



NUERA

OEM Smart Camera - Datasheet





Revision History

	Date	Document Revision	Changes
1	10 Apr 2018	Rev. V1.0	Initial version
2	25 Nov 2019	Rev. V1.1	Restructured for better navigation



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1. Introduction

1.1 Overview

NUERA is a powerful, compact machine vision smart camera. It runs on a high-speed quad-core ARM processor capable of running image processing algorithm & user application. The smart camera is modular, giving customers the option to choose the features like lens, filter, lighting, image sensor, connectivity interfaces and HDMI display as per their needs. Along with camera hardware, software development framework is provided with project templates and example codes to ease application development.

1.2 Key Features

- Compact Design
- Self-contained Machine Vision Camera System
 - Quad Core ARM processor @ 1.2 GHz
 - Inbuilt memory for application
 - Configurable lens, filter, lighting
 - Integrated strobe light control
 - High speed Isolated IOs for trigger & control
 - Gigabit Ethernet, USB, RS232, WiFi, 4G
 - OpenCV library support
 - Web server for easy configuration.
 - User application in C, C++, Python, etc.
- Deep learning capable
- IP67 enclosure for harsh industrial environments
- Direct technical support
- Designed & manufactured in India



1.3 Application Areas



**Fruit & Nut
Grading / Sorting**



**Bar Code / QR Code
Inspection**



**Label / Packaging
Inspection**



**Color Registration
Control System**



2. Technical Specification

	VGA	1.2 Megapixel
Image Sensor & Optics		
Resolution	752 x 480	1280 x 960
Pixel Size	6.0 μm	3.75 μm
Shutter Type	Global Shutter	
Frame Rate @ Full Resolution	60 FPS	54 FPS
Format	Mono / Color (10 bit)	
Optical Format	1/3-inch	
Filter	Default UV filter	
Filter Diameter	58mm	
Lens Focal Length	As per the requirement	
Lens Mount Type	C, CS mount	
Integrated Lighting		
LED Color	White / IR	
LED Strobe Control	24V DC, 1A (max.)	
Embedded Processor and Memory		
Processor	Quad-core ARM processor @ 1.2 GHz	
RAM	1GB LPDDR3	
Internal Storage Memory	8GB eMMC SD card upto 32GB (optional)	
Power Supply	24 VDC / 1.5A (250mA typical)	
Power Consumption	Min. 3W Avg. 6W Max. 8W	
Connectivity & Interfaces		
Digital Input (2x) (Opto-isolated)	On State Current 10mA ON State Voltage 12 - 24V 27V Max. OFF State Voltage 4V Max. Reverse Voltage Protected Min. Pulse Width 300 nSec	
Digital Output (2x) (Opto-isolated)	2 x 24V / 180mA (per channel) (Source / Sink Max. Toggle Freq 400Hz)	
Gigabit Ethernet	1x (10 / 100 / 1000 Mbps)	
RS232	1x (upto 115200 bps)	
Other Peripherals (* Pro Version)	HDMI Full HD USB 2.0	
	VGA	1.2 Megapixel



Optional Features	Touch-screen Sensors
Optional IoT Connectivity	Wi-Fi GSM 3G / 4G
LED Indications	
System LED	Bi-Color (Green - System running normal Red - Error)
User LED	Bi-Color (Application control - Red Green Orange)
Application Development	
Operating System (OS)	RT Linux
Open Source Image processing libraries	OpenCV, etc.
User Application	Eclipse IDE template project C++ example codes for quick start
Web GUI	Display and control via web interface Template providing a framework for extension of parameters
Mechanical	
Enclosure	IP67
Dimensions	63.5mm x 63.5mm x 42mm (w/o lens & its protection cover)
Weight	220 Grams (w/o lens & its protection cover)
Environment Parameters	
Temperature Range	0 - 60 Degree C

NOTE:

We can customize camera hardware, software based on the requirement like dual image sensor, high resolution image sensor, lighting, filters, etc.

3. Dimensions & Mounting

3.1 Dimensions

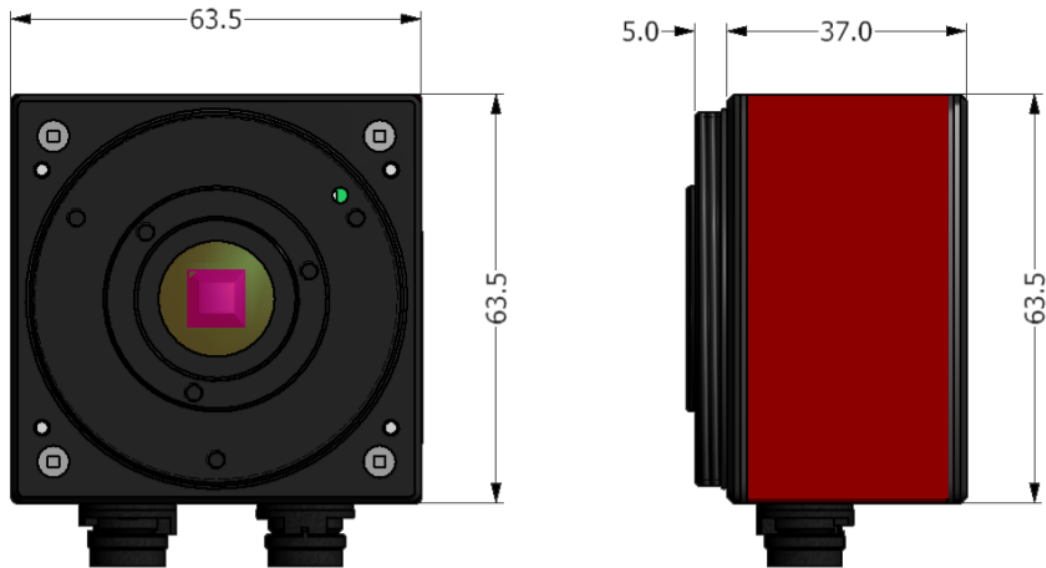


Fig 1. NUERA Dimensions (mm)

3.2 Mounting

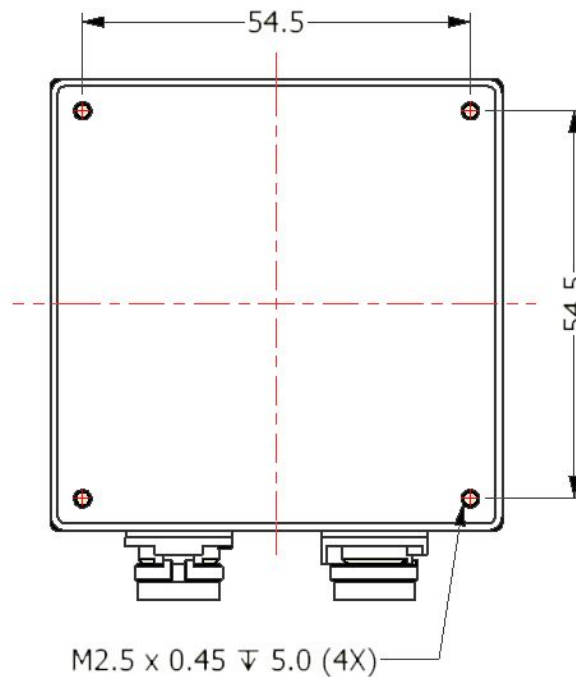


Fig 2. NUERA Back Side Mounting(mm)

4. Cables & Connectors

4.1 Gigabit Ethernet Cable and Pinout

Gigabit Ethernet cable has circular connector (Male) at one end and a standard RJ45 jack at the other end. Standard cable length is 3 meter.

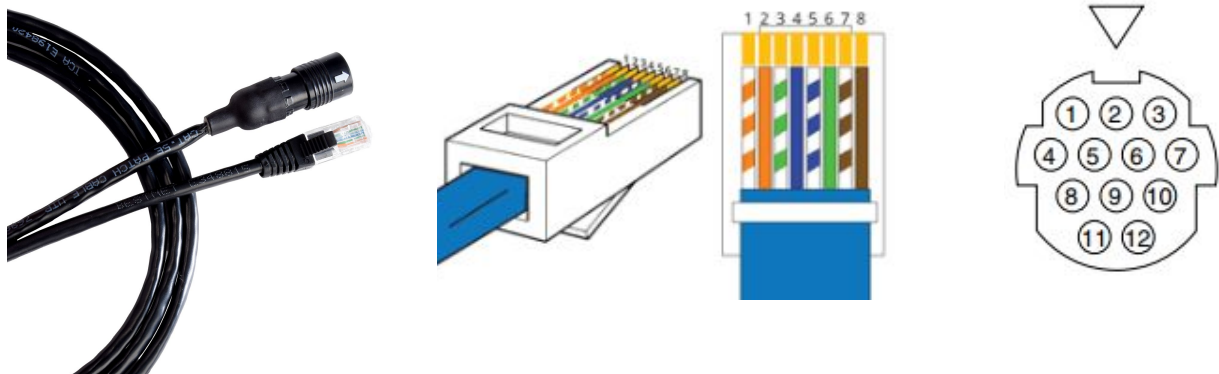










Fig 3. RJ45 & Circular Connector

Table 1. Gigabit Ethernet Cable Connectors Pinout

Circular Connector Pin No.	RJ45 Connector Pin No.	Signal Name Cable Wire Color
1	3	White & Green 
2	6	Green 
3	1	White & Orange 
4	4	Blue 
5	5	White & Blue 
6	2	Orange 
7	7	White & Brown 
8	8	Brown 

4.2 Power & IO Cable and Pinout

Power & IO Cable has circular connector (Female) at one end and a standard DB-15 connector (Male) at the other end. Standard cable length is 3 meters.

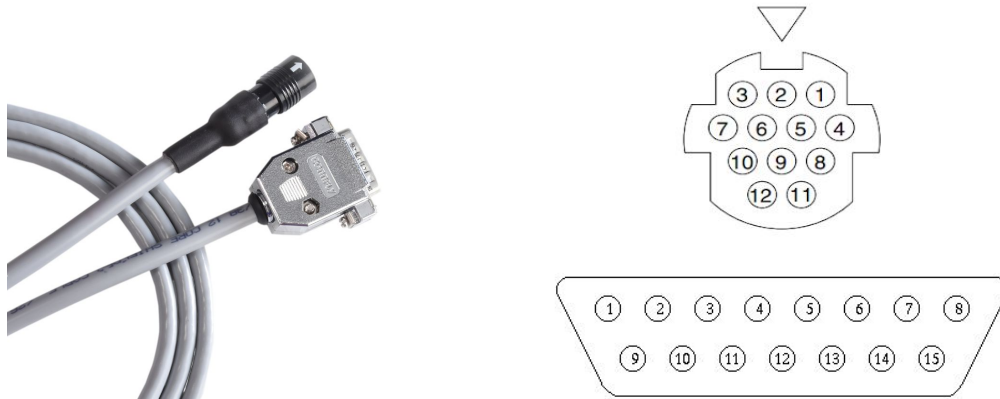


Fig 4. Power & I/O Circular Connector | DB - 15

Table 2. Power & IO Cable Connectors Pinout

Circular Connector Pin No.	DB-15 Connector Pin No.	Signal Name
1	4	INPUT 1 (TRIG)
2	7	OUTPUT Source / Sink
3	15	OUTPUT 2
4	12	IO GND
5	11	INPUT 2
6	8	OUTPUT 1
7	13	RS232 TX
8	3	SHIELD
9	6	RS232 RX
10	5	DGND
11	1	Camera 24V
12	2	Camera GND

5. Camera Connection to PC & Power Supply / IOs

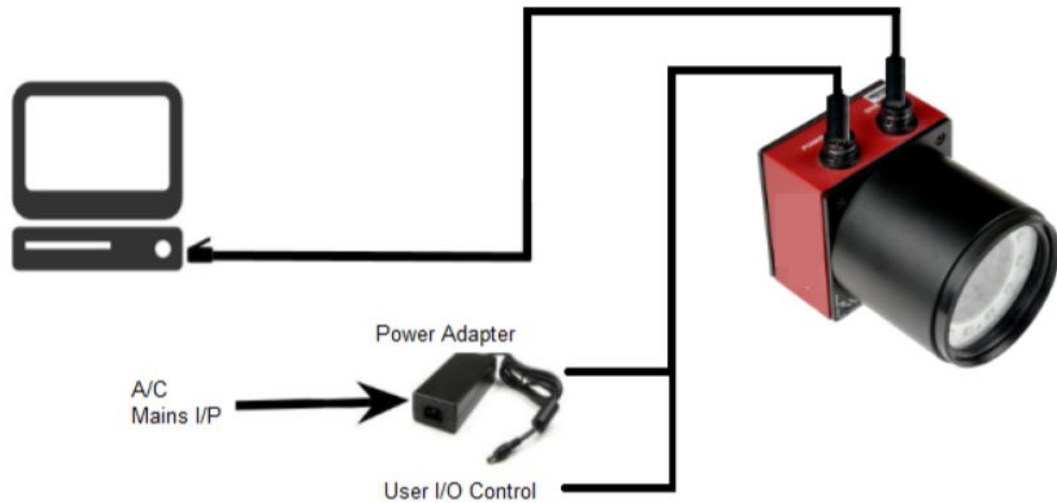


Fig 5. Camera Connections

6. Application Software Framework

NUERA's well designed software framework helps customers get started with application quickly.

6.1 Software Features

As soon as NUERA camera is out of the box, the following features are available through any web-browser:

1. Images will stream from camera and displayed on the web-browser page
2. Configure image sensor parameters:
 - Increase or decrease Exposure Time
 - Enable or disable Auto-Exposure
 - Change Image Boundaries (start x, start y, width, height)
 - Increase / decrease Gain
 - Enable / disable Auto-Gain
 - Enable trigger mode (as opposed to continuous capture mode)
3. Adjust the strobe light configurations:
 - Enable / disable strobe
 - Enable / disable manual strobe ON time
 - Set strobe ON time
4. Configure network details:
 - Change IP Address, IP Subnet Mask, Gateway
5. A sample application would be running on the camera

6.2 Software Architecture



To aid quick application development, Baluns provides project template, to which you one can add existing proprietary image processing algorithm or develop image processing code based on OpenCV or even you can add any other open source library of their choice. Eclipse IDE is used for development. Application developers can use C/C++, Python, etc. languages.

Camera & user application configuration can be achieved by inbuilt web-server/web-browser setup. Camera configuration options are mentioned in the previous section. Configuration for application parameters such as threshold, kernel size, etc. can be added in a few simple steps.

In case of use of application running on the PC side, control and monitoring can be achieved with TCP connection. Application development requires a Linux PC.

A getting started session would be provided to any new developer to ensure smooth setup and quick getting started with the application development.

7. Smart Camera Variants

Following standard and pro variants are readily available. We also design and manufacture customized Smart Camera based on our Nuera platform.

Sr. No.	Smart Camera Variant	Model Number	Details
1.	VGA Standard IP67	NU03STD	VGA resolution, Gigabit Ethernet, RS232, 4x IOs and other standard features
2.	1.2 Megapixel Standard IP67	NU12STD	1.2 Megapixel resolution, Gigabit Ethernet, RS232, 4x IOs and other standard features
3.	VGA Pro	NU03PRO	VGA resolution, Gigabit Ethernet, RS232, 4x IOs, Additional - USB2.0, HDMI Display Output, no IP67
4.	1.2 Megapixel Pro	NU12PRO	1.2 Megapixel, Gigabit Ethernet, RS232, 4x IOs, Additional - USB2.0, HDMI Display Output, no IP67
5.	Customized version	NUXXSTD NUXXPRO NUXXPRO+	Based on the requirement



8. Recommended Accessories

Sr. No.	Accessory Item	Details
1.	24V DC Power Adapter	Power adapter is supplied along with the camera
2.	I / O Module (optional)	If required, need to purchased separately
3.	Lens	Need to be purchased separately as per the requirement, our engineers can help in selecting the right lens
4.	WiFi Module (option in PRO)	Our engineers can help in selecting the right module
5.	3G / 4G Module (option in PRO)	Our engineers can help in selecting the right module



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