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Enhancing Travel Experiences with Augmented Reality

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Abstract : In the travel industry, augmented reality has grown more popular in recent years. This is mainly because it allows hotels and other businesses in this industry to improve the physical spaces, they are promoting customers to explore, such as local attractions and hotel accommodations. Travel is typically subject to thorough research by customers, who need ample information prior to their arrival, unlike other purchases. Furthermore, the demand for information continues even after the customer has arrived. Augmented reality can make sure that a lot of this information is accessible to them around the clock, when it is most fitting. Additionally, a major factor contributing to the adoption of AR in the travel sector has been the overall shift in consumer habits during the last ten years. Contemporary clients frequently use their smartphones while traveling, making the transition to using augmented reality apps on these devices quite seamless.

IndexTerms – **Travel, Users, Reality, GPS, AR**

I. INTRODUCTION

Despite being around as a concept since the 1960s, it wasn't until the past twenty years that advancements in technology allowed for the development of a unique research area dedicated to Augmented Reality (AR). AR is a method of visualization that overlays computer-generated information, such as text, video, graphics, GPS data, and other multimedia formats, onto the live view of the real world from a camera on a computer, mobile phone, or other devices. In simpler terms, AR can enhance how someone sees things by using a computer or mobile device to improve their perception of reality and the world around them. Currently, AR technology is utilized in various sectors like medicine, education, simulated training, and tourism in order to enhance the overall tourist experience. Several instances have demonstrated that AR can help tourist organizations and professionals expand their reach to a broader audience by acting as a means to deliver engaging multimedia content and mobile apps. Alternatively, AR technology systems can assist travelers in accessing useful information and expanding their understanding of a tourist site or location, all while enhancing their overall experience and providing higher levels of enjoyment during the journey. The current paper provides a summary of how AR mobile apps are used, designed specifically for hospitality and tourism professionals. In the upcoming sections, we will elaborate on the current status of information systems and mobile apps utilizing AR for tourism, aiming to showcase the advantages provided to travelers. In conclusion, the paper suggests a basic structure for creating mobile AR apps for the tourism industry, with the goal of maximizing the technology's capabilities within this specific sector.

II. LITERATURE SURVEY

Augmented Reality (AR) has become a groundbreaking technology that has the potential to revolutionize several industries, such as travel and tourism. The purpose of this literature review is to investigate the current studies, progress, and utilization of AR in improving travel experiences.

Concepts and Technologies of Augmented Reality:

- AR is a technology that superimposes digital content onto the physical world, providing immersive experiences for users. Marker-based AR, marker less AR, AR devices worn on the body, and AR apps for mobile devices are important concepts to understand.
- GPS, computer vision, and sensor fusion are the technologies that make AR experiences in travel possible. Uses of Augmented Reality in Travel Experiences.
- Augmented reality is used in different parts of the travel industry such as planning trips, finding directions, discovering cultural heritage, and promoting destinations.
- Apps that use AR technology offer users up-to-date details on landmarks, nearby sights, and guidance for navigation. Case studies demonstrate how AR has been effectively used in the travel industry, including virtual city tours and interactive museum exhibits.

III. AUGMENTED REALITY

Augmented reality (AR) involves merging digital data with the user's surrounding environment in Real Time. In contrast to VR, which generates a completely artificial environment, AR allows users to see generated perceptual information overlaid on their real-world surroundings. Augmented reality is utilized to modify natural surroundings visually or offer extra information to users. The main advantage of AR is its ability to combine digital and 3D elements with a person's perception of the physical world. AR serves multiple purposes, such as aiding in choices and providing amusement. It transmits visual components, audio, and other sensory data to the user via technology like smartphones or glasses. The data is superimposed on the device to craft a seamless encounter where digital data changes how the user sees the physical world. Augmented reality information can be superimposed onto an environment or integrated into the natural surroundings. AR can be accessed through smartphones, tablets, and smart glasses in different formats. Typically, mobile devices come equipped with sensors like cameras, accelerometers, GPS, and compasses. This aids in making AR more available to the average user. A GPS helps locate the user, while its compass determines device orientation. Advanced AR software used in military training may also feature machine vision, object recognition, and gesture recognition. Augmented reality applications are created using unique 3D software that allows developers to connect animation or relevant digital data within the computer software to an augmented reality marker in the physical world. When a known marker sends digital information to a computing device's AR app or browser plugin, it will start running the marker's code and overlay the appropriate image or images.

3.1 TYPES OF AUGMENTED REALITY

Different types of Augmented Reality (AR) can be classified depending on how digital information is added onto the physical world. The following are a few frequently seen forms of augmented reality.
Using markers as the method of identification.
Marker-based Augmented Reality depends on visual markers or cues in order to activate the presentation of augmented content. Typically, these markers are images or patterns that can be easily identified by a camera or sensor. When the AR system identifies a particular marker using a tool such as a device.
A smartphone or AR glasses superimpose digital information or objects onto the marker's location in the real-world perspective.
Marker less Augmented Reality (AR) does not depend on pre-existing markers or visual references to superimpose digital content onto the physical environment. Instead of that, it employs different technologies and sensors to comprehend and engage with the environment.

IV. LOCATION-BASED AR

Position-determined augmented reality (AR) is a tech that superimposes digital data or virtual items onto the physical world, improving the user's understanding and engagement with the surroundings according to their location. This type of AR utilizes location data from GPS or other positioning technologies to provide immersive experiences that are contextually relevant.
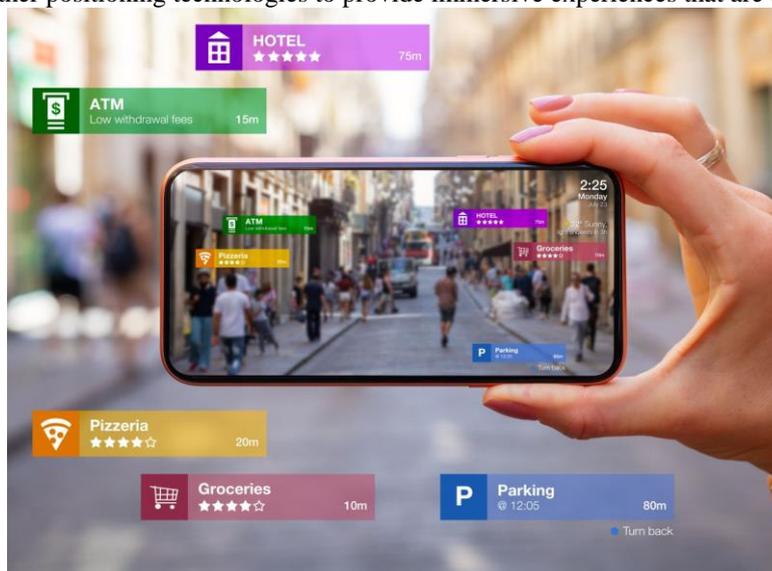

Fig.1 Location-Based AR

4.1 ROLE OF GOOGLE IN LOCATION-BASED AR

Google has a significant impact on the progress and widespread use of location-based augmented reality (AR) by offering different services, tools, and platforms. The various ways Google contributes to location-based AR include ARCore, Google Maps API, Google Places API, Google Earth and Google Earth Engine, and Google Street View.

4.2 GOOGLE GEOSPATIAL

Geospatial pertains to the information and technology associated with the specific geographic placement of items on the Earth's surface. This area covers various subjects and uses related to spatial information, cartography, and examination. The important elements of geospatial information include Spatial Data, Geographic information System (GIS), Mapping, Satellite Imagery, Remote sensing, Global Positioning System (GPS). Geospatial information plays a crucial role in comprehending and tackling various real-life problems, such as urban planning, natural resource management, emergency response, and environmental monitoring. The utilization of geospatial technologies is still developing and growing, with a significant impact in various fields and applications.
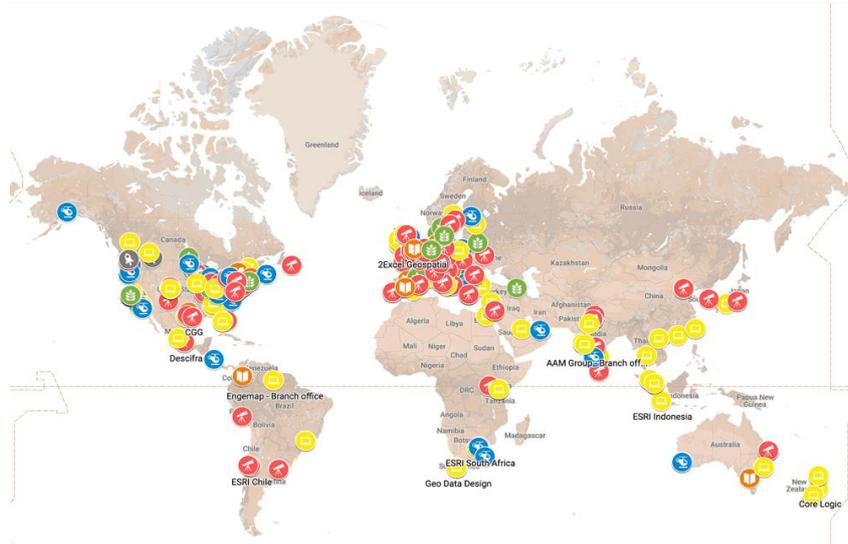

Fig.2 Google Geospatial

V. AUTHORITY TOOL USED-UNITY ENGINE

Unity, developed by Unity Technologies, was first launched in 2005 as a game engine that works across different platforms. Unity's primary emphasis is on creating interactive content and developing both 2D and 3D games. Unity now offers support for more than 20 diverse target platforms for deployment, with the most commonly used ones being the PC, Android, and iOS systems. Unity contains a full set of tools for creating games, with built-in graphics, audio, and level design interfaces, reducing the need for external software during project development.
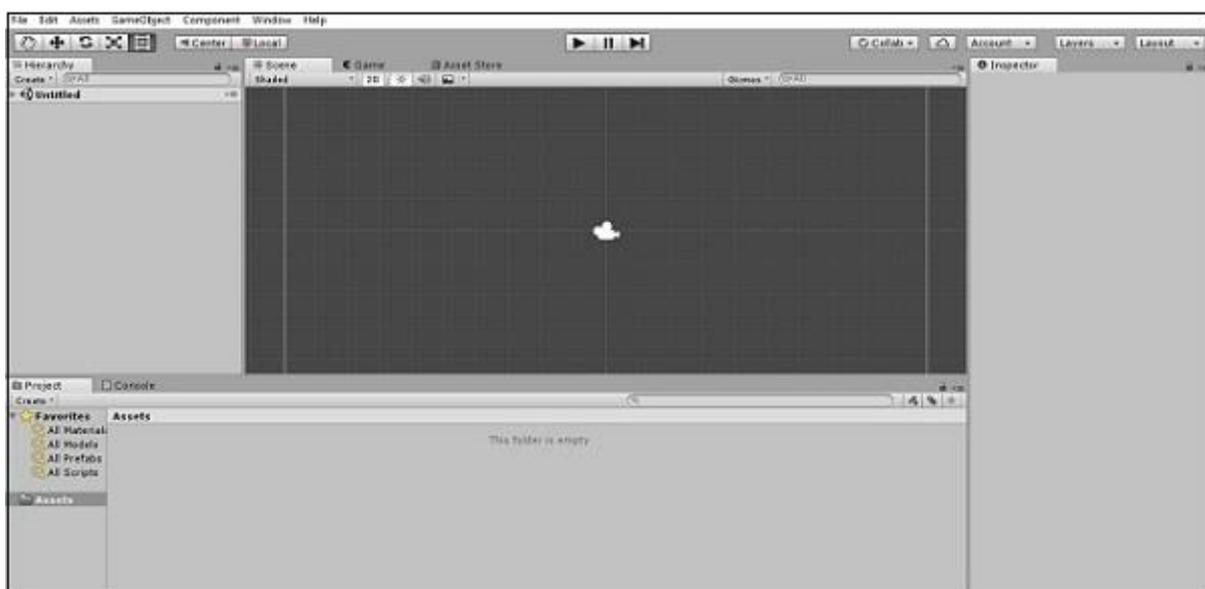

Fig.3 Unity Engine

5.1 TOOLS USED FOR UI DESIGN

Unity is a widely-used game development platform that offers features for designing user interfaces (UI) for games or applications. Below are a few key tools and functions employed for user interface design within unity.

Figma: a digital design tool for creating user interfaces.

Figma is a tool for designing and prototyping that enables real-time collaboration on design projects. It enables several designers to collaborate on the same project at the same time, which is beneficial for teams. Figma provides functionalities like live collaboration, vector editing, prototyping, and version control. Figma's main benefit is its seamless compatibility with various operating systems and devices due to being completely browser-based. This enables designers to reach their projects from any location with internet access. Designers are increasingly using Figma for its user-friendly interface, strong capabilities, and emphasis on working together. It is frequently utilized in the creation of UIs, UX flows, website layouts, and mobile app designs.

Blender:

Blender, a robust 3D computer graphics software that is open-source, is utilized for various functions such as 3D modelling, animation, rendering, sculpting, texturing, and more. It is a flexible instrument that meets the requirements of artists, animators, game developers, and filmmakers. The open-source aspect of Blender has led to a vast and lively community that offers users access to numerous tutorials, add-ons, and resources. It is commonly utilized in animation, visual effects, game development, and the creation of 3D art.

5.2 UNITY IN MANUFACTURING

Unity is being used more and more in the manufacturing sector to improve different processes, such as design, prototyping, training, and simulation. Unity is utilized in manufacturing for tasks such as Digital Twin Development, Product Design and Prototyping, Assembly Line Simulation, Training Simulation, Maintenance and Repair Training, and Factory Planning and Layout Visualization. Its real-time 3D development features are beneficial for manufacturers aiming to streamline operations and improve training and simulation processes.
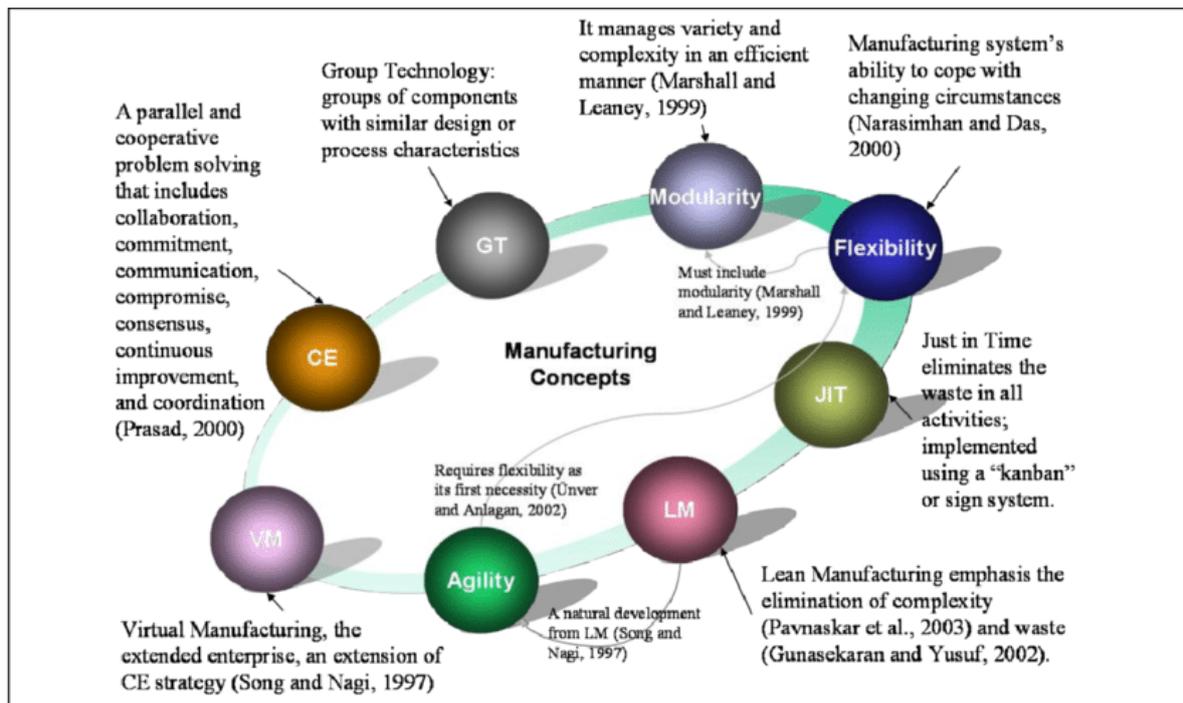

Fig.4 Unity in Manufacturing

VI. AUGMENTED REALITY SDK

Multiple AR SDKs are accessible for developers to build AR apps. The AR sector is always changing, with potential new SDK launches or updates to current ones. The following are some well-known SDKs: AR Core (Google), ARKit (Apple), Vuforia (PTC), Unity AR Foundation, Wikitude, EasyAR, MaxST AR SDK, ARToolKit, Kudan AR SDK, Microsoft Mixed Reality Toolkit (MRTK). When selecting an AR SDK, developers must take into account platform compatibility, features, user-friendliness, and community support. It is important to keep up with the recent developments and advancements in the field of AR development. Google does not offer a dedicated geospatial AR software development kit. Nevertheless, google provides various tools and services that developers can use to create location-based AR experiences. These tools frequently require combining Google Maps APIs with augmented reality features. Listed are several features and tools offered by Google that developers frequently utilize for geospatial AR applications, such as AR Core, Google Maps APIs, AR Street View on Google Maps, Google Cloud Anchors, and Scene Viewer. Even though Google doesn't offer a specific geospatial AR SDK, developers frequently merge different Google services and APIs to develop augmented reality applications based on location and spatial mapping. Furthermore, the realm of AR is changing quickly, therefore it is recommended to refer to Google's developer resources and updates to stay informed about the newest features and tools for geospatial AR.
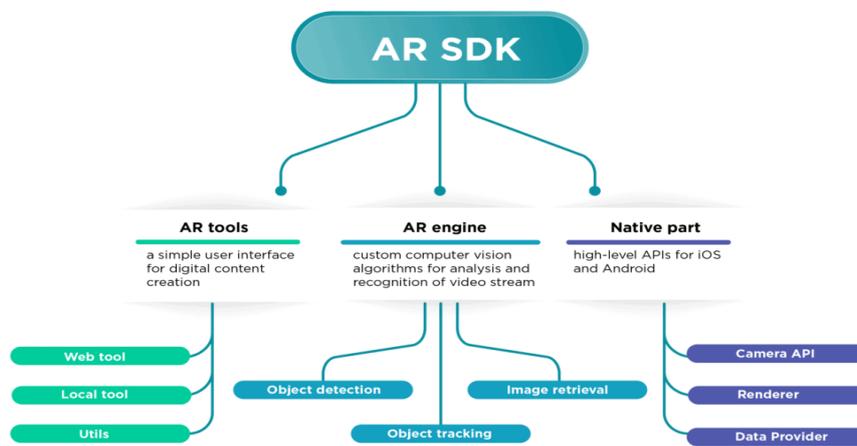
Fig.5 AR SDK

6.1 BACKEND-FIREBASE

Firebase is a platform for developing mobile and web applications created by Firebase, Inc., and bought by Google in 2014. Firebase offers a range of tools and services that streamline the development process, allowing developers to create top-notch apps rapidly and effectively. Firebase is reputable for its simple integration, live features, and wide range of tools that encompass different areas of app development. It is appropriate for both small startups and larger enterprises seeking to efficiently develop and expand their applications. Remember that features and services can change, so it's best to refer to the official Firebase documentation for the most up-to-date information. Firebase is an all-encompassing platform for developing mobile and web applications, offered by Google. It provides a range of services and resources to assist developers in creating, enhancing, and expanding their apps. Firebase offers a cohesive platform that streamlines various parts of the development process, enabling developers to concentrate on building features rather than overseeing infrastructure. It is commonly chosen by startups and developers creating mobile and web applications because of its simplicity, flexibility, and ability to easily incorporate different services.

6.2 SUPPORTED DEVICES

Location-based AR technology has progressed, with different apps and platforms enabling this feature. Here are some recent developments and thoughts about the current availability of AR based on location.
1) Mobile phones and tablet devices:
AR frameworks such as ARKit for iOS and ARCore for Android have made location-based AR experiences easily accessible on smartphones and tablets. Numerous apps, such as navigation tools, tourist guides, and games, make use of the device's GPS and sensors for AR interactions based on location.
2) Augmented Reality Glasses and Headset:
AR glasses and headsets such as Microsoft HoloLens, Magic Leap, and Nreal Light still enable location-based AR experiences. These devices use sensors, cameras, and occasionally GPS to place AR content in the real world.
3) Games that are based on your location:
Games like Pokémon GO, which rely on location-based AR technology, remain in demand and showcase how real-world places are incorporated into gaming.
4) Applications for tourism and navigation.
Location-based AR features are being more and more integrated into applications in the tourism and navigation industries. Users have the ability to obtain information, guidance, and interactive material depending on where they are situated geographically.

VII. CONCLUSION

Location-based augmented reality (AR) is a revolutionary technology that combines the physical and virtual realms to offer engaging and contextually fitting experiences. Through the utilization of GPS, sensors, and mobile devices, location-based AR improves user engagement with the environment, enabling new opportunities in different sectors. The combination of accurate geographic information and augmented reality technology has opened up possibilities in fields like navigation, tourism, gaming, and education. Location-based AR benefits not just users with entertainment and information, but also holds importance for businesses, marketing, and urban planning. Location-based AR has a major benefit in its capacity to customize content according to a user's actual surroundings. This technology customizes experiences based on individual preferences and needs, whether by sharing historical information on landmarks, offering location-specific promotions, or providing educational content related to physical locations. With the ongoing evolution of location-based AR, it is anticipated to have a significant impact on influencing the future of interactive and captivating experiences. Progress in technology, like AR glasses and enhanced smartphone features, is expected to make it easier to incorporate augmented elements into our everyday routines. Still, obstacles such as privacy issues, technological constraints, and the necessity for strong infrastructure persist. Finding the right equilibrium between innovation and tackling these obstacles will be essential for the extensive acceptance and achievement of location-based augmented reality. In

essence, location-based augmented reality is leading the way in technological advancement, providing an interactive and engaging connection between the physical and digital worlds. With ongoing advancements, the opportunities for developing more engaging experiences connected to our environment are limitless, positioning location-based AR as a crucial element in the constantly changing realm of AR applications.

VIII. CHALLENGES AND FUTURE WORK

Challenges in technology: Augmented reality technology is advancing but faces restrictions concerning hardware, like battery life, processing power, and display quality. It is essential to address these restrictions in order to deliver smooth and captivating AR experiences, particularly in outdoor and isolated areas.

Necessary infrastructure: Successful integration of AR in the travel industry relies on strong network infrastructure for seamless real-time data transmission and processing. In regions lacking internet connection or GPS signal, AR apps might encounter difficulties in providing precise data and interactions.

Privacy Issues: Augmented reality apps frequently gather and use personal information for different reasons, triggering worries about privacy and data protection. Guaranteeing clear data policies and utilizing technologies to boost privacy are crucial in tackling these issues and establishing trust with users.

Respect for different cultures is essential in creating augmented reality experiences, which should be considerate of local customs, traditions, and sensitivities. Not taking cultural differences into account may result in unintended outcomes or upset local populations, reducing the effectiveness and approval of AR apps in various travel spots.

Creating user-friendly AR interfaces that are intuitive presents difficulties because of the intricate process of superimposing digital content onto the real world. It is crucial to strike a balance between functionality and simplicity, and to reduce cognitive load to ensure that AR experiences improve rather than take away from the travel experience as a whole.

Upcoming Tasks: Further progress in hardware technology, such as lighter AR glasses, upgraded sensors, and longer-lasting batteries, will improve the portability, convenience, and efficiency of AR devices, increasing their availability to travellers.

Further advancements in localization and mapping technologies, like simultaneous localization and mapping (SLAM) algorithms, will allow for more accurate and dependable AR experiences indoors, in urban areas, and off traditional routes, broadening the range of AR uses in travel.

Investing in tools and platforms for creating and curating content will enable travellers, local communities, and businesses to create and share AR-enhanced experiences customized for specific destinations, interests, and preferences.

Collaboration with new technologies: Examining connections between augmented reality and other new technologies like artificial intelligence, machine learning, and the Internet of Things (IoT) will open up fresh opportunities for personalized, context-aware travel experiences and smooth integration with smart city infrastructure.

Promote cooperation among technologists, designers, tourism professionals, and local stakeholders to develop culturally sensitive AR experiences that cherish diversity, protect heritage, and enhance mutual understanding and respect between travelers and host communities.

Gathering input from a variety of travelers with different demographic information, cultural backgrounds, and travel preferences will be crucial in informing the continuous design and development of AR applications to meet the needs and expectations of a diverse range of users.

Focus on ethical considerations and responsible practices when designing, deploying, and governing AR technologies in travel to reduce harm to local environments, cultures, and communities while maximizing benefits for all stakeholders

IX. REFERENCES

[1] Azuma, R. T. (1997). A survey of augmented reality. Presence: Teleoperators and Virtual Environments, 6(4), 355-385.

[2] Billinghurst, M., & Duenser, A. (2012). Augmented reality in the classroom. Computer, 45(7), 56-63.

[3] Dünser, A., & Billinghurst, M. (2005). An evaluation of outdoor augmented reality tracking techniques. In Proceedings of the 2005 IEEE International Conference on Virtual Reality (pp. 263-270).

[4] Höllerer, T., Feiner, S., Terauchi, T., Rashid, G., & Hallaway, D. (1999). Exploring MARS: Developing indoor and outdoor user interfaces to a mobile augmented reality system. Computers & Graphics, 23(6), 779-785.

[5] Kato, H., & Billinghurst, M. (1999). Marker tracking and HMD calibration for a video-based augmented reality conferencing system. In Proceedings of the 2nd IEEE and ACM International Workshop on Augmented Reality (pp. 85-94).

[6] Schall, G., Mendez, E., & Taketomi, T. (2017). Augmented reality in tourism. Journal of Hospitality and Tourism Technology, 8(1), 5-20.

[7] Wagner, D., Pintaric, T., Ledermann, F., & Schmalstieg, D. (2008). Towards massively multi-user augmented reality on handheld devices. Computers & Graphics, 32(3), 223-232.

[8] Yoo, S. J., Kim, Y. H., & Yang, S. B. (2016). Augmented reality (AR) applications in tourism. In Information and Communication Technologies in Tourism 2016 (pp. 789-801). Springer, Cham.