

IIT Mandi iHub and HCI Foundation

C **NVERGENCE**

**THEME: LARGE LANGUAGE MODEL & HUMAN-COMPUTER INTERFACE
AND IT'S IMPACT ON HCI**



IIT Mandi iHub and HCI Foundation

Newsletter

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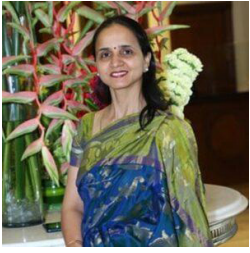
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Do you know what is Fitts' law?

Answer in the page 14





Dr. Ekta Kapoor

Mission Director, NMICPS, DST

In this edition of "Convergence", it is my distinct pleasure to draw attention to the remarkable journey undertaken by IIT Mandi iHUB and HCI Foundation that has significantly shaped the realms of Technology Development, Human Resource Development, Entrepreneurship, and Translational Research.

Nurturing a vibrant ecosystem, by establishing a network between Academia, Government and Industries that aligns with NM-ICPS objectives, IIT Mandi iHUB and HCI Foundation has shown a dedicated commitment to advancement. Their contributions in the field of Human-Computer Interaction, coupled with broader pursuits, have etched a notable mark on the technology innovation landscape, and I look forward to witnessing the continued success of the iHUB.

As we delve into the contents of this newsletter, I invite you to join me in extending sincere congratulations and best wishes to the iHUB team for all their future endeavours.



Prof. Laxmidhar Behera

Director IIT Mandi iHub and HCI Foundation

The IIT Mandi iHUB and HCI Foundation is assertively progressing on the defined path of building the Centre of Excellence in the field of Human-Computer Interaction (HCI) at IIT Mandi.

In the field of translational research, the Call for Proposals has been very successful with more than a dozen projects underway. The notable ones are in the areas of Digital Touch, Digital Smell, and Digital Taste where significant bets have been placed in the areas of senses. They need to digitally evolve and mature to address industry needs.

The iHUB has successfully implemented the Skill Development programs in HCI and is currently engaged in providing training to nearly 2000 students from underprivileged and underserved communities. The area of training is on employable skills in Internet of Things, Drone Technology, and Solar technologies.

Incubation of Startups in the focus areas of Assistive Technologies, Experience Technologies, and Device-Led technologies has yielded results with product-market fit.

International Collaborations are getting established and a few projects with International partners are in the anvil in new-age areas like Large Language Modelling and Social Robotics.

To top it all, the approval of the Board of Governors of IIT Mandi to set up the Center for HCI Research will help build curriculum and sustain translational research in the field of HCI in the coming months.

Our best wishes to the iHUB to grow in stature and size with the goal to usher in social and economic benefits across the country and the world.



Mr. Somjit Amrit

CEO, IIT Mandi iHub and HCI Foundation

The backdrop :

The Department of Science and Technology (DST) under the National Mission for Interdisciplinary Cyber-Physical Systems (NMICPS) has very thoughtfully designed the establishment of Technology Innovation Hubs (TIH) under the auspices of host institutes, which are academic institutions of repute. The sole goal of the TIHs is to translate research into technology adoption by the industry.

This column was originally published in the Times of India (January 28, 2023). It was inspired to tell the world the need to move from research prototype to shrink-wrapped product as per industry needs.

While this progression may not be the focus of the academic goals of the institute, it should be the goal of the TIHs to accomplish this.

The extract is below:

WHEN OUTCOME AND IMPACT ARE NOT SYNONYMS!

Drowsy driving is that scary feeling of conflict between the fear of losing control of the vehicle and the involuntary urge to catch a wink while driving. The India wicketkeeper, Rishabh Pant recently had a miraculous escape, and so had I while driving drowsy, 20 years ago. ...And now, a week ago we received an enquiry to devise a solution to reduce fatigue-induced accidents by forklift drivers.

Do Outcome and Impact mean the same?

This genuine problem has existed for as long as humans have been driving.

When there is a problem there is always the strive for a solution.

Some time ago, a research institute’s (R&D) team engaged in crafting a solution with a slew of features designed for drivers driving on treacherous hilly terrain. The team’s prototype was tested and the testing culminated with the publication of an award-winning paper as the “outcome”. As the boxes got checked off against the immediate objectives, the momentum for the ultimate pursuit to make the prototype into a commercial success got neglected.

What were the reasons for failing to persevere towards the ultimate pursuit? Maybe the team ran out of grants, or with the publication of the award-winning paper, the limited and acceptable objectives were met, or an industry mentor to help in the product-market fit was not explored. Thus, a potentially life-saving device that could have created an “impact” could not venture out of the laboratory.

Was “Impact” sacrificed at the altar of “Outcome”? Did the ephemeral din of celebration douse the need to go beyond?

Principled opposition or mismatch of objectives? While reports abound about the need to spur collaboration between industry and academia (or research institutes) the issue disturbingly continues to rankle us.

The Technology Innovation Hubs (TIHs) have been sponsored by the Government of India and embedded within the host institutes of respectable standing. The TIHs have the stated responsibility to actively facilitate the translation and transition of research from the laboratories for adoption by the mainstream industry.

Being fortunate to work for one of these hubs, I have a ringside view of this collaboration in its making.

Three anecdotal observations:

a. A generic drug manufacturing company is willing to engage with academia to standardize the quality control process for its manufacturing bays. The frequent turnover of the contract workers and the constant rotation in the shifts, affect the product quality as the steps to drug manufacturing are precise and many. The technology-savvy senior leadership wanted to try out technology intervention (in this case Human-Computer Interaction (HCI)) to reduce the reliance on the undocumented “tribal knowledge” among its workers.

After the company reached out for guidance, two options were considered. One was to work with a start-up funded and mentored by the TIH, which had a tried and tested system working on a similar application but in a different industry. The other was to work on the specific technology as a research project with a group of research associates...

Read More.

<https://timesofindia.indiatimes.com/blogs/worldly-wise/when-outcome-and-impact-are-not-synonyms/?val=3728&source=app&frmapp=yes>

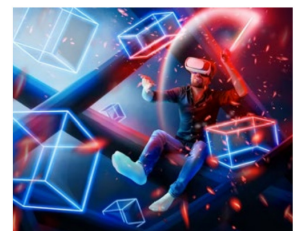


Research and Technology Development

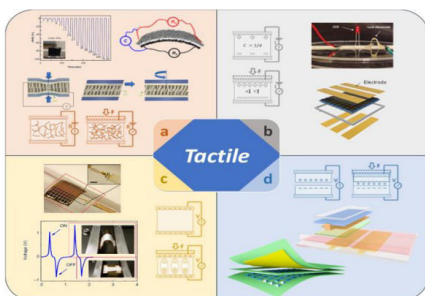
IIT Mandi iHub and the HCI Foundation is dedicated to pioneering research in the area of Human-Computer Interaction (HCI). With a focus on multisensory applications, iHub has embarked on three keen projects that hold the potential to define our digital experiences. Integrating digital smell into mobile devices and television, crafting artificial skin with versatile sensors for enhanced tactile experiences, and venturing into the gustatory frontier with edible nano-composite-based 3D printing. Together, these ventures exemplify a cutting-edge pursuit at the convergence of technology and human perception, defining our interaction with the digital landscape.

DIGITAL SMELL: Integration of digital olfaction with a mobile phone and television

Mimicry of real-life experience in the virtual world has been the driving force behind the Virtual Reality technology development. 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 overarching idea of the current times is to augment the virtual reality experience of audio and motion pictures on television with a sense of olfaction.



DIGITAL TOUCH: Development of artificial skin integrated with multipurpose sensors and creation of perceptual explanations through artificial skin

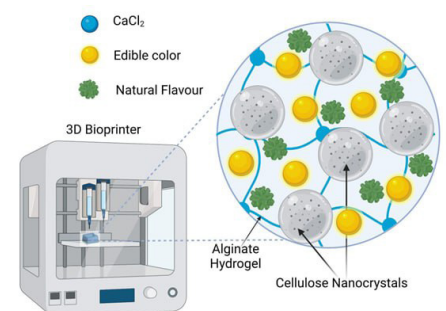


Human skin is one of the complex sensory receptors which provide and reacts to various perception stimuli. Consider the skin tissue of the human hand: it easily deforms when it comes in contact with an object but returns to its original shape in seconds. It is hard and tough against external elements, but soft enough to provide a comforting touch to someone; it even changes its temperature based on the mood. Different emotions can be communicated through touch. Given such complex functions, it's always a challenging task to correlate the knowledge base of skin to that of the neural function of the human brain.

The biggest application of such correlation is for those who for some reason have lost their sense of touch. Under the framework of the proposed project, an artificial skin also termed E-skin will be designed. The proposed E-skin can mimic the properties and sensory perception of real skin with the aid of integrated multipurpose sensors. Further to present the sensory perception of E-Skin an artificial neural network will be integrated which can aid in presenting non-explanatory decisions such as the softness of a flower, or the hardness of a rock. The proposed work will have tremendous applications in areas of health care, robotics, etc.

DIGITAL TASTE: Edible nano-composite-based 3D printing for the gustatory interface

One of the long-standing issues with developing taste-based human-computer interactions has been that they are chemical in nature, requiring an output device capable of producing a range of physical materials. 3D food printing is one possible solution, as it is capable of producing specific flavors on demand. It offers the ability to design physical flavor stimulus into an interface design that connects digital content with a taste experience. The existing and under-development stage digital taste sensors largely focus on devices that simulate the taste in the form of ions or heat sensation without any texture. The present proposal pertains to the development of an edible ink incorporating nanoparticles that impart varying taste, color, and texture and their combinations, that can be 3D printed to reproduce a sample of the food item on screen using an in-house developed low-cost 3D food printer.



Skill Development

PMKVY at IIT Mandi iHub and HCI Foundation

IIT Mandi iHub and HCI Foundation, a Technology Innovation Hub (TIH) located in Mandi, Himachal Pradesh, is actively involved in the implementation of the Pradhan Mantri Kaushal Vikas Yojana 4.0 (PMKVY 4.0), the flagship skill development scheme of the Government of India. The Ministry of Skill Development & Entrepreneurship (MSDE) is spearheading this initiative, which aims to create a candidate-centric ecosystem to meet the evolving demands of various sectors.

Objectives of PMKVY 4.0 Scheme:

- a) Promote an enabling ecosystem for the youth to get skilled and choose a career path aligned with their abilities and aspirations.
- b) Enable the delivery of skill training in a market-oriented and demand-driven manner by making the existing skilling ecosystem more flexible, swift, and geared to meet the emerging demand.
- c) Process overhauling of the skill ecosystem by leveraging technology, innovative financing, and digitalisation.

Implementation through Skill Hubs:

Skill Hubs can be set up in State and Central Government Schools, Higher Educations Institutes (HEIs), Colleges, and Universities (including Skill Universities) with requisite infrastructure for providing Short Term Training under PMKVY 4.0. IIT Mandi iHub is undertaking this initiative as a designated skill hub under its "Skill Development" activity per the mandate of the DST to all iHubs to create an employability stream across technologies.

The PMKVY 4.0 initiative at IIT Mandi iHub and HCI Foundation:

In line with these objectives, IIT Mandi iHub applied for PMKVY 4.0 on February 22, 2023, through an online application process. The application was successful, and the hub was awarded PMKVY 4.0 by the National Skill Development Corporation (NSDC) on March 14, 2023. Under this scheme, IIT Mandi iHub has been allocated a target of 1550 for implementing training programs.

To kickstart the program, IIT Mandi iHub has selected three Human-Computer Interaction (HCI)-centric job roles. These include:

IoT Telecom Technician



Solar PV Installer



Kisan Drone Operator



The aim is to equip students with the necessary skills and knowledge in these areas, which are in high demand in today's market.

The first batch:

The first batch of the IoT Telecom Technician course, consisting of 20 students, commenced on May 15, 2023. Parallely, the second batch of this course, comprising 21 students, began on June 3, 2023. Both batches are day scholar programs and are conducted at the iHub office premises. Most of the students enrolled in these batches are 12th-pass individuals from neighbouring villages, bringing diverse backgrounds and perspectives to the training sessions.



Outreach and Mobilisation:



IIT Mandi iHub is actively engaged in outreach activities to promote the other two courses and attract inquiries for upcoming residential batches. In an effort to raise awareness about PMKVY 4.0 and encourage student participation, IIT Mandi iHub is organising mobilisation events in nearby villages. These events serve as platforms to educate individuals about the benefits of the scheme and motivate them to take advantage of the skill training opportunities provided. The first mobilisation drive was successfully conducted in Kataula Village, located in the Mandi district of H.P.

Holistic development of students to enhance their employability:

One of the key aspects of the Pradhan Mantri Kaushal Vikas Yojana 4.0 (PMKVY 4.0) implemented by IIT Mandi iHub is the holistic development of students. In addition to imparting technical skills and knowledge related to job roles, the program also focuses on enhancing the participants' communication skills and personality development. Furthermore, IIT Mandi iHub provides mentoring and counselling support to the PMKVY 4.0 participants. Experienced professionals and experts in the field guide the students, offering insights and advice to help them navigate their personal and professional growth.

SKILL COUNCIL FOR GREEN JOBS



IIT Mandi iHub and HCI Foundation signed an MoU with Green Job SSC for Skill and entrepreneurship Activities. Under the skill development, Green Job SSC allocated a target to train 180 students of Himachal Pradesh in green jobs skills like Solar power. Currently, we are training the youth of Himachal Pradesh in the following 3 job roles running three job roles.

- 1) Solar PV-installer (Suryamitra)
- 2) Solar PV-installer (Electrical)
- 3) Solar Lighting Assembler

Skilling for Green jobs will help

- Improve energy and raw materials efficiency
- Limit greenhouse gas emissions
- Minimize waste and pollution
- Protect and restore ecosystems
- Support adaptation to the effects of climate change

The first batch of the Solar PV-installer (Suryamitra) course, consisting of 30 students, commenced on 8 Aug, 2023. Parallely, the second batch of this course, comprising on 04 Sept, 2023.

What are Green Jobs?

Green jobs are emerging jobs that contribute to preserving or restoring the environment.

IIT MANDI IHUB IS A PROUD PARTNER IN TRAINING FOR GREEN JOBS

Key sectors covered by 

		
Renewable Power/Fuels	Environment, Forest & Climate Change	Sustainable Citie/Transport

Incubation and Acceleration



IIT Mandi iHub & HCI Foundation
Invites Applications Under

CALL FOR INNOVATION (CFI)

SOLVING THE UNSOLVED

THE WORLD HAS NOT RUN OUT OF PROBLEMS

Scan the QR to Know More



The proposals are invited from Academia, Industry and Startups in the following domains (but not limited to):

- Environment
- Healthcare
- Information & Technology
- Defence & Security

The idea should address or align to:

- Device-Led Technologies
- Assistive Technologies
- Experience Technologies

The influence of **Large Language Models (LLM)** would be welcomed

Last Date to Apply 16th July 2023
Funding Opportunities (Up to INR 1 Crore)

www.ihubiitmandi.in

Call for Innovation (CfI) program, meticulously designed to tackle real-life problems using HCI methodologies.

Start-ups supported under CPS-PRAYAS

















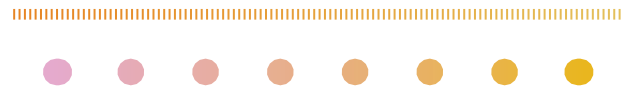

Start-ups supported under CPS-SSS








Start-ups supported under CPS-ACCELERATOR

International Collaboration

Q. Please share the emergence of smart agents in the world of LLM

A. The digital landscape is witnessing a transformative shift with the emergence of Large Language Model (LLM) agents equipped with advanced Natural Language Processing (NLP) and Understanding (NLU). Unlike their predecessors, these agents are not just reactive but are proactive, capable of understanding context, generating human-like text, and learning from interactions. This evolution stems from the vast amounts of data they're trained on. It allows them to grasp nuances, idioms, and cultural references, setting them apart from previous generations of smart agents.



In conversation with



in the area of AI Agents

Q. What are business use cases of smart agents and their impact?

A. The integration of LLM agents in business operations heralds a new era of efficiency and personalization. LLMs offer businesses a competitive edge with their ability to process vast amounts of data swiftly and their nuanced understanding of language. They reduce operational costs, enhance customer satisfaction, and drive revenue growth. Moreover, their adaptability means they can be integrated into diverse sectors, from healthcare to entertainment, making them invaluable assets in the modern business landscape.

-Customer Service & Support:

Personalized Interactions: LLM agents can provide tailored responses based on user history and preferences, enhancing the customer experience.

24/7 Availability: Businesses can offer round-the-clock support without the overheads of human agents, ensuring customers receive timely assistance.

Multilingual Support: LLMs can interact in multiple languages, breaking geographical and linguistic barriers.

-Content Creation & Marketing:

Content Drafting: From blog posts to technical reports, LLM agents can assist in generating drafts or even complete articles, speeding up the content creation process.

Email Campaigns: LLMs can help design personalized email campaigns, analyzing user data to craft messages that resonate with specific audience segments.

-Data Analysis & Insights:

Market Research: LLM agents can sift through vast amounts of market data, extracting trends, patterns, and actionable insights.

Predictive Analysis: Using historical data, LLMs can forecast future trends, helping businesses strategize and make informed decisions.

-Human Resources & Recruitment:

Resume Screening: LLMs can quickly scan and shortlist resumes, identifying candidates that best match job requirements.

Onboarding Assistance: New employees can interact with LLM agents for company information, training modules, and initial queries, ensuring a smooth onboarding process.

-E-commerce & Retail:

Product Recommendations: LLM agents can analyze user browsing patterns and purchase history to recommend products, enhancing sales and user experience.

Inventory Management: LLMs can predict inventory needs based on historical data, ensuring optimal stock levels and reducing overhead costs.

-Finance & Banking:

Fraud Detection: LLM agents can monitor real-time transactions, identifying and flagging suspicious activities.

Financial Advisory: Customers can receive personalized financial advice by interacting with LLMs, which can analyze market trends, risks, and opportunities.

Q. What is view on the transforming on the usage of internet with the advent of LLM?

A. LLM agents are redefining our interaction with the internet. Search queries are no longer about keywords but about context. Users can pose questions or state requirements in natural language, and LLM agents can provide precise answers or resources. They act as personal digital assistants, guiding users, offering suggestions, and learning preferences over time. With the aid of LLM, the internet is transitioning from a vast repository of information to an interactive, user-centric, and intelligent entity, making data access more intuitive and personalized.

Unleashing the power of HCI through Industrial Design

IIT Mandi iHub and HCI Foundation forges a pathbreaking collaboration in Industrial Design for the physical and digital aspects in productization



Think Design is an award-winning future-oriented digital design company based in Bangalore (Havas Paris)

Inventin Design Private Limited is as an International award-winning Product Design Consultancy firm based in NCR

This is an emphatic step towards the IIT Mandi iHub’s journey in translational research and in defining the path from prototype to product.

IIT Mandi iHub partners with Think Design (A Havas Company) and Inventin Design!

We are excited to unveil a groundbreaking collaboration that will support industrial design for both physical and digital products. By joining forces with renowned industry leaders Think Design Collaborative Private Limited (A Havas Company) and Inventin Design Private Limited, IIT Mandi iHub is taking a significant stride towards advancing translational research and bridging the gap between prototypes and real-world products.



HR INITIATIVES



Ninja of the Quarter

- Q. Can you talk about a recent achievement or project that stands out to you and makes you proud?**
- A.** Firstly, I'm excited to share a recent achievement that I'm particularly proud of. I completed a project titled 'Innovometer'—otherwise known as 'The Readiness Calculator'. This tool calculates both Technology Readiness Levels (TRL) and Business Readiness Level (BRL). Technology Readiness Level (TRL) offers a method to gauge the maturity of technologies ready to go to market. By assessing TRL, we can consistently and uniformly judge the technology maturity with accuracy. On the other hand, the Business Readiness Level (BRL) captures whether the business based on such technology is to be ready to be launched. Given the limited context available at the onset, our journey to create this tool wasn't easy. Yet, against these odds, we successfully developed a functional model rooted based on our innovative idea using appropriate parameters.
- Q. How do you approach your tasks and responsibilities? Do you follow a specific work philosophy or method?**
- A.** In terms of my approach to tasks, I try to follow a structured method that involves breaking down a project into smaller tasks and setting achievable goals for each day. I also prioritize tasks based on their urgency and importance, which helps me stay on track and be focused.
- Q. What strategies do you use to effectively manage your time and prioritize tasks, enabling you to reach your goals?**
- A.** Managing time effectively is essential for reaching my goals, so I use a variety of strategies such as setting reminders, scheduling time blocks for specific tasks, and taking breaks when needed. It's all about finding what works best for you!
- Q. For colleagues looking to excel, do you have any advice to share from your experience?**
- A.** Lastly, if there's one piece of advice I could give to colleagues looking to excel, it would be to focus on continuous learning and improvement. Whether it's through taking courses or seeking feedback from others, there's always room for growth and development.



Events and Recognition



The launch of the HCI Center of Excellence at IIT Mandi

The Board of Governors of IIT Mandi has approved the setting up of the HCI Center of Excellence at IIT Mandi. This will provide the necessary fillip to the growth of IIT Mandi iHub and HCI Foundation which is engaged in translational research, skill development, international collaboration and incubating start-ups in the field of HCI.

The faculty affiliated with, the IIT Mandi iHub were felicitated by the Director on the 11th of Aug 2023.



Happy about this recognition by Sector Skill Council, NASSCOM!

IIT Mandi iHub and HCI Foundation has been at the forefront in imparting skills in the designated field of Human-Computer Interaction.

Our well-thought-out and executed programs have reached the underserved and underprivileged sections of the society. This will go a long way in bridging the skill gaps in India and help exploit the demographic dividend of our country.

We are proud to be associated in addressing India's skills gap to make India a digital superpower in line with our charter as a Technology Innovation Hub.

On 22 August 2023 in New Delhi, Shri KB Rajendran, Advisor - Skill Development and Industry Collaboration, IIT Mandi iHub received the award from the Sector Skill Council on our behalf.



Upcoming Events



Research is the compass that drives innovation, while industry adoption of the research drives progress.

The Technology Innovation Hubs (TIHs) across the country are the vehicles to drive this goal.

It is the responsibility of the TIHs to usher in a transformation in the country by recognizing the need to enable the outcome of research to align with the needs of the industry and hence create an impact.

IIT Mandi iHUB and HCI Foundation is pleased to launch "The HIVE".

The HIVE is the conclave with a vision to bring the communities of researchers and incubated start-ups together with the above purpose, in the field of Human-Computer Interaction.

In the coming days please tune in, as details of the conclave would be shared.

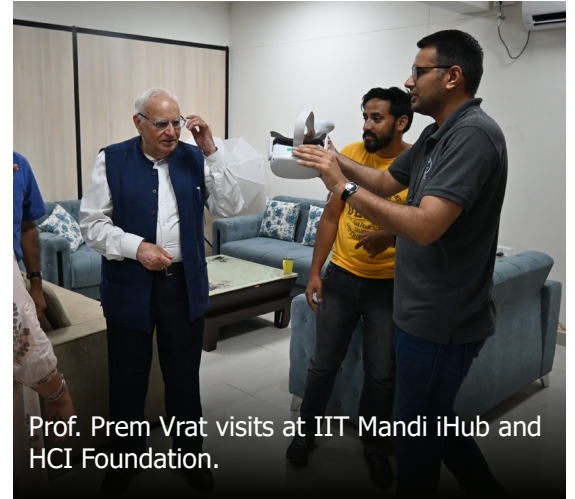
Let us celebrate this convergence and live up to the expectation to bring in this defining change.



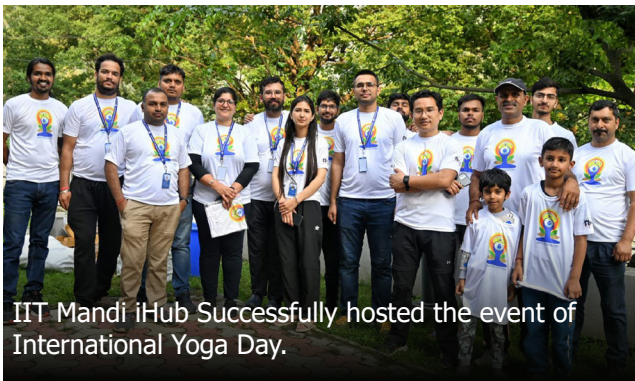
C O N V E R G E N C E



The launch of the HCI Center of Excellence at IIT Mandi.



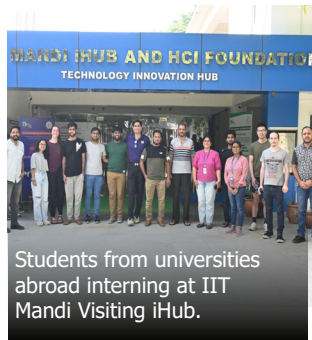
Prof. Prem Vrat visits at IIT Mandi iHub and HCI Foundation.



IIT Mandi iHub Successfully hosted the event of International Yoga Day.



Visit of Skill Council for Green Jobs at our office.



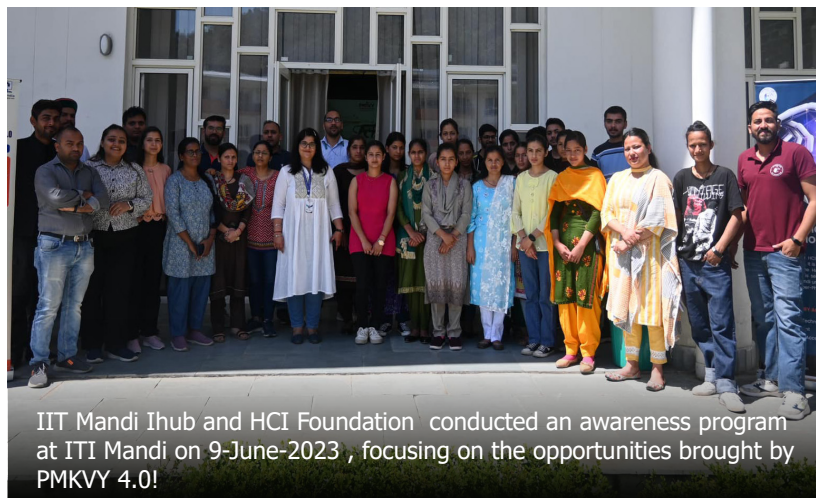
Students from universities abroad interning at IIT Mandi Visiting iHub.



We got the opportunity of hosting a visit of Hon'ble Governor of Himachal Pradesh, Sh. Shiv Pratap Shukla.



Attending Gen AI for Startups event at the Google office in Bangalore!



IIT Mandi iHub and HCI Foundation conducted an awareness program at ITI Mandi on 9-June-2023, focusing on the opportunities brought by PMKVY 4.0!



Prof. Ashutosh Sharma, President, Indian National Science Academy (INSA), Former Secretary, DST visited IIT Mandi iHub.

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Fitts' law is a model for both predicting and measuring. For predicting, Fitt's law is an equation giving the time to acquire and select a target based on the distance moved, and the size of the target.