



## StereoCount: 3D© STEREO OPTICAL SENSOR

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*Technical specification*

***StereoCount 3D is designed for precise visitors counting in the projects of shopping malls and retail stores with heavy traffic.***

Two graphic sensors send the information to the counter's processor, where using the 3D algorithm it is reconstructed into a volume scene of the image, creating a highly accurate three-dimensional mathematical model of the surrounding space.

The counter figures people by determining their heads, which allows to gain the most reliable results and also eliminate children, shopping carts, shadows and baby carriages.

The counter itself is a monoblock 135x65x25 mm, with an Ethernet [PoE] port on the side. On the back cover there is a screw hole with a screw thread of ¼ inch.



*StereoCount 3D© is developed and manufactured by MegaCount, Ufatech Ltd. ©*

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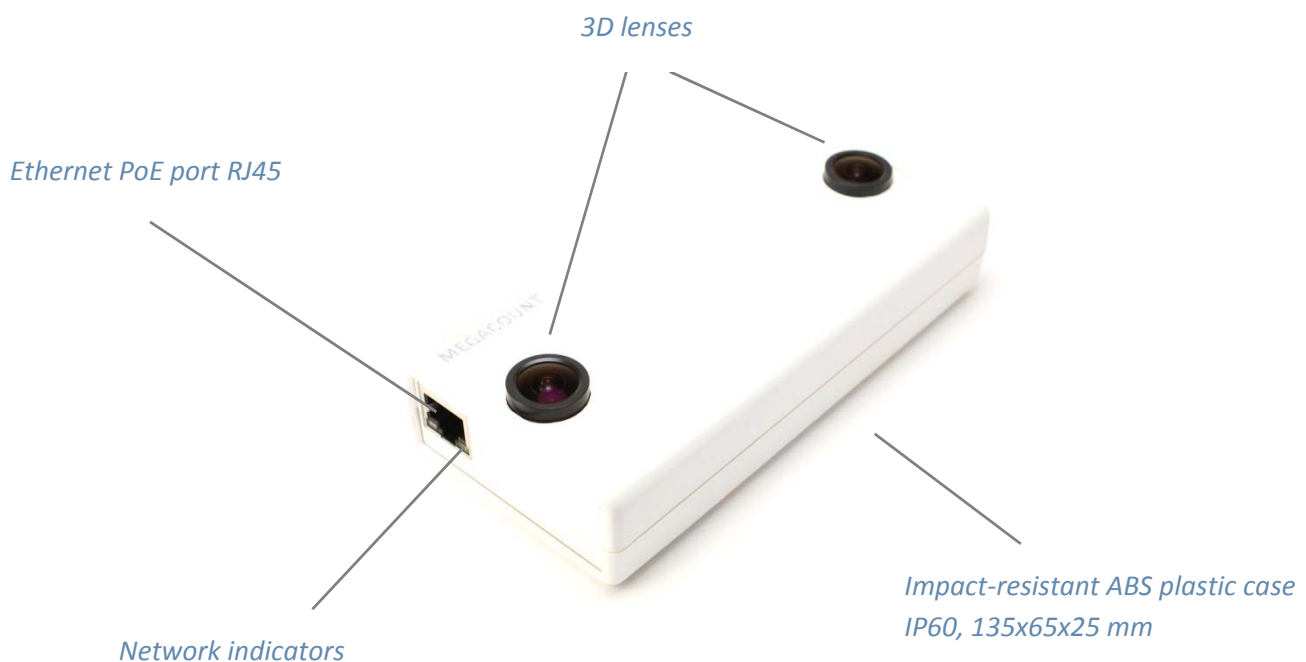
*+7-917-8001005*

## Basic information

StereoCount 3D© is a new generation of people counters based on the stereo stream from two cameras processing.

The 3D counter captures visitors, classifies them according to their height, and assigns each visitor with a unique ID accompanying his track from the moment of fixation to the moment of leaving the area of counting.

- Two lenses are used
- A CMOS image sensor with HDR support is used
- StereoEngine algorithm of initial data processing
- Dual-core DSP
- Operating System DSP BIOS
- Built-in FLASH memory 8 GB
- Automatic adaptation to external lighting - dark, bright sun, glare
- Interval of data collection and recording up to 1 minute
- Counting children, adults, groups of people
- Filtering by height and shape of objects
- 6 instruments of counting in different combinations
- PoE 48 V support
- Impact-resistant housing made of ABS plastic, white / black color - 135x65x25mm, IP60
- Automatic control of uploaded data
- Support FTP, SNTTP, DNS, HTML, TFTP
- Download TXT, CSV, XML, JSON, JPG - tracks, heat map
- Automatic TFTP Firmware Update
- No licensing restrictions
- Installation at an angle of up to 30 °
- Automatic ground determining.
- Automatic positioning over ground
- Passive fanless cooling
- No additional maintenance required



## Operation principle

StereoCount 3D© uses a stereo video algorithm consisting of two separate images that come from two lenses and allow to achieve a stereo effect.

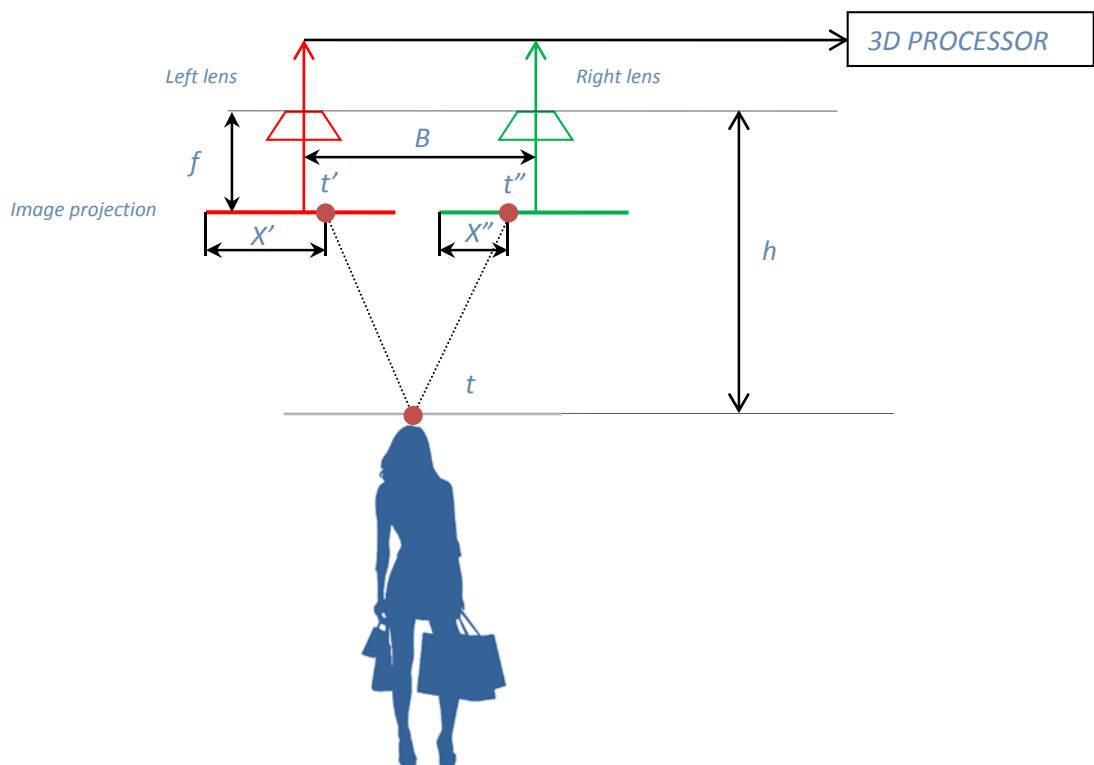
### Brief description

The visible image from two lenses goes to the counter's DSP processor where the two images are compared and the matching points-pixels are found.

To each point of visible space from the left lens there will always correspond the same point from the right lens, the mutual difference of positions of two identical points is called disparity.

Built-in StereoCount 3D © DSP processor calculates disparity for each point of the visible image on the basis of which it builds a three-dimensional mathematical model of 3D space.

### Mathematical interpretation



The counter's processor checks each point of the visible image from the left lens and finds a correspondent point on the right lens.

$t$  - visible point of visitor's head

$t'$  -  $t$  point projection on the left lens

$t''$  -  $t$  point projection on the right lens

The 3D DSP processor calculates the mutual displacement of two points  $t'$  and  $t''$

$X'$  -  $t'$  point displacement on the projection of the left lens,

$X''$  -  $t''$  point displacement on the projection of the right lens

Distance  $h$  calculation formula

$$h = \frac{B \times f}{X' - X''} = \frac{B \times f}{d}$$

$h$  - required distance between a sensor and a point

$B$  - baseline, distance between 120 mm lenses

$f$  - focal length 2,5 mm

$X'$  - left lens point coordinate

$X''$  - right lens point coordinate

$d$  - disparity =  $X' - X''$

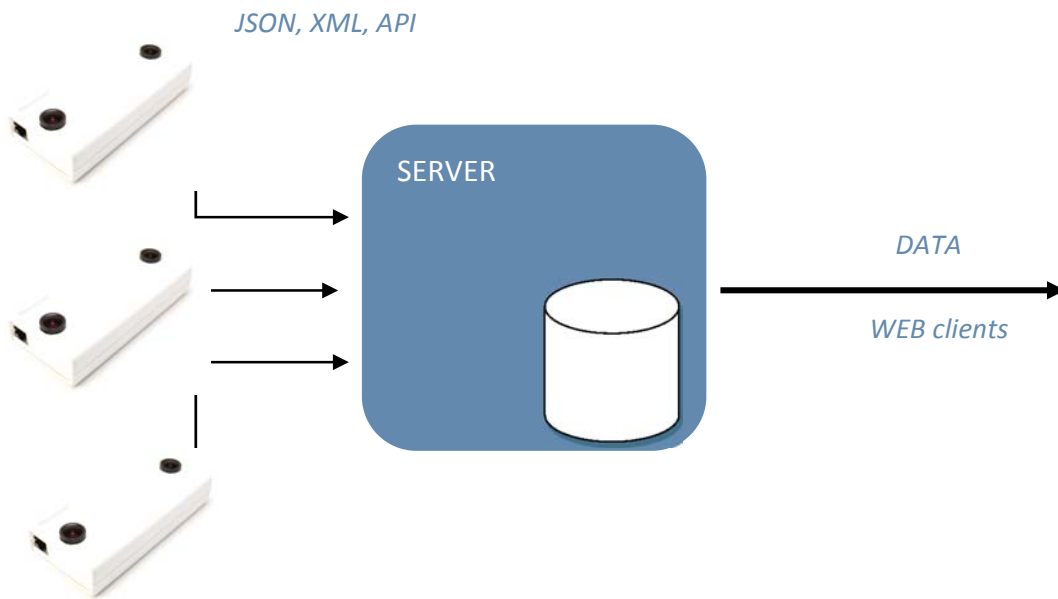
## Benefits of StereoCount 3D© optical technology

- **High resolution** – 1 pixel accuracy of calculating volumetric mathematical depth map allows to determine the height even when installing at 7...10 meters.
- **High area of detection** – implementing wide-angle 3D lenses allows to achieve significant advantages in the range of counting. For example, at 3 meters height the area of detection is 3x2 meters which allows to cover all standard entrances with one counter.
- **High accuracy** - accuracy of counting up to 100%: the counter accurately determines the height of a person, defining his head. Accuracy of determining the height is  $\pm 5$  cm.
- **Durability**, MTBF is over 15 years – unlike Kinect-based laser systems, StereoCount 3D does not contain any radiating elements, such as infrared lasers with a limited lifespan.
- **Safety of use** – no laser emitting elements are used.
- **Fanless passive cooling** – a high-performance 3D processor of StereoCount 3D © is practically not heated and does not require active cooling. The plastic case is resistant to dust, IP 60.
- **Ultra-compact** – 3D lenses and the processor take up little space, the device itself is very compact. The installation does not spoil the design of a facility. Counter's size is 135x65x25 mm.

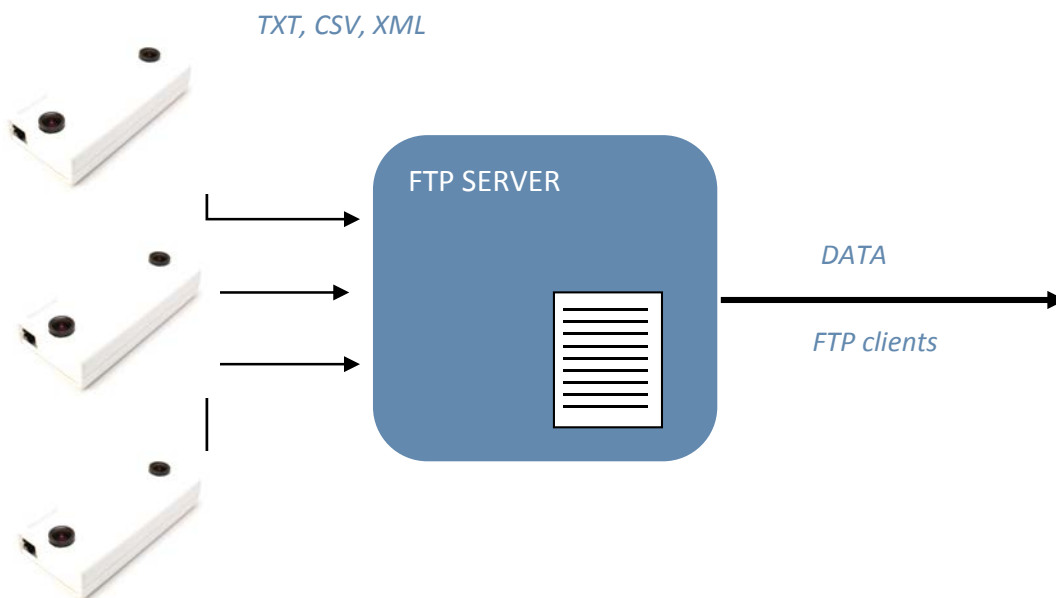


## Information interaction

**WEB upload:** the data from each counter is transferred to the data processing server, JSON, XML stream are used as the transport. To receive the processed analytical data, users connect via the WEB interface from any browser.



**FTP upload:** the data from each counter is transferred to the FTP data server, TXT, CSV, XML are used as the transport. To receive the processed analytical data, users connect to the FTP server through the program.



StereoCount 3D© is fully compatible with other counters, such as Brickstream or Xovis. It has the same XML and TXT upload which allows to add StereoCount 3D© even in operating systems.

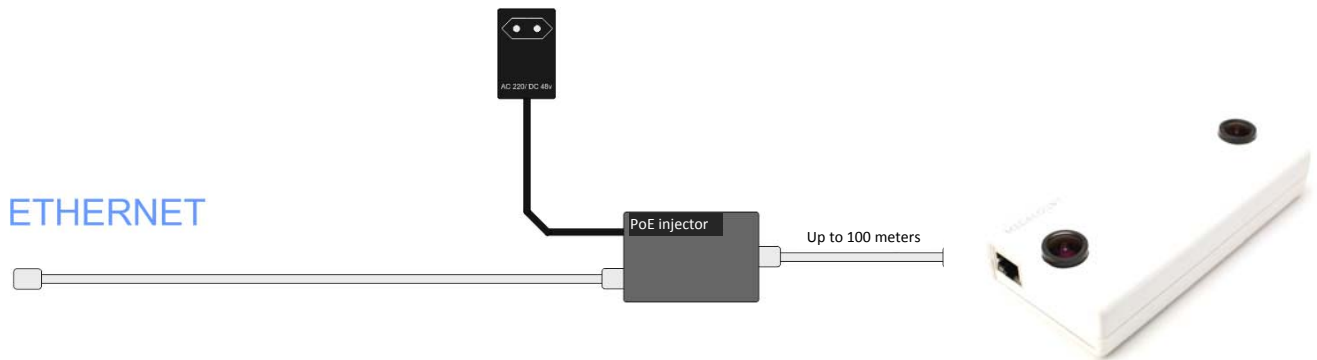
## Network connection

StereoCount 3D © physical connection is via a UTP cable by crimping the RJ45 tips or using a patch cord.

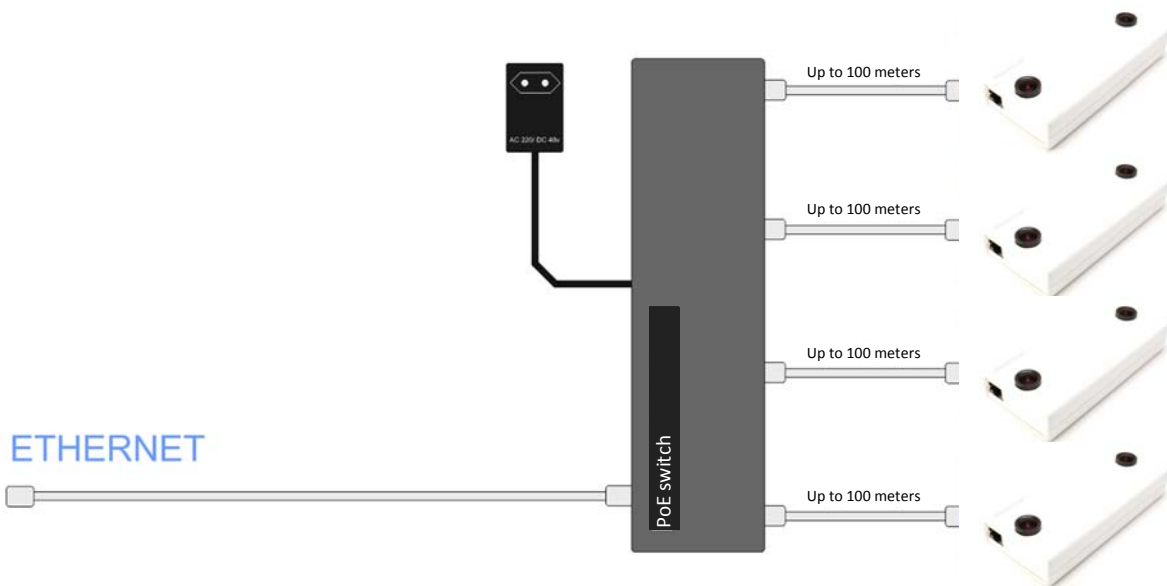


Power is supplied from PoE injector or PoE switch as it is showed below.

- **PoE injector**



- **PoE switch**

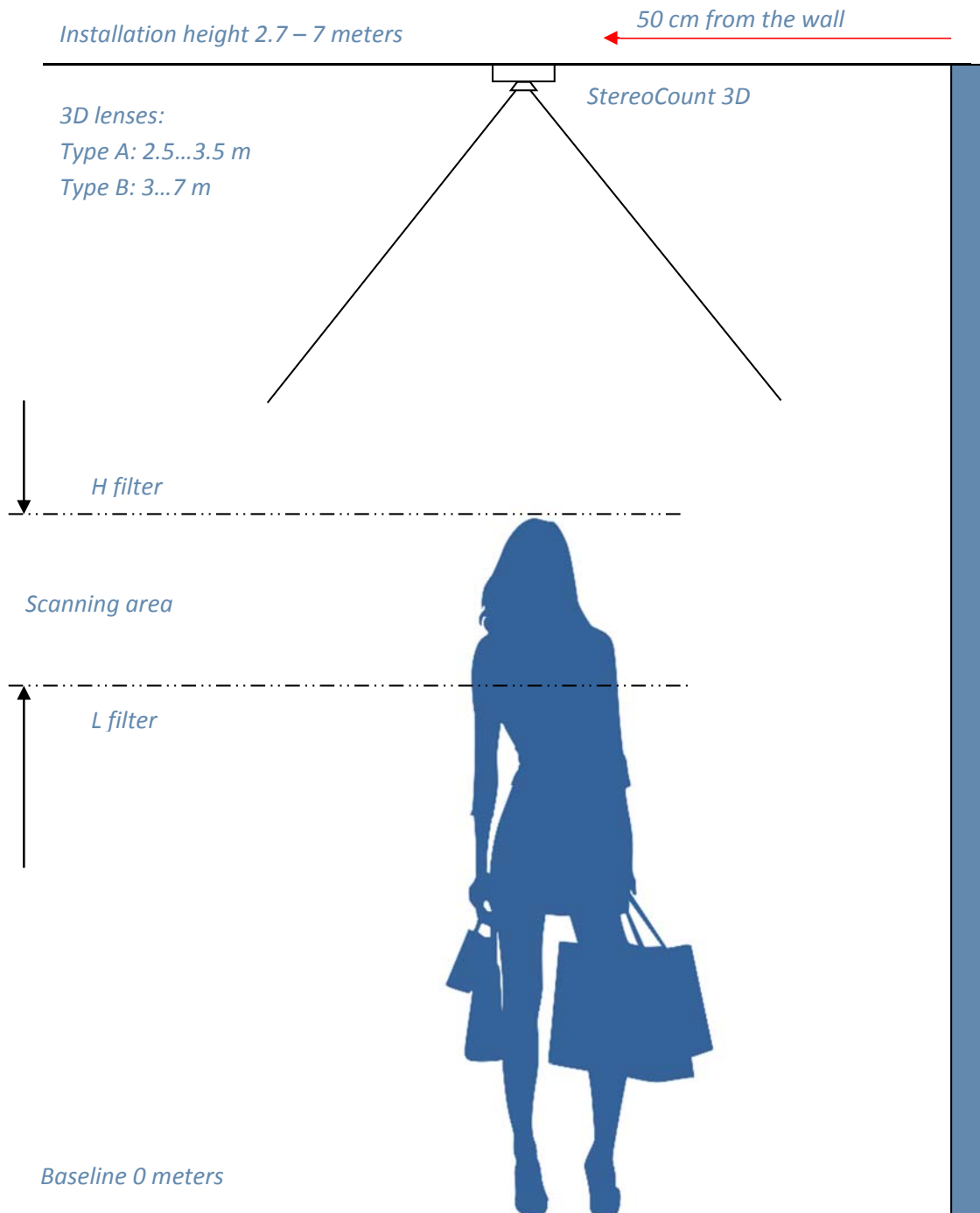


*Ufatech recommends to use the standard 802.3af PoE.  
A PoE injector TL-POE150S is optionally added to the kit.*

## Installation recommendations



*Shops and stores* – mount the counter over the anti-theft antennas. If there are no antennas, mount the counter above the entrance at a distance of 50 cm from the wall.

*Shopping mall* – mount the counter in a place where the visitors flow is maximally distributed – above the elevators, entrances, escalators and passages.



## Areas of counting

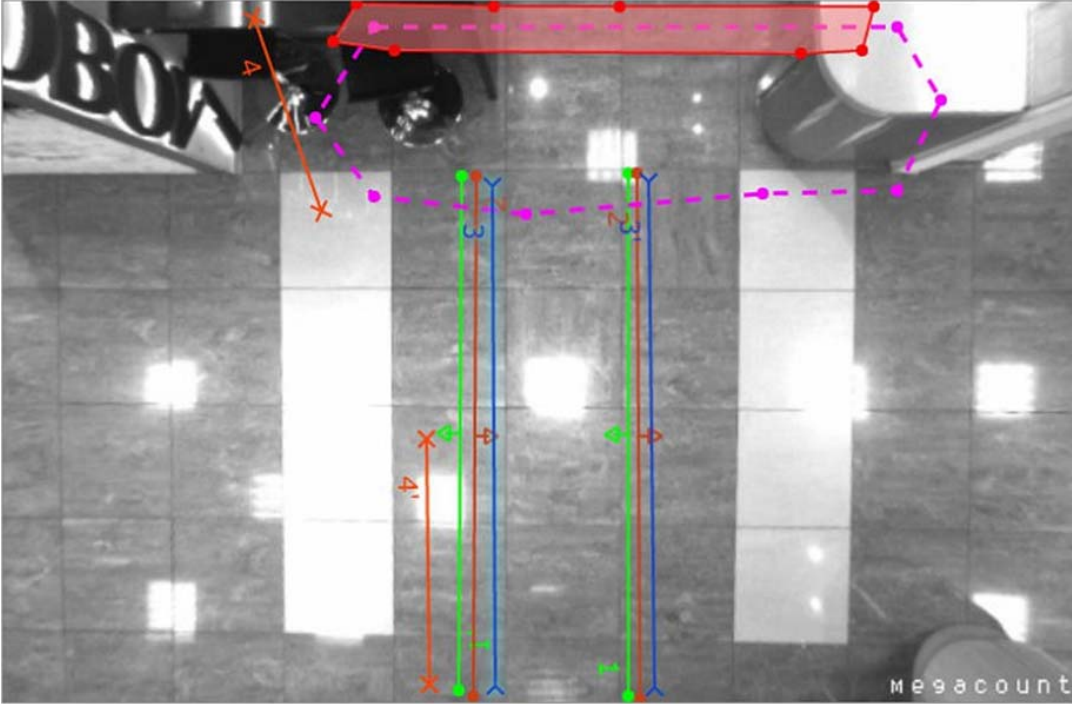
StereoCount 3D© has a unique ability to count visitors in up to 10 independent areas. A new metric can be assigned to each area.

Color	Address	Name	Input	Output
	X-01	New_sensor_1	2968	1271
	X-02	New_sensor_2	---	---
	X-03	New_sensor_3	---	---
	X-04	New_sensor_4	---	---
	X-05	New_sensor_5	---	---
	X-06	New_sensor_6	---	---
	X-07	New_sensor_7	---	---
	X-08	New_sensor_8	---	---
	X-09	New_sensor_9	---	---
	X-10	New_sensor_10	---	---





Add new sensor

Save Cancel

Example: the task is to count basic traffic, passers-by, those who come from the left and those who come from the right. In this case 4 independent sensors are created and special instruments to count people that are using certain routes are added.



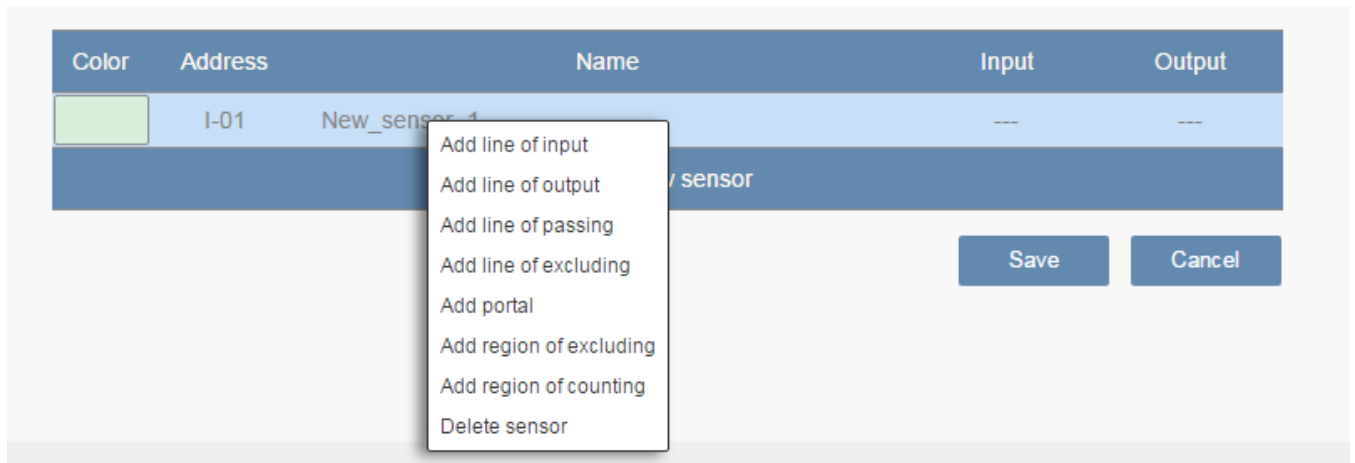
Номер в группе:

Цвет	Адрес	Имя	Вход	Выход
	I-01	Вход / Incoming	34	29
	I-02	Влево / From the left	215	0
	I-03	Вправо / From the right	5	0
	I-04	Мимо_проходящие / Passers by	6	0



## Counting tools

In each area, you can apply up to 5 counting tools and 2 exclusion filters in a different combination.



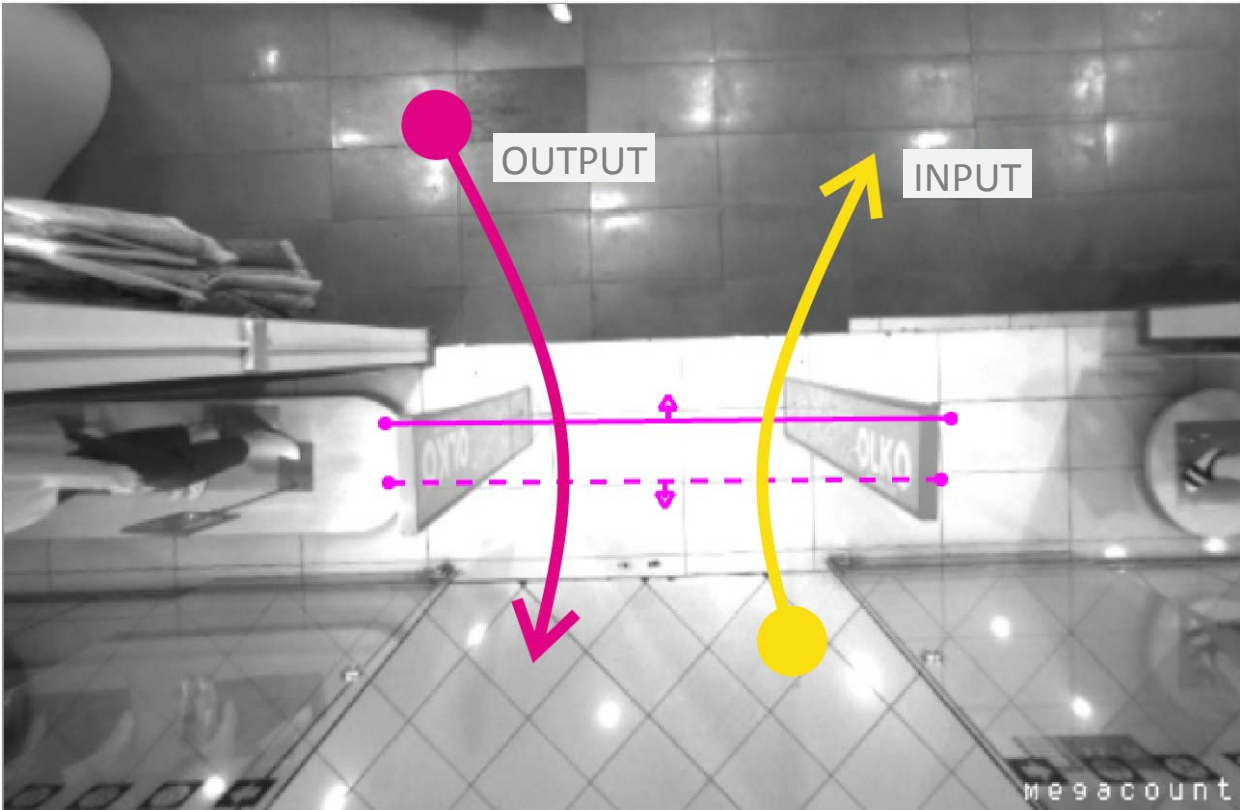
- **Add a line of input:** Adds a line with direction mark that counts people who cross it as incomers.
- **Add a line of output:** Adds a line that counts people who cross it as ougoers.
- **Add a line of passing:** Adds a line that counts people who cross it whether they go in or out. Identifies each cross as an Input.
- **Add a line of excluding:** Adds a line that exclude people who cross it from counting even if they cross other lines/portals as well.
- **Add a portal:** Adds a tool that counts objects that are born inside a certain area and disappear outside.
- **Add a region of excluding:** Adds a filter where counting does not happen.
- **Add a region of counting:** Adds a filter that marks an area of counting. The counting process does not happen outside this area.
- **Delete a sensor:** Deletes a sensor and all its tools.

## Lines of Input and Output

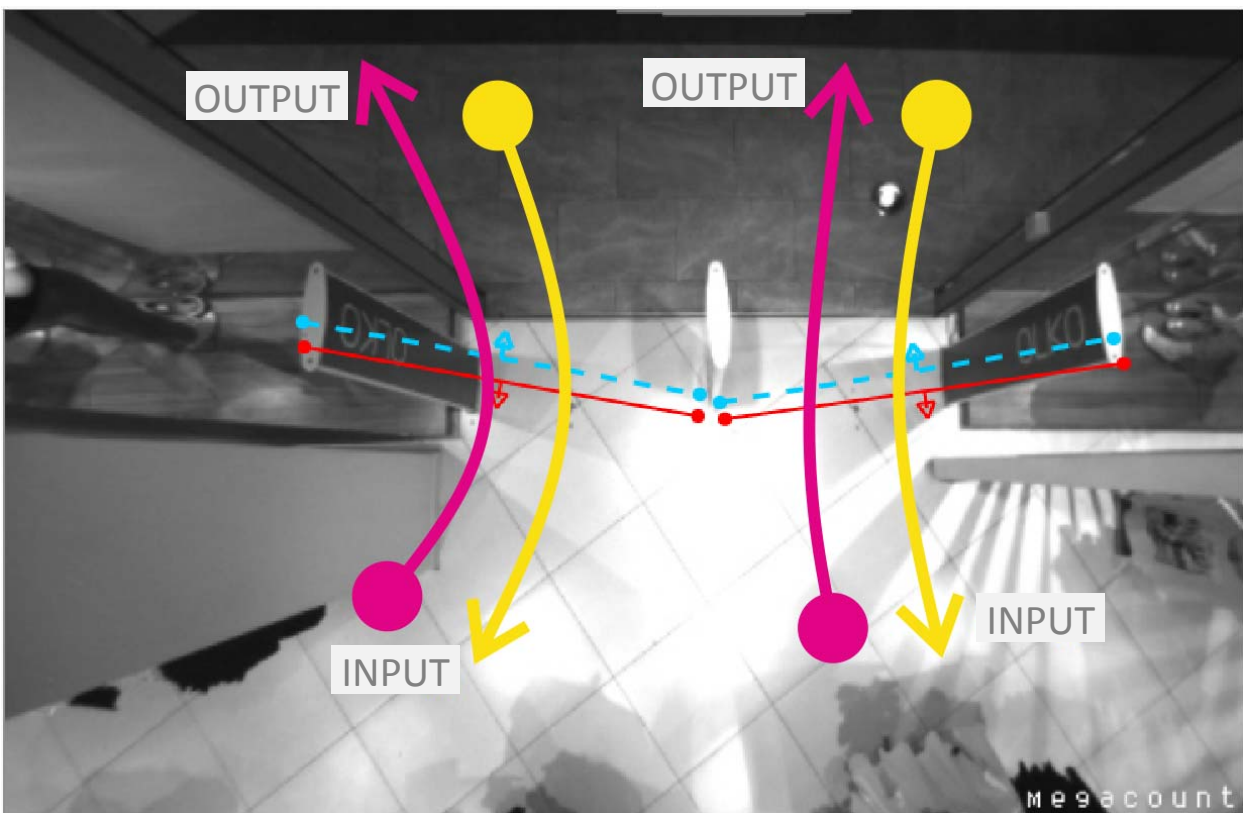
Line of Input – a solid line with direction mark

Line of Output – a dotted line with direction mark

The picture below shows an area of counting with one line of Input and one line of Output.



The picture below shows an area of counting with two lines of Input and two lines of Output



## Lines of passing

The lines of passing are used to estimate the total traffic without dividing into INPUT and OUTPUT, for example for counting passers-by.

All visitors that cross the line are counted in the total score.



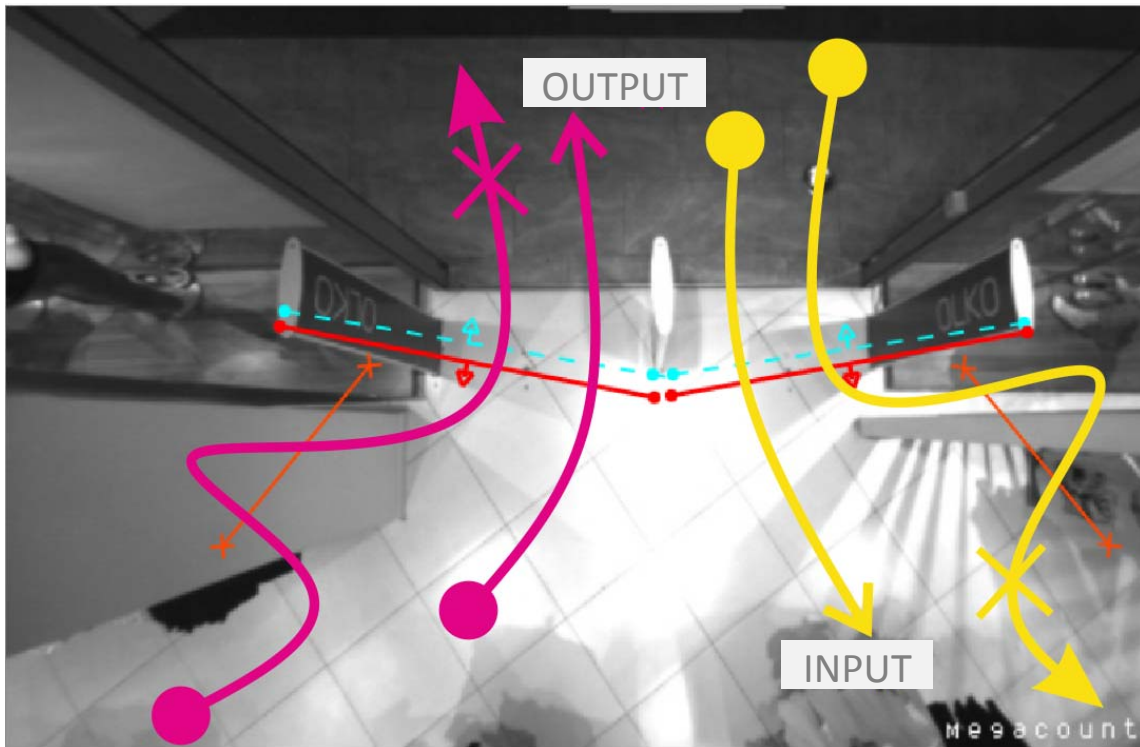
*This combination is optimal when installing a 3D stereo counter outside the outlet, the counter allows you to count the incoming visitors and passers-by, which makes it possible to withdraw the conversion between passing traffic and those who entered.*

## Lines of excluding

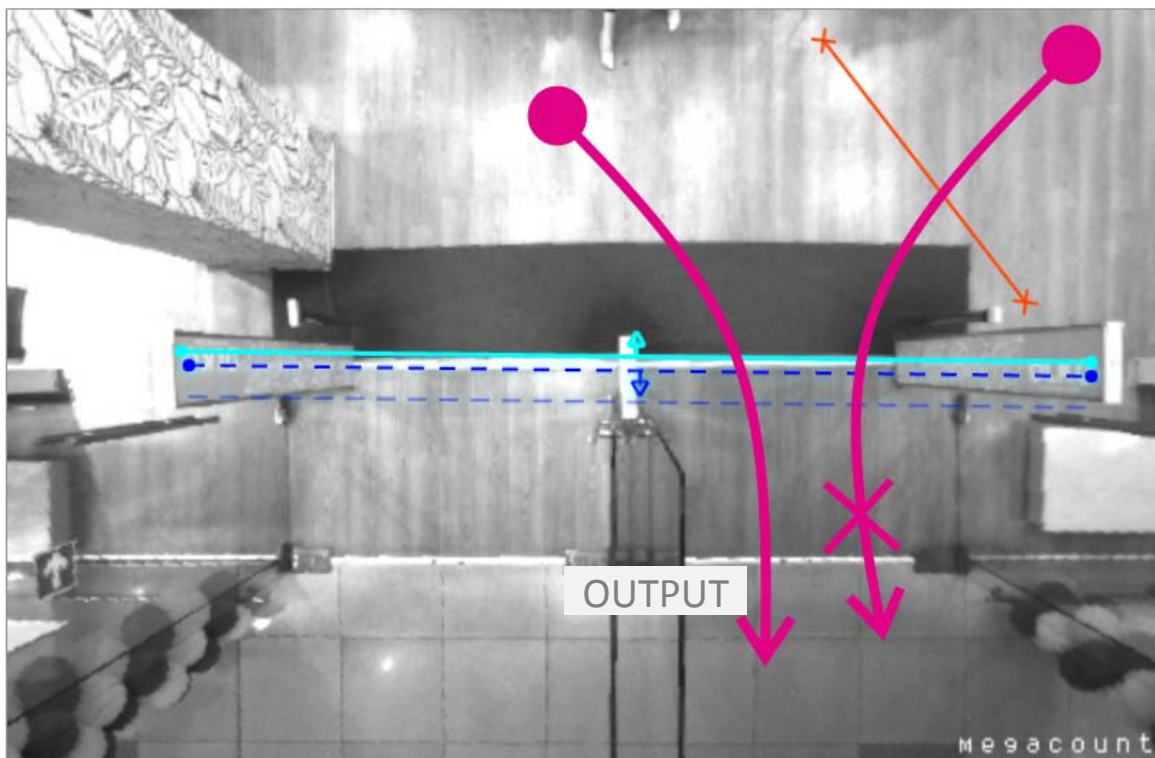
Lines of excluding is a tool to eliminate personnel from counting.

If a person crosses a line of exclusion, he is not counted whether he crossed other tools of counting before exclusion line or whether he will cross them after exclusion line.

An example of using the lines of exclusion. On the left and on the right of the anti-theft gates there are two lines of exclusion. When going in and going out the personnel must go through specified areas at the entrance to cross the lines of exclusion.



Example of excluding traffic going from the right



## Portal

A portal is a tool that allows to count visitors who appear from a certain area and disappear outside this area.

Operating principle:

If an object was created inside a portal and disappeared outside, it would be counted as In.

If an object was created outside the portal and disappeared in the portal, it would be counted as Out.

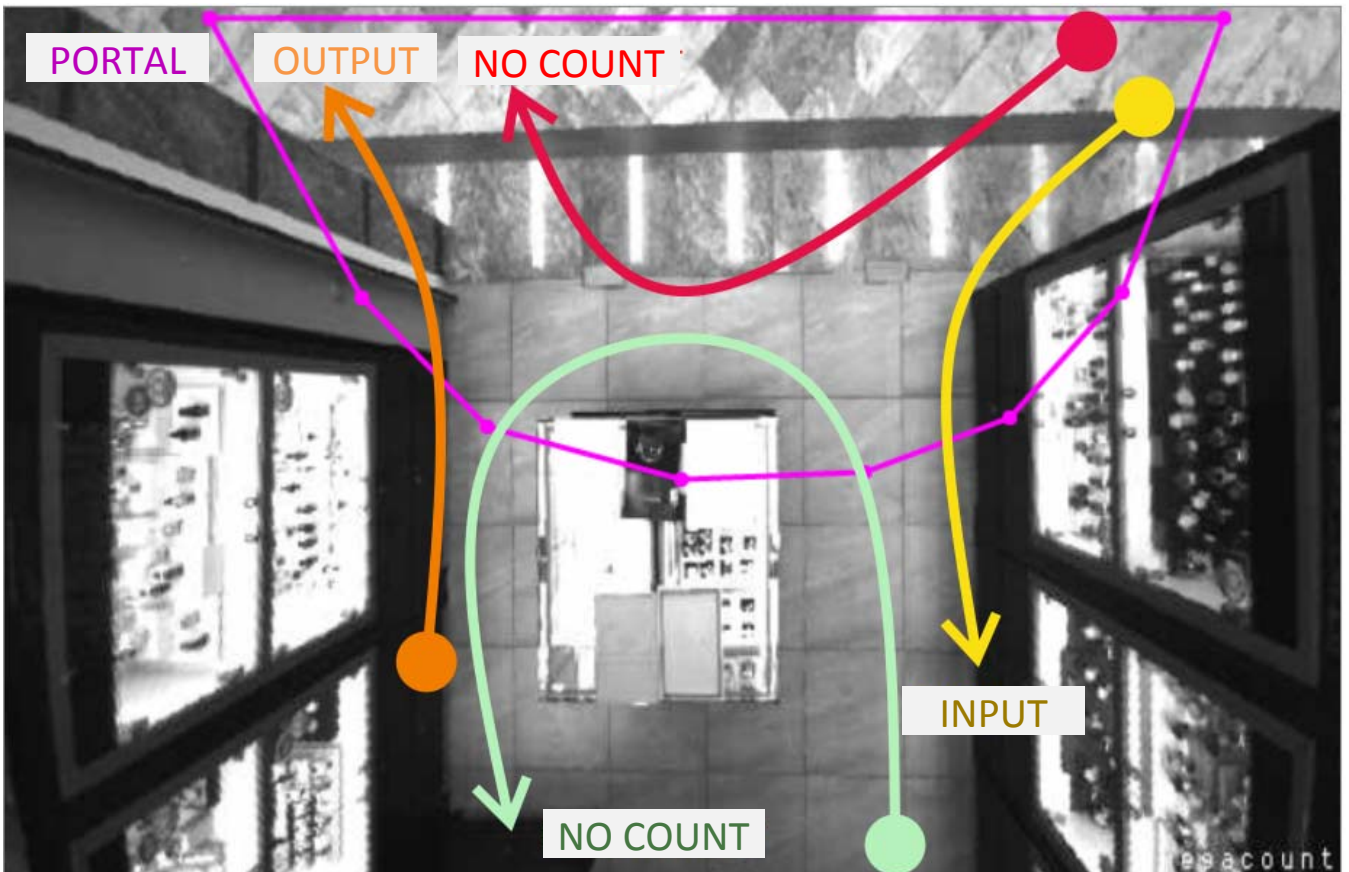
An example of Portal implementing

*Yellow visitor – will be counted as Input*

*Orange visitor – will be counted as Output*

*Red visitor – entered the store, but did not go further, will not be counted*

*Green visitor – went around the stand, but did not leave the store, will not be counted.*



## Regions of exclusion

Visitors' detection occurs only inside the area not marked by a filter.

It is used as a filter to allocate a detection area, for example, for filtering entrance doors or areas where a track should not be created.

