GARDASOFT
Industrial LED technology

triniti
Gardasoft Technology

triniti™ technology
# Expert control of Machine Vision lighting… made easy

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.

triniti delivers many benefits to users, including that it:

- enables non-expert users to use expert Machine Vision lighting techniques

- revolutionises the integration of lighting parameters right through to application level software

- addresses the industry's identified need for a highly flexible system that is also readily 'plug-&-play'

- provides a stability of brightness, long-term, that helps to enhance the reliability of Machine Vision systems, over many years.

Interworking between Machine Vision product manufacturers

As a system-enabling technology, **triniti** embraces a collaborative approach with leading manufacturers of LED Lighting and providers of Machine Vision software.

LED
Lighting

Machine
Vision
software

Expert
light control
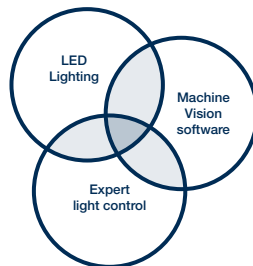
LED Lighting - Two of the world's most prominent Machine Vision product manufacturers, **CCS** and **Smart Vision Lights**, are the leading **triniti** partners for LED Lighting.

CCS
CREATING CUSTOMER SATISFACTION

smart vision lights

Machine Vision APIs - The **triniti** API is already proven with Image Processing Software from leading suppliers that include **Cognex**, **Stemmer Imaging** and **National Instruments**.

COGNEX
STEMMER® IMAGING
NATIONAL INSTRUMENTS

triniti™ comprises three key technological elements:

1 Integration of Lights into software

triniti-enabled LED lights are seamlessly integrated into Machine Vision networks, providing diagnostic and configuration benefits through Imaging and Application processing software.
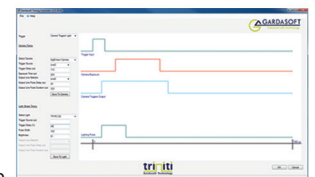
2 Expert Light Control

triniti systems incorporate the control functionality of Gardasoft Vision's patented LED light controller technology, in either discrete or embedded form.

3 Light Identification and Operational Data

triniti chips are mounted into partner lights or light cabling, thereby enabling:
– knowledge of light parameters
– easy light connectivity
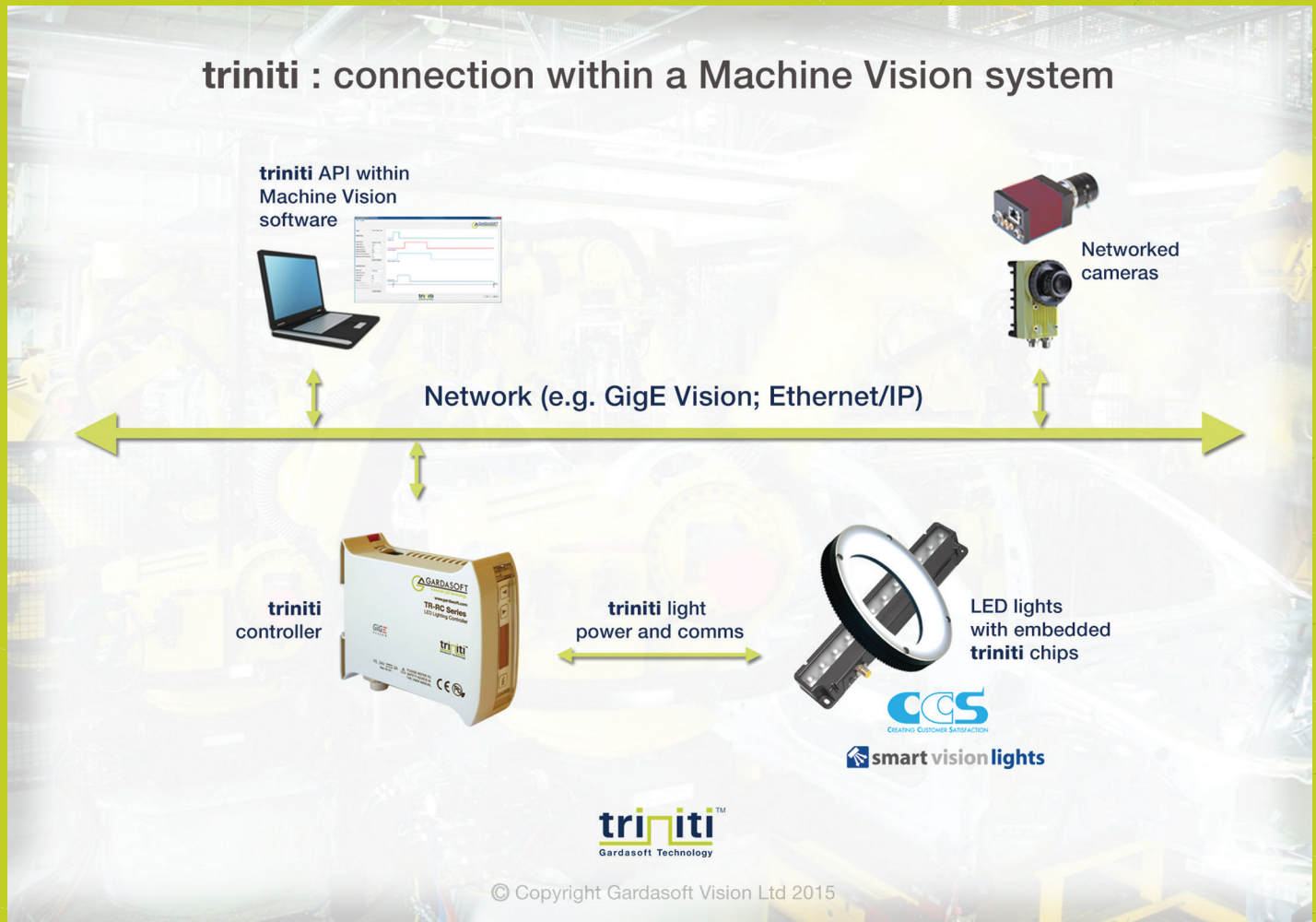– light operational data.

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.

a) 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 : connection within a Machine Vision system

triniti API within Machine Vision software

Networked cameras

Network (e.g. GigE Vision; Ethernet/IP)

triniti controller

triniti light power and comms

LED lights with embedded **triniti** chips

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smart vision lights

triniti™ Gardasoft Technology

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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.

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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.
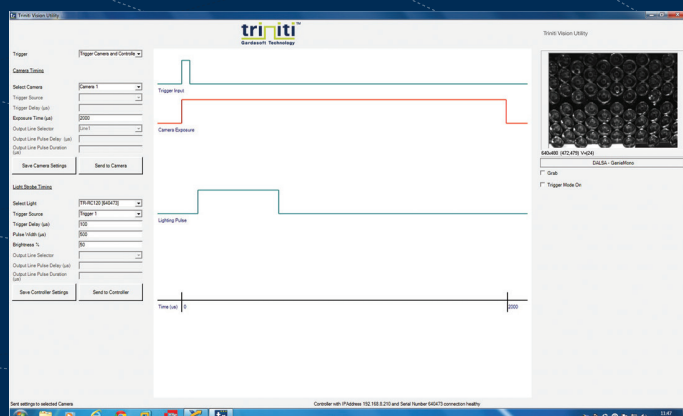
triniti™ Configuration Utility

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).
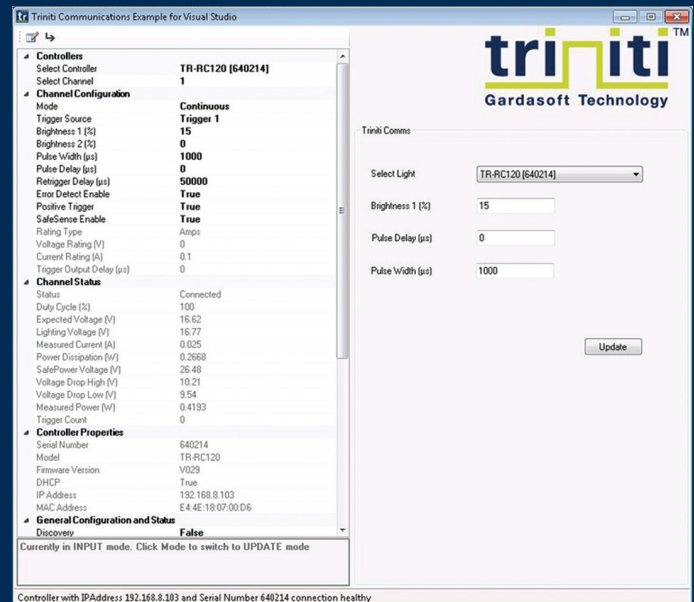
triniti™ SDK

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.

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triniti Lighting

- **triniti**-enabled lights include: LDR2, HPR2, FPQ2, LDL2, TH, HPD2, LFV3 and LFV Series
- Direct connection to Gardasoft **triniti** Controller via M12 Connector
- For further details, visit **www.ccs-grp.com**

- **triniti**-enabled S75 and L300 Series for initial launch
- Direct connection to Gardasoft **triniti** Controller via M12 Connector
- For further details, visit **www.smartvisionlights.com**

triniti Controllers

TR-RC120 **TR-RC122** **TR-RT220-20** **TR-RT420-20**

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

SPECIFICATIONS:	TR-RC120	TR-RC122	TR-RT220-20	TR-RT420-20
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	
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	From 100ms to 100ms in steps of 100µs		From 20µs to 999ms in steps of 20/100µs	
Delay from trigger to pulse	From 2ms to 100ms in steps of 100µs			
Timing repeatability (Delay)	±5µs (Delay + Pulse up to 60ms); Otherwise ±50µs			
Timing repeatability (Pulse width)	±0.1µs (Delay + Pulse up to 0.5ms) ±5µs (Delay + Pulse from >0.5ms to 60ms); Otherwise ±50µs			
Switch mode latency	Maximum 100µs		Maximum 120µs	
Trigger rate	Maximum 100Hz		Maximum 1Khz	
Output voltage	0V to 24V	0V to 48V	0V to 46V	
triniti interface	Gardasoft 4-wire Triniti lighting interface			
triniti communications interface	GigE Vision V2.0, GenICam, UDP/TCP, Third party protocols			
Supply voltage	Regulated 24VDC±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 temparature	-20°C to 50°C			
Humidity	Up to 95% non-condensing			
Standards	CE, RoHS			

Specifications are subject to change without notice.

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