

Aerial display

In the past, there was no imaging technology that could produce such high quality aerial images.

This groundbreaking new technology makes projecting aerial videos simple.

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A decorative graphic consisting of multiple overlapping, wavy lines in shades of pink, purple, and green, flowing from the bottom right towards the center of the page.

Aerial Imaging Business (Technology to Project Images in Mid-Air)



Being able to **display objects as free-floating still or moving images** without the use of any sort of reflecting screen has long been a dream of mankind. We are proud to introduce our manufacturing and sales business of the world's first technology that enables exactly this kind of image device.

<about>



(Actual)



(Ideal)

Many of you have probably seen what seems like a dream-like scene where the main character of a movie or TV drama displays an image or video in mid-air and then uses his or her hands to manipulate it.

In recent years, aerial gesture **operation devices** (sensors) allowing you directly manipulate contents without touching a screen have been introduced, and general sales of these have already been started by a large number of venture capital companies and electronics manufacturers.

However, with all of these products, the **contents of the images being moved are contained within a closed display**, and none of them display the image in front of your eyes like a movie, allowing you to use your fingers or hands to move them. If images could be freely displayed in mid-air, then accurate operations would be possible and images could be deleted when not necessary.

Of course, this technology is not limited to display devices, but can also dramatically change airborne advertising and digital signage images such as those for providing information.



(Vehicle-Mounted Prototype)



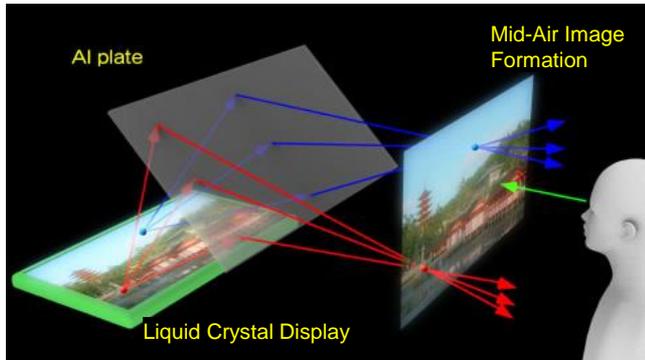
(Shiseido The Ginza)

Unfortunately, real images **cannot be captured** by a camera because there is no reflecting screen, but all images formed in mid-air can be clearly seen by the naked eye.

Aerial Imaging Business (Function and Structure)



Note the extremely **simple structure** where light is just passed through a single plate.



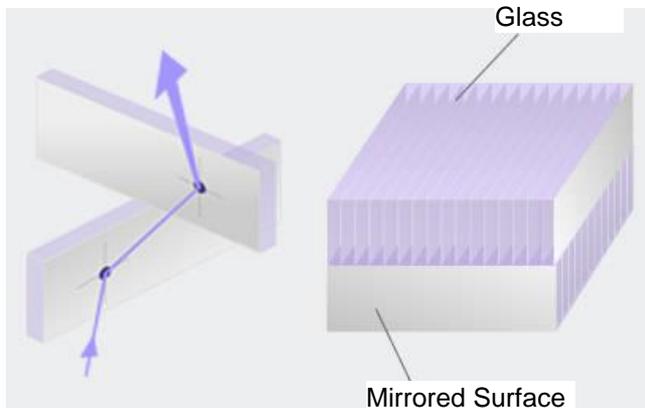
How is an image formed in mid-air?

Although the figure here shows a display that has been set up, an image of any object (such as a print or a cup), regardless of whether it is 2D or 3D, can be formed at the same distance on the other side of the plate as the object is from the plate.

Normally, once the projected light returns once, an image cannot be formed again, but passing light through an AI plate allows light to be concentrated a second time as shown in the figure and an image can be formed. Then, **light is diffused from the concentrated space** once again.

This means that you **can see the image in mid-air** in the same manner as you see the light emitted by the actual object.

As this image is a real image, it won't make you feel ill, and one major feature is there is no concept of focus so that even if the source of the image moves forward or backward, the image moves through the air in the same way while maintaining focus.



AI Plate Structure

As shown in the figure on the left, silver and aluminum are deposited into the wall surface of glass shaped into rectangular strips to create mirrors with two glass strips arranged perpendicular to each other.

The arrows show the course of light as it reflects off of two wall surfaces while being emitted. This method of reflection (passing through) is the reason why the image can be reformed in mid-air when released again into an open space.

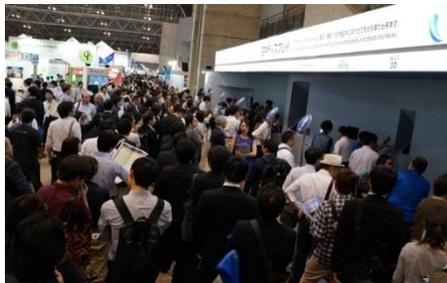
The image on the right shows the glass shapes shown in the figure on the left arranged in a concentrated unit so that light can be reflected and passed through the glass regardless of the position. In actuality, the glass has a minute pitch of hundreds of microns, and stacking the glass in a cross shape as shown in the figure on the right results in a thickness similar to that of a normal sheet of glass.

Aerial Imaging Business (Attracting Attention)



This technology suddenly gained a great deal of attention when the quality of image formation was improved a few years after the start of development, and, as of October 2015, prototype models have been purchased by some 250 major companies in fields such as electronics, personal computers, housing, food, automobiles, office products, amusement, security and advertising.

Additionally, Patent Result ranked our company, including the patent for our optical image formation device, number one in their "Patent Assets Ranking 2014 (Services)".



Large crowds everyday at CEATEC JAPAN 2015



Recognition from Cabinet Offices and the Ministry of Economy, Trade and Industry



Installed in Dubai limited edition super-car



CEATEC JAPAN Gran Prix First Runner-up Award



Experiment to re-project naked-eye visible 3D image in mid-air (joint research with NHK)



Aerial tactile sensor (The University of Tokyo)

Aerial Imaging Business (Applications and Future)



Although the AI plate was first fabricated by hand, we are currently able to produce a fair amount of them but there is a **necessity to reduce costs for the scale of mass production** required for using the AI plate in a large number of applications. We are currently testing full-scale mass production procedures with various companies worldwide that possess superior technology. We are also continuing research to resolve issues such as the following:

- (1) Difficulties in creating large-size versions
- (2) Low rate of field of visibility
- (3) Positional relationship of actual object and mid-air image is 1:1

However, some companies have been **starting to make practical use** of the technology, and we are beginning to see its application spread to large-scale amusement parks, tourist information booths and similar locations. An aerial display for product advertising was introduced at H.I.S. offices in November 2015.

As it can function as a touch panel in situations where persons don't want to touch a physical panel or it can be used for video performances, it has **unlimited potential** from a global perspective also.



(From the left) Application examples of use in electronic sign boards, cars and slot machines



(From the left) Application examples of use in ATMs, restaurants and medical facilities



Intel CEO Brian Krzanich explaining the AI plate and its future during his keynote address for 2015 CES