

Tabletop Two-Layer Aerial Display with AIRR

Yoshiki Terashima¹, Shiro Suyama², Hirotsugu Yamamoto^{1,3}

Utsunomiya Univ.¹, Tokushima Univ.², JST ACCEL³

E-mail: hirotsugu@yamamotolab.science

1. Introduction

Aerial displays are expected to be the next-generation information screens for like digital signage. Aerial imaging by retro-reflection (AIRR) [1] has proposed as one of the image-forming methods. AIRR can form a translucent image through which users can observe the reflected image while observing aerial image.

In this research, we report a new optical system to form two-layer aerial image with AIRR on a tabletop.

2. Principle

Fig.1 shows the optical system of AIRR. Light emitted from the light source is reflected by the beam splitter and reaches the retro-reflector. Retro-reflected light transmitted through the beam splitter and forms the aerial image of the light source. This image position is the plane symmetrical position of the light source with respect to the beam splitter.

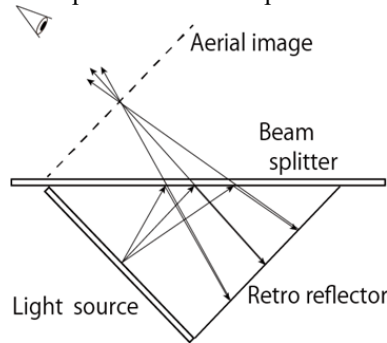
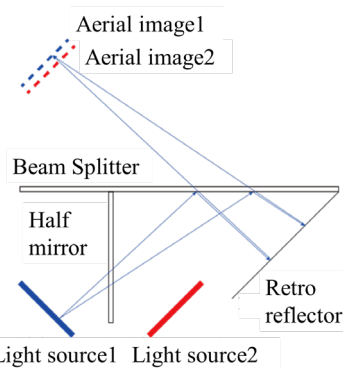


Fig.1 Optical system of AIRR.

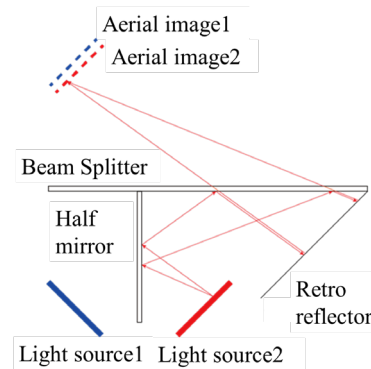
Fig.2 shows the optical system of tabletop two-layer aerial images. We added the half mirror and second light source to conventional AIRR. Fig.2 (a) shows principle to display the aerial image1 (blue image), and (b) shows principle to display the aerial image2 (red image). Light emitted from the light source1 is transmitted through the half mirror, and light emitted from the light source2 is reflected by the half mirror. After those, it is formed as aerial image1 and aerial image2 in the same light path as conventional AIRR. Aerial images are formed on the tabletop (beam splitter) and are observed while observing object back of them.

3. Result

We displayed the aerial image1 as blue image, and the aerial image2 as red image. Fig.3 shows the result of two-layer displaying experiment. The blue square is aerial image1, the red square is aerial image2 and purple square is two-layer aerial image. A part of two-layer is purple by addition of color.



(a) Principle to display aerial image1.



(b) Principle to display aerial image2.

Fig.2 Optical system to display two-layer aerial images.

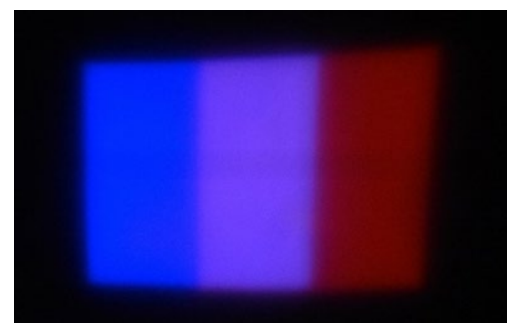


Fig.3 Two-layer aerial image.

4. Conclusion

We have realized tabletop two-layer aerial display by adding a half mirror with conventional AIRR.

Reference

- [1] H. Yamamoto, Y. Tomiyama, and S. Suyama, "Floating aerial LED signage based on aerial imaging by retro-reflection (AIRR)," *Optics Express* 22, pp. 26919-26924 (2014).