

# 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** - CCS is one of the world's most prominent Machine Vision product manufacturers; CCS is also one of the leading triniti partners for LED Lighting.



**Machine Vision APIs** - The triniti API is compatible with Image Processing Software from leading suppliers.

### 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

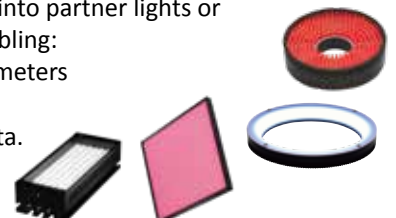
triniti systems incorporate the control functionality of Gardasoft Vision's patented LED light controller technology, in either discrete or embedded form.



#### 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
- and 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.

**triniti** also exploits standard Machine Vision networking and communication architectures such as **GigE Vision** and **Genl-Cam**, in order to ensure that the resulting solutions are fully integrated 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.

### 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 GenlCam can interface directly to **triniti** Controllers.

### 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™ provides APIs for integration with Image Processing Software

triniti offers much closer integration of lighting to the application level. This is done by providing links from the applications to the light through industry-standard protocols and software APIs for specific environments.

triniti API extensions are available for leading Machine Vision software for Image Processing and System configuration – with the result that a full graphical interface is provided to the user for configuration and synchronisation between GigE Vision (and other cameras) and lighting.

By integrating camera and lighting configuration and control at the application level, the operation of the system as a whole can be more visible.

For example, a timing diagram (like the above example) showing the timing of the trigger source, camera exposure time and lighting pulses, can be shown on-screen, to make it much easier for both development and diagnostics.

The screenshot displays the 'Gardasoft Timing Configuration v1.2.2.001' software window. The interface is divided into several sections:

- Camera settings:** Includes a 'Camera Types' dropdown, 'Select Camera' (GigE Vision Camera), 'Trigger Source' (Line2), 'Trigger Delay (µs)' (112), 'Exposure Time (µs)' (223), 'Output Line Selector' (Line2), 'Output Line Pulse Delay (µs)' (44), and 'Output Line Pulse Duration (µs)' (310). A 'Save To Camera' button is present.
- Light settings:** Includes 'Select Light' (TRAC100), 'Trigger Source (µs)' (44), 'Pulse Width' (120), and 'Brightness' (81). It also has 'Minimum Line Position', 'Minimum Line Pulse Delay (µs)', and 'Minimum Line Pulse Duration (µs)' fields, along with a 'Save To Light' button.
- Timing Diagram:** A central graph showing four waveforms: 'Trigger Input' (a single pulse), 'Camera Exposure' (a rectangular pulse), 'Camera Triggers Output' (a rectangular pulse), and 'Lighting Pulse' (a rectangular pulse). The x-axis represents time in microseconds, with markers at 0 and 1000 µs.
- Visual Examples:** On the right side, there are five small images showing different machine vision applications, such as inspecting a circuit board, a mechanical part, a pipe, and a textured surface.

The 'triniti' logo and 'Gardasoft Technology' are visible at the bottom of the window. The copyright notice '© Copyright Gardasoft Vision Ltd 2014' is located at the bottom center of the overall image.

## triniti™ gives expert control

With triniti-enabled lighting, users benefit from having expert control techniques for their lighting systems readily available – with an ease-of-use more typically associated with 'plug-&-play' products.

Functional advantages include enhanced overdrive and pulse control, and flexible light switching and synchronisation. (Note: refer to CCS – [www.ccs-grp.com](http://www.ccs-grp.com) – for specific details.)

### 'Plug-&-play' customer benefits include:

Optimum application settings for lighting are easy to configure, multiple light systems are easy to manage, and automatic adjustment can maintain more stable brightness over many years of operation.

### Expert customer benefits include:

Machine Vision functionality is increased, as performance is improved, and the potential of camera and lighting equipment can be fully exploited. This means that system reliability is maximised, and at the same time, services to end users can be extended and enhanced.

Model Name	Led Color	Wavelength Correlated Color temperature	Options		Weight (g)	Model Name	Led Color	Wavelength Correlated Color temperature	Options		Weight (g)
<b>Ring Lights</b>											
LDR2-32RD2-TR	Red	630nm	Diffusion plate Polorization plate	Lens attachment ring	30	LDL2-119X16RD-WD-TR	Red	635nm	Diffusion plate Polorization plate	Protective panel Bracket	95
LDR2-32SW2-TR	White	5.500k	Diffusion plate Polorization plate	Lens attachment ring	30	LDL2-119X16SW-WD-TR	White	6.600k	Diffusion plate Polorization plate	Protective panel Bracket	95
LDR2-42RD2-TR	Red	630nm	Diffusion plate Polorization plate	Adapter	50	LDL2-74X30RD-TR	Red	635nm	Diffusion plate Polorization plate	Protective panel Bracket	100
LDR2-42SW2-TR	White	5.500k	Diffusion plate Polorization plate	Adapter	50	LDL2-74X30SW-NR-TR	White	6.600k	Diffusion plate Polorization plate	Protective panel Bracket	100
LDR2-50RD2-TR	Red	630nm	Diffusion plate Polorization plate	Lens attachment ring	50	LDL2-74X30RD-WD-TR	Red	635nm	Diffusion plate Polorization plate	Protective panel Bracket	100
LDR2-50SW2-TR	White	5.500k	Diffusion plate Polorization plate	Lens attachment ring	50	LDL2-74X30SW-WD-TR	White	6.600k	Diffusion plate Polorization plate	Protective panel Bracket	100
LDR2-70RD2-TR	Red	630nm	Diffusion plate	Polorization plate	110	<b>Flat Lights</b>					
LDR2-70SW2-TR	White	5.500k	Diffusion plate	Polorization plate	120	TH2-27X27RD-TR	Red	635nm	Light control film	Bracket	30
LDR2-74RD2-LA-TR	Red	630nm	Diffusion plate		90	TH2-27X27SW-TR	White	5.800k	Light control film	Bracket	30
LDR2-74SW2-LA-TR	White	5.500k	Diffusion plate		90	TH2-43X35RD-TR	Red	635nm	Light control film	Bracket	40
LDR2-100RD2-LA-TR	Red	630nm	Diffusion plate		170	TH2-43X35SW-TR	White	5.800k	Light control film	Bracket	40
LDR2-100SW2-LA-TR	White	5.500k	Diffusion plate		170	TH2-51X51RD-TR	Red	635nm	Light control film	Bracket	60
LDR2-132RD2-LA-TR	Red	630nm	Diffusion plate		270	TH2-51X51SW-TR	White	5.800k	Light control film	Bracket	60
LDR2-132SW2-LA-TR	White	5.500k	Diffusion plate		270	TH2-63X60RD-TR	Red	635nm	Light control film	Bracket	100
HPR2-50RD-TR	Red	635nm	Bracket		46	TH2-63X60SW-TR	White	5.800k	Light control film	Bracket	100
HPR2-50SW-TR	White	6.000k	Bracket		46	TH2-83X75RD-TR	Red	635nm	Light control film	Bracket	140
HPR2-50BL-TR	Blue	470nm	Bracket		46	TH2-83X75SW-TR	White	5.800k	Light control film	Bracket	140
HPR2-75RD-TR	Red	635nm	Bracket		160	TH2-100X100RD-TR	Red	635nm	Light control film	Bracket	200
HPR2-75SW-TR	White	6.000k	Bracket		160	TH2-100X100SW-TR	White	5.800k	Light control film	Bracket	200
HPR2-75BL-TR	Blue	470nm	Bracket		160	<b>Dome Lights</b>					
HPR2-100RD-TR	Red	635nm	Bracket		170	HPD2-75RD-TR	Red	635nm	Bracket		140
HPR2-100SW-TR	White	6.000k	Bracket		170	HPD2-75SW-TR	White	6.500k	Bracket		140
HPR2-100BL-TR	Blue	470nm	Bracket		170	HPD2-75BL-TR	Blue	470nm	Bracket		140
<b>Square Lights</b>						HPD2-100RD-TR	Red	635nm	Bracket		160
FPQ3-32RD-TR	Red	630nm	-		50	HPD2-100SW-TR	White	6,500K	Bracket		160
FPQ3-32SW-TR	White	6.000k	-		50	HPD2-100BL-TR	Blue	470nm	Bracket		160
FPQ3-48RD-TR	Red	630nm	-		85	<b>Coaxial Lights</b>					
FPQ3-48SW-TR	White	6.000k	-		85	LFV3-CP-18RD-TR	Red	635nm	-		80
<b>Bar Light</b>						LFV3-CP-18SW-TR	White	6.000k	-		80
LDL2-33X8RD-TR	Red	635nm	Diffusion plate Polorization plate	Bracket	20	LFV3-35RD-TR(A)	Red	630nm	Diffusion plate Polorization plate	Light control film	175
LDL2-33X8SW-NR-TR	White	6.600k	Diffusion plate Polorization plate	Bracket	20	LFV3-35SW-TR(A)	White	6.500k	Diffusion plate Polorization plate	Light control film	175
LDL2-41X16RD-TR	Red	635nm	Diffusion plate Polorization plate	Protective panel Bracket	50	LFV3-50RD-TR(A)	Red	630nm	Diffusion plate Polorization plate	Light control film	335
LDL2-41X16SW-NR-TR	White	6.600k	Diffusion plate Polorization plate	Protective panel Bracket	50	LFV3-50SW-TR(A)	White	6.500k	Diffusion plate Polorization plate	Light control film	335
LDL2-41X16RD-WD-TR	Red	635nm	Diffusion plate Polorization plate	Protective panel Bracket	50						
LDL2-41X16SW-WD-TR	White	6.600k	Diffusion plate Polorization plate	Protective panel Bracket	50						
LDL2-119X16RD-TR	Red	635nm	Diffusion plate Polorization plate	Protective panel Bracket	95						
LDL2-119X16SW-NR-TR	White	6.600k	Diffusion plate Polorization plate	Protective panel Bracket	95						