

Promoting the Smart Tourism by Implementing Virtual Reality and Augmented Reality

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Abstract - In the new era, the latest technologies are emerging in Industry 4.0, currently out of these technologies two are at peak known as Augmented reality which basically converts reality in virtual scenario and Virtual reality which converts virtuality into reality. Tourism the name itself has a peace and for most of the countries and peoples it is the major source of income or we say functioning. What happen if we sync these two with each other and we can refer it as Smart Tourism by implementing AR-VR. With that note we proposed a model regarding the smart view of tourist spot which will generate more curiosity to know that place by visiting them in personally. Reason behind it is that humans have psychology that regard of just viewing images or listening if we experience any incident by our own, we get more fascinated towards it and also keep it remembered for longer period of time. So, here when tourists view locations using AR-VR they feel like they are present at that location, it also helps them to decide whether to visit in real or not. It is cost effective also as user saves a lot by not visiting if place is not of their interest. It also helps to cover all the spots that are even not so famous of specific locations which is not covered in Itinerary provided by most of the tour operators. As tourist will enjoy this and also their expectations and curiosity will increases to visit there, this will boost tourism industry and will become very helpful for locals and others depending on this sector.

Keywords: Smart Tourism, Augmented Reality, Virtual Reality, Virtual Tour

I. INTRODUCTION

A. Tourism

Tourism is travel for pride or enterprise, and the industrial pastime of offering and assisting such travel. The world Tourism organization defines tourism more usually, in phrases which go “beyond the common perception of tourism as being limited to holiday pastime”, as human beings “traveling to and staying in locations out of doors their normal environment for no longer multiple consecutive year for entertainment and no longer less than 24 hours, business and different functions” [1]. Tourism can be home (in the traveller’s personal U.S.A.) or global, and international tourism has each incoming and outgoing implications on a country’s stability of bills. The tourism industry, as a part of the service area, has become an vital supply of profits for plenty regions or even for entire international locations [2]. The Manila assertion on international Tourism of 1980

identified its importance as “an pastime crucial to the lifestyles of countries because of its direct effects on the social, cultural, educational, and economic sectors of country wide societies, and on their worldwide members of the family”.

The tourism industry is one of the largest and fastest-growing industries in the world, accounting for 10.4% of global GDP and providing employment for one in ten people worldwide. Smart tourism is an emerging concept that aims to leverage the latest digital technologies to enhance the tourist experience, promote sustainable tourism, and generate revenue for the tourism industry. Virtual reality (VR) and augmented reality (AR) have emerged as powerful tools for promoting smart tourism [3]. VR involves creating a simulated environment that can be experienced through a headset or other devices, while AR overlays digital information onto the real-world environment through a smartphone or tablet [4].

B. How Smart Tourism Differ from Normal Tourism

Normal tourism refers to traditional forms of tourism where travellers visit destinations and attractions to experience the local culture, history, and natural beauty [5]. Normal tourism typically involves a range of activities, such as sightseeing, shopping, and dining, and may involve interactions with locals and other travellers.

On the other hand, smart tourism refers to the use of technology to enhance the tourism experience [6]. Smart tourism involves the use of digital tools and platforms, such as mobile apps, social media, and augmented reality (AR) or virtual reality (VR) technologies, to provide personalized and immersive experiences for travellers.

Here are some examples of how smart tourism can differ from normal tourism:

1. Personalization: Smart tourism provides personalized recommendations for activities, accommodations, and dining options based on a traveller’s preferences and behaviour. This can help travellers to make the most of their trip and discover new experiences.

2. *Digital Connectivity*: Smart tourism provides digital connectivity for travellers, allowing them to stay connected with family, friends, and work while on the go [7]. This can include Wi-Fi hotspots, mobile apps, and social media platforms that enable real-time communication and information sharing.

3. *AR and VR Experiences*: Smart tourism provides immersive AR and VR experiences that allow travellers to explore destinations and attractions in a new and engaging way. This can include virtual tours, interactive exhibits, and gaming experiences that enhance the tourism experience.

4. *Smart Infrastructure*: Smart tourism involves the use of smart infrastructure, such as digital signage, smart transportation, and smart accommodations, to provide a seamless and convenient travel experience. This can include self-check-in kiosks, mobile payments, and real-time traffic updates.

II. AUGMENTED REALITY

Augmented reality (AR) is an interactive way that combines the real world and pc-generated content material [8]. The content material can span multiple sensory modalities, along with visual, auditory, haptic, somatosensory and olfactory. AR may be defined as a device that includes three fundamental functions: aggregate of real and digital worlds, actual-time interaction, and accurate 3-d registration of virtual and real gadgets. The overlaid sensory records may be optimistic (i.e., additive to the natural surroundings), or unfavourable (i.e., overlaying of the natural environment) [9]. This experience is seamlessly interwoven with the physical world such that it's far perceived as an immersive issue of the real surroundings. In this way, augmented reality alters one's ongoing notion of an actual-world environment. Augmented reality maintains to broaden and end up extra pervasive among a huge range of applications like available restaurants, public utility, malls etc as shown in figure 1.

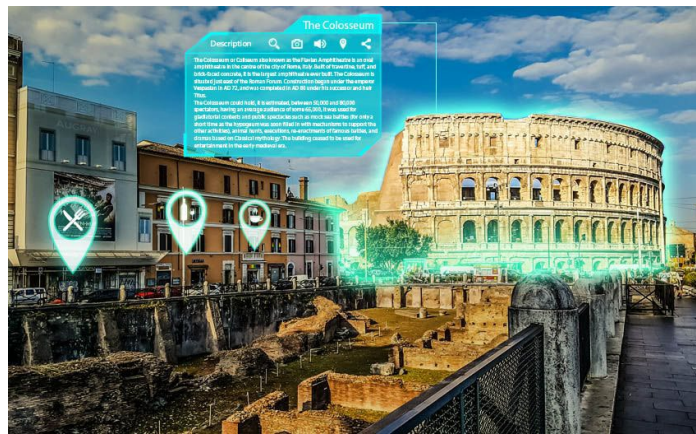


Fig. 1 Scanning Monuments and showing nearby places

Due to the fact its conception, marketers and technology companies have had to battle the perception that augmented reality is little more than an advertising tool. However, there may be evidence that purchasers are starting to derive tangible advantages from this technology and count on it as part of their buying technique [10].

Augmented reality (AR) includes masking visible, auditory, or different sensory data onto the real world to beautify one's revel in. Retailers and other corporations can use augmented truth to sell services or products, release novel advertising and marketing campaigns, and gather particular consumer statistics. Not like virtual reality, which creates its very own cyber surroundings, augmented reality adds to the existing world as it is.

III. VIRTUAL REALITY

Taking a common definition virtual means “present or ensuing in essence or effect even though no longer in real fact, form, or name.” Also, it may imply “created, simulated, or carried on by a pc or pc community” different definitions

may be observed within the scientific literature to complement the dictionary, such as “the action to induce a focused conduct in an organism by means of the usage of synthetic sensory stimulation, whilst the organism has little or no focus of the interference” [11]. Some other thrilling definition for virtual reality is an interactive laptop simulation which transfers sensory statistics to a person who perceives it as substituted or augmented. Consequently, virtual fact will be defined as an environment created via a pc machine that simulates an actual situation [12].

Beginning with the resulting description it can be said that this technology provides the person with the opportunity to be immersed in a programmed environment that simulates a truth. Presently people may be immersed inside those realities through the experience of sight, with the aid of using visualization goggles, through contact- via sporting haptic gloves, and finally, via listening to with the aid of using headphones. The age that makes it possible is based on software functions interacting using peripherals as shown in figure 2 will realize the tourist a real feel of the place.



Fig. 2 Sea Beach View using Virtual Reality

There are various applications. On the other hand, those who want effective processing to apply. Meanwhile, in parallel, all the offers available on the market feature different packages that can run on the phone's processor, allowing us to expand our access channel to this generation. The video game industry has been a major sponsor of improvements in this technology [13]. There are quite a few users in this area who tend to invest in improving their best gaming experience. Once their skills were demonstrated, other sectors such as verbal communication, marketing and advertising realized that such times could be a differentiating detail for their business.

These technologies are useful in many fields few of them are:

1. *Education:* Virtual and augmented reality have the potential to increase student attendance and create particularly stimulating and engaging learning environments. Unlike traditional online education, VR allows students in medical facilities and poor rural areas to interact safely in the classroom.

2. *Tourism:* AR/VR technology allows hotels to show accurate 360-degree photos and videos of their spaces, providing an opportunity to sell themselves.[14] Top tourist destinations and marketers are also using AR/VR to convince visitors with a try-before-you-buy method.

3. *Intellectual Health Services:* According to the latest research, AR and VR have great ability to treat intellectual health problems such as anxiety and her PTSD by giving the user the risk of enduring the problem through ad therapy.

4. *Digital Offers:* AR and VR should provide interactive services that guide customers through software methods rather than asking citizens to fill out static digital forms to receive offers. Cops would be better prepared to face potentially dangerous situations if they had an AR structure that provided relevant statistics about their location.

5. *Emergency Management:* Simply because the accelerated use of data visualization has improved situational awareness in emergencies, Augmented Facts (AR) can help first responders better understand their surroundings and helps you shop for your residents.

Here in this chapter, we are mainly focusing on usage of these technologies in tourism sector, virtualisation of tourism sector makes it smart and more usable and interesting. These technologies have the powers to change the whole tourism sector.

IV. BENEFITS OF IMPLEMENTING VR AND AR IN SMART TOURISM

Implementing VR and AR in smart tourism can provide several benefits. Firstly, these technologies can enhance the tourist experience by allowing tourists to virtually explore tourist attractions and destinations before visiting them in person. This can help tourists plan their trips more effectively and make more informed decisions about where to go and what to see. VR and AR can also provide tourists with a more immersive and engaging experience, allowing them to feel as if they are part of the destination.

Secondly, VR and AR can promote sustainable tourism by reducing the environmental impact of tourism. By allowing tourists to explore destinations virtually, they can reduce the need for physical travel, which can help to reduce carbon emissions and other negative environmental impacts.

Thirdly, VR and AR can generate revenue for the tourism industry by providing new opportunities for tourism businesses to market their products and services. For example, VR and AR can be used to create virtual tours of hotels, restaurants, and other tourist attractions, which can help to attract more customers and generate more revenue.

A. Usage of VR Technology

1. Device Used

Virtual reality can be experienced as 3D photos, images, or 360-degree videos on your computer system or smartphone using an app. More complex VR systems use wraparound computer presentations or entire rooms with high-definition displays built into the walls. But tourists can't arrange all these to just check the location or any institution can make changes in their infrastructure. As such, VR headsets can be used to enhance the tourist's viewing experience. Experience virtual reality environments through VR headsets or glasses.

It could be a headset, like the Oculus VR system or the HTC Vive. Alternatively, you can use a headset adapter and mobile app software to turn your phone into a 3D display like Samsung's Gear VR system. Virtual worlds seem to exist in all directions, as VR headsets track your head movements and adjust what you perceive based on where you're looking. Many VR systems let you manage this digital environment with hand controls or gloves. This includes so-called "haptic" models that vibrate and provide a form of virtual contact.

2. Technology Used in Headsets

a. Components

- i. Stereoscopic head-mounted display
- ii. Stereo Speakers
- iii. Gyroscopes
- iv. Accelerometers
- v. Magnetometers
- vi. Structured lights

The VR glasses use a technology referred to as head-tracking, which changes the field of vision as a person turns their head. The technology may not be ideal, as there's latency if the head movements too rapid. Still, it does offer an immersive experience.

B. Important Components of VR Technology

1. *Field of View*: The average human can see around 220 degrees of surrounding content. The VR headset can rotate about 180 degrees. The field of view of your headset determines the world you see around you and how close you are to the modern environment. No headset yet fully covers our natural vision, but technology is advancing.

2. *Frame Rate*: Frame rate is an alternate visual factor that defines VR behaviour. The frame should move at a premium pace within the VR headset screen, mimicking what you'll see in real life. Experts assume that the human eye can process up to 1000 frames per second. But the human brain never receives these same details. Most developers have observed that going below 60 FPS induces disorientation and nausea. Pro he tries to get close to 120 FPS.

3. *Surround Sound Effects*: Modern panoramic VR headsets use spatial audio to tell you which direction to turn and support a sense of "realism" as you move through different environments and experiences.

4. *Position and Head Tracking*: Head and position tracking features are measured in degrees of freedom, so both 6 and 3 degrees of freedom can be discovered. Headsets with 6 degrees of freedom can see where you are in the room and show you the path your head is pointing. This means you can move around the room completely independently. Sensors on the outside of the VR headset also help keep you safe as you move around the room. Eye-tracking technology can help improve perception of VR stories and reduce the nausea some people experience while using a headset. Haptic feedback sensors and other tracking technologies used to

embed controller options in VR can also make landscape experiences more immersive.

C. Uses of AR in Smart Tourism

AR generation can decorate the tourism enjoy by using offering immersive and interactive content material for travellers. Right here are some examples of ways AR generation may be utilized in tourism.

1. *AR Guided Tours*: AR can offer digital guides that offer audio or visible facts approximately historic sites, landmarks, or museums. The AR guide can spotlight essential functions, provide historic context, and provide travellers a deeper know-how of the region they may be travelling.

2. *AR Navigation*: AR can offer real-time navigation and instructions, permitting travellers to without difficulty locate their way around a brand-new metropolis or vicinity. AR navigation can overlay guidelines and statistics on a visitor's smartphone digicam view, making it easier to navigate surprising streets and landmarks.

3. *AR Language Translation*: AR can offer language translation features, allowing travellers to translate symptoms, menus, and other written information in actual time. this will be particularly useful for worldwide vacationers who might not speak the neighbourhood language.

4. *AR Attractions*: AR can provide immersive and interactive sights, together with virtual fact studies or AR video games, that enhance the tourism revel in. For instance, an AR recreation might permit tourists to gather digital items or remedy puzzles even as exploring a city or web site.

5. *AR Souvenirs*: AR can provide unique souvenirs, along with AR postcards or digital picture opportunities, that permit vacationers to seize and share their studies in a brand new and creative way.

Overall, AR technology can upload cost and pleasure to the tourism revel in, making journey greater enticing and noteworthy for vacationers.

D. Uses of VR in Smart Tourism

Virtual Reality (VR) era has the capacity to transform the tourism enterprise through presenting immersive stories that allow vacationers to discover destinations and attractions from a new attitude. Right here are some examples of how VR technology may be utilized in tourism.

1. *Virtual Excursions*: VR era can offer virtual tours of famous visitor locations, allowing vacationers to explore locations they'll not have the possibility to visit in individual. As an instance, a VR excursion of a national park might permit vacationers to revel in the splendour and majesty of the panorama with-out virtually visiting there.

2. *VR Tour Making Plans:* VR technology can provide travellers with a digital experience in their journey plans earlier than they make a reserving. This can include digital resort rooms, 360-degree perspectives of locations, and different immersive reports that assist tourists make informed choices approximately their ride.

3. *VR Attractions:* VR can provide immersive attractions that permit vacationers to experience activities or adventures that can be difficult or not possible in real life. For instance, a VR appeal would possibly permit vacationers to bungee leap or skydive in a safe and managed environment.

4. *VR Education:* VR can provide schooling opportunities for tourism enterprise experts, inclusive of resort personnel, excursion courses, and journey marketers. VR training can provide safe and managed surroundings in getting to know and practising abilities, along with customer support or emergency methods.

5. *VR Advertising And Marketing:* VR can offer an effective advertising tool for tourism locations and points of interest. VR studies can show off the particular features and sights of a vacation spot, assisting to draw and engage capacity tourists.

Overall, VR era has the ability to revolutionize the tourism industry via imparting immersive and engaging reviews for vacationers. By means of presenting a brand-new angle on journey, VR era can assist to enhance the tourism experience and appeal to new travellers to destinations around the world.

V. DATA ANALYSIS

The use of AR and VR technologies in the tourism sector has grown rapidly in recent years, providing new and innovative ways for travellers to explore destinations and attractions. Data analysis of the use of AR and VR in the tourism sector can provide insights into the effectiveness and impact of these technologies on the industry. Here are some key findings from recent studies.

1. *Increased Engagement:* AR and VR technologies have been found to increase engagement and interest among travellers. According to a study by the World Tourism Organization (UNWTO), VR experiences were found to increase engagement and emotional connection among travellers, leading to a greater likelihood of return visits and positive word-of-mouth recommendations.

2. *Improved Customer Satisfaction:* AR and VR technologies have been found to improve customer satisfaction and loyalty. A survey by Travelport found that travellers who used AR and VR technologies reported higher levels of satisfaction with their travel experience, leading to increased loyalty and repeat business.

3. *Enhanced Learning:* AR and VR technologies have been found to enhance learning and education among travellers.

A study by the University of Central Florida found that VR technology was effective in increasing visitor engagement and understanding of historical sites and cultural landmarks.

4. *Increased Revenue:* AR and VR technologies have the potential to increase revenue for tourism destinations and attractions. A study by the UK Government's Department for Digital, Culture, Media and Sport found that VR experiences led to increased spending and revenue at tourist attractions.

5. *Growing Industry Adoption:* The use of AR and VR technologies in the tourism sector is growing rapidly, with increasing adoption among tourism destinations, hotels, and attractions. According to a report by Grand View Research, the global market for AR and VR in tourism is expected to reach \$13.6 billion by 2025.

VI. CHALLENGES ASSOCIATED WITH IMPLEMENTING VR AND AR IN SMART TOURISM

While implementing VR and AR in smart tourism can provide several benefits, there are also some challenges associated with these technologies. Firstly, there is a lack of standardization in the VR and AR industry, which can make it difficult for tourism businesses to adopt these technologies effectively. Secondly, VR and AR require significant investment in terms of hardware and software, which can be a barrier for small tourism businesses. Thirdly, there is a risk that VR and AR could lead to a decline in physical travel, which could have negative economic impacts on tourism destinations that rely on tourism revenue.

VII. RECOMMENDATIONS FOR IMPLEMENTING VR AND AR IN SMART TOURISM

To overcome these challenges, it is important to develop standards and guidelines for the use of VR and AR in smart tourism. This will help tourism businesses to adopt these technologies more effectively and ensure that they are used in a way that benefits both tourists and the tourism industry. It is also important to provide training and support for tourism businesses that want to adopt VR and AR, particularly for small businesses that may not have the resources to invest in these technologies independently.

Finally, it is important to develop policies and strategies that encourage the responsible use of VR and AR in smart tourism, to ensure that these technologies are used in a way that promotes sustainable tourism and benefits both tourists and the tourism industry.

We conducted a survey with our students. We select a batch of sixty students. We ask them whether they want to visit India Gate as a tourist. 29 students says yes, they want to visit, 11 students says they cannot say and 20 students says No. After giving those children a virtual tour of India Gate on VR, which is shown in figure 3, when we asked the same question again, there was a lot of difference in their reply.



Fig. 3 India Gate Virtual Tour (<https://www.youtube.com/watch?v=KMptHv1-EuE>)

After virtual tour 47 students says yes, they want to visit; 5 students says they cannot say and 8 students says No. So, this experimental survey shows that using the VR tour, curiosity

of a person to visit that place increase and it will definitely enhance the tourist industry. Results in form of graph is shown below in figure 4.

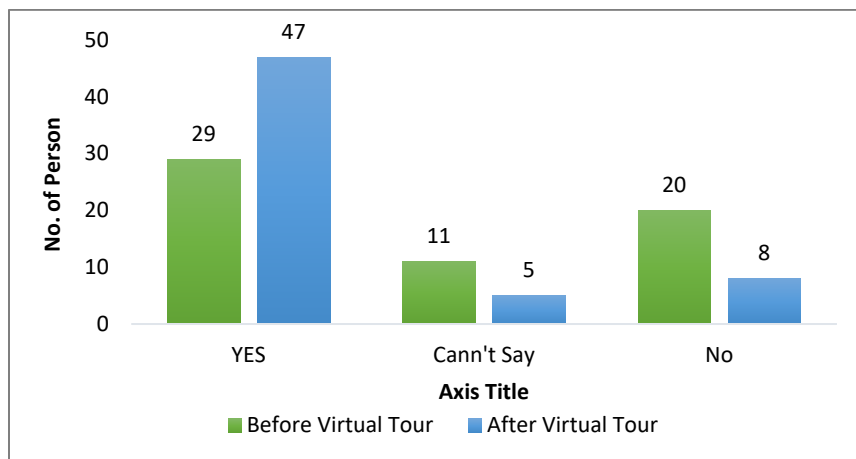


Fig. 4 Graph showing raise in visiting a tourist place after Virtual Tour

VIII. CONCLUSION

Implementing VR and AR in smart tourism has the potential to provide several benefits, including enhancing the tourist experience, promoting sustainable tourism, and generating revenue for the tourism industry. However, there are also challenges associated with these technologies, including a lack of standardization.

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