Maximize the flexibility

Realise camera applications with varying object distances faster and more flexibly

Many image processing applications depend on varying working distances. As more and more production lines need to operate profitably both for mass production and also for small batches, the adaptation to new products and therefore varying working distances must be easy and quick to manage. Cameras equipped with liquid lenses focus in milliseconds on various object distances - for millions of cycles, wear-free and without moving parts. With the modular "Active Focus" (AF) board level cameras from IDS and liquid lens lenses from Edmund Optics (EO), camera applications with variable object distances can now be implemented more easily.

Corning Varioptic liquid lenses are based on the principle of electro-wetting, where the surface tension of a liquid is manipulated by an electric field. The resulting possible deformation of a drop of water can be used functionally like an optical lens. Following this principle, the liquid lenses consist of a cell with two non-miscible liquids whose different refractive indices reflect the light at the surface boundary in the same way as a conventional glass lens does. When a voltage of up to 70V is applied, the ratio of surface tension between the liquids changes, making the radius of the curvature of the spherical surface controllable.
Maximize the flexibility

Figure 1 - The surface tension of the electrically conductive liquid and thus the radius of curvature of the spherical surface between the two liquids can be systematically transformed by an electric field, whereby the "lens" changes its focal length.

This year EO will present a new series of S-Mount (M12) lenses based on Corning Varioptic liquid lenses at VISION Stuttgart, the international trade show for industrial image processing. The integration of the liquid lens in place of the aperture enables a compact lens design and a small aperture of F/2.4 at all four focal lengths (6 to 16mm). Since the optical design is adapted to the liquid lenses, the product series offers high image quality on large sensor formats of 1/2" or 1/1.8". The optomechanical design supports uncomplicated handling of the lenses. These are screwed in up to the mechanical stop, and focusing between the minimum distance and infinity is then performed via the liquid lens. In addition, the rear lens group is removable so that the user has direct access to the liquid lens. This allows the liquid lens to be rotated 180°, which facilitates electrical connection to the camera.

With the uEye LE USB 3.1 Gen 1 "AF" models, IDS Imaging Development Systems GmbH offers cost-efficient board level cameras with S-mount or CS-/C-mount as focusable variants. The liquid lens control is realized via an additional connector board, which is connected to the digital inputs and outputs of the camera board, which also enables the I2C communication with the liquid lens driver. Due to the complete implementation of Varioptic in the uEye software, the focus of the industrial camera can be easily adjusted via the user interface using the uEye programming interface. This modular camera concept allows both the software and the hardware to be easily expanded for various applications. The user can determine and mount the required liquid lens himself. All lenses based on a Varioptic liquid lens are compatible.
Figure 2 - The uEye LE USB 3.1 Gen 1 "AF" board level cameras are available with S-Mount and CS-/C-Mount. All lenses based on a Varioptic liquid lens are compatible with hardware and software.

A Varioptic liquid lens is also used in the new IDS NXT vegas platform. Inside the completely enclosed and IP65 protected camera housing, a liquid lens is the ideal optical component to give the user software control over the focus level of the versatile embedded vision system. Accompanied by a ToF sensor (Time-of-Flight) for distance measurement, the integrated liquid lens automatically focuses in milliseconds and captures sharp images, for example, in surveying tasks, driverless transport systems or in the surveillance area for people checks.

Figure 3 - Liquid lens lenses enable fully integrated embedded vision systems, such as the IDS NXT vegas, to cover varying working distances by software control.

Liquid lenses maximize the flexibility of camera applications by providing both initial image setup and fast focus adjustments during operation. Especially when cameras are used in places that are difficult-to-reach, the focus can be readjusted comfortably via software.
The newly developed uEye LE USB 3.1 Gen 1 Active Focus camera models from IDS in combination with liquid lens lenses from Edmund Optics now offer a focus solution that is very easy to integrate and allows conventional applications to be implemented with less time and cost. On the other hand, it can also be used to address completely new applications that require sharp images even at varying object distances.

With **Software Suite 4.92** or higher, the uEye LE AF board level cameras are available with autofocus function. The single shot autofocus of the board level cameras can be easily triggered via software. It can be individually configured depending on the application and ensures perfectly sharp images in the blink of an eye.

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