



HIGH PERFORMANCE SENSOR POINTING TECHNOLOGIES

RobotEye RE02 3D Laser Scanning System

Product Datasheet

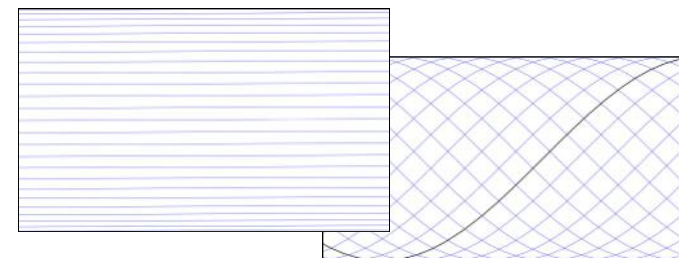


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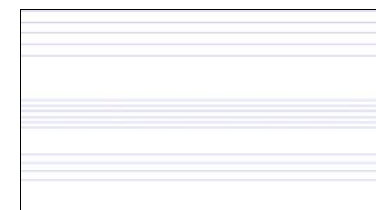
The RobotEye RE02 is a high performance short range 3D laser scanning system configured as a simple network appliance. Connect the RE02 to a suitable power supply and your Ethernet network, and the system is ready to go. The supplied software, *RE02 Tools*, and the RE02 C++ class library make it quick and easy to simply gather 3D range data, or integrate the system into your existing data gathering pipeline.

The embedded RobotEye technology brings to laser scanning previously unavailable control over scanning behaviour. Three scanning schemes are currently standard with the RobotEye RE02 System. Each scan pattern is fully parameterised, so that the behaviour of the system is entirely user defined.

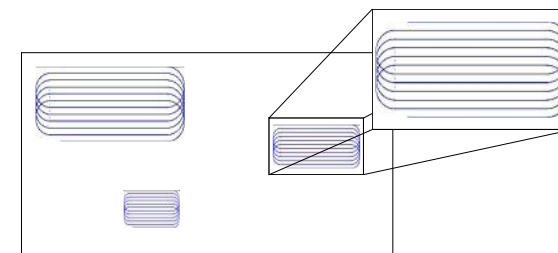
- *Full Field Scanning* — When Full Field Scanning is used, the RobotEye scan parameters are the azimuth and elevation rates. Varying these parameters results in a wide variety of possible scan patterns, ranging from fast, coarse scans, to slower, more dense sampling patterns. The diagrams to the right show unwrapped examples of the scan patterns that can be achieved, firstly with a high relative azimuth rate to elevation rate and secondly with a lower azimuth rate relative to the elevation rate.



- *Bounded Elevation Scanning* — In bounded elevation scanning mode, the operator is able to define a scan that covers a full 360° in azimuth but is restricted to a region of the elevation range of the RE02. Again the azimuth rate is configurable as is the line density of the scan. This mode enables the operator to concentrate the focus of the RE02 Scanner to a desired region and at the same time have complete control over the density of the samples taken in that region. The diagram to the right shows some examples of different bounded elevation scans with varying location, extent and line density.



- *Region Scanning* — The region scanning mode allows the operator to define a region within the RE02's azimuth and elevation range in which to concentrate the range scanning. The region scan mode gives the most control over the attention of the scanner with settings for azimuth rate and line spacing as in the bounded elevation scan as well as the extent of the scan region relative to its top left hand corner where it will scan repeatedly until a different scan is commanded. Again, the diagram to the right shows an unwrapped example of some possible region scans.



Additionally, with the RE02 3D Laser Scanning System you are able to reconfigure or swap between any of the scanning modes immediately, making dynamic control of the scanner behaviour easy.

RE02 Specifications

<i>Mechanical</i>		<i>Rangefinder</i>	
Maximum Azimuth Rate	20Hz	Laser Class	3B
Maximum Elevation Rate	3Hz	Laser Wavelength	780 nm
Azimuth Axis Resolution	0.010°	Laser Power	20 mW
Elevation Axis Resolution	0.004°	Laser Divergence	0.5 milliradians
Azimuth Range	360° Continuous	Range (Reflectorless)	12 metres
Elevation Range	70° (±35°)	Range Accuracy	7.5mm
Weight	8.5kg	Maximum Sample Rate	200 kHz
		Minimum Sample Rate	50 Hz
<i>Electrical</i>		<i>Environmental</i>	
Communication (min - 100 Megabit)	Gigabit Ethernet	Operating Temperature Range	-10°C - +40°C
Supply Voltage	24VDC	IP Class Rating	65
Power Consumption — Typical (average)	<1.5 A	<i>Note: IP Rating valid only when both supplied power & optionally supplied weatherproof Ethernet cable connectors are fitted.</i>	
— Maximum (peak)	10.0 A		
<i>Software</i>			
RE02 Class Library Support	Windows/Linux		
RE02 Tools Support	Windows/Linux		



Specifications are subject to change without notice

Software

RE02 Tools — The supplied *RE02 Tools* application allows control of all RE02 system settings including scan parameters, sample frequency, maximum range and connection settings. *RE02 Tools* also gives full control over the logging of 3D data from the RE02 and the translation of the logged binary data to ASCII CSV format for export to point cloud display software. For more detailed information on *RE02 Tools* see the RE02 User Manual downloadable from the Ocular Robotics website.

RE02 C++ Class Library — The RE02 ships with a fully documented C++ class library for both Windows and Linux that can be used to simply and quickly interface to the RE02 device. This enables rapid application development for users who wish to integrate the RE02 into their proprietary systems. The library provides access to the entire range of RE02 features. The RE02 Network Interface Class Library Reference Manual is available for download from the Ocular Robotics website.

Custom Application Development — Ocular Robotics Pty. Ltd. provides a full range of custom development services for users who have specific application requirements for the RE02. These services range from custom firmware development for the RE02 through to large scale software development for applications of the RE02, such as in volume estimation tasks. Please contact Ocular Robotics for more information if required.

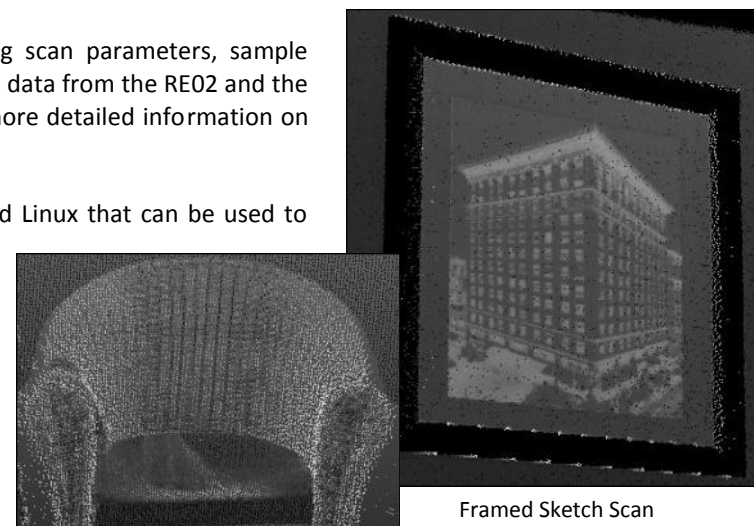
Data Output

The RE02 system outputs 3D data points at up to 200kHz making it possible to quickly acquire very dense point cloud data from the region specified by the current scan settings or alternatively rapidly update 3D range information over a wide area at ranges up to 12 metres.

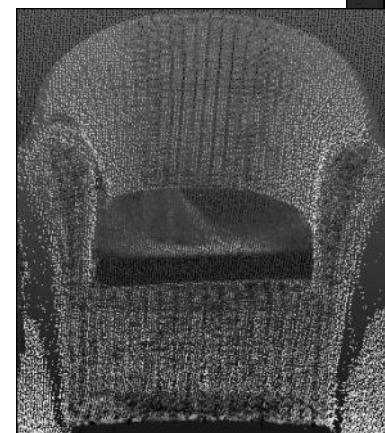
Using RE02 Tools, the native 3D data format of the RE02 laser scanner is *range, azimuth, elevation, intensity*. The user can retain this native format when logging or choose to log data in *x, y, z, intensity* format. 3D data logged in native format can be converted to *x, y, z, intensity* using *RE02 Tools* translation settings when translating binary files to ASCII.

Environmental

The RE02 3D Laser Scanning System has been designed to operate in a wide variety of industrial environments. The RE02 has an environmental rating of IP65 and will operate in ambient temperatures of up to 40°C.



Framed Sketch Scan



Cane Chair Scan



Vegetation Scan

Range Sensor

The range sensor at the heart of the RobotEye RE02 3D Laser Scanning System is the AR4000-LIR rangefinder from Acuity Laser Measurement of Portland, OR. With sample rates of up to 200kHz the AR4000-LIR rangefinder achieves measurement accuracy nominally of 7.5mm as configured for use with the RE02, however measurement accuracy for any particular scenario will be determined by factors such as sample rate, nature of the surface being measured and ambient light levels.

Communication

The bidirectional communication of data and control with the RobotEye RE02 is achieved via the system's Ethernet port. This enables the system to be operated and data processing to occur anywhere on the network to which the RE02 is connected, limited only by the allowable length of CAT6 Ethernet cable. The RE02 laser scanner supports Gigabit connectivity, however a 100 Megabit connection will be sufficient for most applications.

Laser Safety

The RobotEye RE02 3D Laser Scanning System is a class 3B laser device.



- CAUTION! - This laser device should not be aimed at the human eye. Use laser safety eyewear specifically designed for the laser wavelength emitted by the sensor whenever there is a possibility of the beam entering the eye either directly or via reflection from a surface.
- Installers of laser sensors should follow precautions set forth by their local laser safety oversight organisation for the safe use of lasers when installing this system.

A RobotEye RE02 installation can be reclassified as class 3R depending on the scan pattern, the lowest scan rate at which the laser is configured to turn on, and/or the distance from the aperture a person can approach without triggering a laser interlock device that turns the laser off. The scan rate interlock is factory configured and must be specified when ordering.

System components

The RE02 3D Laser Scanning System is supplied as standard with the following components:

- RobotEye RE02 3D Laser Scanning Unit
- 5 Metre Power Cable with Keyed Laser Interlock
- Aperture Cover
- RE02 Tools Operating, Logging and Translation Software
- RE02 Network Interface Class Library

Optionally, a system case shown opposite and/or weatherproof Ethernet cable assembly can be supplied.



Ocular Robotics Pty Ltd
Level 3 12-14 Ormonde Parade
Hurstville
NSW 2220 Australia

phone: + 61 2 8021 5078
fax: + 61 2 8021 5073
email: sales@ocularrobotics.com
web: www.ocularrobotics.com

