Theia Technologies, LLC

Theia Technologies is a new company that designs, manufactures and sells ultra wide rectilinear lenses (without fisheye distortion).

Lens History

Theia's ultra wide rectilinear lenses are based on our patented Linear Optical Technology™. Jeff Gohman and Mark Peterson invented this lens design while working in the Advanced Technology group at InFocus Corporation, a maker of business and entertainment projectors. In 2002 InFocus decided to design an ultra thin rear projection TV to compete with the plasma and LCD TVs that were just coming out. This required a very wide angle lens without distortion to enable a very thin TV. The lens they designed was 160 degrees with less than 1% distortion resulting in a 61" diagonal TV that was less than 7" deep (even now it is still the thinnest projection TV in the world). This TV was produced by InFocus and TV partner RCA in 2004. It won multiple awards including Popular Science magazines' "Best of What's New" in 2004. It was sold during 2005 and 2006, until InFocus and RCA decided to exit the market when the price for plasma TV dropped precipitously.
http://www.ultimateavmag.com/rearprojectiontvs/205rca/

Company Organization

In 2006 Gohman and Peterson obtained an exclusive license from InFocus to take the lens technology into other markets. They founded Theia Technologies and decided to enter the security and military markets initially.

Theia Technologies was started along with Japanese manufacturing partner Nittoh Kogaku KK. Nittoh Kogaku is a well respected lens manufacturer with plants in Japan and Indonesia. Lenses are first designed in the US at Theia and then redesigned to improve manufacturing and cost by Nittoh. The lenses are manufactured to ISO 9001 and ISO 14001 standards at Nittoh's Indonesian plant.

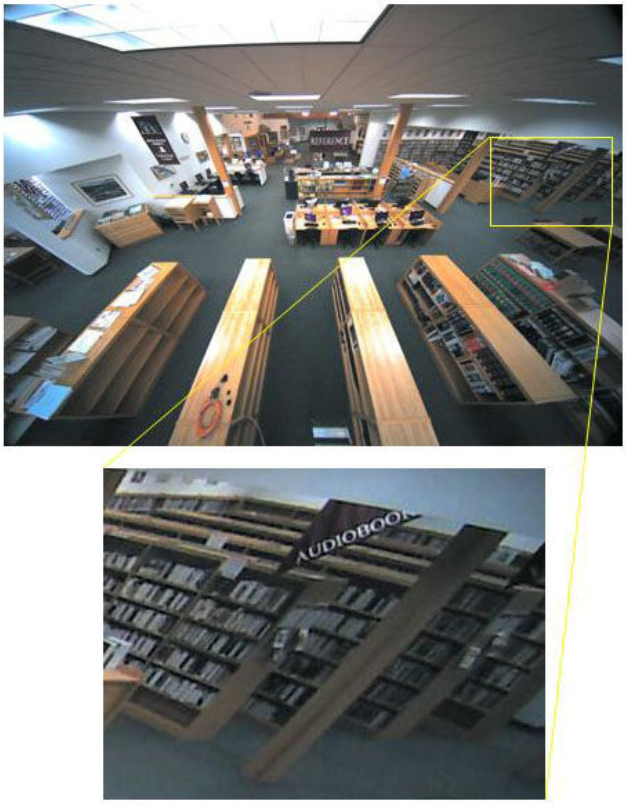
Theia sells worldwide through distributors, resellers, and direct from its website. Theia's management team consists of Jeff Gohman - President, Mark Peterson - VP Advanced Technology, Andrea Iniguez - VP Business Development, and Lisa Gohman - VP Finance.

New technology

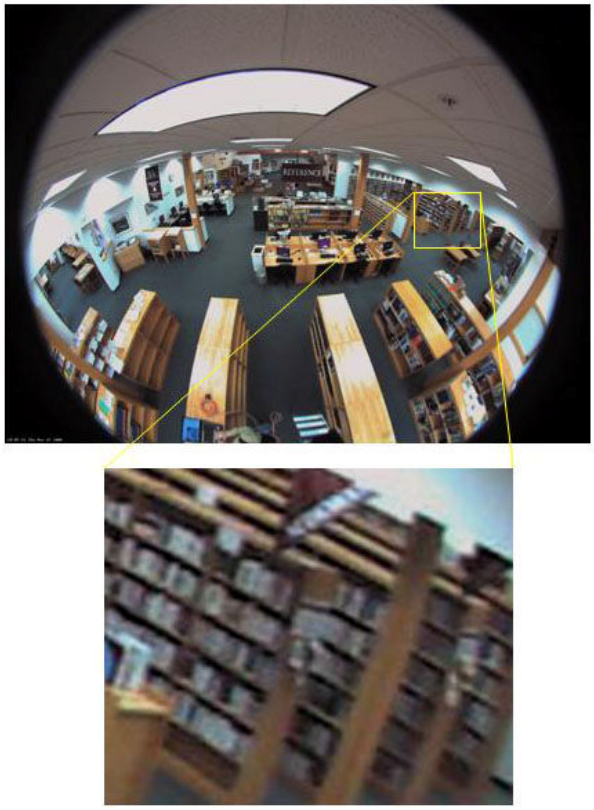
Theia Technologies has introduced the world's first ultra wide rectilinear lens for the security and machine vision markets. Theia's proprietary Linear Optical Technology allows the design of ultra wide angle lenses with fields of view of up to 135° while almost completely eliminating barrel image distortion. Straight lines remain straight in the image. Distortion correction is achieved optically in the lens; no additional de-warping software is required, allowing the lens to be used on any currently installed compatible camera. The lenses are compatible with 1/4", 1/3", and 1/2.5" security cameras from high resolution analog up to 5 megapixel resolution.

All optical distortion correction

Distortion correction is achieved optically using Theia's patented Linear Optical Technology, This has the advantage of improved resolution at the edges of the image. Barrel distortion (otherwise known as fisheye distortion or wide angle distortion) causes the image at the edges to be compressed and lost. The information is unrecoverable through software. Theia's rectilinear lens increases the ease of detection and identification at the edges of the image by optical distortion correction.



Theia's ultra wide lens



High quality fisheye lens

This increased resolution is introduced through an effect called 3D stretching. Any object at the edges of the image with dimensions parallel to the optical axis of the lens will appear stretched in the image. This increases the number of pixels available to cover the image.
Unlike a fisheye lens which only illuminates about 2/3 of the image sensor (leaving 1/3 of the pixels dark), the image from Theia's lens completely covers the image sensor. The cost per useful pixel is reduced.

Best-in-class megapixel lens

Theia's lenses are designed to support cameras from high resolution (540 line) analog cameras up to 5 megapixel resolution. Using a standard quality lens and even some megapixel-rated lenses on a multi megapixel camera will result in an unsatisfactory image. Few megapixel lenses are designed to give the sharp image required for the user to take full advantage of their multi-megapixel camera. Theia's lens is designed so the camera is the resolution limit in the system, not the optics.

Digital PTZ functionality

With a high resolution camera, such as a 5 megapixel resolution IP camera, one camera can capture up to 135deg HFOV image, allowing the user to digitally zoom in 16X or more while maintaining the same image quality they have been used to in the past. Below is an example showing a parking lot from the top of a 4 story building using a 5 megapixel camera.

By replacing 3-4 cameras with one camera using Theia's ultra wide lens, the user can save money on installation, cabling, DVR ports, and image storage. With the Theia lens, the entire wide image is continually recorded, even while the user digitally pans and zooms from area to area. Zooming-in on an area of interest does not prevent a crime in another area from being recorded.

Award winning technology

In September 2007 the SY125, Theia's first lens based on Linear Optical Technology™, was selected by Security Sales and Integration magazine as a "show stealer" at the ISC East show. Commercial sales of the SY125 began in January 2008. In April 2008 Theia won the "Special Achievement in Innovation" award from the Security Industry Association (SIA). In February 2009 Theia introduced the SY110 lens. Based on the same technology platform, the SY110 is also IR corrected for use with Day/Night cameras.

Applications

Theia's ultra wide low distortion lenses can be used in many applications where wide field of view, high resolution images are required. Some typical applications are listed.

Surveillance:

The improved resolution at the edges of the image (compared to typical lenses with barrel distortion) allow lobby, office, and other spaces with limited ceiling height to be effectively monitored using Theia's ultra wide angle lens. There is no longer a need to install multiple cameras at great installation expense in these applications.

Critical infrastructure:

Theia's Linear Optical Technology allows the lens to see a very large field of view while maintaining a small physical profile, allowing the lens to be mounted inconspicuously in small areas such as inside bus and light rail cars. The rectilinear optical design makes straight lines appear straight on the image. This is useful for determining distance from a flat surface such as a rail car (in transportation security applications) or a fence line (in critical infrastructure protection).

Military security:

The ultra wide angle lens allows the unmanned aerial vehicle (UAV) to make fewer passes and spend less time flying over its region of interest. This allows less fuel to be used and, in the case of hostile environments, less time for the UAV to be a target. Also the UAV can be used with low cloud cover and still gather valuable images.
Manned and unmanned ground vehicles (UGV) can have a large area staring camera to see an image with similar field of view as a human viewer. This can be relayed back to a remote viewer or used for unassisted image interpretation allowing soldiers to see targets and threats around their vehicle.

Under vehicle surveillance system:

With a single lens at ground level, the entire underside of a vehicle can be seen. This allows faster throughput and higher reliability than under-car mirrors at border crossings and entrance gates.

Factory automation and machine vision:

For applications with flat objects such as a brick wall or shipping container, the straight lines won't bend and bricks will appear the same size and shape regardless of where they are in the image. This makes automated image interpretation faster and more reliable because there doesn't have to be a radial de-warping calculation as there does when using a lens with barrel distortion such as a fisheye.

Further information

For more information contact us at info@TheiaTech.com, visit our website www.TheiaTech.com, or call 503-570-3296.

