Researchers suggest magicians' mirror tricks could be used as large scale cloaking devices (w/ video)

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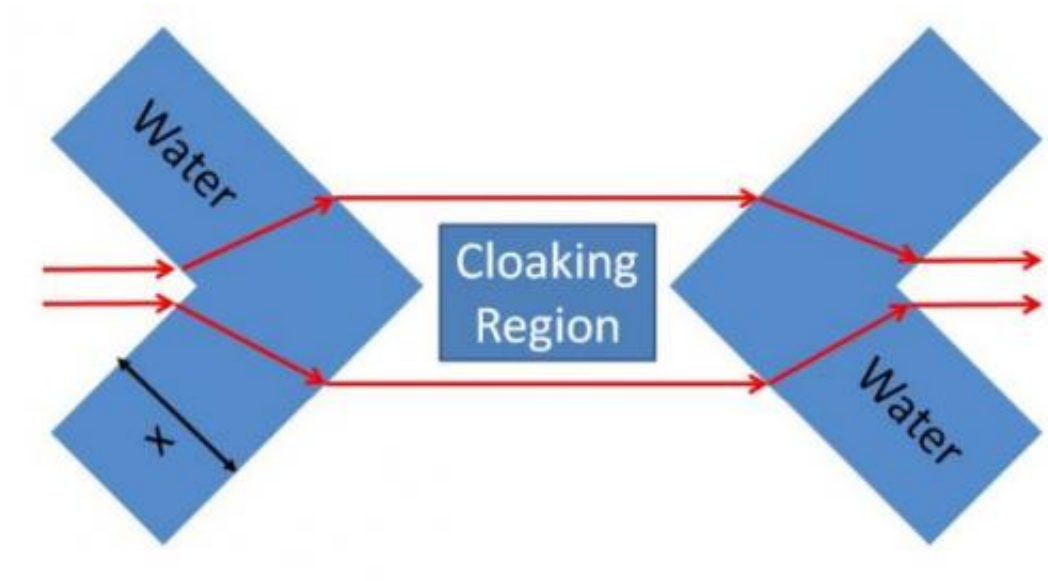

A cloaking device based on Snell's law. Credit: arXiv:1306.0863 [physics.optics]

(Phys.org) —John Howell, a Professor of Physics at the University of Rochester, and his teenage son, have uploaded a paper to the preprint server *arXiv* in which they suggest that some common magicians' tricks could be used to create large cloaking devices. They describe three types of simple cloaking devices: one made of Plexiglass and water, another of inexpensive lenses, and a third constructed using ordinary mirrors.

Cloaking devices have become an item of interest to both the general public and physicists. The *Harry Potter* movies showed what a cloaking device might look like, while breakthroughs in metamaterials have allowed for the creation of real cloaking materials. Unfortunately, the real materials only work for certain wavelengths of optical frequencies and for very small sample sizes. Another, less high-tech approach is to use mirrors to make objects "disappear" as magicians have been doing for years. That's what Howell and his son have done.

Cloaking devices all work under the same principles—they bend light in such a way as to cause an object to be hidden from view. A simple example would be a small island in a river. Water is split at one end of the island, moves past on either side, and is then reconnected at the other end. If the water were replaced with light, the island would appear to be invisible from the point of view of an observer (in two dimensions, of course).

Howell and his son aren't suggesting they've invented anything new; rather, by building and demonstrating some simple cloaking devices, they are showing that such devices might be useful for real world applications, such as hiding satellites. They fully acknowledge a major limitation of their devices, namely that they only work when viewed from a specific angle. But that's not the point. The real point is that age-old technology could be updated for use in practical modern applications. If a mirror-based cloaking device were put into space to hide a satellite, for example, it could be computer controlled to keep it at the proper angle as it circled the globe. Even simpler would be "hiding" satellites that hover in a geosynchronous orbit.

Such cloaking devices, they note, would work across the entire visible spectrum and could be made in virtually any size and, perhaps best of all, could be made inexpensively using materials that are already well understood.

More information: Simple, broadband, optical spatial cloaking of very large objects, arXiv:1306.0863 [physics.optics]
arxiv.org/abs/1306.0863

Abstract

We demonstrate three simple cloaking devices that can hide very large spatial objects over the entire visible spectrum using only passive, off-the-shelf optics. The cloaked region for all of the devices exceeds 10^6 mm3 with the largest exceeding 10^8 mm3. Although uni-directional, these cloaks can hide the cloaked object, even if the object is transversely or self-illuminated. Owing to the small usable solid angle, but simple scaling, these cloaks may be of value in hiding small field-of-view objects such as mid- to high-earth orbit satellites.