EXPERIENTIAL TECHNOLOGY INNOVATION CENTRE

XTIC Chronicle

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Newsletter of Experiential Technology Innovation Centre
of IIT Madras, Chennai

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DISCLAIMER

About XTIC - Experiential Technology Innovation Centre

XTIC is an Indian Institute of Technology-Madras Community for Experiential Technology. It is India's 1st Research & Product Innovation Centre for Virtual Reality, Augmented Reality, Mixed Reality and Haptics.

CAVE - Consortium for Augmented and Virtual reality (VR/AR/MR) Engineering:

Under umbrella of XTIC, CAVE is the first consortium in India for XR Innovations (VR/AR/MR) in Engineering Mission in India (CAVE), is an India Specific group of academia, industries, startups, government bodies, at the IIT Madras.

CAVE is a part of a bigger vision of the XTIC in which we aim to make India as the XR Corridor for the world. Similar to the phrase "India is the IT corridor of the world", XTIC and CAVE aim to realize "India as the XR Corridor of the world" by 2040.

The CAVE's Engineering Mission is to promote engineering of XR technology development, not just using XR, and adoption of virtual, augmented, and mixed reality globally, particularly in India, with best practices, dialogue with all stakeholders, government policy makers, and research institutions. The CAVE is a resource for industry, academia, consumers, and policymakers interested in virtual, augmented, and mixed reality. CAVE shall have industry and domain specific group like AutoCAVE for Automotive, AeroCAVE for Aerospace, ArchCAVE for Architecture, IoTCAVE for Internet of Things and so on to focus work for adoption in that sector.

The main objective of this consortium is to enable members to create new advanced technologies and applications in XR together. Our research collaboration is with industrial sponsors and participants from industry, academic Institutes, government, Startups, Individuals, Medium Scale Enterprises and members.

What we do?

We are an innovation corridor that exists to support innovation in AR, VR & MR for IIT Madras projects and selected students in their pursuit to explore and guide to the journey of entrepreneurship. We are the catalyst who will accelerate growth, expedite the process, and envision a project or product to completion.

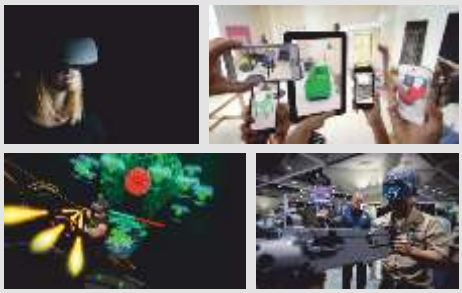
What we offer?

We give a wide array of services to become the innovative power of individuals through a network of highly-curated tutors and advisors, peer-to-peer interaction, and inclusive resource and programming support.

What we believe?

We firmly believe that wisdom paves the way for innovation, collaboration, and fitting together is vital as well. We also trust that by connecting like-minded people with shared goals and similar values, remarkable things happen. We believe in providing all the essential supports for innovation, including physical safety, transparency, empathy, compassion, connection, and the prospect for an inventive collision. We believe in revealing inherent value that can have a deep influence on marketplaces, on the world, and on the individuals, who come across these doors. We also instill our belief, we can be our creators.

Our Technology:
Virtual Reality,
Augmented Reality,
Mixed Reality,
Haptics Technology



Our Labs:
Media Labs, AR/VR Studio, Haptic Lab, Maker Lab and Manufacturing Lab

For more details, please visit and join at https://xtic.org/cave

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Why XR Wave will be the next bigger wave than the current AI Wave

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While AI has significantly impacted numerous sectors, XR promises to revolutionize the way humans interact with digital content and the physical world. The rise of XR is poised to become a more transformative wave than the current AI wave for several compelling reasons.

While AI is about Data, XR is about human experience. While AI focuses on creating intelligent systems that can learn, reason, and make decisions, XR involves creating immersive environments and experiences that blend the physical and digital worlds. It has the potential to redefine user engagement across sectors.

While AI enhances user experience by making systems smarter and more efficient, XR provides an immersive experience, essential for human experience, of digital environments or overlaying digital information on the real world leading to highly interactive and engaging experiences, more intuitive and natural. XR provides a level of immersion that AI alone cannot achieve.

While AI's impact on industries is primarily through automation, data analysis, and decision-making, XR's impact transforms industries by changing how users interact with information and environments, leading to enhanced training, improved customer experiences, and new ways to visualize and manipulate data.

While the future of AI involves advancements in generative AI, and the development of more ethical and transparent AI systems, the future of XR involves the creation of more sophisticated and realistic virtual environments that are seamlessly integrated with physical contents.

While XR is distinct from AI, the two technologies complement each other. AI can enhance XR experiences by providing intelligent interactions, adaptive learning environments, and personalized content. The synergy between XR and AI can lead to innovations that neither technology could achieve alone. AI can power virtual characters, provide real-time feedback, and enable sophisticated simulations in XR settings.

Integrating AI with XR significantly enhances human experience and is only one of the many technologies that would be integrated with XR for better human experience. Other exponential technologies such as BlockChain, 5G/6G, IoT etc would also be integrated. As more and more technology becomes increasingly integrated into our daily lives, focusing on human-centeredness ensures that advancements benefit society and enhance human well-being.

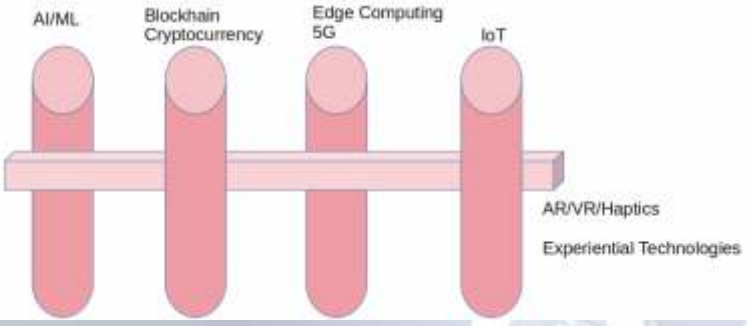
Integrating blockchain into XR enhances the human experience by ensuring security, trust, and transparency. It enables secure transactions, protects digital assets, facilitates decentralized identity management, and promotes fair reward systems for content creators.

Integrating 5G/6G into XR enhances the human experience by providing the necessary connectivity to support high-quality, low-latency, and interactive applications. It enables richer, more immersive experiences across various sectors, including entertainment, education, healthcare, and industry.

Integrating IoT into XR enhances the human experience by creating interactive, context-aware, and data-driven environments. It enhances various sectors, including smart homes, healthcare, education, industry, and tourism, by providing real-time information, improving interactivity, and enabling more personalized and effective applications.

This focus on human-centeredness is a response to the complex interplay between technology and society. By prioritizing human well-being, ethical considerations, sustainability, and innovation, XR aims to create a future where technology enhances human life rather than displacing it. Placing humans at the center of the future is crucial for creating a balanced and inclusive future where technology serves as an enabler rather than a replacement. By enhancing human capabilities, improving job satisfaction, promoting ethical and sustainable practices, addressing workforce diversity, fostering innovation, enhancing customer experiences, and building resilient systems leads to a more meaningful and fulfilling future and also drives economic growth, resilience, and sustainable development. As we move further into the future, the emphasis on human-centeredness will be crucial for building a harmonious and prosperous future for all.

The focus on human-centeredness makes the XR a horizontal technology while others are vertical technologies. XR integrates all other technologies to make the human at the center of technologies instead of replacing the human. This human centeredness is the main reason I believe XR will make a bigger wave than the current AI wave.



Editorial Desk

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XTIC at IIT Madras released a whitepaper on XR in India on March 14, 2024

From Vision to Reality:
Integrating XR into India's Digital Landscape

The whitepaper provides a comprehensive overview of experiential technologies, clearly defining terms such as Virtual Reality (VR), Augmented Reality (AR), Mixed Reality (MR), Extended Reality (XR), the Metaverse, Web 3.0, and Haptics. It emphasizes the integration of these technologies within the ambitious Digital India initiative, highlighting their synergy with AI, Blockchain, Robotics, IoT, and 5G. A strategic gap analysis of XR skills in India, aligned with global initiatives, underscores the need for infrastructure and skill development. The proposed initiatives-XR-Superhighway, XR-Corridor, XR Innovation Centers, and more-reflect a well-structured plan to bridge existing gaps and foster growth.

The whitepaper also focuses on the development and governance of the Metaverse, addressing critical issues like privacy, security, and monetization through the creation of the Metaverse India Policy and Standards (MIPS) forum. Advocacy for open-source technologies and a strong emphasis on innovation highlight a forward-thinking approach that encourages collaboration and standardization.

The document articulates a strategic economic vision, stressing the importance of hardware development and the establishment of leadership in experiential technologies for macro-economic gains. By envisioning significant advancements in XR by 2030 and further transformations by 2047, the whitepaper sets a long-term perspective on the evolution of these technologies. It calls for robust government policies and investments to create a favorable climate for XR, emphasizing intellectual property development to ensure economic benefits beyond services, positioning India as a global leader in emerging technologies.

Follow below link for full whitepaper: https://xtic.org/whitepaper-xr-in-india/

Raghavendra Achari
Principal Project Officer
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Distinct Realities:
Why XR Deserves Unique Policy Consideration Apart from AVGC

Extended reality (XR) is transforming fields such as education, healthcare, manufacturing and many more sectors. Despite its broad impact, especially In India, XR is often grouped with animation, VFX, gaming, and comics (AVGC) in policy-making. This grouping can limit XR's growth and unique potential.

Unlike AVGC, which primarily focuses on entertainment, XR applications are diverse. In education, VR can create immersive learning environments. In healthcare, MR can assist in surgeries. In Manufacturing, XR can aid in design and maintenance. These varied uses require specific policies that address the unique needs of XR.

Economically, XR has significant potential beyond entertainment. The XR Market size is estimated at USD 62.9 billion in 2024, and is expected to reach USD 294.6 billion by 2030 Source: Market.us. It creates new job opportunities and requires specialized skills. Policies should focus on workforce training and economic incentives tailored to the XR industry.

The technological requirements for XR are also different. XR needs advanced hardware, such as headsets and sensors, and robust software for real-time interaction. It also relies on high-speed, low-latency internet connections like 5G. Policies must support these unique technological needs to ensure XR's growth.

The Academics requirements for XR are more interdisciplinary and robust, whereas for Animation, VFX and comics are more Techno Artistic. Unlike AVGC, which involves in limited screen format, XR deals with Real scale immersive environment and needs new academic streamline like perception engineering.

Research and development (R&D) are crucial for XR's advancement. XR innovation is driven by research in fields like computer vision, AI, and human-computer interaction. Supporting R&D through dedicated funding and incentives is essential for the continued progress of XR technologies.

Privacy and ethical considerations are also important. XR devices collect extensive data, including biometric and environmental information, raising unique privacy concerns. Policies need to ensure data protection and address the psychological impacts of immersive experiences.

Table 1_AVGC_XR_Distinct Realities

Area	AVGC	XR
Technologies	High end Graphics	+ Head mount devices, Low Latency internet (5G) and sensors
Academics	Techno Artistic	+ Highly Interdisciplinary, Perception engineering, computer vision , AI and HCI
Grammar/ principles	Animation /gaming principles are well established for 2D screen format	+ Real time immersive Perception Granner and principles yet to establish
Research & Development	Game engines shaders and rendering	+ XR innovation is driven by research in fields like computer vision, AI, and human-computer interaction
Job opportunities	Primarily entertainment sectors, upskill/reskill	+ across all sectors, Education, Healthcare, Manufacturing and many more
Applications	Mainly Entertainment	+ Education, Healthcare, manufacturing, retail, marketing and many more sectors
Privacy Ethical	Data Protection	+ Biometric, environmental data and psychological impacts

In conclusion, while XR shares some similarities with AVGC, its distinct applications, technological requirements, and socio-economic impacts warrant separate policy considerations. Recognizing XR as a unique sector in policy-making will better support its development and unlock its transformative power across various industries.

Dr. Padmapriya P V
CEO
Merkel Haptic Systems

XR-Haptics Experience Center in Mumbai

Merkel Haptic Systems, in partnership with XTIC, delivered Haptics and VR-based fire safety training simulators to the Indian Oil Management Centre of Learning.

A state-of-the-art VR studio was inaugurated on 24th May 2024 at Indian Oil Management Centre of Learning (IMCL). This VR studio is equipped with four advanced VR and Haptics-based training simulators developed by Merkel Haptic Systems, designed to enhance employee training in Fire Safety and Cardiopulmonary Resuscitation (CPR).

Key Features of these Training Simulators are

1. **Customized Immersive Scenarios:**

   The simulators provide realistic and immersive training environments that replicate the specific conditions of the Oil Terminal and LPG bottling plants where fires are likely to occur.

2. **Tailored Haptic Extinguishers:**

   The training equipment includes customized haptic extinguishers that mirror the actual extinguishers used in the workplace, including 75kg POWDER, 9kg POWDER, and 4.5kg CO2 extinguishers.

3. **Objective Assessment Metrics:**

   The system incorporates assessment metrics to objectively evaluate the trainees' performance, ensuring effective and targeted training outcomes.

Additional VR Module for CPR Training

The fourth VR module with Haptics feedback focuses on training employees in the correct procedures for administering Cardiopulmonary Resuscitation (CPR), ensuring that they are well-prepared to handle medical emergencies.

Both the fire safety and CPR training modules will be integral parts of the all the training programs conducted at IMCL, enhancing the safety and preparedness of IOCL employees.

These custom-tailored features ensure that the training modules are specifically designed for Indian Oil Corporation Limited (IOCL), making the training sessions more relevant and effective compared to generic fire safety training modules available in the market.

We extend our heartfelt thanks to XTIC for choosing us as implementation partners in this project. The Merkel Team is proud to contribute to this innovative training initiative, helping to ensure the safety and readiness of IOCL's workforce. This initiative by IOCL marks a significant step forward in the use of virtual reality and haptics technology for specialized fire safety training, setting a new standard for safety and emergency preparedness in the petroleum industry.

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Enhancing Rhythm Adherence in Track and Field Sports with Augmented Reality Feedback

Aruna S
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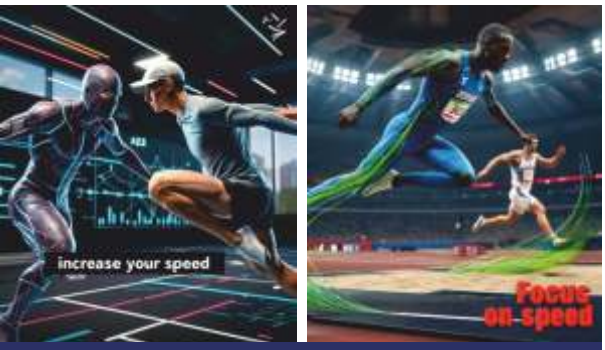
Introduction

In track and field sports, athletes often rely on specific gait rhythms tailored to their disciplines to optimize performance. The selection and adherence to these rhythms are influenced by various factors such as biomechanical characteristics, environmental conditions, and competition variables. The ability to adapt and modify these rhythms during competitions can significantly impact an athlete's performance outcome. Consider Long jump or High jump,Athletes must focus on various phases of the jump, including the approach, takeoff, flight, and landing, each demanding specific techniques and strategies to optimize distance and execution .To enhance athletes' performance, using augmented reality (AR) we can develop advanced feedback systems that provide real-time visual, auditory, and haptic cues on their rhythm adherence. These feedback mechanisms will be instrumental in fine-tuning their technique and ensuring optimal performance. Such feedback mechanisms can assist athletes in maintaining their desired rhythm and adjusting to changing variables effectively during competitions.



AR Visualization with Motion Capturing Techniques

Visual feedback can be achieved through various advanced methods. Athletes can wear AR glasses or use a mobile AR app that overlays virtual markers or visual cues onto the track or field. These markers indicate the ideal positions or timing for each step, jump, or hurdle clearance based on the desired rhythm. By overlaying graphical markers on key body points, such as the hips, knees, and ankles, and comparing the athlete's movements to an expert model, can provide detailed visual feedback. This feedback can cover critical aspects such as take-off technique, body position during flight, and landing mechanics. In addition to that, the motion capture data from different software such as Rokoko studio helps in creating a 3D representation of the athlete's movements, which can be analyzed to identify deviations from the optimal technique. Additionally, high-speed videos of the athlete performing jumps from multiple angles can be recorded. Using motion capture techniques, these videos can be further enhanced to provide a detailed analysis. Wearable motion capture suits or sensors, like those from Rokoko Studio, can be used to capture the athlete's precise movements in real-time. This comprehensive visual analysis helps athletes understand and correct their form. The AR system can highlight discrepancies between the athlete's current performance and the ideal model, allowing for precise adjustments. For example, the system can show if the athlete's take-off angle is too steep or if their landing mechanics are misaligned, providing targeted feedback to address these issues. Athletes can receive this visual feedback in real-time during practice sessions or review detailed analyses post-session. Real-time feedback via AR glasses or a mobile app helps athletes make immediate adjustments, while post-session analysis using high-speed video and motion capture data offers deeper insights for long-term improvements. By integrating all these advanced AR visualization techniques with motion capture technology, athletes can gain a profound understanding of their movements.

Auditory Feedback

Auditory feedback can be tailored to the athlete's specific needs and training objectives. For example, athletes can receive metronome-like sounds or verbal instructions that help them maintain their rhythm. The frequency and timing of these auditory cues can be customized according to the athlete's preferences. A beep or tone could signal the precise moment the athlete should initiate their jump or make contact with the take-off board, reinforcing proper technique and timing. This auditory feedback serves as an immediate guide, helping athletes stay in sync with their intended rhythm.

Haptic Feedback

Wearable devices, such as haptic feedback vests or armbands, provide tactile sensations to alert athletes when they deviate from their intended rhythm. For instance, a gentle vibration can indicate that the athlete needs to adjust their step length or timing. This haptic feedback is especially useful during training sessions, as it provides instant, non-intrusive cues that help athletes correct their movements on the fly. The system can adapt to changing variables such as surface conditions, wind speed, and athlete fatigue, utilizing machine learning algorithms to continually enhance feedback accuracy and effectiveness.

By integrating these advanced AR feedback mechanisms, we can create a sophisticated training environment that dynamically adapts to the athlete's needs and conditions. This approach not only enhances rhythm adherence but also contributes to overall performance improvement, injury prevention, and a deeper understanding of optimal movement patterns in track and field sports.

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Virtual Weddings to Immersive Showrooms:
Indian Brands Embrace AR/VR

In a bold and revolutionary move, Indian brands are undergoing a metamorphosis by embracing the power of immersive technologies to reshape shopping experiences. Through a seamless fusion of physical and digital retail, these forward-thinking businesses are immersing customers in a virtual reality space where the distinction between reality and the virtual realm blurs. The advent of immersive technologies transcends physical limitations, offering Indian brands an unparalleled opportunity to redefine the shopping journey and create unforgettable experiences that leave a lasting impact.

In 2022, Abhijeet and Sansrati, a couple from Bhopal, made history as the first Indian couple to marry in a virtual reality space. Their digital avatars celebrated on a picturesque virtual beach, with guests joining via their avatars. This groundbreaking wedding occurred on February 5th, 2022, alongside a physical ceremony in Bhopal. In collaboration with ITC and Matrimony.com, Wavemaker India orchestrated this unique 3D wedding, highlighting the fusion of technology and tradition to create an immersive experience. Virtual guests enjoyed dancing, interacting, and participating in dynamic activities, with the nuptials live-streamed within the virtual world, enabling remote friends and family to join. ITC and Matrimony.com enhanced the experience with virtual stores offering items, discounts, and gift cards. Involving brands like Coca-Cola, ITC, and Matrimony.com emphasized their commitment to innovation and digital transformation. This event created lasting memories for the couple and marked a significant milestone in exploring the potential of immersive technology to redefine social interactions and celebrations in the evolving technological landscape.

By harnessing immersive technologies like augmented and virtual reality, Indian brands are propelling a new era of engagement with their customers. They have recognized the immense potential of the virtual space to deliver an immersive and multisensory experience, seamlessly blending the best elements of the physical and digital worlds. Gone are the days of traditional showrooms-virtual showrooms now allow customers to test-drive cars, explore realistic environments, and even try on products, all from the comfort of their homes. This innovative approach eliminates physical visits and provides an engaging and convenient shopping experience. Moreover, the virtual space fosters social interactions and community building without borders. Brands can curate virtual events, concerts, and art galleries, enabling customers to connect with the brand more deeply. This sense of community and shared experiences adds a new dimension to the shopping journey, forging a unique bond between customers and brands.

Indian brands have quickly seized the virtual reality sphere, introducing shoppers to captivating virtual shopping experiences. A prime example is Maruti Suzuki, a renowned automotive brand that launched ARENAVerse, a virtual platform for its esteemed Arena showroom network. This immersive virtual experience allows users to explore their favourite Maruti Suzuki vehicles within a realistic virtual environment, showcasing the company's unwavering commitment to enhancing the interactive retail experience for modern-day consumers.

The transformation of the shopping journey is not limited to automotive brands alone. Nutralite, a leading food brand, made waves by hosting the world's first-ever cookery show in the virtual sphere, Nutraverse. Participants revelled in an immersive virtual reality experience, engaging with avatars, participating in activities and games, and even capturing selfies with the digital avatar of celebrity chef Sanjeev Kapoor.

As Indian brands embark on this transformative journey to reshape the shopping experience in virtual worlds, they are not merely providing an unparalleled experience but also harnessing abundant data to capture the voice of the customer with unrivalled precision. By seamlessly integrating computing capabilities, brands can gather insights from every interaction and make well-informed decisions based on intelligent data analysis. This data-driven approach enables brands to personalize their offerings, anticipate customer preferences, and deliver tailored experiences that resonate with their target audience.

Amidst this metamorphosis, data security and privacy emerge as crucial considerations. Indian brands must prioritize safeguarding customer information to ensure a safe and secure digital environment. With the collaboration of industry experts, government organizations, and legal professionals, efforts are underway to establish robust security measures and strategies to protect users' data and privacy in the virtual sphere.

The advancement of AR, VR, MR, and XR technologies is revolutionizing how we interact and shop, though it remains in its early stages. While smell and taste integration are still developing, haptic suits are gaining importance alongside head-mounted displays, promising a more immersive and multisensory future. As these technologies evolve, they will continue to enhance user experiences, offering increasingly sophisticated and realistic interactions within virtual environments.

Srinivasan Yagnanarayanan
Founder & CEO
GRAHAs VR, Chennai

Metaverse Onboarding & Training

The metaverse, an immersive digital landscape, is set to revolutionize corporate onboarding and training, two critical processes are often plagued by inefficiencies and high costs. By leveraging virtual reality (VR) and augmented reality (AR), companies can create engaging, interactive experiences that reduce onboarding time, lower costs, and improve employee engagement.

Current Onboarding Challenges

Traditional onboarding is a multi-phase process that can span weeks or even months. It involves a significant amount of paperwork and administrative tasks for HR departments, as well as a steep learning curve for new hires. The average cost per hire is estimated at $4,425, with approximately 10 hours spent on paperwork alone. In manufacturing, onboarding may be shorter, but it's followed by extensive on-the-job training, often taking 12-18 months before an employee reaches full productivity as per a Global PWC Study conducted in 2021.

Training Challenges

Ongoing training is essential for employees to stay up to date with product updates, process changes, and industry developments. However, it can be expensive and time-consuming, requiring employees to be away from their regular duties. In the corporate world, training programs are often structured, but in manufacturing, training is typically on-the-job, contributing to the longer ramp-up time for new hires.

Metaverse Solutions

The pandemic accelerated the adoption of remote work and virtual meetings, paving the way for metaverse technologies to reshape onboarding and training. Research indicates that VR training is four times faster and more effective than traditional methods, with employees demonstrating increased confidence in applying their newly acquired knowledge.

The metaverse offers a myriad of possibilities for onboarding and training. New hires can be immersed in virtual replicas of their workplaces, interacting with colleagues and learning about company culture in a realistic and engaging way. They can participate in interactive simulations of work tasks, receiving real-time feedback and guidance.

PWC Soft Skills Efficacy Report

Benefits of Metaverse Onboarding & Training

- **Cost Reduction:** Training costs can be reduced by 40-50%, and other indirect costs associated with logistics and administration would decrease significantly.
- **Increased Productivity:** Productivity could potentially increase by 4X, with employees reporting higher morale and confidence.
- **Global Talent Acquisition:** Companies can recruit from a global talent pool without the constraints of geographical location or relocation costs.
- **Gamification:** Gamification elements can be incorporated into onboarding and training, making the experience more enjoyable and boosting employee engagement. This is especially beneficial in remote or hybrid work environments.

Implementation Considerations

To successfully implement metaverse onboarding and training, companies should consider the following:

- **Content Creation:** Develop high-quality, engaging content that reflects the company's values and culture.
- **Hardware Investment:** Invest in reliable VR/AR devices for employees.
- **Communication:** Clearly communicate expectations to employees and provide them with the necessary support and training to use the technology effectively.
- **Pilot Programs:** Conduct pilot programs to test the effectiveness of metaverse onboarding and training before full-scale implementation.

While the initial investment in hardware and content creation can be substantial, the long-term benefits are expected to outweigh the costs. The metaverse offers a unique opportunity for companies to enhance their onboarding and training processes, improve employee engagement and retention, and ultimately drive business growth in the digital age.

As 5G, advanced computing, and optics technologies continue to advance, the metaverse is poised to play an increasingly important role in the future of work, revolutionizing how we onboard, train, and collaborate.

How XR Technology is the New Skill Enabler
- A Solution For ITIs

Vinodh Kumar B
Impact Executive, AjnaLens

Imagine learning a skill in a matter of time instead of days. Picture becoming a well-informed welder in a few short months, replacing the years it takes traditionally. This is happening right now PAN India, from Dibrugarh to Deccan and from Mumbai to Chennai! With home-grown XR technology and the entire XR ecosystem, AjnaLens is now training the spine of the next generation workforce with over 72000+ user base.

Current Challenges at the ITIs

Industrial Training Institutes (ITIs) have long been the backbone of vocational education in India. They produce skilled workers who work not only in India but also abroad, mostly in the Gulf. These workers not only drive the country's industrial and economic growth but also bring huge foreign remittances, adding dollars to the Indian foreign reserve.

However, traditional training methods at ITIs face various infra and structural challenges, particularly in the welding and spray painting trades. These challenges include limited access to equipment, safety concerns, and a lack of formal tracking and analytics to monitor student's progress.

Issues Observed at the Welding and Painting Front

1. **Lack of Equipment**

   ITIs frequently lack essential equipment for both welding and painting. For welding, this includes Tungsten Inert Gas (TIG), Metal Inert Gas (MIG), and stick welding torches. In painting, necessary spray equipment like Airless Spray Painting Guns and HVLP (High Volume Low Pressure) Paint Guns are often missing. This shortage limits the ability of trainees to learn and practice various techniques in both segments.

2. **Material and Consumable Shortages**

   Both trades face consistent shortages of necessary materials and consumables. Welding students often lack the required consumables for hands-on practice, while painting students do not have enough materials to develop their skills. These shortages hinder students' ability to gain the practical experience needed for dexterity.

3. **Repetitive Practice Limitations**

   Resource constraints in both segments limit the ability for repetitive practice, which is crucial for mastering skills. Continuous practice is essential for developing muscle memory and refining techniques in both welding and painting.

4. **Safety Concerns**

   Safety is a major concern in both trades. Welding students often lack Personal Protective Equipment (PPE) and are exposed to harmful fumes and gases like carbon monoxide, carbon dioxide, sulfur dioxide, ozone, and nitrogen oxides. Similarly, students learning spray painting are exposed to harmful chemicals, posing significant health risks. These conditions can deter students from pursuing careers in these trades.

5. **Material Wastage**

   Traditional methods in both trades result in significant material wastage. This increases training costs, lacks sustainability and has a negative environmental impact, making efficient resource management a priority.

6. **Lack of Analytics**

   Both welding and painting training programs lack formal systems for tracking and analysing student performance and progress. Without data, it is a huge challenge to measure student progress, identify areas for improvement, and ensure that students achieve the desired competency levels in both trades.

The Solution: XR-Based Welding and Painting Training

AjnaLens, a Mumbai-based XR startup, has developed the entire XR ecosystem with the idea of making learning skills possible for people, even at the grassroots level. ITIs are the best place to start with; this innovative approach utilises a phygital (Physical + Digital) training methodology, allowing students to learn with real-life welding and spray painting tools in a digitally created simulation. This method significantly enhances safety and efficiency, enabling students to master these skills within a structured and controlled setting.

Best Outcomes Fuelling The Workforce of New India

The implementation of XR-based training has yielded exceptional results, significantly enhancing overall performance and efficiency. It has drastically reduced training costs by minimizing the need for consumables and material wastage, while gamified learning has boosted student engagement and interaction, making training more enjoyable and effective.

The interactive and immersive nature of simulation-based learning has improved knowledge retention, enhanced muscle memory, and accelerated proficiency, reducing the required training time.

Furthermore, comprehensive analytics provide valuable insights into student performance, promoting continuous improvement. Trainees are now more technically sound in reading and interpreting technical parameters, planning work processes, and using tools effectively. Additionally, XR training instils a strong adherence to safety rules and environmental protection guidelines, fostering responsible work practices and reducing the environmental impact.

Here's How AjnaLens by Dimension NXG is Supporting the Digitization of ITIs

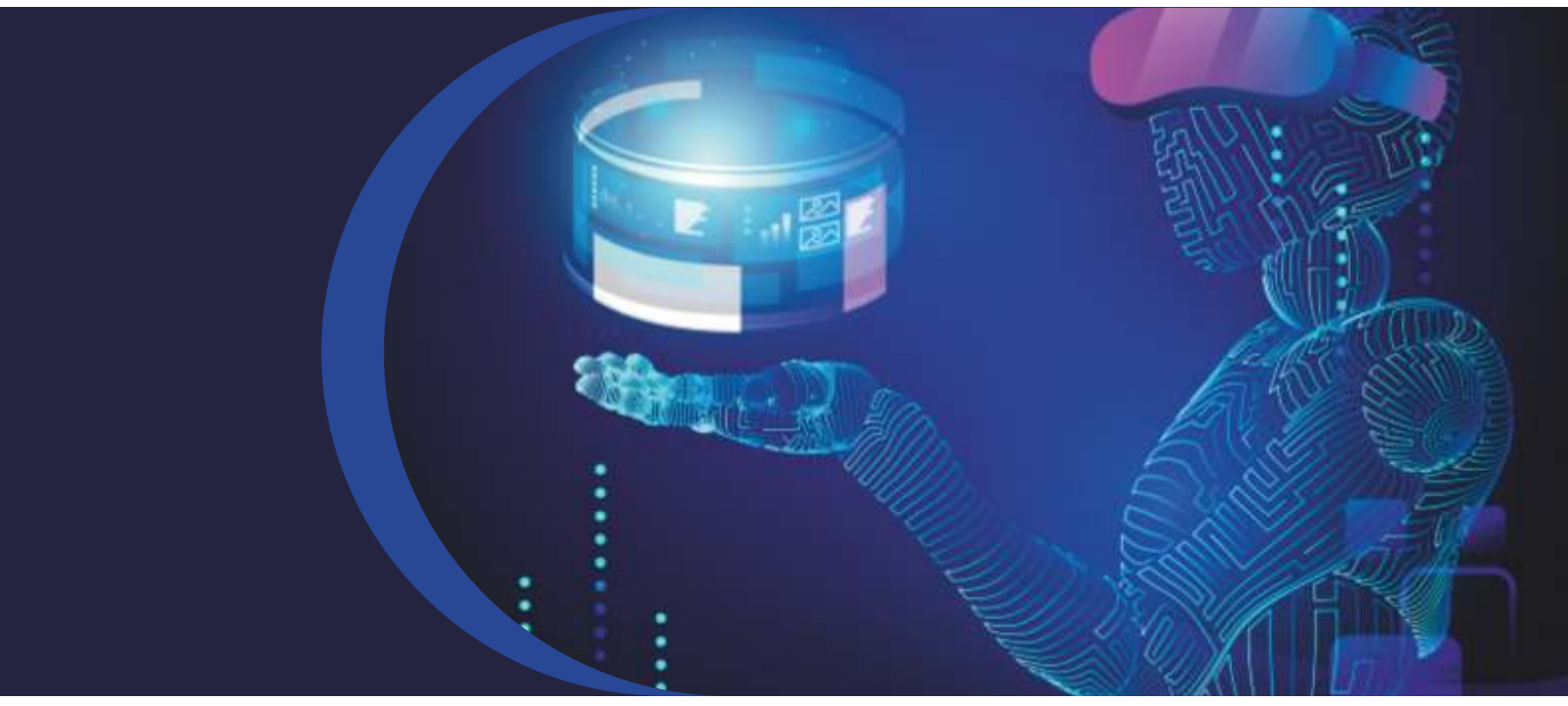
Pankaj Raut, CEO at AjnaLens quotes "The government has made significant strides in promoting the technology sector in India with initiatives like Digital India. Now it's our turn to accelerate this progress. At AjnaLens, we have already deployed cutting-edge XR technology to over 600 ITIs, the goal now is to make it a national movement. This initiative will not only digitise upskilling but also empower the next generation of workforce, giving them a competitive edge in the modern workforce."

AjnaLens is making this vision come to life by:

- Building infrastructure for imparting education at ITIs. This includes the setup of XR labs equipped with advanced simulation tools.
- Starting with painting and welding courses, there is potential to add more courses using the same infrastructure. This flexibility ensures that the training solutions remain relevant and up-to-date with industry needs.
- Developing industry relevant digital content for various trades, ensuring that students have access to high-quality training materials for multiple occupations/vocations using a unified AjnaLens platform enriched with gamut of phygital tools.
- Creating a comprehensive skill database to track student progress and performance. This database provides valuable insights into the effectiveness of training programs and helps in continuous improvement.
- Establishing a proof of concept that can be scaled by the government. This demonstrates the effectiveness of XR-based training solutions and encourages wider adoption.

As we move forward, the successful implementation of these technologies will pave the way for a more skilled and competent workforce globally, driving industrial growth and economic development.

The integration of XR-based training solutions not only addresses the challenges faced by ITIs but also aligns with the broader vision of digitising vocational education in India. This is possible because of the transformation of VR from a gaming novelty into a powerful skill development tool through gamified learning for both blue and white-collar workforce.



Bridging the Skill Gap in India: **The Role of XR and AI in Enhancing Soft Skills**

Vishal Pandey
CTO & PhD Candidate, IIT Roorkee
MythyaVerse

In India, the landscape of skill development is fraught with challenges, particularly in the realm of soft skills. Despite producing a large number of technically proficient graduates, the Indian education system often falls short in equipping students with essential soft skills such as communication, teamwork, and emotional intelligence. This disparity is a barrier not only to individual career success but also to the nation's economic growth, as industries increasingly demand well-rounded professionals who can thrive in collaborative and dynamic environments.

The Potential of XR in Soft Skills Development

XR technologies create immersive environments that can simulate real-life scenarios, providing a practical and engaging platform for soft skills training. By placing learners in virtual situations that mimic workplace challenges, XR enables them to practice and refine their communication, problem-solving, and teamwork abilities in a controlled, risk-free setting.

For instance, a VR simulation can recreate a high-pressure team meeting where participants must negotiate, collaborate, and make decisions under stress. Through such experiences, learners can develop critical soft skills, receive real-time feedback, and gain the confidence needed to apply these skills in real-world contexts. The immersive nature of XR ensures that these lessons are more impactful and memorable than traditional training methods.

VRPlaced: Pioneering XR in Career Readiness

Founded in 2023 by IIT Roorkee Ph.D. students Anmol Gupta and Vishal Pandey, MythyaVerse is revolutionizing career readiness through advanced AI and VR. Their flagship product, VRPlaced, combines AI-powered interview simulations with realistic VR environments to bridge the gap between traditional education and the demands of an AI-driven job market. VRPlaced helps users reduce interview anxiety, improve public speaking, and enhance confidence by offering personalized feedback and training across a wide range of professional scenarios.

VRPlaced provides personalized feedback on both verbal and non-verbal communication, helping users understand and improve their performance. During virtual interview simulations, the platform analyses the user's tone of voice, body language, and response content, offering insights into areas of strength and improvement. Additionally, VRPlaced's focus on emotional intelligence training helps users develop empathy, active listening, and conflict resolution skills-essential in today's AI-driven job market. By integrating these elements into its curriculum, VRPlaced ensures learners are well-prepared for job roles and equipped to navigate modern professional environments.

The Future of AI-Driven Industries

As the future unfolds, the integration of AI and XR technologies is set to redefine industries across the globe. The rise of AI-driven tools in the workplace is increasing the demand for skills that machines cannot easily replicate-chief among them, soft skills. Professionals who can combine technical expertise with strong interpersonal abilities will be at a distinct advantage in this evolving landscape.

AI-powered platforms like VRPlaced are at the forefront of this transformation, providing innovative solutions that bridge the skill gap and prepare individuals for the demands of an AI-driven economy. By continuously evolving and incorporating the latest advancements in AI and XR, such platforms will play a crucial role in shaping a workforce that is adaptable, resilient, and equipped for the future.

In conclusion, addressing the soft skills gap in India is essential for both individual career success and broader economic growth. XR technologies offer a promising avenue for effective soft skills development, providing immersive, engaging, and impactful training experiences. Through platforms like VRPlaced, the power of XR and AI can be harnessed to create a future-ready workforce, capable of thriving in an increasingly automated world. The journey ahead is exciting, and the potential for innovation and growth in this field is immense.

XR Bharat:
Shaping Tomorrow's Realities

Introduction

XRIG - a platform where academics, industries, and creativity unify to shape the future of immersive technologies, is all set to host India's First Student-Run Extended Reality Summit at IIT Madras. Scheduled to take place this November, the summit encapsulates a spirit of innovation exceeding boundaries across domains. As stated by Professor A.N. Rajagopalan, VR and AR also have important implications in the medical domain, especially in the difficult times of Covid, where these technologies played a major role in assuring the mental state of affected people.

Objective

At the core of the XR Bharat is a mission to unite curious minds from various fields to pioneer the next era of reality. This summit aims to build a network of individuals with shared interests, delving into the vast possibilities of augmented reality (AR), virtual reality (VR), and mixed reality (MR). Through a series of meticulously curated events, attendees will embark on an adventurous journey of discovery and inspiration.

Execution Plan

The Summit's array of events is designed to captivate participants at every turn.

- The Spotlight Series shines a light on distinguished global guests, with their knowledge and experience they bring insightful perspective on the evolving landscape of Extended Reality. Attendees will get the chance to connect with the experts, ask questions, and gain valuable insights into this XR ecosystem.
- The Masterclass Sessions are an opportunity for interactive learning and coaction. This will not only help gain in-depth technical knowledge but also serve as an immersive exploration with the latest tools, technologies, and methodologies used in XR development through engaging practical exercises and discussions enabling attendees to apply their newfound skills in the real-world.
- The Workshops are more than just learning sessions; they are crucibles of creation. Offering experience zones meticulously designed to showcase all things XR . From augmented reality (AR) and virtual reality (VR) use cases in Unity to XR design principles and content creation, the workshops cover a spectrum of topics for both beginners and seasoned enthusiasts.
- The XR Hackathons are more than just competitions; they serve as harmonious quests for innovation. Participants will brainstorm ideas, and embark on a journey to develop solutions for addressing challenges. From XR game development and design to healthcare applications and educational simulations, the hackathons cover a wide spectrum of XR domains.
- The Research Paper Presentations are a testament to the depth and breadth of XR research happening around the world spanning its applications across domains. From innovations to frameworks, this alignment with industry trends and challenges ensures that each research presented is not just theoretical but also relevant and impactful.
- The XR Startup Pitch is a launchpad for emerging startups, providing all with the opportunity to pitch their ideas, demonstrate their XR solutions, and gain valuable feedback and mentorship from industry veterans. The XR Startup Pitch is more than a contest; it's a catalyst for growth and success. Participants will receive guidance, exposure, and networking opportunities that can propel their startups to new heights.

Future Outlook

"By establishing a 'VR Superhighway,' we envision a future where India leads in XR innovation, training a new generation of experts and fostering a vibrant ecosystem of startups and industries in virtual reality." - M.Manivannan, Professor - Touch Lab, XTIC, IIT Madras.

Beyond being a gathering, the XR Bharat is a medium for collaboration, inspiration, and transformation. It embodies the core ethos of XRIG, an inclusive platform where diverse perspectives converge to shape the future of immersive technologies. Together, attendees will embark on an exhilarating journey, where innovation, curiosity and harmony reign supreme.

As we look forward to the XR Bharat, let's embrace this spirit of exploration and discovery. With the aim of paving the way for a future where XR reshapes our realities, blurring the lines between the physical and digital worlds, and ushering in a new era of possibility.

XRIG:
Crafting Realities Beyond Screen

In the bustling corridors of IIT Madras, an independent visionary student-led initiative is reshaping the boundaries between the physical and digital dimensions. XRIG (eXtended Reality Innovation Group) is at the forefront of exploring cutting-edge technologies that redefine our perception of the world. From Augmented Reality to Virtual Reality, XRIG is on a mission to revolutionize how we encounter and interact with digital content. Opening doors to immersive experiences and innovative learning opportunities, while also providing industry-relevant exposure.

What sets XRIG apart is its comprehensive roadmap and meticulously curated resources. These resources are not just about teaching XR concepts but about empowering learners to navigate the complex landscape of immersive technologies. Through knowledge sharing, XRIG raises awareness and promotes technological literacy, nurturing a generation of XR enthusiasts well-equipped to make a significant impact.

One of XRIG's standout features is its active participation in hackathons and real-world applications. Some of our impactful projects that redefine learning and collaboration include AR for NCERT which transforms education by bringing textbook concepts to life. It includes a gravity simulation for predicting rocket trajectories and interactive 3D Hybridisation models for Chemistry. The project aims to make learning more engaging and help students better understand and retain complex concepts. With an aim of offering an immersive virtual exploration of all the IIT campuses, we have VR Campus Tour. Using advanced VR technology, users can navigate different areas and facilities, experiencing the campus life and environment without being physically present. Oasis to enhance online collaboration by merging personalized avatars with video calls on a Unity-based VR platform. Users can create avatars from photos, making virtual interactions more engaging. The project aims to turn remote meetings into more effective and enjoyable experiences. Along with projects like Insti Social, AI2AR, VR Campus Tour, and Contour AR not only showcase XRIG's technical expertise but also position it as a pioneer in the XR domain. By pushing the boundaries of what's possible, XRIG inspires others to explore immersive technologies and contribute to positive change.

Central to XRIG's success is its global outreach and collaborations. With a distinguished faculty advisor like Dr. M Manivannan from the Department of Applied Mechanics at IIT Madras, XRIG's influence extends far beyond local borders. Collaborations with entities like XTIC (Experiential Technology Innovation Centre) and ICXR (Intercollegiate XR) further amplify XRIG's impact. XTIC, India's foremost research center for product innovation in virtual reality, augmented reality and mixed reality, provides XRIG with a platform to showcase cutting-edge solutions. On the other hand, ICXR, based in the USA, forms a vast network of XR enthusiasts and practitioners, fostering a collaborative ecosystem of knowledge exchange and innovation.

In essence, XRIG's journey is not just about hosting summits, hackathons, global guest sessions, masterclasses, workshops, startup pitches, or research opportunities. It's about pioneering a new era of reality, one where boundaries are blurred, creativity thrives, and technology serves as a medium for positive change.

Enhancing Holistic Wellness through Immersion!

V Vijayalakshmi
Professor, IIT Madras

V S Baskar
MS Scholar, IIT Madras

Youth well-being has become a matter of concern recently. NIMHANS Bengaluru, University of Melbourne, Australia and several other Indian universities have declared the existence of a significant prevalence of depression, anxiety symptoms, disinterest, lack of enthusiasm and suicidal thoughts among students. The survey revealed a staggering 38.1% of students have suicidal thoughts, 33.6% of students have depression symptoms and 23.2% have moderate to severe anxiety symptoms. Loneliness, social disconnection, overthinking, inferiority complex, peer pressure, academic pressure, relationship failure, disinterest in academic, and lack of purpose in life are among the factors that influence wellness in youth.

We look to technology to provide us with solutions to address this burgeoning epidemic. There is an onus on educational institutions, through their wellness centers, to foster an environment that is safe, nurturing and healing. Wellness centers partner with trained psychologists and clinical therapists to conduct various wellness programs such as mediation, yoga sessions, mindfulness activities, one on one and group counseling to enhance holistic wellness of the student community. These traditional ways of offering mental wellness support have come a long way, but still a long way to go in accessing care initiatives to the most needy.

How do we capitalize on student needs and preferences? Can we reframe wellness initiatives in a manner that is relatable and attractive to the youth? The advent of mobile and internet technology through self-care mobile applications, instant chat with therapists and remote video call consultation has digitalized mental wellness practices. Going a step further, the influx of cutting-edge emerging technologies such as Metaverse, VR, AR and MR has enhanced the treatment for mental wellness by making patients immerse themselves in therapeutic procedures with much effectiveness.

Marrying wellness interventions with immersive technologies provides a fresh dimension to the therapeutic process. Wellness centers in educational institutions can leverage students' preference to metaverse related technologies by motivating students to seek support for their therapy. VR technology treats students with exposure therapy by simulating scenarios that are challenging for the student, in an immersive 3D environment. VR technology can be used to treat emotional regulation by following self-care options through gamification of breathing and mindfulness techniques. Ofcourse, we cannot overlook technical challenges such as cost, accessibility, simulation sickness but the use of immersive technologies to address wellness challenges is the way forward, is less intimidating and plays to students' preference.

Formation of the Metaverse India Policy and Standards (MIPS) Committee at XTIC, IIT Madras

Thriveni P
Sr. Program Coordinator
XTIC, IIT Madras

Announcing the Formation of the Metaverse India Policy and Standards (MIPS) Committee at XTIC, IIT Madras.

We are thrilled to announce the creation of the "Metaverse India Policy and Standards (MIPS)" committee at XTIC, IIT Madras. This pioneering initiative aims to establish and promote standards and best practices for metaverse and XR solutions, with a focus on ensuring safety, privacy, and ethical adoption of these emerging technologies.

The Purpose of MIPS

The metaverse represents a rapidly evolving digital frontier, necessitating adaptive and robust standards. The MIPS committee is dedicated to guiding this evolution responsibly, requiring active support and collaboration from academia, industry, government, and individuals. It is our collective efforts that will shape the future of the metaverse in India.

Committee Responsibilities

The MIPS committee will not directly produce standards or policies. Instead, it will coordinate the needs and resources to promote the development of these standards within relevant organizations. The committee's responsibilities include:

1. **Research:** Conducting thorough research on Metaverse technologies, their applications, and global policy frameworks.
2. **Policy Framework:** Developing a comprehensive Metaverse standards and policy framework tailored to India's unique socio-cultural and economic landscape.
3. **Impact Analysis:** Analyzing the potential impacts of the Metaverse on various sectors like education, healthcare, gaming, and enterprise, and proposing strategies to maximize benefits.
4. **Ethical Issues:** Addressing ethical, privacy, and security concerns associated with Metaverse technologies.
5. **Stakeholder Collaboration:** Engaging with stakeholders from industry, academia, and government to gather diverse perspectives and insights.

First Meeting Highlights

The inaugural meeting of the MIPS core committee took place on May 6, 2024.

Several key points discussed including decentralizing leadership, establishing an oversight committee for professionalism, and creating strategic

frameworks for domain groups. The committee aimed to form subcommittees for specific areas, promote inclusivity among diverse stakeholders, address India-specific issues like language and digital identity and plan promotional activities of MIPS for greater visibility.

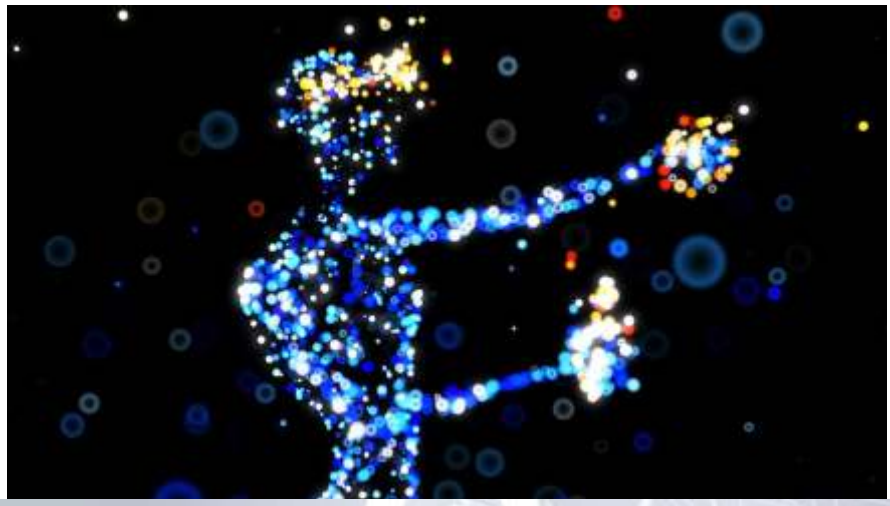
Next Steps

The core committee will focus next on tasks that include but not limited to collecting input from other core committee members and identifying action items, creating subcommittee based on expertise and interests, setting clear expectations and roles for subcommittee members, exploring partnerships and promotional opportunities. There will also be continuing discussions on draft policies and standards and defining timelines for outcomes and future meetings.

Invitation to Join

The MIPS core committee invites experts from various related fields to join us as members for the MIPS subcommittees. Your participation will significantly contribute to the success of this initiative, ensuring a MIPS that embraces the immense potential of the metaverse while ensuring responsible and inclusive implementation.

For more details and to express your interest in joining, please contact us at cave@xtic.org. Together, we can shape a responsible and innovative future for the metaverse in India.



Somjit Amrit
iHUB HCI Foundation
IIT Mandi

IIT Mandi iHub and HCi Foundation

Who we are: IIT Mandi iHub and HCi Foundation is a Technology Innovation Hub (TIH) of IIT Mandi focused on Human-Computer Interaction (HCi) technologies. The Hub was incorporated on 24th September 2020. It is set up by the Indian Institute of Technology (IIT) Mandi under India's National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS).

The Vision: "To be an internationally recognized hub that nurtures HCi research, enables technology translation for industry, and scales skill development.

Primary Activities of TIH:

1. Technology Development
2. Skill development and Entrepreneurship
3. Incubation and Acceleration
4. International Collaboration

Breakthrough Technologies by IIT Mandi iHub:

1. DRIVER ALERTNESS MANAGEMENT SYSTEM (DAMS)

At the forefront of cutting-edge research in Human-Computer Interaction (Hci), the IIT Mandi iHub focuses on leveraging Indian datasets. A notable achievement is the development of the Driver Alertness Management System (DAMS). DAMS utilizes computer vision and device-led technologies to enhance road safety by monitoring driver alertness in real-time. Recently demonstrated to the Chandigarh Transport Undertaking (CTU), DAMS showcased its effectiveness across various scenarios within operational buses, highlighting its capabilities in both front-end and back-end operations.

Brief Description: DAMS is a Computer-Vision based, Device-Led Technology in HCi, aimed at preventing fatal accidents by providing timely and personalized alerts to drivers.

Breakthrough Nature of Technology

- Introduction of Indian Dataset for the first time in the public transport sector, revolutionizing risk management.
- Implementation of an optimal and lightweight combinatorial algorithm in computer vision.

Initial deployment commenced on 9th February 2024 at Chandigarh Transport Undertaking (CTU)

2. DOMAIN-BASED LEGAL LLM FOR THE ENTERPRISE

In collaboration with the High Court of Punjab and Haryana, advancements are made in legal solutions tailored to specific domain requirements using Gen AI for Enterprise.

Phase I: Understanding the High Court's environmental needs, especially in dense and congested environments. The system ensures high performance in dynamic setups with tiered access profiles.

Phase II: Utilizing the open-source Indian legal database to create domain-based legal Large Language models (LLM) through a pilot project for the High Court, incorporating Wi-Fi 6 technology for improved efficiency & security.

Key Features

- Faster Data Rates
- Increased Capacity
- Improved Power Efficiency

Enhanced Performance in Crowded Environments Phase I execution is valued at more than INR 2 Cr, with Phase II is currently underway.

Launch of the Centre for Human-Computer Interaction (CHCi) by the Technology Innovation Hub (TIH) at IIT Mandi

The establishment of the Centre for Human-Computer Interaction is a significant milestone in the nascent history of Technology Innovation Hub and IIT Mandi. The centre was inaugurated on May 08, 2024, by Prof. M. Manivannan, Professor of Biomedical Engineering from the Department of Applied Mechanics at IIT Madras. He was the chief guest for the event.

The inaugural event was graced by esteemed personalities from Department of Science and Technology, Govt. of India, academia, and Industry.

One of the stated goals of the Technology Innovation Hub (TIH) at IIT Mandi is to set up a world class centre to nurture the science and technology of the rapidly evolving world of Human-Computer Interaction. With the establishment of CHCi, the ecosystem would be created to promote excellence in translational research resulting in products and platforms which could yield significant breakthroughs to address some of the nation's priorities.

During his special address, Chief Guest Prof. M Manivannan, IIT Madras, said, **"The advancement of computer interfaces heralds the dawn of the next technological era, underscoring the need for us to maintain our forefront position in innovation. As technology continues to evolve rapidly, it is crucial to establish a centre capable of guiding India towards leadership in future technologies. CHCi stands ready to assume a pivotal role in spearheading this ambitious endeavour. India possesses significant potential to make substantial contributions to the advancement of technology, employing an integrated approach across diverse engineering disciplines and embracing a multi-model methodology. I am confident that CHCi will emerge as a catalyst for collaboration, propelling India towards the forefront of technological innovation in Human-Computer Interaction."**

The Centre's initiatives will encompass a wide range of areas within the HCi landscape, including but not limited to:

- Assistive Technologies
- Experience Technologies
- Device-Led Technologies
- Brain-Computer Interaction
- Generative Design

These core areas will be supported by state-of-the-art facilities spanning over 2200 square feet, fostering innovation and nurturing talent in the field of HCI.

The establishment of the CHCi closely aligns with the broader objectives of the Technology Innovation Hub (TIH) at IIT Mandi. By leveraging existing physical assets and engineering research talent, the Centre aims to accelerate translational research and extend its reach to industry sectors. Through collaborative efforts with industry leaders, the Centre seeks to address industry-specific problem statements effectively, bridging the gap between academia and industry.

Nikitha Donekal Chandrashekar
Research Scholar
Virginia Tech

The Next Frontier in XR: **Collaborative and Multimodal Technologies**

Collaborative Multimodal Extended Reality (XR) is revolutionizing the way we interact with virtual environments by integrating advanced sensory inputs and collaborative features. By combining visual, auditory, haptic, and even olfactory inputs, this technology offers a comprehensive and immersive user experience. Real-time collaboration in virtual spaces is facilitated by robust networking solutions like 5G and edge computing, which ensure low latency and high-speed data transfer. Integrating data from various sensors and utilizing algorithms to interpret multimodal inputs enable intuitive interactions, allowing users to control virtual environments with natural gestures, voice commands, and eye movements.

The applications of collaborative multimodal XR span a wide range of industries. In healthcare, it enhances surgical training and remote consultations, providing realistic simulations and real-time expert guidance. For instance, the HoloLens by Microsoft has been used in medical training to project 3D models of human anatomy, enabling a more interactive learning experience. Educational

institutions and corporate training programs leverage XR for immersive learning experiences that improve understanding and retention. The Unity platform is widely used for creating educational XR content, offering a versatile toolset for developing interactive and engaging training modules. In the realm of remote work, platforms like Spatial facilitate spatially aware teamwork, essential for fields like architecture and engineering.

The entertainment industry also benefits significantly from XR technologies, offering more engaging and interactive experiences through immersive gaming and virtual events. Popular VR games like "Half-Life: Alyx" demonstrate the potential of XR to create deeply engaging gaming experiences. Furthermore, XR concerts and events, such as those hosted by platforms like Wave, provide a glimpse into the future of interactive media and entertainment. As the technology advances, we realize increased realism, accessibility, and integration with IoT and smart city infrastructures, making collaborative XR a central part of our interconnected future. This ongoing evolution promises to enhance various aspects of everyday life, from professional collaboration and education to entertainment and beyond.

Transforming Workforce with Gen AI and Multi-Sensorial XR

Scaling up training programs with Haptics and XR

Dr. Alpana Dubey
Technology Research Principal Director
Accenture

Generative AI (Gen AI) has shown great promise in improving workforce productivity on several fronts – e.g., by providing easier access to information, co-creating content, writing code, etc. However, its full potential is yet to be unlocked, as efforts to leverage Gen AI with other emerging technologies have just begun. One such example is the use of Gen AI with multi-sensorial XR technologies.

Multi-sensorial XR technologies are the technologies where XR content is presented along with other sensory simulations such as touch, smell, temperature, or taste. Let us explore some opportunities that Gen AI and multi-sensorial XR can bring for large-scale workforce training.

Imagine a nurse trainee who is required to undergo several hours of practice to perfect each procedure. He can practice these procedures either on a human manikin available in his training institute or as an apprentice under a senior nurse. Such an approach for practicing and training is not scalable to address the huge workforce shortage in several industries [2,3]. We have witnessed one such extreme shortage of healthcare professionals during the pandemic. To make the workforce ready for such jobs faster, it is essential to provide trainees with customizable practice environments at scale with relatively less effort and time. Gen AI along with multi-sensory XR technologies can help address some of these burning demands.

Gen AI is already capable of generating procedural training content, but we are focusing on industries where workforce need to acquire skills beyond procedural knowledge and developing a multi-sensorial memory footprint is a crucial part of training. For instance, in the healthcare industry, it is important for a nurse to build muscle memory for needle procedures. Similarly, in manufacturing industry, a technician needs to understand texture and resistance while handling a machinery, an operator needs to get tactile feedback while operating machines remotely. So far, such needs have been addressed by physical simulators like car simulators, drilling simulators, variety of physical manikins for medical procedures, etc. However, simulators are limited in capability as they are available for a fixed number of scenarios and provide limited opportunity for customization.

With Gen AI and multi-sensory XR technologies, it is now possible to synthetically create innumerous training scenarios. For example, Gen AI can synthetically generate a patient profile along with the force feedback exerted by different layers of skin when a needle procedure is administered. This can be simulated in an XR environment augmented with a haptic device. This helps a trainee practice a needle procedure on a variety of patients without the need for specific manikins for each patient profile. Further, Gen AI can help customize the training content based on the trainee's performance. For example, he can be provided more scenarios of elderly patients if he finds this more challenging.

Accenture is collaborating with Touch Labs IITM in the area of Gen AI and XR technologies to reimagine a scalable workforce training solution. We believe that as Gen AI starts to embrace multiple modalities and sensory simulators, we will witness a great transformation in large-scale workforce training.

References:

[1] The human side of generative AI: Creating a path to productivity https://www.mckinsey.com/capabilities/people-and-organizational-performance/our-insights/the-human-side-of-generative-ai-creating-a-path-to-productivity

[2] Nursing and midwifery . https://www.who.int/news-room/fact-sheets/detail/nursing-and-midwifery

[3] The Skilled Professional Shortage: An Unsung Need for Technicians https://www.forbes.com/sites/forbesbooksauthors/2023/12/12/the-skilled-professional-shortage-an-unsung-need-for-technicians/

IITM-Finland Certificate Course on Fundamentals of Virtual Reality:

A Transformative Learning Experience

Immerse yourself in the fascinating world of Virtual Reality (VR) with the IITM-Finland Certificate Course on Fundamentals of Virtual Reality. This unique program, a collaboration between IIT Madras and the University of Oulu, offers an unparalleled opportunity to delve into VR technology, guided by leading experts in the field.

Why VR?

VR technology opens doors to incredible experiences-from exploring breathtaking virtual environments to enhancing learning and training through immersive simulations. With the advancement of affordable and accessible VR systems, now is the perfect time to master this transformative technology.

Course Highlights:

- **Expert-Led Instruction:** Learn from distinguished faculty, including early Oculus founders Dr. Steven LaValle and Dr. Anna LaValle, along with esteemed IIT Madras professors Dr. M. Manivannan and Dr. Kaushik Mitra.
- **Comprehensive Curriculum:** Gain a deep understanding of VR hardware, software, and the interaction between human senses and VR systems. Topics include 3D modelling, rendering, tracking, sensor fusion, human physiology, and perception in VR.
- **Hands-On Experience:** Develop your own VR experience using Unity3D, calibrate VR systems, and evaluate human perception in virtual environments through practical assignments and projects.
- **Accessible Learning:** Benefit from live online classes, interactive quizzes, and recorded lectures, with flexible access to accommodate diverse schedules.
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Special Opportunity:

Top 200 participants will be invited to a one-week campus visit to IIT Madras, where they will interact with faculty, explore campus facilities, and engage with industry pioneers.

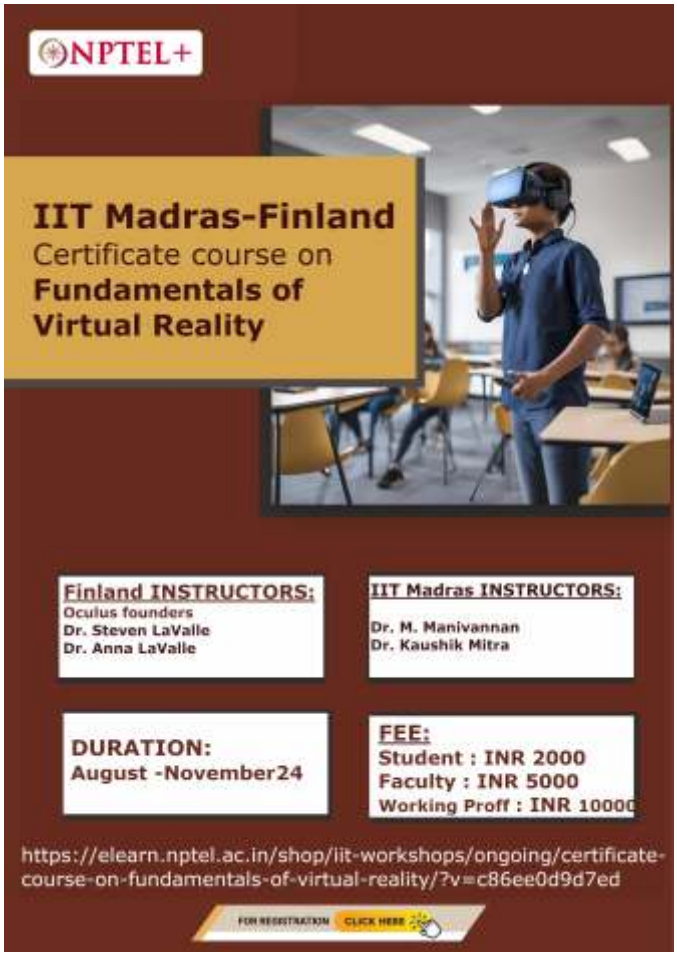
Join Us:

Embark on this exciting journey to master VR and expand your horizons. Register now and be part of a transformative learning experience that bridges the best of academia and industry.

For More Information:

Visit NPTEL link for registration and additional details.

https://elearn.nptel.ac.in/shop/iit-workshops/ongoing/certificate-course-on-fundamentals-of-virtual-reality/?v=c86ee0d9d7ed



Don't miss out on this incredible opportunity to advance your skills and knowledge in Virtual Reality!

For Registration

Release of First Newsletter XTIC Chronicle

Newsletter for XR Community in India!

Dr. S Pandian, Former Director, Satish Dhawan Space Center SHAR, ISRO and Visiting Faculty, Applied Mechanics and Biomedical Engineering Department, IIT Madras releases inaugural newsletter- "XTIC Chronicle" of XTIC-IITM in a function held on 14th March 2024 at Research Park - IIT Madras.

Dr. S Pandian handed over newsletter to Mr. Prakash Damodharan, IAS (Retd.) First IT Secretary of Tamil Nadu and advisor of IoE Research Center on VR and Haptics also known as XTIC IIT-Madras to release for readers and XR community.

Thanks to Prof. Ashok Jhunjhunwala for gracing the occasion.

Following Image (Left to Right) Mr. Raghvendra Achari, Dr. Ashok Maharaj , Rabindra Sah, Mr. Prakash Damodharan IAS (Rtd), Dr. S. Pandian and Dr. M. Manivannan.

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