressure Testing of the Towfish performed at IOCL Faridabad validated the structural integrity of the design.



Tow fish





Technology  
Innovation Hub  
of IIT Delhi

# I-Hub Foundation for Cobotics (IHFC), IIT Delhi

## HUB OVERVIEW

The vision of the IHFC is to focus on the research and development of novel technology in the areas of robot analysis, design and control, communication, computer architectures, machine learning, artificial intelligence & the design of embedded systems and power topologies. The IHFC aims at serving various sectors like medical robotics, agriculture, disaster management, defence, industry.

## PROJECT UPDATES

### Remotely operated tele-robotic ultrasound system

The system has been developed to enable real-time control over distances of 3,000–13,000 km, featuring cobot manipulation with haptic feedback and peer-to-peer video streaming of ultrasound images. It operates seamlessly on any network without additional configurations, utilizing encrypted communication for security. The innovation lies in its in-house-developed control algorithms for safe patient interaction and precise imaging, complemented by a custom-built software stack for video communication. The technology (TRL-6) has been tested successfully under lab conditions at AIIMS Delhi.

## STARTUPS



### Exobot Dynamics Pvt. Ltd.

An assistive technology startup focused on developing advanced and affordable bionic limbs for amputees. The company's flagship product, the Exobot Carbon Hand, is the world's lightest bionic hand, offering features like motorized finger and thumb movements, a 2-channel EMG system, and wireless connectivity. The Exobot Carbon Hand (TRL-6) has been tested on multiple users, with plans for pilot launches in India and international markets.



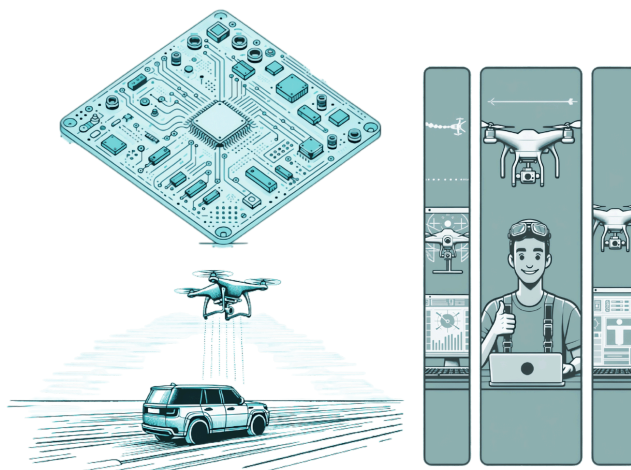
Exobot Dynamics



80L ROBOTICS

### 80L Robotics Pvt. Ltd.

The UAV (Unmanned Aerial Vehicle) technology startup specializes in industrial-grade flight controllers for drones. The company's flagship product, the 80L Flight Controller (F8C), is designed for defense and industrial applications, offering features like online sensor calibration, autonomous precision landing, and secure communication. The F8C (TRL-6) has been tested in various industrial environments, with successful demonstrations of precision landing and target tracking.



Flight controller

# IIT Guwahati Technology Innovation and Development Foundation, IIT Guwahati



## HUB OVERVIEW

Technology Innovation and Development Foundation at IIT Guwahati is dedicated to advancing Technologies for Underwater Exploration. Projects range from developing underwater robots for tracking, surveillance, and monitoring to applications in defense research, earth science, health research, renewable energy, tourism, shipping, and skill development. The hub focuses on creating cost-effective solutions through research & development. Cyber-Physical Systems take center stage, integrating underwater computer vision, communication technologies, artificial intelligence, IoT, and diverse robotic systems for groundbreaking advancements in underwater technology.

## STARTUP UPDATES

### Aorvis Dynamic Private Limited

The startup supported under the TIH has achieved significant milestones in the field of geophysical analysis and electromagnetic sensing such as:

#### NFR Underground Survey Run 1 Completed:

A major step forward in surveying and mapping underground resources using advanced techniques, for better understanding of subsurface conditions. **Development of Vidarshan and Pratyakshan:**

Two software tools for geo-physical analysis are powered by AI-driven interpretation capabilities, allowing for more precise and efficient analysis of data collected during surveys.

The solutions enhance the startup's ability to offer advanced insights and predictive capabilities.

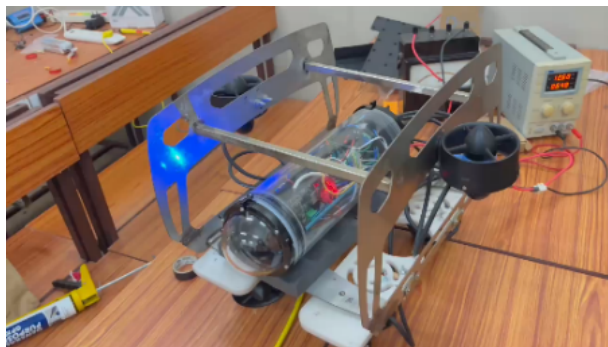
#### Development of Circuit Design for Indra-I:

An airborne electromagnetic sensor designed for detecting subsurface features and analysing geophysical conditions. The successful completion of the circuit design brings them one step closer to its full deployment in advanced geophysical applications.



Indra-I

## PROJECT UPDATES



The intelligent underwater robot, currently at Technology Readiness Level (TRL) 6, is being developed for target detection and aquatic health monitoring. In collaboration with the Central Institute of Fishery and Aquaculture (CIFA), it is being tested and deployed to detect infected aquatic animals. Technology validation is underway for an automatic path-planning algorithm, which has been verified in ROS to ensure efficient underwater maneuvering. Additionally, real-time testing of underwater image processing algorithms for crack detection is in progress, with final validation on the horizon.

## COLLABORATIONS

The TIH has collaborated with Northeast Frontier Railway (NFR) on several advanced solutions for improving safety and operational efficiency in the railway system such as Real-Time Alert System for Alarm Chain Pulling in Trains, detection of Broken and Unbroken Seals on Cargo Trains Using AI and Computer Vision.



Collaboration with NFR



## NMICPS Technology Innovation Hub on Autonomous Navigation Foundation, IIT Hyderabad

### HUB OVERVIEW

TiHAN, a Section 8 company at IIT Hyderabad under the NM-ICPS scheme of the Department of Science & Technology focuses on Autonomous Navigation Technologies that play a critical role in enabling vehicles and robots to navigate safely and efficiently in a wide range of environments, from urban streets and highways to off-road terrain and indoor facilities.

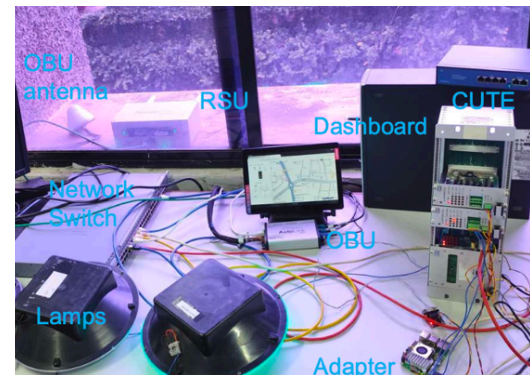
### PROJECT UPDATES

#### Design, development, and deployment of energy-efficient smart EDGE devices

The TIH is developing traffic signal control system for real-time traffic flow prediction and control. It integrates Triple DeepQ-Networks (3DQN) with an advanced traffic prediction model to enhance traffic flow efficiency at intersections. Utilizing dynamic reward mechanisms and dynamically adjusting green light durations in real-time, the system aims to minimize vehicle wait times, reduce congestion, and improve overall traffic management.



TiHAN-IITH in collaboration with C-DAC-Thiruvananthapuram, has developed C-V2X Universal Hardware Adapter for traffic signal controllers in Autonomous Vehicle Navigation. The initiative aims to address the lack of direct communication between autonomous vehicle systems and traffic signal controllers in India, which are not yet C-V2X or CAV-ready. Instead of replacing the costly existing infrastructure, the project proposes a universal hardware adapter to enhance intersection safety, optimize traffic flow, and reduce emissions by minimizing idling and sudden stops. Field implementation of the CV2X adapter across 10 junctions in Bangalore for the ITS Green Corridor project has commenced.



Technology for the Deployment of C-V2X traffic signal controller

### COLLABORATIONS



Technology Transfer Agreement

TiHAN-IITH, C-DAC, and Zero-Sum ITS Solutions Private Limited, signed a Technology Transfer Agreement to Commercialize the Indigenous 5G C-V2X Platform. The agreement facilitates the transfer of the C-V2X On Board Unit, C-V2X Road Side Unit and C-V2X Communication Stack conforming to the IEEE 1609.x standard for deployment and commercialization.



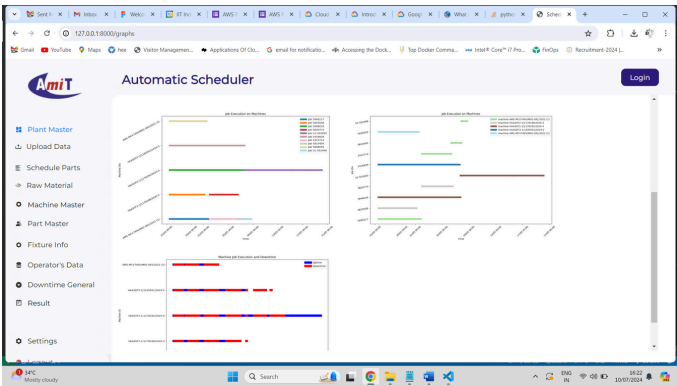
# IITI DRISHTI CPS Foundation, IIT Indore



## HUB OVERVIEW

IITI DRISHTI CPS Foundation, created as a one-stop shop for CPS solutions with a specific focus on system simulation, modelling and visualisation. The hub has created an ecosystem which works as a focal point for the convergence of the efforts of academia, industry and government agencies for technology development and commercialization.

## PROJECT UPDATES



Cloud-based scheduler

### Intelligent scheduling solution for MSMEs

The hub has developed a cloud-based scheduler tool (TRL-6) to enhance production agility through Modeling and Simulations. The developed tool can accommodate multiple industrial scenarios and offers multiple levels of optimization based on the need. This intelligent tool provides a comprehensive, responsive, and effective solution for diverse Job Shop scenarios and offers effortless job scheduling by employing various heuristics/metaheuristics for solving problems considering one or more performance measures under diverse industrial scenarios.

The tool is currently being tested at Client locations for real-life applications.

## STARTUP UPDATES

### BramhAnsh Technologies Pvt. Ltd.

Migraelief is a drug-free wearable neurostimulation device developed by BramhAnsh Technologies Pvt. Ltd., a startup supported under the TIH. The device provides both immediate relief and prevention for migraines. Unlike traditional methods that rely heavily on chemical drugs and their associated side effects, Migraelief uses neurostimulation to target the root cause of migraines. The device works by sending sound vibration waves through the skull, tissues, and cells of the brain, effectively stimulating nerves to provide relief. With an efficiency rate of over 80% and no reported side effects, Migraelief offers a safe and effective alternative to conventional treatments.



Migraelief

## COLLABORATIONS



DRISHTI CPS has signed a MoU with the Military College of Telecommunication Engineering (MCTE), representing the Indian Army, to co-innovate, develop, and commercialize cutting-edge technologies in the cyber-physical systems domain for defense applications.

MoU with MCTE



# I-HUB for Robotics & Autonomous Systems Innovation Foundation, IISc Bangalore

## HUB OVERVIEW

I HUB for Robotics and Autonomous Innovation Systems Foundation(ARTPARK-IISc - AI & Robotics Technology ark) is a unique non-profit (section-8) organization promoted by the Indian Institute of Science (IISc) to foster innovations in AI & Robotics by bringing together the best of the startup, industry, research, and government ecosystem. It is funded by the Department of Science & Technology (DST), Govt. of India, under the National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS) and the Govt. of Karnataka. ARTPARK @ IISc is driving advances in robotics, autonomous systems and AI through translational R&D in areas of Intelligent Healthcare, Automation for Logistics and Skilling for the AI age.

## STARTUP UPDATES

### Yaanendriya

An incubated startup under the TIH, Yaandendriya is an emerging Indian manufacturer of advanced sensing modules and electronic subsystems, specializing in innovative sensor solutions for autonomous navigation and precision applications.

With support of the TIH, the startup is working on development and commercialization of the following technologies:

- Enhanced YDX IMU ( full) and YPS GNSS ( full) Modules
- AI-Based Noise Reduction for precise orientation & position for Autonomous Navigation systems
- Position Tracking, Pose Estimation, Navigation, Motion Capturing, Vibration Detection and Impact Sensing
- Yaanendriya Software for analysing the data and recording it and In-house developed Firmware for better precision and reliability for long working hours compensating for the drift induced by the hardware



Extensive Machine health monitoring system testing of YDX M IMU sensors/



Tydra

### Versor Robotics

Versor Robotics incubated under the TIH has developed TYDRA, an autonomous mobile robot that performs farm operations such as transplanting, staking, spraying, bed shaping, deweeding and more. It features an advanced modular design that allows its width to adjust up to twice the original size automatically. It is engineered as an all-wheel-drive, all-wheel-steer robot, making it suitable for all terrains. Currently designed for semi-autonomous operation, TYDRA has the potential to evolve into a fully autonomous system in the future. Currently, our prototype is being deployed and tested in a test facility.

# I-HUB Quantum Technology Foundation (IISER) Pune



## HUB OVERVIEW

I-HUB Quantum Technology Foundation is a section-8 company hosted by IISER Pune and funded by the Department of Science and Technology, Government of India under the National Mission on Interdisciplinary Cyber-Physical Systems. I-HUB QTF promotes development of Quantum Technologies through four verticals: Quantum Information & Metrology; Quantum Communications; Quantum Materials & Devices; and Enabling Technologies; and via these aims to harness the quantum phenomena to develop advanced computing systems as well as for more immediate applications in precision sensors, navigation devices for GPS, geological mapping, atomic clocks, encrypted communication and novel materials. Beyond technology development, the Hub facilitates technology translation, incubation and human resource development.

## STARTUP UPDATES

The TIH has supported 8 start-ups spanning across different domains of c, including Quantum Computing, Quantum Communications, Quantum Sensing, & Quantum Materials. These start-ups are being supported through comprehensive guidelines.

The supported startups are QNu Labs, QpiAi India, PRENISHQ, Dimara Technologies, QuPrayog, Quanastra, Pristine Diamonds & Quan2D Technologies.



Quantum tech startups

## SKILL DEVELOPMENT



Workshop on Being Quantum Ready'

The TIH organized a 'Hands-on workshop to be Quantum Ready' in collaboration with NVIDIA. This workshop was aimed at preparing individuals for the era of Quantum Computing, wherein 40+ faculties/scientists from various institutions and organizations participated. Distinguished speakers discussed and demonstrated the need and usefulness of large-scale quantum computing simulations in Quantum Materials, Quantum Communications, Quantum Computing, Defence, Theoretical Physics etc.





**TIH**  
iHub Drishti

## IHUB Drishti Foundation, IIT Jodhpur

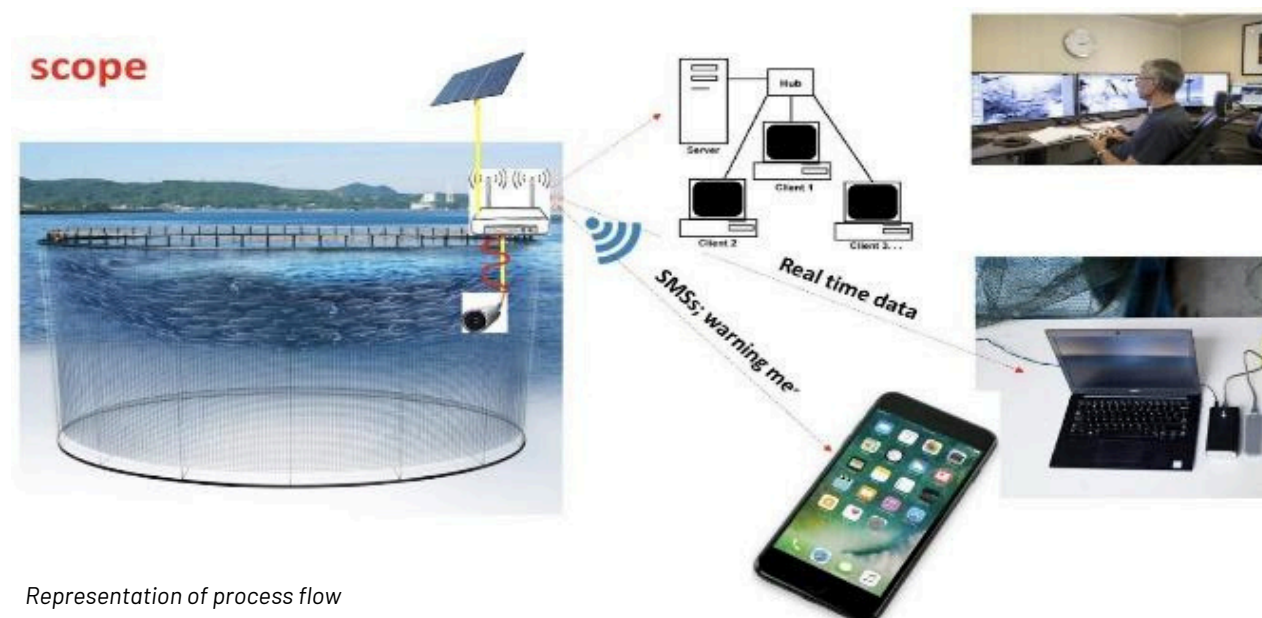
### HUB OVERVIEW

The TIH on Computer Vision and Augmented and Virtual Reality (CV and ARVR), named as iHub Drishti Foundation focuses on the core research areas of Seeing and Sensing, Dependability, Real-time Computer Vision Systems, and Data Collection, Curation, and Annotation. iHub Drishti has identified the following application areas for developing technologies: Computer Vision for Autonomous Systems; Computer Vision for Better Living: Healthcare and Biosphere; Imaging for Document Analysis; CV and VR for Industry 4.0; Dependable AR-VR for X (including games).

### PROJECT UPDATES

#### Computer Vision-Based Monitoring of Fishes in Marine Cage Farming (TRL-6)

The TIH is developing computer vision-based technology for automated underwater monitoring systems that could inform managers about the growth increment and health status of fish stocked in marine cages, enhance human safety, and cost-effectiveness of operations. A domain adversarial learning technique towards underwater image enhancement, resulting in improved visual enhancement across various levels of degradation, attenuation, and depth in images has been achieved. The TIH has created a new synthetic underwater dataset derived from the Underwater Image Enhancement Benchmark (UIEB) dataset, consisting of 890 underwater reference images.



#### Olfactory Enabled Media & Food Engineering:

An innovative system integrating eye-tracking and olfactory stimuli for enhancing immersive experiences in mixed reality (MR) environments is being developed.

The key features of the technology are:

- **Eye-Tracking Integration:** The system recognizes users' gaze patterns in real time to release various fragrances when MR objects are fixed on for a set duration.
- **Synchronized Olfactory Outputs:** MR visual signals and contextually relevant smells are flawlessly synced, boosting immersion.
- **Aroma Dispenser Unit (ADU):** The ADU provides individual aromas without cross-contamination for a clean, immersive smell.

The technology has broad applications in education, healthcare, entertainment, and cultural heritage.

# iHub Anubhuti-IIITD Foundation, IIIT Delhi



iHub Anubhuti-  
IIITD Foundation



## HUB OVERVIEW

iHub Anubhuti-IIITD Foundation aims at building a tripartite collaboration between industries, academia and government agencies by developing data-driven Cognitive Computing and Social Sensing solutions, mainly in the verticals - Healthcare, Education and Law Enforcement & Security.

## STARTUP UPDATES

### Corover.ai

Corover.ai, a startup supported under the TIH through strategic partnerships with industry leaders is pioneering voice-based UPI payments globally in collaboration with NPCI and IRCTC. Corover platform now integrates with Gemini, facilitating the creation of virtual assistants via Gemini LLM without coding. Enhancements to the self-service platform, including new billing options, have led to over 1,000 sign-ups, empowering enterprises and developers to democratize AI app development. BharatGPT.ai, a platform by the startup, enables the creation of secure, multilingual, multi-format, and multichannel virtual assistants.



Corover.ai

## COLLABORATIONS



Collaboration with Amrita Research Centre Delhi (ARCD)

iHub Anubhuti, has partnered with Amrita Research Centre Delhi (ARCD) to address key challenges in the healthcare sector. The collaboration focuses on three critical areas:

- 1.Improving treatment adherence and monitoring for Atopic Dermatitis (AD),
- 2.Reducing dermatological misdiagnosis and the overuse of topical corticosteroids, and
- 3.Enhancing ultrasound diagnostics to minimize delays and improve accessibility in resource-limited settings for periphery doctors.

The partnership aims to promote cutting-edge research and product development in medical and engineering sciences while fostering collaborative networks for translational innovation in healthcare technology. Through joint projects and shared research infrastructure, the initiative will facilitate knowledge exchange and accelerate impactful advancement in healthcare.





## IIT Tirupati Navavishkar I-Hub Foundation, IIT Tirupati

### HUB OVERVIEW

The IIT Tirupati Navavishkar Hub Foundation (IITTNiF) is set up to host Technology Innovation Hub (TIH) focusing on cutting-edge technology in Positioning and Precision Technology (PPT) which includes Positioning, Navigation, Timing, GIS, Remote Sensing and other non-invasive technologies.

### PROJECT UPDATES



Image Capture Testing of Hyperspectral Camera

#### Design and development of an Indigenous Hyperspectral camera

IITTNiF has supported the Design and development of an Indigenous Hyperspectral camera for remote sensing applications. The breakthrough nature of this product is the design which integrates selective optical coatings and custom-designed complementary metal oxide semiconductor image sensors which ensure precise spectral capture across a wide range. In addition, the 3D printing for the camera console enables lightweight, scalable, and cost-efficient production. The utilization of advanced simulation tools like Technology Computer-Aided Design for sensor design reduces dependency on imported systems and offers an affordable solution for high-quality hyperspectral imaging.

#### Operation Dronagiri

IITTNiF successfully completed the first phase of Operation Dronagiri. The program is supported by five Geospatial Innovation Accelerators (GIAs) located across India. These GIAs are mentoring startups, providing funding, and guiding them in creating impactful solutions within their respective districts. The application phase received an overwhelming response from the startup ecosystem. 484 Startups from across India showcased their innovative solutions to leverage geospatial technology for impactful applications across critical sectors such as agriculture, infrastructure, and livelihoods.



Launch Event of Operation Dronagiri

# IIT Patna Vishlesan I-Hub Foundation, IIT Patna



Technology Innovation Hub  
Vishlesan I-Hub Foundation



## HUB OVERVIEW

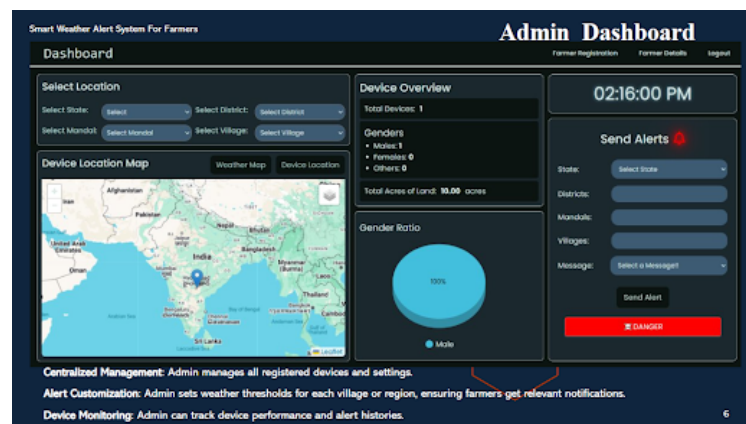
The multidisciplinary Vishlesan I-Hub Foundation at IIT Patna under Technology Incubation Hub (TIH) in the technology vertical - "Speech, Video & Text Analytics" targets to leverage Research and Engineering capabilities of Sustainable Development Goals and achieve the mandate of National Mission on Interdisciplinary Cyber Physical Systems. The Vishlesan I-Hub at IIT Patna also encourages to leverage other related areas for technology development , innovation, professional education, entrepreneurship, brand building, technology commercialization, and product management for the dissemination and deployment of intellectual property, and for public outreach.

## STARTUP UPDATES

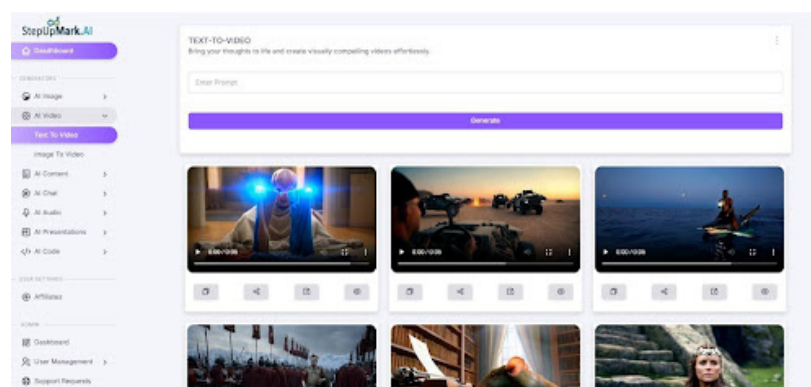
### IoT Driven Early Warning System

Atya Technologies Pvt. Ltd. a startup supported under the TIH has developed a handheld alert device, designed as a wristband or armband, which delivers real-time warnings about weather hazards like lightning, floods, heatwaves, and more. Developed to reduce the tragic loss of lives, particularly among farmers, it integrates with meteorological data from the Indian Meteorological Department (IMD).

Key features include GPRS/Wi-Fi connectivity, location tracking, real-time updates, and multilingual support, aiming to enhance public safety and disaster preparedness nationwide.



Admin Dash Board for the EWS for farmers



AI enabled Text to Video Generation

### StepupMark.AI

StepupMark.AI, supported under the TIH has developed an AI-driven Speech, Text and Video Analytics tool for media and advertising under GenAI category. This AI-powered tool offers feature for content generation, Search Engine Optimization(SEO), campaign management, and data analytics, providing a comprehensive solution for marketing professionals. Leveraging specialized AI models for NLP and data analysis, it delivers precise insights and generates high-quality, targeted content.



## IIT Mandi iHub and HCl Foundation, IIT Mandi

### HUB OVERVIEW

iHub and HCl Foundation is a Technology Innovation Hub (TIH) established by IIT Mandi as part of the National Mission on Interdisciplinary Cyber-Physical Systems (NMICPS) scheme of Department of Science and Technology, Govt. of India. The Hub is focused on Human-Computer Interaction with a vision to nurture research in the area, enable technology translation for industry, and build scale in skill development.

### PROJECT UPDATES

#### Prototype of the sensor - Artificial SKIN

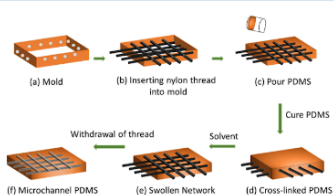


Fig 1: Schematic diagram of Fabrication process of the wearable tactile sensor.

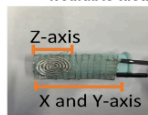


Fig 4: Bonded X, Y and Z-layer



Fig 2: 3-D Printed Mold for X, Y and z-Axis



Fig 3: PDMS Skin patch with microchannels in X, Y and Z Axis

#### Digital Touch (Haptics): Artificial-SKIN

The TIH has developed a prototype of Artificial-SKIN integrated with multipurpose sensors to create perceptual explanations. This innovative design involves the stacking and bonding free of two hyper-elastic silicone rubber layers, each containing an embedded microchannel with distinct patterns that provides the sensor 100% strain limit for various sensing functions, including multi-axial strain, object classification (Hard-Soft, Textured) and temperature sensing. It enables simulating physical interactions such as pressure, vibration, temperature, pain.

### STARTUP UPDATES

#### MadVR

MadVR, an incubated startup under the TIH has developed Portable Surgical Simulator which enables medically accurate surgical training using advanced VR, that enhances the skills and knowledge of medical professionals, ultimately leading to better patient outcomes.



### SKILL DEVELOPMENT

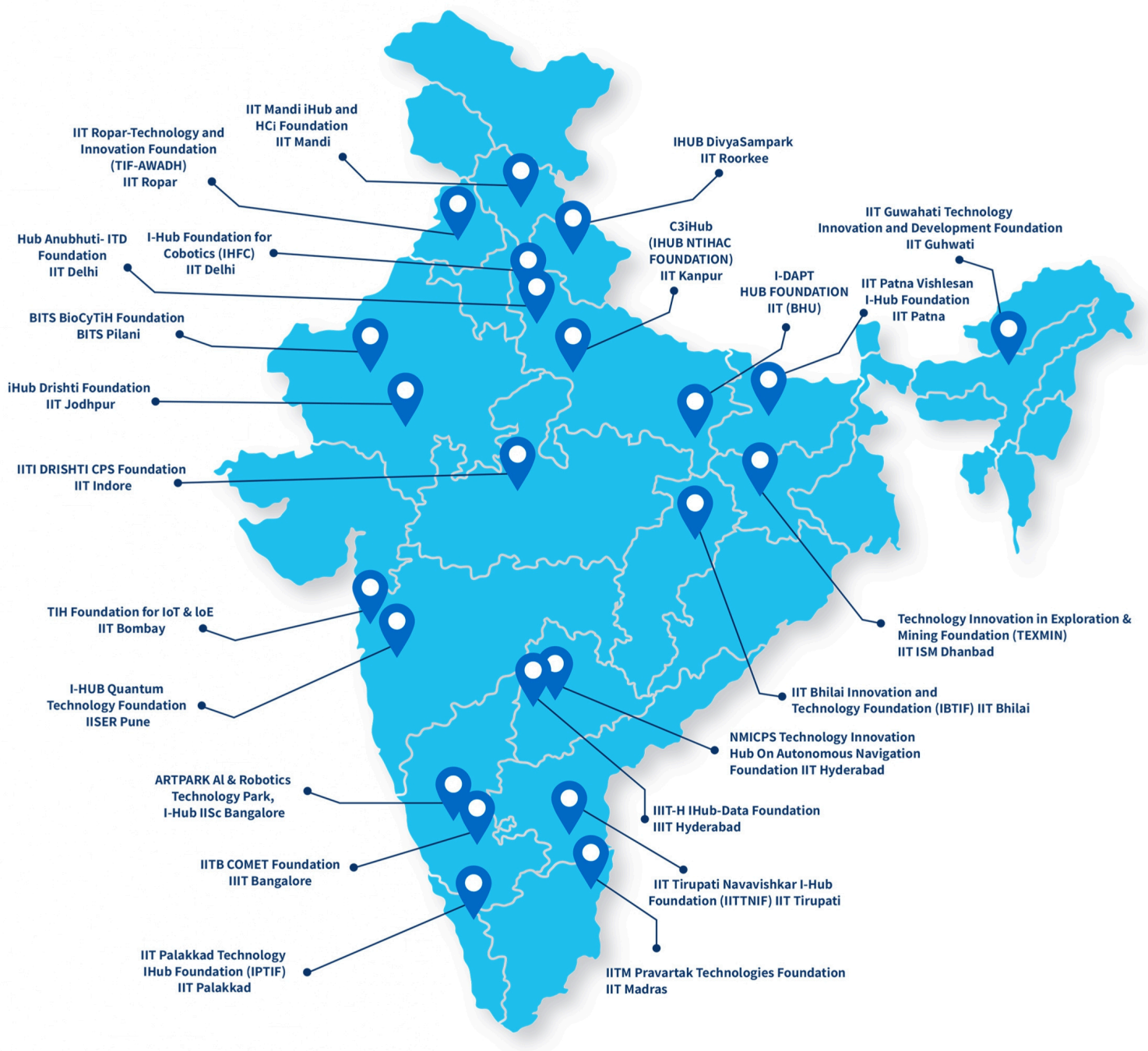


Skilling and training programs

The TIH has enrolled 117 students-03 batches in Solar Technology and 01 batch in AI/Machine Learning under Skilling and training programs.



## 23 Active Technology Innovation Hubs Across India



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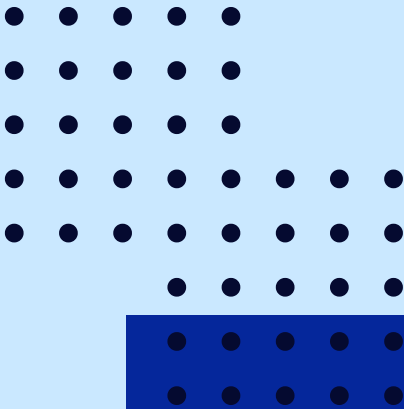
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**23 Active Technology Innovation Hubs** (TIHs) established under NM-ICPS

# SPECIAL SUPPORT

ARTPARK, I-HUB for Robotics & Autonomous Systems Innovation  
Foundation, IISc Bangalore





National Mission on  
**Interdisciplinary Cyber-Physical  
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