



USB 2.0, USB 3.0, Gigabit and Ethernet

TRANSPORTATION CAMERAS

Lumenera offers a wide range of cameras specifically designed for advanced transportation systems. Choose from over 1,250 off-the-shelf board-level and enclosed cameras. Tailor our flexible products to meet your specific needs, or fully customize your own product to fit your design requirements. Select your sensor, interface and features of choice to build a solution that sets you ahead of the competition. Compact, lightweight, versatile, on-board memory buffering, choice of data interface and ruggedized for harsh environments, these cameras are ideally suited for transportation applications. Thousands of cameras deployed worldwide in transportation applications today.

Contact us to determine how you can benefit from Lumenera's high-quality reliable products.



www.lumenera.com

KEY ROLES IN INTELLIGENT TRANSPORTATION SYSTEMS (ITS)

ITS provide a proven set of tools and processes that address specific challenges such as safety and congestion, while accommodating for the growth in transportation usage and minimizing environmental impact. These systems improve transportation safety and mobility while enhancing productivity.

ITS encompasses a wide number of applications, each with their own set of requirements, including:

- Automated Tolling
- Safety Monitoring
- Road Inspection
- Speed Enforcement
- Red Light Enforcement
- Reserved Lane Enforcement
- HOT Enforcement
- Parking Access
- Tunnel Safety



CHALLENGES ENCOUNTERED



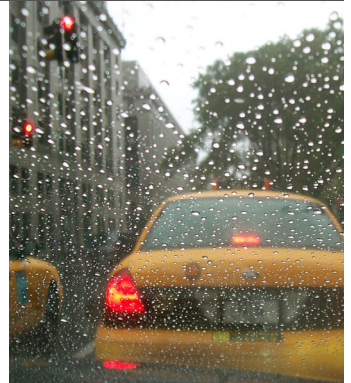
Transportation applications present a challenging set of requirements for vision systems and automated imaging. For free-flow toll systems, the high speed of vehicles requires real-time cameras with high resolution and high sensitivity sensors. Speed enforcement and license plate recognition are demanding applications that must contend with the varying formats in plate and character styles apart from other issues including dirt, dents, motion and variations in lighting. For tunnel systems, effective incident management depends on fast detection and verification by relying on the ability of the vision system to quickly narrow the flow of information to the most relevant data. Overall, most transportation systems are faced with uncontrolled lighting, harsh environments and competing priorities.

Ambient lighting is often very difficult or impossible to eliminate and can rarely be overlooked, setting transportation apart from industrial vision applications. To compound the problem, providing sufficient additional light to uniformly illuminate vehicles so an image can be captured accurately can be highly challenging. Rather than eliminate the ambient light, it must be effectively managed by the vision system including the dramatic variations that occur throughout the course of a day.

ROBUST SOLUTIONS

There are also a number of other environmental concerns that must be addressed. In transportation applications, vision systems must be designed for conditions that include extreme temperatures and humidity, as well as blowing leaves and debris. With systems being implemented worldwide, conditions can vary from frigid cold to torrid heat, or fine dust from the desert to freezing rain from the northern climates. A vision system must be able to withstand the varying elements within its environment. In all cases the shock and vibration from passing vehicles are constant and must be attended to by utilizing extremely robust equipment.

Cameras for transportation must be very rugged and reliable. In transportation, image-processing systems are often installed in remote locations. This may make accessibility very difficult due to height and safety regulations. The expense of replacing or repairing unreliable equipment is prohibitive without even accounting for the disruption and environmental costs associated with such repairs, further stressing the prerequisite for quality, robust and proven products to be specified.



CHOOSING CAMERA RESOLUTION



Selecting the correct camera for use in a transportation application is essential to the performance of the complete vision system. Several factors play a role when selecting the sensors for intelligent traffic systems. The first is the resolution of the sensor; it determines the ease of identifying details from a given portion of the image. For automated tolling systems and speed measurement devices, where only the license plate for individual vehicles is the focus or when the flow of traffic into a tunnel must be recorded, a relatively low resolution sensor is sufficient. For a toll collection system or a traffic violation monitoring system recording numerous lanes of traffic at once, a high resolution sensor with a high pixel count is essential.

If cameras are constantly running in high resolution mode, one must deal with a large amount of data where most of it will be irrelevant. Certain functionality can be added to the camera to reduce wasted data, minimizing the overload to the host computer. One example is to operate the camera in one or many regions of interest (ROI) with just a small portion of the scene being transmitted.

LARGE FORMAT CAMERAS

These very high resolution, progressive scan cameras allow a single device to capture multiple lanes of traffic with a single image. High sensitivity, integrated electronic shutter, and high smear rejection allow for the capture of high quality, crisp, clean images. The camera houses an integrated Canon lens mount* with full lens control, giving users the flexibility required to position the camera and easily operate the system, making for simple deployment. Replacing multiple lower resolution cameras with one higher resolution camera reduces system implementation, improves performance and limits maintenance costs.

Lm11059 (USB 2.0)

11 MP 35mm CCD

- 4008 x 2672 resolution
- Truesense KAI-11002 sensor
- 4.3 fps at full resolution

Lg11059 (GigE)

11 MP 35mm CCD

- 4008 x 2672 resolution
- Truesense KAI-11002
- 5 fps at full resolution
- Full camera control over a GigE network

Lt16059H (USB 3.0) *Coming soon!*

16 MP 35 mm CCD

- 4896 x 3264 resolution
- Truesense KAI-16070
- 12 fps at full resolution

Lt29059 (USB 3.0) *Coming soon!*

29 MP 35 mm CCD

- 6576 x 4384 resolution
- Truesense KAI-29050 sensor
- 6 fps at full resolution

Ask us about GiGE ordering options



* All of these large format cameras feature an integrated Canon EF lens controller

USB 3.0 CAMERAS

SONY EXview HAD II QUAD TAP PERFORMANCE

These cameras couple CCD technology with a high-speed USB 3.0 interface, offering the best low noise performance and sensitivity in the industry. Sony EXview HAD II technology delivers strong signals, even from the most minute amount of light entering the sensor. Traffic applications that record fast-moving vehicles require a high-sensitivity sensor, capable of working with extremely short exposure times. Low noise and high sensitivity ensure optimized images in an array of ambient light conditions without an external flash.

Lt365R

High-speed 2.8 MP 2/3" CCD

- 1936 x 1456 resolution
- Sony EXview HAD II ICX674 sensor
- 53 fps at full resolution

Lt665R

High-speed 6.0 MP 1" CCD

- 2752 x 2192 resolution
- Sony EXview HAD II ICX694 sensor
- 27 fps at full resolution

Lt965R

High Sensitivity 9.1 MP 1" CCD

- 3376 x 2704 resolution
- Sony EXview HAD II ICX814 sensor
- 19 fps at full resolution

Lt1265R *Coming soon!*

High Resolution 12 MP 1" CCD

- 4250 x 2838 resolution
- Sony EXview HAD II ICX834 sensor
- 15 fps at full resolution



GLOBAL SHUTTER CMOS

The Lt225 and Lt425 cameras feature innovative, large CMOS sensors with a fully electronic global shutter that captures excellent quality, high-speed images with zero blur, solving the motion artefact limitation found with traditional CMOS technology. These sensors do not suffer from blooming and smear issues, positioning them as an ideal solution for transportation. The use of large pixels increases sensor sensitivity to a level that rivals CCD. Very high frame rates of up to 170 fps at 2.2 MP over the USB 3.0 data interface open up a large realm of transportation applications including automated tolling.

Lt225

2.2 MP 2/3" CMOS

- 2048 x 1088 resolution
- CMOSIS CMV2000 Rev3 sensor
- 170 fps at full resolution

Lt425

4.0 MP 1" CMOS

- 2048 x 2048 resolution
- CMOSIS CMV4000 Rev3 sensor
- 90 fps at full resolution

NEAR INFRA-RED (NIR) SENSITIVITY: Lumenara offers NIR sensitivity enhanced versions of the Lt225 and Lt425 cameras, that have higher quantum efficiency (QE) for wavelengths above 600 nm. Around 900 nm the QE is about doubled and increases from 8% to 16%.

CUSTOM CAMERAS

In cases where transportation applications are so unique that an off-the-shelf camera will not satisfy its requirements, a custom designed camera is the best solution, providing that competitive edge. Lumenara is a proven supplier of customized high-performance board level and enclosed cameras, as well as cost-sensitive high volume solutions that fit your specific application and budgetary requirements. Modifications can include either small hardware or software adjustments such as private labeled enclosures and tailored firmware, to fully designed and customized electronic subassembly with unique mechanicals.

All cameras in this brochure are available in color and mono (NIR)



WHY LUMENERA?

- Improve your return on investment and lower total cost of ownership for your leading vision system through our cost-effective, high performance digital imaging solutions.
- Ensure the highest quality standards from design to delivery - research, development and manufacturing are tightly controlled in one location.
- Rely on our commitment to rapid product development - we have dedicated more engineers to customization than many direct competitors have employees.
- Count on our timely product supply through our long established relationships with vendors.

- Depend on our in-house manufacturing inspection and quality controls.
- Bank on our ongoing success and solid growth for years to come - we continue to invest in research and development in order to maintain our reputation as a leading provider of high-performance cameras.
- Maximize the value of your traffic system, personnel and applications by relying on our years of imaging, technology and vision expertise.
- Meet the uncompromising needs of today's safety and transportation professionals - with worldwide deployments in transportation, military, municipalities, retail and more, there isn't much we haven't seen before.
- Trust in Lumenera - with thousands of transportation deployments, we understand your pain points and can tailor our flexible solutions to meet your needs.
- Receive quick and competent responses to your technical, business, and support-related questions. Lumenera is recognized for its industry-leading pre and post-sales support and "easy-to-do business with" practices.



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LUMENERA TRANSPORTATION CAMERAS

Contact us today for a personal demonstration, and to learn more about how Lumenera can help you implement powerful and reliable transportation vision solutions.



7 Capella Court, Ottawa, ON, K2E 8A7
Telephone: 613-736-4077
sales@lumenera.com

www.lumenera.com

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