

# HOKUYO URG-04LX laser range-finder (LADAR)



<http://www.acroname.com/robotics/parts/R283-HOKUYO-LASER1.html>

## 1. General

URG-04LX is a laser sensor for area scanning. The light source of the sensor is infrared laser of wavelength 785nm with laser class 1 safety. Scan area is 240° semicircle with maximum radius 4000mm. Pitch angle is 0.36° and sensor outputs the distance measured at every point (683 steps). Laser beam diameter is less than 20mm at 2000mm with maximum divergence 40mm at 4000mm.

The principle of distance measurement is based on calculation of the phase difference, due to which it is possible to obtain stable measurement with minimum influence from object's color and surface gloss.

URG-04LX is designed under JISC8201-5-2 and IEC60947-5-2 standards for industrial applications.

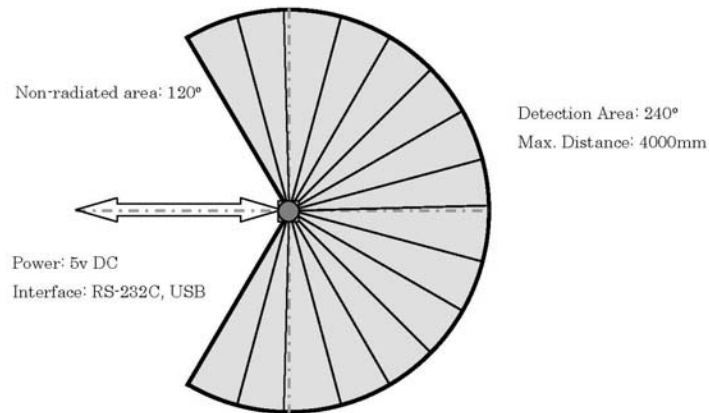


Figure 1

### Note

Figure 1 shows the detectable area for white Kent sheet (70mm×70mm). Detection distance may vary with size and object.

## 2. Important Notice

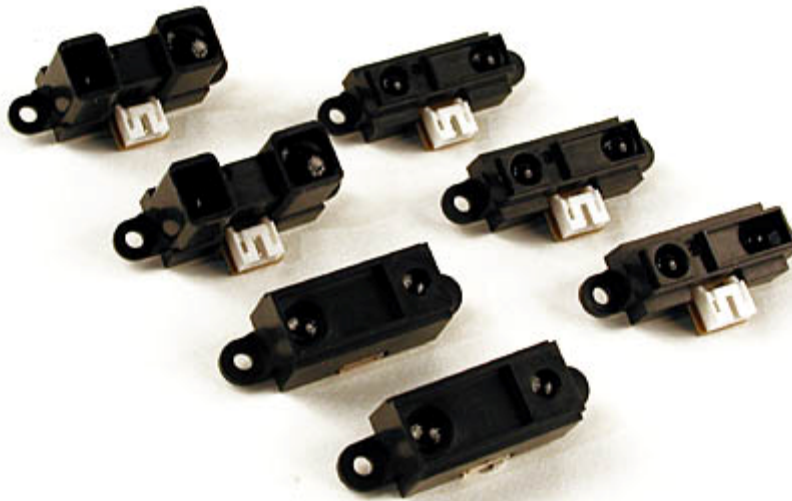
This sensor is designed for indoor use only.

This sensor is not a safety device/tool

This sensor is not for use in military applications

Read specifications carefully before use.

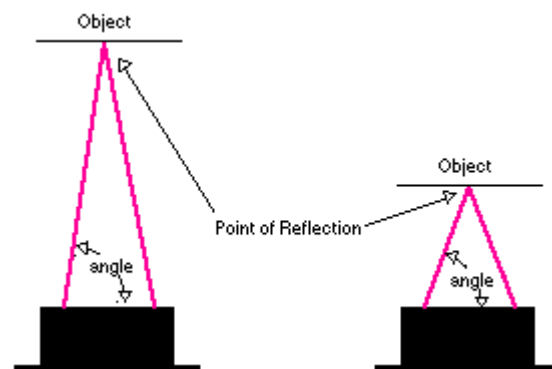
Title	URG-04LX Specification	Drawing No	C-42-3319A	2/5
-------	------------------------	------------	------------	-----



The various Sharp IR Rangefinders offered by Acroname

### Theory of Operation

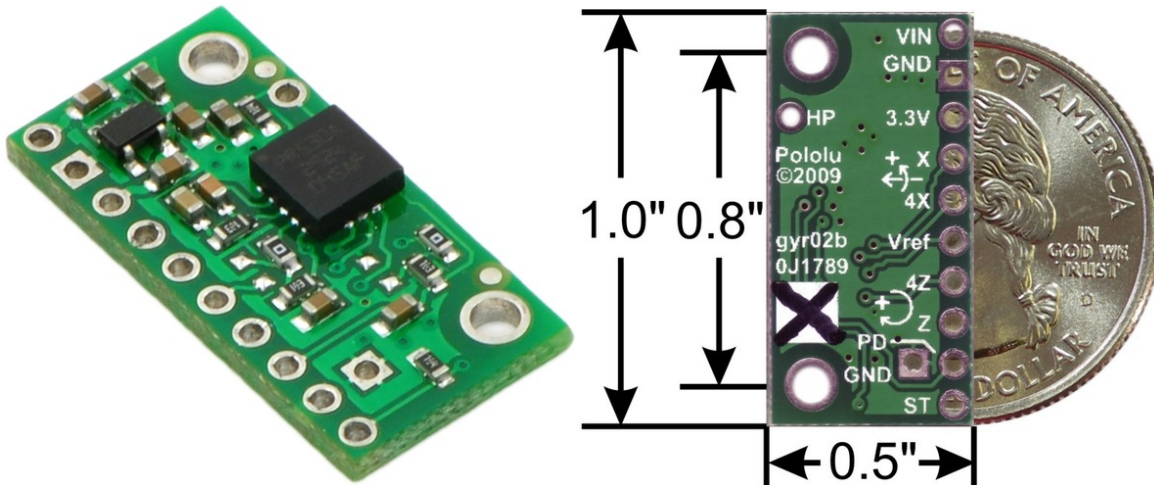
These new rangefinders all use triangulation and a small linear CCD array to compute the distance and/or presence of objects in the field of view. The basic idea is this: a pulse of IR light is emitted by the emitter. This light travels out in the field of view and either hits an object or just keeps on going. In the case of no object, the light is never reflected and the reading shows no object. If the light reflects off an object, it returns to the detector and creates a triangle between the point of reflection, the emitter, and the detector.



Different Angles with Different Distances

The angles in this triangle vary based on the distance to the object. The receiver portion of these new detectors is actually a precision lens that transmits the reflected light onto various portions of the enclosed linear CCD array based on the angle of the triangle described above. The CCD array can then determine what angle the reflected light came back at and therefore, it can calculate the distance to the object.

# STMicroelectronics LPY510AL $\pm 400^\circ/s$ Pitch and Yaw Rate Gyro



Voltage Range:  $\approx 0.23V \rightarrow -400^\circ/s$ ,  $\approx 1.23V \rightarrow 0^\circ/s$ ,  $\approx 2.23V \rightarrow 400^\circ/s$

How to Calculate Angle:

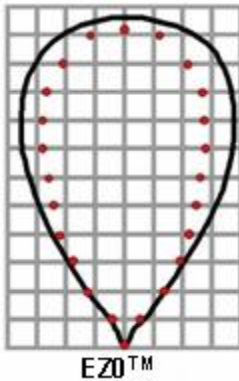
1. For the first 3 seconds find the average gyro's zero voltage while leaving the robot still.
2. Then after the first 3 seconds calculate the angle by integrating the rate signal:

$$gyrorate_K = gyrogain * (rawgyroreading_K - gyrozero)$$

$$\theta_K = \theta_{K-1} + \frac{gyrorate_K + gyrorate_{K-1}}{2} \Delta t$$

<http://www.pololu.com/catalog/product/1267>

# Maxbotix LV-MaxSonar-EZ1 Sonar Range Finder



Black Dot



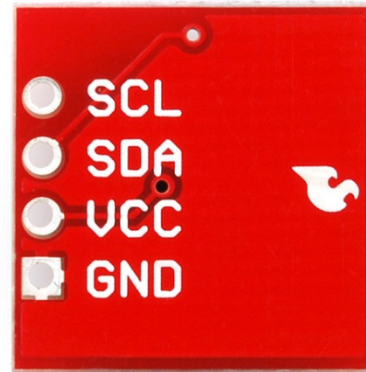
LV-MaxSonar®-EZ beam patterns	EZ0™	EZ1™	EZ2™	EZ3™	EZ4™
Detection pattern to a 1/8 inch diameter dowel.					
Detection pattern to a 1/4 inch diameter dowel.					
Detection pattern to a 1 inch diameter dowel.					
Detection pattern to a 3 1/4 inch diameter dowel.					

-5V  
• 3.3V  
V+ supply voltage.  
(Distances overlaid on a 1 foot grid.)

The Maxbotix LV-MaxSonar-EZ family of sonar range finders offers very short- to long-range detection and ranging in an incredibly small package with ultra-low power consumption. The LV-MaxSonar-EZ detects objects from 0 to 6.45 meters (21.2 feet) and provides sonar range information beyond 15 cm (6") with a resolution of 2.5 cm resolution (1 in). Objects between 0 and 15 cm range as 15 cm. The sensor provides three output interfaces, all of which are active simultaneously: digital pulse width output, analog voltage output, and asynchronous serial digital output. The LV-MaxSonar is available in five factory-calibrated beam patterns (EZ0-4).

<http://www.pololu.com/catalog/product/726>

# Honeywell's HMC6352 Compass IC



- Simple I2C interface
- 2.7 to 5.2V supply range
- 1 to 20Hz selectable update rate
- 0.1 degree resolution output

<http://www.sparkfun.com/products/7915>