

# C NVERGENCE

IIT MANDI IHUB & HCI FOUNDATION

JANUARY - APRIL 2023



विज्ञान एवं प्रौद्योगिकी विभाग  
DEPARTMENT OF  
SCIENCE & TECHNOLOGY

NEWSLETTER

#EXPERIENCE TECHNOLOGY

ASSISTIVE  
TECHNOLOGY

#RESEARCH AND TECHNOLOGY DEVELOPMENT

#HCI

#COLLABORATIONS

#TECHNOLOGY TRANSLATION

#INDUSTRY ADOPTION

#SKILL DEVELOPMENT

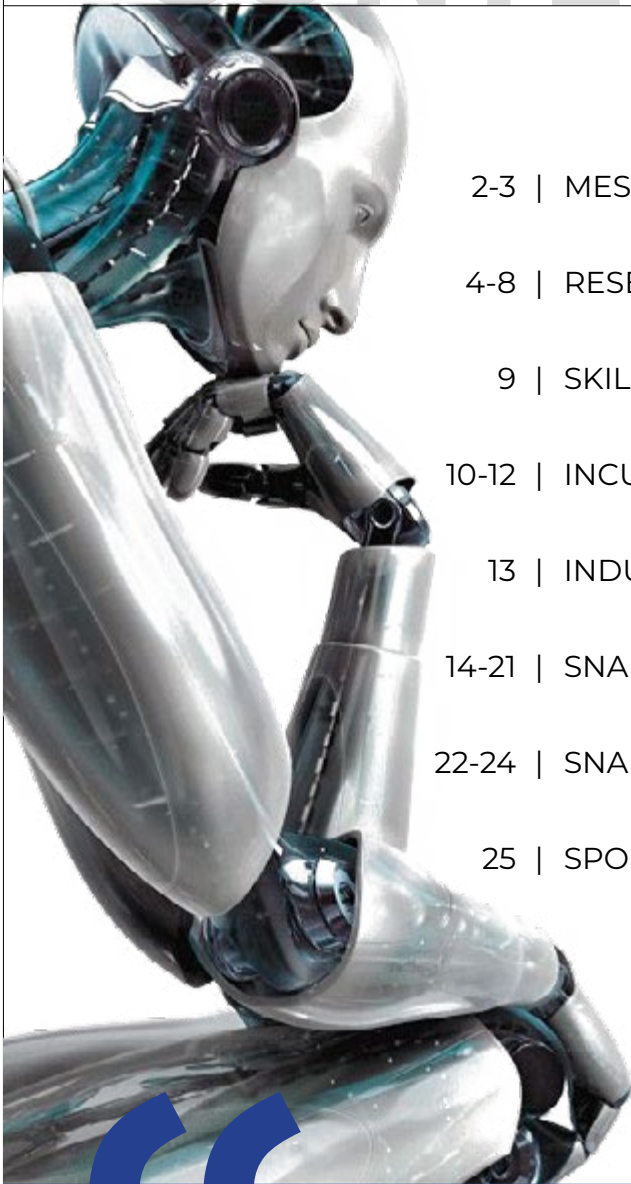
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# TECHNOLOGY IN HARMONY WITH HUMAN NEEDS

IIT MANDI IHUB & HCI FOUNDATION



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To be an internationally recognized hub that nurtures HCI research, enables technology translation for industry, and scales skill development.



# MESSAGE

**Dr. Syed Abbas**  
Dean (SRIC and IR)  
Indian Institute of  
Technology, Mandi



IIT Mandi iHub and HCI Foundation is striving to bring in the focus on Human-Computer Interaction (HCI) and is setting up the foundation for building the Centre of Excellence in this multidisciplinary field. This field comprises Computer Science, Cognitive Science, and Industrial Design which can be leveraged to the strong faculty, students, and startup community in IIT Mandi.

Through its various programs and initiatives, iHub has been able to foster a vibrant HCI Community, bringing together researchers and industry experts to collaborate, share knowledge and develop innovative solutions. This is through its active role in bringing in technology translation.

**Dr. Varun Dutt**

Project Director, IIT Mandi iHub and HCI Foundation



I am pleased to share with you the progress made by IIT Mandi iHub in various verticals to date. In Research and Technology

Development, we have supported multiple Human-Computer Interaction (HCI) based projects, including Assistive Technologies, Experience Technologies, and Device-Led Technologies. These projects aim to impact society positively and include applications for depression disorder counselling, interactive virtual surgery training, and detecting textual entities. We have also collaborated with leading technology companies in the industry,

including Neuphony and Naxon Labs, to promote Brain-Computer Interaction and Neurotechnology.

In Incubation and Acceleration, we have supported 42 startups in different CPS schemes. In Skill Development, we have been registered and approved by NSDC as a Training Partner for skill development activities in the domain of HCI under Pradhan Mantri Kaushal Vikas Yojana (PMKVY) 4.0. Our goal is to provide training to 1,550 Indian youth in one year in different technology areas like Kisan Drone Operator and Telecom Technician-IoT Devices/Systems, among others.

We are proud of the progress made by IIT Mandi iHub and look forward to continuing our efforts to promote technology and positively impact society.





## Mr. Somjit Amrit

CEO, IIT Mandi iHub and HCI Foundation

With the mandate to create the Centre of Excellence for Human-Computer Interaction (HCI), it starts with demystifying HCI. The study of creating computers and technologies to best serve its users is known as Human-Computer Interaction (HCI).

We at IIT Mandi iHub and HCI Foundation, consider HCI to be the confluence of three disciplines namely, Computer Science, Cognitive Science, and Industrial Design.

**Our focus has been to build solutions addressing three major sectors of HCI namely:**

### 1. Assistive Technologies (AT)

- Play an important role in ensuring that everyone can access and use technology, regardless of their abilities.

### 2. Experience Technologies (XT)

- By creating engaging and immersive experiences, XT can help to ensure that technology is not only functional but also enjoyable to use.

### 3. Device-Led Technologies (DT)

- Device-Led Technologies focus on using the features and capabilities of the devices, such as sensors, touchscreens, and cameras, with voice, touch, and gestures to enhance the user's intuitive interaction with technology.

The last quarter had been an eventful quarter. The first win is to build the experiential training module for the Pharmaceutical Industry. The 3-day workshop (TIPS 2.0) was held at IIT Delhi where 25 iHubs got the opportunity to

present the progress to a very exalted review committee comprising the leaders from the industry and the leading scientists from the Department of Science and Technology (DST), Government of India.

Our Social Robot, "Vedika" performed flawlessly to welcome and register the 200 delegates at the workshop, earning laurels for itself and the iHub.

IIT Mandi iHub reinforced its relentless focus on the need for Technology Translation. This was with the showcase of the relevance of the Technology Readiness Level (TRL) being addressed in tandem with the Business Readiness Level (BRL) through a case study.

Our research papers have been accepted at International conferences like Pervasive Technologies Related to Assistive Environments (PETRA) and American Psychological Association (APA) and we would look forward to strengthening our participation in the coming months. The initiative to set up the Brain Gym has commenced with the determination that it would be established by the year-end.

Last but not least the sterling leadership and the unwavering support provided by the Director of the Host Institute, Dr. Laxmidhar Behera, and the Board of Directors have helped create a strong foundation for the planned growth of iHub.

**Let us together build this Centre of Excellence for HCI and live up to the Mission statement "Technology in Harmony with the Human Needs".**

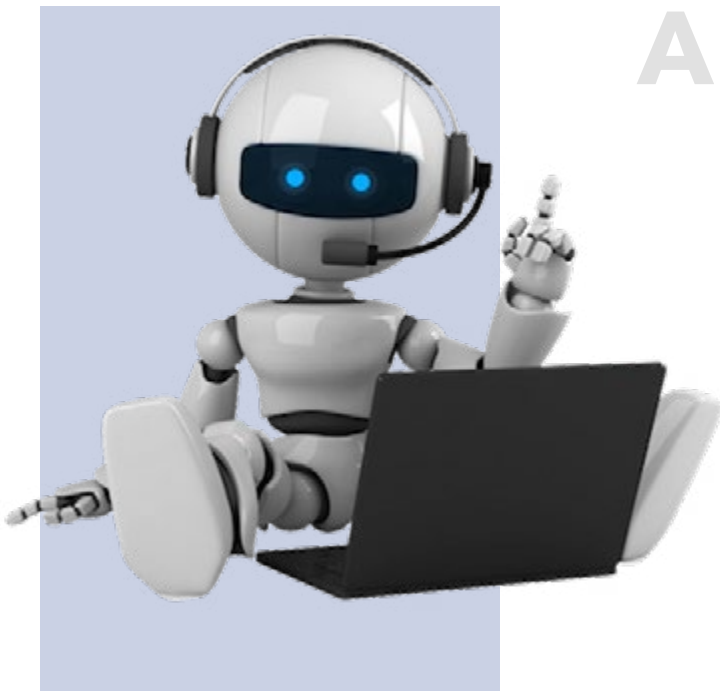
# RESEARCH

## RESEARCH & TECHNOLOGY DEVELOPMENT

RESEARCH & DEVELOPMENT LED HUMAN-COMPUTER INTERACTION (HCI) BASED PROJECTS THAT ARE BEING SUPPORTED BY IIT MANDI IHUB AND HCI FOUNDATION



### ASSISTIVE TECHNOLOGIES



# A

GENERATION OF HINDI-ENGLISH CODE-MIXED COMPUTATIONAL LEXICON AND CHATBOT COUNSELLING APPLICATION FOR DEPRESSION DISORDER

This research project will address the problem of early depression detection by developing an intent-based chatbot application software. The chatbot application would be able to conduct various psychometric tests to detect the level of depression in users. It will also provide a comfortable environment by incorporating queries and responses in Hindi-English codemixed language to its users.

**B**

## INTERACTIVE VIRTUAL SURGERY TRAINING AGENT

This research project will design and develop an Interactive Virtual Surgery Training Agent which can generate a behavioral and dynamic 3d model of the patient as per the disease requirement. It will use deep learning algorithms for handling interactive response generation and simulation of the behavioral model of the patient.

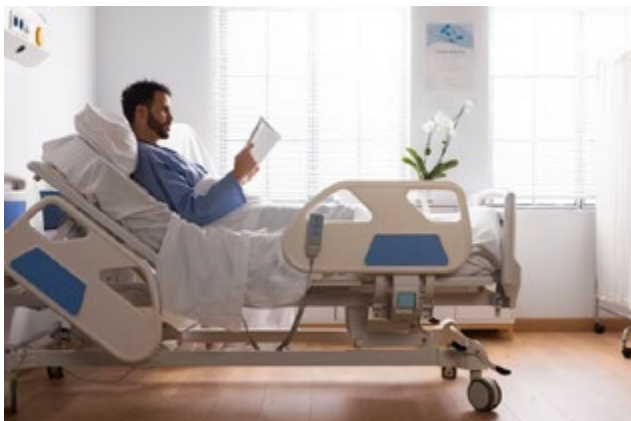
**C**

## DETECTING TEXTUAL ENTITIES WITH REPRESENTATIONAL MINING ON BIG TEMPORAL KNOWLEDGE GRAPHS OF ANCIENT LITERATURE AND SOCIAL MEDIA DATA

It is challenging to write and run efficient distributed graph analytics algorithms that facilitate the study and optimization of Big TKG mining. The aim of the project is to use advanced parallel-graph-computing-based algorithms to optimize the mining of Big Temporal Knowledge Graphs.

**D**

## EEG-BASED SMART BED SYSTEM FOR BEDRIDDEN PATIENTS



Development of an autonomous bed system for bedridden persons to make them self-dependent. The project is aimed to detect human signals in the form of brain signals, EMG, and gestures. Based on the signals, the control algorithm will identify and classify the signal and then this signal is sent to the controller for the actuating mechanism for the bed.



# 2

## EXPERIENCE TECHNOLOGIES

### A

EEG SOURCE LOCALIZATION ASSISTED AYURVEDIC INTERVENTION IN BRAIN DISORDER MANAGEMENT

This research project will address the issue of managing neurodegenerative diseases using Ayurveda. EEG-based Subcortical and Cortical Dipole Source Localization (S/C) DSL-based neuro tools will be utilized for studying the impact of medication on neurodegenerative diseases. These neuro tools will be additionally used for early diagnosis of neurodegenerative diseases.

### B

DEVELOPING AI-BASED COGNITIVE FUNCTION ENHANCEMENT APPLICATIONS BY APPLYING ARTIFICIAL INTELLIGENCE AND BIOMARKER PROFILING

Development of the mobile application with built-in elements like yoga protocol as well as the gamification aspect. The feedback on the performed yoga that will be provided to the end-user will have immense future potential to alleviate conditions of stress, anxiety, and depression among rural and poor populations, who cannot afford costly healthcare solutions.





# 3

## DEVICES-LED TECHNOLOGIES

A

DIGITAL NOSE FOR HEALTHCARE: DIAGNOSING DIABETES AND HEART DISEASES VIA A LOW-COST DIGITAL NOSE

Development of a multi-sensor low-cost digital nose that can be programmed to detect abnormally high Blood Glucose Levels (BGLs) for diabetes monitoring and the prevalence of heart diseases.

## B | INTEGRATION OF DIGITAL OLFACTION WITH A MOBILE PHONE AND TELEVISION

Television technology has by and large captured the senses of hearing and vision but has failed to capture the experiences of organs viz. smell, taste, and touch. Therefore, the objective of this project is to augment the virtual reality experience of audio and motion pictures on television with a sense of olfaction.



## C | DESIGNING ADVANCED, EFFICIENT, COMPACT, HIGHLY RELIABLE SENSORS AND BIOMARKERS-BASED SYSTEMS TO COMBAT ALZHEIMER'S DISEASE, HEART ATTACKS, AND EARLY-STAGE CANCERS



Developing on-body / off-body / invasive / non-invasive advanced, non-destructive, highly sensitive, and rapid-detecting biosensor systems. It will use technologies such as magnetic resonance imaging, electromagnetic reflection, neurological images, infra-retransmissions, etc. Such sensors will not only analyze the biomarkers but will also predict the cause of anomalies in the vital signatures.

## D | DEVELOPMENT OF AN FPGA-BASED MODEL PREDICTIVE CONTROLLER FOR TDCS USING PORTABLE NEUROIMAGING (FNIRS-EEG) DATA STREAMS

Development of a transcranial direct current stimulation (tDCS) based Non-Invasive Brain Stimulation (NIBS) system and Indian Classical ragas for the rehabilitation of elderly patients with mild to moderate mental depression.



# SKILL DEVELOPMENT

## SKILL DEVELOPMENT

### Pradhan Mantri Kaushal Vikas Yojana (PMKVY) 4.0

Pradhan Mantri Kaushal Vikas Yojana (PMKVY) is the flagship scheme of the Ministry of Skill Development & Entrepreneurship (MSDE), Government of India. It is implemented by the National Skill Development Corporation (NSDC).

IIT Mandi iHub and HCI Foundation has been selected as Skill Hub by National Skill Development Corporation (NSDC) for skill development activities in the domain of Human-Computer Interaction (HCI) under Pradhan Mantri Kaushal Vikas Yojana (PMKVY) 4.0.

Under this initiative, IIT Mandi iHub will provide training to 1,550 Indian youth in one year in emerging technology areas like Kisan Drone Operator, and Telecom Technician-IoT Device/System and Solar PV Installer (Suryamitra).



कौशल विकास और उद्यमशीलता मंत्रालय  
MINISTRY OF SKILL DEVELOPMENT AND ENTREPRENEURSHIP



#### ABOUT PMKVY

Pradhan Mantri Kaushal Vikas Yojana (PMKVY) is the flagship scheme of the Ministry of Entrepreneurship and Skill Development (MSDE). The objective of this scheme is to enable a large number of Indian youth to take up industry-relevant skill training, which will help them in securing a better livelihood.

#### TRAINING PARTNER



#### IIT Mandi iHub and HCI Foundation

#### ABOUT iHub

IIT Mandi iHub and HCI Foundation is a Technology Innovation Hub (TIH) working in the domain of Human-Computer Interaction (HCI). The major verticals are Research & Technology Development, Skill Development, Incubation & Acceleration and Industry Collaboration.



Skill India  
कौशल भारत - कुशल भारत



कौशल विकास और उद्यमशीलता मंत्रालय  
MINISTRY OF SKILL DEVELOPMENT AND ENTREPRENEURSHIP



#### COURSES OFFERED FOR

- ✓ Kisan Drone Operator
- ✓ Telecom Technician - IOT Device/System
- ✓ Solar PV Installer (Suryamitra)

**Eligibility Criteria:** 10th, ITI, Diploma, 12th, Engineering Graduate/Post-Graduate, Ph.D. Holder

**Duration:** 3-4 Months/Course



#### BENEFITS

- ✓ No cost short-term training program
- ✓ Certificate from NSDC and IIT Mandi iHub & HCI Foundation
- ✓ Job placement assistance
- ✓ Access to IIT Mandi advance labs and infrastructure
- ✓ Industrial-based skill training on live projects

#### OTHER ACTIVITIES

- ✓ Meditation, Yoga sessions, Gaming and Trekking



For More Details:

- ✉ [Khem@ihublitmandi.in](mailto:Khem@ihublitmandi.in)
- ✉ [Suneli@ihublitmandi.in](mailto:Suneli@ihublitmandi.in)
- 🌐 [www.ihublitmandi.in](http://www.ihublitmandi.in)
- ☎ 90154-58338

# INCUBATION & ACCELERATION

## INCUBATION AND ACCELERATION

1

START-UPS SUPPORTED  
UNDER CPS-PRAYAS

THE TOTAL NUMBER OF START-UPS  
ONBOARDED: 28

calibr

syncsense

iBloom.ai

Adventure  
MONK.com

Ksham  
Innovation



Engineers Connect

Fitlivi

βeFriends



NEUROSTELLAR



Newton's Apple  
Your chance to taste it...



GoPillz

Your Digital Care Assistant

MAZINDA

CARBINE  
SYSTEMS



AR VILLAGE

SiZIFI<sup>®</sup>  
SMART MEASURES

V A S A N A

VAIN



VOCBOT.AI



WIT TAND  
FITNESS  
LET'S CONQUER YOUR LIMIT



SUNBOTS



# INCUBATION & ACCELERATION

2

**START-UPS SUPPORTED UNDER CPS-SSS**

THE TOTAL NUMBER OF START-UPS ONBOARDED: 11



# INCUBATION & ACCELERATION

**3**

**START-UPS SUPPORTED UNDER CPS-ACCELERATOR**

THE TOTAL NUMBER OF START-UPS ONBOARDED: 4



**PARENTHESSES SYSTEMS**



**TASK TRACKER**

## COLLABORATIONS

# 1

### Memorandum of Understanding with **Neuphony**



- IIT Mandi iHub and HCI Foundation and Neuphony signed an MOU on 24th January 2023.

- Neuphony is a leading technology company working in Brain-Computer Interaction, based in Noida, India.

- IIT Mandi iHub and HCI Foundation in partnership with Neuphony will extend technical collaboration in Brain-Computer Interaction, a key research and development area in Human-Computer Interaction (HCI).

- Neuphony will support the iHub to establish the “Brain Gym” at the iHub office premises, which will provide mass exposure to Brain-Computer Interface and the benefits could be derived through the accessibility and usage of the “Brain Gym”.

# 2

### Memorandum of Understanding with **Naxon Labs**



- IIT Mandi iHub and HCI Foundation and Naxon Labs signed an MOU on 30th January 2023.

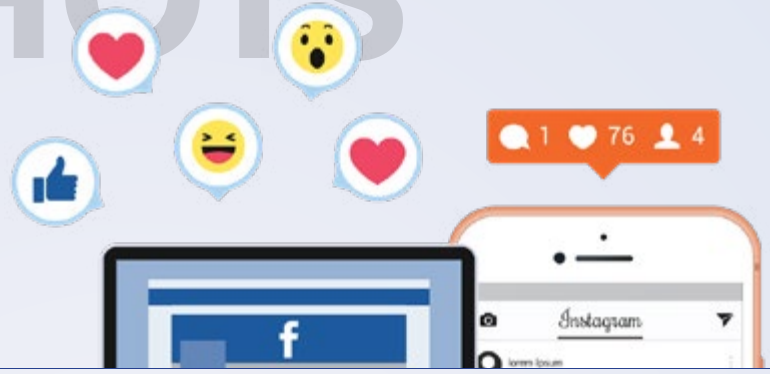
- Naxon Labs is a leading Neurotechnology company based in Montevideo, Uruguay.

- IIT Mandi iHub and HCI Foundation in partnership with Naxon Labs will collaborate in Artificial Intelligence (AI), Electroencephalography (EEG) technology, and Brain-Computer Interaction (BCI). These are the key skill development and research and development areas in Human-Computer Interaction (HCI).

- The collaboration will provide opportunities for students and researchers to work on cutting-edge technologies and contribute towards the development of practical tools and applications for industry adoption.

# SNAPSHOTS

## SNAPSHOTS OF VISITS TO IHUB OFFICE

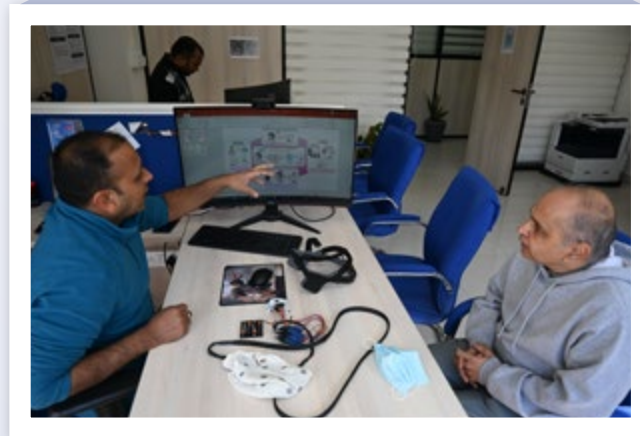


1

VISIT OF **MR. VINAY KUMAR**, FOUNDER, AND MANAGING DIRECTOR, DATAWISE, HYDERABAD, INDIA TO THE IHUB



**MR. VINAY KUMAR**, FOUNDER, AND MANAGING DIRECTOR, DATAWISE, VISITED THE IIT MANDI IHUB AND HCI FOUNDATION OFFICE ON 18TH JANUARY 2023.

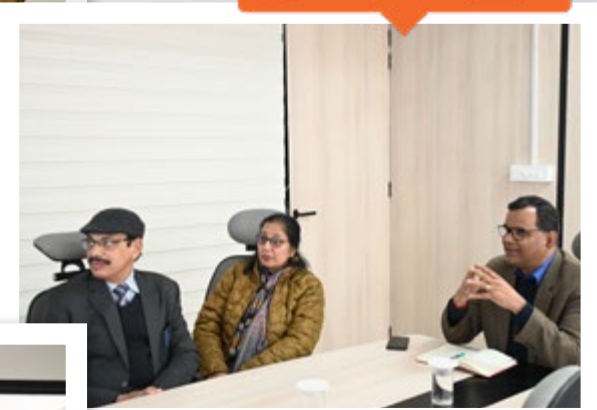
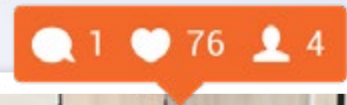




# SNAPSHOTS

2

VISIT OF **DR. RAJESH SANND**, ASSISTANT DIRECTOR, REGIONAL AYURVEDA RESEARCH INSTITUTE (RARI), MANDI TO IHUB



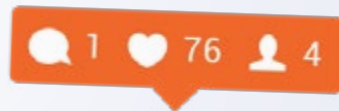
A TEAM FROM THE REGIONAL AYURVEDA RESEARCH INSTITUTE (RARI), MANDI, LED BY DR. RAJESH SANND, VISITED IIT MANDI IHUB AND HCI FOUNDATION OFFICE ON 18TH JANUARY 2023.



# SNAPSHOTS

3

VISIT OF PROFESSOR **ARVIND MAHAJAN**, SYSTEM REGENTS PROFESSOR, PRESIDENTIAL PROFESSOR FOR TEACHING EXCELLENCE, PIPER PROFESSOR FOR SCHOLARLY AND ACADEMIC ACHIEVEMENT, AND LAMAR SAVINGS PROFESSOR OF FINANCE, TEXAS A&M UNIVERSITY, TEXAS, UNITED STATES TO IHUB



**PROFESSOR ARVIND MAHAJAN FROM THE MAYS BUSINESS SCHOOL, TEXAS A&M UNIVERSITY, TEXAS, UNITED STATES VISITED IIT MANDI IHUB AND HCI FOUNDATION ON 7TH FEBRUARY 2023.**



# SNAPSHOTS

4

VISIT OF **PROF. ANJAN KUMAR SWAIN**, PROFESSOR, INDIAN INSTITUTE OF MANAGEMENT, KOZHIKODE, KERALA, INDIA TO IHUB



PROF. ANJAN KUMAR SWAIN, PROFESSOR, INFORMATION SYSTEMS, INDIAN INSTITUTE OF MANAGEMENT, KOZHIKODE, VISITED IIT MANDI IHUB AND HCI FOUNDATION ON 10TH FEBRUARY 2023.





# SNAPSHOTS

5

VISIT OF **MR. ARUN MALHOTRA**,  
EX- MANAGING DIRECTOR, NISSAN  
MOTORS, INDIA TO IHUB



**MR. ARUN MALHOTRA**, EX-MANAGING DIRECTOR,  
NISSAN MOTORS INDIA, AND AUTOMOBILE IN-  
DUSTRY EXPERT VISITED IIT MANDI IHUB AND HCI  
FOUNDATION ON 15TH FEBRUARY 2023.



# SNAPSHOTS

6

VISIT OF **MR. VENKATADRI RANGANATHAN**, CHIEF COMMERCIAL OFFICER, TATA CHEMICALS LIMITED, MUMBAI, INDIA TO IHUB



**MR. VENKATADRI RANGANATHAN**,  
CHIEF COMMERCIAL OFFICER, TATA  
CHEMICALS LTD. VISITED IIT MANDI  
IHUB AND HCI FOUNDATION ON  
28TH FEBRUARY 2023

# SNAPSHOTS

7

VISIT OF STUDENTS FROM **ATAL BIHARI VAJPAYEE GOVERNMENT INSTITUTE OF ENGINEERING AND TECHNOLOGY (ABVGIT), SHIMLA, INDIA** TO IHub



STUDENTS FROM ATAL BIHARI VAJPAYEE GOVERNMENT INSTITUTE OF ENGINEERING AND TECHNOLOGY (ABVGIT), SHIMLA VISITED IIT MANDI IHub AND HCI FOUNDATION ON 12TH APRIL 2023.





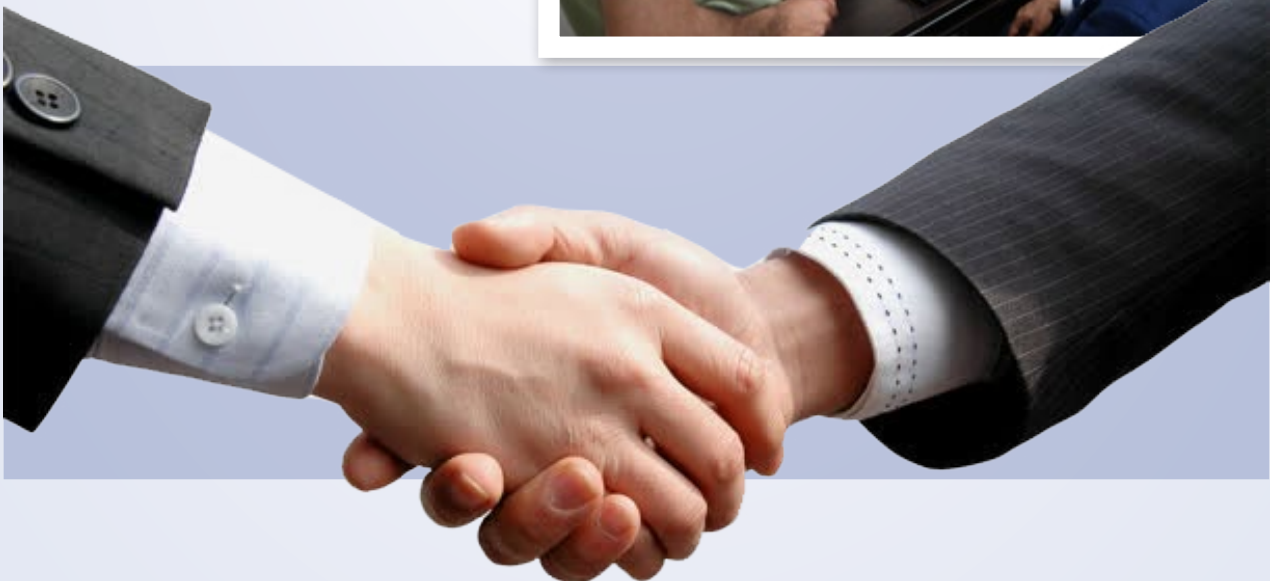
# SNAPSHOTS

8

VISIT OF **MR. RAVI KANJOLIA** AND **MR. ABHISHEK AGRAWAL**, MERCK, USA TO IHUB



**MR. RAVI KANJOLIA**, TECHNOLOGY FELLOW, EMD ELECTRONICS, MERCK USA, AND **MR. ABHISHEK AGRAWAL**, DIRECTOR, STRATEGY DEPARTMENT, EMD ELECTRONICS, MERCK USA VISITED IIT MANDI IHUB AND HCI FOUNDATION ON 17TH APRIL 2023.



# SNAPSHOTS

## SNAPSHOTS OF VISITS BY IHUB OFFICE



1

VISIT TO KHALSA COLLEGE, AMRITSAR FOR **G20 MEETING ON EDUCATION**



IIT MANDI IHUB AND HCI FOUNDATION PARTICIPATED IN THE G20 MEETING ON EDUCATION, AT THE KHALSA COLLEGE, AMRITSAR, PUNJAB FROM 15TH - 17TH MARCH 2023.



IIT MANDI IHUB SUPPORTED STARTUP, TRISH I R&D PRIVATE LIMITED DISPLAYED ITS PRODUCTS BASED ON HEALTHCARE TECHNOLOGY.





# SNAPSHOTS

2

VISIT TO PRAGATI MAIDAN, NEW DELHI FOR THE 30TH CONVERGENCE INDIA AND **8TH SMART CITIES 2023 EXPO**



IIT MANDI IHUB AND HCI FOUNDATION PARTICIPATED IN THE 30TH CONVERGENCE INDIA AND 8TH SMART CITIES 2023 EXPO UNDER THE DEPARTMENT OF SCIENCE AND TECHNOLOGY (DST) PAVILION, AT PRAGATI MAIDAN, NEW DELHI FROM 27TH - 29TH MARCH 2023.



IHUB-SUPPORTED STARTUP, UPSIDE DOWN LABS DEMONSTRATED THEIR DIY NEUROSCIENCE KITS. SMART CITIES EXPO IS INDIA'S LARGEST TECHNOLOGY AND INFRASTRUCTURE EXPO JOINTLY ORGANIZED BY THE SMART CITIES MISSION, MINISTRY OF HOUSING & URBAN AFFAIRS (MOHUA), INDIA TRADE PROMOTION ORGANISATION (ITPO), AND EXHIBITIONS INDIA GROUP (EIG).

# SNAPSHOTS

3

## VISIT TO INDIAN INSTITUTE OF TECHNOLOGY, DELHI FOR THE 2ND NATIONAL WORKSHOP ON TECHNOLOGY INNOVATION IN CYBER-PHYSICAL SYSTEMS (TIPS)



IIT MANDI IHUB AND HCI FOUNDATION PARTICIPATED IN THE 2ND NATIONAL WORKSHOP ON TECHNOLOGY INNOVATION IN CYBER-PHYSICAL SYSTEMS (TIPS) UNDER THE NATIONAL MISSION ON INTERDISCIPLINARY CYBER-PHYSICAL SYSTEMS (NM-ICPS), ORGANIZED BY THE DEPARTMENT OF SCIENCE AND TECHNOLOGY, GOVERNMENT OF INDIA FROM 6TH - 8TH APRIL 2023.

IHUB-SUPPORTED STARTUPS NAMELY WELLNESYS TECHNOLOGIES PRIVATE LIMITED (YOGIFI), NUVERSE HEALTH SOLUTIONS PRIVATE LIMITED, SQUARE COMP SOLUTIONS PRIVATE LIMITED, CLICKZY CREATIVE TECHNOLOGIES PRIVATE LIMITED, AND GOPILLZ AI SOLUTIONS PRIVATE LIMITED PRESENTED THEIR TECHNOLOGIES TO EMINENT GUESTS INCLUDING DR. TARUN KAPOOR, ADVISOR TO PMO, DR. AKHILESH GUPTA, SECRETARY SERB AND SR. ADVISOR, DST, AND DR. EKTA KAPOOR, MISSION DIRECTOR, NM-ICPS, DST, GOVERNMENT OF INDIA.





# SPONSORS XPECTO'23

## IIT MANDI IHUB AND HCI FOUNDATION SPONSORS XPECTO'23



IIT Mandi iHub and HCI Foundation was the Title Sponsor for XPECTO'23. It was an Inter-College Technical Fest organized by the Science and Technical Council (SNTC), Indian Institute of Technology, Mandi. It was a 3-day event from 3rd – 5th March 2023, wherein iHub presented different fellowship programs and technological developments to the participants in the domain of Human-Computer Interaction (HCI).







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