



triniti™ technology

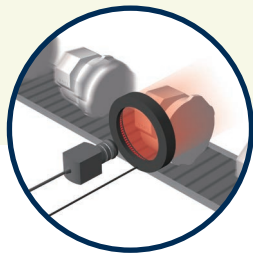
Intelligent lighting for Machine Vision

triniti™ is a new, enabling technology from Gardasoft, which provides expert control, operational intelligence and full integration of Machine Vision Lighting - all within a 'plug-&-play' environment.

With triniti, Machine Vision systems with LED Lighting are now much easier to create, configure and commission, while, at the same time, offering increased functionality.

This is because complex control techniques have now been made very easy to implement.

- enables non-expert users to use expert Machine Vision lighting techniques
- revolutionises the integration of lighting parameters right through to application level software
- provides a stability of brightness, long-term, that helps to enhance the reliability of Machine Vision systems, over many years.
- enables calibration of lighting for consistent operation and exact lighting replacement



Optimised illumination intensity

Using GenICam and a special Triniti chip, LED controllers automatically detect and seamlessly configure Triniti-compatible lights. Maximum strobe and overdrive are easily and safely obtained.



Easy integration with cameras

Integration is easy as Triniti technology relies on the same GenICam and GigE Vision standards popular with most machine vision cameras. Support for leading machine vision software packages is available.



Remote diagnostics and data-logging

Each Triniti-enabled light is also able to provide dynamic data related to operational performance and diagnostics. This includes an individual light name, on-time, and hours of operation.



A Collaboration of Machine Vision manufacturers: LED lighting; image processing software; expert light control

triniti™ products and developments

As part of the collaborative development programme, triniti deliverables include core hardware and software elements that are integrated with, or embedded into, products from leading LED Light hardware and Machine Vision software manufacturers.

b) triniti Protocols

The GigE Vision protocol has been implemented in the triniti Controllers so that intelligent cameras and applications and libraries which support GigE Vision or GenICam can interface directly to triniti Controllers.



triniti also exploits standard Machine Vision networking and communication architectures such as GigE Vision and GenICam, in order to ensure that the resulting solutions are fully integrated (as illustrated above, and as follows):

a) triniti Machine Vision Software Interface (API)

triniti-enabled LED lights are seamlessly integrated into Machine Vision networks and provide diagnostic and configuration benefits through Image Processing Software.

c) triniti Controller

These are LED Light Controllers which inherit the patented Gardasoft functionality, and combine this with triniti communication and GigE Vision compatibility.

d) triniti Chip

The triniti chip has been built into partners' lights or light cabling. It holds manufacturer's data on the lights, stores dynamic usage data and can return measurements from sensors within the light.

triniti™ Software

triniti provides very close integration of lighting into the whole machine vision system, enabling the user's application to easily configure and see the status of all the lights in the system. The application can be (or can use) any one of the following:

- Industry-standard image processing package
- User's own image processing code
- Smart Camera with its own image processing.

The application can be written in any .NET language, including C#, VB, and C++, or it can be a native application written in C++.

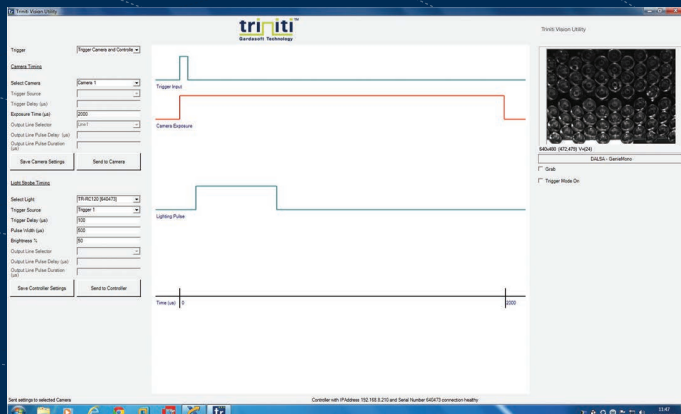
The image processing packages supported include Stemmer's Common Vision Blox, Cognex's VisionPro and National Instrument's LabVIEW. The Smart Cameras supported are those of Cognex's Insight range.

triniti™ Vision Utility

The triniti system makes machine vision techniques easier to use. One example of this is the Triniti Vision Utility, which enables the user to set up the timing for a whole machine vision system, with cameras and strobe-mode lighting, all from one place (strobe-mode being very useful for increasing the lifetime of lighting and providing increased light output).

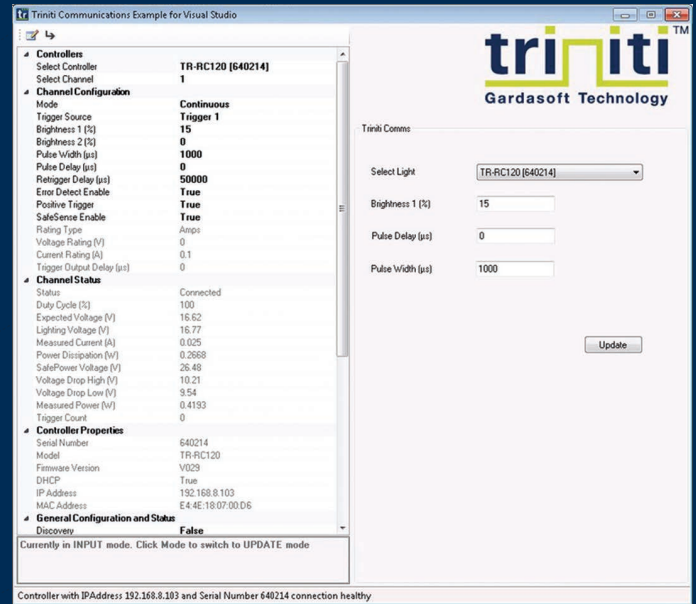
The Vision Utility uses the licence for the supported image processing packages so it can work with any camera that they support (which is generally any camera compatible with GigE Vision or GenICam).

The Utility provides a diagram, which shows the timing of the camera exposure and the lighting pulse on one screen. It's easy to see when the two are not aligned, and a live camera image shows the effect of the settings. The timing can be changed and saved interactively.



triniti™ Configuration Utility

This Utility enables users to configure their Lighting Controller, to show its status, and to edit certain lighting control parameters, via a PropertyGrid (as shown below).



triniti™ SDK

The SDK comprises: an API (Application Programming Interface) for .NET programming support; example WinForms program in C#.NET, and one in VB.NET, showing the use of the API, and Data Source objects (which provide a view of the controllers and lights in the system).

The API provides immediate access to controller and lighting properties, enabling controller connection, status reading and parameter changing. It can be used with applications that have custom image processing, or that use a third-party package (e.g. Stemmer CVB or Cognex VisionPro). It is provided through a DLL for .NET support.

Data source objects can be bound to TreeView and PropertyGrid .NET User Controls, to generate graphical views of controller and lighting values.

Plugins for third-party applications

National Instruments LabVIEW: A Virtual Instrument (VI) is provided, which can be put into a LabVIEW diagram, giving access to any networked Triniti controller and light.

Cognex Insight Code Snippet: Triniti provides a Code Snippet, which can be put into an Insight spreadsheet, enabling all the status and parameters of a lighting controller to be available to the Insight camera.

trinito Lighting



www.ccs-grp.com/trinito



www.smartvisionlights.com



www.tpl-vision.com



www.metaphase-tech.com



trinito Controllers



TR-RC120



TR-RC122



TR-RT220



TR-RT420

- 1, 2 and 4 channel LED lighting controllers
- Compatible with trinito Intelligent Lighting platform
- GigE Vision compliant
- Pulsing up to 20A
- Continuous output to 3.0A
- 30W maximum output per channel
- Pulse timing to 1 μ s
- Ethernet and Push-button interfaces (dependent on model)

SPECIFICATIONS	TR-RC120	TR-RC122	TR-RT220-20 TR-RT220(F)-2	TR-RT420-20 TR-RT420(F)-2
User interface	Ethernet and Push-button		Ethernet	
Output channel	One constant current output		Two independent constant current outputs	Four independent constant current outputs
Output current	Up to 1.2A continuous or 2.0A pulsed	Up to 1.25A continuous or 10.0A pulsed	Up to 3.0A per channel continuous or 20A pulsed (-20 model) Up to 2A continuous or pulsed (-2 model)	
Output power	Max 25W	Max 30W	Max 40W per unit	Max 50W per unit
Trigger input	One Smart input compatible with 3V-24V, TTL, NPN, and PNP. Input impedance (nom): 8Kohm		Two opto-isolated digital inputs. Require 3V-24V operation	Four opto-isolated digital inputs. Require 3V-24V operation
Pulse Timing	Standard versions			
Pulse timing and Delay from trigger to pulse	Pulse 100 μ s to 100ms. Delay 2 μ s to 100ms For delay + pulse up to 900 μ s: steps of 100 μ s, repeatability 1 μ s For delay + pulse 900 μ s to 100ms: steps of 100 μ s, repeatability 100 μ s		Pulse 20 μ s to 1s. Delay 20 μ s to 1s For delay + pulse up to 900 μ s: steps of 20 μ s, repeatability 1 μ s For delay + pulse 900 μ s to 40ms: steps of 20 μ s, repeatability 6 μ s For delay + pulse > 40ms: steps of 100 μ s, repeatability 100 μ s	
Switch mode latency	Maximum 100 μ s		Maximum 20 μ s	
Pulse Timing	'F' versions			
Pulse timing and Delay from trigger to pulse	n/a		Pulse 1 μ s to 1s. Delay 4 μ s to 1s For delay + pulse up to 900 μ s: steps of 1 μ s, repeatability 1 μ s For delay + pulse 900 μ s to 40ms: steps of 6 μ s, repeatability 6 μ s For delay + pulse > 40ms: steps of 100 μ s, repeatability 100 μ s	
Switch mode latency	n/a		Maximum 4 μ s	
Trigger rate	Maximum 100Hz		Maximum 1Khz	
Output voltage	0V to 24V	0V to 48V	0V to 46V	
trinito interface	Gardasoft 4-wire Trinito lighting interface			
trinito communications interface	GigE Vision V2.0, GenICam, UDP/TCP, Third party protocols			
Supply voltage	Regulated 24VDC \pm 10%. A SELV power supply is required.		Regulated 24V to 48V. A SELV power supply is required.	
Dimensions	101mm long x 35mm wide x 120mm high	101mm long x 60mm wide x 120mm high	112mm long x 97mm wide x 62mm high	159mm long x 97mm wide x 62mm high
Weight	175g	340g	300g	400g
Mounting	DIN rail mount		Panel mounting, DIN rail option	
Operating temperature	-20°C to 50°C			
Humidity	Up to 95% non-condensing			
Standards	CE, RoHS			

Note: channels are compatible with Trinito or non-Trinito lights.

Specifications are subject to change without notice.



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