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 | OCTOBER 2024

www.nmicps.in

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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. 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
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 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)

IIT Palakkad

IIT Palakkad
Technology IHub Foundation
Driving automation for energy and safety

IIT Palakkad Technology IHUB Foundation (IPTIF)

SCAN HERE

Hub Overview

IIT Palakkad Technology IHUB Foundation (IPTIF) works 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

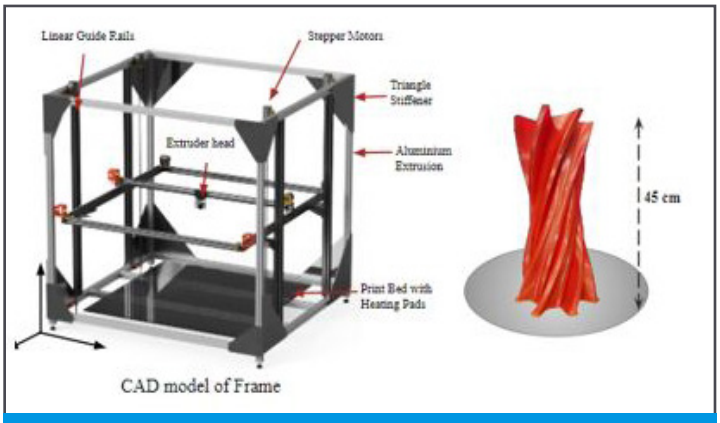


Image: Large size 3D Printer

Development of 3-D printer for Fabricating Sustainable Product

The TIH supported startup developed and demonstrated first generation large size (1.2 m 3) 3D Printer. The developed setup plays a crucial role in extruding the paper pulp into a definite shape which demonstrates the feasibility of fabricating a 3D dimensional part. The focus is on development of process and setup for 3D printing of parts from waste paper.

Startups

Image: Air Purifier

Medcuore Medical Solutions Pvt Ltd.

The TIH supported utilizes Advanced AI-ML and IoT-Integrated Solutions for sustainable Indoor Air Quality enhancement through Intelligent Collaborative Systems (ICS). Key Features include Multi-Parameter Sensors, Real-Time Data Analytics, Advanced Filtration Technology, Cloud-Based Monitoring, User-Friendly Interface, Simple, intuitive user interface for easy control, adjustments, and visualization of air quality data and Data Energy-Efficient Design.

Image: Electric Outboard Motor

All About Innovation and Advanced Research

The TIH supported has developed Radian Electric Outboard Motor which is a high-performance, eco-friendly motor that offer a compelling alternative to traditional gasoline-powered engines. The electric outboard motor represents a significant leap forward in sustainable marine propulsion. The motor is Ideal for a wide range of applications, including recreational boating, commercial fishing, and water tourism. It has been deployed (6 HP vertical motor) in an Alappuzha shikara boat which serves as a testament to the motor's capabilities in real-world scenarios.

Image: TechConnect @ Coimbatore

Collaborations

IPTIF along with IIT Palakkad and TECHIN conducted an Industry Connect meeting namely TechConnect @ Coimbatore bringing together over 120 Industry leaders from more than 70 industries in the Automotives, Electronics, Manufacturing, Industrial Automation sector in the Coimbatore region. The event showcased IIT Palakkad's and IPTIF's expertise, facilities, and collaboration opportunities.

BITS BioCyTiH Foundation

SCAN HERE

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.

Startups

Image: AI Stetch with mobile compatibility

AI Health Highway Pvt. Ltd.

The TIH supported startup is developing **AiSteth**, an AI-enabled smart stethoscope designed to screen, detect, and predict heart and lung disorders using advanced signal processing and machine learning. This innovative solution aims to reduce premature deaths from non-communicable diseases. Unlike existing hospital-based tools, AiSteth provides a cost-effective method, tailored for primary care and community clinics, where patients commonly seek initial care.

Image: Portable IXanner® 3D scanner eye screening device

Tishyas Medical Device Development Solutions Pvt Ltd

The TIH supported startup has developed IXanner® AEAR. IXanner® is a cost-effective, portable eye screening device designed to detect diseases that lead to progressive blindness, such as cataracts, glaucoma, diabetic retinopathy (DR), and age-related macular degeneration (AMD). By harnessing Optical Coherence Tomography (OCT) technology, IXanner® makes early diagnosis affordable and accessible in primary care settings, ensuring ease of use for both healthcare providers and patients.

Image: Research Excellence for Entrepreneurial Leadership (REEL) program

Capacity Building

The TIH organised Research Excellence for Entrepreneurial Leadership (REEL), a unique program highlighting the role of academics and scientists in research translation and techno-entrepreneurship. REEL brought together government officials, industry leaders, academics, investors, and startups.

IIITB COMET Foundation

SCAN HERE

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

RIS prototype

As part of an ongoing project funded by IIITB COMET Foundation, the circuitry for a Reconfigurable Intelligent Surface (RIS) prototype has been designed and fabricated.

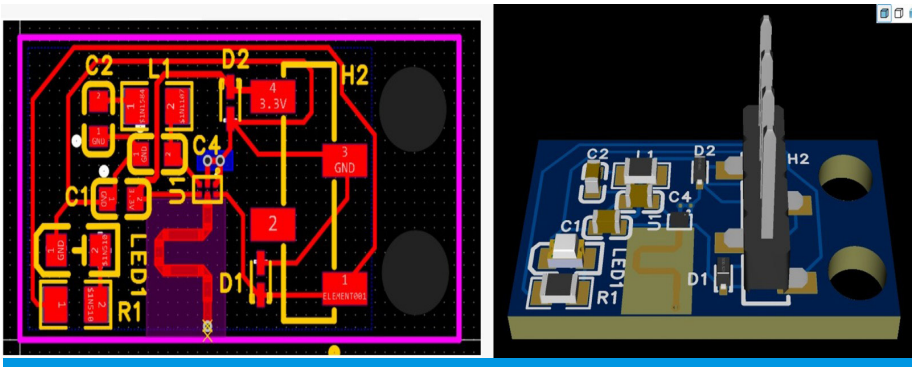
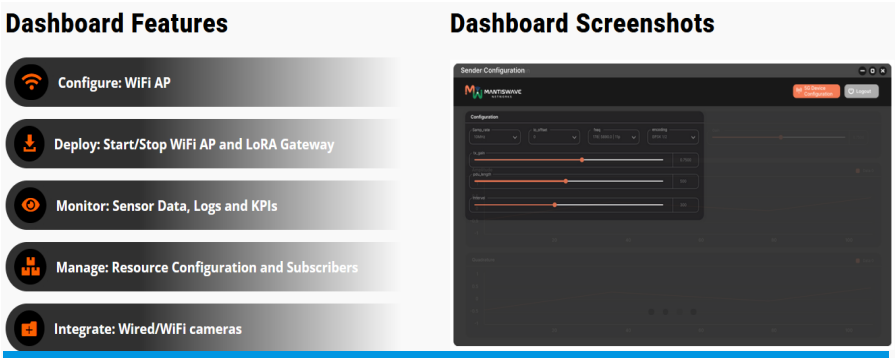


Image: AI Stetch with mobile compatibility

Image: RIS tile fabricated

Startups



Images: Mantis 5G Industrial IoT Gateway dashboard

Mantiswave Networks Pvt. Ltd.

The start-up incubated at IIITB COMET Foundation, has developed a 5G-NR, Wi-Fi, and LoRa Gateway, a cutting-edge solution designed to revolutionize wireless communication in industrial settings. This advanced gateway seamlessly integrates 5G New Radio (NR) with Wi-Fi, and LoRa technologies, offering unparalleled connectivity and performance for a wide range of industrial applications.

Accessed and managed through the Mantis Dashboard, this gateway provides a comprehensive platform for industrial IoT, surveillance, and edge video processing.

Collaborations

IIITB COMET Foundation signed an MNDA with Tejas Networks to evaluate the RIS technology developed as part of COMET R&D projects, and to collaborate on future development and standardization activities regarding RIS technology.

IIT Kanpur

C3iHub
(IHUB NTIHAC Foundation)

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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, UAV-security, tamper-proof data storage and cybercrime prevention, and associated horizontal layers: hardware security, network security, firmware security, etc.

Project Updates

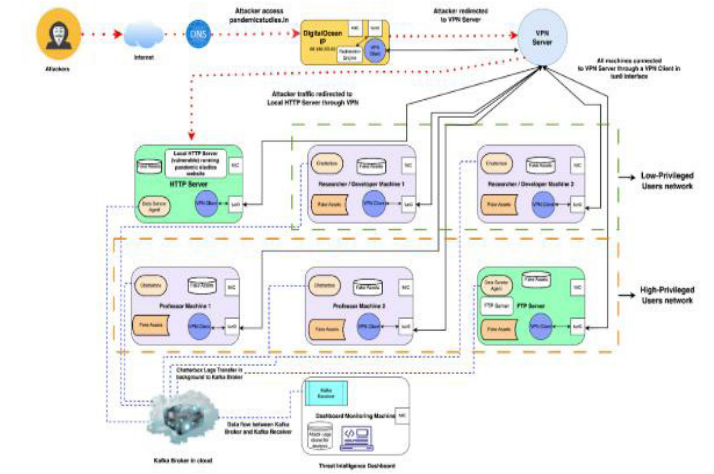

Image: ADAPT

ADAPT - Adaptive camouflage-based orchestration of behavioral honeypots for Advanced Persistent Threats

The C3iHub has designed and developed ADAPT - an adaptive camouflage-based orchestration of behavioral honeypots, specifically tailored to trap well-known APT groups, which is crucial for national security. Deployed for 100 days within C3iHub network, the orchestrated honeypots recorded 1.4 Crores hits from ~4500 unique IP addresses, and successfully captured 3 real APT Scenarios, with possible attribution to Chinese threat actors. Ready in the form of "ADAPT as Service", it is first-ever such capability developed in India and highly beneficial for LEAs and Govt.

Startups

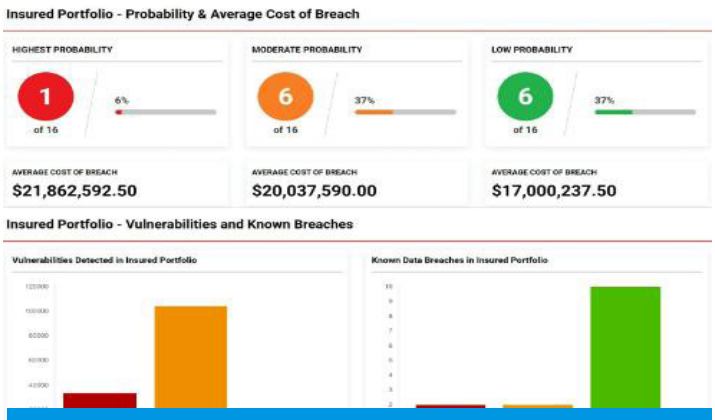

Image: CyberInsur360

Engaiz GRC Solutions Pvt. Ltd.

C3iHub-incubated start-up has commercialized **CyberInsur360**, a Software-as-a-Service platform with integrated risk intelligence, assessment, monitoring and compliance platforms. CyberInsur360 offers cyber insurance risk assessment, third party risk intelligence, information security certifications, and regulatory compliance, for insurers, insured, and the brokers.

Skill Development

Large-scale Vocational Course on Cybersecurity

C3iHub at IIT Kanpur, in collaboration with CSJMU Kanpur and CSJMIF, launched a Cyber Security Vocational Program. This online course, featuring hands-on training through a cyber-range, has attracted over 1.6 lakh student enrollments.

IITM Pravartak Technologies Foundation

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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.

Project Updates

Swayatt Drishtigochar Private Limited

Image: Predictive maintenance

The TIH incubated startup is digitizing industrial machine's parameters with data driven technology solutions to predict potential breakdowns, maintain safety and optimizing efficiency. The predictive maintenance solution integrates sensor, camera modules & M2M communication to enable proactive equipment monitoring without hindering ongoing production operations. The solution seamlessly integrates with systems which includes ERP, MES & PLM that streamlines workflows, reducing downtime and operational costs.

The solution also leverages predictive analytics and authorization workflows, that helps the organizations identify and resolve equipment failures before they occur. The startup is engaged in pilot projects with IMPCOPS, a leading Pharmaceutical Industry located in Chennai, Advance Manufacturing Technology Development Centre (AMTDC) – an IIT Madras Centre of Excellence (COE), Uno Minda, Sarvodaya Engineering, Vishwakarma Group, Krishna Enterprises & RK Enterprises.

Collaborations

Image: Collaboration with Tamkeen Education

The TIH has partnered with Tamkeen Education, Oman to deliver job-enabling courses in Qatar and Oman through a hybrid model. This collaboration will offer comprehensive training across various disciplines that includes Data Science, AI/ML, Cricket Analytics, DevOps, and Cloud Computing.

iHUB DivyaSampark

SCAN HERE

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.

Project Updates

Revolutionizing MRI Technology: Clinical Trial Launched for Flexible Metamaterials

Image: Flexible Metamaterials

The project for development of thin, flexible metamaterials as add-ons to MRI scanners to enhance efficiency, affordability, and accessibility has entered into clinical trials. The trials are underway at GNRC Hospital in Guwahati by installing a flexible meta surface inside a 1.5T GE MRI scanner for testing.

Startups

Image: Nano UAV

Dtown Robotics Pvt. Ltd.

The TIH supported startup has launched its first NANO category commercial Unmanned Aerial Vehicles (UAV) system. This innovative nano drone, designed with precision engineering, brings cutting-edge technology while setting new standards in robotics and UAVs.

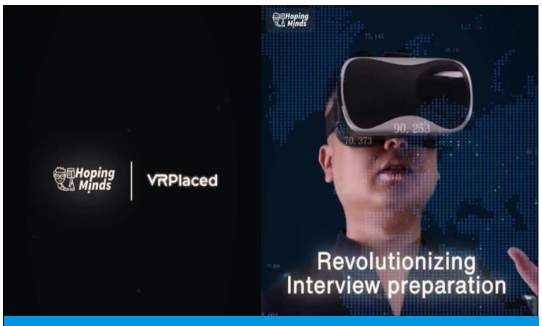

Image: VR placed

Mythyaverse Pvt. Ltd.

The TIH supported startup Mythyaverse Pvt. Ltd. has partnered with Hoping Minds (a placement training center) for VR placed to get the students interview ready. Many companies have also started using the tool for hiring candidates reducing their time-to-hire and cost-of-hiring.

IIT Ropar

AWaDH
Agriculture and Water Technology Development Hub

IHub Agriculture And Water Technology Development Hub(AWaDH)

SCAN HERE

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 he Agricultural & Water related issues through deployment of CPS in Food Processing, Rural Development, Fisheries, Textiles, Electronics, Fertilizer, Atomic Energy etc.

Project Updates

Image: Weather Monitoring Station

Weather Monitoring Station

The TIH has achieved significant progress with the Weather Monitoring Station, a sensor network measuring key atmospheric parameters like temperature, humidity, and wind speed. Integrated with IoT technology, it enables real-time data transmission to cloud platforms for remote monitoring and analysis. This system supports applications ranging from local agricultural monitoring to advanced scientific research, enhancing accurate weather forecasting and climate studies. Ultimately, it aims to improve decision-making in agriculture and environmental management through precise, real-time data.

Startups

Image: Vertical farming

Vertical Farming Private Limited

The TIH supported startup is transforming sustainable agriculture in India with its innovative IoT-based automation system for Controlled Environment Agriculture (CEA). The startup has secured five patents and operates India's largest R&D farm, cultivating 20 crops across 12 microclimates using renewable energy sources. The venture exemplifies the potential of innovation and sustainability in modern farming.

Image: CPS lab inauguration

Deployment

iHub-AWaDH deployed two new Cyber-Physical Systems (CPS) labs: one at the University of Ladakh, marking its first venture into the northernmost region, and another at Baba Farid College of Engineering and Technology in Punjab. These labs empower over 170 students and faculty at Baba Farid and 40 at Ladakh, focusing on emerging technologies like IoT, AI, and data analytics to foster innovation and skill development.

Skill Development

iHub-AWaDH, in partnership with IIT Ropar's Computer Science Department, launched the AI Vicharanshala, a two-month residential program for 35 students. The initiative focused on hands-on learning of AI fundamentals, guided by esteemed professors through interactive sessions.

IIT (ISM) Dhanbad

(TEXMiN) Technology Innovation in Exploration & Mining Foundation

SCAN HERE

Hub Overview

Technology Innovation in Exploration & Mining (TEXMiN), the Mining Technology Innovation Hub has been set by GoI 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).

Collaborations

Image: Collaboration with Coal India

TEXMiN took a major leap toward Mining 4.0 by signing an MoU with Coal India to establish the “Innovation in Mining (IMiN) - Centre of Excellence (COE).”

Skill Development & Training

Image: Training for Hindalco Industries

The TIH organized a two-week comprehensive advanced onboarding & induction training for Hindalco Industries on mining and related operations Ltd.

Image: Training on
Advances in Mine Surveying Technology

TEXMiN, in collaboration with IIT (ISM) Dhanbad, organized a flagship course designed for survey officers from the coal mining industry. The Six-week intensive Course on “Advances in Mine Surveying Technology” was organized for 76 experienced survey officers from the coal mining industry.

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IIIT Hyderabad

HUBDATA
IIIT HYDERABAD

IHub-Data

SCAN HERE

Hub Overview

iHub - Foundation for Data (iHub-Data) is dedicated to enhancing national research and deploying solution in data banks, data services, 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

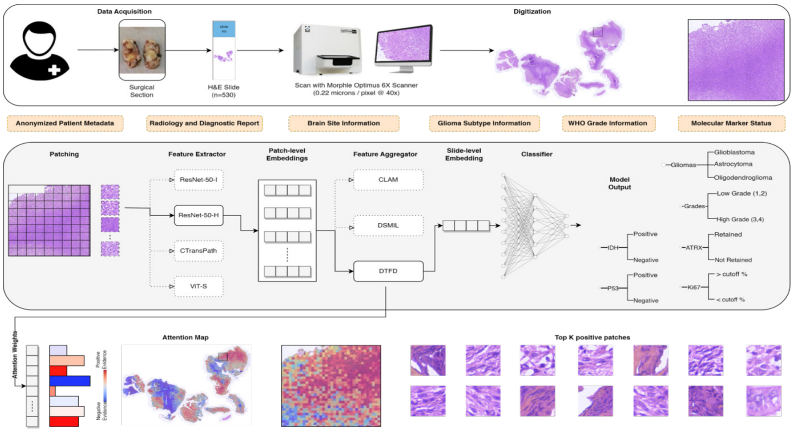

Image: Deep learning pipeline for glioma subtype, grade, and molecular prediction

Indian Pathology Dataset (IPD)

IHub-Data launched the Indian Pathology Dataset (IPD), a digital library aimed at improving pathological data collection. Traditional microscopy faces challenges such as observer variability and a lack of trained pathologists, which IPD addresses through advanced computational techniques like deep learning and image analysis.

The dataset, developed in collaboration with various hospitals, includes over 3,000 whole slide images (WSIs) across multiple cancers (lung, breast, brain, cervical, and oral) and Lupus Nephritis. This initiative not only enhances diagnostic accuracy but also aims to reduce costs and improve patient care.

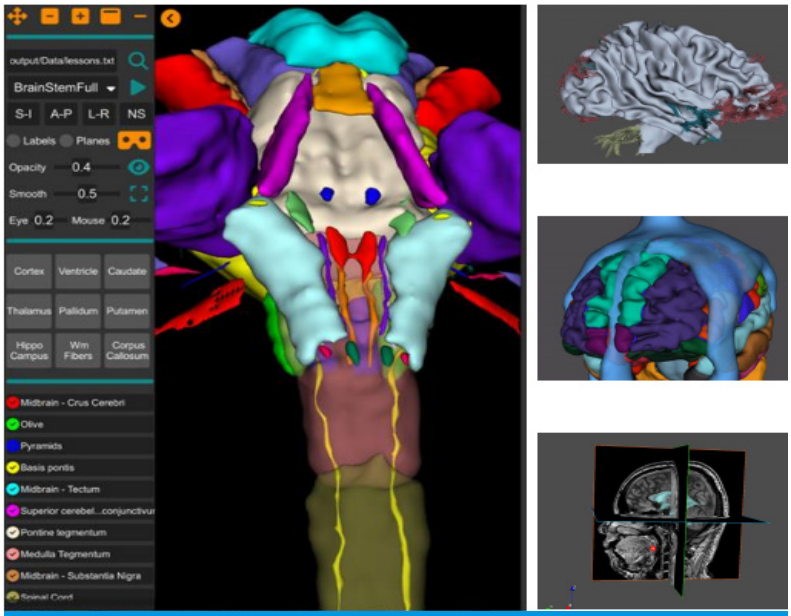

Image: AnaVu 3D visualization tool

Anatomy Viewer (AnaVu)

The TIH has designed AnaVu, a 3D visualization tool aimed at improving anatomy education by addressing challenges like limited cadaver access and the limitations of 2D images. Using real MRI and CT scans, it provides an immersive learning experience for students. Focus is being laid on building a community of content creators in the medical field. A content creation platform is also being developed to enable educators to publish anatomical materials, with the goal of offering comprehensive content to medical students via subscription. The long-term vision for AnaVu includes its use as a diagnostic tool for doctors, integrating the platform into clinical practice.

Pilot deployments of AnaVu is being done in Bhaskar Medical College and General Hospital, Osmania Medical College and Government Medical College, Thiruvananthapuram.

Collaborations

The TIH has signed a MoU with Wadhwani Foundation to jointly run a program to incubate early-stage startups in the domains of healthcare and mobility, powered by AI/ML and DeepTech.

IIT Bhilai Innovation And Technology Foundation

SCAN HERE

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

A platform For Cost-Efficient Public Health Service Delivery in Mizoram

The TIH has supported a start-up from Mizoram University which has developed a platform using AI/ML to connect patients with doctors, hospitals, and pharmacies, offering services like appointment booking, consultations, and e-payments. The app supports the Mizo language and will share health data with government agencies to enable informed policy making. The platform also envisages to implement a drone-based medicine delivery system to remote areas with challenging access.

The PoC application called DigiMedMiz, has been deployed in Mizoran and testing of AI/ML system for severity classification, test recommendations, and pharmacy order services are currently underway.

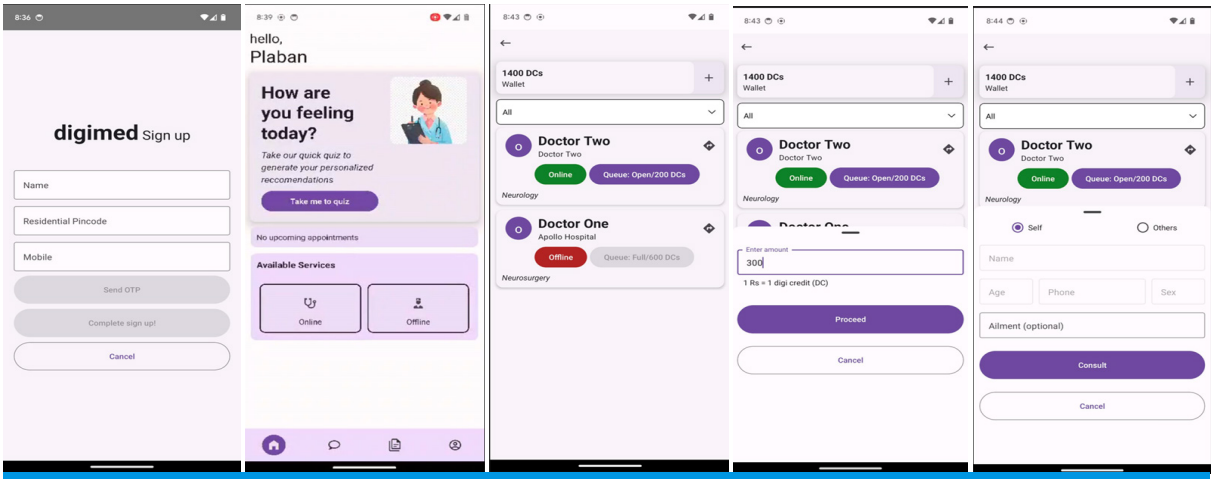

Image: Snapshots of the DigiMedMiz

Skill Development

Marketplace Literacy Workshop

The IBITF organized a two-day workshop titled “Marketplace Literacy” at IIT Bhilai. The workshop aimed to train women leaders from Self-Help Groups (SHGs) with marketable products and ideas. The workshop covered essential topics such as marketplace literacy, sustainability practices, and effective teaching methods.

Image: Marketplace Literacy Workshop

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IIT BHU

I-DAPT Hub Foundation

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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

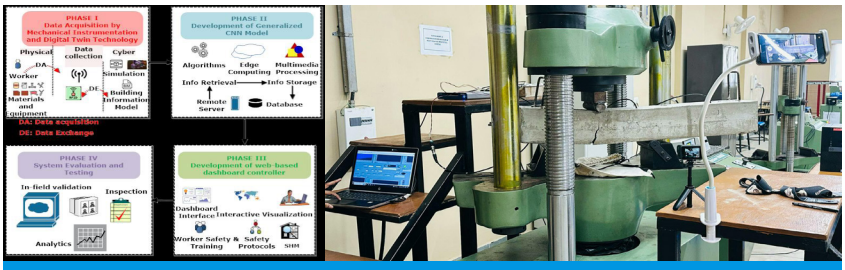


Image:: Casted Bending Test Setup with piezo transducer location, laptop and crack location

Low-Cost Federated Learning-Empowered Digital Twin Framework for Structural Health Monitoring (SHM) of Roads and Bridges

I-DAPT Hub Foundation has developed a Structural Health Monitoring (SHM) technology that predicts aging, detects damages, and prevents failures in civil structures.

The system uses wireless sensor networks, fog computing, and MEMS sensors for continuous, cable-free monitoring. It incorporates Digital Twin technology to upgrade monitoring from manual reviews to real-time, data-driven, and customized federated learning models, improving infrastructure under PMGS projects.

Image: Low resolution face data sets converted in high resolution by usine the Deep Learning techniques

Deep Learning based CCTV Footage Super-resolution for Human Subject Recognition for Defence Applications

I-DAPT Hub Foundation has developed a technology that uses the application of Deep Learning techniques to enhance low-resolution CCTV footage and improve human subject recognition for defence applications.

Startups

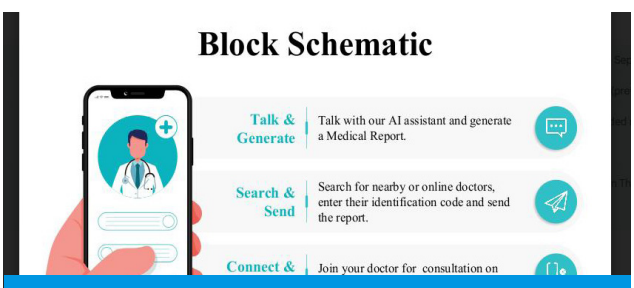


Image: GUI of Med AI Healthcare Platform

Med AI Pvt. Ltd.

The startup supported by the TIH is creating an AI assistant that acts as a junior doctor. Patients can interact with the assistant to provide detailed information about their symptoms, which is then converted into a medical report. The report includes AI-generated insights to assist doctors in diagnosing the patient.

IIT Bombay

TIH Foundation
for IoT & IoE

Technology Innovation Hub for IoT and IoE

SCAN HERE

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.

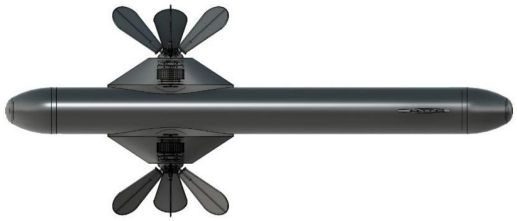
Project Updates

ASHA

ASHA (Anytime Smart Help Anywhere)

The TIH in collaboration with the Telecommunication Engineering Centre (TEC), Department of Telecommunication, GoI has developed ASHA (Anytime Smart Help Anywhere), a portable IoT device that uses LoRA, GSM, and Wi-Fi protocols to send distress signals, including time and location, to a centralized monitoring system. It captures distress through a switch press or coded voice message, ensuring quick and reliable communication during emergencies.

Aritra Propulsor



Aritra Propulsor based AUV

The TIH is supporting development of Aritra Propulsor, a unique cone-shaped propulsion-cum-steering solution for AUV´s with the world's first compact and scalable 360^0 directional "Radial Wheel" for Thrust Generation and Power Generation in water using water currents. An underwater vehicle is developed for testing 5DoF of the propulsion wherein the estimated drag by simulations and measurements perfectly matched during testing.

Image: AVS based Acoustics Collection System

Acoustic Vector Sensor (AVS) Based Acoustics Collection System

Acoustic Vector Sensor Technology is a new technology that integrates an Acoustic Vector Sensor (AVS) system for underwater platforms like ROVs and AUVs. The AVS measures sound particle velocity and scalar acoustic pressure, enhancing the detection capabilities of underwater acoustic sources. A prototype of the AVS has been developed, incorporating signal processing algorithms, with future steps including calibration, housing structure installation, and water tank performance testing.

IIT Delhi

IHFC

I-Hub Foundation for Cobotics

SCAN HERE

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.

Technology Transfer

Image: Technology Transfer to ALIMCO

Enrich Technology Transfer to Artificial Limbs Manufacturing Corporation of India (ALIMCO)

IHFC celebrated the successful handover of the EMG Controlled Prosthetic Hand (ENRICH), an Indian-made prototype to ALIMCO. This significant milestone marks the beginning of validation and commercialization for this groundbreaking, indigenous technology.

Startups

Xterra Robotics

The TIH is supporting Xterra Robotics, an Indian deep tech robotics start up in AI specializing in autonomous legged robots offering world class solution in locomotion problem by building advanced legged robots tailored for application in inspection, security surveillance and defense.

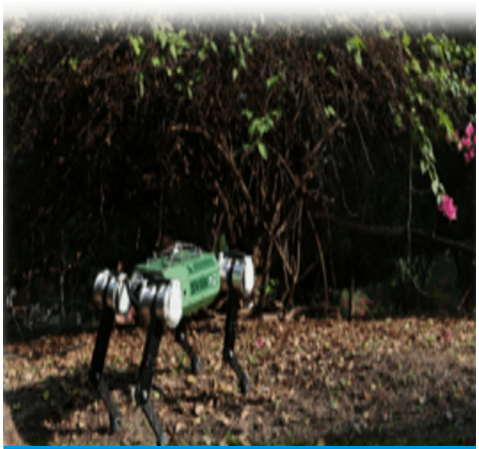


Image: Autonomous legged robot

Gravitas Automation

The startup supported by the TIH has developed 5 axis CNC machine with an X-Y-Z BC configuration with a customized spindle. The CNC-based control ensures a high degree of form accuracy, ability to polish complex geometries and a remarkable polishing efficiency. The PCP process is capable of polishing flat as well as freeform surfaces because the tool can adapt to the work surface. This aids automated industrial applications in warehousing and factory.

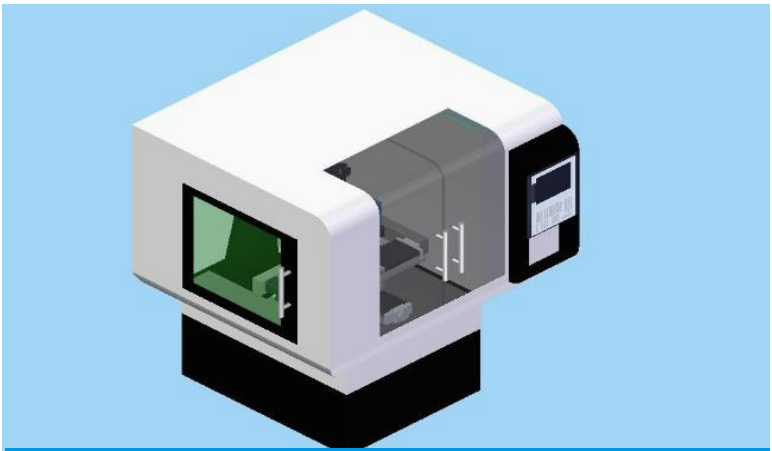


Image: 5 axis CNC machine

IIT Guwahati

Technology
Innovation Hub
IITG TIDF

Technology Innovation and Development Foundation

SCAN HERE

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.

Startups

Image: Autonomous Underwater Vehicle (AUV)

Maribus Solar

Maribus Solar, a startup under the TIH, has successfully dispatched its first order for an Autonomous Underwater Vehicle (AUV) hull made from carbon fiber. This lightweight yet strong material enhances durability and operational efficiency, marking a key achievement for the startup in the field of advanced underwater technology.

Honeyloop Technologies

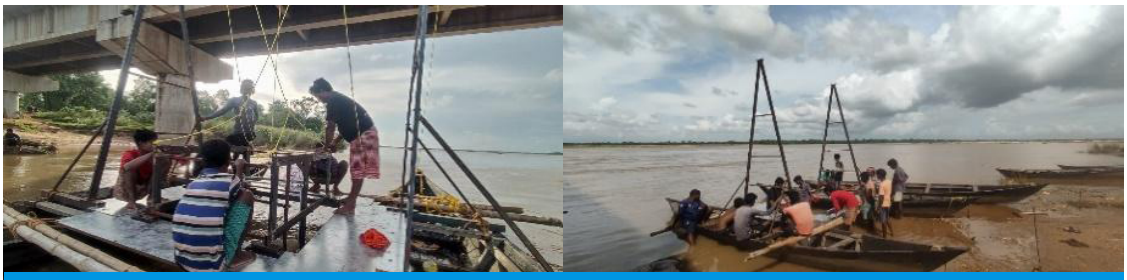


Image: Floating and portable power plant model

The TIH supported startup achieved a significant milestone by deploying their first floating and portable power plant model on the Subernarekha River at Bhasraghat, West Bengal. This innovative model is now operational and generating sustainable power. The startup is actively seeking collaborations to leverage the generated power for various applications, such as green propulsion systems or green hydrogen production, through advanced technological integration.

Image: Collaboration with PHN

Collaborations

TIH has partnered with PHN Technology Pvt. Ltd. to establish a Center of Excellence (CoE) focused on Robotics, AI, and ML. The CoE will foster innovation, develop advanced solutions, and train talent, supporting TIH's mission to advance technology and contribute to India's innovation ecosystem.

IIT Hyderabad

TiHAN
IIT HYDERABAD

NMICPS Technology Innovation Hub on Autonomous Navigation Foundation

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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

Image: FloodNet

FloodNet

An advanced model for water detection leveraging semantic segmentation has been developed by TiHAN. This innovative technology aims to significantly improve flood monitoring and response efforts, providing timely and accurate data to support disaster management.

Startups

Image: Deployment in Vijaywada

Qoptars Private Limited

The TIH supported startup has developed Qoptars, an innovative drone technology company focused on revolutionizing surveillance, inspection, and urban mobility through cutting-edge autonomous drone systems. With a complete ecosystem of autonomous drones, AI/ML-driven Video analytics platforms, and advanced fleet management systems, Qoptars delivers end-to-end solutions for diverse industries. Qoptars Pvt. Ltd. has deployed its innovative product in Vijayawada to aid rescue operations.

Collaborations

TiHAN has signed a MOU with the IRMA ISEED Foundation to host a Hackathon focused on driving innovation and creativity while tackling critical challenges in Autonomous Navigation. This initiative will not only onboard new startups but also offer funding for their technological ideas, creating a robust ecosystem that nurtures entrepreneurial growth and advancement.

IITI DRISHTI CPS Foundation

SCAN HERE

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.

Startups

Image: OASIS application integrated with drone

OASIS: Online aerial image-based surface information system (TRL-9)

A startup, Bhoodhristi Pvt. Ltd., has been established to commercialize **OASIS**: Online Aerial image-based Surface Information System" developed under the Hub.
It is a computer vision-based product to provide a brain to the drone controller through which it can assess the incoming images and provide some semantic detail in real-time and "on-the-go" without requiring any extra hardware like GPU or continuous internet connectivity. **OASIS** enhances commercial drone capabilities by providing automated semantic analysis of real-time images, eliminating the need for human operators to interpret data manually.

The team has partnered with Vizag Steel Plant and is in the final stages of securing a deal with Rashtriya Ispat Nigam Ltd. (RINL), Visakhapatnam, to provide drones customized for volumetric analysis of their stockpiles.

Image: TORUS

PlebC Innovations Private Limited

The startup supported under the TIH has developed Tele-operated Robotic Ultrasound System (TORUS) which enables remote ultrasound diagnostics, eliminating the need for a radiologist's physical presence. It consists of a doctor's station and a patient station with a robotic arm, connected via a secure network for efficient operation. TORUS addresses the challenge of limited ultrasound access in remote areas and the need for radiologists on-site, improving the availability and timeliness of essential diagnostics.

Image: Collaborations with AIIMS Bhopal

Collaborations

DRISHTI CPS has partnered with AIIMS Bhopal on over eight collaborative digital healthcare projects, combining IIT Indore's engineering innovation with AIIMS' medical expertise for research, validation, and commercialization.

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DEPARTMENT OF
SCIENCE & TECHNOLOGY

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

IISc Bengaluru

ARTPARK
AI & Robotics Technology Park, I-Hub @ IISc

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

SCAN HERE

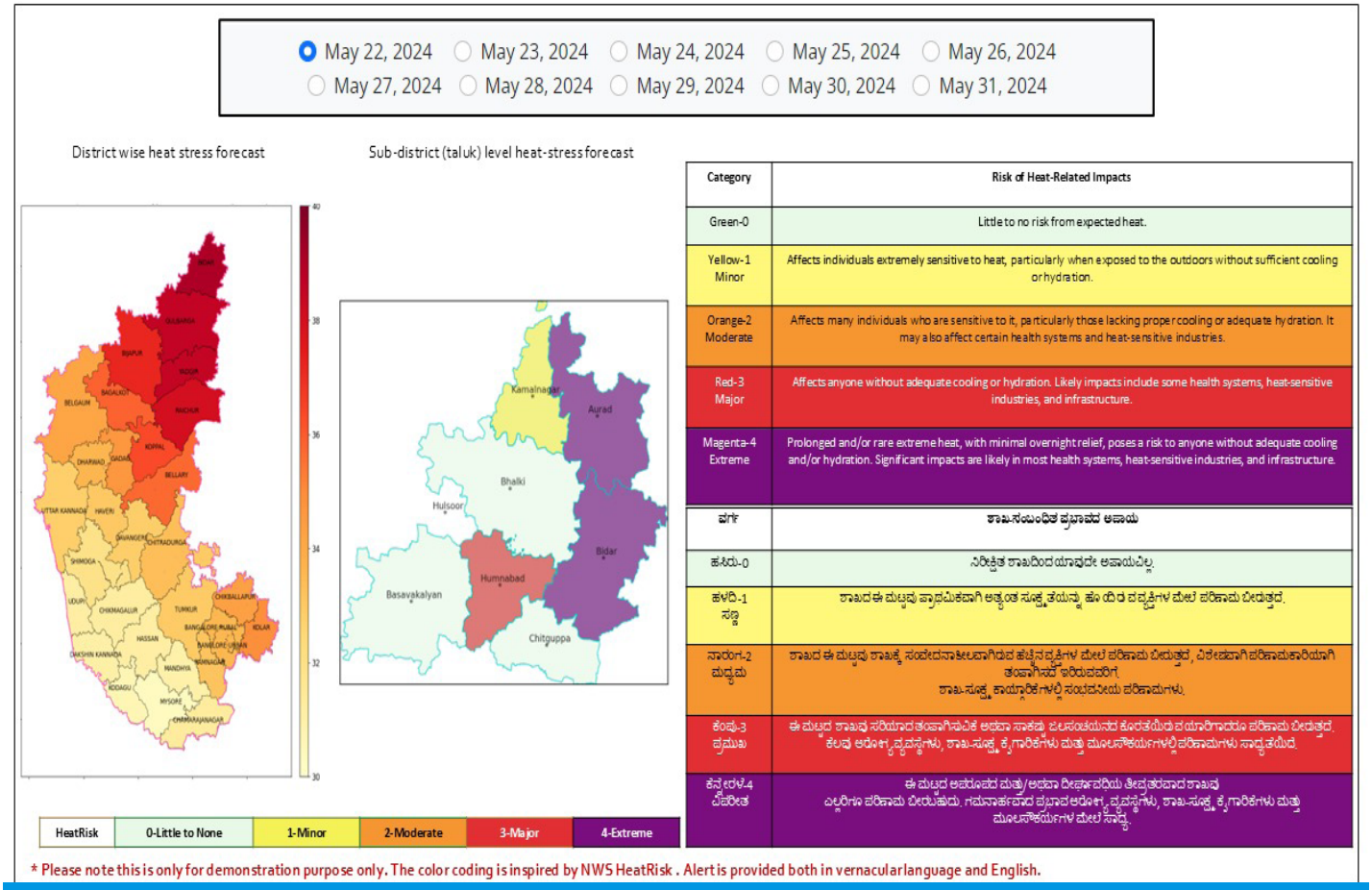
Hub Overview

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.

Project Updates

AI-Powered Localized Risk Forecasting System

AI-Powered Localized Risk Forecasting Systems for Climate Change and Human Health is being developed under the TIH. The project envisages forecasting extreme heat events in Karnataka. Currently, at a prototype stage, where data gathering is being conducted, and preliminary models are being developed, alongside conducting a meta-analysis to enhance understanding of existing research and forecasting approach. The aim is to provide actionable insights for decision-makers and communities, and embed into the existing systems.



Category	Risk of Heat-Related Impacts
Green-0	Little to no risk from expected heat.
Yellow-1 Minor	Affects individuals extremely sensitive to heat, particularly when exposed to the outdoors without sufficient cooling or hydration.
Orange-2 Moderate	Affects many individuals who are sensitive to it, particularly those lacking proper cooling or adequate hydration. It may also affect certain health systems and heat-sensitive industries.
Red-3 Major	Affects anyone without adequate cooling or hydration. Likely impacts include some health systems, heat-sensitive industries, and infrastructure.
Magenta-4 Extreme	Prolonged and/or rare extreme heat, with minimal overnight relief, poses a risk to anyone without adequate cooling and/or hydration. Significant impacts are likely in most health systems, heat-sensitive industries, and infrastructure.

ವರ್ಗ	ಶಾಖ-ಸಂಬಂಧಿತ ಪ್ರಭಾವದ ಅಪಾಯ
ಹಸಿರು-0	ನಿರೀಕ್ಷಿತ ಶಾಖದಿಂದಯಾವುದೇ ಅಪಾಯವಿಲ್ಲ.
ಹಳದಿ-1 ಸಣ್ಣ	ಶಾಖದ ಈ ಮಟ್ಟವು ಪ್ರಾಥಮಿಕವಾಗಿ ಅತ್ಯಂತ ಸೂಕ್ಷ್ಮತೆಯನ್ನು ಹೊಂದಿರುವ ವ್ಯಕ್ತಿಗಳ ಮೇಲೆ ಪರಿಣಾಮ ಬೀರುತ್ತದೆ.
ನಾರಂಗಿ-2 ಮಧ್ಯಮ	ಶಾಖದ ಈ ಮಟ್ಟವು ಶಾಖಕ್ಕೆ ಸಂವೇದನಾಶೀಲವಾಗಿರುವ ಹೆಚ್ಚಿನವ್ಯಕ್ತಿಗಳ ಮೇಲೆ ಪರಿಣಾಮ ಬೀರುತ್ತದೆ, ವಿಶೇಷವಾಗಿ ಪರಿಣಾಮಕಾರಿಯಾಗಿ ತಂಪಾಗಿಸದೆ ಇರುವವರಿಗೆ. ಶಾಖ-ಸೂಕ್ಷ್ಮ ಕೈಗಾರಿಕೆಗಳಲ್ಲಿ ಸಂಭವನೀಯ ಪರಿಣಾಮಗಳು.
ಕೆಂಪು-3 ಪ್ರಮುಖ	ಈ ಮಟ್ಟದ ಶಾಖವು ಸರಿಯಾದತಂಪಾಗಿಸುವಿಕೆ ಅಥವಾ ಸಾಕಷ್ಟು ಜಲಸಂಚಯನದ ಕೊರತೆಯಿರುವಯಾರಿಗಾದರೂ ಪರಿಣಾಮ ಬೀರುತ್ತದೆ. ಕೆಲವು ಆರೋಗ್ಯವ್ಯವಸ್ಥೆಗಳು, ಶಾಖ-ಸೂಕ್ಷ್ಮ ಕೈಗಾರಿಕೆಗಳು ಮತ್ತು ಮೂಲಸೌಕರ್ಯಗಳಲ್ಲಿಪರಿಣಾಮಗಳು ಸಾಧ್ಯತೆಯಿದೆ.
ಕೆನ್ನೇರಳೆ-4 ವಿಪರೀತ	ಈ ಮಟ್ಟದ ಅಪರೂಪದ ಮತ್ತು/ಅಥವಾ ದೀರ್ಘಾವಧಿಯ ತೀವ್ರತರವಾದ ಶಾಖವು ಎಲ್ಲರಿಗೂ ಪರಿಣಾಮ ಬೀರುಬಹುದು, ಗಮನಾರ್ಹವಾದ ಪ್ರಭಾವಆರೋಗ್ಯವ್ಯವಸ್ಥೆಗಳು, ಶಾಖ-ಸೂಕ್ಷ್ಮ ಕೈಗಾರಿಕೆಗಳು ಮತ್ತು ಮೂಲಸೌಕರ್ಯಗಳ ಮೇಲೆ ಸಾಧ್ಯ.

Image: AI-Powered Localized Risk Forecasting System

IISER Pune

I-HUB
QUANTUM
TECHNOLOGY
FOUNDATION

I-Hub Quantum Technology Foundation

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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.

Events

2nd Industry Meet with members of Defense Equipment Manufacturers' Association (DEMA)

The 2nd I-HUB QTF industry meet with Defence Equipment Manufacturers Association (DEMA), focused on Quantum Technology advancements. The event featured collaborative discussions, product demonstrations, and poster presentations, promoting greater collaboration between the Indian industry and the scientific community. The key highlights of this were: Collaborative Discussions, Product Demonstrations, Poster Presentations.

Image: Industry meet with Defence Equipment Manufacturers Association (DEMA)

Image: Conference on "Quantum Technologies Using Ultra-Cold Atoms

Conference on Quantum Technologies using Ultra-Cold Atoms

I-HUB QTF hosted a conference with the British Council on "Quantum Technologies Using Ultra-Cold Atoms". The event featured engaging talks and innovative poster presentations from Ph.D. students, postdoctoral researchers, and industry professionals, fostering a vibrant exchange of ideas and showcasing the latest advancements in the field.

IIT Jodhpur

TIH
iHub-Drishti

Technology Innovation Hub - iHub Drishti Foundation

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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

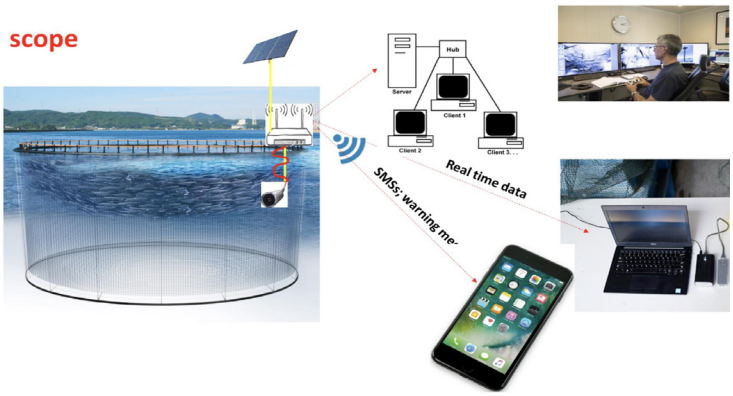

Image: Representation of process flow

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

The TIH is developing computer vision 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: Future of Immersive Food Experience

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

Key Features of the system include:

- 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 MR-ORS has broad applications in education, healthcare, entertainment, and cultural heritage.

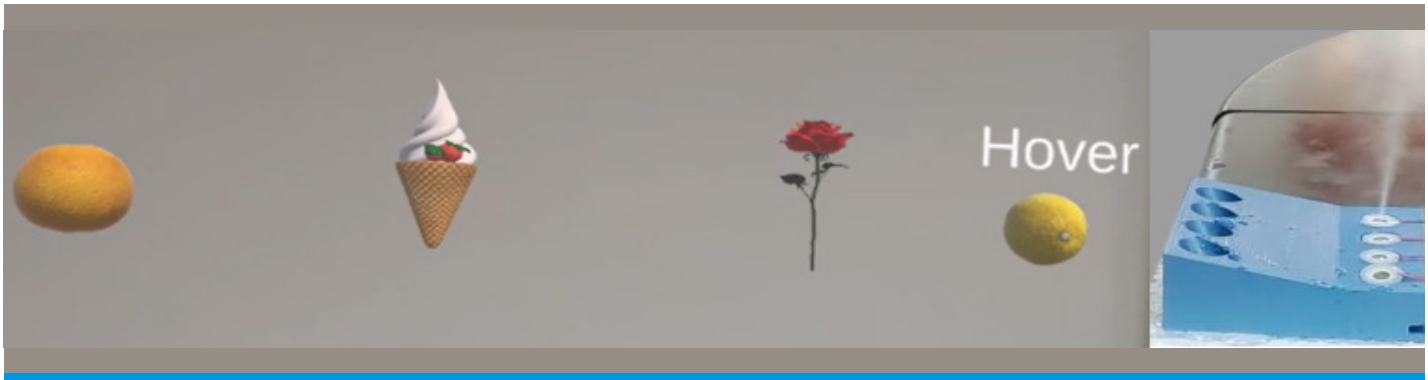

Image: Olfactory Enabled Media & Food Engineering system

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.

Project Updates

Image: MoU between iHub Anubhuti and IIIT Delhi

AI-Driven Solution for Road Safety

iHub Anubhuti, in partnership with IIIT Delhi, is enhancing road safety for NHAI through AI-driven solutions, focusing on road sign availability and condition. HanuAI, an iHub startup, is utilizing AI and GIS technologies to analyze road signage on 25,000 km of national highways. The collaboration is backed by an MoU between iHub Anubhuti and IIIT Delhi, aimed at leveraging AI for surveying and analyzing road signs.

A gap study has been conducted to identify discrepancies between current road signage and required safety standards for high-speed corridors.

Skill Development

Workshop on Monitoring Human Performance in Virtual Reality

iHub Anubhuti IIITD Foundation hosted a successful two-day hands-on workshop on “Monitoring Human Performance in Virtual Reality”. The workshop focused on integrating EMG and physiological sensors into VR applications. It also equipped participants with skills in VR development, sensor integration, and data analysis.

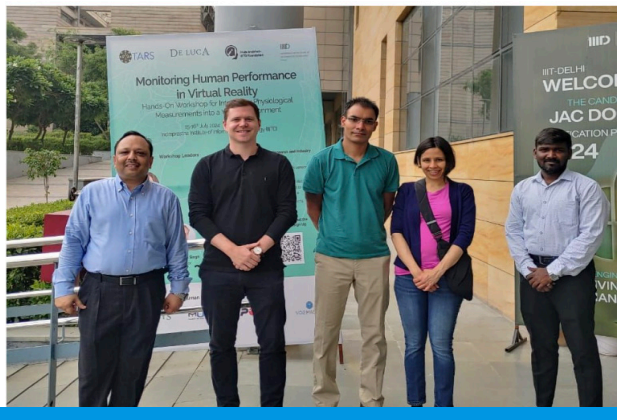

Image: Workshop

Image: A session in conference

Conference on AI-driven healthcare solutions

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

IIT Tirupati

IIT Tirupati
Navavishkār
I-Hub Foundation

Navavishkar I-Hub Foundation

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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

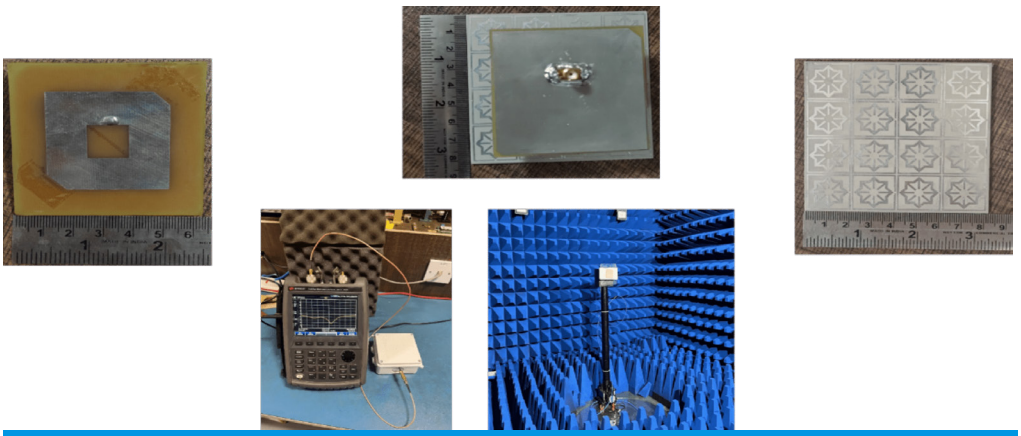

Image: Anti-Jamming & Anti-Spoofing Antenna System

The TIH is supporting design and development of Multi-Band Antenna System for GNSS. The antenna system is expected to cover L1, L5, and S bands, offering advanced anti-jamming and anti-spoofing capabilities for enhanced signal integrity and security.

Skill Development

One-Day National Workshop on 3D Modelling & Photogrammetry

IITTNiF organized a workshop on 3D modelling and photogrammetry. The workshop covered practical skills and modern data visualization techniques. Around 27 participants explored the concepts.

Image: Participants- 3D modeling and photogrammetry workshop participants

Collaborations

IITTNiF and ICFOSS signed an agreement to collaborate on technology and capacity-building programs in research, GIS, GNSS, Remote Sensing, and other non-invasive technologies. The aim is to promote entrepreneurship and innovation within the IITTNiF startup ecosystem.

Image: Agreement signing

IIT Patna

Vishlesan I-Hub Foundation

SCAN HERE

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.

Project Updates

Image: IoT-based chemical process monitoring system

IoT-based chemical process monitoring system

EmbedView Solutions, in collaboration with TIH IIT Patna, has developed an IoT-based chemical process monitoring system for the pharmaceutical industry. The system tracks key parameters such as temperature, pH, and pressure in real-time, ensuring seamless integration with existing processes. It also includes predictive maintenance to minimize downtime and improve reliability. Aligned with Pharma 4.0, the technology supports product quality and operational efficiency. EmbedView recently achieved TRL 7/8 with a successful demonstration, marking a key milestone in IoT adoption in pharmaceutical manufacturing.

Startups

EYECAN: Empowering Visually Impaired Through the Power of AI

EYECAN, incubated at TIH IIT Patna, is using innovative AI technology to empower visually impaired individuals. The Eyecan Pro app launched recently offers tools to improve mobility and employability for the differently abled. The platform also fosters a supportive community where users can connect, share experiences, and access assistance.

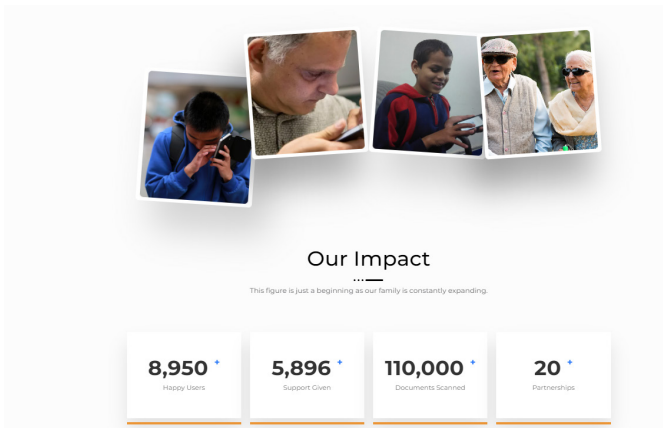

Image: Eyecan Pro

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DEPARTMENT OF
SCIENCE & TECHNOLOGY

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

IIT Mandi

IIT Mandi iHub & HCi Foundation
Technology in Harmony with Human Needs

iHub and HCi Foundation

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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 (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

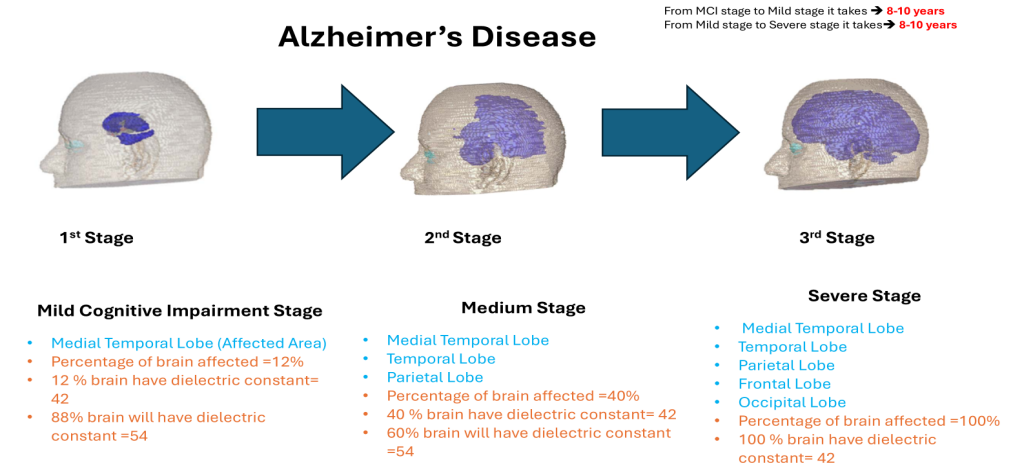

Image: Progression of Alzheimer's Disease

Non-invasive and portable system to detect Alzheimer's disease

The TIH is developing a non-invasive, portable system to diagnose early stage Alzheimer's. As Alzheimer's alters the relative permittivity of the healthy brain, therefore, as the dielectric constant of the brain changes, the resonant frequency of the RF sensor also shifts. Under this project Microwave Imaging of different stages of brain has been completed so far.

Startups

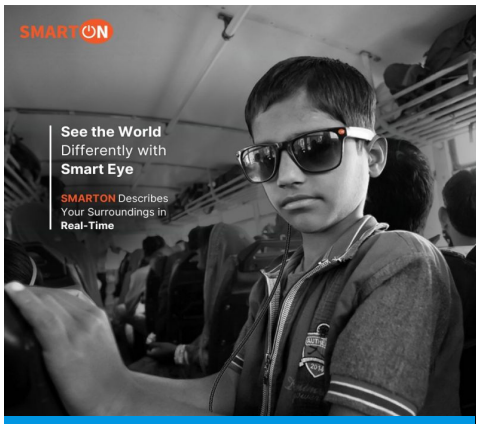

Image: Wearable device

Sunbots Innovations LLP

The TIH supported startup has developed camera based wearable device that translates visual world into audio form using camera vision to provide actionable intelligence for Blind and Visually impaired persons using ML.

The device is multifaceted and has features for Object Identification with Text, Read Text, Currency Identification, SMART EYE (Live Description, Color Identification, Access STEM Content), DOC AI (Summaries) digital PDF documents and search for specific information) and AI Tutor (Helping students prepare for exams by solving questions that they many have while studying). The product has attracted attention from many stakeholders.

Skill Development

Skill training with Himachal Pradesh Centre for Entrepreneurship Development (HPCED)

The TIH in collaboration with HPCED is training the potential entrepreneurs for setting up tiny, rural, small and medium scale enterprises and carrying out research studies, evaluations, assessments in the field of entrepreneurship and industrial development.

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

Special Support

IIT Mandi iHub & HCi Foundation, IIT Mandi

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National Mission On
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Systems (NM-ICPS)

23 Active Technology Innovation Hubs
Across the Country

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

Department of Science and Technology
Ministry of Science and Technology
Government of India
2024

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