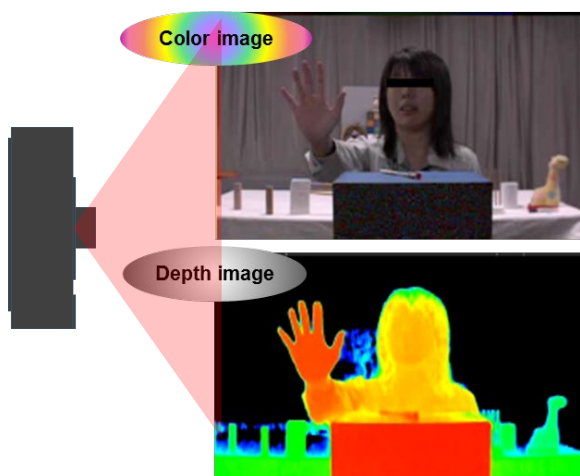
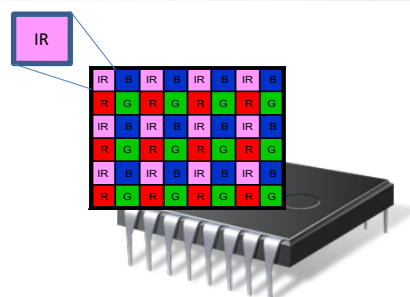


Time of Flight Depth-Color Image Camera: GC1N

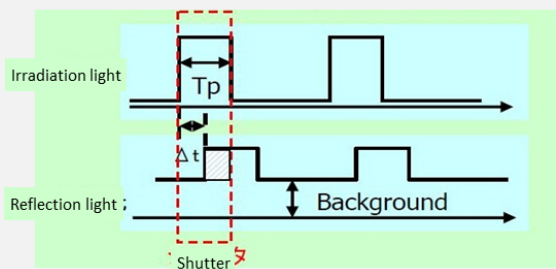
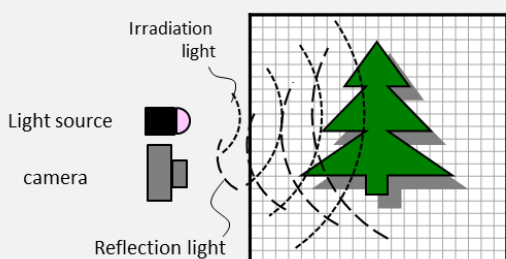
- Accurate real-time depth sensing and image camera
- Detection of 3D objects with no image parallax
- Two (H) FOVs: 55° and 90°
- RGB image (640x480), Depth Map(320x240)(640x480)
- 30/24 fps
- Indoor use (Outdoor models- future)
- Resolution 1 mm @ 2.5m
- Laser Diodes (Class 1)
- 5V/4A 100-240VAC 50/60Hz 5.4W

- **Simultaneously have depth image data (near-infrared) and color image on a single CCD sensor.**



*Image processing
done on customer side*

TOF (time of flight) is one of the method for taking depth map image. TOF is based on the light flight time (delay time) which the camera releases the irradiation light and that light is reflected from subjects.



Detect the reflection light's delay time Δt on each ranging pixel

■ Specifications

Points of Depth Map	RGB Type : 320x240 (approx.77k points) NIR Type : 640x480 (approx.300k points)
Points of Image (RGB, NIR)	RGB Type : 640x480 (RGB), 320x240 (NIR) NIR Type : 640x480 (NIR)
Frame rate	RGB Type : 24[fps]max NIR Type : 30[fps]max
Field of View	● Normal FOV Type : 55[deg]H x 41[deg]V ● Wide FOV Type : 90[deg]H x 70[deg]H
Shooting Range	{Indoor type} Min. 100mm to 7000~8000mm / {Outdoor type} Min. 100mm to 4000~5000mm NOTE) Actual maximum shooting distance depends on the conditions of target reflectance, environment around it.
Jitter of Depth ^{(*)1} [mm] @1[m] (typ.) (reference)	RGB Type : when NR_OFF... σ 15 / when NR_ON... σ 5 (Shooting range < 2.5[m]) NIR Type : when NR_OFF... σ 9 / when NR_ON... σ 3 (Shooting range < 2.5[m])
Accuracy of Depth ^{(*)2} [mm] @1[m] (reference)	max. 50 at shipment (Calibratable by users)
Definition of Depth Map ^{(*)3} [mm] @1[m] (reference)	● Normal FOV Type : RGB Type : 3.3 NIR Type : 1.6 ● Wide FOV Type : RGB Type : 6.3 NIR Type : 3.1
In-plane Resolution of Depth Map ^{(*)4} [mm] @1[m] (reference)	● Normal FOV Type RGB Type : when NR_OFF...6.5 / ON...13 NIR Type : when NR_OFF...5.5 / ON...11 ● Wide FOV Type RGB Type : when NR_OFF...13 / ON...25 NIR Type : when NR_OFF...11 / ON...21
Operating Ambient Temperature	0 ~ +40[°C]
Light Source	LD (Class 1); Indoor use : 855[nm] / Outdoor use : 940[nm]
Input/output Interface	Basic Model : Parallel connector (specifically assigned pins)
Dimensions of Outline[mm]	Basic Model : 100W x 65H x 24D
Weight [g]	Basic Model : 150
Power Supply	Basic Model : DC 5[V] * max.4[A]
Rated Power Consumption [W]	5.4

[NOTE] All values above are reference data under the conditions of Panasonic's factory.

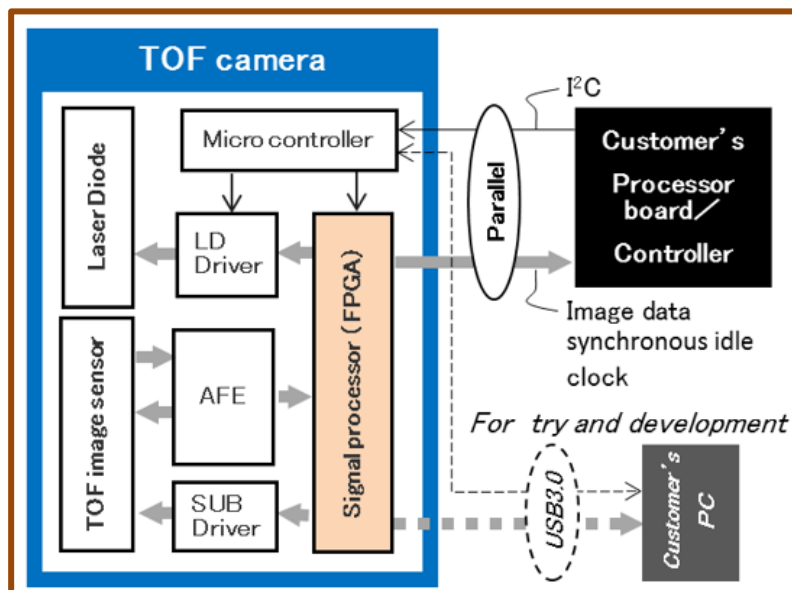
*1) "Jitter" refers to dispersion of detected depth value, and is expressed by its standard deviation σ .

*2) "Accuracy" refers to a deviation between actual distance and detected depth value (average of the central area of depth map).

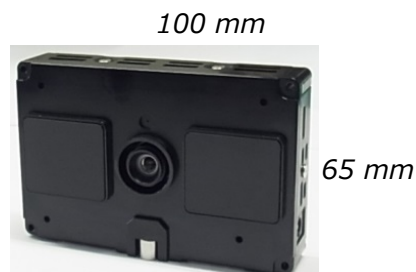
*3) "Definition" refers to the minimum detectable object size (or the interval between detecting points) on the target plane.

*4) "In-plane Resolution" refers to the minimum size of plural objects which are distinguishable each other on a depth map.

GC1N



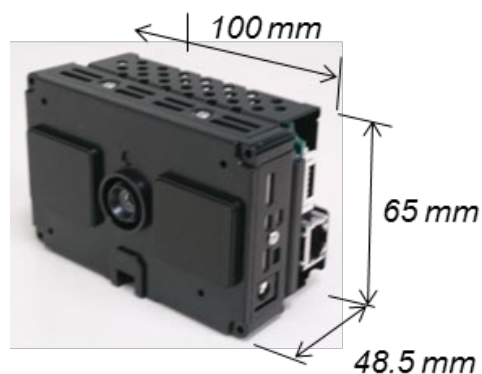
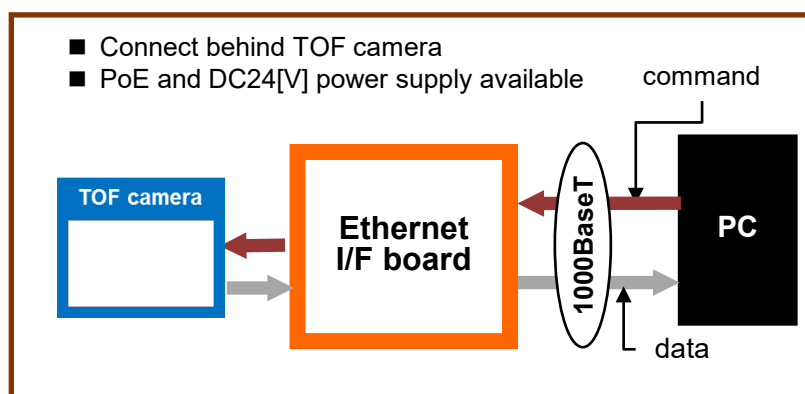
■ 55 deg FOV



■ 90 deg Wide FOV



■ TOF camera with Ethernet I/F board [2018 spring]



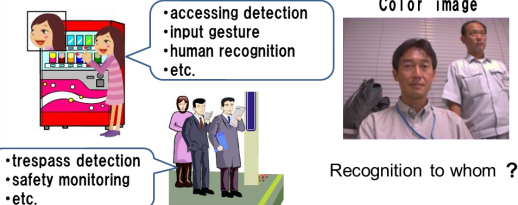
GC1N



Before

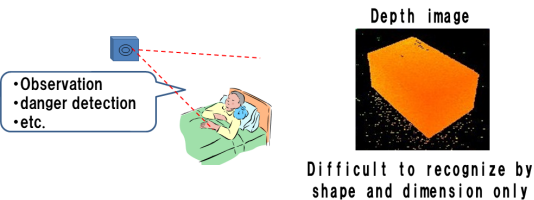
Recognition by 2D image only

Difficult to extract the object due to unnecessary information on the background



Shape detection by depth info only

Application scope is limited due to impossibility of recognition by color, design and face.

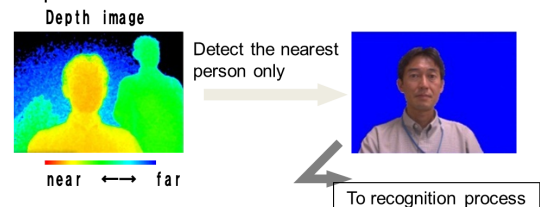


※Instruments becomes big and there's a shadow due to parallax, if 2D image camera is added.

After

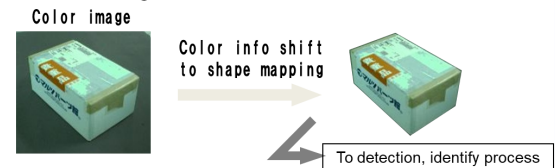
Image recognition with depth image

Easy to pick up an image which is standing at the fixed distance and location, then accuracy of recognition will be improved.



Shape detection with color image

Possible to use for various application which are identify different color, design with same shape, face and male/female recognition



※There's no shadow due to parallax, and possible to achieve small size by one imaging part.