

# Augmented Reality Experiment with Unity

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**Abstract**—Augmented Reality-based technology is growing rapidly due to the appearance of free and easy to use AR platforms and software. Using AR to enhance visual appeal and user experience is common amongst designers. One of the platform is Vuforia, a Unity plugins that has many helpful AR features, which the most popular one is a pattern recognizer. Using the camera, the application is able to scan a pattern in real world and augment it in the user's device. Many more features can be easily added to improve AR-based applications using free tools.

**Keywords**—Augmented Reality; Unity; Vuforia; Pattern Recognition; Technology

## I. INTRODUCTION

Information technology is one of the most popular and fastest growing science on the planet. The constant demand of information technology in every aspect of human life pushes every IT scientist to experiment with various technologies to keep up with the exponentially growing computer technology.

One of the most demanded aspect of information technology in this modern era is the interaction between human and digital world. In the previous decade, most human population would not have thought of interacting with computer, let alone holding a computer on a daily basis. However, the past 10 years has been remarkable in breaking the barrier between human and computer, notably with the presence of laptops, smartphones and other smart devices such as IOTs or wearables.

The science of digital world has broken even more of its boundary by the arrival of Augmented Reality, in which the real world is augmented by digital means to create an even more engaging experiment. Moreover, with an even more accessible 3d graphic engines and tools, it is even easier now for non-IT engineers such as designers to utilize AR (*Augmented Reality*) to the fullest, creating endless possibilities that are previously not possible with software engineers alone.

In this paper, the author tried to utilize one of the most popular game engine, Unity, to showcase a possibility of using augmented reality to enhance user experience of an interaction, as well as explaining the program and the supportive plugins used in the experiment. The author expected that this paper would serve as a good introduction to develop a simple AR technology with free tools.

## II. THEORIES

### A. Augmented Reality

By definition, Augmented Reality (AR) is a concept where a view of a real-world environment has its elements augmented by a computer-generated sensory input. It differs from the also-popular virtual reality, in which the real-world environment is completely replaced by digital / simulated world [1].

Augmented Reality had been used for limited medical, navigation and military purposes due to its high deployment cost, but ever since the tools and software for producing AR contents become cheaper and more accessible, the usage of AR became significantly diverse, including games, commercial, education, and many more. One of the most popular AR-based software is Pokemon GO, released by Niantic, which raised the popularity of AR-based technology in global scale.

### B. Unity

Unity is one of the most popular game engine / game making tool ever existed. With its sheer number of supported platforms and engines, it is said to be one of the pioneer of the universal game development [2].

Unity is especially known as very versatile as a free software, where it is capable on rendering various textures and designing realism such as collision and gravity.

## III. EXPERIMENT

### A. Experimenting with AR using Vuforia

One of the most intriguing aspect about creating an AR-based application is how and where will it works. A quick discussion with a Visual Design student reveals that AR is commonly used to better show illustrations on paper as a 3d object.

The tool used to achieve this is Vuforia, an AR platform built in as a plugin for Unity. There are a lot of applicable features of Vuforia, but one of the most notable is its target manager. An easy, common AR-based showcase usually includes directing the camera into a certain pattern, and then the system shows an object on the pattern.

With the help of Vuforia, the programmers no longer need to create their own pattern recognition algorithm; instead they can use a built-in targeting feature from Vuforia.

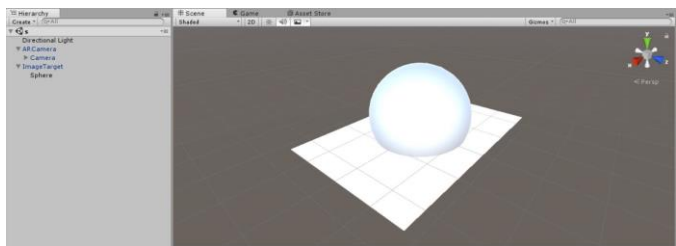


Picture 5: A Pattern with overlay features for pattern-recognition

Source: [developer.vuforia.com/targetmanager](http://developer.vuforia.com/targetmanager) [3]

The pattern uploaded to the target manager is automatically analyzed by Vuforia to determine the feature points of the respective pattern. The more feature points in the pattern, the more accurate the recognition would be. In this example, the rock terrain pattern contains a lot of feature points, which is rated 5 stars by Vuforia which means that it is easier to trace.

The next step is to set up the target with Unity. The simple way is to use the built-in camera from Vuforia that will use the webcam or mobile camera. Place the pattern and the object to show on the pattern. In this occasion, the author uses a simple white sphere.

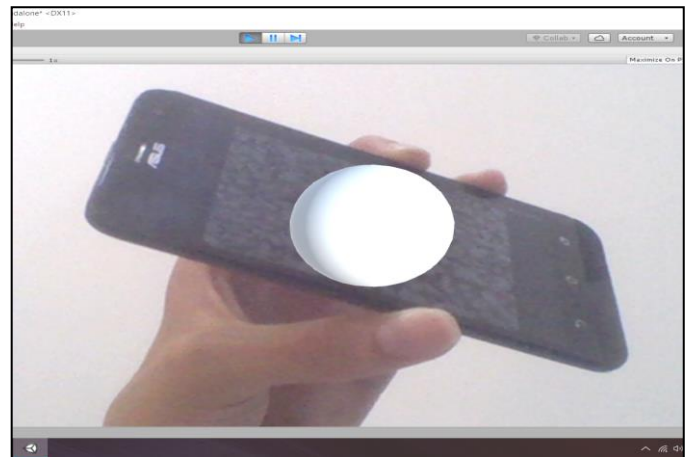


Picture 9: Position of a sphere above the target plane in Unity 3D Editor

Source: Author

After the setup, simply build and run the project on the respective platform (windows or android) and direct the camera at the rock terrain texture.

## B. Result



Picture 9: Webcam showing a white sphere appearing on screen over a certain pattern in real world

Source: Author



Picture 9: Mobile camera screenshot of the sphere showing on the pattern in the laptop monitor

Source: Author

## IV. CONCLUSION

Augmented Reality is a good way to enhance interaction between computer object and human, and is rather easy to create with many free software. There are a lot more possibilities to explore on this technology, either using a platform such as Vuforia or creating from scratch. However, the existence of those AR platforms really helps people to combine their creativity with the digital technology.

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#### PERNYATAAN

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