

Camera Focus Technology Reinvented: Using Multi-Segment LiDAR Sensing for Precise Distance Measurements

How a worldwide specialist in camera and lens control systems leverages 16-segment sensor modules for depth-of-field automation



Recent innovations in digital imagery have profoundly transformed the way we create our cinematic productions. Highly sophisticated equipment, such as digital cameras and state-of-the-art lenses, has become the standard among industry professionals—with breathtaking results. However, the recent upscaling of picture quality is pushing technical boundaries even further, which provides a technical challenge for filmmakers, as higher definition also means increased image sensitivity and constraints.

Staying focused

[Preston Cinema Systems](#) is a company that specializes in the design and development of camera and lens control systems. Through the years, the company has provided the motion picture industry with several breakthrough technologies, with many of its products now considered mainstream requirements on film sets worldwide.

One of the company's most persistent challenges was to develop a focus assist device intended to be used on movie sets to control the focus on the camera lens—a task that has been made considerably more difficult as higher definition became the norm. To achieve this, Preston Cinema Systems had to design a sensing device that could answer several critical performance criteria:

- Be able to acquire accurate distance information across multiple detection areas simultaneously
- Work reliably under a wide range of natural and artificial lighting conditions
- Have a fast refresh rate to avoid lag
- Be compact enough to be mounted on a camera
- Be eye-safe
- Operate in a wide variety of environments, such as those plausible on film sets: indoor / outdoor, hot / cold, clear / poor visibility due to rain, dust, etc.

The search for the right technology

Preston Cinema Systems has been searching for an enabling technology for multi-segment focus assistance for quite some time. Many years back, the company had developed a previous version of the product using a collimated IR laser that could measure distance at a single point. The device required a highly skilled technician to set up and operate, limiting its use to exceptional situations. Other distance measurement methods, such as ultrasonic detectors, stereo cameras and mechanical scanning LiDAR have been considered, but none had the combination of capabilities wanted for the LR2.

After reading about LeddarTech's multi-segment sensors in a specialized magazine, Preston Cinema Systems founder and owner Howard Preston ordered a Leddar evaluation kit to test the technology and see if it could answer its application's requirements. The result was unequivocally positive and development of the Light Ranger 2 could move forward.



The solution: Leddar M16 multi-element sensor module



The subject distances are represented by an array of rectangles, each one representing one of the 16 detection zones of the Leddar M16 module

The Light Ranger 2 leverages the Leddar M16's multi-element sensing capabilities to provide accurate distance measurements over 16 discrete segments simultaneously and at a range of up to 40 feet. The M16's fast refresh rate prevents any system latencies and allows the Light Ranger 2 to communicate efficiently with its video interface module to generate the graphic overlay for the focus puller's monitor.

LeddarTech's patented signal processing algorithms allow the LR2 to work reliably even in the most difficult visibility or lighting conditions, which are not rare on film sets. The sensor's robust solid-state design ensures that the system remains unaffected by vibrations and manipulation, making for a durable, long-term solution that can easily be mounted on any camera.

"The Leddar's capability to measure distances across many detection zones simultaneously dramatically simplified the setup and operation of the LR2, and opened up its use to the entire cinema market rather than a specialty niche."

- Howard Preston, CEO, Preston Cinema Systems



LeddarTech: A technology provider of choice

It is easy to start developing with the Leddar M16, which can easily be purchased online and comes with an SDK. The module is available in several field-of-view configurations, making it a top choice for a wide range of applications. LeddarTech's team of specialists in LiDAR sensing is available to provide help with product integration, as outlined by Mr. Preston: *"LeddarTech's support team has been extremely helpful in optimizing the performance of the Leddar unit to our application."*

[Leddar M16 product information](#)