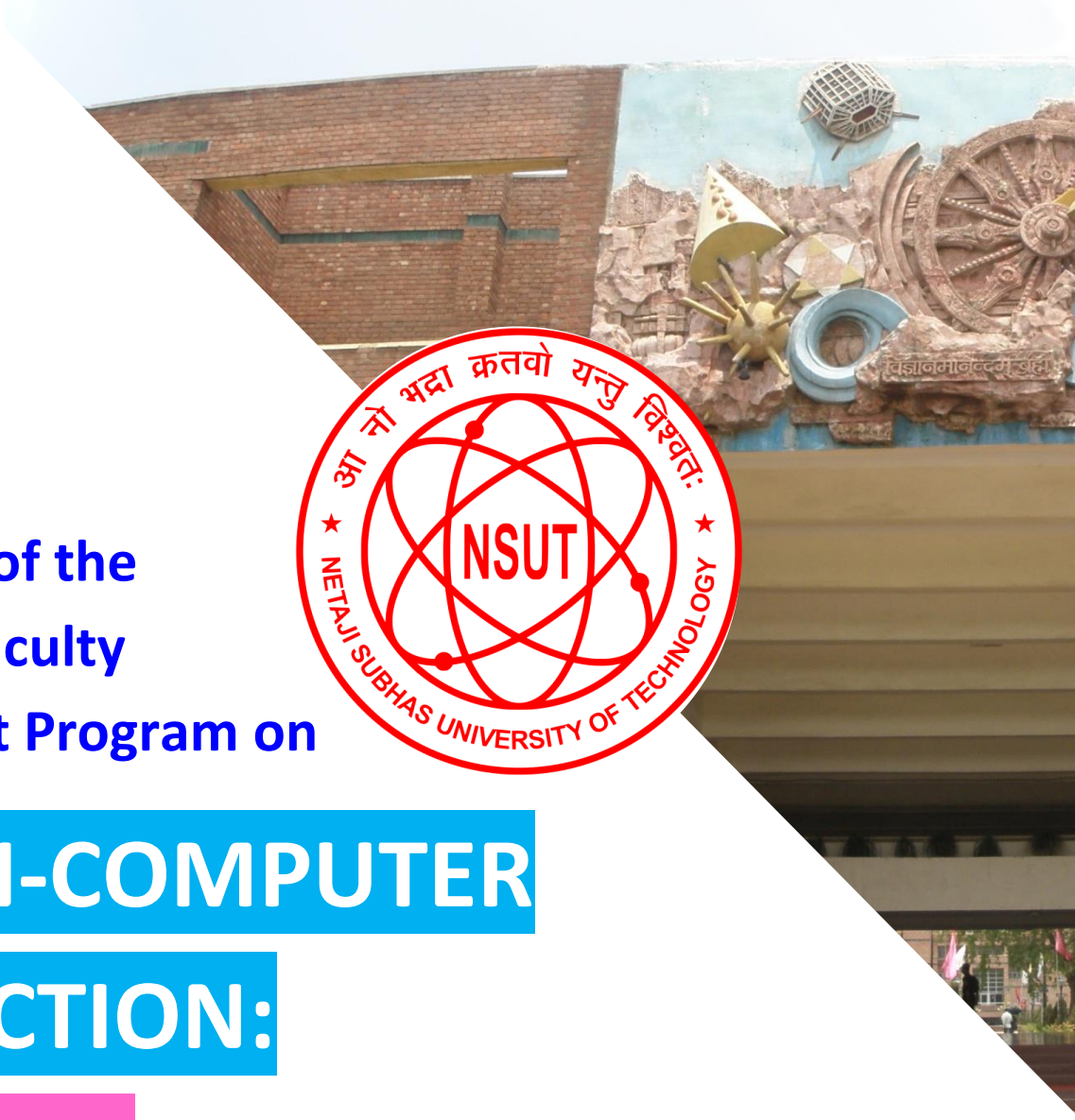

Proceedings of the
One Week Faculty
Development Program on

HUMAN-COMPUTER INTERACTION: AN INDIAN PERSPECTIVE

In Online Mode
(24th-28th February 2025)

Organized by
Department of Computer Science and Engineering
Netaji Subhas University of Technology
Sector 3, Dwarka, New Delhi 110078, India
www.nsut.ac.in

Patron

Prof. Anand Srivastava

FDP Chairs

Prof. M. P. S. Bhatia	Prof. Sushama Nagpal

Conveners

Prof. Ritu Sibal	Dr. Pinaki Chakraborty

Participants

Mr. Abhijeet Vardhan	Mr. Pancham Singh
Dr. Abhinav Tomar	Dr. Partha Das
Dr. Amita Jain	Mr. Pravin Vishwambar Dhole
Mrs. Ankita Mishra	Prof. Rajesh Kumar Rajput
Dr. Ankush Jain	Dr. Rashmi Chaudhry
Mr. Arnab Kumar Pal	Dr. Renu Ghosh
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Dr. Bhawna Aggarwal	Ms. Ruchika Sharma
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Dr. Geetanjali	Mr. Satish Kumar Singh
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Dr. Kusum Lata	Dr. Shweta Taneja
Dr. Mohit Sajwan	Dr. Sudhakar Mishra
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Rapporteur

Mrs. Neha Kumari

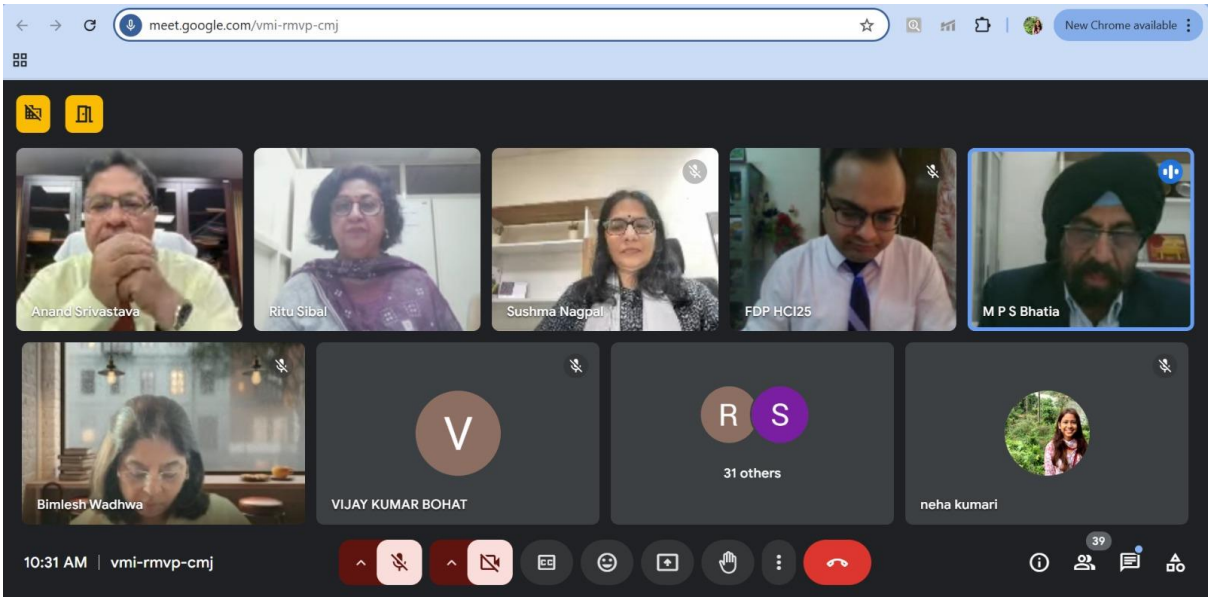
Day-1

Welcome Address by Prof. Ritu Sibal (FDP Convener)

Prof. Ritu Sibal extended a warm welcome to Prof. Anand Srivastava, the Hon'ble Vice-Chancellor, Netaji Subhas University of Technology, Prof. M. P. S. Bhatia, Dean, Faculty of Information and Communication Technology, Dr. Sushama Nagpal, Head, Department of Compter Science and Engineering, resource persons and participants, marking the official inauguration of the Faculty Development Program (FDP). Prof. Sibal set the tone for the event by emphasizing the importance of user collaboration in various languages and the need for devices to be sensible, intuitive and easy to use for all demographics. She highlighted why digital solutions are essential, especially for rural communities and the elderly, stressing that digital literacy is a crucial aspect of modern technological advancement. She also discussed the transformative role of Human-Computer Interaction (HCI) in bridging the digital divide, ensuring that technology is accessible, inclusive and user-friendly.

Inaugural Address by Prof. Anand Srivastava (FDP Patron)

The inaugural address by Prof. Anand Srivastava set an inspiring tone for the FDP, highlighting his deep interest in HCI, innovative programs and academic courses. He emphasized the pressing issues of digital literacy, acknowledging the various strata of personas and the existing gaps in digital accessibility. He pointed out challenges such as linguistic barriers, connectivity limitations and the need for inclusive solutions to bridge these divides. Prof. Srivastava urged researchers and innovators to develop solutions that are not only effective in India but also have a global impact, encouraging a user-centric approach that caters to diverse demographics. He particularly stressed the importance of engaging young minds to "Create for Good," fostering innovation that benefits society. Additionally, he expressed a strong interest in collaboration for research, projects and course development, reinforcing the need for interdisciplinary efforts to advance HCI and digital inclusion.



Address by Prof. M. P. S. Bhatia (FDP Chair)

Prof. M. P. S. Bhatia delivered an insightful session on India's position in the field of HCI, shedding light on the open challenges that need to be addressed. He provided a comprehensive view of both the Indian and industrial perspectives, emphasizing the need to integrate security and data

protection parameters into design. He also highlighted ethical concerns in emerging fields like Generative AI, stressing the importance of responsible AI development. Prof. Bhatia pointed out that young talent can act as a bridge to solving these critical issues, advocating for context-aware design solutions that adapt to user needs dynamically. A major focus of his address was on skill set development, where he emphasized that anyone equipped with the right skills can contribute to HCI, regardless of their field of study or expertise. His session served as a call to action for interdisciplinary collaboration, innovation and ethical responsibility in shaping the future of HCI.

Address by Prof. Sushama Nagpal (FDP Chair)

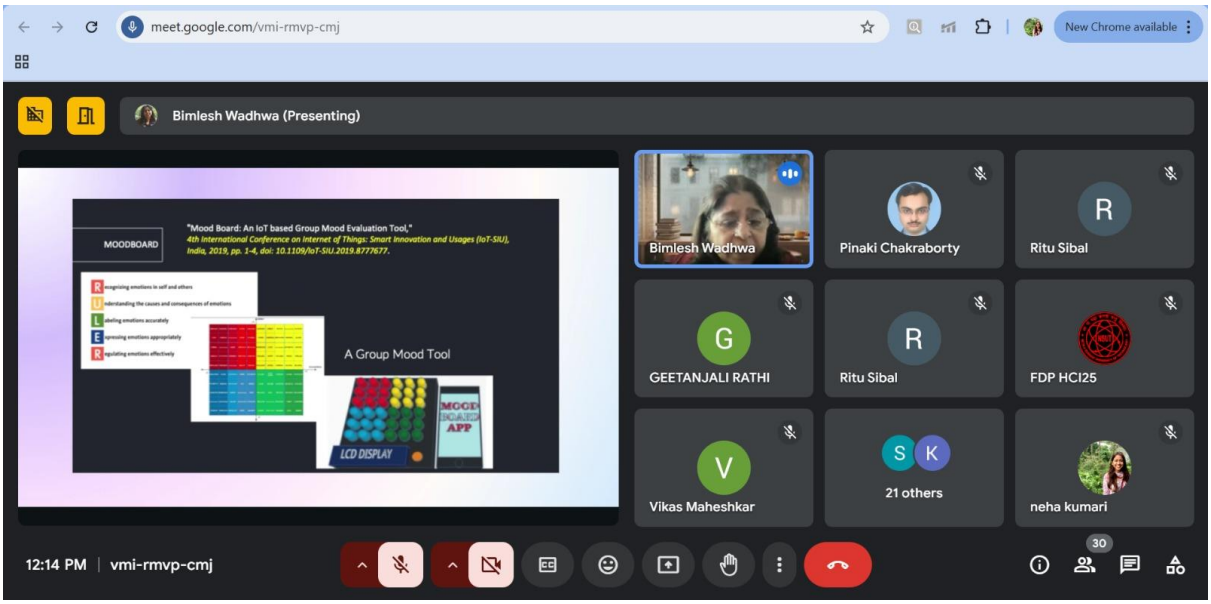
Prof. Sushama Nagpal delivered an insightful address on the complex nature of human interaction with digital systems, emphasizing that India's vast linguistic diversity is not just a challenge but an opportunity in the field of HCI. She highlighted the need for price-efficient devices to cater to different economic strata, ensuring that technology remains accessible to all. She discussed how HCI can be a game-changer in critical sectors like education, agriculture and healthcare, driving innovation and inclusivity. A key aspect of her address was cultural inclusivity, stressing that digital solutions must be designed with accessibility and usability as primary parameters to ensure a seamless experience for users across different demographics. Her session underscored the importance of creating technology that is not only functional but also inclusive, affordable and adaptable to diverse user needs, making HCI a powerful tool for societal transformation.

Briefing by Dr. Pinaki Chakraborty (FDP Convener)

Dr. Pinaki Chakraborty requested the participants to introduce themselves and the participants introduced themselves in brief. Dr. Chakraborty then explained that the FDP will have three types of sessions, viz. lectures on basic topics in HCI by the FDP Conveners, lectures on advanced topics by HCI researchers of national and international repute, and hands-on sessions by HCI practitioners.

Keynote Address by Dr. Bimlesh Wadhwa, National University of Singapore

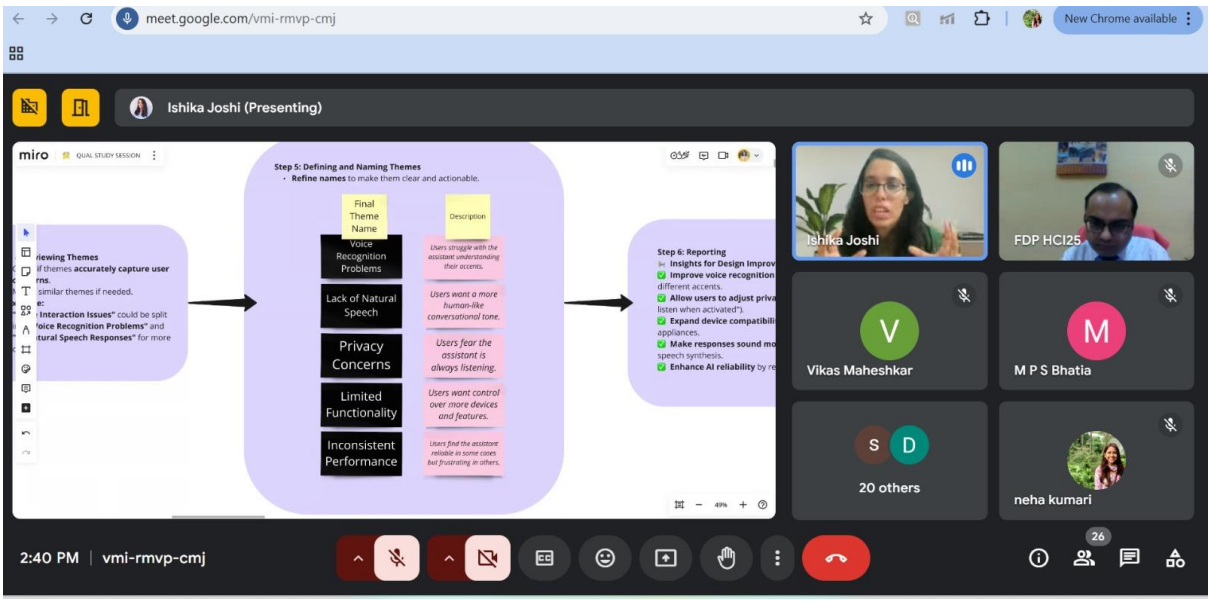
Dr. Bimlesh Wadhwa delivered an insightful keynote address titled "Design Deception: Unmasking Dark Patterns in UI/UX," shedding light on how deceptive design practices manipulate users into unintended actions. Dark patterns are deceptive UI/UX strategies that trick users into actions like subscriptions or data sharing. She emphasized that most users are unaware of these manipulations, making awareness and ethical design crucial. Various regulations, have introduced guidelines to



combat dark patterns. The session stressed the importance of designing for trust through clarity, simplicity and user control. Ethical UI/UX should ensure explicit consent, easy-to-find settings and transparent call-to-action (CTA) buttons. Preventing dark patterns is essential for maintaining long-term user trust and sustainability. She highlighted that proactive transparency, rather than regulatory enforcement, improves user experience, brand reputation and legal compliance. Dr. Wadhwa urged designers to adopt ethical design practices that prioritize user well-being over short-term business gains. The session provided a comprehensive understanding of ethical, legal and design principles needed to create responsible and user-friendly digital experiences.

Hands-on Session by Ms. Ishika Joshi, Adobe India

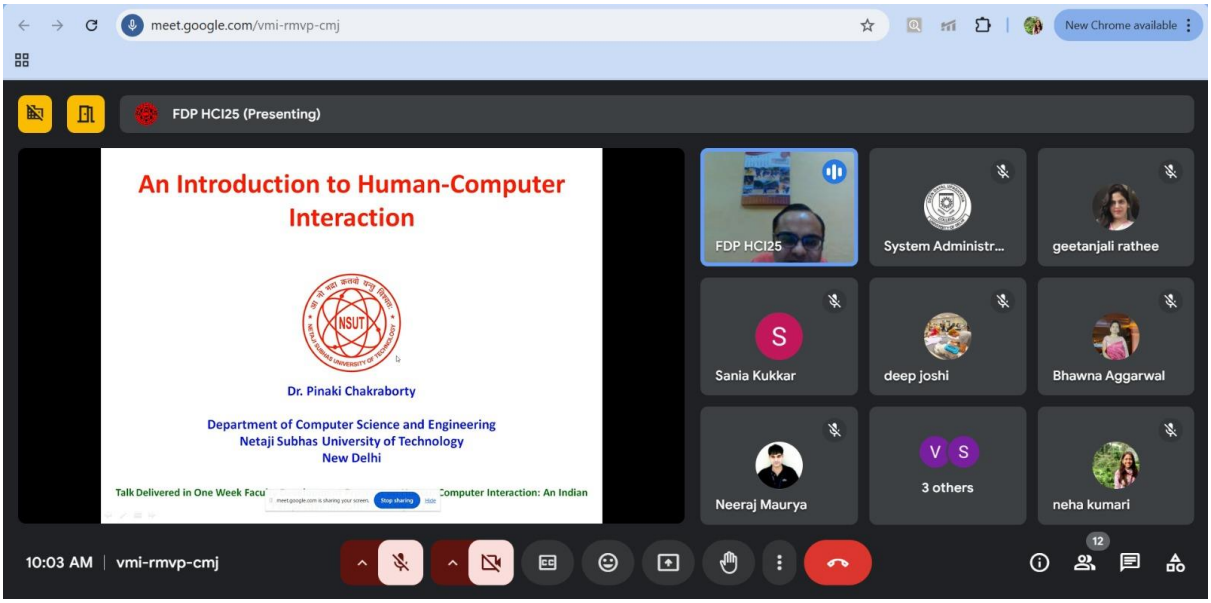
The session on "Approach to Understanding User Needs and Behavior in Human-Computer Interaction", conducted by Ms. Ishika Joshi, provided valuable insights into designing human-centric solutions by understanding user behavior and needs. She introduced HCI principles, emphasizing usability, accessibility and efficiency in system design. The session explored two primary research approaches: quantitative methods, which use numerical data to identify patterns and trends and qualitative methods, which focus on deeper user experiences through techniques like interviews, ethnography and focus groups. Surveys were highlighted as a powerful tool for collecting user feedback, with an emphasis on designing effective, unbiased questions. The importance of ethnography in observing real-life user interactions and focus groups in gathering collective opinions was also discussed. Ms. Joshi connected these methodologies to the human-centric design process, stressing how iterative research helps refine products to align with real user needs. To enhance learning, participants engaged in interactive activities which demonstrate the process, making the concepts more tangible. She presented a case study related to human-AI interaction and helped the participants to solve it using Miro. The session effectively demonstrated how combining qualitative and quantitative insights ensures meaningful user experiences and better product development. The session also provided an industry perspective on the topic to the participants.



Day-2

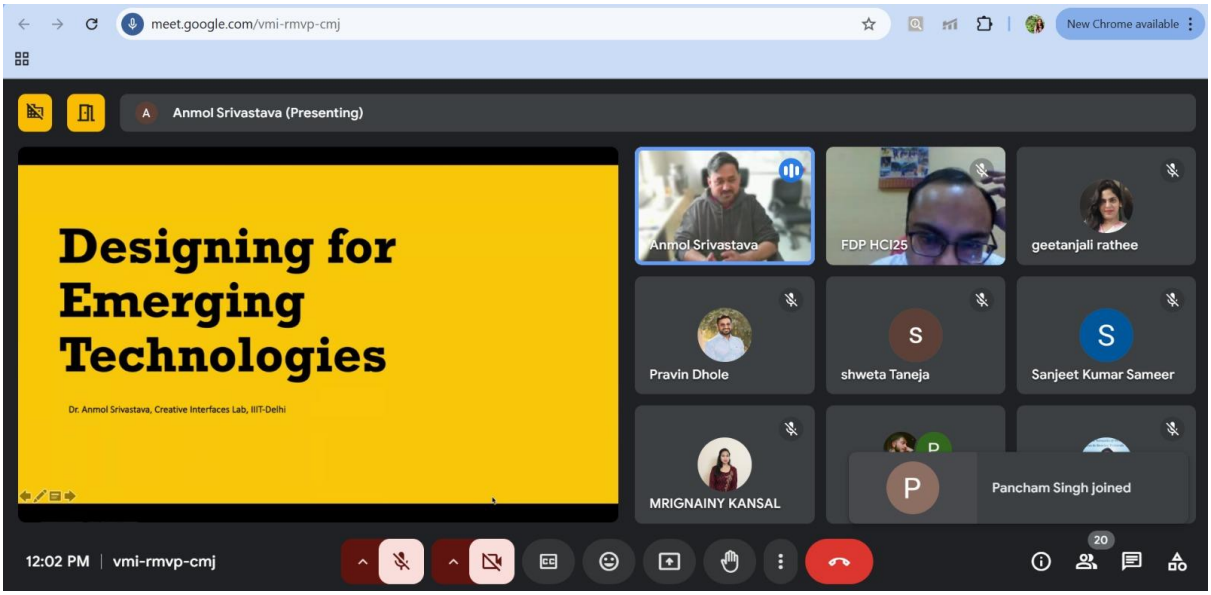
Talk by Dr. Pinaki Chakraborty

Dr. Pinaki Chakraborty delivered a talk on the topic “An Introduction to Human-Computer Interaction”. He took the audience on a journey through the evolution of HCI, highlighting how design principles have adapted over time. From the fundamentals of font design to the psychology of interaction, Dr. Chakraborty explored how humans engage with computers. A key highlight was the discussion on the Gulf of Execution and the Gulf of Evaluation—the gaps that often hinder smooth user experiences. The session also covered 15 essential properties of good interaction, shedding light on what makes technology truly intuitive. The engaging talk concluded with insights into Graphical User Interfaces (GUIs) and the evolving landscape of child-smartphone interaction. With real-world examples and deep analysis, this session set the stage for a day filled with learning and discovery!



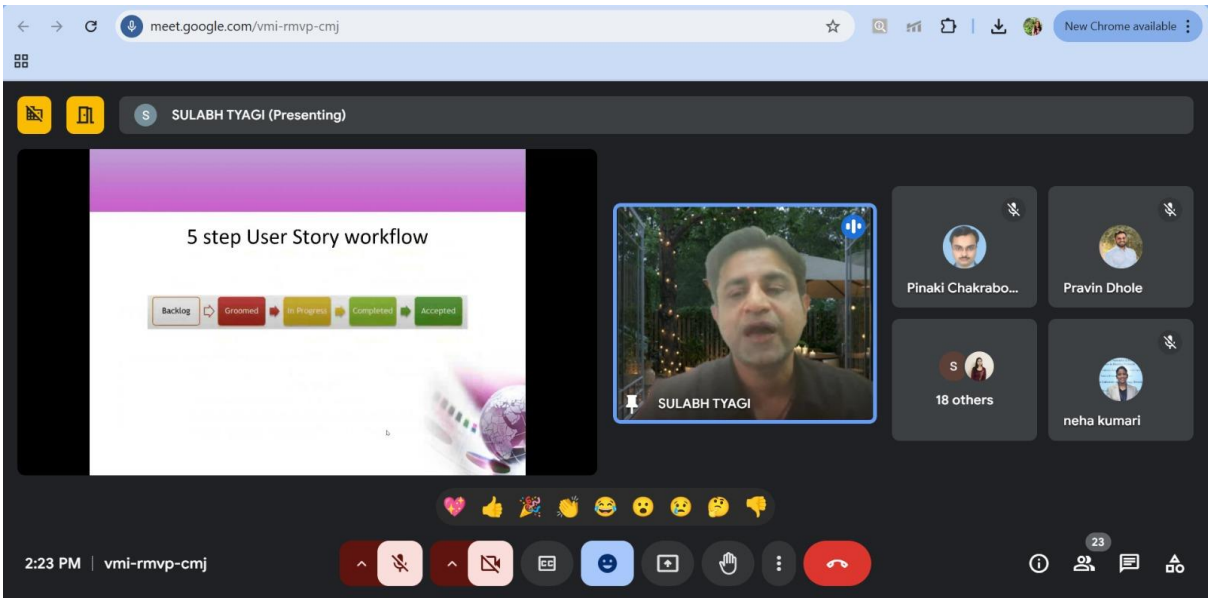
Talk by Dr. Anmol Srivastava, Indraprastha Institute of Information Technology Delhi

The next talk was by Dr. Anmol Srivastava, who spoke on “Designing for Emerging Technologies”. He began by exploring the evolution of technology, tracing its historical roots in HCI. He introduced three key design paradigms—Classical Design, Design Thinking and Computational Design—highlighting how designers must adapt and evolve to remain relevant in the computational era. Dr. Srivastava showcased his projects integrating Indian cultural heritage, such as Kaavadbits, ARoma and AiPan AI, demonstrating how technology can preserve traditions. He emphasized the shift in design focus—from products to experiences to outcomes—and detailed the Design Thinking process as a framework for innovation. Finally, he discussed what's next in technology-driven design, urging designers to embrace computational advancements for future success. This session provided valuable insights into the intersection of culture, technology and design evolution, inspiring participants to rethink their approach to HCI.



Hands-on Session by Dr. Sulabh Tyagi, Jaypee Institute of Information Technology

Dr. Sulabh Tyagi delivered an insightful hands-on session on “Designing User-Centric Storyboards using JIRA”. He began by explaining the fundamentals of user story development and the critical role of the INVEST criteria in creating clear, actionable stories. Dr. Tyagi then delved into the estimation process, emphasizing four key parameters: complexity, business value, risk and dependencies. He provided a detailed walkthrough of a five-step user story workflow, covering various user story states, the formulation of acceptance criteria. and practical methods for story and task estimation. The session concluded with a hands-on demonstration of how JIRA software can be effectively used to design and manage user stories, offering attendees valuable insights into agile methodologies and project management best practices.



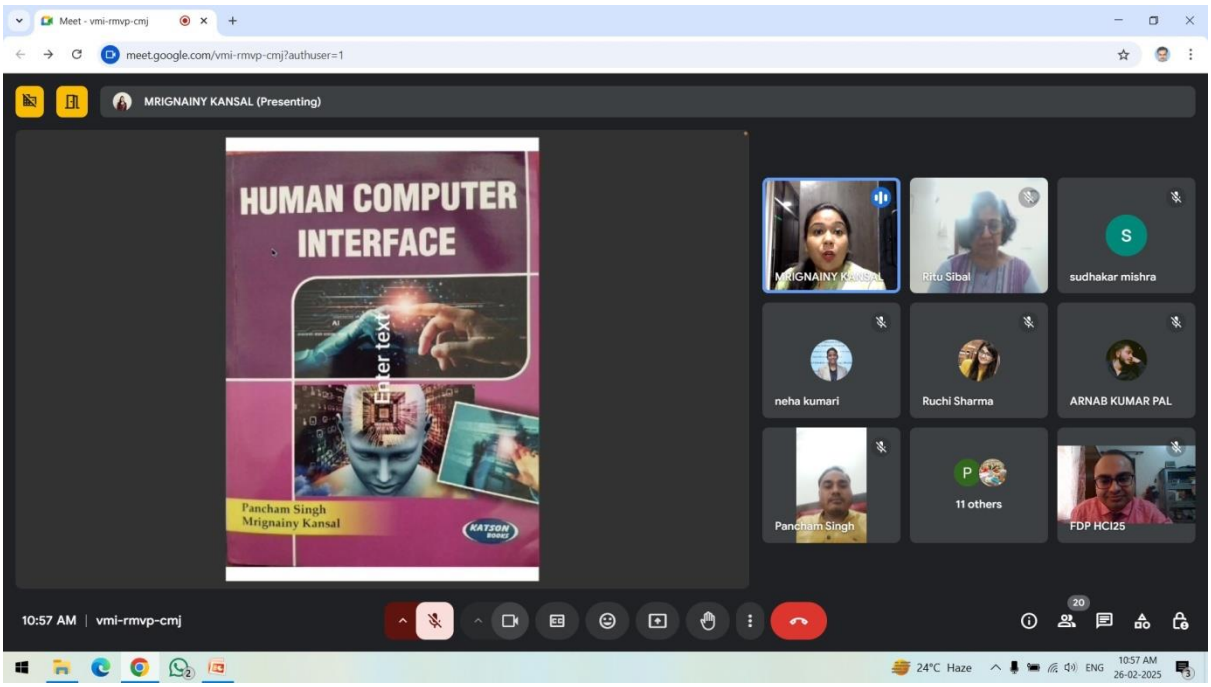
Day-3

Talk by Dr. Pinaki Chakraborty

Dr. Pinaki Chakraborty's talk titled "Technological Factors behind Current Form of Interaction between Human Beings and Computers" highlighted how decades of hardware and software improvements, alongside the invention of the World Wide Web, have transformed HCI. He emphasized that the increasing number of users and the frequent use of computers make understanding HCI essential. The discussion covered key challenges such as reducing the gulf of execution—bridging the gap between user intentions and system actions—and reducing the gulf of evaluation, which deals with interpreting system feedback. Dr. Chakraborty also traced the evolution of computers from first-generation vacuum tubes to fourth-generation microprocessors, showing how each advancement has made interactions more intuitive. He further explored the concept of direct manipulation interfaces that offer immediate, visual feedback, thereby enhancing the user experience.

Discussion on Book Authored by Mr. Pancham Singh and Ms. Mrignainy Kansal

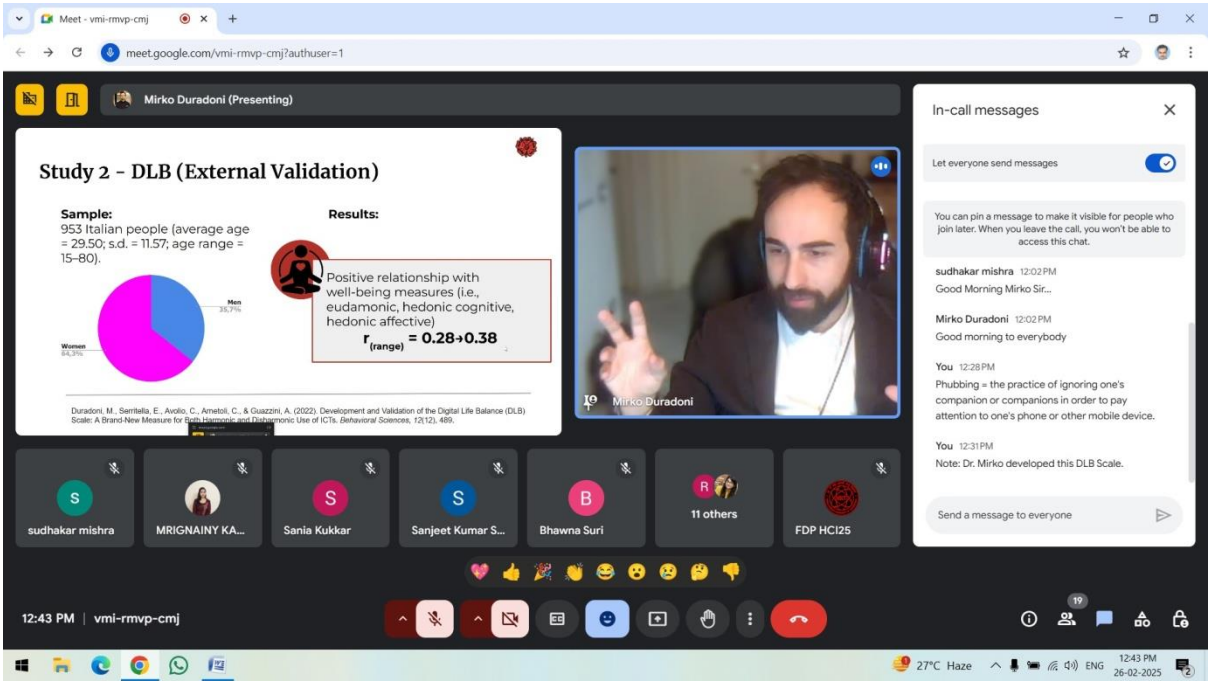
A discussion on a recently-published book titled "Human Computer Interaction" authored by Mr. Pancham Singh and Ms. Mrignainy Kansal. Both authors were present and talked about their book. This discussion marked a significant milestone in addressing the scarcity of quality Indian publications on HCI. The book offers students, researchers and scholars a comprehensive resource that delves into foundational concepts, design challenges and emerging trends in HCI. By presenting practical insights and academic perspectives, the book aims to bridge existing gaps in the literature and foster a deeper understanding of HCI within the Indian context. The discussion was well-attended, reflecting a strong interest in advancing local scholarship and innovation in the field.



Talk by Dr. Mirko Duradoni, University of Florence, Italy

Dr. Mirko Duradoni talked on the topic "How Experiences Across Offline and Online Environments Contribute to People's Harmonic or Dysfunctional Use of Technology". The presentation explored

the psychological balance between online and offline activities, emphasizing that disruption in this equilibrium can lead to dysfunctional technology use—akin to behavioral addictions—resulting in emotional exhaustion and negative impacts on work and family life. Researchers developed the Digital Life Balance (DLB) Scale to assess this balance, validating its robust psychometric properties across Italian, Turkish and Brazilian populations. The scale showed positive correlations with well-being and negative correlations with excessive technological use. The study also revealed that unmet psychological needs, particularly the desire for social connection and validation, drive excessive digital engagement. To address this, therapeutic strategies such as gradually increasing offline social interactions were proposed. This ongoing international research, involving collaborations across 11 countries, invites further participation to refine our understanding and solutions to digital imbalance.



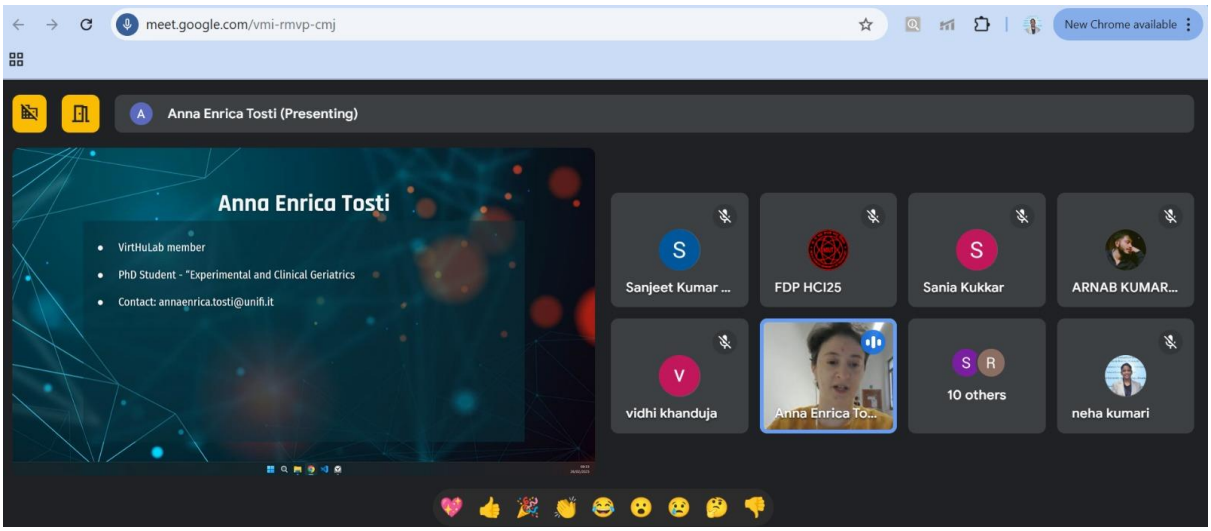
Trivia by Dr. Mirko Duradoni

Upon being requested, Dr. Mirko Duradoni talked a little bit about his city – Florence. Florence is known for being the cradle of the Renaissance and for having a great influence on Western civilization. Dr. Duradoni's mother's family was associated with the House of Medici, which was the de facto ruler of Florence during the medieval period. Their coat of arms is shown here. Dr. Duradoni informed us that the blue color used in various famous Renaissance-era Italian paintings came from indigo, which was imported from India.

Hands-on Session by Dr. Anna Enrica Tosti, University of Florence, Italy

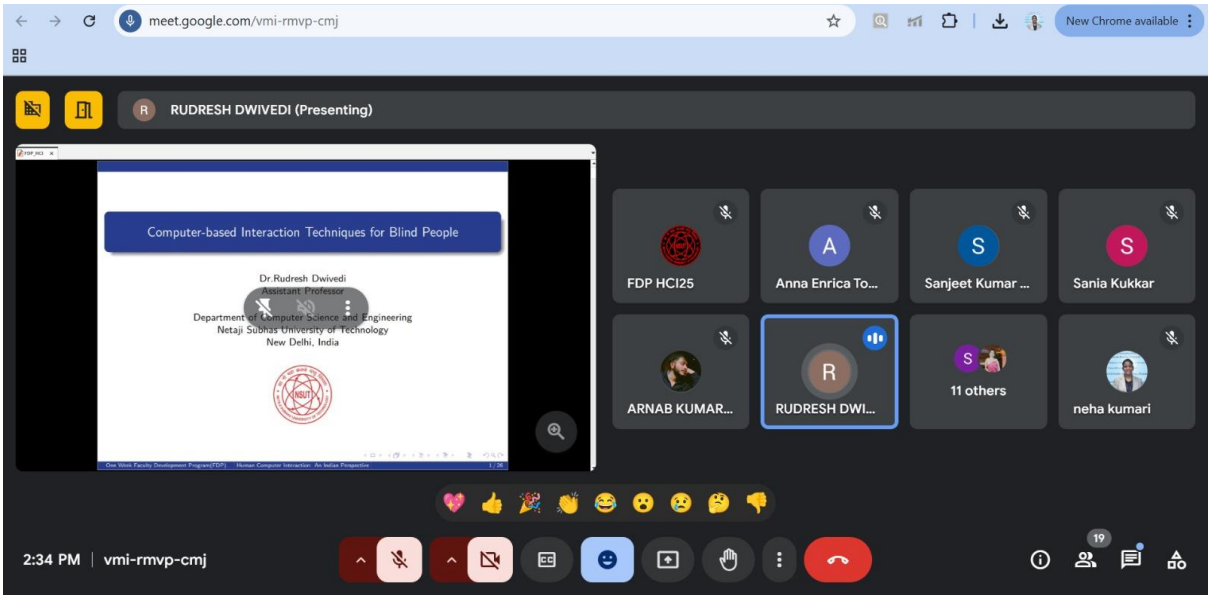
Dr. Anna Enrica Tosti presented an engaging hands-on session on "Application of WAFER in Human-Computer Interaction" emphasizing its role in advancing psychometrics within facial recognition. She traced an unorthodox history of psychometrics and detailed how it evaluates explicit and implicit attitudes. The session addressed critical issues related to population aging, including age-related trends in dementia prevalence and the limitations of neuropsychological assessments. Dr. Tosti also discussed the influence of information and communication technology (ICT) in shaping these

evaluations and outlined the primary research questions surrounding dementia. Additionally, she reviewed various test batteries—such as the clock drawing test, trail making test, attentive matrices test, corsil block tapping test, sentence comprehension and semantic association tasks—to illustrate their application in assessing cognitive functions in aging populations. This comprehensive presentation provided valuable insights for students, researchers and practitioners in HCI.



Hands-on Session by Dr. Rudresh Dwivedi, Netaji Subhas University of Technology

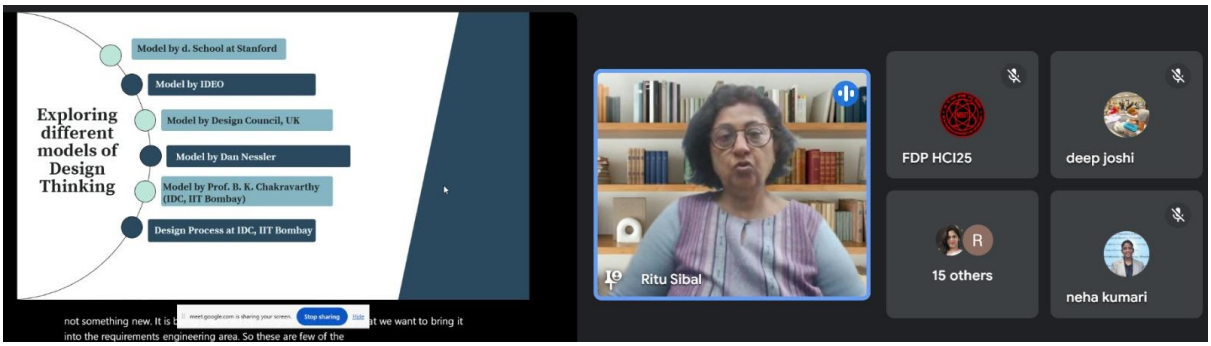
Dr. Rudresh Dwivedi presented his hands-on session on the topic "Computer-based Interaction Techniques for Blind People". He introduced his innovative model, based on the Convolutional Neural Network (CNN) architecture, and provided a thorough literature review. The model was implemented using OpenCV. Dr. Dwivedi shared the performance analysis of his model, utilizing metrics such as Jaccard coefficient, Matthew's coefficient and Hamming loss. His model achieved impressive near-99% accuracy, significantly outperforming existing literature. The session concluded with a hands-on demonstration, showcasing how his model can improve interaction for blind individuals. This presentation offered valuable insights for researchers and practitioners working on accessible technology solutions, significantly contributing to the development of innovative tools for the visually impaired.



Day-4

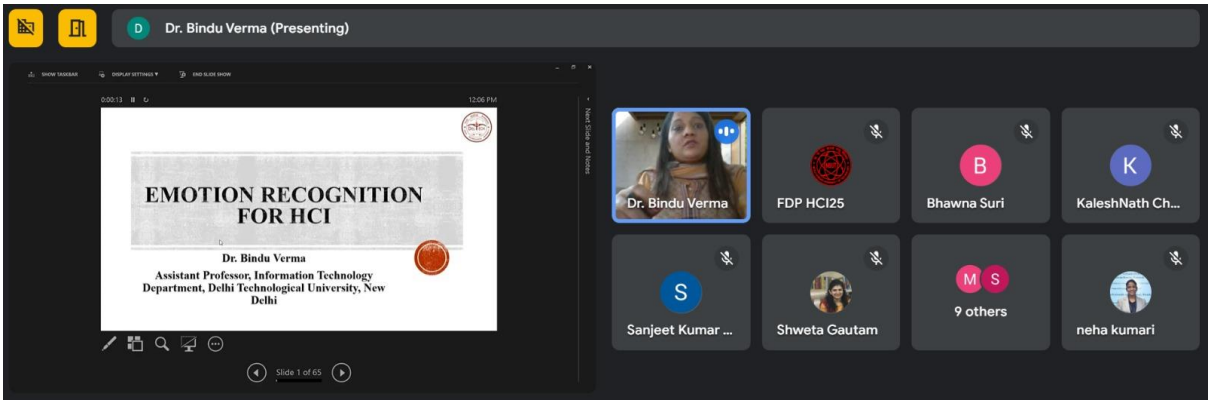
Talk by Prof. Ritu Sibal

In her talk, Prof. Ritu Sibal explored "Design Thinking for Human Centered Software Engineering". The session began with an in-depth look at requirement engineering—discussing key questions such as identifying essential system properties, transforming vague objectives into concrete requirements and verifying fulfillment. Prof. Sibal outlined the six phases: inception, elicitation, elaboration, negotiation, specification and validation, while addressing the limitations of traditional approaches. Transitioning to design thinking, she described it as a human-centric mindset rooted in uncovering both obvious and hidden user needs. Emphasizing its flexibility and technology-agnostic nature, various models were discussed, including the d.school's 6-step process, IDEO's approach, the Design Council's model, Dan Nessler's modified double diamond and Prof. B. K. Chakravarthy's model at IDC, IIT Bombay. The session concluded with an exploratory case study that brought these concepts to life.



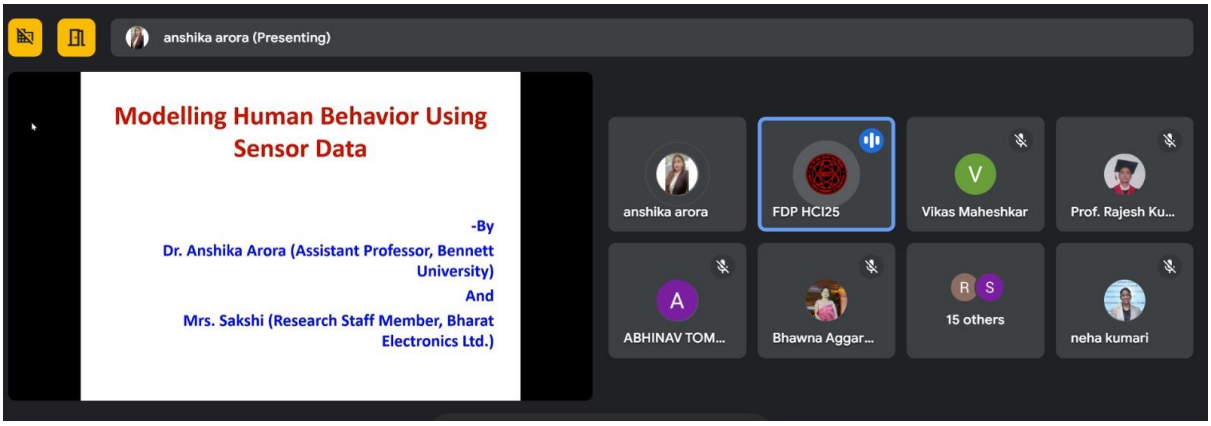
Talk by Dr. Bindu Verma, Delhi Technological University

Dr. Bindu Verma presented an in-depth talk on the topic "Emotion Recognition for Human Computer Interaction". She began by outlining her perspective on HCI and how emotional analysis can enrich user interfaces. Dr. Verma discussed key applications, including facial recognition fundamentals, the classification of various emotions and methodologies to detect them. She explained the general pipeline of deep learning systems, focusing on CNN-based recognition—with emphasis on convolution layers, operations, padding and pooling—and detailed steps for creating effective emotional recognition models. The session also covered text-based emotional analysis, speech emotion detection and business applications such as real-time classroom monitoring, the Eyeris AI digital board, AI-driven student engagement, retail customer emotion analysis, sentiment evaluation and security systems. The session concluded with an illustrative case study that integrated these diverse applications.



Hands-on Session by Dr. Anshika Arora, Bennett University and Mrs. Sakshi, Netaji Subhas University of Technology

Dr. Anshika Arora and Mrs. Sakshi delivered an in-depth presentation on “Modeling Human Behavior using Sensor Data”. Dr. Arora began by outlining behavioral health and its key components, emphasizing the role of sensor data in analyzing human behavior. She described various sensor types and data collection methods and explained preprocessing techniques and feature extraction methods essential for behavior modeling. Dr. Arora reviewed machine learning approaches, model evaluation and optimization strategies and examined real-world applications through case studies. One example highlighted depression assessment using sequential motor activity data, sleep quality indicators, sleep consistency and other behavioral markers. Following this, Mrs. Sakshi focused on model selection. She compared traditional machine learning models that rely on handcrafted statistical and frequency domain features—such as decision trees, SVM, KNN, random forests and gradient boosting—with deep learning models including CNNs, LSTMs, Bi-LSTMs, CNN-LSTM hybrids, transformer-based models and autoencoders. Mrs. Sakshi discussed her work on meta-heuristic feature selection for smartphone inertial sensor data, model deployment strategies, evaluation metrics (accuracy, precision, recall, F1, ROC-AUC), and optimization techniques like hyperparameter tuning, regularization, ensemble methods and data augmentation. A hands-on Python notebook demonstration and case studies enriched the session.



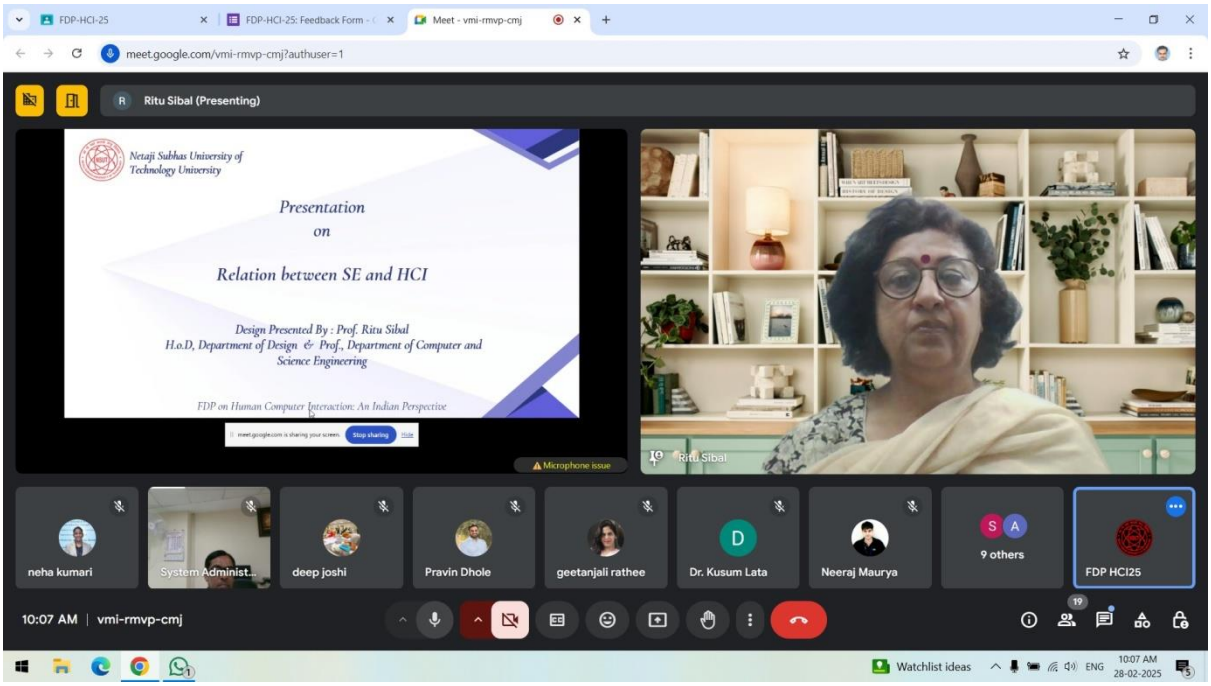
Day-5

Prof. Ritu Sibal’s Answer to Dr. Sudhakar Mishra’s Query

On Day-4, Dr. Sudhakar Mishra asked a query on the difference between Software Engineering (SE) and HCI. Day-5 commenced with a presentation by Prof. Ritu Sibal providing a detailed answer to the query. She succinctly reviewed the phases of requirement analysis—from functional, non-functional and user experience requirements to design, build, implementation and evaluation—highlighting that HCI design follows an iterative SDL process and is inherently interdisciplinary.

Talk by Prof. Ritu Sibal

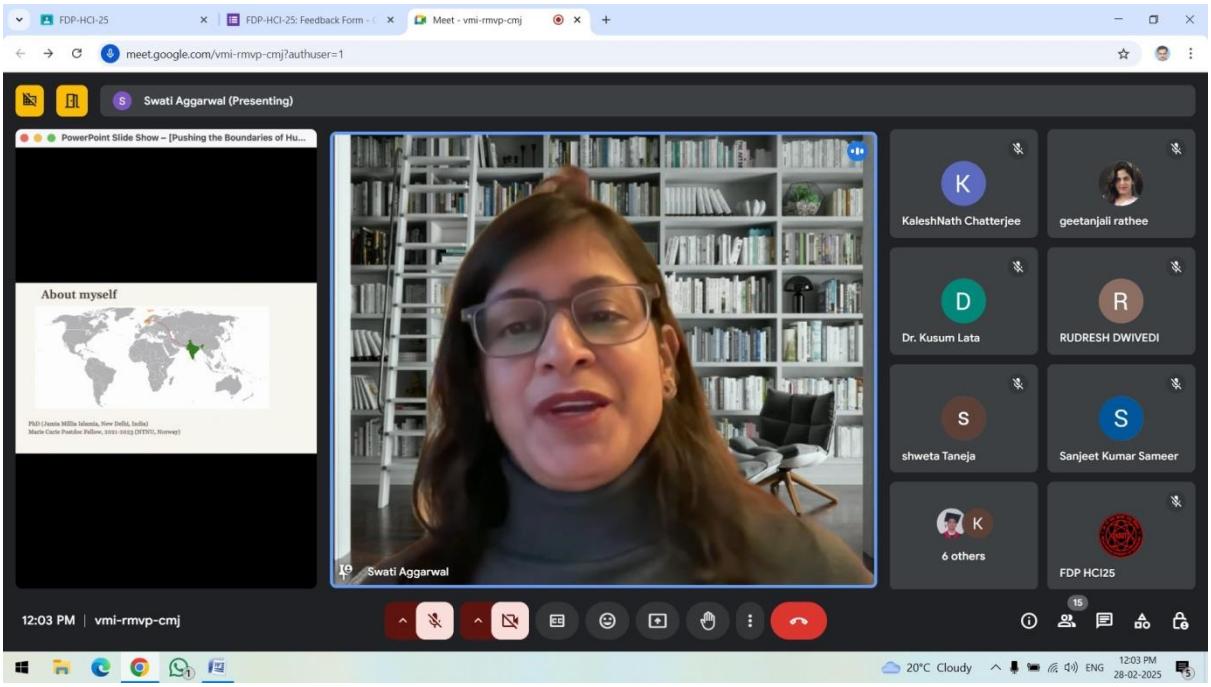
The topic of Prof. Ritu Sibal’s talk was “Agile Usability Testing”. Transitioning to agile usability testing, Prof. Sibal elaborated on how agile methodologies can transform traditional usability testing. She explained that agile usability testing integrates continuous user feedback into rapid development cycles, enabling real-time adaptations and iterative improvements in HCI design. Key concepts discussed included human-computer interaction fundamentals, core usability testing



principles and agile testing practices that foster quick identification and resolution of design flaws. An exploratory case study further illustrated how agile usability testing accelerates problem detection and enhances overall user satisfaction. Prof. Sibal underscored that this flexible approach not only refines software quality but also ensures that the evolving needs of users are effectively met, paving the way for more resilient and user-centered products.

Talk by Prof. Swati Aggarwal, Molde University College, Norway

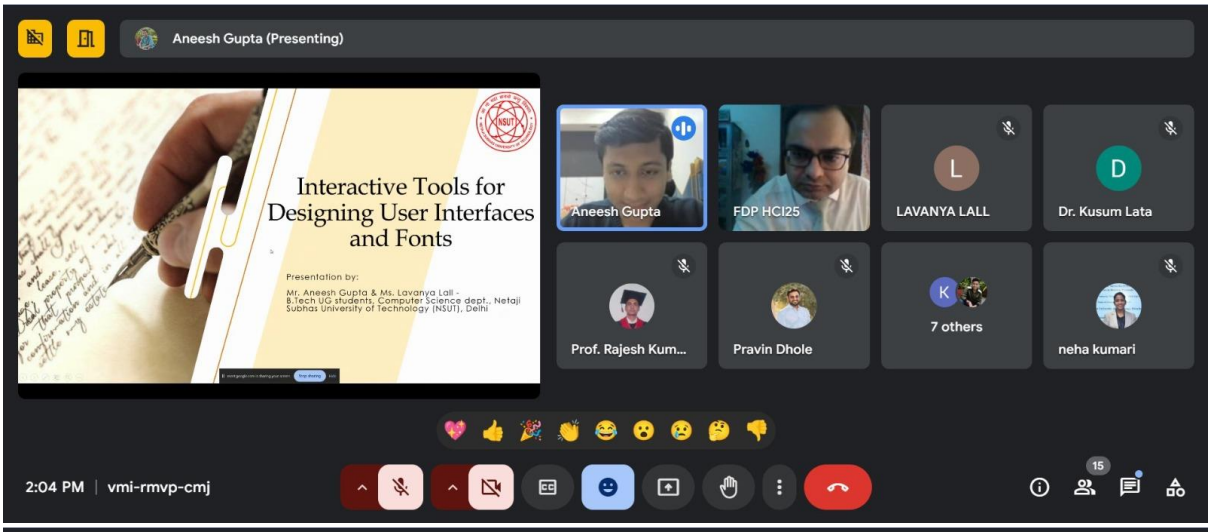
Dr. Swati Aggrawal's talk titled "Pushing the Boundaries of Human-Computer Interaction with Brain-Computer Interfaces," explored the fundamentals and applications of Brain-Computer Interfaces (BCIs). She detailed various BCI types and their broad uses in healthcare and neurodevelopment. Driven by her research in pediatric neurodevelopment, Dr. Aggrawal introduced an AI model designed for cognitive assessment in infants and children. She posed the problem, "Is it feasible to use BCI technology to monitor perceptual development in infants?" and presented promising preliminary results. The session also addressed ethical considerations, the evolving regulatory

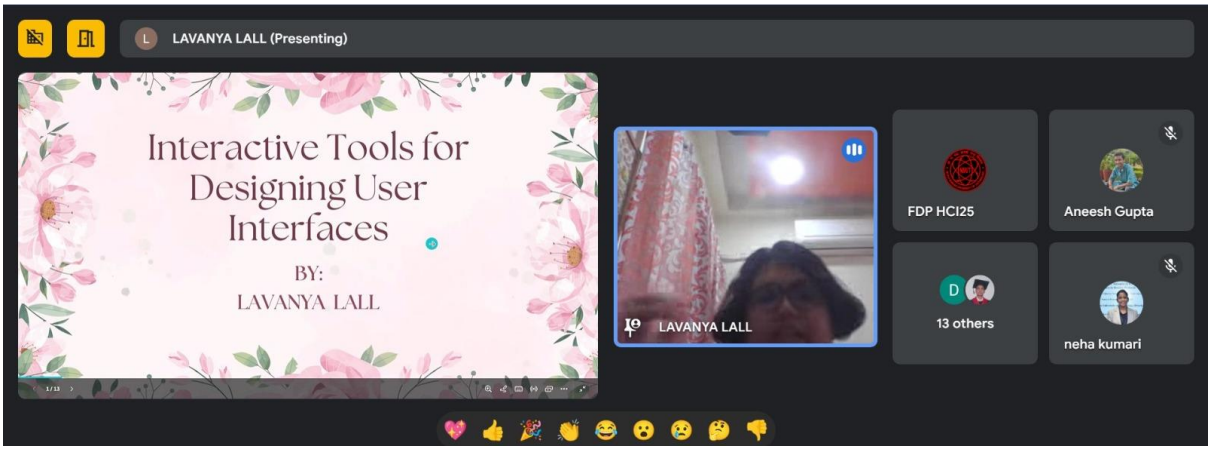


landscape and the social impact of BCI technologies. Dr. Aggrawal highlighted key global players and discussed India's emerging role in the international BCI market, outlining future opportunities and challenges in this innovative field.

Hands-on Session by Ms. Lavanya Lall and Mr. Aneesh Gupta, Netaji Subhas University of Technology

Ms. Lavanya Lall and Mr. Aneesh Gupta, both of whom are undergraduate students at Netaji Subhas University of Technology, presented a hands-on session titled "Interactive Tools for Designing User Interfaces and Fonts". Mr. Gupta opened with an exploration of fonts and typography fundamentals. He discussed various elements including font styles, glyphs, numerals, ligatures, diphthongs and x-height, while also explaining the four-line concept—capital line, waist line, long line and baseline—and their significance in establishing proper line height, fractions and overall text balance. Differences between typefaces and fonts were clarified and the practical application of these concepts was illustrated through a case study titled "Designing Fonts for Children Aged 5-7". He took brief hands-on session on Metaflop, in which allowed participants to experiment with font design, including insights into calligrapher formats. Ms. Lall then took over with a focus on interactive tools for designing user interfaces. She emphasized the importance of UI design and identified common challenges such as inconsistent layouts, complex navigation and poor accessibility. Ms. Lall outlined key goals and principles for effective UI design, detailed the step-by-step process of creating user-friendly interfaces and reviewed popular UI design tools with a special emphasis on Figma—explaining her preference for it. The session concluded with a practical Figma demonstration, where participants created a new design file and actively engaged in designing a UI.





Tools Used in the Hands-on Sessions

Speaker	Name of Tool	Description
Ms. Ishika Joshi	Miro	Miro is a digital collaboration platform that allows teams to work together in real-time on a virtual whiteboard, making brainstorming, planning and problem-solving more efficient. It offers a variety of tools and templates for project management, design thinking and creative collaboration, supporting remote and distributed teams.
Dr. Sulabh Tyagi	Jira	Jira is a project management tool designed for bug tracking, issue tracking and agile project management. It helps teams plan, track and manage work through customizable workflows, sprints and detailed reporting features, making it ideal for software development and IT operations.
Dr. Anna Enrica Tosti	WAFER	The Web-Agile Facial Emotion Recognition and Eye-Tracking System (WAFER) is a software tool that analyzes facial expressions and tracks eye movements to assess user emotions and visual attention. It is commonly used in fields like UX research, psychology and HCI to gather insights on emotional responses and user behavior.
Dr. Rudresh Dwivedi	OpenCV	OpenCV is a comprehensive, open-source library designed for real-time image and video analysis, computer vision and machine learning. It offers over 2,500 optimized algorithms to perform tasks like object detection, facial recognition and image processing across different platforms and programming languages.
Dr. Anshika Arora and Mrs. Sakshi	Google Colab	Google Colab is a cloud-based notebook service that lets users run Python code without needing local setup, offering free access to GPUs and TPUs. It supports real-time collaboration and comes preloaded with essential libraries for data science and machine learning.
Mr. Aneesh Gupta	Metaflop	Metaflop is a web-based tool that allows users to create custom fonts by adjusting various design parameters like weight, width and contrast. It generates open-source fonts in real-time, providing an easy way for designers to experiment with typography and create unique typefaces.
Ms. Lavanya Lall	Figma	Figma is a cloud-based design tool that enables collaborative design for user interfaces, allowing multiple users to work on projects in real-time. It offers powerful vector editing, prototyping and design system features, making it ideal for web and app design.

Epilogue

The One Week Faculty Development Program on the theme Human-Computer Interaction: An Indian Perspective was not merely an academic exercise but a transformative experience for those who

participated. Over the span of five days, the FDP provided a deep dive into the fundamental aspects of HCI, offering valuable insights that combined both theoretical and practical aspects of the discipline. While HCI has existed for several decades, the focus on creating technology that puts users at the center of design is more pertinent than ever. The FDP emphasized how deeply intertwined human interaction with technology is and the responsibility of creators to ensure that the products they develop are intuitive, accessible and ethical. The discussions and presentations revolved around the ways in which HCI can drive the design of more inclusive, responsive and adaptable technology for diverse populations. This sense of responsibility towards inclusivity and ethical considerations served as the backbone of much of the FDP's discussions.

User-Centered Design: At its core, the FDP highlighted the importance of user-centered design as the foundational principle of HCI. From the earliest stages of human-computer interaction, the focus has always been on understanding the user and their needs. The FDP reinforced the notion that HCI is not just about making technology functional but also about making it human-centric. Technology should not only meet technical specifications but also be intuitive, efficient and enjoyable to use. The core idea that emerged from these discussions is that human behavior and cognitive abilities should guide every stage of the design process. With the advent of new technologies and the increasing complexity of digital systems, there is a greater need for human-centered design—designs that are driven by a deep understanding of human behaviors, capabilities and limitations.

Inclusivity in Design: It became abundantly clear that technology should never be a one-size-fits-all solution. As digital environments become more integrated into our daily lives, they must be adaptable to the needs of diverse users. Whether considering the varying degrees of digital literacy among different populations or the need for adaptive interfaces for individuals with disabilities, the idea that technology should be designed for all people emerged as a primary concern. The FDP placed particular emphasis on the need for designing systems that are not only accessible but inclusive, taking into account the varied social, economic and cultural backgrounds of users. This inclusivity can be reflected in multiple aspects of technology design, from language preferences to accessibility features that ensure all users, regardless of ability or experience, can engage meaningfully with digital tools. The FDP reinforced the idea that digital literacy is a crucial skill for modern society, but equally important is ensuring that the design of technology does not leave those without high levels of digital competence behind.

The Role of Emerging Technologies in HCI: As the FDP unfolded, it also became clear that the increasing technological advancements in fields such as artificial intelligence (AI), machine learning and brain-computer interfaces (BCI) add new layers of complexity to the design process. With the integration of these emerging technologies into HCI, the challenges of designing systems that are both effective and ethically responsible became even more pronounced. The rise of AI, for instance, brings into question the fairness and transparency of algorithms that dictate how users interact with technology. Are these algorithms designed in ways that are free from bias? Do they respect user privacy and ensure data security? The rapid pace of technological innovation demands that designers remain vigilant about these issues. As new technologies evolve, it is not enough to merely create innovative solutions; designers must also integrate ethical considerations into their work. This involves grappling with the moral implications of designing systems that control access to information, influence decision-making processes and, in some cases, directly affect users' lives. The FDP emphasized that ethical design in HCI is not just an afterthought, but a fundamental aspect of the process. Ensuring that design decisions reflect values such as transparency, privacy and security is a responsibility that cannot be overlooked.

Bridging the Digital Divide through HCI: One of the central issues discussed during the FDP was the role of inclusive design in bridging the digital divide. As technology continues to shape every

facet of society, the gap between those with access to digital tools and those without is widening. This divide is not only geographic but is also tied to social, educational and economic factors. As we move further into the digital age, the concern about unequal access to technology becomes ever more pressing. The FDP underscored the need for context-aware design, systems that adapt to the specific needs of individuals, communities and regions. For example, while some areas may have access to cutting-edge technologies, others may still struggle with basic connectivity issues. Designers must consider these disparities and create systems that can work effectively in low-bandwidth environments or in communities with limited access to the latest digital tools. The focus of the FDP on digital literacy as a foundational pillar of inclusive design was instrumental in highlighting the necessity of creating systems that empower all users, regardless of their socioeconomic status or technical expertise. This theme resonated deeply throughout the FDP, reinforcing the idea that technological systems must work for everyone, not just for the privileged few.

Interdisciplinary Collaboration: As we explored these issues, it became apparent that creating inclusive, human-centered technology requires collaboration across disciplines. HCI is inherently interdisciplinary, involving elements of computer science, design, psychology and even sociology. The FDP provided participants with a chance to engage in a variety of collaborative activities, ranging from hands-on sessions to group discussions, all of which emphasized the importance of bringing together diverse perspectives. Through the hands-on sessions, participants had the opportunity to apply the theoretical knowledge they gained, experimenting with prototypes and engaging in real-time problem-solving. These activities helped solidify the key principles of HCI, providing practical experience that was essential for understanding the design process. By drawing on expertise from different fields, we can better understand how users interact with technology and how we can create products that meet a wide array of needs. For example, insights from psychology help us understand cognitive processes and how to design systems that align with human perception and memory, while expertise from sociology can shed light on how technology is influenced by cultural and social factors. By integrating these disciplines into the design process, we are more likely to produce systems that are truly human-centered and socially relevant.

Practical Experience in HCI Design: The practical components of the FDP—such as prototype design, user research and usability testing—served as a reminder of the importance of grounding design decisions in empirical evidence. These hands-on sessions emphasized the need for user research at every stage of the design process, from initial ideation to final implementation. We were reminded that technology should never be developed in a vacuum; rather, it must be tested with real users in real contexts. The significance of usability testing cannot be overstated. It is not enough to build systems that are technologically sophisticated; these systems must also be usable and intuitive for the end-users. User research allows designers to gather valuable feedback on how people interact with technology, what works well and what needs improvement. Through this feedback loop, HCI practitioners can refine their designs to ensure they meet the real-world needs of users.

User Experience and Emotional Engagement: In terms of user experience (UX), the FDP stressed that designing for usability goes hand in hand with creating positive emotional experiences for users. It is not enough for a system to simply function; it must engage users and elicit positive emotional responses. User satisfaction is a critical aspect of HCI and it was clear from the FDP that successful designs are those that seamlessly integrate utility with pleasure. Whether designing a website, mobile application, or an interactive kiosk, designers must consider how to create experiences that are not only efficient but also enjoyable, satisfying and rewarding for users.

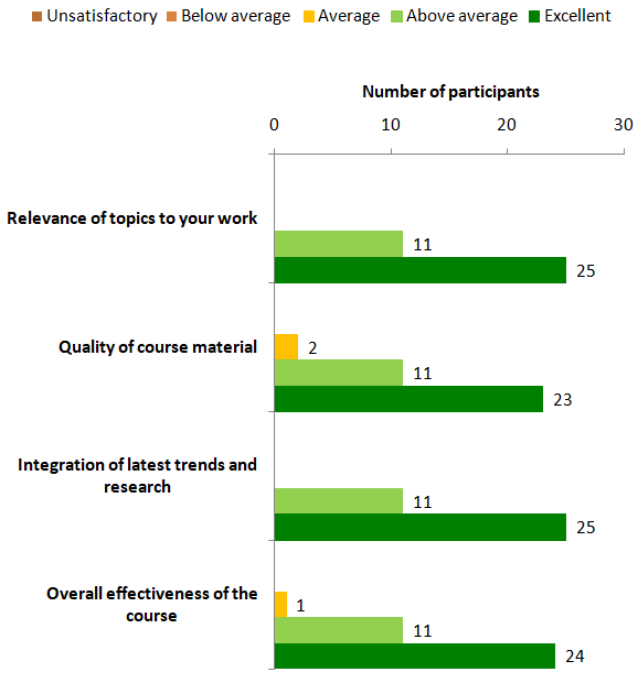
Ethics and Responsibility in HCI Design: As the FDP came to a close, the discussions turned toward the broader societal implications of HCI. The potential for technology to reshape the world is immense, but it also carries risks. The more we integrate technology into our lives, the more we are confronted with ethical dilemmas and societal challenges. How do we ensure that emerging technologies are used for good? How do we prevent technology misuse, such as through dark patterns or manipulative design? These questions underscore the growing importance of ethical design in HCI. As creators of technology, it is our responsibility to ensure that our work does not exploit, deceive, or harm users. We must remain committed to developing technology that aligns with ethical values, such as fairness, transparency and respect for user autonomy.

Concluding Remarks: The FDP served as a timely reminder of the important role that HCI plays in shaping the digital landscape. As we look to the future, the principles of human-centered design, ethical responsibility, inclusivity and collaboration across disciplines will continue to guide the development of new technologies. It is our collective responsibility to ensure that the technologies we create are not only innovative and efficient but also ethical, accessible and beneficial for society at large. As HCI practitioners, we must commit to designing technology that puts the user first and helps to build a more inclusive, equitable and just world. This FDP has provided the knowledge, skills and insights necessary to navigate the complex and evolving field of HCI, and it is now up to us to apply these lessons in our future work and research. The hands-on sessions, combined with expert insights, have equipped us with both the theoretical and practical knowledge to tackle the challenges of HCI head-on, making us better prepared to contribute to the advancement of human-centered technology in our respective fields.

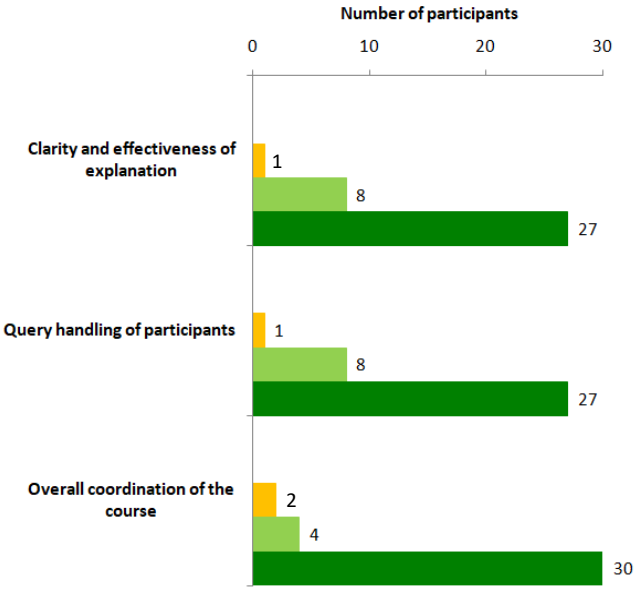
Participant Feedback

(Feedback was received from 36 participants.)

Course Content



Coordination and Faculty



Qualitative Feedback

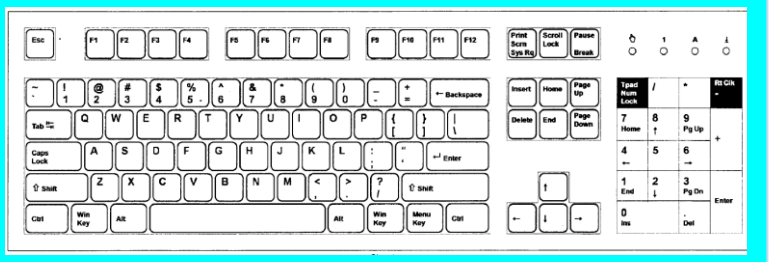
(Edited to improve presentation.)

- "It was a very well-organized FDP with excellent hands-on sessions and very well-explained from a research point of view as a research scholar. It was a great learning experience and wonderful opportunity to participate and gather knowledge from a research point of view and as a source of learning as well."
- "It was an informative event. By this FDP I got to know the integration of SE and HCI which is new to see in. Well organized and wonderfully executed. All the speakers are really knowledgeable and wonderful present the topic as well as answer our query. Special thanks to Dr. Pinaki sir and Dr. Ritu Sibal ma'am who initiated this and execute in great note."
- "The FDP was beautifully organized. All the sessions were nice and very informative. I really liked the sessions from Keynote speaker, Dr. Ritu Sibal and Dr. Pinaki Chakaborty. Good work, keep it up and my best wishes for your future workshops."
- "Excellent content on recent topics, nice arrangements."
- "Very informative sessions."
- "Everything was well organized. All sessions were very informative, and everything was explained well."
- "Great job, I learnt so many things."
- "Informative FDP."
- "Nice sessions."
- "Very informative sessions."
- "Excellent and very insightful FDP."
- "Very beautifully organized."
- "Well coordinated FDP."
- "Well planned and well organized. Many congratulations to Dr. Pinaki and Prof. Ritu."
- "I will be joining more FDP organized by Computer Science Department, NSUT Delhi."

HCI Research at NSUT

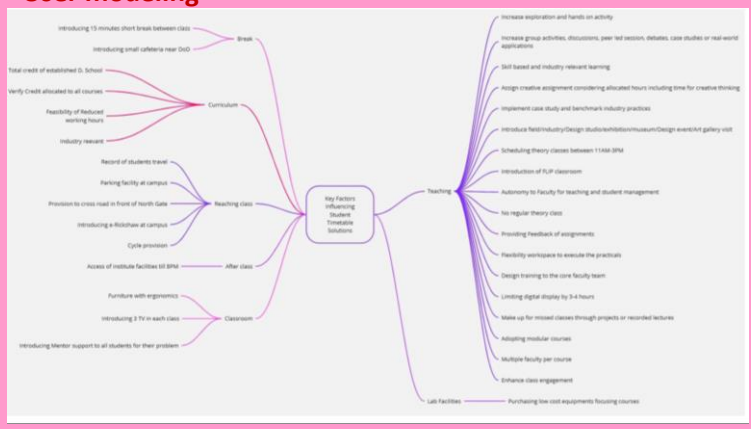
Patents

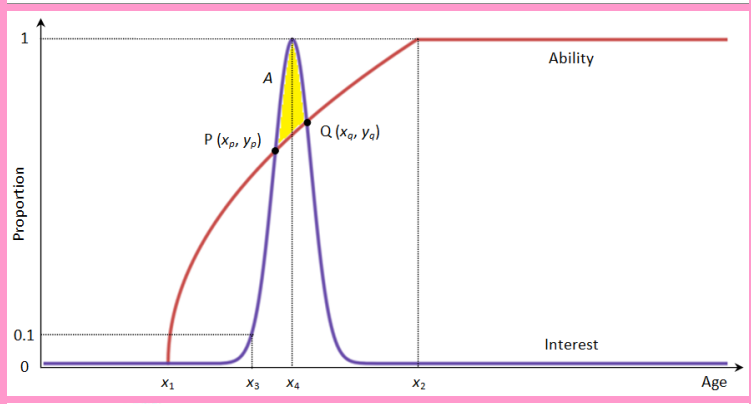
Patent number: 554868

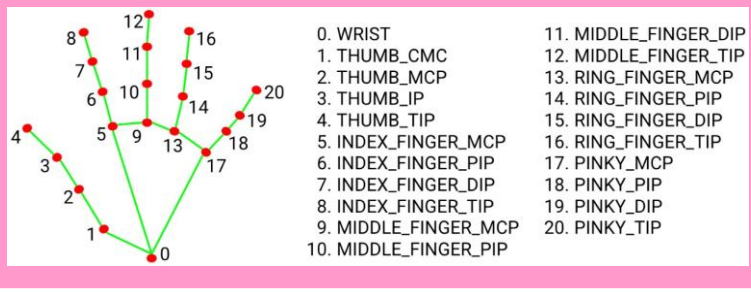


Patent number: 479715

User modeling







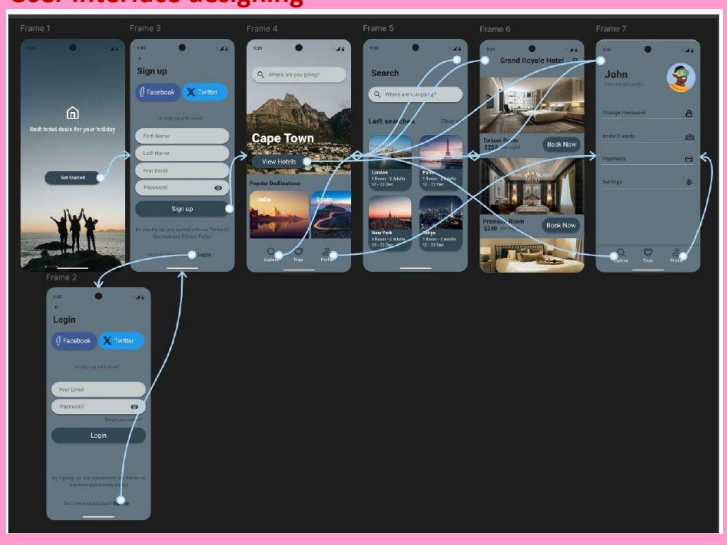
AR/VR

Wearable devices

Typeface designing

Contrary to popular belief, Lorem Ipsum is not simply random text. It has roots in a piece of classical Latin literature from 45 BC, making it over 2000 years old. Richard McClintock, a Latin professor at Hampden-Sydney College in Virginia, looked up one of the more obscure Latin words, consectetur, from a Lorem Ipsum passage, and going through the cites of the word in classical literature, discovered the undoubtable source. Lorem Ipsum comes from sections 1.10.32 and 1.10.33 of "de Finibus Bonorum et Malorum" (The Extremes of Good and Evil) by Cicero, written in 45 BC. This book is a treatise on the theory of ethics, very popular during the Renaissance. The first line of Lorem Ipsum, "Lorem ipsum dolor sit amet..", comes from a line in section 1.10.32

User interface designing



Brain-computer interface

Courtesy: Dr. D. V. Gadre's lab