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प्रौद्योगिकी मंत्रालय
MINISTRY OF
**SCIENCE AND
TECHNOLOGY**
सत्यमेव जयते

Quarterly Bulletin **January 2024**

Transforming the
Nation with
Translational Research

Healthcare

Agriculture

Environment

Infrastructure

Defence

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

DEPARTMENT OF
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About

Interdisciplinary Cyber-Physical Systems (NM-ICPS)

The Union Cabinet has approved the National Mission on Interdisciplinary Cyber Physical System **(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. 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 four major categories i.e., 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 Cyber Physical Systems (CPS) and associated technologies

2. Adoption of CPS technologies to address India specific National / Regional issues.

3. Produce next generation of 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, Technology and Engineering disciplines.

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** make them more efficient, safe, and sustainable to place India at par with other advanced countries.

Content

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National Mission on
Interdisciplinary Cyber-Physical Systems (NM-ICPS) 03

Theme:

Agriculture

Empowering agriculture through Innovation:

Cultivating tomorrow with today's technology
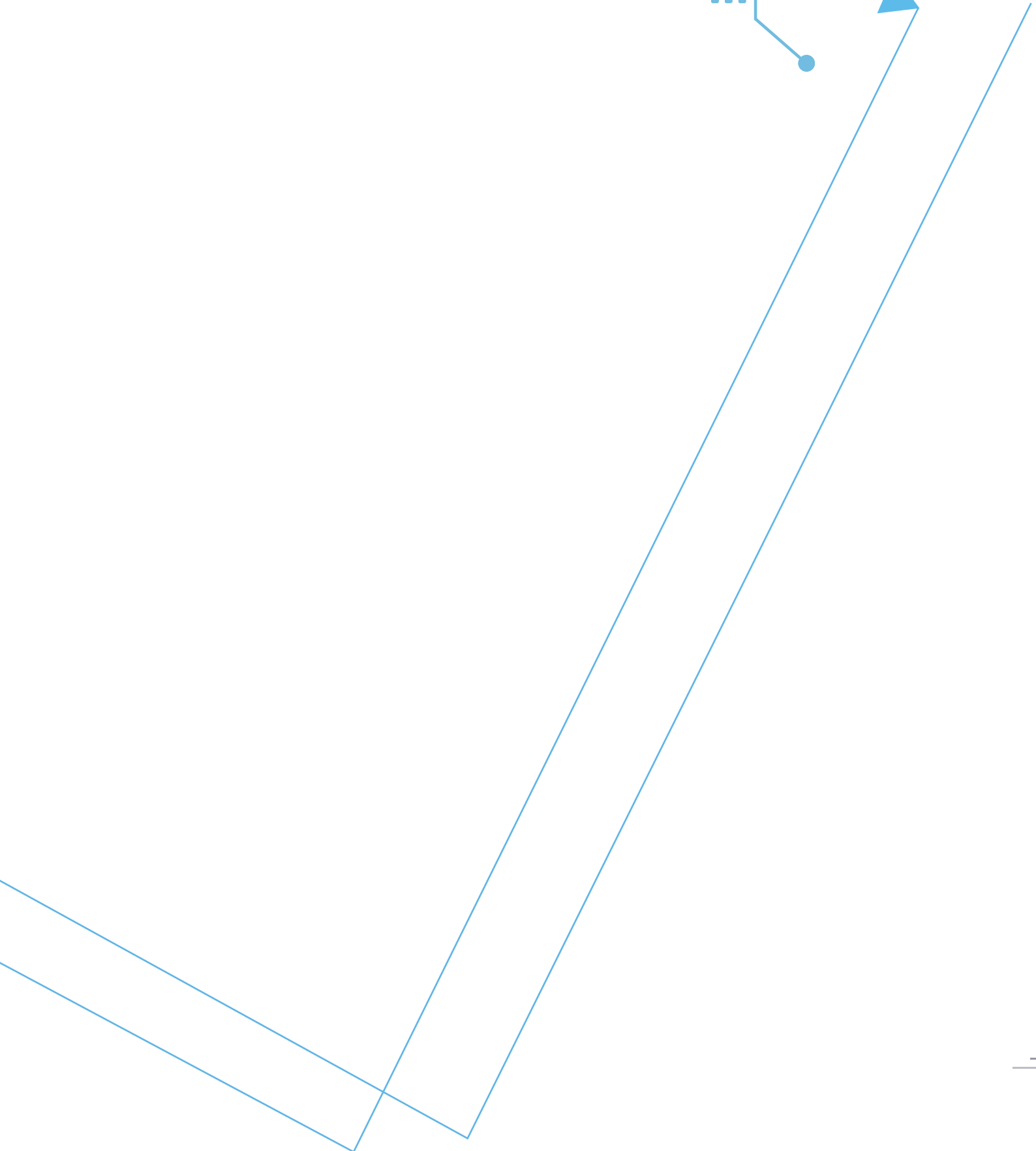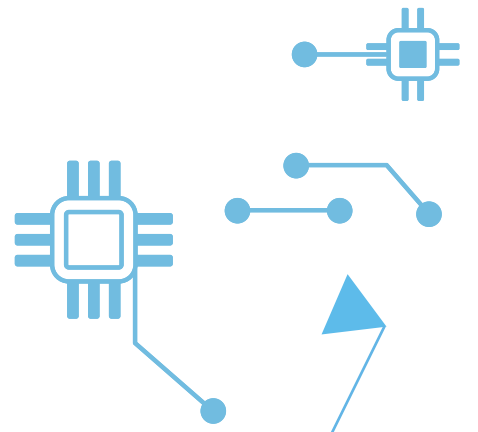
IIT BHILAI INNOVATION AND TECHNOLOGY FOUNDATION

IIT Bhilai

Theme: Agriculture

Scan QR to know more

Hub Overview:

The IIT Bhilai Innovation and Technology Foundation (IBITF) was established under the aegis of the Department of Science & Technology (DST), as part of the National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS). Operating in Fintech, IBITF focuses 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 sector. Its objectives include advancing fintech research, prototype/product development, facilitating manpower training, and fostering successful start-ups, specifically targeting applications in the Agritech sector.

Research & Development:

Startups:

BhoomiCam Pvt. Ltd.

AI-based geo-enabled crop insurance and farm equipment renting solutions.

The Bhoomicam project aims to help farmers by using satellite images to check if they can get loans seamlessly. This way, farmers can grow crops in the right conditions, making decisions faster. Bhoomicam's web-based vigilance application uses satellite data to derive geographical elements such as crop sowing, crop name, crop health, and yields. It also provides information about the location of land because verification of land is important before a bank agrees to provide a land loan to a farmer or anyone else. The socio-impact of the solution is improvement in crop productivity and farmer income, easy access to insurance for farmers, dedicated government support to farmers in distress, etc.

Recently Bhoomicam has also added a seamless Agri-drone service renting solution for the application of insecticides, pesticides, weedicides, etc., in farms to improve efficiency, boost productivity, and increase agriculture income for farmers.

Application download link:
https://play.google.com/store/apps/details?id=com.bhoomicam

Theme :
Agriculture

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iHUB - AWaDH (Agriculture &
Water Technology Development Hub)

IIT Ropar

Theme: Agriculture

AWaDH
Agriculture and Water
Technology Development Hub

Scan QR to know more

Hub Overview:

The goal of iHub - AWaDH 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 the Agricultural & Water related issues through deployment of CPS in food processing, rural development, fisheries, textiles, electronics, fertilizer, atomic energy etc.

Project Updates:

Bee Hive Project

The technology project aims to monitor bee activity and assess their contribution to field pollination. In this initiative, nodes are strategically placed within bee hives, continuously sending data on temperature, humidity, and audio to the gateway at regular intervals. The gateway uploads this information to the AWS Cloud, providing real-time updates on bee activity, hive temperature, and humidity conditions. Currently, we are monitoring three hives at a local farm and are actively working towards scaling this number at the earliest opportunity.

Startup:

M-Lense Research Pvt Ltd.

It is a pioneering dairy technology company from Uttarakhand, India, with a steadfast commitment to combating the critical issue of milk adulteration. At the forefront of their innovative solutions is PaperPro, a revolutionary single-use testing card capable of efficiently detecting six common milk adulterants with just a single drop. Noteworthy features such as an eco-friendly design, portability, and a user-friendly indication meter characterize PaperPro's cutting-edge technology.

SAMRIDHI 2.0

Strategic Acceleration for Market, Research, Innovation & Development: a Holistic Initiative for ICPS Startups (SAMRIDHI 2.0), Dec 2, 2023: A premier deeptech ignition drive was carried out in IIT Ropar AWaDH to support deep tech startup in the domains of Agriculture and Water with 5 Cr investment in 13 startups, in support from 130+ partners. It was inaugurated by the Honorable Governor of the State of Punjab, Shri Banwarilal Purohit in the presence of Dr Akhilesh Gupta, Secretary, SERB; Dr Ekta Kapoor, Mission Director, NM-ICPS, DST, GoI and Mr Amitabh Nag, CEO, Bhashini.

Theme :
Agriculture

TECHNOLOGIES FOR AGRICULTURE & WATER

TIH Foundation for IoT and IoE

IIT Bombay

Theme: Agriculture

Scan QR to know more

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:

LEAgriS

LEAgriS is a LoRaWAN based smart IoT solution for monitoring crop and soil health. It is based on a low powered device which can operate for up to two years. The system currently supports soil moisture, temperature, EC, pH, NPK and leaf wetness sensors. The sensor configuration is customizable as per users' requirements. Its design allows installation using minimum space and is weather resistant. The farmer can view and visualize the data on a mobile application which also provides recommendations to manage crop health. A version of LEAgriS is deployed at 7 locations in Satara district of Maharashtra and testing is being done.

Startups:

Neoperk Technologies Pvt. Ltd.

Project: End-to-end soil testing solution using NIR Spectroscopy and ML Models

Product Innovation: Large-scale soil nutrient and organic carbon data collection extremely easy, reliable and affordable through our end-to-end solution.

Collaborations:

ATMAN (Agritech Startup demo & funding)

Successfully organized the ATMAN (Agritech sTartup deMo And fuNding) event on 29th Sept 2023 in collaboration with IITI DRISHTI CPS Foundation, IIT Indore, AI4ICPS I HUB Foundation, IIT Kharagpur and Technology and Innovation Foundation for the Agriculture & Water Technology Development Hub (AWaDH), IIT Ropar. The event focused on game changing startup pitches, inspiring masterclass, panel discussions, spotlight talks and exhibition. Inaugurated by Dr. Jitendra Singh (Hon'ble Minister of State [Independent Charge] for Science and Technology, Government of India). Out of 55 startups, 24 earned their ticket to investment success out of which TIH IoT will fund 10 startups.

Theme : **Agriculture**

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

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IIT Kharagpur AI4ICPS
I-Hub Foundation

IIT Kharagpur

Theme: Agriculture

AI4ICPS

Scan QR to know more

Hub Overview:

An AI & ML Technology Innovation Hub for Interdisciplinary Cyber-Physical Systems (ICPS) established by the Indian Institute of Technology Kharagpur under the aegis of the National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS), DST, Government of India.
We do fast-paced Technology Translation through Innovation and Start-ups for AI adoption into the traditional CPS and industry.

Startup:
EdgeForce Solutions

EdgeForce Solutions endeavors to act as a 'Force Multiplier' for the nation's Armed Forces, leading the way in developing indigenous Edge-based solutions that propel the 'Smart Technologies' revolution. Their goal is to design, develop, and produce secure, robust IT products by harnessing state-of-the-art technologies, including System on Module (SOM), System on Chip (SOC), Tiny ML, and other cutting-edge advancements. Through these pioneering innovations, we are dedicated to embodying the principles of Edge Architecture, contributing to the mission of 'Atmanirbhar Bharat,' and enhancing the capabilities of our Armed Forces.

Translational Research:

Simulating Multimodal MRI Equivalents from CT for Emergency Neuroimaging

The Project objective is to Improve emergency neuro-radiology access in low-income regions by developing a method to generate MRI-like images from more widely available CT scans. Using advanced neural networks and adversarial learning, the approach aims to enhance stroke diagnosis in areas lacking direct MRI access. Validation includes comparing simulated and real MRI images through Likert Scale and assessing lesion segmentation against established benchmarks. Future work may explore additional medical imaging advancements.

Collaborations:

ATMAN (Agritech sTartup deMo And fuNding)

ATMAN (Agritech sTartup deMo And fuNding) event triumphantly conducted on September 29, 2023, in collaboration with IITI Drishti CPS Foundation, IIT Indore, TIH-IoT, IIT Bombay, and Innovation Foundation for AWaDH, IIT Ropar. Dr. Jitendra Singh, Hon'ble Minister of State for Science and Technology (Independent Charge), inaugurated the event. Among 55 startups, 24 secured investments, and AI4ICPS will fund 5.

Theme :
Agriculture

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

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

09

Theme:

Defence

Securing Tomorrow, Today:

Fortifying Nation Through Advance Defence Technologies

C3iHub
(IHUB NTIHAC FOUNDATION)
IIT Kanpur

Theme: Defence

3*i*Hub

Scan QR to know more

Hub Overview:

C3iHub (Cybersecurity and Cybersecurity for Cyber-Physical Systems Innovation Hub) addresses cybersecurity issues of the cyber-physical systems and devises technologies to protect. 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:

C3iHub has recently made Security Operation Centre (SOC) compatible with IT-OT assets both. Through continuous upgradation, the SOC has been made compatible across sectors (e.g., power, refinery, manufacturing) & across original equipment manufacturers (OEMs). Upgraded SOC consists of multiple new platforms, e.g., asset inventory & vulnerability management, risk calculation tool for organizations/enterprises & compliance management.

Deployment: C3iHub & NHAI (TRL 9)

Application Sector: Any large organization

IT-OT SOC provides maximum safety against potential cyber-attacks, as well as cost-effective

OT SOC & SCADA

Startup:

C3iHub-incubated startup, T-Sanct Technologies Pvt. Ltd., has deployed their latest product, Falconfeeds.io, a cutting-edge cyber threat intelligence platform that provides real-time threat feeds from across the globe. It can be seamlessly connected with workflow apps like slack, Microsoft teams and email for notifications, can also be integrated with SOCs to ingest threat incident data to strengthen cyber defense - subscribed by 4000+ security professionals in last quarter.

Real-time threat feeds across the globe

Theme :
Defence

iHub
Drishti Foundation
IIT Jodhpur

Theme: Defence

TIH
iHub Drishti

Hub Overview:

iHub Drishti, the TIH working on Computer Vision and Augmented and Virtual Reality (CV and AR-VR), concentrates on key research domains like seeing, sensing, dependability, real-time computer vision systems, data collection, curation, and annotation.

Project Updates:

Generalizing Robot Perception for Indoor and Outdoor Scenarios by Combining Spatial and Semantic Reasoning

Thematic Area : Defence

TRL Stage and Deployment Status : 8

Developed off-road deep learning methodology to determine traversable regions while avoiding obstacles and rough terrains. Several applications like agriculture, mining, and security, need the robotic vehicles to travel in regions where there is no proper road (off-road conditions). For robots to travel safely in these conditions, we need to find safe and unsafe areas for navigation autonomously. Ability to quickly determine navigable regions is the innovation in this project.
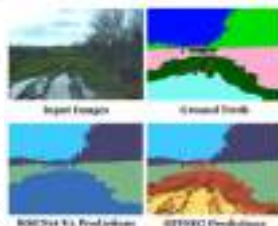
Application area/Use Case : Defence/Security, Agriculture, mining

Socio-economic impact : Increased productivity as the robots can perform the tasks persistently.

TrustMe:Explainable Adversarial Attack Detection and Mitigation for Object Recognition Algorithms

Thematic Area : Defence

TRL Stage and Deployment Status : 3

Description : Algorithm to estimate model robustness and performance evaluation. Evaluate the performance of the attack detection algorithm. Algorithm to mitigate the effect of adversarial attack. Algorithm to estimate model explainability and performance evaluation. Helps detect maliciously perturbed images that can confuse machine learning algorithms and generalize and detect several adversarial attacks on object recognition algorithms

Application area/Use Case : Defence/Security
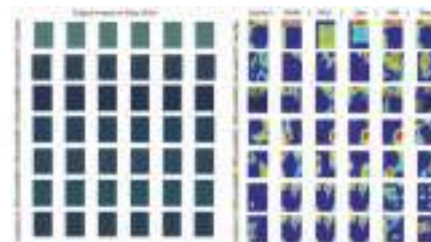
Theme :
Defence

I-HUB Quantum Technology Foundation

Indian Institute of Science Education and Research (IISER) Pune

Theme: Defence

**I-HUB
QUANTUM
TECHNOLOGY
FOUNDATION**

Hub Overview:

I-HUB Quantum Technology Foundation is a section-8 company hosted by IISER Pune and is one of the 25 technology hubs funded by the Department of Science and Technology.

I-HUB Quantum Technology Foundation (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.

Project Updates:

Prototype of 20 Qubit Ion Trap Quantum Computer (in progress)

The process of developing a 10 qubit ion trap computer is underway, which would be the first in the country. By virtue of its long coherence times, this platform is amongst the preferred choice for the Quantum Computing community, and the long term goal of this project is to make a fully functional 10 qubit quantum computer available for the Indian tech community as a shared resource. The first signals of trapped ions have already been verified very recently.

Development of Josephson Parametric Amplifiers for superconducting qubits based quantum processors -

Josephson Parametric Amplifiers (JPA) are some of the lowest noise microwave frequency amplifiers which are crucial for any superconducting quantum processor as they help in achieving high fidelity measurements in a short amount of time. This makes them an invaluable tool for quantum error correction as well. These devices can be quickly commercialized, and the engineering needed is not very complicated. Making them broadband and high dynamic range will require further research and can be soon turned into a marketable technology with a wide market both in industry and academia. The basic component of a JPA is a non-linear inductor which is implemented using Aluminium Josephson Junctions which can be fabricated using ebeam lithography and double angle metal deposition.

This project which runs as a spoke project of IHub QTF at TIFR Mumbai further plans to develop the following three types of devices:

- **Narrow band JPAs;**

- **Impedance engineered broadband JPAs**

- **Broadband Travelling Wave Parametric Amplifiers (TWPA)**

Theme :
Defence

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iHUB DivyaSampark

IIT Roorkee

Theme: Defence

iHUB Divya Sampark

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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'.

We are 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:

IDR Research & Development Pvt Ltd.

Our Startup IDR Research & Development Pvt Ltd., for their Military grade Nano Drone Doot MK-1 was recognized by Union Minister Dr. Jitender Singh at the "Indian Military Heritage Festival", this versatile drone is set to aid the Indian Army in critical operations. With the ability to identify 80 objects, a lightweight design (200g), and a top speed of 80 kmph.

Events:

1st ever Semix Annual Summit titled "Inventing Our Semiconductor Future Together," Co-organised by iHUB DivyaSampark at IIT Bombay to develop the semiconductor ecosystem.

The Centre for Semiconductor Technologies (SemiX) at IITBombay organized its 1st Annual SemiX Summit from 27th November to 29thNovember 2023. The Summit had more than 350 attendees, representing almost 67companies from the semiconductor and related industry, 10 venture capitalcompanies, and 15 academic institutions. The Chief Guest was Shri S Krishnan,Secretary, Minister of Electronics & Information Technology. This eventhelped us get better connect with stakeholders from industry and academia inthe semiconductor sector globally

Theme :
Defence

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National Mission on
Interdisciplinary Cyber-Physical Systems (NM-ICPS) 15

Theme :

Environment

Sustainable Solutions, Digital Evolution:
Nurturing Our Planet with Technology
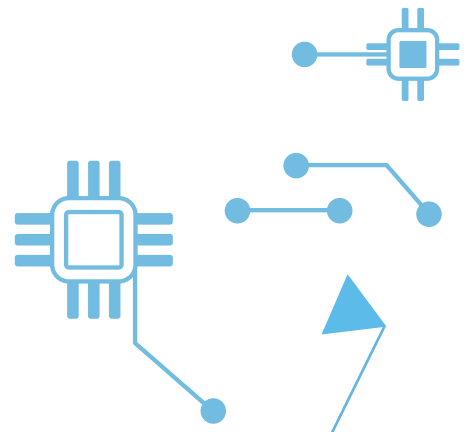
IIT Palakkad Technology IHUB Foundation (IPTIF)
IIT Palakkad

Theme: Environment

Scan QR to know more

Hub Overview:

IIT Palakkad Technology IHUB Foundation (IPTIF) on Intelligent Collaborative Systems (ICS) 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:

High Efficiency Rooftop Vertical Axis Wind Turbine for Wind-Solar Hybrid Usage

- High Efficiency Small Wind Energy for Grid Free Electricity
- Patented high efficiency vertical axis wind turbine with variable amplitude dynamic blade pitching
- Start at low wind speeds 2-3 m/s
- High efficiency across different wind speeds with blade amplitude modulation
- Built-in storm protection, easy to install and maintain
- Lab scale models have been fabricated and tested in wind tunnel for performance validation

AN UNDERWATER ROBOTIC VEHICLE FOR HIGH ENDURANCE AQUATIC EXPEDITIONS

- Underwater robotic vehicle with tilting thrusters with 6 DoF for manipulators & autonomous control systems for defense, marine and off-shore oil & gas applications
- Fabricated a fully functional prototype with aluminum alloy casing for 300 m depth applications & tested in Simulated Motion Basin of NSTL up to 30 m depth.
- Developed autonomous control module & field tested in a reservoir study
- Industry partner identified for technology transfer

Startup:

Low-cost automated Bio-Charcoal Machine

Major environmental problems contributing to global warming include stubble burning, low Soil fertility and deforestation.

A "Fully automated Low cost Bio-charcoal Machine" which directly addresses these environmental problems is fabricated for manufacturing charcoal from crop residues

This machine works on the lean oxygen process, pyrolysis or retort method. Does not require 3 phase electricity and can work on 1 kv solar panel. Its able to convert every kind of biomass to charcoal.

INTELLIGENT COLLABORATIVE SYSTEMS

Theme :
Environment

MINISTRY OF SCIENCE AND TECHNOLOGY

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IIT Guwahati Technology Innovation & Development Foundation

IIT Guwahati

Theme: Environment

Technology Innovation Hub
IITG TIDF

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Hub Overview:

IIT Guwahati Technology Innovation & Development Foundation, IIT Guwahati is set up in technology vertical technologies for underwater exploration. The Hub proposes projects on the development of underwater robots, which may be used for underwater tracking, surveillance and monitoring purposes. Monitoring of cracks in ship hulls, in industrial pipes and so on is another application area of this project, the Hub deals with the development of an apparatus for underwater operations like cleaning, cutting, etc. at a cost lower than that available today..

Project Updates:

An economical E-propulsion system

Our start-up Maribus Solar Pvt. Ltd. has successfully developed a prototype of water propulsion system. This eco-friendly device can be easily retrofitted on a wooden boat. In the next stage we are going to retrofit this system on a bamboo boat (developed by another start-up of IIT Guwahati TI&DF) and deploy in the market.

Programs:

Underwater Welding Certification Program

Developed and successfully completed India's first underwater welding certification course in association with Indian Register of Shipping (IRS) Mumbai, Neel Diving Academy and IIT Guwahati TI&DF. We are now getting several expression of interests from different organizations and individuals to start next batch of this certification program.

Theme :
Environment

BITS BioCyTiH Foundation

Birla Institute of Technology and Science (BITS) Pilani

Theme: Environment

Scan QR to know more

Hub Overview:

BITS BioCyTiH Foundation is a Section 8 company incorporated by Birla Institute of Technology and Science (BITS) Pilani and funded under NM-ICPS program of DST, Government of India. It is a Technology Innovation Hub (TIH) focused on "Bio-Cyber Physical Systems (Bio-CPS)".

Project Updates:

Transistor-based BPS biosensor

About the Technology: Transistor-based biosensor which will facilitate sensitive, rapid, reliable and easy to use detection of BPS in water. This technology has IP potential.

Application Sector: Health, Environment monitoring and Food Safety.
⬈   Detection of BisphenolS (BPS) in diverse environmental matrices which includes surface and ground water owing to its toxic nature leads to adverse effects on health.
Innovation in the Technology:
⬈   Development of transistor-based biosensor device for detection of BPS.
⬈   Sensitive, reliable and ease of detection.
The detection of BPS in water impacts society in terms of sustainable development goals (SDGs) 3 and 6 on "good health and well being" and "clean water and sanitation for all" respectively.

Startup:

Ekosight Technologies Private Limited

Portable soil testing device and patented powdered reagents for rapid and accurate soil nutrient analysis. AI-powered nutrient recommendation, empowering data-driven decisions.
socio-economic Impact on the Country:
Ekosight's soil testing technology accelerates farming with timely, precise reports, potentially boosting yield by 20% and saving 40% on fertilizers. It also empowers rural youth as micro-entrepreneurs and promotes sustainable, climate-friendly farming practices.
About the technology: Developed a proprietary reagents for soil testing, in powdered form and sold as a sachet. For test soil sample, one has to mix the powered reagents into the soil solution, and reading can be taken using in-house developed ultra-low-cost dual-channel optical sensor device in seconds.

Theme :
Environment

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National Mission on
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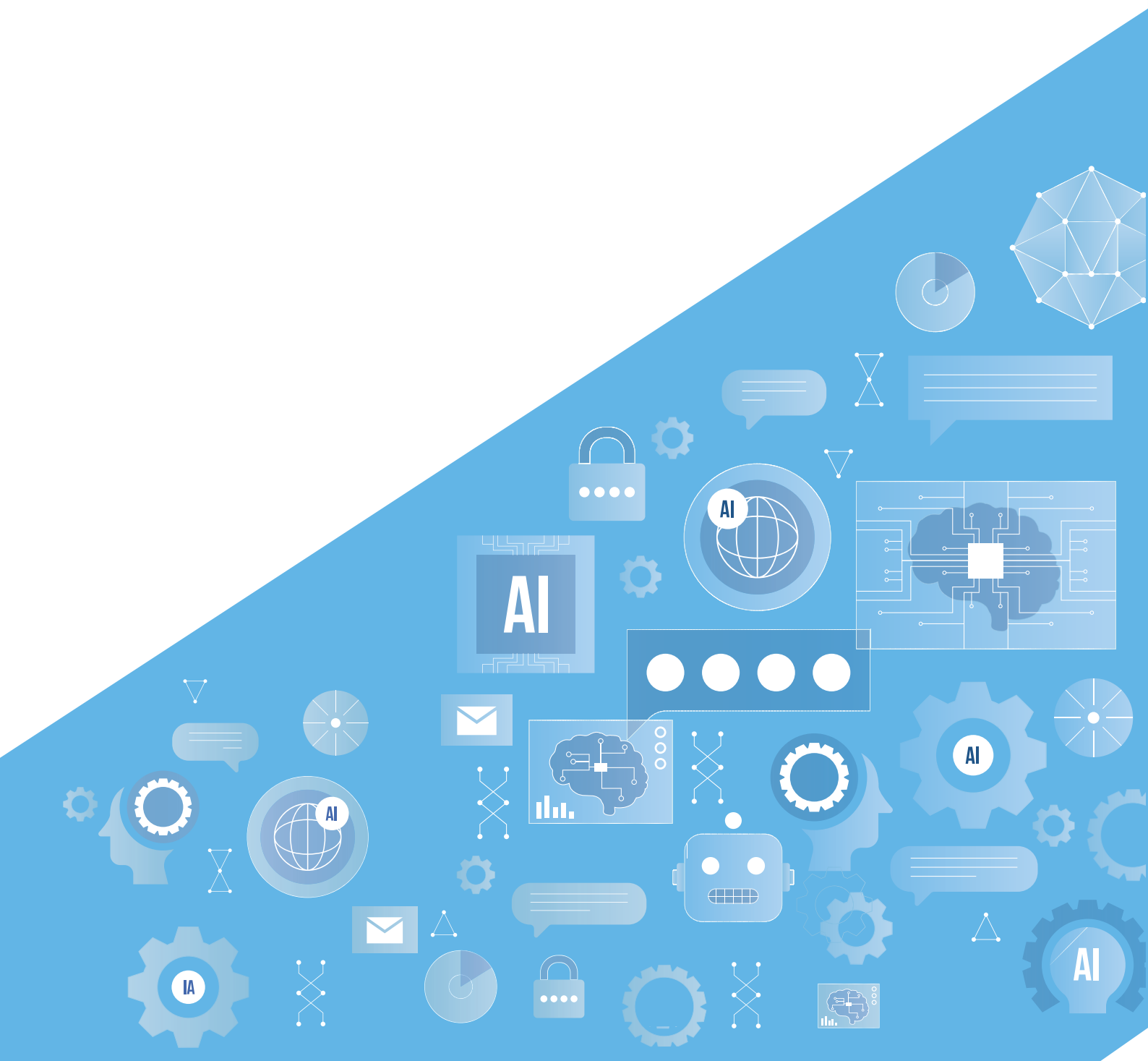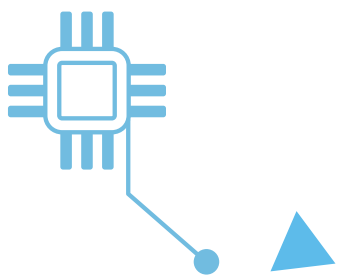
Theme:

Healthcare

Revolutionizing wellness:

Pioneering Health Through Advanced Technology
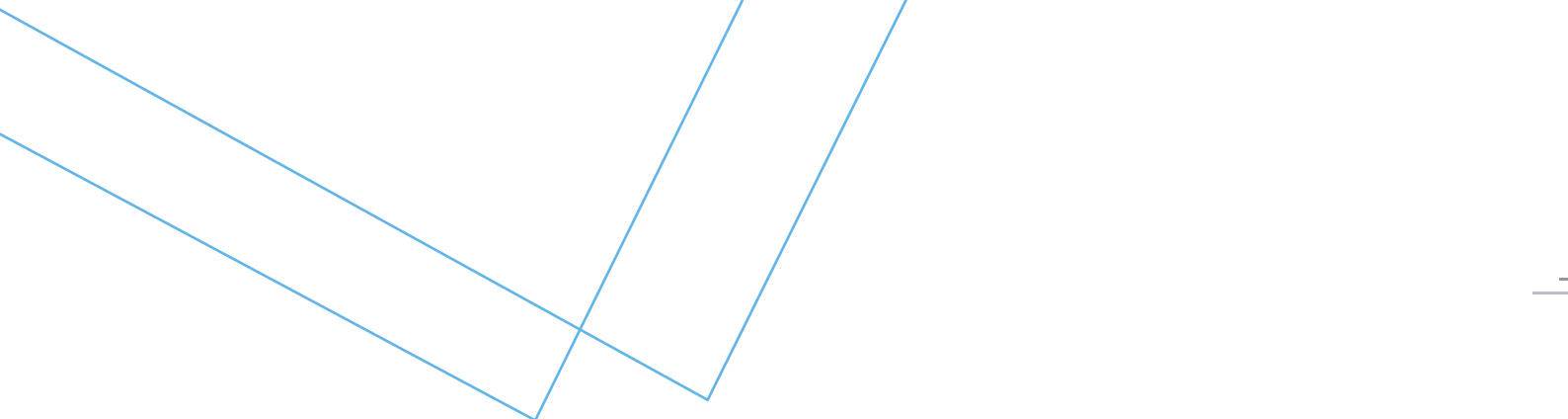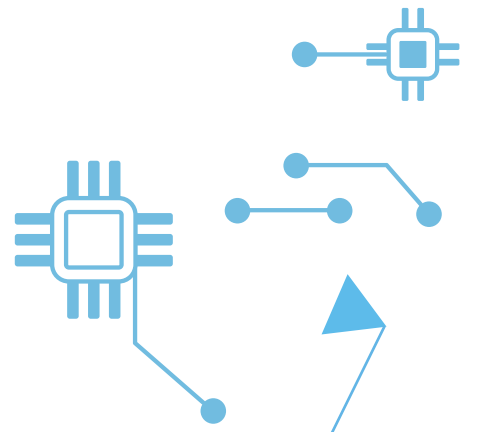
I-DAPT Hub Foundation
IIT (BHU), Varanasi
Theme: Healthcare

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Hub Overview:

I-DAPT Hub Foundation IIT (BHU) has been set up to address the emerging need 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 fulfil the modernization of socio-technical systems and services with disruptive innovations. 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 with a focus on technology or product development.

Project Updates:

Portable Optical Sensing Device (TRL: 6)

I-DAPT Hub Foundation developed a portable optical sensing device connected to a single-board computer, enabling the detection of Alkaline Phosphatase (ALP) in milk samples.

The device's real-time assessment is sensitive and efficient, indicating its commercial and clinical importance in colorimetric detection for diverse macromolecules.

The device is designed for real-world implementation and personalized diagnostic use.

Paper-based Micro-device (TRL: 6)

I-DAPT Hub Foundation developed a paper-based micro-evice using Digital Image Colorimetry (DIC) to quantitatively estimate ascorbic acid (AA) in the cosmetic, food, beverage, and pharmaceutical industries.

The device was tested for interfering molecules and commercial viability using market fruit juice and vitamin C tablets. Its stability is above a month with proper storage conditions, making it a promising solution for future commercial applications.

Development of Deep Learning based CCTV Footage Super-resolution for Human Subject Recognition (TRL: 4)

This technology focuses on improving the identity detection process through a multi-step approach from CCTV Footage.

The primary objective is to improve the accuracy and reliability of identifying individuals from facial images by integrating face cropping, super-resolution, and identity recognition techniques.

This technology has potential application in security systems, surveillance, and other domains requiring precise identity verification.

Startup:

Sedax Data Solutions Pvt. Ltd. (TRL: 5/6)

Sedax Data Solutions is an innovative encrypted eKYC solution leveraging web3 technologies to minimize exposure of users' vital personal information while performing KYC process at various private entities to facilitate their services.

Technology/Product Detail: WEB3, SSI Framework, Zero-Knowledge Algorithm, Blockchain Data Science and Block Chain Technology for Data Analytics and Cyber Physical.

Applications: Travel Tourism, Finance & Banking, Telecommunication, Healthcare, Education.

Theme :
Healthcare

iHub Anubhuti
IIITD Foundation
IIIT Delhi

Theme: Healthcare

**iHub Anubhuti-
IIITD Foundation**

Scan QR to know more

Hub Overview:

iHub Anubhuti – IIITD Foundation thrived on nurturing tech innovation through robust R&D and strategic collaborations. The quarter showcased dynamic projects, celebrated successes, and provided essential incubation support for startups.

Project Updates:

Leveraging Multi-modality in Understanding and Summarizing Task-Oriented Dialogue Systems

Our healthcare communication project, "Leveraging Multi-modality in Understanding and Summarizing Task-Oriented Dialogue Systems" focused on advancing dialogue systems, is now at the commercialization stage. It fills gaps in emotional intelligence & topic-aware summarization, pioneering advancements in healthcare, customer support, EdTech, and entertainment. Our innovation transforms communication within diverse industries, emphasizing transparency.

Theme-Specific Progress:

MCC Launch- iHub Anubhuti-IIITD Foundation and iHub Foundation for Cobotics (IHFC) have jointly launched the 'MCC-Medical Cobotics Centre' at IIIT Delhi. The centre is India's first tech-enabled medical simulation and training facility for professionals, including doctors, paramedics, technicians, engineers, biomedical researchers, and entrepreneurs. It aims to provide hands-on simulation training to the nationwide medical community.

Startup:

CoRover Pvt. Ltd.,

With support from iHub Anubhuti, introduces BharatGPT—a groundbreaking AI platform integrating OpenAI's GPT technology with Indian cultural context and is designed for diverse linguistic preferences. Hon'ble PM visit to CoRover Stall at GPAI.

Startup Conclave occurred on December 8, 2023, at IIIT Delhi during the 11th International Conference on Big Data and Artificial Intelligence. Dr. Ekta Kapoor and Prof. Ranjan Bose graced the event with over 100 participants. The conclave featured a panel discussion on AI trends, venture funding, and policy, led by top industry experts including Amitabh Nag, Ankush Sabharwal and others. The conclave provided a platform for startups to showcase their products and technologies, fostering connections and dialogue among industry leaders, entrepreneurs, and innovators.

Theme :
Healthcare

COGNITIVE COMPUTING AND SOCIAL SENSING

IIT Patna
Vishlesan I-Hub Foundation
IIT Patna

Theme: Healthcare

Scan QR to know more

Hub Overview:

The multidisciplinary Vishlesan I-Hub Foundation at IIT Patna under Technology Incubation Hub (TIH) 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.

Startups:

Digiclinics
Development of Computer Aided Diagnostic System for Breast Cancer.

Impact : Around Pathology Annotated images are trained in our AI models to predict breast cancer grading

Eyecan
Assistance to the visually impaired individuals in their daily life activities through object detection, text to speech feature translation through the AI-based application system.

Impact : AI Based Personal Assistant for Object Identification. The personalized AI app provides Audio inputs the Visually impaired user for better situational awareness and has helped Visually impaired in reading 12000 plus documents.

Sparcolife Digital Healthcare Technologies Pvt Ltd
AI based text, video and Data analytics for Female healthcare Applications.

Microgrid Technologies Pvt Ltd
Conversational AI platform for hospital and healthcare ultra-low-cost dual-channel optical sensor device in seconds.

SPEECH, VIDEO & TEXT ANALYTICS

Theme :
Healthcare

I-Hub Foundation for Data iHub-Data

IIIT Hyderabad

Theme: Healthcare

Hub Overview:

iHub- Foundation for Data (iHub-Data) is dedicated to enhancing national research and deploying solutions 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:

The following (figures 1 and 2) is a lab prototype in development under the public health vertical of healthcare efforts sponsored by the iHub-Data.

The primary goal for this vertical is to ensure Quality, Accessible & Affordable Healthcare.

Figure1: Early Hardware Protype

Figure 2: Prototype App showing the vitals in real-time

Ongoing Projects:

• Wearable bioelectrical impedance analyzer for estimation and monitoring of body water. (in collaboration with Apollo Hospital) – building the prototype itself.

• A study on the impact of oral glucose load on total and segmental phase angle in healthy normal individuals using a non-invasive wearable bioimpedance analyzer. (in collaboration with ICMRNational Institute of Nutrition) – using the prototype for experimental studies.

Human Resource & Skill Development:

As part of skill-development training programs, the Hub has forayed into PSU sectors, with an aim to help the PSUs attain self-reliance through acquisition of knowledge and skills in the AI/ML domains – computer vision, natural language processing, speech and signal processing and also Data Mining. A couple of two-week long executive training programs have been organized so far involving around 75 scientists from research institutions that include almost all research centers of DRDO, three centers from HAL, Brahmos Aerospace, Goa Shipyard and a couple of research institutes of CSIR.

Theme :
Healthcare

IITI DRISHTI CPS Foundation

IIT Indore

Theme: Healthcare

Hub Overview:

IITI DRISHTI CPS Foundation, a Technology Innovation Hub was set up at IIT Indore with an overarching objective of becoming a one-stop shop for CPS solutions with a specific focus on system simulation, modelling and visualization. DRISHTI CPS currently supports over 62 research projects led by faculties, students, and researchers from various Indian academic institutions. The foundation also nurtures more than 30 startups, offering financial assistance ranging from INR 2 Lacs to INR 40 Lacs, with a focus on digital healthcare and manufacturing.

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. It is currently working to support breakthrough technologies in the area of CPS through translational research, product commercialization, startup incubation, and skill enhancement, catering to the country's growing demand in this field.

Project Updates:

CHARAK DT, Human Digital Twin (DT) Healthcare Platform

CharakDT is a digital twin platform that uses high-resolution patient models for precise diagnosis and personalized treatment, enhancing patient care by creating a cohesive digital ecosystem for data exchange and analysis.

Problems Addressed- The CharakDT-Human Digital Twin Platform for Healthcare aims to bridge the gap in healthcare by leveraging digital twin technology to provide a personalized, preventive approach, addressing the challenge of integrating traditional holistic principles with advanced technological solutions.

Current TRL- 6

Deployment/Commercialization Status- Different technologies and startups integrated with platform operating in Operational environment at pre-commercial stage in 5 districts of West Bengal, AIIMS New Delhi, etc.

Collaborators- IITs, IIITs, NITs, AIIMS, Multiple Startups and University of Cambridge, UK

Applications- Hospitals, Healthcare centres, Diagnostic labs, Nursing homes.

Achievement- Secured implementation funding from ICMR, GoI, and Royal Academy of Engineering, UK

Startup:
Arficus Private Limited

Medhini - Intelligent healthcare radio diagnosis decision support system:

Healthcare access in rural and suburban areas is a significant issue, affecting underserved communities like women, girls, ethnic minorities, disabled individuals, and older adults due to cost and unavailability of trained professionals.

Current TRL- 8

Technology enabled solution:

The AI-powered health-tech SaaS platform uses deep neural technologies to provide accurate diagnoses for diseases like melanoma, stroke, heart attack, pneumonia, and liver and kidney ailments. It processes medical scans, produces diagnostic reports, and provides early diagnoses in less than a minute. With an accuracy rate of 99.31%, it serves as an early warning system for patient health.

Deployment: The technology is already commercialized with 130 active clients across 8 countries including India, UK, Nigeria, Cambodia, Malaysia, Kenya, and Tanzania. Collaborations: Highlight any collaboration opportunities with other hubs or external stakeholders.

Employment Generated : 45

Achievement: Medhini with its solution has touched 17.6 million lives so far with a mission impact driven and creating sustainable ecosystem and has raised USD 3 million for implementation in the African continent.

Theme :
Healthcare

IITM Pravartak Technologies Foundation

IIT Madras

Theme: Healthcare

Hub Overview:

IITM Pravartak Technologies Foundation is a Technology Innovation Hub (TIH) of IIT Madras. Key activities include technology development, entrepreneurship development, human Resource development, and International collaboration in sensors, networking, actuators, and control Systems (SNACS). With initiatives supporting entrepreneurs, IITM Pravartak has seeded 8 startups in this quarter.

Project Updates:

Optimized Mobile Surgical Unit for Cataract Surgeries in Remote Areas

Mobile Eye Surgical Unit, MESU™, a first-of-its-kind technology in the country, targets the huge unaddressed need for cataract surgeries in rural India. MESU is an innovative engineering solution in the form of a stable, self-

sufficient and mobile platform that provides a controlled and sterile environment for performing high-quality cataract surgery even in rural locations with no basic amenities

Socio-economic Impact on the Country: Till date, MESU has conducted 22,000+ surgeries in over 100 rural locations and is continuing operations in rural areas.

Collaborations:

IIT Madras Pravartak Foundation has partnered with McIndeez WLL, Bahrain to extend its certification courses to the learners in Bahrain and the GCC region. McIndeez will be involved in the promotional activities (Offline and Online) of IITM Pravartak courses so that students and working professionals in the GCC region can benefit from these industry-relevant courses.

IITM Pravartak courses are promoted through McIndeez's platform called https://www.mcindeezacademy.com. Students and working professionals from the GCC region can enroll for the courses through this platform.

Theme : Healthcare

I – Hub Foundation for Cobotics (IHFC)

IIT Delhi

Theme: Healthcare

Scan QR to know more

Hub Overview:

I – Hub Foundation for Cobotics (IHFC) focuses under its 3 major pillars of success from academia, government and industry bringing forward research & development of novel tehnology in the area of AI, ML, communications, robotics and cobotics to serve sectors across like defence, medical , agriculture and Industry 4.0. IHFC mandates include to work on indigenously made products and deliver results through R&D, entrepreneurship and start-ups, skills and training & international collaborations.

Project Updates:

Telepresence and Tele action System for Robot Assisted Dentistry

Maintaining social distance and making dental services accessible to remote places such as villages and smaller towns is the main motivation. It will enable proper social distancing to prevent spread of infectious diseases like Covid-19. Manufacturing these devices will provide source of employment.

Smart Robotic Assistant for stroke patients

Stroke patients are faced with a quality of life devoid of autonomy.

Cost-effective solution that can enhance quality of life of locomotion disabled patients on a wheelchair. Cognitive mapping of brain with the patient to enable gross motor movements.

Soft Exo-skeleton/Exo-Suit for application in daily life and rehabilitation

- Currently exoskeletons are very difficult to use and heavy.

- A lightweight, user friendly, and a wearable soft exosuit that uses a less number of rigid structures, so as to give more freedom of movement to the user will be developed.

- This project will give an option to industries to increase the strength of labour to work on heavy loads with less injuries and better safety.

- Manufacturing these devices will provide source of employment.

Intelligent Hybrid Pressure Sensor Matrix based on Photopatternable Dual Tranduction Nanocomposites

- Fully Flexible Substrate

- Individually Addressable

- Piexoelectic/Triboelectric

- Simple Design

Application: This can be attached to insoles. The sensor has immense application in smart healthcare Medical diagnostics and well as sports injury rehabilitation.

Startup: Nanoscale materials synthesis machine

- Smart manufacturing at nanoscale using sensing, automation, robotics and AI.

- Low cost nanostructures will be made easily available in the healthcare sector for delivery of medicines to area difficult to reach within body.

- This technology will contribute towards sustainability

- Production efficiency will be increased and labor shortage problems will be resolved.

Theme :
Healthcare

COBOTICS

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

IDEAS – Institute of Data Engineering, Analytics and Science Foundation

ISI Kolkata

Theme: Healthcare

Scan QR to know more

Hub Overview:

IDEAS – Institute of Data Engineering, Analytics and Science Foundation is the Technology Innovation Hub set up at ISI Kolkata under the aegis of National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS). The hub is committed to design and develop effective and scalable algorithms distributed machine learning models to solve real life problems and help in decision making for businesses and the government.

Project Updates:

Smart Wearable Device for Early Prediction and Alerting of Epilepsy in Pre-ictal Phase using Advanced Learning Techniques

- A cost-effective smart 3D printed wearable device
- Advanced data analytics and deep learning techniques for pre-ictal prediction
- A mobile application to maintain personalized seizure diary and to provide alert messages.

Application:

The application of a "Smart Wearable Device for Early Prediction and Alerting of Epilepsy in Pre-ictal Phase using Advanced Learning Techniques" offers early seizure detection, personalized monitoring, and remote healthcare integration thereby improving the quality of life for individuals with epilepsy.

Prediction of Walking Imbalance and Performance Improvement of Designed Prosthetic Lower Limb

The major deliverables of this project are:
Product development of the gait synchronized prosthetic lower limb.

Developing an automated system to:

a. Detect the stability of movement with prosthetic limb and improve the stability with adaptive controller.

b. Predict the walking imbalance based on real time database.

Advantages :
- Simple Design
- Cost Effective
- Synchronized
- Higher Accuracy

Right Normal Limb and Left Prosthetic

Theme :
Healthcare

DEPARTMENT OF
SCIENCE & TECHNOLOGY
MINISTRY OF
SCIENCE & TECHNOLOGY

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

31

Theme:

Infrastructure

Building Tomorrow, Today:
**Transforming Infrastructure With
Cutting Edge Technologies**

I-Hub and HCI Foundation
IIT Mandi

Theme: Infrastructure

Hub Overview:

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

Startup:
Electica Energy

IIT Mandi iHUB has sponsored a startup called Electica Energy. It is pioneering a battery-swapping solution to address challenges faced by electric vehicle (EV) owners in India. This revolutionary swapping solution allows EV owners to swiftly exchange depleted batteries for fully charged ones in just under 30 seconds. This approach significantly minimizes the waiting time associated with traditional charging methods, which can take hours. As a result the intelligent charging machine enhances user experience & optimizes battery life, promoting seamless interaction between EVs and the infrastructure.

Figure 1: Hardware Prototype

Figure 2: Prototype App showing the User Interface

Human Resource & Skill Development:

IIT Mandi iHub has introduced a specialized "Drone didi batch" tailored for women aged 18 and above, offering enrolment in the Kisan Drone Operator course. This initiative is part of a fully residential Drone Training Program aligned with the PMKVY4.0 (Pradhan Mantri Kaushal Vikas Yojana) scheme.

Figure 3: Class of Drone didi

Figure 4: Training Session

The "Drone didi batch" commenced on December 2023 with 20 girl students. Participants in this program can expect to acquire professional skills in drone flying, obtain a Drone Pilot License, and master applications in agriculture, such as crop pesticide spraying, monitoring plant health, field conditions, seeding, and pollination, and deploying drone based skills.

Theme :
Infrastructure

(TEXMiN) Technology Innovation in Exploration & Mining Foundation

IIT (ISM) Dhanbad

Theme: Infrastructure

TEXMiN IIT (ISM)

Scan QR to know more

Hub Overview:

TEXMiN (Technology Innovation in Exploration & Mining) Foundation is a Section 8 company, the Mining Technology Innovation Hub of IIT (ISM) Dhanbad, with the funding support of the Department of Science and Technology (DST), GoI under National Mission for Inter-disciplinary cyber-physical systems (NMiCPS) to address the issues and challenges of the mining and exploration industry.

Activities and achievements:

Capacity Building :

TEXMiN IIT (ISM), Dhanbad in collaboration with Curtin University, launched the International Leadership Program (with classes/site visits in India and Australia) ; and 45 day Campus to Corporate program for more than 200 industry executives to build capacities in Mining 4.0

Collaborations and Partnerships :

TEXMiN signed MoU with GMDC's iCEM, on 02.12.2023 and with MOIL on 17.12.2023 with for co-development of solutions enabling Mining 4.0 & Exploration 4.0 like AI-assisted explorations, Mine traffic management, Geospatial technologies, Telematics. Holographic visualization etc. The MOU also enables both parties to undertake activities like Capacity building, and partnerships for execution of mining projects through indigenous technologies.

Technology Demonstration :

TEXMiN along with its start-up M/s Niral Networks won the National hackathon organized by Ministry of Coal for the topic "Private 5G use cases in Mining". The Private 5G solution, implemented as pilot at Sonepur Bazari mines, where ECL was demonstrated live during IMC 2023. Solutions included 5G carrier drones, 5G enabled AI cameras, Voice communication and Holographic visualization of mines.

Theme :
Infrastructure

TECHNOLOGIES FOR MINING

I-Hub for Robotics and Autonomous
Systems Innovation Foundation(ARTPARK)

Indian Institute of Science, Bangalore

Theme: Infrastructure

ARTPARK

Scan QR to know more

Hub Overview:

ARTPARK @ IISc (AI & Robotics Technology Park) 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 seed 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. Our work spans open tools, standards, IP, technologies, databanks and path-breaking companies.

Theme-specific progress

ARTgarage, a state-of-the-art manufacturing and testing facility for robotics and autonomous systems is empowering innovation through a modern manufacturing ecosystem centered around assisted and autonomous intelligent systems. The 75,000 sqft facility is undergoing major capability enhancement through addition of about 800 sqft clean room, 6 DOF Motion Capture System, CNC vertical machining centre, are significant amongst other accretions.

Hosting India's first ROSCon

ARTPARK-IISc co-hosted the inaugural edition of ROSCon India 2023, along with Acceleration Robotics and Rigbetel Labs on Dec 14-15th, 2023. With an impressive turnout of over 700 attendees, ROSCon India 2023 featured seven innovative robotic startup showcases, fourteen enlightening talks on ROS, and four engaging panel discussions. These sessions delved into the evolving landscape of robotics in India, exploring challenges faced by startups in robotics, the significance of edge computing, and the intricacies of securing venture capital funding. The event played a pivotal role in uniting and strengthening the robotics community across the country. The event received significant support from industry leaders, with Qualcomm, Nvidia, and Analogue Devices India joining as platinum sponsors. Their participation underscored ROSCon 2023 as a convergence point for the best minds and organizations in India's thriving robotics community.

Participation in Global Partnership for Artificial Intelligence (GPAI Summit 2023)

Under the motto "Sabka vikas AI ke saath", ARTPARK-IISc showcased solutions in AI to societal problems in healthcare, climate change and languages. These include: AI + One Health + Climate platforms currently covering 80 million through public health systems in Karnataka and Maharashtra, virtual chatbot for high-risk pregnancy cases and model comparison tools. The event was inaugurated by Hon'ble Prime Minister Narendra Modi and we were privileged to have him glance at the ARTPARK booth.

Startups:

Chirathe Robotics

Currently performing subsystem testing for some of the newer designs. Some designs are manufactured and tested for partial specification. Some other components are being manufactured. Control software has been tested in simulation. Pending software testing on the robot.

Twara Robotics

The Twara Actuator DEVKIT was released this past quarter. It contains all the necessary hardware peripherals, a rich API-enabled Actuator Control Dashboard and our detailed manual with step-by-step instructions - allowing clients to become operational in less than an hour.

Deployment " Twara Actuator DEVKITS

A total of three new Actuator DEVKIT deliveries and installations were done in the quarter. It is being integrated into R&D robot development, surgical robotic arm and an autonomous ground vehicle by the 3 clients respectively.

ROBOTICS & AUTONOMOUS SYSTEMS

Theme :
Infrastructure

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

IIITB COMET Foundation

IIIT Bangalore

Theme: Infrastructure

Hub Overview:

IIITB COMET Foundation, in this quarter, continued to make strong progress along its two main endeavors (picked up based on inputs from the Department of Telecom, DoT):

☑ 5G-Advanced Base Station – indigenously built massive MIMO 5G-Advanced base station leveraging Open-RAN

☑ Reconfigurable Intelligent Surfaces (RIS) – to create smart radio environments – foundational for 6G

Project Updates:

Mantiswave Networks

Our product is an integrated in-house 5G Network-in-Box, known as 5G Private Box, that offers academia and R&D labs a secure, high-performance 3GPP-compliant 5G network for their innovative experiments and research endeavors. The same box can also be deployed in the fields in the space of a digital future with a strong focus on integrating cutting-edge industry 4.0 applications with the 5G network to help enterprises. It is customized to deliver tailored 5G solutions for businesses of all sizes. Our solutions are wireless standard-compliant and customizable to meet the unique needs of the customers. Apart from the network creation we provide the solutions to digital connectivity for video surveillance, sensor data, and actuators using our Mantis 5G Gateways and sensors

Deployment:

Currently in TRL-7 testing stage

Problems addressed:

A 5G network-in-a-box serves as a crucial solution for learners and researchers by tackling accessibility challenges and offering a cost-effective and customizable environment. It facilitates hands-on learning, experimentation, and innovation, providing a controlled space for testing and prototyping. The ability to simulate realistic scenarios and emulate diverse network conditions enhances skill development. The portable nature of the solution encourages remote access, making it conducive to collaborative efforts. This versatile tool significantly reduces costs associated with setting up full-scale 5G networks and supports a wide range of research and development activities in the dynamic field of 5G technologies. It is also tailored to test in the fields for industry 4.0 applications.

Applications:

☑ *5G Skill Development and Innovation*
☑ *Testing using Real 5G Networks*
☑ *Emergency Response and Disaster Recovery*
☑ *Remote Industrial Operations*
☑ *Military and Defense*
☑ *Healthcare*
☑ *Smart Cities*
☑ *Satellite Ground Stations*
☑ *Agriculture*
☑ *Entertainment and Media*
☑ *Autonomous Vehicles and Transportation*

Theme :
Infrastructure

IIT Tirupati Navavishkar I-Hub Foundation

IIT Tirupati

Theme: Infrastructure

Scan QR to know more

Hub Overview:

The IIT Tirupati Navavishkar I-Hub Foundation (IITTNiF) is set up to host Technology Innovation Hub (TIH) focusing on cutting-edge technology in Positioning and Precision Technologies (PPT) which includes Positioning, Navigation, Timing, GIS, Remote Sensing and other non-invasive technologies. IITTNiF core aim includes developing advanced technology solutions, and thrilled to report the onboarding of several promising technology development projects to our ecosystem, like atomic clocks for navigation systems, anti-jamming and anti-spoofing for GNSS/IRNSS, and indoor positioning systems. This quarter we also onboard startups like Spaceinf, Thazhal Geospatial, and Garudalytics to further propel their endeavors.

Beyond technology development projects and startups, IITTNiF is committed to National Geospatial Policy. In this regard, IITTNiF has initiated number of programs which includes – GIS for Schools, GIS for Farmers, and GIS for Urban Infrastructure. These programs have garnered interest across the schools, farmers and city municipalities. IITTNiF's dedication to both cutting-edge technology and future generations ensures a bright future for spatial innovation in India.

For any queries and information visit our website

https://iittnif.com

Project Updates:

In a significant push towards technological advancements and infrastructure development, a total of six innovative products are supported by IITTNiF

- Development of a transportable all-optical trapped ion atomic clock for PNT (Positioning, Navigation and Timing) applications
- Ultra-Tightly Coupled Reliable Integrated Navigation System with GNSS and Low-Cost IMUS NERTU for Land Vehicles, Robots and UAVs
- Design and Fabrication of Hyperspectral Camera for Remote Sensing
- Small Objects Detection and Tracking in Aerial Images under Diverse Weather Conditions
- In Campus Navigation Assistive System for Blind School Students
- 5G-GNSS System for Improved Navigation and Positioning of Drones

Startups:

Development of a transportable all-optical trapped ion atomic clock for PNT applications

Ultra-Tightly Coupled Reliable Integrated Navigation System with GNSS and Low-Cost IMUS NERTU for Land Vehicles, Robots and UAVs

To foster an entrepreneurial spirit, three innovative startups are funded. Here is the list of startups:

Thazhal Geospatial Analytics Pvt Ltd: Infra-Risk/Utility Risk Assessment Tool. The tool uses deep technology to map and monitor assets both natural and man-made. The monitoring solution helps the business to reduce the risk due to climate change.

Garudalytics: Garudalytics Smart Mapping. The tool helps in extracting insights from location data to solve spatial problems using location intelligence.

Spaceinf Technologies Pvt Ltd: Integrated Risk Mapping for Disaster Resilience and Response (IRMDRR) uses location analytics coupled with Deep learning to uncover hidden patterns, extract crucial insights from the spatial data to create competitive edge and data driven decision making for businesses and industry segments such as agriculture, utilities, health, urban, climate & retail which fuels innovation and real-time insights."

Collaborations:

- IIT Tirupati Navavishkar I-Hub Foundation (IITTNiF) has signed a Memorandum of Understanding (MoU) with the Department of Science and Technology (DST), the National Institute of Geospatial Science and Technology (NIGST)-Survey of India (SoI), to establish a Centre of Excellence (CoE) for Geospatial Research, Technology, and Innovation.
- We are delighted to announce that IITTNiF has signed a Memorandum of Understanding (MoU) with Elena Geo System to collaborate on the development of innovative NavIC/GNSS devices and solutions.

Theme :
Infrastructure

NMICPS Technology Innovation Hub on Autonomous Navigation Foundation

IIT Hyderabad

Theme: Infrastructure
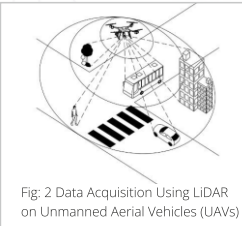
Hub Overview:

NMICPS TiHAN, a Section 8 company at IIT Hyderabad is recognized as a Scientific and Industrial Research Organization (SIRO) by DSIR. TiHAN contributes to the National Mission on Interdisciplinary Cyber-Physical Systems (NMICPS), playing a crucial role in sectors, such as health, education, energy, environment, agriculture, strategy and security, industry 4.0, smart cities, and sustainable development goals with a focus on innovation, entrepreneurship, and the start-up ecosystem.

Project Updates:

1. Autonomous drug delivery robots for the healthcare Industry - TRL 7: Service robots in the healthcare industry will serve as supplemental healthcare workers in hospitals, elderly-care facilities, and at home. They can perform logistics and laborious physical tasks, sanitizing, and combat loneliness and inactivity in the elderly population, or assigned.

Fig: 1 Autonomous Drug Delivery Robots for Healthcare Industry

2. Technology for data acquisition using LiDAR on Unmanned Aerial Vehicles (UAVs) – TRL 7: The main aim of this project is to design and develop a system and method of mobile mapping system of UAVs, for acquiring the quality data of a three-dimensional view of the environment around Unmanned Aerial Vehicles (UAVs) by using LiDAR sensors. Patent Filed: Application No: 202341079067, Year: 2023.

Fig: 2 Data Acquisition Using LiDAR on Unmanned Aerial Vehicles (UAVs)

3. Vision-based target tracking and localization for loitering munition System – TRL 7: The main aim of this project is to design and develop a vision-based guidance system for loitering munition systems and estimating the distance of a target from a UAV.

4. Leveraging UAV-based technology for crop residue: An important resource for the crop-livestock farming community – TRL 7: UAV-based image analysis for crop residue yield in terms of plant height and canopy coverage in sorghum and groundnut varieties.

5. Development of IoT-enabled AI-based UAV system with onboard and cloud-backed inference capabilities for surveillance, event detection, and reporting – TRL 7: Developing end-to-end systems for aggregating multi-sensory data captured by drones. Autonomous navigation capabilities using cloud-based control systems.

Technology Deployment:

TiHAN IIT Hyderabad is actively participating in key programs, including the Voluntary Vehicle-Fleet Modernization Program (V-VMP), Connect Vehicle Technologies for India, Demonstration of Drone Technology in Governance at LBSNAA and India Mobile Congress (IMC) 2023, India.

Skill Development Programs:

TIHAN has successfully conducted seven skill development training programs, encompassing diverse fields, such as autonomous navigation, UAV technology, 5G + edge applications, and automated driving & The manpower trained is 273.

Editorial Team

Dr. Ekta Kapoor
Mission Director, NM-ICPS and
Head, Frontier and Futuristic Technologies (FFT) Division

Dr. Swati Rawal Dang
Scientist-D, FFT Division, DST

Ms. Tanushri Sharma
Scientist-C, FFT Division, DST

Ms. Rajani Kushwaha
JA (Tech), FFT Division, DST

Contributors

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

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**IITI DRISHTI CPS Foundation,
IIT Indore**

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

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MINISTRY OF SCIENCE & TECHNOLOGY

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25 Technology Innovation Hubs
Across the Country

IIT Ropar -Technology and
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(TIF - AWaDH)
IIT Ropar

IIT Mandi iHub and
HCI Foundation
IIT Mandi

iHUB DivyaSampark
IIT Roorkee

IIT Guwahati Technology Innovation
and Development Foundation
IIT Guhwati

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IIITD Foundation
IIT Delhi

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Cobotics (IHFC)
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ISI Kolkata

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IIT ISM Dhanbad

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I-HUB Quantum Technology Foundation
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NMICPS Technology Innovation Hub On
Autonomous Navigation Foundation
IIT Hyderabad

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AI & Robotics Technology Park, I-Hub
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IIIT-H IHub-Data Foundation
IIIT Hyderabad

IIITB COMET Foundation
IIIT Bangalore

IIT Tirupati Navavishkar I-Hub Foundation (IITTNiF)
IIT Tirupati

IIT Palakkad Technology IHub Foundation (IPTIF)
IIT Palakkad

IITM Pravartak Technologies Foundation
IIT Madras

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