

High Optical Angle Test and Analysis for Automotive Camera

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Abstract. Mobile cameras which are one of the most popular formats along with automotive cameras, have a pixel count of over 10 million and is excellent for small sizes or image signal processing. Camera module test equipment have developed from the mobile camera market leading to dramatic technological advances. Automotive cameras have many differences compared to mobile cameras. Therefore, in this study, We tested and analyzed the automotive camera white balance, color reproduction.

Keywords: Automotive camera, Camera test equipment, AVM

1 Introduction

With the arrival of digital convergence, many automobiles equipped with cameras have become mainstream. Businesses related to combining IT and cameras are also seeing fast progress. The rear view mirror or the parking assistance system used in cars provide a wide angle of up to 190 degrees compared to the existing 120 degrees or less. This minimizes blind spots and secures as much view of the back as possible to help with safe driving. As such, cameras attached on cars are devices that improve the convenience and safety of the driver and thus requires a differentiated characteristic and confidence compared to camera modules. To that end, an algorithm that extracts quantified data for cars to approve or reject during the assembly or export inspection of cameras is needed. [1],[2] Therefore, We tested and analyzed the automotive camera white balance, color reproduction.

2 Around View Monitor System Unit

The five-faceted object composition which is at the core of forms an AVM (Around View Monitor) system unit so that the tilt moving, in addition to the movements of the X, Y, Z axes, is made possible. This is shown in Figure 1. In particular, the operating part of the object can be transitioned from motorized mode to cylinder mode or to manual rail mode to provide flexibility and wider application to various forms of automotive cameras. Test equipment consists of AVM system unit, frame unit, BLU (Back Light Unit) moving unit.

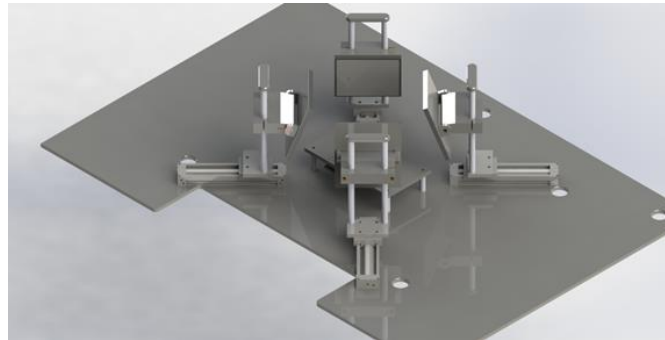


Figure 1. AVM (Around View Monitor) system unit

3 Test and Analysis of Automotive Camera

Color reproduction result plot shows the difference between the target illuminant value of the color checker square and the value that has been obtained from the load image. The white balance result plot shows how well the white Balance algorithm is working on the camera. When the image is a perfectly white balance, gray patch will have equal R, G, and B component values.

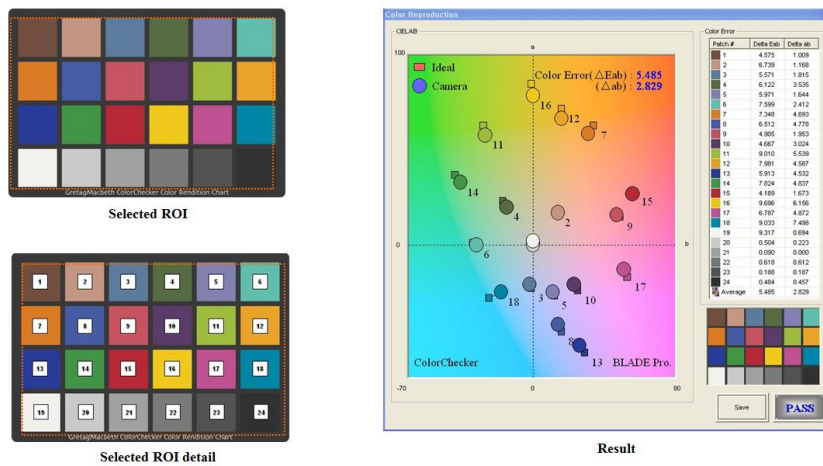


Fig. 2. Color reproduction result

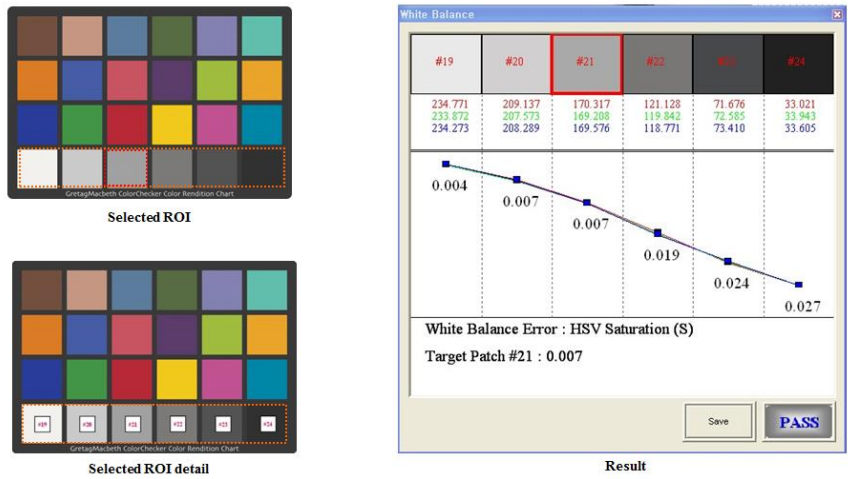


Fig. 3. White balance result

Dynamic range is the range of brightness over which a camera responds. The result plot shows Log level RGBY code and RGBY output code on each density.

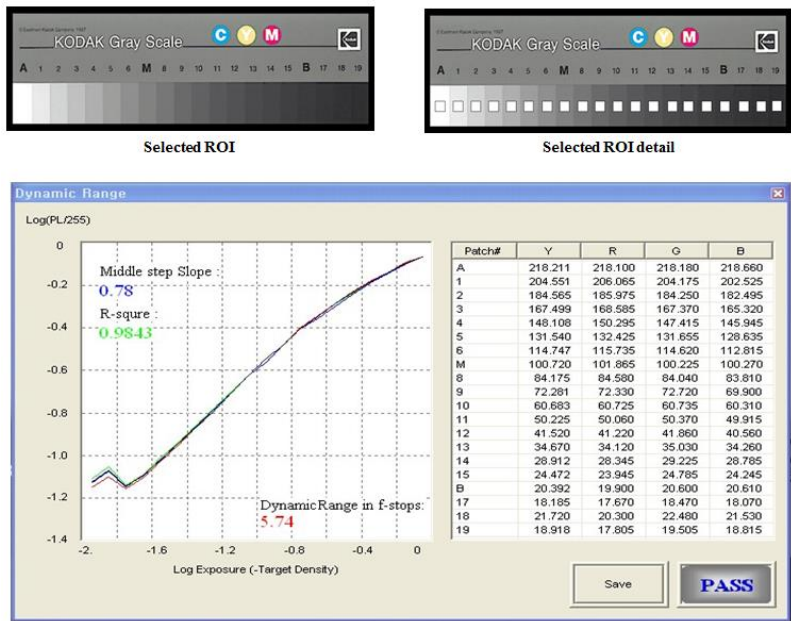


Fig. 4. Dynamic range test result

4 Conclusion

This study developed a five-faceted object composition to test wide angle cameras by ensuring high confidence of the test equipment and ensuring meticulous adjustments. The module consists of an AVM (Around View Monitor) system unit so that tilt moving, as well as moving of the X, Y, Z axes are made possible. Also, we tested and analyzed the automotive camera white balance, color reproduction and when the image is a perfectly white balance, gray patch will have equal R, G, and B component values.

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