Image Processing Marker Augmented Reality For Design Furniture Room

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Abstract-. AR useful for industrial applications to enhance the visual perception of the user, for example, the AR system is capable of visually new building project at a real construction site, which gives the viewer a better understanding in accordance with the existing environment. The method used by the AR is a marker detection and tracking, the method used for the detection and tracking marker is a natural feature tracking. This method detects features that are in the marker. In detecting marker object sometimes can not appear because of the influence of several factors: the size of the marker printing, color printing conditions marker and the environment when making a marker by the camera (light), therefore, in this study analyze the AR marker colors for the design of indoor furniture. Marker marker colors used are 8-bit RGB color brochure with a picture size of 496 x 702 pixels with a marker print size 210 x 148.5 mm and 297 x 420 mm. On testing took 6 print condition marker, where the marker is placed in a room print then the camera will detect in real-time to print the marker. In the data processing using the histogram and star-rating as an indicator of the possibility marker can be detected. Based on testing and data processing, then that marker print size, print condition marker and marker detection affects the environment when the object visualization.

BACKGROUND

Augmented Reality (AR) is a field of computer science research that combines real-world and digital data. AR applications appear in newspapers such as Katso, Seura, Cosmopolitan, Esquire and Süddeutche Zeitung. Printed books are added in the form of AR contents, for example Dibitassut. AR technologies are now at the top level of "technology hype curve" [1]. AR definition according to the Encyclopaedia Britannica [1]: *"Augmented reality, in computer programming, a process of combining or 'augmenting' video or photographic displays by overlaying the images with usefulcomputer-generated data."* AR useful for industrial applications to enhance the visual perception of the user, for example, the system is capable of AR mengvisualisasikan new building project at a real construction site, which gives the viewer a better understanding in accordance with the existing environment. AR research field covers computer-vision and computer graphics. AR research in the field of computer vision regarding marker and feature detection and tracking, motion detection and tracking, image analysis, gesture recognition.

The method used by the AR is a marker detection and tracking. Research into the marker has a lot to do, for example on research Michael Bajura and Ulrich Neumann using LEDs as a marker and demonstrated the vision-based registration system for Augmented Reality[2]. There is also a study done [7] of the AR application for the interior design of a house.

Marker is an image that has a feature that can act as a trigger to display and visualize a 3D object or 2D. Marker is the image target by a camera that serves as a trigger for displaying an object. In detecting markers sometimes object can not appear because of the influence of several factors, including the print size marker, the lighting of the position marker, the position of the marker with the object and the position marker with a camera, so in this paper is discussed about the analysis of marker colors AR to design the furniture of a room.

The Analysis in this research discusses how the marker detection marker color with different conditions and environment. Conditions printed marker condition with some state that is printed marker fine in accordance with the original, Print marker stripes and colors do not match the original, print marker crumpled, color printing in accordance with the original, print marker on scratch scratch, print marker torn without a break and printed marker torn so that the missing part of the image.

The goal this research is to see the effect of the appearance of the object on the marker, whether the object persists or even not appear at all. Parameters that become a benchmark in this research is a form of histograms and graphs to indicate that these markers can be detected using a star-rating system Vuforia.

RESULTS AND DISCUSSION

In this research analyzed markers including markers are imperceptible colored marker. Step this research are shown in Figure 1 below.

Figure 1. Analysis AR Marker Color

Marker color is the trigger for displaying objects of 3D furniture. This marker shaped colored brochure with a picture of a chair, markers used in this research are shown in Figure 2 below. The colors used in this marker 8 bit RGB, capture marker color brochures are taken in real-time using the camera.

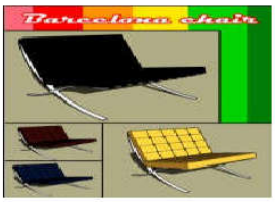


Figure 2. Marker Color Brochure

Color marker is taken with a variety of conditions that marker fine print, print disjointed markers do not match the original color, print marker with disorderly condition, print marker in tear without breaking (sobek1) and print marker ripped to break up (sobek2). Color marker analysis using a histogram and Star-rating system Vuforia.

Markers used in this study is a single marker in the form of image color marker in the form of brochures furniture AR marker. Marker color brochure created with a size of 496 x 702 pixels shown in Figure 2, the print size marker 210 x 148.5 mm and 297 x 420 mm. 3D models of furniture shown is a chair created using 3D modeling software maker, AR system used in this study is AR Vuforia. Methods of testing and observations made by the author are put marker brochure in one of the positions of the room, and then navigate to the camera at the marker so that the marker appears above the object and the object size is set. Methods of data collection conducted by the authors that is by making observations and measurements that occur between the marker and the object.

The parameter measured is the distance between the camera and the marker, the shape of the histogram markers with markers of various conditions. The implementation results of this research are shown in Table 1 and Table 2.

Table 1
Histograms and Star Rating Color Brochure

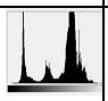
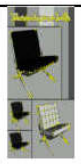
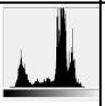
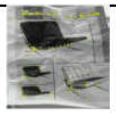
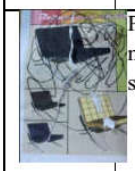
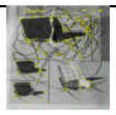
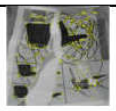
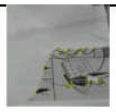
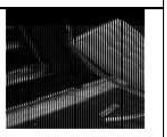
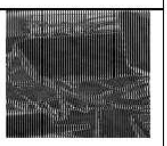
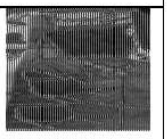
Image marker	Condition Print Marker	Histogram	Feature	Star Rating *
	Print smooth marker			★★★☆☆
	Print marker stripes and colors do not match the original			★★☆☆☆
	Print marker crumpled, prints match the original color			★★★☆☆
	Print marker on scratch			★★★★★
	Print marker split without a break			★★★★★
	print marker split up discon nected			★☆☆☆☆

Table 2
Object Impact AR

Conditions Print Marker	Impact Object	Result
smooth	detected	
damaged	detected	
scratch	detected	
Split 1	detected	

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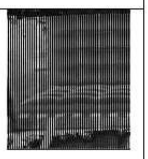
Split 2	No detected	

Table 3
Size Print Marker And Object 3D

Size Print Marker (mm)	Object 3D
210 x 148,5	
297 x 420 mm	

In table 1 shows histograms of the condition of each marker with indicator star-rating, at the table shows that the shape of the histogram graph evenly between the lower level and upper level, then the star-rating even higher so that this image can be a target image that is both visible from print image to print image smooth marker marker scratchs. On marker that was often painted still be detected so as to enable to trigger the appearance of the object as shown in Table 2.
At the marker can be seen from the histogram is evenly distributed, which means even if the marker in graffiti but features can still be detected, then the marker can still allow to trigger to bring up the object. In Table 1 and Table 2 are also visible markers in tear without breaking up is still likely to be a trigger that can still bring up the object, whereas markers in torn up dropping out can not be detected due to feature on the marker has been lost and so can not bring up the object, is also seen the histogram graph on the bottom-level top level looks the unequal, lower levels tend to be lower than at the top level and its star-ratings are also showing only one star, which means the features are detected only slightly so it can not raise the object. In Table 2 shows the impact appears object between marker and camera. Print size marker indeed affect as a factor in generating object because the camera detects marker features.
Table 3 shows the impact on the appearance of 3D objects based on print size marker, the larger the print size marker then the camera will capture features more quickly.

Based testing and observations made in this research that the detection of the marker is not only influenced by the position of the camera and the marker but also influenced by the environment or circumstances. When the state of the environment shows a dark or light, causing the colors tend to be dark or white inclined, then the marker feature can not be detected so as not to raise the object.
Print size marker influence in generating the object, as long as the camera is able to detect the marker then the marker feature could possibly raise the object. Print size markers affect the display size of the object, since the size of the print size marker then feature on the marker can be detected even if the camera distance away from the marker.
Condition print marker affecting bring up the object, if the print condition marker is damaged so that features in the marker is missing then the system can not detect the marker so it can not raise the object. This is evidenced in Table 1 and Table 2.
In a subsequent study of factors are expected to calculate the position of the marker on the camera so it can display real objects better. In addition, the marker is not printed but the marker is based on the object to be detected so that the AR system more effective.

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