iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 8 **Issue:** V **Month of publication:** May 2020

DOI: http://doi.org/10.22214/ijraset.2020.5459

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue V May 2020- Available at www.ijraset.com

ImaginAR - Shaping the Future

Diya Wadhwani[1], Jalaj Limaye[2], Sahil Sahu[3], Smita Jangale[4]
[1, 2, 3]*Student,* [4]*Professor, Department of Information Technology, Vivekanand Education Society's Institute of Technology, Mumbai.,*

Abstract: ***With the advent of social media, various new technologies have emerged that provide users with unending entertainment. The most eventful of them being augmented reality. The proposed project aims to implement AR technology in such a way that AR technology adds information to the user's current environment, in order to make an activity or experience more meaningful. The project combines various modern-day technologies to implement an app that can be used to entertain people and create creative content. The project leverages Augment Reality to create an app that will make use of technology very seamless. This project will be a founding stone for further research in the field of Augmented Reality.***
Keywords: Augmented Reality (AR), Virtual Reality(VR), Software Development Kits(SDK), Android, Ios, Mobile Devices, Edutainment, Google AR Core.

I. INTRODUCTION

ImaginAR is a user-friendly app that uses Google AR Core to deliver a best-in-class augmented reality experience to users thus bringing AR to their fingertips. ImaginAR is the platform where your imagination comes to life. ImaginAR lets users play with Augmented Reality like no other app. Users can use various modes of the app to create high-value content seamlessly and within seconds.

A. Augmented Reality

Augmented reality (AR) is an interactive experience of a real-world environment where the objects that reside in the real-world are "augmented" by computer-generated perceptual information, sometimes across multiple sensory modalities, including visual, auditory, haptic, somatosensory and olfactory.[1][2]

Augmenting reality gives the power to enhance all the life experiences of the user. Throughout history, humans have always looked for ways to bring their imagination to life. It started with words then stories followed by sculptures, paintings all the way to photographs and movies. And then with the dawn of the age of computers, it all changed with a ferocious pace. Now photographs and movies can be seen on handheld mobile devices and this opened up a whole new world of possibilities. With the help of AR, now, all that people ever imagined will come to life. Virtual space can be mixed with the real-world in multiple proportions to create a customized immersive experience for users. Real-world objects can be replaced with virtual objects to study their behavior under various circumstances.

This is done by superimposing a digital twin of the real-world object onto itself and then removing the actual object from the virtual space. (a.k.a. Diminished Reality)

The goal of augmented reality systems is to combine the interactive real world with an interactive computer-generated world in such a way that they appear as one environment. As the user moves around the real object, the virtual one reacts as it is completely integrated with the real world.

Milgram et al 1994, introduce the reality-virtuality continuum that defines the term mixed reality and portrays the "link" between the real and the virtual world (Figure 1). If the real world is at one of the ends of the continuum and VR (i.e. computer-generated, artificial world) is at the other end, then the AR occupies the space closer to the real world. The closer a system is to the VR end, the more the real elements reduce.

For example, the AR systems using Optical See-through Displays are placed closer to the real world compared to AR systems with Video-mixing (Figure 1). If the real world can be augmented with virtual objects, it is logical to expect that the virtual world can be augmented with real scenes (views, objects). Such an environment is called augmented virtuality. On the reality-virtuality continuum, AV occupies the space closer to the VR environments.

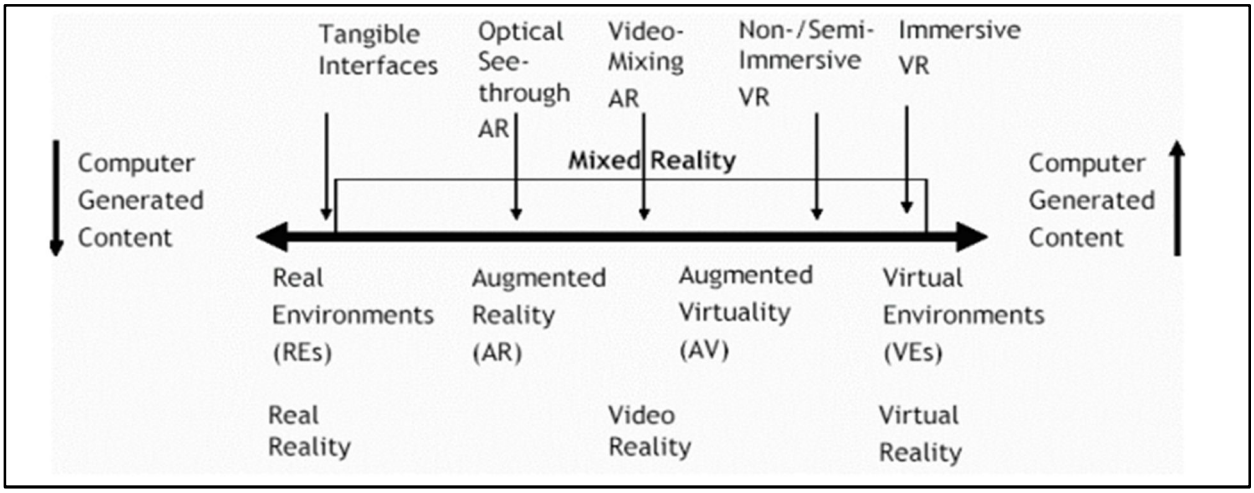


Figure 1. Reality-Virtuality Continuum (Milgram and Kishino 1994)

There are different types of Augmented Reality experiences. The following are the most common types of available Augmented Reality experiences

B. Marker-based AR (Target Images)

Marker-based AR is the most recognizable type of augmented experience. It involves a particular object or surface acting as a reference point for the virtual objects. Once such a surface is detected, the AR content will attach itself to the scene, in accordance with this reference point. However one cannot hope to always find such a reference point in reality and hence this application is constrained. However, there is no saying to what these surfaces can be. For example- food and drink labels (and other related items), business cards, brochures, newspapers, books, magazines, and even road signs, billboards and city lights. The most reputable companies that have their own marker-based AR engines are Vuforia and Wikitude.

Figure 2. An example of Marker Based AR

C. Markerless AR

Since marker-based AR isn't always an option, markerless AR comes to fill in the gap. In this scenario, the AR components will not be strictly connected to particular reference points but can be anywhere in the AV environment. In 2017 Apple and Google announced support of this technology naming them ARKit & ARCore.

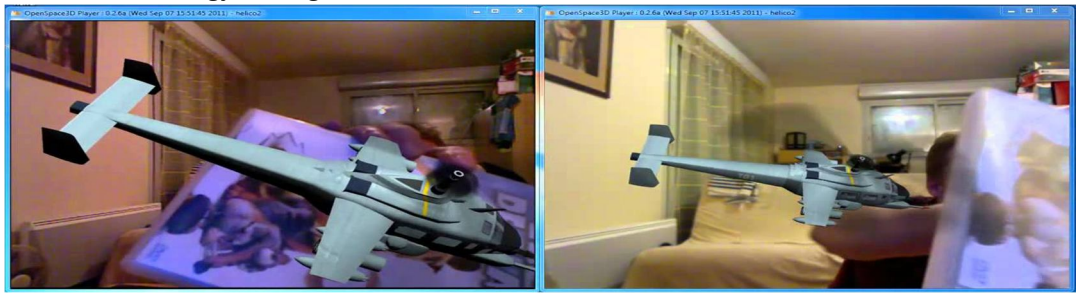


Figure 3. An example of Markerless AR

D. Facial Recognition and AR Lenses

Realtime facial recognition combined with AR allows users to have a multitude of various lenses, masks, and filters on the face. The most fascinating feature of this is that the filters or masks move with the face when it moves. Thus creating a realistic effect of having an actual mask on without actually having mask on. Companies like Snapchat and Instagram have leveraged this technology into million-dollar business models, thus paving the way to enhancements in this technology.

Figure 4. An example of Marker FaceAR

E. Object recognitions + AR

Object recognition detects objects in the surroundings and invokes the AR components related to them.

There can be a couple of variations using object recognition. The first one is about mapping and overlay of real-world surroundings and objects with digital AR content. The second one includes just a popup with relevant content or message after recognition of the object. Imagine you are in a museum, with the help of this technology you can have information about the artifacts present right there on your screen in real-time. This allows adding videos, animations and other such immersive content to be integrated in the catalog. Targets and objects for this type of AR can be anything ranging from toys and electronics to vehicles and buildings.

Figure 5. An example of Object Recognition + AR

F. Geolocation based AR

AR components can be attached to an actual physical location and made available there at all times by means of geolocation and geo-fencing. This uses the geolocation of the users' devices to trigger these components when their geolocation can be mapped. The major usage of this technology would be military HUDs and even 3D maps and real-world positioning systems. It allows discovering Augmented Reality routes in the camera view directly. Development framework to release such kind of AR experience, app or project is Google Maps SDK + ARKit. Users can use it to tone their experiences.

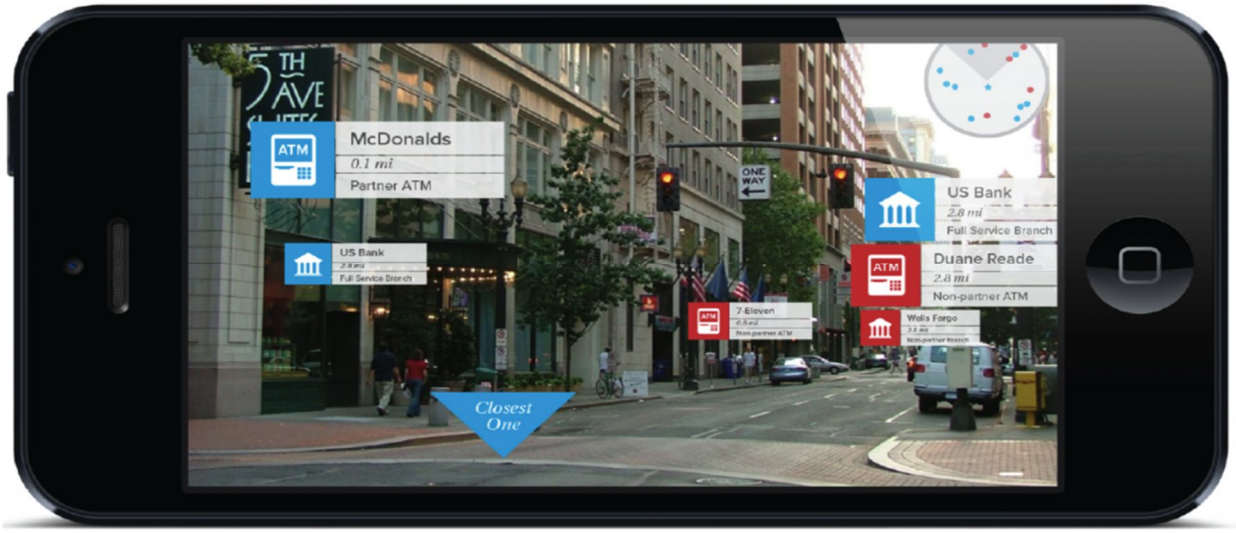


Figure 6. An example of Geolocation Based AR

II. HOW TO GET 3D MODELS

3D models are the heart and soul of AR. They provide the most immersive and entertaining AR experience by letting users interact with their favorite characters that previously possible. This also enables users to explore fantastic environments on their fingertips. To obtain these 3D models is however no mean task. It requires great skill, technique, and resources.

The following are the ways generally used to create or obtain these models.

III. PHOTOGRAMMETRY

In photogrammetry, lots of pictures are taken of objects that are to be digitized. These photos are taken from various angles so as to have a complete perspective of the object. It also creates various texture files to define the colors of the object as seen from various angles. This also allows rendering the lighting and shadow effects of the object. It also helps define the texture of the object from various sides. However, while photogrammetry can be extremely effective for some objects, it can be highly ineffective for others.

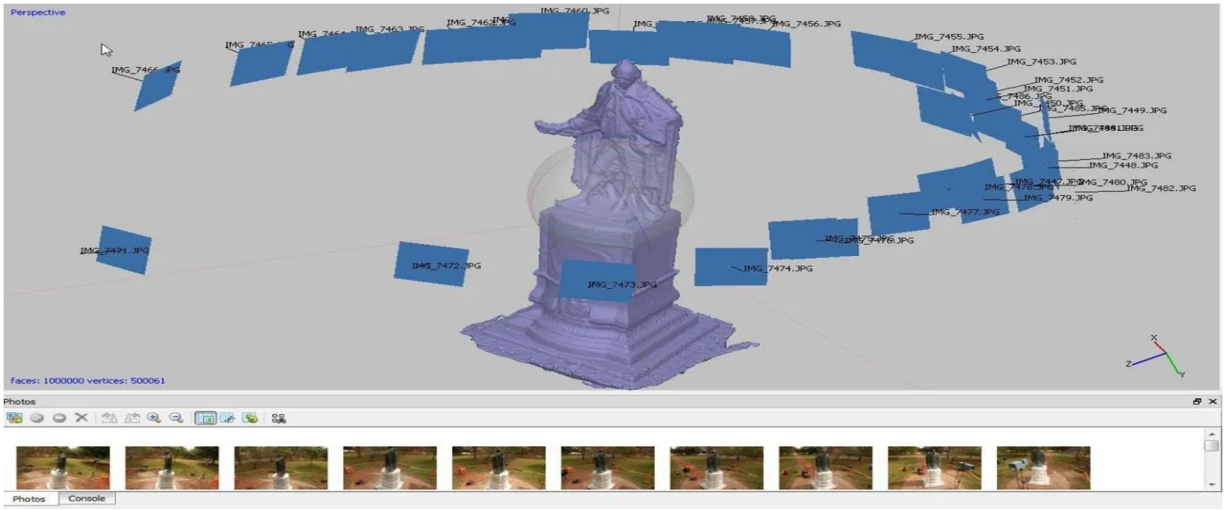


Figure 7. An example of Photogrammetry

A. 3D Scanning

3D scanning uses specialized hardware to scan actual objects and make their 3D models. These models are highly accurate in their textures, colors, and shapes. It, however, provides a non-optimized model that results in large file sizes and requires more time to operate. Moreover, the cost of buying a 3D scanner is also a drawback.

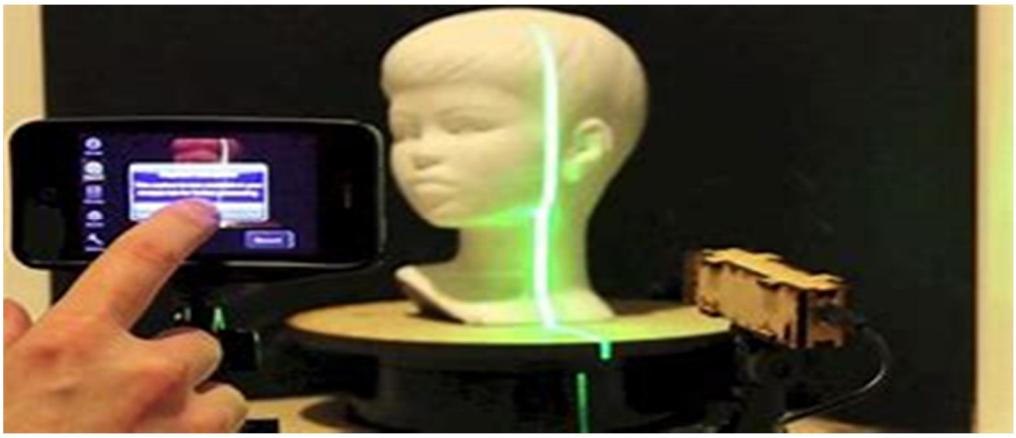


Figure 8. An example of 3D Scanning

B. 3D Modeling Programs

3D modeling programs provide users with an empty sandbox to make things of their imagination come to reality. 3D models can be made by users as per their requirements. This allows a lot of flexibility and adds more creativity to the subject matter. Modeling outputs can also be moving 3D animations. This can be a time-consuming process and needs the skills of an experienced modeler to get right. However, the results can be visually accurate and fully optimized for specific purposes.

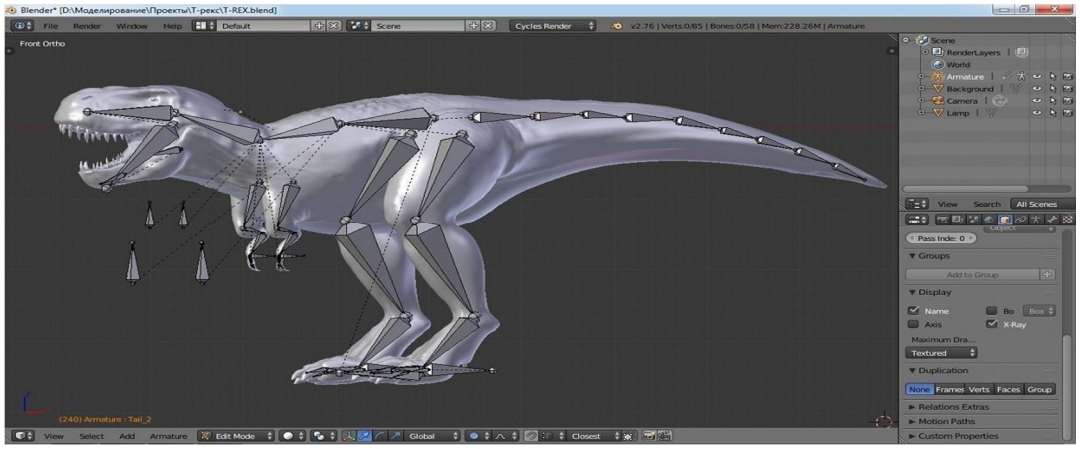


Figure 9. An example of 3D Modeling

IV. RESULTS

The app is divided into four key parts based on the type of animations used namely, PNG animations, 3D Faces, Playground and 'Just for Fun'.

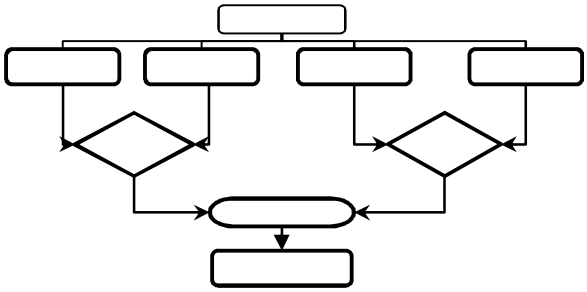


Figure 10. Basic WorkFlow of the App

A. PNG Animations

PNG animations are simplistic 2D overlays that attach to users' faces to create a splendid mask by detecting various tracking objects like face edges and other feature points.

Figure 11. An output of the PNG animations section

B. 3D models

Firstly the face recognition is done using the TensorFlow library, this helps us to detect feature points where our 3D face model will reside. After the edges of the face have been detected superimposing of our 3D models on the face takes place to give the user a splendid look.

Figure 12. An output of the 3D Faces section

C. Playground

This uses feature points to create scenery which users can use to render the predefined models and change the scenery. This can also be leveraged to render custom-made models to augment a user's daily scenario and giving the user hold, how he wants to see it thereby augmenting the reality.

Figure 13(a). An output of the Playground section (A village scene set up in a classroom)

Figure 13(b). An output of the Playground section(Android dancing on a chair)

D. Just for Fun

Just for fun mode encompasses all the entertaining components simple markerless AR animations, like solar system models. This mode uses developer made models whose main purpose is to entertain users. These will be funny and witty things.

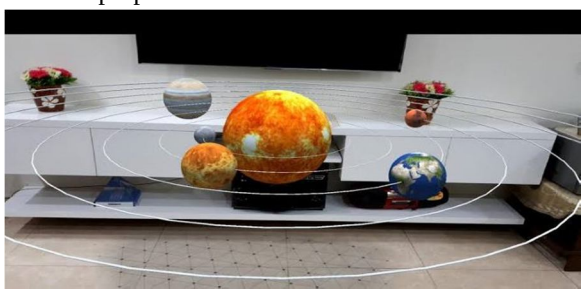


Figure 14. An output of the Just For Fun section

V. CONCLUSION

Thus, after studying a number research papers and finding extraordinary methods that can be implemented, a ideal way to structure this project was formulated. Various research papers were found which further bolstered the research and help find a number new technologies such as ARCore. Techniques like Diminished Reality in addition support the process to be followed and add new user experience which is beneficial for both private and industrial usage.

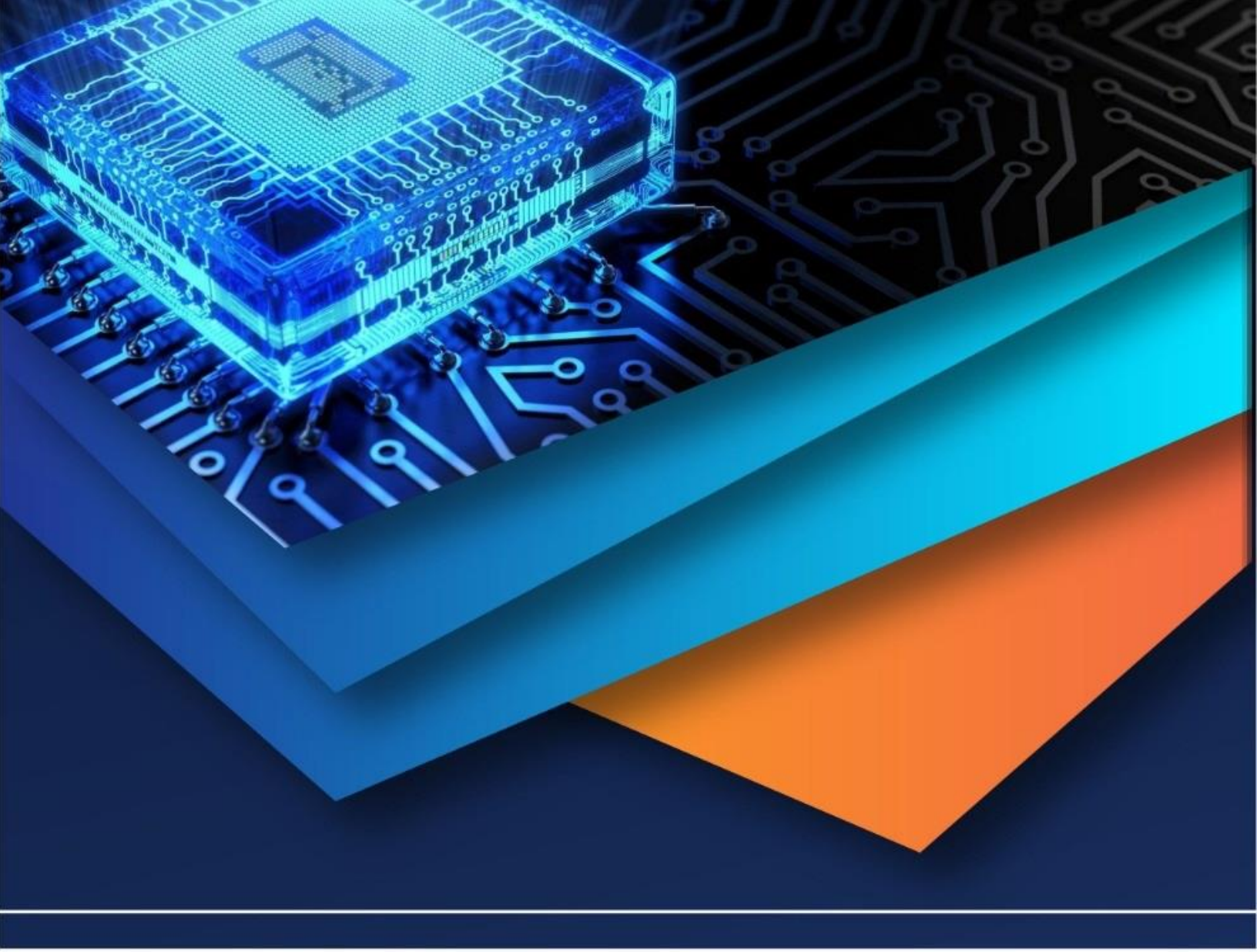
The project tries to put in force technologies which have not been skilled to the fullest yet; alongside with supplying help for these corporations which are not exposed to AR but can use it to enrich a variety of experiences and create an influence.

ImaginAR can be a great source of knowledge for upcoming AR based projects. It will serve as a building block for all upcoming researches and help developers understand the AR technology better.

Google ARCore has proved to be a vital part of this project. It is a developing platform which will evolve into a far better version of itself intime. Google ARCore provides the base features that can be used to create a seamless AR experience for general public users. This helps in improving UX to a whole new level. ImaginAR will continue to develop and provide users with a best-in-class AR experience.

CITATIONS

[1] "The Lengthy History of Augmented Reality". Huffington Post. 15 May 2016.
[2] Schueffel, Patrick (2017). The Concise Fintech Compendium. Fribourg: School of Management Fribourg/Switzerland. Archived from the original on 24 October 2017. Retrieved 31 October 2017.
[3] Milgram, P., & Kishino, F. (1994). Taxonomy of Mixed Reality Visual Displays. IEICE Transactions on Information and Systems, E77, 1321-1329. https://doi.org/10.1.1.102.4646
[4] Herpich, F., Guarese, R. L. M., & Tarouco, L. M. R. (2017). A Comparative Analysis of Augmented Reality Frameworks Aimed at the Development of Educational Applications. Creative Education, 8, 1433-1451. https://doi.org/10.4236/ce.2017.89101



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY