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Augmented Reality Based Measurement Application

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ABSTRACT

This paper is to create an Augmented Reality Based Measurement application ie. object distance measurement using android studio, and simple mobile camera in order to measure object distance. The technologies nowadays are very highly developed and it may give our lives a new interface and thus make it more accurate. One of the technologies that able to do so is the Augmented Reality (AR) technology. Traditionally, we have used common measurement tools such as rulers, robots, and lasers to measure objects. The drawbacks of such measurement could led to the high maintenance cost, consuming lot of times, and human resource. Hence, it is important to have new technology such as Augmented Reality (AR) system that could help to minimize the cost and increase the accuracy of measurement.

Keywords: Augmented Reality , Virtual Reality , Measurement , ASA Algorithm.

I. INTRODUCTION

With the enhancement and modern technology nowadays, comes up a new diversity of Virtual Reality (VR) known as Augmented Reality (AR). Many studies and researches had been done as it been around for the last 40 years, since 1960s. Augmented Reality (AR) is a variation of Virtual Environment (VE) or Virtual Reality (VR). In VE, the users completely immerse in an artificial world where the real world is replaced by computer-generated environment or object and it allows user to interact with it.[1] While in AR, it allows user to see the real world as well as the computer-generated objects at the same time. It superimposes or overlays the computer-generated objects on the real world objects and creates an environment where the real and virtual objects coexist together.[3] Thus, user can see both the computer-generated objects and the real environment simultaneously (Azuma, 1997).

An AR system should have the characteristics as listed below:

1. It combines the real and the computer-generated objects in the real world environment.
2. It is interactive in real time.
3. Register the virtual objects in the real world environment.

Many researches done in order to integrate AR in humans‟ tasks to ease the difficulties within. It applied in different kind of fields such as medical, manufacturing, visualization, entertainment etc. It is hope that as the time pass, it will be a part of humans daily life. With the presence of AR technology, a new exposure is given for the humans to explore new things.[4] In this matter specially, the AR technology can help enhance our measuring technique and in the future, maybe develop a new application to measure our surroundings.

1.1 History of Augmented Reality:

Augmented Reality (AR) is leading-edge technology that provides a digitally amplified view of the physical world, presenting end users with useful and informative content in different situations.[2]When a system combine existing and virtual environments, provide interaction in the real time and allow end user to observe the real world in 3D, the system is termed as AR system. AR is a substantial standard AR is also termed as "a system that combines real and computer generated information in a real environment, interactively and in real time, and align virtual objects with physical objects

1.2 Goal

The goal of this project is to develop an Augmented Reality version of measuring length or distance between camera and object using AR and accelerometer.

1.3 Objectives:

The objectives of the project are to:

- ✓ To perform study on the Augmented Reality (AR) application for measuring distance.
- ✓ To simplify everyday work on using Augmented Reality (AR) from converting object measurements to the computer screen.
- ✓ To develop object distance application using ARCore that is capable to measure the length between camera and object.

1.4 Scopes:

The scopes of the project are:

- ✓ To use simple camera in order to measure object distance with 100% accuracy.

1.6 Justification:

Nowadays, the technology around us is expanding fast to keep up with the modern world. Everything has an upgrade or alternative to make our everyday tasks simpler and hassle free.[3]Augmented Reality (AR) is a well-known application in today's society. It is a variation from Virtual Reality (VR) or Virtual Environment (VE) and has been developed since 1960s.

With this project, we are aiming to minimize the time and energy that is used to measure equipment using Augmented Reality based measurement application.[5] Instead of using the traditional ways of measuring, this method can replace the modern ways of living. In the future, this method maybe can be used to measure buildings and help architecture to plan their work precisely. [[9]

II. METHODS AND PROCEDURES

ASA Algorithm:

The ASA (Angle-Side-Angle) postulate states that if two angles and the included side of one triangle are congruent to two angles and the included side of another triangle, then the triangles are congruent. (The included side is the side between the vertices of the two angles.)[8]

AA (Angle-Angle) Similarity. In two triangles, if two pairs of corresponding angles are congruent, then the triangles are similar. (Note that if two pairs of corresponding angles are congruent, then it can be shown that all three pairs of corresponding angles are congruent, by the Angle Sum Theorem.).[10] This method is used to get the height of the object which our camera is pointing.

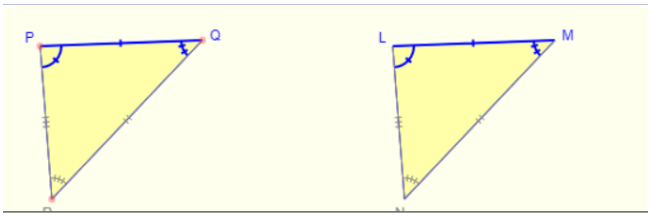

Figure 1. ASA Triangle

The two angles and included side are drawn in thick blue lines to indicate they are the parts being used to test for congruence.

Sensors used:

Accelerometer and Gyroscope:

An accelerometer is a device that measures proper acceleration. Proper acceleration, being the acceleration (or rate of change of velocity) of a body in its own instantaneous rest frame, is not the same as coordinate acceleration, being the acceleration in a fixed coordinate system.[6] The accelerometer gets all the features which are shown by the camera. This gives good accuracy while measuring any static object rather than doing all the mathematics. Motion sensors are useful for monitoring device movement, such as tilt, shake, rotation, or swing . [7] The movement is usually a reflection of direct user input (for example, a user steering a car in a game or a user controlling a ball in a game), but it can also be a reflection of the physical environment in which the device is sitting (for example, moving with you while you drive your car).]

III. Conclusion

In this module we are successfully measuring the height of an object at a specific distance. This accuracy is depended on user's height. AR is one of the pioneering concept of 21st century which will give a new way to interact with the visual object.AR can be very helpful for e-commerce, or when we had to demonstrate any object in the real world.AR applications can become the backbone of the education industry. Apps are being developed which embed text, images, and videos, as well as real–world curriculums.AR based measurement application which will be developed will reduce the man work, time and will increase the accuracy of measuring distance in real time.

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