



XTIC
EXPERIENTIAL TECHNOLOGY INNOVATION CENTRE

XTIC Chronicle

Volume 03 | September 2024

Newsletter of Experiential Technology Innovation Centre
of IIT Madras, Chennai

Human Wellbeing



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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 Prioritizing Human Well-Being is Critical in the Era of AI/ML, AR/VR and 5G/6G

The true promise of AI/ML, AR/VR, and 5G/6G lies not just in their ability to revolutionize industries and drive economic growth, but in their potential to enhance human well-being. To achieve this, we must commit to a technology-driven future that prioritizes the human experience, with well-being as the guiding principle behind every innovation.

As we stand at the cusp of a technological revolution powered by AI/ML, AR/VR, and the rapidly advancing 5G and future 6G networks, there is an undeniable excitement about the possibilities these innovations bring. From automating mundane tasks to creating immersive virtual experiences and enabling lightning-fast connectivity, technology is evolving at an unprecedented pace. However, amid this rapid development, one crucial consideration must remain at the forefront: human well-being. The potential benefits of these technologies are vast, but without a deliberate focus on human well-being, they also pose risks to mental health, social cohesion, and personal fulfillment. By centering technological advancement around the well-being of individuals and communities, we can ensure that these innovations enhance, rather than diminish, our quality of life.

The Human Cost of Technological Progress

While AI/ML, AR/VR, and 5G/6G offer tremendous benefits, they also come

with challenges that can affect human well-being in myriad ways.

Mental Health Impacts: The increasing use of AI and automation has raised concerns about job displacement and economic insecurity, leading to stress and anxiety for many workers. Furthermore, as AR/VR technologies create new digital environments, there is a risk that individuals may become isolated from real-world social interactions, exacerbating feelings of loneliness and disconnection. While more AI-powered chatbots, such as Woebot or Wysa or August AI, provide real-time emotional / medical support and guidance to users, these systems need to be carefully designed to ensure they provide appropriate advice and can recognize when human intervention is necessary.

Digital Overload: With the widespread adoption of 5G and the anticipated introduction of 6G, we are seeing a surge in the volume of data, notifications, digital interactions and tremendous distractions. While these technologies promise greater connectivity and access to information, they can also contribute to a sense of "digital overload," and distractions where constant connectivity leads to burnout, diminished attention spans, and reduced quality of life. While AI-driven personalization can make digital experiences more relevant and engaging, frequent notifications to keep users engaged, sending alerts for new messages, updates, suggested articles, or social media interactions, and Infinite

Scroll and Content Feeds, would lead to Digital overload which in turn leads to Decision Fatigue, reduced productivity, and impaired wellbeing. To mitigate these effects, users can take steps such as managing notification settings, setting limits on screen time, and engaging in digital detox practices. AI/ML systems should be designed to promote healthier digital habits, such as encouraging breaks and reducing the frequency of non-essential notifications.



Privacy and Security Concerns:

While AI/ML and AR/VR systems provide significant benefits, they also present risks to privacy and security when not properly managed. They have the ability to collect and analyze vast amounts of personal data. AR/VR technologies, closer to human beings, can infringe privacy and security much more. Without proper safeguards, this could lead to privacy violations and misuse of information, undermining people's sense of security and trust in technology. AI/ML systems such as Targeted ads, particularly those that rely on large datasets and predictive algorithms, can create significant privacy and security concerns due to their ability to collect, analyze, and infer sensitive information. To protect users, it is essential to establish robust data protection

regulations, ensure transparency in AI/ML and AR/VR systems, and provide individuals with greater control over their data. Privacy-enhancing technologies and clear ethical guidelines can help mitigate the risks associated with data collection and usage of AI/ML and AR/VR systems.

Human-Centered Solutions:

To navigate these challenges, it is essential to adopt a human-centered approach to technology development, focusing on fostering well-being in both individuals and communities. Here are several key areas where this focus is critical:

1. Mental Health and Emotional Support:

AI/ML technologies can be powerful tools for supporting mental health. For instance, AI-driven chatbots and virtual therapists are being developed to offer immediate emotional support to individuals in need. However, these solutions must be carefully designed to ensure that they complement, rather than replace, human interaction and care. In addition, technology can be leveraged to detect early signs of mental health issues through predictive analytics, allowing for timely intervention. Ensuring that AI-driven mental health solutions are accessible, ethical, and evidence-based is crucial for promoting overall well-being.

2. Balancing Digital and Physical Worlds:

AR/VR offer incredible opportunities for learning, entertainment, and productivity, but they also risk alienating people from

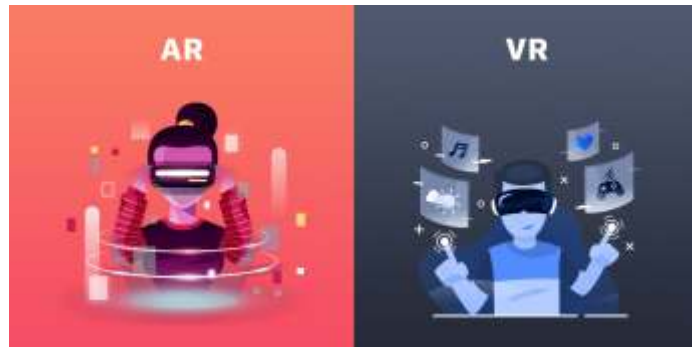
real-world experiences. To maintain balance, it is important to design technologies that encourage users to remain connected to their physical surroundings and relationships. For example, AR applications can be designed to enhance, rather than replace, real-world activities, such as exercising, socializing, or learning. In the workplace, VR could be used for skills training and collaboration, but it must be carefully integrated with human interaction to preserve social bonds and teamwork.

3. Ethical Data Use and Privacy Protection:

As AI/ML-powered systems and 5G/6G networks continue to collect and process data at unprecedented levels, ensuring ethical data use and privacy protection is critical. Clear regulatory frameworks and transparent data practices can help build trust between users and technology providers. Prioritizing privacy and data security safeguards can also alleviate concerns around AI's potential to infringe on personal freedoms. By protecting individuals' rights and ensuring accountability, we can foster a healthy relationship between people and technology.

4. Encouraging Healthy Digital Habits:

In a hyper-connected world, fostering healthy digital habits is essential for maintaining human well-being. Tools that promote digital mindfulness—such as apps that encourage breaks from screen time, track digital consumption, and promote physical activity—can help individuals maintain a healthy balance between their online and offline lives. Additionally, designing



technologies with features that encourage moderation and self-regulation can prevent the negative impacts of overuse, such as digital addiction or information fatigue. Educational campaigns about digital wellness are also key to helping users navigate this new landscape mindfully.

5. Equitable Access and Social Inclusion:

The deployment of 5G/6G technologies has the potential to bridge digital divides by connecting remote areas and underserved populations. However, care must be taken to ensure that these advancements are implemented equitably, without leaving behind vulnerable communities. By prioritizing universal access, we can ensure that the benefits of these technologies are shared widely, contributing to greater social and economic well-being.

Shaping a Future That Prioritizes Well-Being

By adopting a holistic approach that considers mental, emotional, and social health, we can create technologies that empower individuals, strengthen communities, and contribute to a more inclusive and sustainable world. Ensuring that these advancements align with our values and aspirations will help us harness the full potential of technology for good. In an era of AI/ML, AR/VR and next-generation connectivity, focusing on human well-being is not just an option—it is a necessity for building a healthier, happier, and more resilient society.





Editorial Desk



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The Power of Human-Centric Era

In an era where human experience is paramount, extending beyond mere transactions to an immersive engagement, XR (Extended Reality) technologies-encompassing AR (Augmented Reality), VR (Virtual Reality), and MR (Mixed Reality)-are pioneering a transformation in how we approach human wellbeing. This edition of our newsletter explores this groundbreaking theme, shedding light on how XR is reshaping our practices and enhancing our quality of life.

Elevating Health and Fitness Through XR

XR technologies are redefining practices and processes in health and fitness, creating new pathways for maintaining a positive mindset and overall well-being. By integrating VR content, users can immerse themselves in virtual environments that simulate various physical activities and wellness routines, making fitness more engaging and accessible. For example, VR can transport users to serene landscapes for guided meditation or challenging terrains for virtual workouts, bridging the gap between motivation and practice.

The Power of Immersive Experiences

In today's market, the human experience is critical when selecting products and services. XR provides a unique platform to create immersive experiences that

resonate deeply with users. Through VR, we can craft detailed scenarios that allow individuals to experience products and services in a virtual setting before making a commitment. This not only enhances user satisfaction but also fosters a deeper connection between individuals and their wellbeing solutions.

The Role of Perception Engineering

Perception engineering is central to XR's impact on human wellbeing. It involves designing experiences that effectively alter user perceptions and emotions. By leveraging advanced XR technologies, we can create environments that



encourage relaxation, focus, and emotional balance. Tailoring these experiences to address specific wellness goals ensures that users derive maximum benefit from their XR interactions.

Opportunities for Skill Development

The expanding field of XR offers substantial opportunities for students to build skills and contribute to this evolving space. Whether through developing XR-based products or providing services, there is a growing demand for expertise in this area. Educational institutions and industry leaders must collaborate to prepare the



next generation of professionals who will drive innovation in XR technologies for human wellbeing.

Industry Adoption for Enhanced Efficiency

For industries, adopting XR technologies can streamline internal processes and enhance customer interactions. By integrating XR into training programs and customer service, companies can reduce costs and save time while providing richer, more interactive experiences. This dual advantage of operational efficiency and improved customer satisfaction highlights the strategic value of XR technologies.

As we move forward, the convergence of XR and human wellbeing promises to unlock new dimensions of health, fitness, and emotional resilience. Embracing these technologies not only enriches our personal lives but also paves the way for a future where wellbeing is seamlessly integrated into our everyday experiences.



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Exposure Therapy using Extended Reality

Exposure therapy, a cornerstone in psychological treatment, has witnessed a transformative evolution with the advent of Extended Reality (XR). By immersing patients in simulated environments, XR offers a controlled and graduated approach to confronting fears and anxieties, often yielding more rapid and enduring results than traditional methods.

The World Health Organization (WHO) estimates that 19.1% of the global population suffers from some kind of anxiety disorder, which includes phobias. In other words 1 in 5 people experience some anxiety disorder, including phobias, in their lifetime. This translates to approximately 1 billion people worldwide suffering from anxiety disorder.

At its core, exposure therapy involves gradually exposing individuals to the situations or objects they feel anxious about. This process, whether in traditional or XR formats, is grounded in the principles of classical conditioning, where a conditioned fear response is gradually extinguished through repeated exposure.

Key advantages of exposure therapy include:

- a) **Gradual Desensitization:** By systematically exposing individuals to feared stimuli, the therapy helps to reduce anxiety responses over time.
- b) **Cognitive Restructuring:** Exposure therapy challenges distorted thoughts and beliefs about feared situations, promoting more adaptive thinking patterns.
- c) **Behavioral Change:** Through repeated exposure, individuals learn to engage in behaviors they previously avoided, leading to increased self-efficacy.

d) **Improved Quality of Life:** Successful exposure therapy can significantly enhance individuals' daily functioning and overall well-being.

e) **XR technology amplifies these advantages by providing highly immersive and customizable environments.** For instance, a patient with acrophobia (fear of heights) can be virtually placed on a skyscraper's edge, allowing them to confront their fear in a safe and controlled setting. The progression of exposure can be meticulously calibrated, ensuring a gradual desensitization process.

One of the most significant advantages of XR in exposure therapy is its ability to simulate a wide range of phobic stimuli. From claustrophobia to social anxiety, XR can recreate these environments with remarkable realism. This versatility expands the scope of treatment, making it accessible to a broader patient population. Moreover, XR offers opportunities for exposure to situations that might be impractical or ethically challenging in real life, such as combat-related trauma or natural disasters.

Beyond phobias and anxiety disorders, XR-based exposure therapy has also shown promise in treating post-traumatic stress disorder (PTSD). By recreating elements of traumatic experiences in a controlled virtual setting, individuals can gradually process and reframe their memories, leading to reduced symptoms of PTSD. Additionally, XR has potential applications in treating obsessive-compulsive disorder (OCD) by exposing patients to their feared situations or objects in a virtual environment.

While XR holds immense promise, it is also essential to appreciate its

limitations. Issues such as simulator sickness, the need for specialized equipment, and the potential for over-reliance on technology require careful consideration. Additionally, the integration of XR into therapeutic practice demands specialized training for clinicians.

Despite these challenges, the potential benefits of XR in exposure therapy are undeniable. As technology continues to advance, we can anticipate even more sophisticated and effective applications of XR in mental health treatment. From haptic feedback that simulates physical sensations to AI-driven adaptive treatment plans, the future of XR in exposure therapy is bright. By combining the power of virtual environments with therapeutic expertise, XR is poised to revolutionize



the way we address phobias, anxieties, and traumas.

To maximize the effectiveness of XR exposure therapy, it is crucial to tailor treatment to individual needs, combine it with traditional therapy, address ethical considerations, and monitor for adverse effects. By carefully considering these factors, clinicians can harness the full potential of XR to improve patient outcomes and enhance the overall efficacy of exposure therapy. The therapy can help its recipients break free from their limitations, unlock their potential, and lead a more authentic, fulfilling, and purposeful life.



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AR and VR Technology in Planning and Design of Airports: A Revolution in Aviation Infrastructure

Augmented Reality (AR) and Virtual Reality (VR) technologies are transforming various sectors, and the aviation industry is no exception. These technologies are proving to be game-changers in the planning and design of airports, offering innovative solutions that enhance efficiency, safety, and passenger experience. This article delves into the impact of AR and VR on airport design and planning, with a focus on Indian case studies to illustrate their practical applications and benefits.

Understanding AR and VR in Airport Design

AR and VR technologies provide immersive experiences that can significantly aid in the planning and design phases of airport construction and renovation. AR overlays digital information onto the real world, enhancing the perception of the physical environment. In contrast, VR creates a completely virtual environment, allowing for detailed simulations and walkthroughs.

These technologies facilitate various aspects of airport design, including:

Visualization and Simulation: Architects and planners can create detailed 3D models of airport layouts,

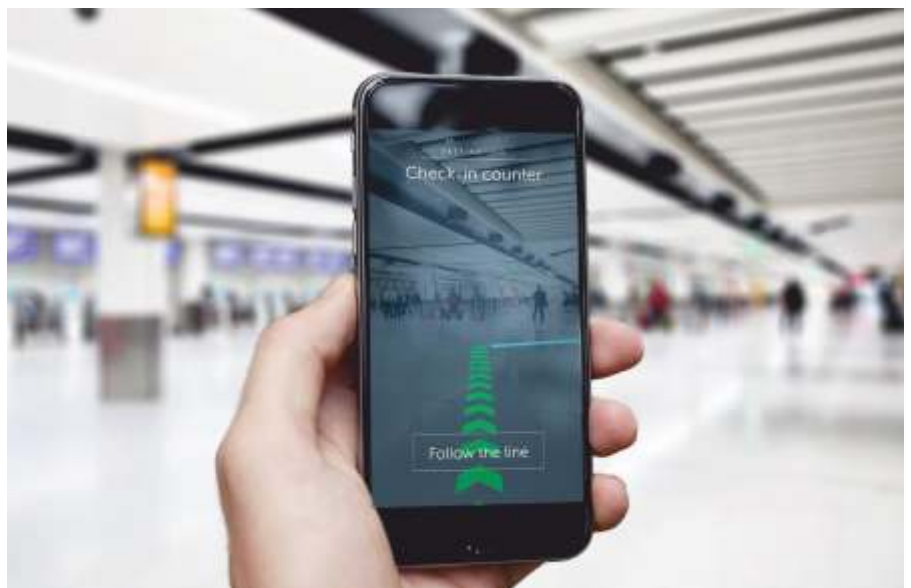


enabling stakeholders to visualize the design before construction begins. This helps in identifying potential issues and making informed decisions.

Training and Safety: VR can simulate emergency scenarios and operational processes, providing staff with realistic training experiences without any risk. This enhances preparedness and safety protocols.



Passenger Experience: AR can be used to improve the passenger experience by providing real-time information and navigation assistance within the airport, reducing stress and improving overall satisfaction.



AR and VR in Indian Airports:

India, with its rapidly growing aviation sector, has been an early adopter of AR and VR technologies in airport design and operations. Here are a few notable examples:

1. Kempegowda International Airport, Bengaluru

Kempegowda International Airport (KIA) is one of the pioneering airports in India to integrate AR and VR technologies in its planning and operations. The airport authority employed VR to simulate the design and layout of its second runway and terminal, allowing stakeholders to experience the design in a virtual environment. This helped in making crucial design adjustments before actual construction, saving time and costs. Additionally, AR has been implemented to enhance the passenger experience. The airport offers an AR-based navigation app that helps passengers find their way through the terminal, locate

amenities, and receive real-time flight updates.



2. Chhatrapati Shivaji Maharaj International Airport, Mumbai

Chhatrapati Shivaji Maharaj International Airport has utilized VR technology for training and operational purposes. The airport's management has developed VR-based training modules for security personnel, simulating various scenarios like security breaches and emergency evacuations. This has significantly improved the readiness and efficiency of the airport's security staff. The airport also employs AR to assist ground staff in maintenance and repair tasks, overlaying critical information on real-world equipment, thus enhancing accuracy and reducing downtime.



3. Indira Gandhi International Airport, New Delhi

Indira Gandhi International Airport (IGIA) in New Delhi has integrated AR and VR technologies to streamline its design and planning processes. During the planning of its Terminal 3 expansion, VR was used to create detailed virtual models of the new terminal. This allowed designers and engineers to explore different design options and identify potential bottlenecks in passenger flow and logistics. Moreover, AR is being used to provide passengers with an interactive and engaging experience. IGIA's AR-enabled mobile app offers features such as virtual shopping, where passengers can view and purchase products from airport stores through their smartphones.



Benefits and Future Prospects

The integration of AR and VR in airport planning and design offers numerous benefits, including:

Cost and Time Efficiency: By identifying and addressing design issues in the

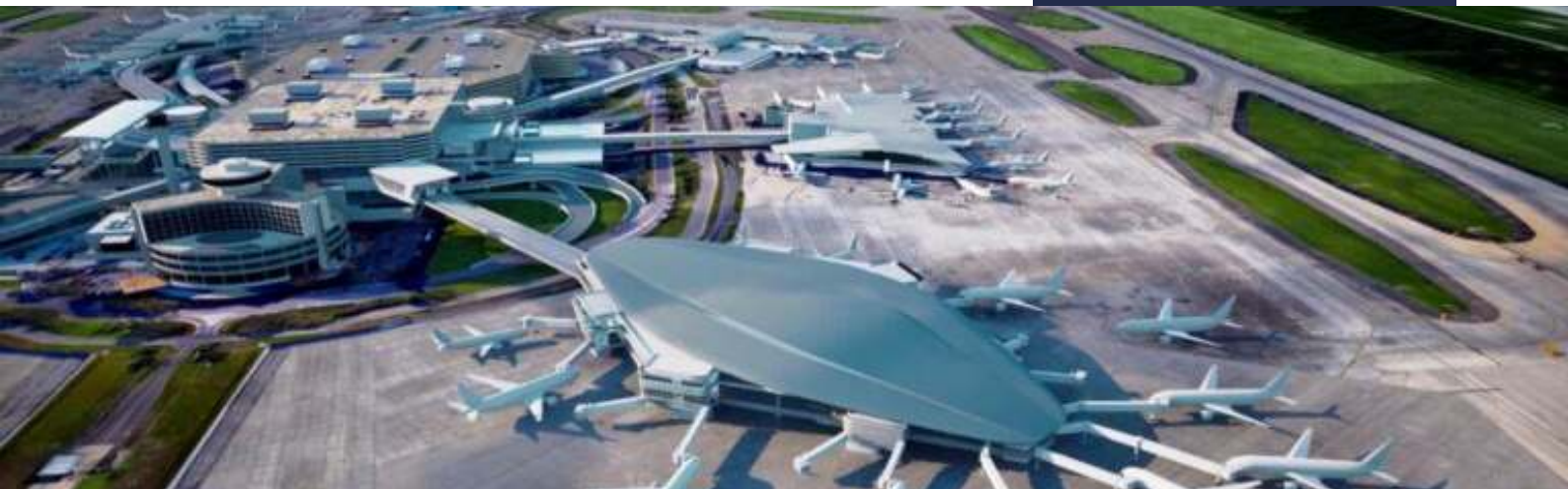
virtual phase, airports can avoid costly modifications during construction.

Enhanced Safety: VR-based training ensures that staff are well-prepared for emergencies, leading to improved safety standards.

Improved Passenger Experience: AR applications provide passengers with useful information and assistance, making their journey through the airport smoother and more enjoyable.

Looking ahead, the adoption of AR and VR in airport design is expected to increase, driven by advancements in technology and the growing demand for efficient and passenger-friendly airports. The Indian aviation sector, in particular, stands to benefit significantly from these innovations as it continues to expand and modernize its infrastructure.

AR and VR technologies are revolutionizing the planning and design of airports, offering innovative solutions that enhance efficiency, safety, and passenger satisfaction. Indian airports like Kempegowda International Airport, Chhatrapati Shivaji Maharaj International Airport, and Indira Gandhi International Airport are leading the way in leveraging these technologies to create state-of-the-art aviation hubs. As these technologies continue to evolve, their impact on airport design and operations is set to grow, heralding a new era of smart and efficient aviation infrastructure.





Dr. M. Ramasubramani

Director

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The Future of Learning: Embracing VR and AR in Education

The way that technology is developed is changing the nature of education. Virtual reality (VR) and augmented reality (AR), revolutionizing how students learn and interact with information, are two of the most promising innovations. Institutions can provide immersive, captivating, and customized learning experiences that meet the varied requirements of students by incorporating VR and AR into the classroom. This blog will examine the possibilities for VR and AR in education, going over their advantages, difficulties, and prospective applications.



Understanding VR and AR in Education

Before delving into the applications of VR and AR in education, it's essential to understand what these technologies entail. Virtual Reality (VR) creates a fully immersive environment that allows users to experience a different reality through the use of headsets and other

devices. Augmented Reality (AR), on the other hand, overlays digital information onto the real world, enhancing the user's perception of their surroundings. When applied in educational settings, VR and AR in education can transform traditional learning methods into dynamic and interactive experiences.

Benefits of VR and AR in Education

The integration of VR and AR in education offers numerous advantages that can enhance the learning process significantly.

Enhanced Engagement and Motivation

One of the most significant benefits of using VR and AR in education is the increase in student engagement and motivation. These technologies make

learning more interactive and enjoyable, capturing students' attention and encouraging them to participate actively in their education.

Personalized Learning Experiences

VR and AR in education provide personalized learning experiences that cater to individual student needs and

learning paces. By allowing students to explore content at their own speed, these technologies help to ensure a deeper understanding of the material.

Improved Retention and Comprehension

Research has indicated that when

students are able to truly participate with the material, they recall it better. Through the use of VR and AR in the classroom, students can directly experience difficult subjects, improving their comprehension and long-term memory.

Safe and Controlled Learning Environments

VR and AR in education offer safe and controlled environments where students can experiment and learn without real-world consequences. For example, medical students can practice surgeries in a virtual setting, gaining valuable experience without any risk.

Applications of VR and AR in Education

The use of VR and AR in education spans various fields and subjects, offering unique applications that enhance learning outcomes.

Science and Medicine

Virtual reality (VR) and augmented reality (AR) in science and medicine can give students lifelike models of intricate systems and processes. For example, medical students can perform surgery in a virtual operating room, while biology students can examine the human body in three dimensions.

History and Social Studies

Students studying social studies and history can go back in time and experience historical events firsthand thanks to the use of VR and AR in the classroom. Students can gain a deeper grasp of the past by using virtual reality to explore ancient civilizations or see important historical episodes.

Arts and Design

VR and AR in the classroom give students studying art and design additional avenues for project creation and



visualization. With the use of these technologies, students can enhance their creative process by designing 3D models or visualizing their artwork in various settings.

Challenges of Implementing VR and AR in Education

Despite the numerous benefits, there are challenges associated with implementing VR and AR in education.

Cost and Accessibility

One of the primary challenges of adopting VR and AR in education is the cost of the technology and its accessibility. Schools and institutions may face budget constraints, making it difficult to provide the necessary equipment for all students.

Technical Issues and Support

The use of VR and AR in education requires technical expertise and support to ensure smooth operation. Schools need to invest in training educators and IT staff to handle any technical issues that may arise.

The Future of VR and AR in Education

The future of VR and AR in education looks promising, with advancements in



technology making these tools more accessible and affordable. As more institutions recognize the potential of VR and AR in education, we can expect to see widespread adoption and integration into various educational programs.

Increased Adoption and Integration

As technology continues to advance, VR and AR in education will become more prevalent. More schools and institutions will integrate these technologies into their curricula, providing students with innovative and engaging learning experiences.

Conclusion

The integration of VR and AR in education marks a significant shift in how students learn and interact with information. By offering immersive and personalized learning experiences, these technologies have the potential to revolutionize education and prepare students for the challenges of the future. While challenges remain, the benefits of VR and AR in education far outweigh the obstacles, making them essential tools for the modern classroom. As we continue to embrace these innovations, the future of education looks brighter than ever.





Amjath Meeran

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Film Production Company

Introduction:

As a member of the film, media and entertainment sector, I would like to address the topic "Human Wellbeing" focusing on the consumption of entertainment using technology and devices. Wellbeing is always a recurring topic because it is the 4th basic need of life next to food, cloth and shelter. As Content Creators (films, shows and songs) and as the producers who have spent time and money on producing a film or any entertainment content; we always have the pressure to take the content to wider audiences. We promote them to watch. At the same time we have the responsibility to analyse the impact that our content creates on the audiences, especially the kids and the young adults. I would term it as 'ESR' Entertainer's Social Responsibility. The onus is on the creators to adhere to the safety of the viewers by measuring the viewer's physiological and psychological implications on what they consume as a content. Creators depend on Technology to deliver their content because all these content files they create become Signals of

Consumption of Entertainment using Technology and Devices

Communication. It is the Era of Communicators and Technologists. In this modern world of IoTs, Metaverse and Artificial Intelligence of Things; all these creators jointly with techies; they promise the consumers with 'More Personalized or Immersive Experience' which is a constant bombardment of campaigns that reads "Hay! get come and Indulged!". Well, when it comes to Digital Wellbeing or Responsible Consumption of Entertainment it is a topic that is seldom addressed.

Please, I am sticking to my subheading which is "The Impact on Audiences while Consuming Entertainment on the Mobile Screen".

A human gets equated with 5 points while consuming an entertainment / infotainment or presentation content on the Mobile Screen (1) It's excitement and addiction to the kind of the content it consume (The Genre, Theme Etc), (2) The want to use new technologies and methods to consume the content more comfortably in high definitions and resolutions (3) The Pride attached with the equipment/gadget they own through which they consume entertainment (4) The Ignorance of Physiological effects of their sensory organs when they get in-touch with gadgets while consuming, (5) The Ignorance of the Psychological effects of addictive video watching and the aftermath illusion that stays inside the concentric mind for sometime or even forever. In this article, let us pick up the fourth point for a simple read.

The Ignorance of Physiological Effects on the Sensory Organs While Consuming Entertainment:

What are the 5 human senses? Hearing, Seeing, Touching, Smelling and Tasting. Out of which Hearing, Seeing and Touching gets indulged while watching

a film or a song. Let me categorize into 2 broad points based on Seeing and Hearing. For both the common sense that is also put to use is the Sense of Touching - be it Physical touch (Kineticism) or the Mental touch (through feelings/emotions).

1) Sense of Seeing and Its Physiological Effects:

Let us take a non-immersive consumption of entertainment as a case analysis; A Couple is watching a Youtube Video on a mobile device. I googled to get an answer for a question which is "How far one should keep distance away from his/her eyes to watch a film on a mobile device. The answer is approxi 20 Inches to 30 Inches. However in practicality either he or she, as individuals or as together they watch within a distance of 10 centimeters or even less. As I am typing I got another question which is 'why do I suddenly see white spots after I am exposed to a bright TV screen or my laptop, in fact, I only indulged for a few minutes?'. The search engine prompted me with loads of articles probably written by Ophthalmologists, Personal care Professionals, Medicine / Medical / Paramedics departments. I herewith consolidate the search result in a para that goes like "Looking at a bright light and then looking away can cause Temporary Blindness or the Temporary Appearance of Spots or Patterns in your Vision. Bright Light Causes Special Cells in your Retina to become Saturated with Pigment looking directly into the sun, or any bright lights / explosions can cause permanent sight loss and the article goes on and on emanating constant warning for the reader. Well if this is the case when the couple



watch on a mobile screen for an approximate running time of a movie for about 150 Minutes, what could be the impact their retina would be exposed to?. Unlike earlier, these days we are constantly on the mobile or looking at the mobile. From infants to elderly most of them are so addicted that without looking at the screen they do not even eat. So, how we are going to tackle these tech-trends which pose a tech-threat to human wellbeing. Of all the concern Dads and Moms use mobiles to feed their infants instead of a spoon. And how much the tender retina of the infant would tolerate?

The saviours are going to be the Doctors and Scientists / Researchers to analyse it and come out with a tech based solution that would act as the filter between eyes and the screen. I just imagined about the same, what if we create a Compound Spectacle, something like a movie watching aid like a 3D glass, something that can be used like a normal reading glass. The compound spectacle idea is an inspiration from the eyes of the Insects (for ex. Bee) because Bees sees objects that include moving objects such as Humans as a collective Spam of Particles. They move in unison as each particle is in connection with one another and together as they keep wavering in the shape of a human. Probably the compound lens based specs could disburse the light particles that emerge out of the mobile screens and experience the entertainment through the specs that consists of tens of tiled lenses that would probably reduce the strain of the Retina of a viewer. In fact every frame of a movie we watch on the screen is a teleported signal as RGB / CMYK dots and finally gives the illusion of a completed image of the actors and background. It is just a thought and I do not want to share something half baked with less or no knowledge about optical science or ophthalmology.



2) The Senses of Hearing, Touching and its Physiological Effects:

The connection between Ears, Fingers, Body Posters constitutes kinesthetic communication. These 'Audio Haptics' is something a commoner is unaware of but it is this communication that helps one feel a film. When the eardrum is constantly exposed to vibrations through music or sound effects what kind of impact (presser regulation) the ear diaphragm would undergo in the long run after watching a 15 min to 2+ hrs of content? Do the developers of the audio haptic devices (such as usual headphones or AR VR headsets) prescribe on their products about how long one should use their devices. Or else should the ENT Doctors have to circulate their patience or educate the Ministry about the impacts of hearing Hi fidelity sounds while (for example watching an Action Film or a Horror Film, or even an Indian Kuthu Song with high Bass). Is there an physiotherapy exercise to recover or treat a damaged eardrum? Every question is unanswered. Because, except the branded, most of the companies whoever developing their products with the integration of not so skin friendly artificial material (Such as Plastics, Foam, Sponges, Copper, Wires, Fiber Optics,

Glasswool and So on) the companies are under pressure to get the final manufactured product of a headset or an earphone aiming at high performance and profit plus within a time frame. So that their company can get the maximum share in the market pie, so that they don't lose on the market trends, to pay their employees and to pay the bank debts, etc. Of course they do multiple Human-Impact tests with their products in their labs, in order to meet Govt. Standards Certifications, but beyond that they have no control over a consumer once their product (an earphone or a headset) is purchased.

Now whose responsibility is it to educate the consumers about the adversities they would face for their prolonged Hearing habits of an entertainment content or an infotainment content that also demands a Sitting or Leaning Position on a Chair or Bed or on-the-Go or while being in the driver's seat. Precisely, no one. It is like selling 'Smoking is Injurious to Health' on the Pocket and the pocket has the legal approval to sell. I guess there is nobody in this world except oneself and his/her self awareness about the adversities and how they should make a lifestyle change in order to



keep away from the impacts and effects while consuming an entertainment content.

So far I have taken an example only with consumption of normal entertainment, which is like consuming entertainment with lots of distractions from their surroundings. Ok, when it comes to Immersive technology, say think about XR immersive experience? wearing the headset of AR VR. What is the impact of it? We know immerse means the Impact, which means using all senses in one because the headsets play the role of a blinker. XR is about high definition or high precision Human Experience, which means the audience totally gets engulfed into a different world for a brief period of time. What the images of the films or an office presentation leave on the head after oneself remove the headset. It is actually for the future, because as of now people cannot afford it because of AR VR sets are expensive, however, soon there will be cheap headsets by the 2nd quality producers.

This is not a Summary:

Now that from an infant to an elderly they do their basic daily activities watching on a mobile phone screen, the worst part is even the drivers, be it two

wheelers or four wheelers they do have on-line chat while driving, which is the most dangerous practice. Generally an intellect would believe the onus is on the tech Service / product Providers to ensure the Audience with Digital Wellbeing or Entertainment Wellbeing. To protect their wellbeing the corporations, research centers and institutions along with policy makers and the health ministry should come out with solutions like, for example, restricting social media for a specific period of time. What a weird person am I? Still, let me continue, Say Facebook / Youtube or Insta shuts by 9 PM IST and opens only by 9 AM IST. if you feel unsound about it, well should the mobile phone/gadget makers come out with a technology that would beat the intensity of the brightness without allowing the user to alter the contrast or any night filters. Or should the gadget itself beep when it is used beyond a fixed period of time? or will they provide Specially Designed Power Glasses for the buyers of either Samsung or an Apple Phone as part of the Purchase Pack.

Watching ordinary content on the screen affects the entire body starting from the eyes, the diaphragm of the ears (drum), The neck spine, since we

constantly swipe while sitting in a place or a seat it affects the limbs and legs, the additive haptic activities affect the fingers to shoulder joints, as they keep swiping the screen. What if my entire senses such as Hearing, Seeing, Touching all get connected through an immersive experience? Probably the audience gets disillusioned for at least a few minutes after watching an immersive tech based entertainment on a bright digital screen. Probably the Zologram based entertainment could beat this stress on the audience as well as on the gadget makers because in zologram-entertainment like the characters in Starwars Movies they come out of the device and interact with us. This is indeed a huge topic I can write about in future.

There are loads of data being dumped in the cloud, day by day it is becoming heavy. I would say the King of All Data must be the Entertainment Content Files. The onus is on who, let us put the question with an open end. Let me also think about it and probably come back and ensure that the dialogue on digital / entertainment wellbeing of humans goes on. I am usually tech savvy with a penchant for good life and technology. Yesterday I was thrilled to read about a Maglev, the way it levitates and flies crosses 600 to 1000 KM / Hour. That is how I get excited, at the same time the above discussed topics are the lingering questions that we need to answer time and again and the questions never going to stop so are the betterment of life through day by day innovations. In the coming years the biggest market is for the Specs Makers, especially the Kids Specs Makers and I say it with a heavy heart.





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Generative AI: The Architect of Infinite Metaverses

Imagine stepping into a universe that's not bound by the laws of physics, a realm where your wildest dreams take shape at the speed of thought. This is the promise of the Metaverse, a digital frontier that is poised to reshape our lives. Yes, that is sort of "Ready Player Me". But how do we build such vast and immersive digital worlds? The answer lies in the extraordinary potential of Generative AI.

Generative AI, the technology capable of creating everything from art and music to code and entire simulations, is the key to unlocking the Metaverse's infinite possibilities. It's like having a legion of architects, designers, and storytellers at your fingertips, all tirelessly working to construct virtual experiences beyond our imagination. Generating 3D contents including Avatars and 3D reconstruction are the basic requirements of the Metaverse. Interactive Storytelling and Personalization of the 3D world are the key factors of successful Metaverses. So we can see GenAI as the key enabler of the Metaverse.

Mark Zuckerberg, CEO of Meta, shares this vision, stating, "We believe the Metaverse will be the successor to the mobile internet and we believe that Generative AI is going to be the foundational technology that makes this possible."

This isn't just about creating visually stunning environments; it's about crafting living, breathing digital worlds. Generative AI can populate these worlds with unique characters, each with their own personalities and backstories. It can generate dynamic narratives that unfold

based on user interactions, creating truly personalized experiences.

NVIDIA CEO Jensen Huang sees Generative AI as the catalyst for a new era of creativity. "Generative AI is as significant as the invention of the PC itself," he declares. "It's a technology that will impact every industry."

The impact on the Metaverse is already evident. Companies like Roblox are using Generative AI to empower users to create their own games and experiences, leading to a surge in user-generated content. Startups like AI Dungeon, KoBoldAI are utilizing AI to generate interactive text-based adventures, blurring the lines between storytelling and gaming.



We can see the rise of startups that use Generative AI to accelerate the Metaverse. Startups like Promethean AI, Anything World are building 3D content runtime; Startups like Fable Studio, Arcturus, Replica Studio are building Avatars, volumetric video capture and voice overs. Startups like Latitude, InworldAI, DeepStory and Hidden Door are building personalized and interactive gaming environments. On top of that, NVIDIA's Omniverse platform is a powerful toolset for creating and

collaborating on 3D worlds and simulations, utilizing AI for various tasks like physics simulation and asset generation.

In parallel, Metaverse related Hardware development also starts using Foveated Rendering and Adaptive Resolution for Content Optimization, Ergonomics and Thermal management for Design Optimization and Virtual Prototyping and User Testing for Testing and Validation. All the above approaches are being powered by Generative AI.

While the potential is immense, it's important to acknowledge the challenges ahead. Ensuring that Generative AI is used responsibly and ethically is crucial. Striking the right balance between human creativity and AI assistance will be key to creating truly meaningful Metaverse experiences.

As Satya Nadella, CEO of Microsoft, aptly puts it, "We are at the dawn of a new era of AI. Our goal is to democratize AI, to make it accessible to everyone, and to use it to solve the world's biggest challenges."

The Metaverse, powered by Generative AI, holds the promise of connecting us in ways we never thought possible. It could revolutionize education, entertainment, work, and even social interaction. It's a future where our imagination is the only limit, and where Generative AI is the architect of our dreams.

The journey is just beginning, but one thing is clear: Generative AI is set to redefine our digital landscape, and the Metaverse is the ultimate canvas for this technological revolution. The possibilities are infinite, and the future is waiting to be built.



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Exploring the Metaverse: A Balanced Look at the Next Internet

The term "metaverse" has become a buzzword, encompassing everything from virtual game worlds to the next iteration of the internet. While some may dismiss it as hype, immersive technologies like XR are quietly integrating into our daily lives through social media, virtual collaboration, and digital experiences. Computer vision and AI are constantly blurring the lines between the physical and virtual worlds.

In this dynamic landscape, understanding our role in adapting to new technologies is critical. Recognizing this, I wrote *Exploring the Metaverse: Redefining the Reality in the Digital Age* to provide insights that separate inflated expectations from genuine opportunities. The book equips you with a balanced and informed perspective on the promises and challenges of the metaverse.

Exploring the metaverse in five parts:

1. Defining the metaverse: Delve into the history of digital revolutions and the origin of the metaverse. We'll explore various definitions, expert perspectives, and address common misconceptions to arrive at a well-rounded understanding.



2. Building blocks of the metaverse:

Explore the technological foundation of the metaverse, including XR, IoT, Cloud, Blockchain, and advancements in AI. You'll gain insight into how these advancements collectively pave the way for the metaverse.



3. The metaverse in action:

Explore hundreds of use cases of real-world applications spanning diverse industries. From revolutionizing gaming & entertainment to fostering virtual social interactions, transforming travel experiences, enhancing fitness routines, and revolutionizing healthcare practices. Discover how the metaverse is reshaping retail and commerce by reimagining property and assets. Moreover, witness the enterprise metaverse's capacity to enhance skilling and reskilling efforts, while ensuring greater compliance with safety standards.

4. Metaverse concerns:

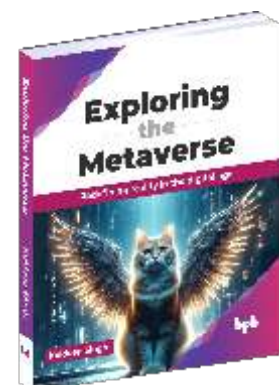
While the Metaverse offers exciting possibilities, it also presents potential pitfalls. This section addresses concerns regarding

identity protection, privacy, and sustainability, ensuring readers are aware of potential risks.

5. Making of the metaverse:

Understand metaverse solution ecosystem, technologies and tools. Focus on shaping up standards and practices. Learn about the ongoing collaborative efforts to strengthen the technology while fostering awareness and responsible adoption among academia, industry, governing bodies, and the public.

Join the Conversation: "Exploring the Metaverse" concludes with a call to action, urging collaboration and responsible engagement from all stakeholders. The book empowers you to be part of shaping the future of technology, and the next internet.





Preyan Mehta

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Sacred Spaces in Metaverse

The Metaverse, or 3D Internet, isn't just a technological innovation-it's poised to significantly impact our society, culture, and lifestyles. To understand why, let's look at the past and the potential future of the internet. When the internet first emerged, many dismissed it as a fad. Few anticipated how it would revolutionize the world, evolving from simple text exchanges to sharing live experiences globally.

The internet has evolved through different phases:

- **Web 1.0:** A decentralized, local, and 2D internet focused on text-based information and community-driven forums.
- **Web 2.0:** Our current internet, centralized and controlled by a few major companies. It includes texts, images, audio, and video, and is truly global but still 2D.
- **Web 3.0 (The Metaverse):** A decentralized, global, and 3D internet. It incorporates all current formats of information and is immersive by design.

Unlike the 2D internet, the 3D Metaverse allows for spatial memories and a more humanized interaction. It includes:

- **Virtual Reality (VR):** Complete immersion in a virtual world.
- **Augmented Reality (AR):** Overlaying virtual elements onto the physical world without interacting with it.
- **Mixed Reality (XR):** Interacting with both virtual and physical worlds simultaneously.

An example of interactive reality is the "Portal installation" between New York and Dublin. These portals, with their mono-circular screens, provided 24/7 live video streams of the streets in both cities. However, the portals had to be temporarily closed due to incidents of people cursing and engaging in discriminatory acts. This article came to me with the title - "Portal Installation temporarily closed due to Public behavior". I'll tie this example later on within this article.

immersive nature could significantly alter our cultural fabric. Web 2.0 has already shown how digital interactions can lead to both positive movements (like "Black Lives Matter") and negative consequences (like the spread of misinformation and anonymity-driven irresponsibility).

This disruption stems from our brains struggling to handle the vast scale of global interactions facilitated by algorithms that prioritize attention-



The Rise of Social Media and Impact on Culture

Social media, a significant byproduct of the internet, has deeply integrated into our daily lives. It has become synonymous with the words Internet and Mobile Phones not just within Social discussions, but also within Scientific Publications. It mirrors physical social interactions in a digital space-urban squares are like Meta feeds, cafes like WhatsApp groups, and posters like Meta ads. Despite its benefits, social media is often blamed for issues like shortened attention spans, FOMO (Fear Of Missing Out), increased suicide rates among the youth to name the few. The Metaverse's

grabbing negative content over positive content. For example the article regarding the "Portal Installation" surfaced for me with a Negative connotation, instead of Positive because the algorithm wants people to click on it.

The Future of Sacred Spaces in the Metaverse

Sacred spaces, such as temples, mosques, churches etc hold deep spiritual and cultural significance. These places are often seen as sanctuaries where individuals gather to seek peace, connect with the divine, and find community. In the Metaverse, these sacred spaces might transform into



entirely new forms, blending technology with spirituality in ways we've never experienced before. Imagine entering a vast space inspired by cosmos, where an AI-powered, personalized deity interacts with you. This virtual god, imbued with artificial intelligence, could answer your questions in real time, providing guidance and support tailored specifically to you. The experience would be immersive, with the AI communicating through a humanized voice, creating a sense of personal connection and spiritual presence. These virtual sacred spaces would not be confined by physical limitations. They could connect people from all over the world, allowing for a shared spiritual experience that transcends geographical boundaries. At the same time, they could foster local communities by creating virtual environments that feel familiar and

culturally significant. For example, imagine a digital version of your house or your city, but instead of people and amenities you could find quests which would help you find the spiritual answer you were seeking while interacting with the AI.

The integration of these sacred spaces into the Metaverse would offer a continuous and personalized spiritual experience. For instance, you could access your virtual place of worship at any time, from anywhere, and still feel a profound sense of connection and belonging. The immersive nature of the Metaverse would enable these experiences to be rich and engaging, activating all your senses and creating a powerful spiritual journey. Additionally, these virtual sacred spaces could be linked to physical locations, creating a hybrid experience. For example, a person could only enter a certain Virtual

experience by entering a specific area in a physical temple.

In conclusion, the Metaverse represents not just a technological advancement but a profound cultural shift. It will reshape how we interact, socialize, and find meaning in our digital age. By blending technology with our deepest spiritual and cultural traditions, the Metaverse could create new ways for us to connect with each other and the divine, making the world feel both smaller and more interconnected than ever before. This transformation will redefine our notions of community, spirituality, and the sacred, leading us into a new era of digital and cultural evolution.





Aditya Mani

Founder

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Avatars and Branded Gear: Crafting Digital Personas in Immersive Virtual Narratives

Introduction

In the digital age, the concept of identity has transcended the physical realm, extending into virtual spaces where avatars serve as digital representations of users. These avatars are not merely placeholders; they are carefully crafted personas that embody the traits, preferences, and aspirations of their creators. With the rise of immersive technologies, such as augmented reality (AR) and virtual reality (VR), these digital personas have become central to the user experience in virtual environments. The integration of branded gear within these narratives further enhances the depth and authenticity of these personas, subliminally influencing user behavior and brand perception.

This paper explores the role of avatars in shaping digital personas and the strategic placement of branded gear within immersive stories, drawing on the expertise and innovations pioneered by YOLOgram, a leader in the field of digital fashion and avatar creation.

The Role of Avatars in Digital Persona Creation

Avatars serve as the primary interface between users and the virtual world, acting as a digital extension of their identity. The design and customization of avatars allow users to project their desired self-image, blending reality with aspiration. This process of avatar creation is not merely cosmetic; it is deeply tied to the psychology of identity formation. Users select attributes, attire, and accessories that align with their personality, social status, and cultural affiliations.

YOLOgram's advanced avatar platform exemplifies the importance of these digital representations. By offering a

wide range of customization options, from facial features to fashion choices, YOLOgram enables users to create avatars that are both unique and reflective of their individual identities. The company's emphasis on high-quality visuals and realistic textures ensures that these avatars are not only aesthetically pleasing but also immersive, allowing users to fully embody their digital personas within virtual environments. Subliminal Branding in Immersive Narratives Incorporating branded gear within the narrative framework of virtual environments is a powerful tool for influencing consumer behavior. Unlike traditional advertising, which can be intrusive and disruptive, subliminal branding within immersive stories is seamless and organic. When users equip



their avatars with branded attire or accessories, they are not just consuming a product; they are integrating it into their digital identity. This form of branding is highly effective because it leverages the emotional connection users have with their avatars.

YOLOgram's approach to integrating branded gear within its immersive platforms is a testament to the effectiveness of this strategy. By collaborating with leading fashion brands, YOLOgram offers users the opportunity to outfit their avatars in designer gear, which not only enhances the visual appeal of the avatar but also subtly reinforces brand loyalty. This integration is done in a way that feels natural to the user experience, ensuring

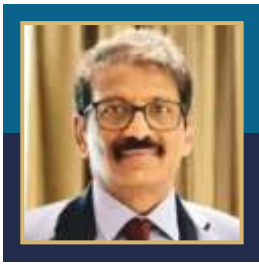
that the branding message is both received and embraced without disrupting the immersive narrative.

Use Cases and Impact

Several use cases illustrate the impact of avatars and branded gear in shaping digital personas and influencing consumer behavior. In one example, YOLOgram partnered with a luxury fashion brand to create a limited-edition virtual collection. This collection was made available exclusively to avatars within a popular virtual world, where users could purchase and wear the items. The virtual collection quickly became a status symbol within the community, driving demand for both the virtual and real-world versions of the items. Another use case involved the integration of branded gear within a narrative-driven AR experience. Users could unlock exclusive gear for their avatars by completing in-game challenges, creating a sense of achievement and further deepening their connection to the brand. These examples highlight how subliminal branding within immersive narratives can drive engagement, foster brand loyalty, and ultimately influence purchasing decisions.

Conclusion

As digital personas become increasingly integral to the user experience in virtual environments, the role of avatars and branded gear in shaping these identities cannot be overstated. YOLOgram's innovative approach to avatar creation and subliminal branding demonstrates the potential of these technologies to not only enhance user immersion but also drive brand engagement in a meaningful way. As immersive technologies continue to evolve, the intersection of digital identity and branded content will likely become a key area of focus for both researchers and industry professionals alike.



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Crafting the Future: The Innovative Use of AR and VR in Cultural Heritage Preservation by the Idol Wing of Tamil Nadu Police

In the annals of technological advancement, specific innovations transcend their initial applications, weaving stories of resilience, creativity, and future possibilities. Such is the case with Virtual Reality (VR), Augmented Reality (AR), and the metaverse in cultural heritage preservation. These technologies, exemplified by the collaborative efforts of IIT Madras and Invent Softlabs, have revolutionized the preservation and accessibility of cultural heritage, as demonstrated through their work with the Tamil Nadu Idol Wing.

The Tamil Nadu Idol Wing faced the monumental task of recovering and preserving stolen cultural artefacts. During my tenure as the Chief of the Idol Wing, we meticulously catalogued and preserved hundreds of idols, each a testament to Tamilnadu's rich cultural heritage. These artefacts, from metal objects to stone carvings, encapsulate centuries of artistic ingenuity and craftsmanship.

Recognizing the need for innovative solutions, we partnered with IIT Madras and Invent Softlabs Labs to employ VR and AR technologies in our preservation efforts. Utilizing state-of-the-art techniques like Photogrammetry, the team at IIT Madras captured high-resolution 3D images of these idols, creating digital replicas that preserve every detail of the original artefacts. This initiative was part of my vision to create a virtual museum, transforming how we protect and interact with cultural heritage. The Virtual Museum created during my tenure as the Chief of the Idol Wing of the Tamilnadu Police can be accessed at <https://www.tnpoliceidolwing.com/home>.



FIG 1 : THE HOME WEBPAGE OF THE VIRTUAL MUSEUM HOSTED BY THE IDOL WING OF THE TAMIL NADU POLICE

The Digital Revolution: VR and AR in Heritage Preservation

Integrating VR and AR in cultural heritage preservation represents a paradigm shift in how we interact with the past. These technologies offer unprecedented opportunities to transform how we understand and appreciate cultural heritage.

1. Immersive Educational Experiences

VR and AR can revolutionize education by providing immersive learning experiences. Virtual museums can offer interactive exhibits where students and scholars explore artefacts in a 3D environment, gaining a deeper understanding of ancient civilizations' traditions, customs, and beliefs. This immersive approach enhances engagement and retention, making history come alive in ways traditional methods cannot.

For instance, imagine students donning VR headsets and stepping into a meticulously recreated ancient temple. They can walk around, interact with the environment, and witness historical events through detailed recreations. This experiential learning fosters a deeper connection to history, enhancing comprehension and appreciation.



FIG 2: SOME EXHIBITS IN THE IDOL GALLERY OF THE VIRTUAL MUSEUM.

2. Enhanced Research Capabilities

For researchers, VR and AR provide powerful tools to study artefacts in detail without physical constraints. Digital replicas can be manipulated, magnified, and examined from various angles, allowing for more thorough analysis. This technology facilitates remote collaboration among scholars worldwide, fostering a more inclusive and comprehensive approach to cultural heritage research.



Consider the intricate details of a stone carving from an ancient temple. With VR, researchers can examine every nook and cranny of the carving, zooming in on minute details that one might miss in physical examination. AR can overlay historical information directly onto the artefact, providing context and enhancing understanding.

3. Virtual Tourism and Accessibility

Virtual tourism powered by VR and AR can democratize access to cultural heritage sites. Individuals worldwide can explore historically significant locations and artefacts from the comfort of their homes, which promotes cross-cultural understanding and ensures that cultural treasures are accessible to those who may not have the means to visit these sites in person.

For example, a virtual tour of the Tamilnadu Idol Wing's collection allows anyone, anywhere, to experience the beauty and history of Tamilnadu's cultural artefacts, which raises and fosters a sense of shared cultural appreciation.

4. Preservation of Endangered Sites and Artifacts

VR and AR can be crucial in preserving endangered cultural heritage sites and artefacts. By creating detailed digital records, these technologies ensure that even if the physical objects are lost or damaged, their digital counterparts remain available for future generations. This approach provides a safety net for cultural preservation efforts, safeguarding our heritage against unforeseen threats.

Consider an ancient temple threatened by natural disasters or urban development. Creating a detailed VR replica ensures we preserve its cultural and historical significance, allowing future generations to experience and learn from it even if the physical site is lost.

5. Interactive and Engaging Public Exhibits

Museums and cultural institutions can leverage VR and AR to create

interactive and engaging public exhibits. These technologies bring static displays to life, allowing visitors to interact with artefacts in new and exciting ways. For example, AR applications can overlay historical information onto physical artefacts, providing context and enhancing the visitor experience.

Imagine visiting a museum where, through AR, you can see an ancient statue in its original, vibrant colours or witness a historical battle unfold around you. Such experiences transform passive observation into active participation, making history more engaging and memorable.

6. Crowdsourced Cultural Documentation

Looking to the future, VR and AR could enable crowdsourced cultural documentation. Volunteers could use these technologies to capture images of cultural artefacts in their local areas, contributing to a comprehensive digital repository. This collaborative approach could significantly expand our understanding and documentation of global cultural heritage.

For example, locals in Tamil Nadu can use AR apps to document and upload images of lesser-known artefacts and temples, contributing to a collective effort to preserve and share cultural heritage, which enriches the repository and fosters community involvement and ownership.

The Metaverse: A Bold New Frontier

The concept of the metaverse—an interconnected virtual world—holds immense potential for cultural heritage preservation. Visitors can explore, interact, and engage with history in this digital realm unprecedentedly. For instance, the Tamil Nadu Idol Wing's virtual museum could evolve into a dynamic metaverse where users can not only view artefacts but also participate in virtual reconstructions of historical events and sites.

In the metaverse, historical education becomes a dynamic, interactive experience. Imagine attending a virtual lecture where you can walk through

ancient cities, interact with historical figures, and participate in events as they unfold. This immersive environment provides a deeper understanding and appreciation of history, making it a powerful tool for education and preservation.

Conclusion: Embracing the Future

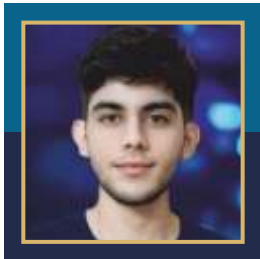
Integrating VR, AR, and the metaverse in cultural heritage preservation represents a paradigm shift in how we interact with the past. As we stand on the cusp of this new era, the work of institutions like IIT Madras and Invent Softlabs serves as a beacon of innovation and dedication. Through the convergence of tradition and technology, we are crafting a legacy that will inspire future generations.

By embracing these technologies, we are preserving our cultural heritage and democratizing access to it, fostering cross-cultural understanding, and enhancing educational and research capabilities. As we explore the boundless possibilities of the virtual realm, we must remind ourselves of the power of the past to shape the future and the enduring potential of human creativity and ingenuity in the face of adversity.

The journey of the Tamil Nadu Idol Wing's virtual museum is far from over. As new chapters unfold, brimming with the promise of discovery and enlightenment, we envision a bold new frontier where the virtual museum evolves into a thriving Metaverse where visitors can interact with history unprecedentedly, bridging the gap between the past and the future.

In India and beyond, the potential applications of VR and AR in cultural preservation are vast. These technologies can help safeguard and propagate cultural heritage, ensuring that the contributions of ancient peoples are appreciated and understood by future generations. As we face the challenges of today with courage and conviction, the lessons of the past will be our greatest allies in shaping a brighter tomorrow. With the Tamilnadu Idol Wing leading the way, we can step boldly into the future, knowing that our cultural heritage will endure for generations.

The Next Leap in XR Technology: Say Goodbye to Bulky Eye-Trackers



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As augmented and virtual reality (AR/VR) technologies continue to evolve, the demand for more immersive and comfortable experiences has never been higher. However, the bulky design of traditional eye-tracking systems has been a significant hurdle, limiting the potential of XR devices. But what if we could remove the bulk without compromising performance? Enter lensless cameras—a groundbreaking technology set to redefine the future of XR experiences.

How Lensless Cameras Work: The Science Behind the Slimming

Traditional eye-tracking systems rely on complex optical lenses that require a significant amount of space to function correctly. These lenses focus light onto sensors, capturing detailed images of the eyes. However, this setup contributes to the weight and size of the headset, often making prolonged use uncomfortable.

Lensless cameras, on the other hand, operate on a fundamentally different principle. Instead of using bulky lenses, they employ a thin optical mask placed very close to the sensor. This mask encodes light in a way that looks nothing like the scene it captures. Advanced algorithms then step in, decoding this light pattern to reconstruct the image.

This approach eliminates the need for large lenses, resulting in an ultra-thin and lightweight device that can be seamlessly integrated into XR headsets.

But the innovation doesn't stop at the hardware. The lensless system is paired with a custom-designed deep learning algorithm that accurately tracks eye movements in real-time. This combination ensures that users enjoy the same—if not better—accuracy and responsiveness as traditional systems, without the bulk.

Enhanced User Comfort and Experience: Lighter, Sleeker, and More Immersive

For anyone who has worn a VR headset for extended periods, comfort is a big deal. The weight of traditional eye-tracking cameras can lead to strain and fatigue, limiting how long users can stay immersed in virtual environments. By drastically reducing the size and weight of the tracking system, lensless cameras offer a solution that promises to make XR devices as comfortable as everyday eyewear.

Imagine an XR headset as light as your favorite sunglasses, yet powerful enough to track your gaze with pinpoint accuracy. This is not just about aesthetics or convenience; it's about unlocking new possibilities in XR design. With

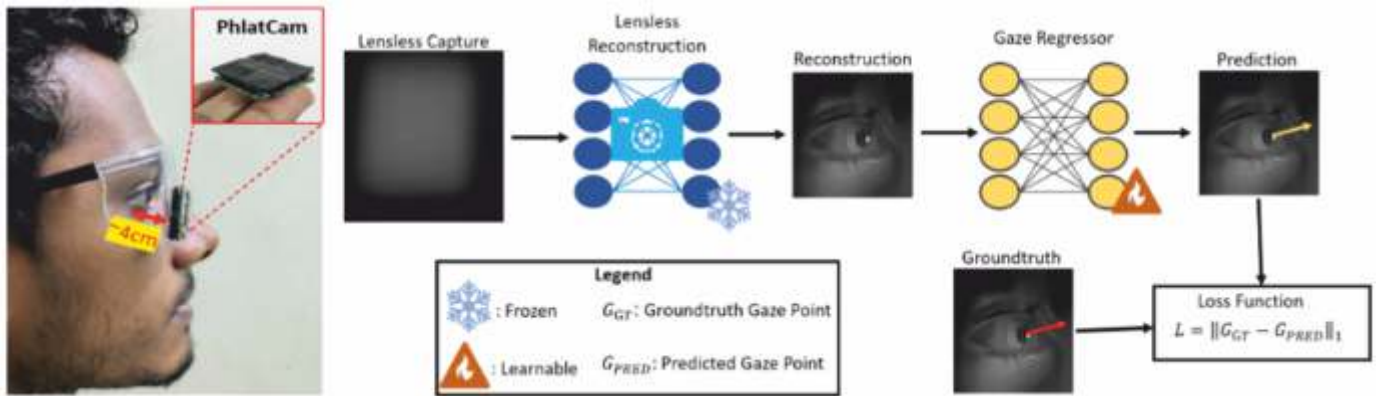
Lensless cameras hold exciting possibilities

Camera Miniaturization

Conventional	Lensless
10-20 mm	< 2 mm
8-15 g	0.5 g

And promising applications

- Medical Imaging: Capsule Endoscope, Miniscope
- AR/VR
- Surveillance: Robobees



less bulk, designers can create sleeker, more ergonomic devices that provide a more immersive experience without sacrificing comfort.

Privacy and Security: A Built-In Advantage

In today's digital world, privacy concerns are at the forefront of technology adoption. Traditional eye-tracking systems, by capturing detailed images of the eyes and surroundings, can inadvertently expose sensitive information. This has raised legitimate concerns about data security and privacy.

Lensless cameras offer a significant advantage in this regard. The way they capture and process light makes it inherently challenging to reconstruct the original scene from the captured data. This means that while the system tracks your eye movements with high precision, it does so without compromising your privacy. In essence, lensless eye-tracking could be the key to more secure XR experiences, protecting users' data in ways that traditional systems cannot.

Driving Innovation in XR: Opportunities for Developers and Designers

For developers, designers, and innovators in the XR space, lensless cameras represent a game-changing opportunity. The potential to create lighter, more comfortable, and secure XR devices opens up new avenues for innovation. Imagine designing a headset

that feels as natural as a pair of glasses, or creating applications that take full advantage of precise, real-time eye tracking without the usual privacy concerns.

Furthermore, the reduced hardware footprint of lensless systems could lead to cost savings in manufacturing, making high-quality XR experiences more accessible to a broader audience. This democratization of XR technology could accelerate its adoption across various industries, from gaming and entertainment to education and healthcare.

Join the Revolution: Explore the Science Behind Lensless Eye-Tracking

The future of XR is bright, and lensless cameras are poised to play a crucial role in shaping it. If you're intrigued by the possibilities this technology offers and want to delve deeper into the science behind it, our research paper 1,2 provides an in-depth look at the data, algorithms, and hardware that make this innovation possible. We encourage you to explore our findings and consider how you can be part of the next big leap in XR technology.

As XR continues to push the boundaries of what's possible, lensless eye-tracking could very well be the key to unlocking its full potential. By embracing this innovation, we can create more immersive, comfortable, and secure experiences that redefine how we interact with the digital world.

1. Bagadthey, Dhruvjyoti et al. "FlatNet3D:

Intensity and absolute depth from single-shot lensless capture." Journal of the Optical Society of America. A, Optics, image science, and vision vol. 39,10 (2022): 1903-1912.
<https://doi.org/10.1364/JOSA.A.466286>

2. Khan, Salman Siddique, et al. "FlatNet:

Towards Photorealistic Scene Reconstruction from Lensless Measurements." IEEE Transactions on Pattern Analysis and Machine Intelligence, 2020, pp. 1-1. Crossref,
<https://doi.org/10.1109/tpami.2020.3033882>



Vinoth E.
Founder & CEO
Leoverse

A Cosmic Odyssey: Transforming Space Mission Design through Virtual Reality

Navigating the Virtual Frontier:
The Rise of Virtual Reality Technology in the 21st Century

In the 21st century, virtual reality (VR) has emerged as a transformative force, permeating diverse industries from gaming to healthcare. Its pervasive applications have reshaped our interaction with the world, transcending boundaries. This article explores the integration of VR in the aerospace industry, with a focus on space mission design, unlocking unprecedented possibilities for the next generation.

Crafting the Cosmos: Virtual Reality in Aerospace Space Mission Design

At the forefront of innovation, the aerospace industry is embracing virtual reality in space mission design. VR technology offers engineers and designers unique opportunities to visualize, iterate, and perfect spacecraft designs within simulated environments, thereby optimizing mission success. This section delves into the technical intricacies of integrating VR into the aerospace design process.

Unreal Engine of Imagination: Designing Space Environments in Virtual Reality

The utilization of Unreal Engine in space mission design goes beyond aesthetics; it facilitates the creation of incredibly realistic and immersive virtual environments. Detailed technical insights into how Unreal Engine replicates extraterrestrial landscapes and cosmic settings with astonishing accuracy will be explored, highlighting



its role as a dynamic platform for mission planners to address the challenges of space exploration.

Journeying Through the Stars: Simulating Space Missions with Unreal Engine

Delving into the technical realm, this section explores the mechanics of virtual reality simulations using Unreal Engine. Engineers can simulate the entire mission lifecycle, from launch to landing, allowing for comprehensive testing and refinement. Insights into how this process enhances mission reliability, reduces costs, and minimizes risks associated with space exploration will be discussed.

From Fiction to Reality: Bridging the Gap with Virtual Reality

Beyond cinematic references, this section will delve into the software and technical advancements that have turned science fiction into reality. Drawing parallels between movies like "Interstellar" and "The Martian" and the innovative use of VR, it will explore how software technologies have evolved to bring futuristic concepts into the practical realm of space mission design.

Directed by: Christopher Nolan

Possibilities and Advantages: Charting a Course for the Future

This section will provide a comprehensive overview of the technical possibilities that VR offers in space mission design. From the technicalities of training astronauts in realistic environments to the intricacies of remotely controlling robotic missions, the manifold advantages of VR will be explored. Additionally, it will highlight the collaborative potential of VR in fostering a global effort to address the challenges of space exploration.

Conclusion: Inspiring the Cosmos Explorers of Tomorrow

As we venture into the cosmos, the integration of virtual reality in space mission design propels us into a new era of exploration. The technical marriage of Unreal Engine with aerospace expertise not only refines our approach to space missions but also captivates the imagination of the next generation. In this virtual frontier, researchers find a canvas to paint their dreams of the cosmos, blurring the lines between what was once fiction and the reality we now strive to create.



Dr. A. Paventhan

Sr. Director / Scientist-G, ERNET India,
D4-05, IIT Madras Research Park



Dr. M. Manivannan

Professor

Touch Lab, Experiential Technology
Innovation Center
IIT Madras, Chennai

The Power of a Human-Centric Approach in the Era of AI/ML, AR/VR, and 5G/6G

these tools enhance human life-complementing human judgment rather than substituting it.

Augmented and Virtual Reality: Expanding Human Experience

The advent of AR and VR is transforming the way we interact with the digital and physical worlds. AR enhances real-world environments by overlaying digital content, while VR immerses users in fully virtual worlds, opening up possibilities in gaming, entertainment, education, and even remote work.

However, these technologies should not aim to disconnect people from reality but to enrich real-life experiences. In education, for example, VR can transport students to historical events or remote environments, making learning more engaging and interactive. But the focus must remain on improving understanding and accessibility. A human-centered AR/VR approach prioritizes enhancing empathy, collaboration, and creativity rather than simply offering an escape from reality.



The Role of 5G/6G in Connecting People and Devices

5G networks have already begun to revolutionize communications with higher speeds, lower latency, and more reliable connections. As 6G looms on the horizon, the potential for unprecedented advancements in connectivity seems boundless. These technologies will power the next generation of smart cities, autonomous vehicles, IoT devices, and real-time data sharing across industries.

However, the essence of 5G/6G lies not just in faster download speeds but in how they enable people to connect, collaborate, and access services more efficiently. A human-centric approach ensures that the rollout of these

technologies focuses on bridging digital divides, ensuring equitable access, and improving the quality of life for people around the world, regardless of geography or socioeconomic status.

Why Human-Centric Design Matters

Incorporating human-centric design principles into these rapidly advancing technologies ensures that they remain accessible, ethical, and effective. Human-centric design puts people at the heart of technology development, ensuring that products and services align with human values, needs, and behavior.

For AI/ML systems, this could mean focusing on transparency, fairness, and accountability to mitigate bias and foster trust. For AR/VR, it involves designing experiences that promote inclusivity, safety, and well-being. In the context of 5G/6G, it means prioritizing connectivity for underserved communities, ensuring that the benefits of these technologies are broadly distributed.

The Ethical Dimension

One of the critical components of a human-centric approach is ethics. The power of AI, AR, and next-generation connectivity brings significant responsibility. The challenge is to balance innovation with ethical considerations such as privacy, security, and the potential for misuse. Human-centric development requires that stakeholders-governments, corporations, and civil society-work together to create policies and frameworks that protect individuals and communities while allowing technological progress.

Conclusion

In this era of rapid technological evolution, the power of a human-centric approach cannot be overstated. AI/ML, AR/VR, and 5G/6G are poised to redefine our world, but it is essential that these technologies be designed, deployed, and managed with human interests at their core. By doing so, we ensure that technology empowers us, enriches our lives, and fosters a more inclusive, connected, and empathetic world. As we look to the future, a focus on humanity will be the key to unlocking the true potential of these transformative technologies.

As we enter an age dominated by Artificial Intelligence (AI), Machine Learning (ML), Augmented Reality (AR), Virtual Reality (VR), and the rapid advancements of 5G and upcoming 6G technologies, one core principle remains critical: the human-centric approach. These cutting-edge technologies, while revolutionary in nature, must be rooted in the well-being and needs of humans to truly succeed. Prioritizing human experiences and societal impacts is essential to ensuring that technology serves as a tool for empowerment rather than a source of detachment or division.

The Era of Intelligent Systems

AI and ML have dramatically reshaped industries, enabling automation, predictive analytics, and smarter decision-making across healthcare, education, finance, manufacturing, and more. By processing vast amounts of data at lightning speed, AI/ML systems can make predictions, offer insights, and even solve problems that previously required significant human effort.

However, the true potential of AI/ML lies in how it can augment, rather than replace, human capabilities. For instance, AI in healthcare helps doctors diagnose diseases with greater accuracy, but it is still the physician's empathy and experience that make patient care effective. By keeping humans at the center of AI's deployment, we ensure that

Events at XTIC



Dr. M. Sridevi
CSE, NIT Trichy

Brainstorming Workshop on Augmented and Virtual Reality

25th July 2024

The Department of Computer Science and Engineering of the National Institute of Technology has organized a "Brainstorming Workshop

on Augmented and Virtual Reality" on 25th July 2024. The workshop is supported by Touch Lab & eXperiential Technology Innovation Centre (XTIC), IIT Madras. The event coordinated by Dr. M. Sridevi, Associate Professor, Department of CSE, NIT, Tiruchirappalli.

The workshop was inaugurated by Dr. M. Manivannan, Professor of Biomedical Engineering, and Head of Touch Lab & XTIC, IIT Madras in the presence of Dr. Mary Saira Bhanu, HoD, CSE department of NITT, and the event was held at the Department of Computer Science &



Group Photo with the Participants



Participants during Technical Session



Inauguration of the event



Interaction with NITT Students and Faculty members



Thanks to Touch Lab & XTIC, IIT Madras for providing an opportunity to host the workshop at NIT, Tiruchirappalli

Engineering, National Institute of Technology, Tiruchirappalli. Totally 60 participants including Faculty members, Research Scholars, PG & UG students attended the workshop both offline (52 Participants) and online (08 Participants) from Tamil Nadu, Bangalore, Goa, and Puducherry.

Events at XTIC

The resource person for the workshop is Dr. M. Manivannan. He is a Professor of Biomedical Engineering, and Head of Touch Lab & XTIC at IIT Madras. He established India's first Touchlab at IITM in 2005, a distinction it still holds nationwide. Recently, he established XTIC, the country's premier multidisciplinary hub for Extended Reality - XR (Augmented Reality - AR /Virtual Reality - VR / Mixed Reality- MR) & Haptics, and India's first Industrial Consortium for XR known as CAVE which has more than 300 startups and industries exclusively working in XR technologies.

The workshop content includes an introduction to extended reality, real-time applications, and demos focusing on multidisciplinary applications. The resource person emphasizes the future wave of AR & VR and its importance. The opportunities in AR & VR technologies are deliberated and also explained the opportunities and support that can be offered by the XTIC to enhance in the domain of immersive technologies. He

BRAINSTORMING WORKSHOP ON AUGMENTED AND VIRTUAL REALITY
25th July 2024

Topics Covered

- ✓ Introduction to AR & VR
- ✓ Interdisciplinary Applications
- ✓ Future AR & VR
- ✓ Opportunities

Outcome of the Session

- Live Demo & Real-world Applications
- Upskill for Future (Registration to Certificate Courses)
- Internship opportunities
- Networking with the experts
- Mentoring support
- Incubation & Startup support

Meeting link
<https://niti.webex.com/niti/j.php?MTID=nr500ak07e631c72a2e1acc690828>

Join at 10 am

Coordinator : Dr. M. Seidevi **Contact :** msidevi@iit.edu

Organized by
Department of CSE, NIT Trichy
Supported by
Touch Lab & XTIC, IIT Madras

Resource Person
Dr. M. Manivannan,
Professor, Biomedical Engineering;
Head, Touch Lab & XTIC, IIT Madras

AI / ML is Today, AR / VR is Future: Get Ready

Eligibility

- Open to all discipline
- UG, PG Students, Research Scholar & Faculty Members

talked about the future collaboration with NITT.

The individuals can also enhance their knowledge in the AR & VR domain by registering to the NPTEL courses. The NPTEL Certificate Course on "Mastering VR: Fundamentals to Practice" taught by Prof. Dr. M. Manivannan, IIT Madras, and Dr. Steven LaValle & Dr. Anna LaValle University of Oulu, and early Oculus Co-founders. A special concession on the

registration fee is offered to the NITT community.

This workshop has provided insight and a deep understanding of Augmented and Virtual Reality technologies and its applications to the participants. The participants were interactive throughout the sessions and provided positive feedback about the course content and delivery.

Action Plan of the Brainstorming Workshop on Augmented & Virtual Reality held on 25th July 2024

Sl. No.	Action	Assigned to	Due Date	Status
1	Registration to the NPTEL Certificate Course on "Mastering VR: Fundamentals to Practice"	NITT	29th July 2024	A total of 15 participants registered for the course. (Includes Faculty, Students of NITT and other institutes)
2	CAVE Membership	NITT	Long Term	After completion of the NPTEL course
3	Collaboration with NITT to work on AR & VR projects and XR corridor	NITT	Long Term	In process
4	Internship opportunity for the NITT students	IITM	During Summer Vacation	NITT students learning the fundamentals of AR & VR



Events at XTIC

Music Meets Innovation at IIT Madras

Recently A.R. Rahman visited Indian Institute of Technology, Madras to announce his new project "Secret Mountain", where he engaged with a variety of startups working in cutting-edge fields like VR, AI, and blockchain. During his visit, he interacted with both NIRMAAN IITM and Centre For Innovation (CFI) teams from Plenome, Ewebstore .in, and had a meaningful discussion with Team Abhyuday. A.R. Rahman shared his inspiring vision for taking India to global prominence with the intersection of technology and humanity, and insights into his current projects, highlighting "Secret Mountain". He engaged in a closed door session with IITM's senior faculty members Prof. Balaraman Ravindran of School of AI, Manivannan Muniyandi of XTIC and John Augustine of XTIC who explained their work on AI, XR and Blockchain.



Secret Mountain is an attempt in which AR Rahman aimed to push the boundaries of artistic expression by introducing a unique and immersive experience. Stunning Avatar design and creation of the "multinational and multicultural" characters of the movie is the crux of the new project. The challenge was to create a captivating film that would resonate with audiences, especially the younger generation, and showcase AR Rahman's innovative approach to music and storytelling.



Guru Talks by Prof. M. Manivannan of XTIC Organized by IIT Madras Alumni Association on July 26th, 2024

The Guru Talk series by the IIT Madras Alumni Association is a prestigious platform that brings together distinguished experts, thought leaders, and innovators to share insights and knowledge across various fields. Designed to inspire and engage, the talks provide valuable perspectives on current trends, emerging technologies, and leadership lessons. These sessions serve as an opportunity for the IIT Madras community and beyond to learn from accomplished alumni and thought leaders who have made significant contributions to academia, industry, and society.

Prof. M. Manivannan presented various activities of XTIC as a part of the Guru Talks on July 26th. His talk titled "AR/VR Wave is going to be Bigger than AI/ML Wave" attended by many alumni of IITM and others.

More details can be found at <https://www.iitmaa.org/events/12269>
 Online recording of the event can be found at <https://www.youtube.com/watch?v=aqzm2W1yQJI>

XTIC Invited for Thought Leaders Talk Series of ICT Academy

ICT Academy organizes the "Thought Leaders Talk Series" 6th edition on 7 August 2024, titled "The Defining Decades - Career Opportunities in Emerging Technologies," this exclusive webinar features seasoned professionals and scholars from various organizations deliberating on the significant impact of emerging technologies on career opportunities and the industry landscape.

ICT Academy, part of the IITM Research Park regularly organizes the Thought Leaders Talk Series (TLTS) to create awareness of the recent advancements in sectors that are potential for exponential growth and to disseminate the wealth of information throughout

Industry and Academia, This exclusive webinar series aims to deliver insightful sessions from industry experts and bureaucrats on emerging trends, new technologies, far-sighted information, and roadmaps in the ESDM, AVGC, Smart Manufacturing and Life Sciences sectors.

Prof.M.Manivannan of XTIC was invited to the TLTS event on 7th Aug to elaborate on the XR (AR/VR/MR and Haptics) Potential in India. He introduced AR/VR/MR and Haptics and the "Research Center on VR and Haptics at IITM" to the participants and reasoned why XR Wave is imminent and it would be bigger than the current AI/ML Wave.

ICTACADEMY
THOUGHT LEADERS TALK SERIES
EDITION 6

Webinar on
The Defining Decades - Career Opportunities in Emerging Technologies
07 August 2024 (10:00 am - 12:00 pm)

Focus Areas

- Dive into the Future with VR
- Expertise in Research and Advance Engineering
- Industry 5.0 insights

Who can Attend?
Academic Leaders, Corporate Executives & Entrepreneurs and Higher Education Students

Speakers

Akila CM
Assistant General Manager
ICT Academy

Manivannan
Professor
IITM Department of Applied Mechanics and Biomedical Engineering, Experiential Technology Innovation Center

Anantharaman Prakash
Vice President Research & Advance Engineering, Innovation
Renault Nissan Technology & Business Center India Pvt. Ltd.

Register at: www.ictacademy.in/tlts

Events at XTIC

AI in Digital Health: Key Focus of 3rd CII Digital Health Summit, New Delhi

In a pioneering event showcasing the transformative impact of technology on healthcare, the 3rd CII Digital Health Summit was held on July 19, 2024 in New Delhi. Organized by the Confederation of Indian Industry (CII) under the theme 'Leveraging AI for Improving Health Outcomes,' the summit brought together prominent leaders from the healthcare, government, and technology sectors. The event focused on exploring the revolutionary potential of artificial intelligence (AI) to enhance healthcare delivery and outcomes.

In his address, Dr. Vinod K. Paul, Member of NITI Aayog, emphasized the vast potential of AI to transform personalized care, prediction, targeting, and precision health. He also highlighted the government's eagerness to collaborate with the industry to harness AI for public health advancements. Dr. Paul pointed out that AI could significantly improve physicians' decision-making processes and referenced the Global Initiative on Digital Health (GIDH), aimed at helping countries adopt digital technologies. He also underscored the achievements of the Ayushman Bharat Digital Mission (ABDM), which has successfully registered approximately 66 crore ABHA accounts.

In a panel discussion on "Responsible AI in Healthcare-Navigating Ethical & Legal Challenges" moderated by Dr Shравan Subramanyam, Co-Chair, CII Task Force on Health Technology & Advisor - Healthcare and Med Tech Investments Premji Invest, six experts deliberated on the topic. This panel includes Prof.M.Manivannan of XTIC IIT Madras. Other panelists are Mr Ajay Prakash Sawhney, Former Secretary,



Ministry of Electronics and Information Technology; Mr Madhivanan Balakrishnan, Chief Executive Officer, Apollo 24/7; Dr Rana Mehta, Partner and Lead Healthcare, PwC; Mr Rahul Matthan, Partner - Corporate, Technology, Media and Telecom, Trilegal; Dr Dhaval Shah, Co-founder PharmEasy.

Prof.Manivannan emphasized the importance of the role of AI in patient education, training and safety. He highlighted the role of data analytics and Virtual Reality, Augmented Reality, Mixed Reality along with Haptics on 'Improving clinical skill training data is crucial, as clinical errors are not well-documented in India' was noteworthy and was well received by the participants.





Events at XTIC

XTIC and Tech Deep Dive Conference of Telecommunications Standards Development Society, India (TSDSI)

7th Edition of TSDSI Tech Deep Dive Conference 2024, held from 16-19 July 2024. Prof.M.Manivannan of XTIC was invited as an expert Speaker in the Session- Usage Scenarios.He emphasized the use of Haptics, VR/AR/MR in the healthcare and Telepresence and the upcoming use-cases of 5G and 6G. He highlighted how the XR and Haptic technologies have potential to transform Indian Villages along with 5G/6G reverse-urbanize India.

This session delved into the importance of IMT-2030/6G usage scenarios for India, drawing on insights from operators about their 5G deployment experiences and identifying areas for improvement in immersive communication, HRLLC, and massive communication. It featured two engaging panel discussion on IMT-2030 usage scenarios for operators

and/Service providers and Use cases for Verticals, that included Defence, FinTech, Automotive, and Health.

Key takeaways from the session include:

- eMBB (Enhanced Mobile Broadband) along with mMTC (Massive Machine Type Communication) emerged as key use scenarios for discussion for 5G Advanced.
- Need for latency as a KPI for driving XR use cases, energy efficiency, ubiquitous connectivity and coverage were highlighted as key KPIs.
- Seamless communications between space, air, ground, and sea, as well as the 6G healthcare vertical covering aspects of AI/ML and the metaverse, were extensively discussed.

The conference technical sessions had 589 participants overall. There were 255 participants in a panel discussion on the

usage scenarios. It was Co-Chaired by Dr.Pavendhan Aurumugam, Director of ERNET India and Jishnu Aravindakshan of Tejas Networks. Other panelists were Abhishek Thakur, IDRBT; Ravi Lakhotia, Vodafone - Idea; Ashok Kumar, DoT; Christian Mannweiler, Nokia; R. Muralidharan, Tata Advanced Systems; Saurabh Mittal, Bharti Airtel ; Satish Jamadagni, Reliance Jio; It was coordinated by Vijay madan and Akash Malik of TSDSI.

The conference featured a very eminent set of 70 speakers - Government representatives, Indian and global industry experts, Academia / Researchers (including 7 from outside India)

More details can be found <https://ttdd.tsdsi.in/>

IOCL IMCL VR Studio Inauguration

VR Studio with Haptics Feedback at IMCL
May 27th 2025 at 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



Events at XTIC

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 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.

IIT Mandi iHUB Center for Human Computer Interaction (CHCI) Inauguration

May 8th 2024

Institute Colloquium: Title: War Among Tech Giants on XR - India is the Future

<https://www.iitmandi.ac.in/institutecolloquium.php>

Other Guests:

Inaugurated the Center for Human Computer Interface (CHCI)

1. This is part of iHUB and HCI Foundation
2. Several Startup as part of the Center have displayed their product.
3. As a mandate for iHub, the startup are connected to the end user and therefore led to translational research/development.
4. It was not clear to them for long time what HCI is, now they seems have defined: AR/VR, IoT, Assitive Technologies, Cloud Technologies.
5. They are allotted 120 Crores 4 years ago, but they are unable to give proposals and got 40 Crores instead so far, they have spent 36 crores,

given funds to kins and kiths and acquaintees and squantrred the funding.

6. They next review come in a week at Delhi.



7. Ms. Elka Kapoor, Mission Director, National Mission on Cyber Physical System, at DST looking all the 33 iHubs was part of the meeting but online

8. The DST may have plan of shelving few iHubs and support only select few iHubs in the near future
9. The Director was not present, he joined online, which was big disappointment for me. As the decision maker, I thought he should be there. I did not know that he would be absent. He was in an Ayurveda resort getting some Panchakarma Treatment.
10. The CHCI team would setup a meeting online with the Director later to discuss all the strategies we have discussed with the team.
11. Ribbon-cut inaugurated their Center for Human Computer Interface.

Events at XTIC

Microsoft Insights from Mr. Surya Narayan, MSHYD

1. Hololens is shutdown because of Military complained that they have vection/ motion sickness.
2. Microsoft acquired Nokia mobile platform thinking that Nokia and its device OEMs would shift to MS Os in Smartphones, but the Nokia OEMs shifted to Android instead.
3. Microsoft seems to have poor strategy as far as the hardware is concerned. Surface is a big flop.
4. Azure is the one project which is successful and getting profit much more than expected.

Our Agenda taken forwards

1. Invited to join CAVE
2. Joint Courses
3. Asking their students join our IITM-Finland Course
4. Big Mega projects planned
5. Experience Center
6. XR Corridor
7. XRIG
8. XTIC Newsletter
9. BharXR

<https://education.sakshi.com/en/engineering/education-news/iit-mandi-launch-centre-human-computer-interaction-155676>



5. The three major cloud companies are focussing on India: MS, Amazon, Google.
6. Narayan is planning to quit MS and take a break from Industry.

Insights from Balamuralidhar, Distinguished Chief Scientist TCS (Retd)

1. Anandthakrishnan sitting in IITMResPark retired, some one else from Pune has taken over his position.
2. TCS Research at IITMRP is so successful that the TCSRes in other cities are also moved to ResPak in other IITs.

Got the Best Paper Award in the CVPR 2024 Workshops. The details of the paper is given below and in the forwarded email.

Jay Bhanushali, Praneeth Chakravarthula, Manivannan Muniyandi, Cross-Domain Synthetic-to-Real In-the-Wild Depth and Normal Estimation for 3D Scene Understanding, Accepted for CVPR Workshops 2024, Seattle.

Jay Bhanushali is our MS Scholar just graduated from our lab.

Best Presentation Award in IEEE ICCAR 2024

Manali Jain, Bijo Sebastian and Muniyandi Manivannan, Shared Control for Telepresence Robot in a Dynamic Virtual Reality Environment, IEEE ICCAR



2024 Conference (27-29 April, 2024) Singapore.

- OpenSource Development FICCI and Meta
- 21st and check out 22nd November
- FICCI XROS Fellowship Program

Amongst an impressive pool of 10,000 applicants, I am honored to be Among the 100 XR developers selected for this prestigious fellowship.

XROS Fellowship Program is a uniquely curated initiative aimed at supporting Indian developers working on XR technologies by providing fellowships which will include a stipend and mentoring by industry experts. The Program will support developers to make contributions to open source projects related to XR technology. The Program aims to give developers a platform to work with the best resources to create digital public goods and further support their careers by facilitating fellowships in organisations working in the domain of AR, VR, MR, 3D Modelling, etc. XROS Fellowship will provide a learning cohort for 100 developers and selected developers will work on projects with partner organisations and industry mentors.



Professor Dr. Manivannan Muniyandi Visits Indian Register of Shipping, Mumbai

On May 24, 2024, Professor Dr. Manivannan Muniyandi from the Indian Institute of Technology, Madras, visited the Indian Register of Shipping in Mumbai. During the visit, he engaged with senior officials to explore potential opportunities for collaboration in the field of Extended Reality (XR).

He also conducted a session titled "War Among Tech Giants on XR," where he discussed the growing demand and adoption of XR technology, current research initiatives, various projects and use cases, as well as the skilling and opportunities in this space.

As a follow-up to this discussion, Professor Dr. Muniyandi visited on July 29, 2024, to identify specific projects for collaboration.





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