19 Cast shadows add dimensions

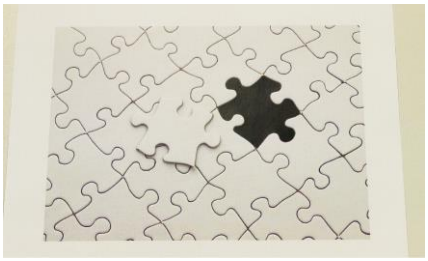
- Projection mapping giving depth illusion to real objects -

Abstract

We demonstrate a new perception-based technique to make real two-dimensional objects apparently hover over their original places. Previous studies have reported a depth illusion of a virtual object; given appropriate cast shadow patterns, the virtual object apparently hovers over its original place. By projecting cast shadow patterns to them through a light projection method, our technique can successfully give the similar kind of depth illusion to a real object. In addition to the depth illusion, our technique can give a transparent surface illusion to a real opaque object such as a paper. That is, by changing the shape of projected cast shadow patterns, we can easily manipulate the perception of object surfaces between transparency and opaque. We would like to develop and improve this sort of perception-based manipulations of real objects because we believe it is one of promising directions to offer users the rich and enjoyable perceptual experiences in the future.

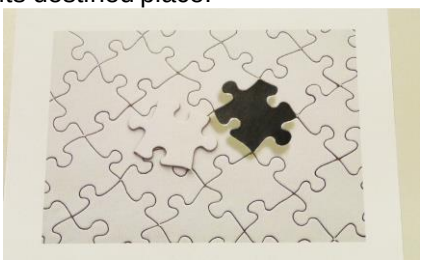
●Depth illusion by our technique

① A Jigsaw puzzle image printed on a paper



② An cast shadow pattern to be projected on the Jigsaw puzzle image

③ Due to the projection of a cast shadow pattern, the gap is seen as a black puzzle piece hovering over its destined place.



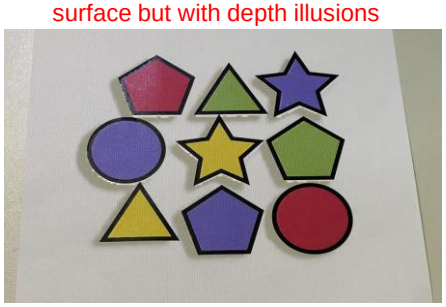
●Transparent surface illusion by our technique

In addition to the depth illusion, our technique gives transparent surface illusions to opaque printed objects by means of the projection of cast shadow patterns.

A papers on which geometric figures are printed (no effect)→

Printed geometric figures with transparent surface as well as depth illusions

Printed geometric figures without transparent surface but with depth illusions



References

T. Kawabe, “The illusion of floating objects caused by light projection of cast shadow,” in *Proc. the Eighteenth Annual Meeting of the Vision Sciences Society (VSS2018)*, 2018.

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