

Embedded Lens Control

Embedded Vision Systems

Single-board, embedded computer systems are in common use today to control many devices in consumer, industrial, automotive, medical, commercial and military applications. There is now growing demand from OEMs, machine builders and systems integrators for small, self-contained vision systems for use in applications where space is limited.

The embedded approach for vision systems often demands embedded control of other aspects of the vision system such as the lens or illumination. Remote lens control is important in any application where the distance between the camera and the subject can vary and it is not always easy to manually adjust the lens. The wide range of applications for remote lens control includes machine vision systems for production lines, intelligent surveillance and traffic management.

Embedded Lens Control

Dynamic lens control is traditionally achieved using lenses in which the zoom, focus and aperture are controlled by internal motors. Gardasoft has a range of dedicated Lens Control Units which are designed specifically for embedded use and can drive the zoom, focus and iris mechanisms on motorised lenses. They are also suitable to drive pan and tilt motors. The hardware is provided on a small-footprint circuit board which can be tailored to fit the constraints of a specific application.

For demanding individual applications, Gardasoft has developed a board-level lens controller to drive conventional motorised lenses. It includes up to 9 double-ended DC motor drives and can support lenses with the following features:

- » Zoom direct drive
- » Focus direct drive

- » Iris direct drive (auto iris)
- » Iris Video Drive
- » Pan direct drive
- » Tilt direct drive
- » Iris auto/manual switch
- » Lighting trigger output
- » Camera trigger output

Gardasoft can assist with the technical support required to integrate the Lens Controller into a specific lens.

P-Iris Control

Auto and video iris systems allow a continuous adjustment of aperture size to accommodate variations in the amount of light reaching the camera. However opening or closing the aperture too much can introduce diffraction or other aberrations into the image and will also change the depth of field. One way of addressing this is to use Precise-iris (P-iris) systems, where the iris is controlled by stepper motors. Gardasoft board-level systems offer dual-output channels for driving P-irises and can also driving motorised lens motors. P-iris systems automatically optimise the aperture size, camera gain and exposure, with the iris setting remaining fixed between camera exposures.

Focus-Tunable Lenses

The new, electrically-tunable lenses such as those from Optotune AG provide a compact, high-speed alternative to traditional lenses and are particularly attractive due to their low mechanical complexity and long life. These lenses are based on a combination of optical fluid and a deformable, polymer membrane and are electrically controlled. An accurate drive current causes the outer diaphragm to push down on the membrane and rapidly modify the shape of the lens. Gardasoft

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provides a range of [liquid lens controllers](#) such as the [CL190 Embedded Lens Controller](#) that is designed specifically for embedded use and achieves a step change of focal length in under 10ms.

The [CL190 / CL191](#) embedded single channel industrial lens controllers are designed to allow Optotune focus tunable lenses to be integrated into embedded systems. The CL190 is available in a design module that can be added to the user's PCB design files for the ultimate flexibility, while the CL191 is a miniature PCB version that is designed to fit into cameras, lighting and other equipment. The controllers provide the necessary accurate, constant current lens drive and include lens EEPROM data communications. The Liquid Lens Controllers are compatible with the most common communication protocols for embedded devices. For additional ease of use, Gardasoft is able to pre-configure the CL191 to the user's requirements prior to shipping.

Embedded Lighting Control

Accurate control of lighting is just as important in embedded vision applications as in traditional vision systems to obtain reliable images. For this reason, Gardasoft has developed the versatile TR-100 single channel embedded lighting controller. This is small enough to fit inside some lights or in a cable bulge. It can operate at 2A continuous output or up to 10A in pulsed mode for overdriving applications. Internal or external triggering is supported and the analog input can also be used for intensity control.

White Papers

[Liquid Lens Technology For Machine Vision](#)

Products

[CL190/CL191 Embedded Industrial Lens Controllers](#)

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