

OMRON Solution for IoT and smart city

An IoT sensors range ready to be implemented in new remote automatic systems



Overview of EMC company

We offer broad range of products that provide advanced device and module solutions centered on relays, switches, connectors, and sensors.

Relays



Switches



Connectors



Sensors - MEMS



SENSORS

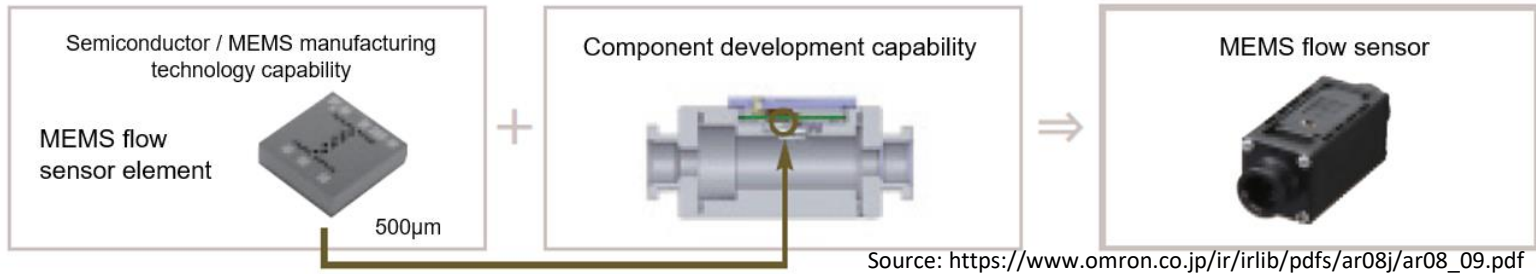


- **Human Vision Components (HVC)**
- **Environmental Sensor**
- **Air Quality / Dust Sensor**
- **Pressure Sensors**
- **Thermal Sensors**
- **Optical Sensors**
- **MEMS Flow Sensors**
- **Tilt / Vibration Sensors**
- **etc...**

OMRON starts to combine different products, creating added value to customers

Example of component making:

Integrated production from semiconductor to components (For example: MEMS flow sensor for fuel cell)



Example of function integration: Environment sensor

Miniaturized integration
7 sensors mounted in a small package of 46x39x15mm size

Power supply
Coin type lithium battery CR2032
Battery life more than half a year (measurement interval 5 minutes)

Wireless communication
Adoption into various IoT devices is advancing
Bluetooth low energy is adopted

Signal processing
Calculates new indicators such as heat stroke warning, discomfort index
Determines 6 events from the sensor data and calculation index

The sensor includes: Acoustic pressure, Temperature, Humidity, Air pressure, Acceleration, UV, and Illumination.

FC CE Bluetooth

OC core technology is combining ultraminiature **thin film MEMS** and **unique algorithm**.

Summary

Competence

- Ultraminiature thin film MEMS technology
- Development of an application-fit algorithm

Value provided

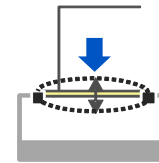
- Design freedom by miniaturization and lower power consumption
- Shortening customer production process with high precision.

Competitive advantage

- Creation of high precision MEMS with large diameter (8 inch) wafer.
- Unique algorithm (always updated with the latest information).

Example

Thin Film MEMS



Converts the vibrations of thin film into electric signal and measures **vibrations, flow rate, and pressure**



Algorithm

Seismic sensor

Simple calculation of SI value algorithm

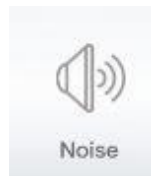


Flow sensor

Identification of type of gas algorithm



ENVIRONMENTAL SENSORS 2JCIE



It contributes for creation of new values by multiple sensors in small one package

Multiple

Multiple sensors in one package provide you multiple information at same time and one time.

Memory *1

The information loss is prevented by saving data inside of built-in memory even if communication is not active.

*1 Bag: 26,000 measurements, USB: 60,000 measurements

Small

Small dimension, packaging provide you to use at any place.

Option

2 kinds of package are available, the customers can select based on their application.

Bag



USB





PCB

Coming next FY

We will not officially release the current PCB type. If the customer is satisfied with the specification, we will issue RIS.

Difference between bag type and USB type

Package, power supply, sensor function, communication

Appearance			
Item		2JCIE-BL01	2JCIE-BU01
Size		39.0 x 46.0 x 14.6 mm	14.9 x 29.1 x 7.0 mm
Power		CR2032	USB supply
Material of housing		ABS, PC	ABS, PC, SPCC
sensor		Temp., humidity, light, UV , pressure, sound	Temp., humidity, light, pressure, accelerator , sound, VOC
range	Temp.	-10~60°C	-10~60°C
	Humidity	30~85%RH	30~85%RH
	Light	10~2000lx	10~2000lx
	UV	Index1~11	-
	Press.	700~1100hPa	700~1100hPa
	Sound	37~89dB	40~94dB
	Accelerator	-	Earthquake / vibration detect judge
	VOC	-	0~32767ppb
Usage environment		Indoor and outdoor	Indoor
communication		Bluetooth4.1	Bluetooth5.0, USB2.0

VOC *1 Detection

The sensor allows eTVOC*2 reading which refers to the total concentration of volatile organic

Compounds to help users realize the importance of maintaining a comfortable environment.

*1 VOCs (Volatile Organic Compounds) include such as alcohol consumption, cigarette smoking, and formaldehyde.

*2 eTVOC (equivalent Total Volatile Organic Compounds) refers to the total concentration of volatile organic compounds in a room environment.



LEVEL display (POOR, MODERATE, GOOD)

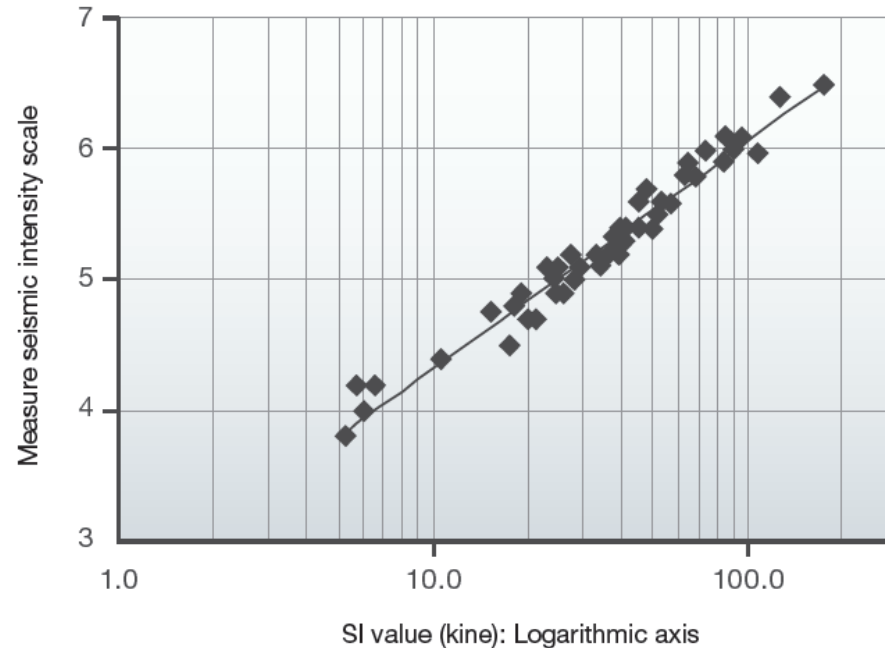
Level	Category	TVOC [ppb]	eCO2[ppm]
1	GOOD	<250	400-1499
2	MODERATE	250-449	1500-2499
3	POOR	>450	>2500

Note: VOC sensor does not identify gas types. Only outputs the total concentration of VOCs.

Note: When VOC is over 250ppb, the influence will occur on our body.

The sensor uses Omron's unique spectral intensity (SI*) value calculation algorithm to distinguish between seismic activity and other movements.

[Correlation between SI value and measured seismic intensity scale]

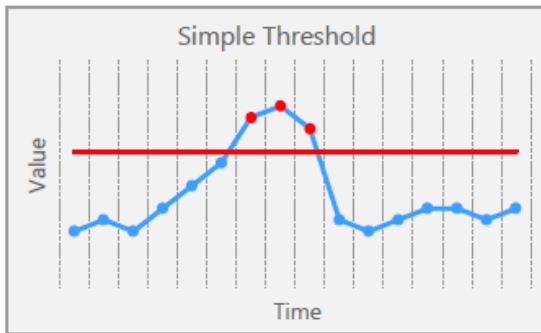


*SI value

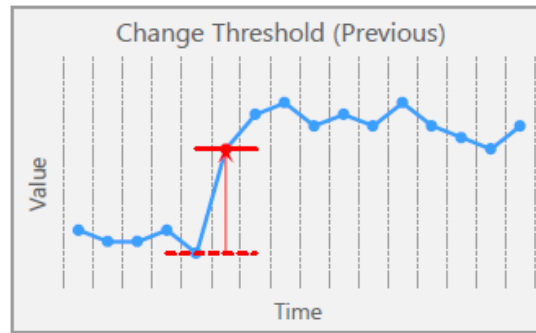
(or spectral intensity) is equivalent to the magnitude of the destructive energy imposed by seismic motion on structures.

SI value has a high correlation with the seismic intensity scale which helps identify seismic hazards in your vicinity.

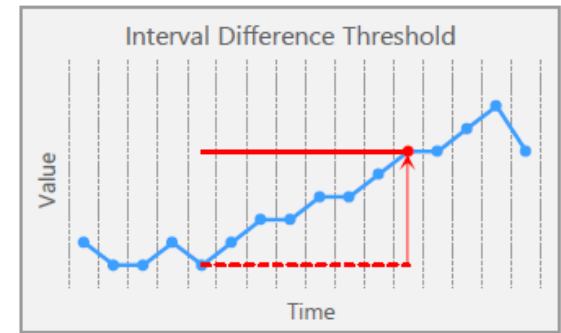
You can set both the upper-limit and the lower-limit threshold to every output data, and a beacon can notify you of any event detection. The sensor can make a judgment not only by a simple threshold but also by a change threshold (comparison with previous data, comparison between periods, etc.).



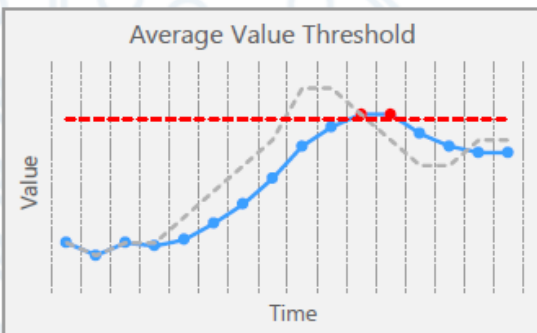
Simple Threshold



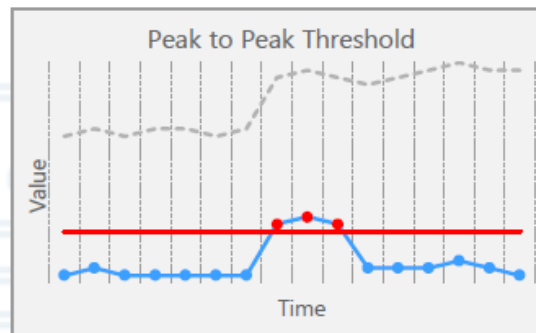
Change Threshold



Interval Difference Threshold



Average value Threshold



Peak to Peak Threshold

Home gateway

All devices are connected with home gateway.
Controller of home and window from inside/outside.

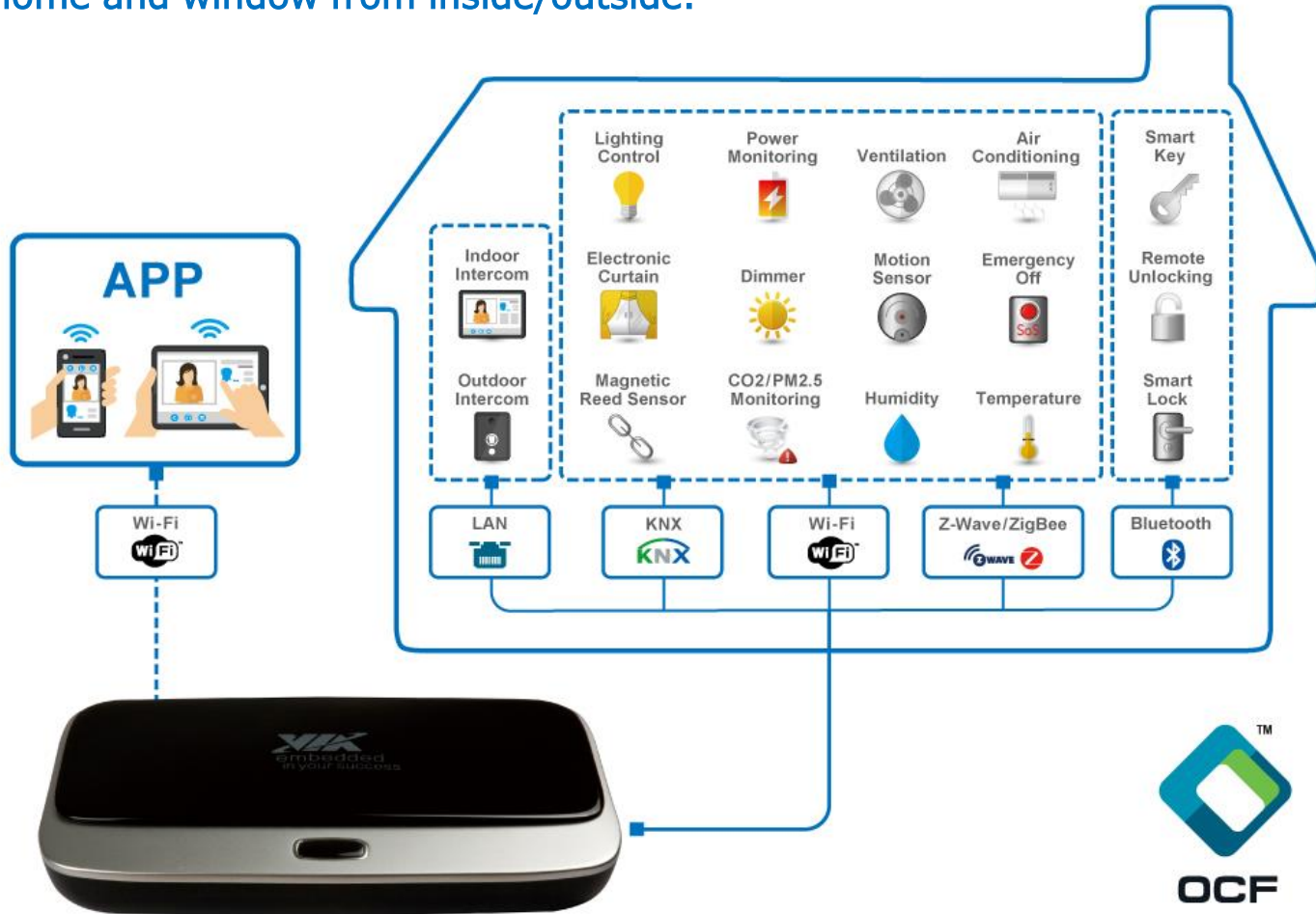
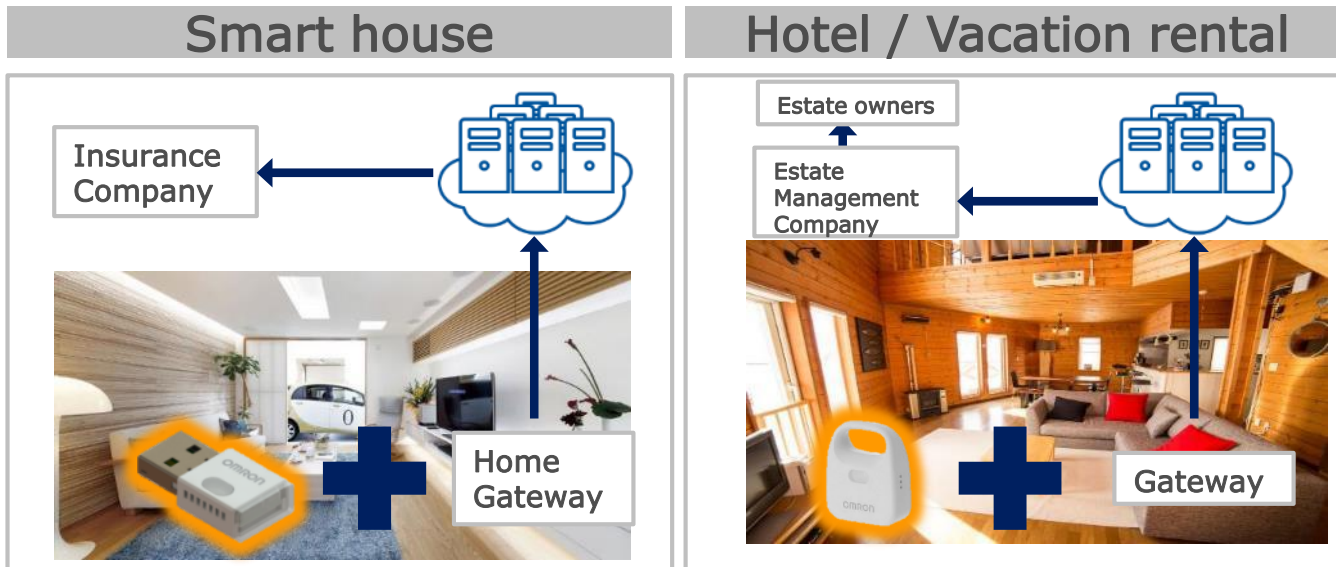


Image may have been protected by copyright
Do not copy and use your presentation

Markets & Applications



- Obtains living environment information and **controls lighting** fixtures and **household appliances** via the smart speaker etc. to support a comfortable life.
- Notifies the indoor environment to the smart phone **in a distant place**, so people can watch the living **conditions of the elderly and pets**.
- **Analyzes damage** to the house on the basis of the vibration data obtained during **earthquakes**, and proposes repair to the owner.
- Monitors the **indoor air quality** by means of eTVOC, and urges people **to ventilate the room** in case of high concentrations.
- **Forecasts the worsening weather** conditions due to a sharp drop in barometric pressure, and notifies them to the resident.

- **Monitors the indoor air quality** by means of eTVOC, and notifies the timing of ventilation to people.
- **Adjusts the air conditioner** on the basis of the temperature and humidity around the bed to support a comfortable sleep.
- **Monitors the sound noise** in a guest room to prevent complaints from neighbors.
- Acquisition of guests' noise staying in rental house and report to the estate owners with acquisition data to rate guests
- Acquisition of **earthquake data**: House makers analyze damage condition of house from acquisition data and provide timing of house renovation to house owners

Markets & Applications

Office



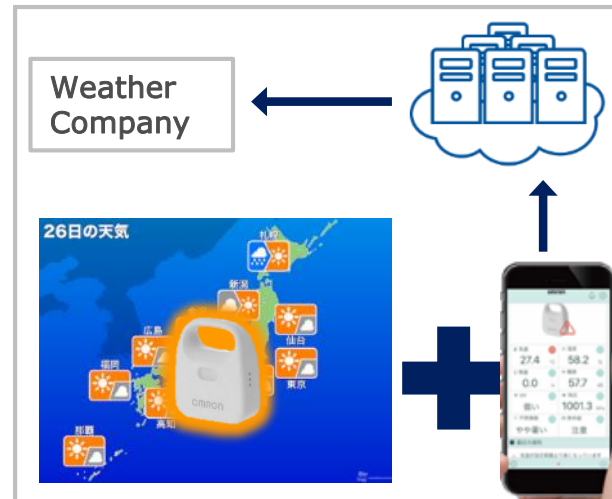
- Monitors the **temperature** in an office to visualize the variations.
- **Cooperates with air conditioners and blinds** to realize automatically controlled comfortable space.

Meeting Rooms



- Simply **predicts the use** of a meeting room **on the basis of light intensity and sound noise data**, without having to install wiring or do installation work. This will visualize the room availability search and the **difference between reservations and results** so that the meeting room can be used effectively, contributing to the improvement in productivity.
- Monitors the **indoor air quality** by means of TVOC, and urges people to **ventilate the room** in case of high concentrations.

Weather Stations



- Acquisition of environment data in each area
- Weather companies use data to realize **real-time weather in each area**, visualize weather trend by analysis of data, and provide those to users

Promotion

- Data sheet
- Catalog
- White paper



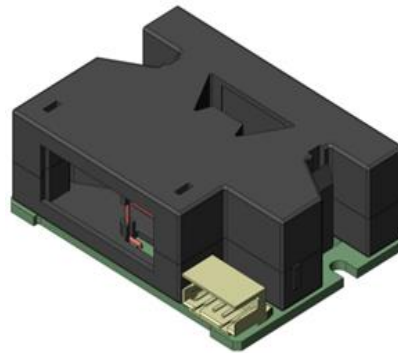
Development Support

- Environment Sensor User's Manual
- Demo software
- SDK for Raspberry PI
<https://github.com/OmronMicroDevices/envsensor-observer-py>

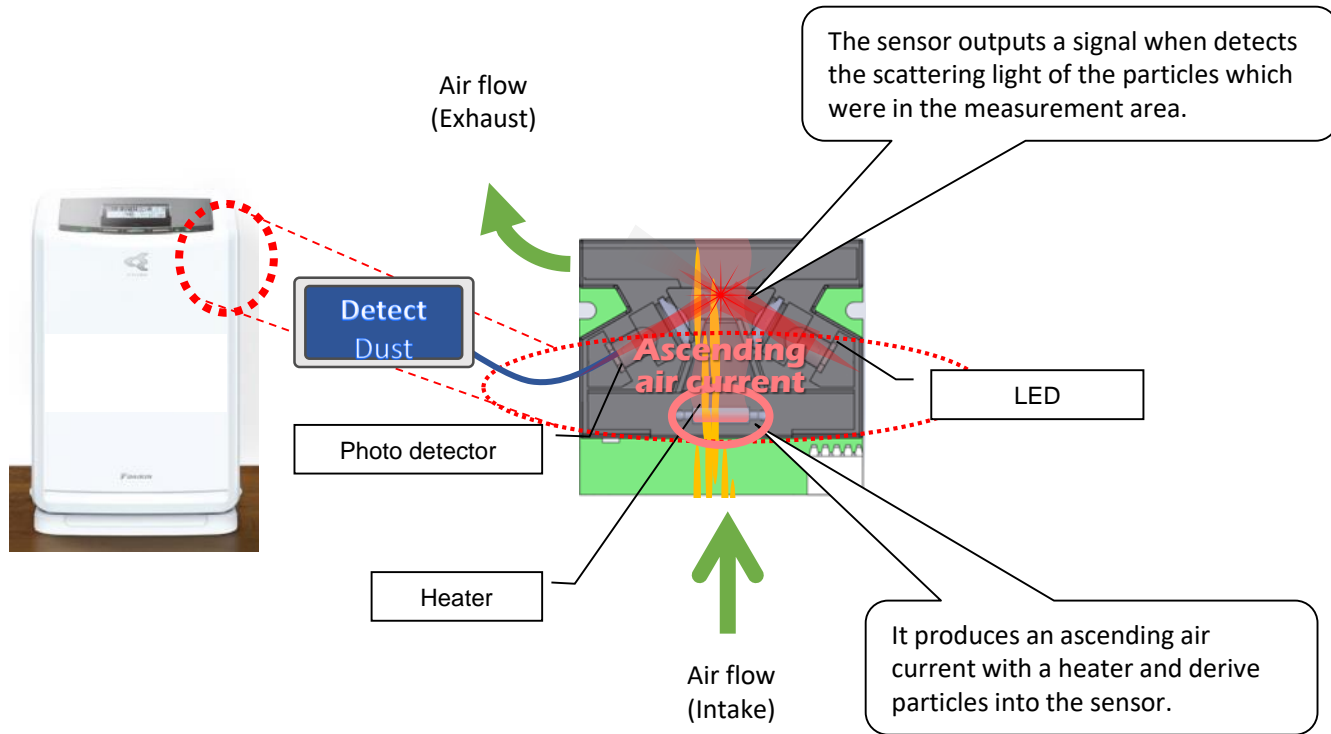
Check OMRON global website

<https://www.components.omron.com/product-detail?partId=73065>

Air Quality Sensor / Dust Sensor B5W-LD

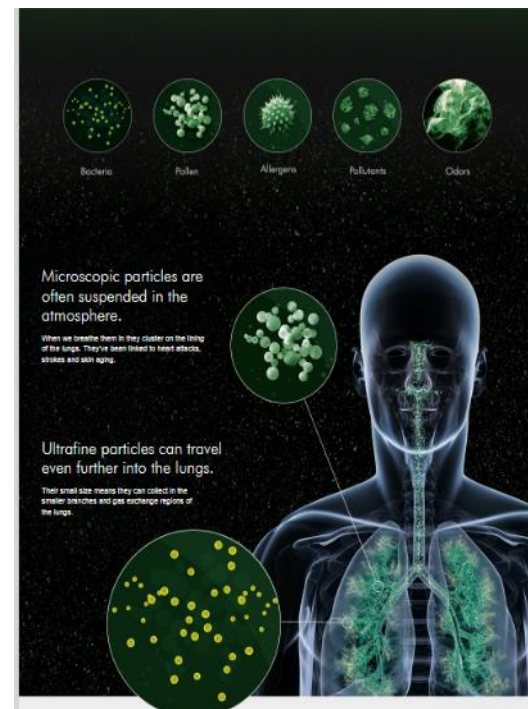
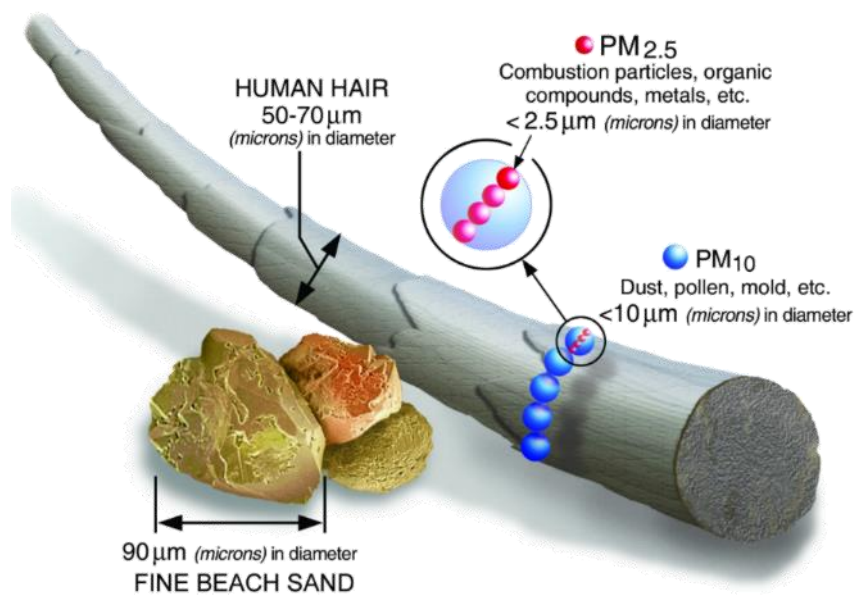


How does it work?



Background of Product Launch

- Size comparisons for PM particles



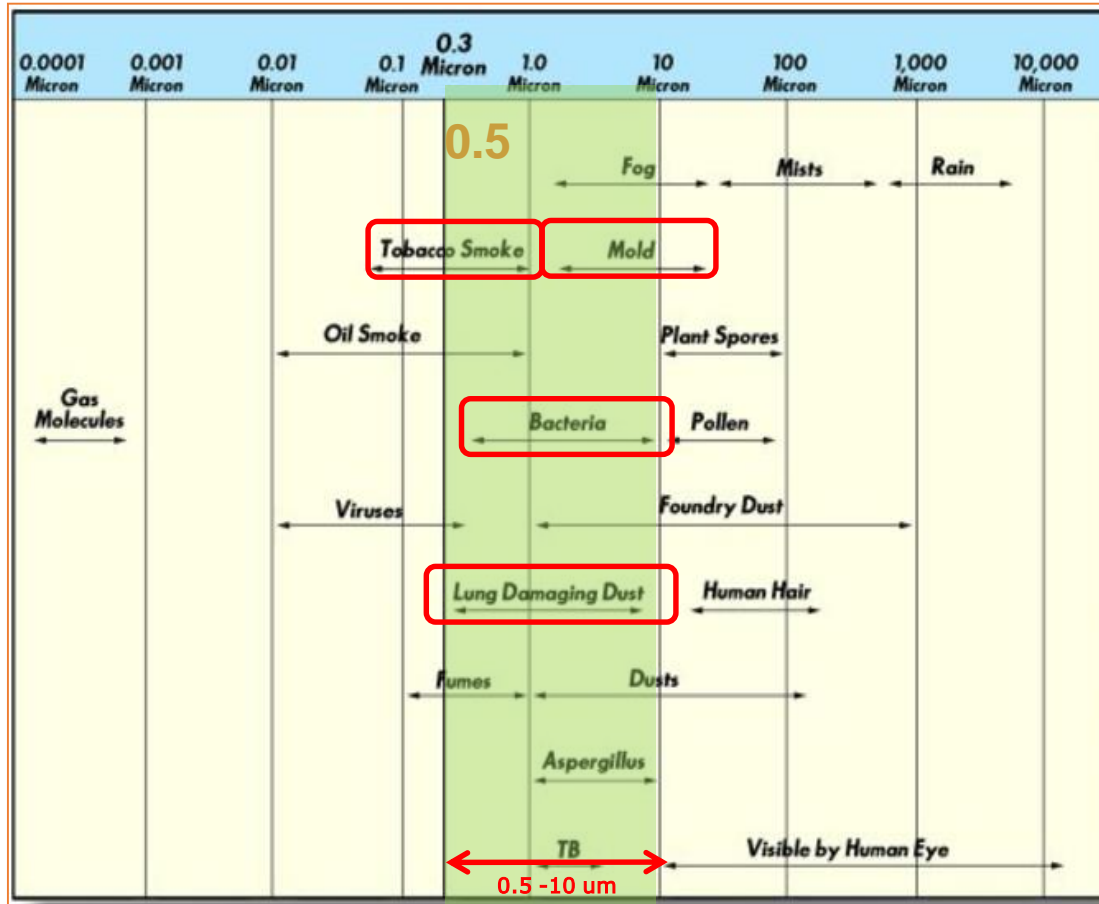
*WHO: The highest risk Carcinogen, Cerebral thrombosis

Influence: Absorb particle in capillary, through respiratory organ.

Source: EPA United States Environmental Protection Agency

Detectable particle size

B5W-LD0101 : Possible to detect particle size: 0.5 to 10 um.



Correlative evaluation

High correlation with dust concentration meter

Evaluation Method.

Spared particle(under 1um) inside of Clean BOX

Switch on the down flow to clean inside clean box

and monitor the output of sensor.

3. Pulse counting for 20 sec by oscilloscope.

4. Also check the inside of box particle condition

by dust concentration meter(TSI 8530)

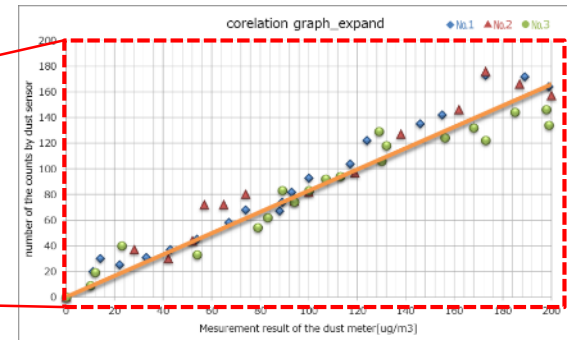
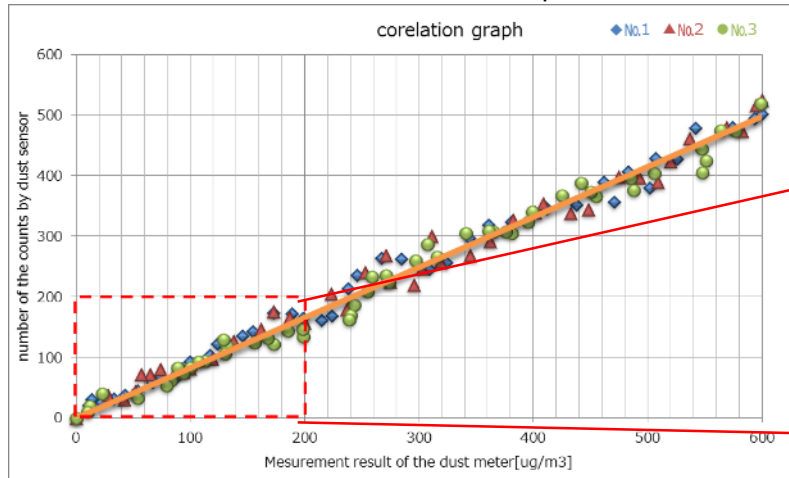
*the result of three different samples



Measurement environment

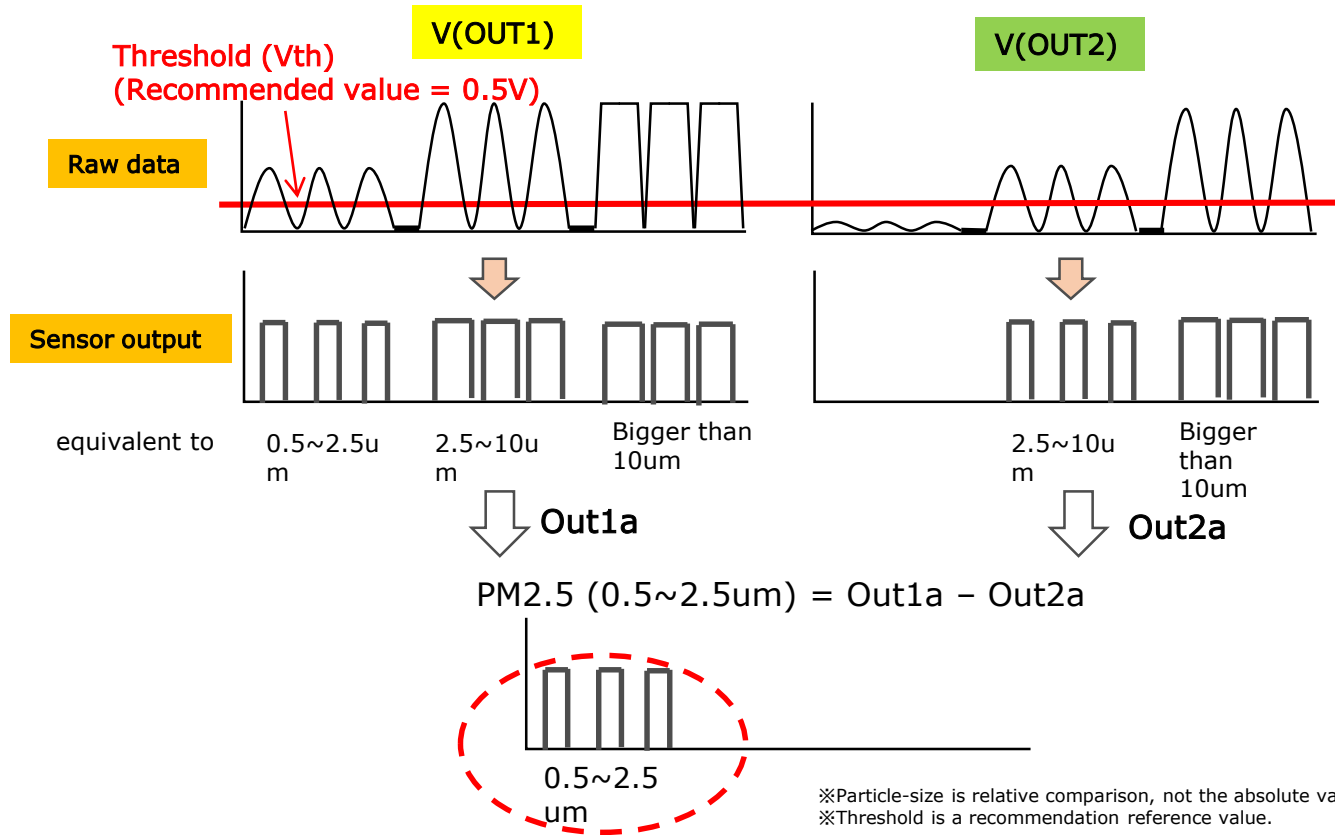


TSI 8530



How to distinguish between particle sizes

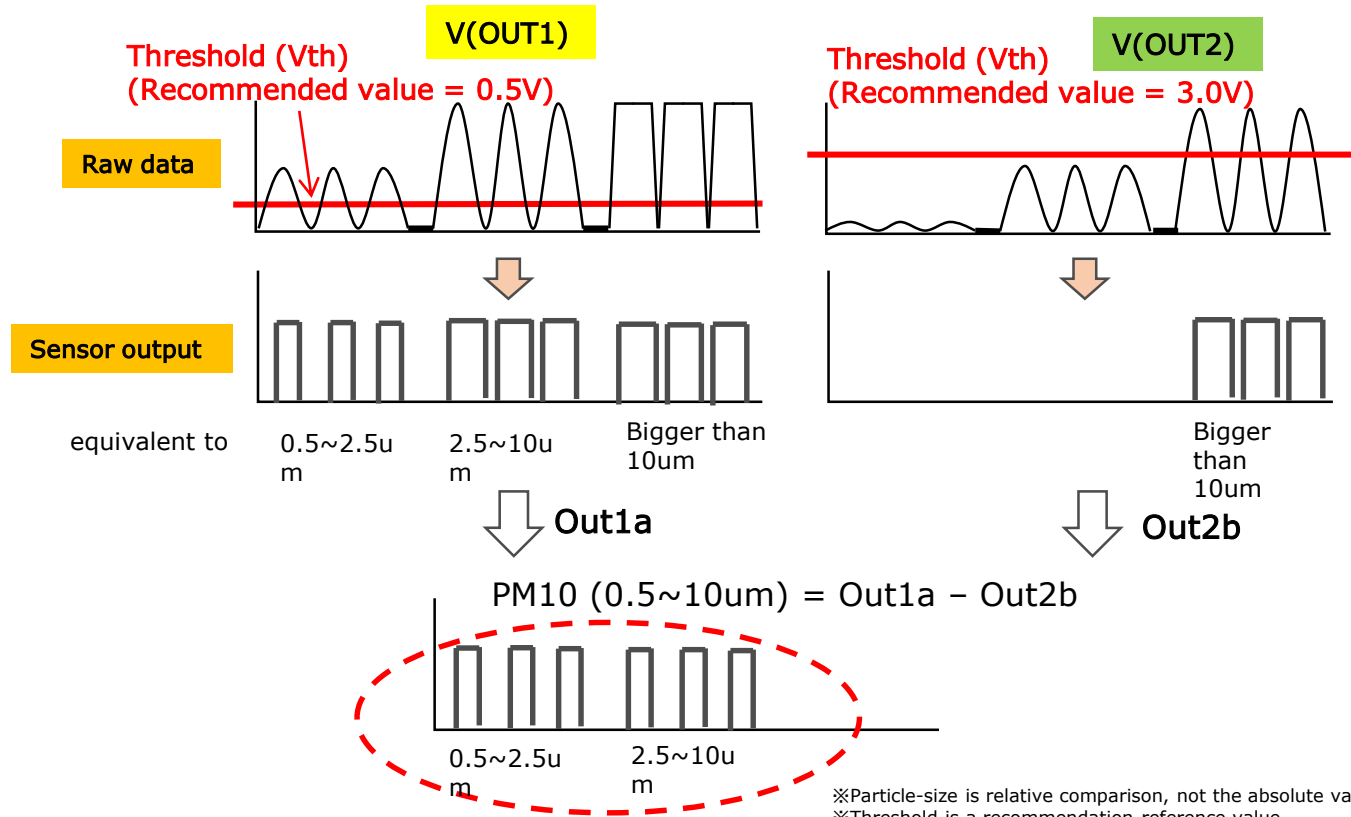
Calculation method of PM2.5(0.5~2.5um) equivalent information



※Particle-size is relative comparison, not the absolute value guarantee.
 ※Threshold is a recommendation reference value.

How to distinguish between Particle Sizes

Calculation method of PM10 (0.5~10um) equivalent information



Applications

Air purifier



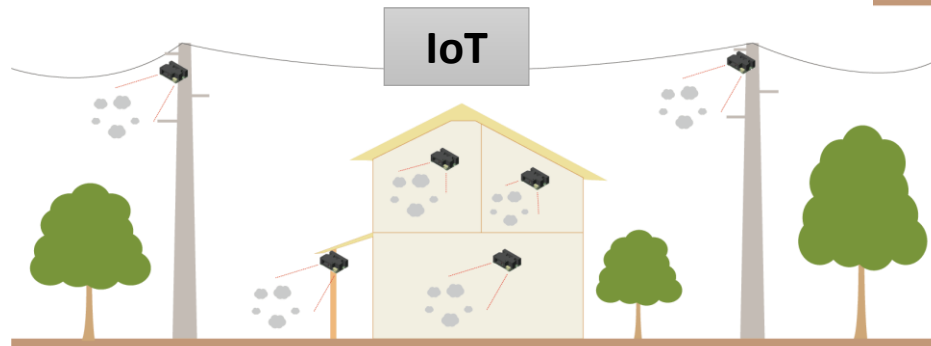
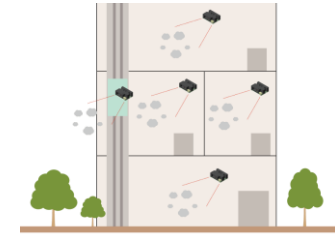
Air conditioner



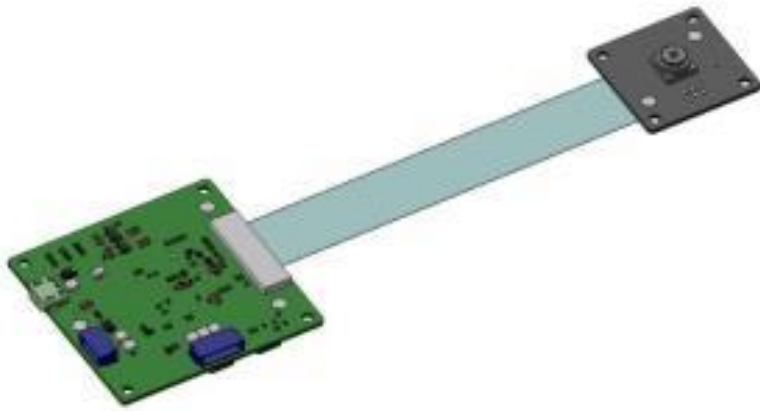
Air quality monitor



HVAC equipment or system



HVC-P2 Human Vision Component (B5T)



What is Human Vision Components?

10 image sensing functions included, which can be activated together

Face Detection



Face Recognition



Gender Estimation



Age Estimation



Expression Estimation



Facial Pose Estimation



Gaze Estimation



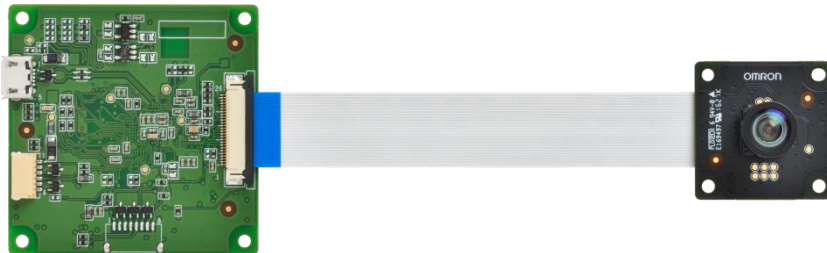
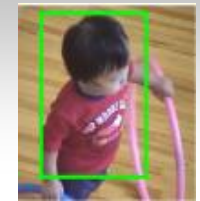
Blink Estimation



Hand Detection



Human Body Detection



HVC is not storing full images,
just only raw data

Impossible to re-produce full image

No privacy issue

Function - Face Detection -

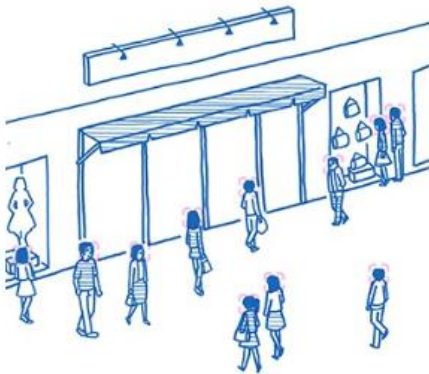
Detect with high accuracy and speed multiple faces of various size through the use of a unique algorithm

Features

- Can detect faces in all 360 degrees roll angle.
- Can detect and track faces partially occluded.

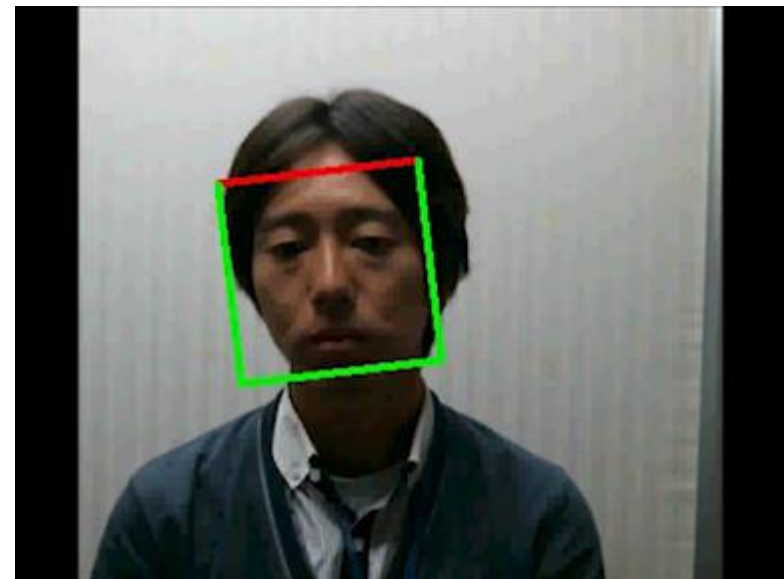


Application example



Count number of visitor
in the shopping mall or
super market

Count number of visitor automatically, it
can reduce labor costs



Recognition can be done in various conditions

Features

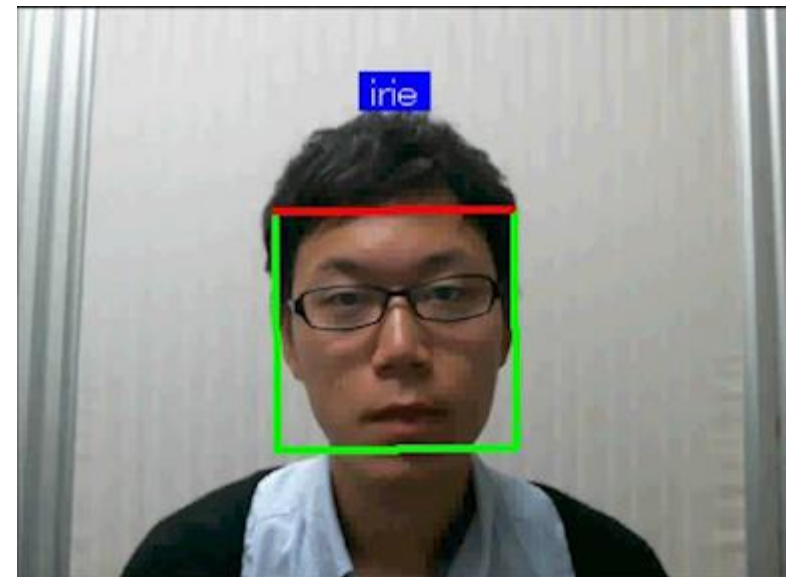
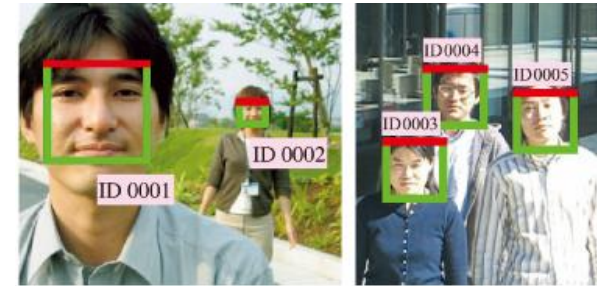
- Can recognize person with high accuracy under various conditions (face orientation, expressions, lighting conditions and skin tones).
- Can be used for face search or login features.
- Can be used for real time recognition in various devices.

Application example



- Access control
- Security gate

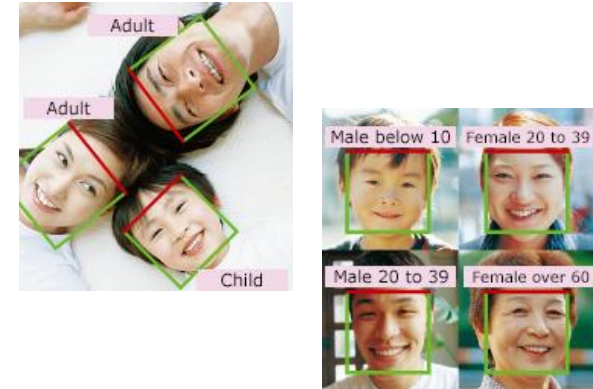
Limit access to restricted areas by recognizing people and improve security



Estimate the gender and age from the facial image

Features

- Can estimate the gender and age of a face with high estimation regardless of skin tones.
- Age and gender counting for customer analysis
- Can be used for real time estimation in various devices.

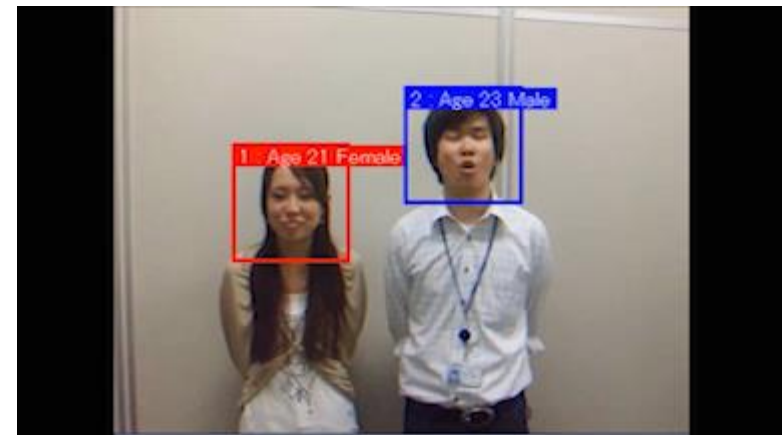


Application example



- Digital signage
- Vending machine

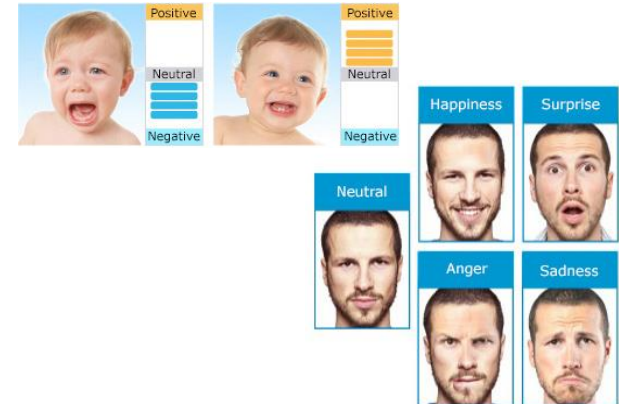
Change advertisement based on user's age/gender, increase the appeal of products



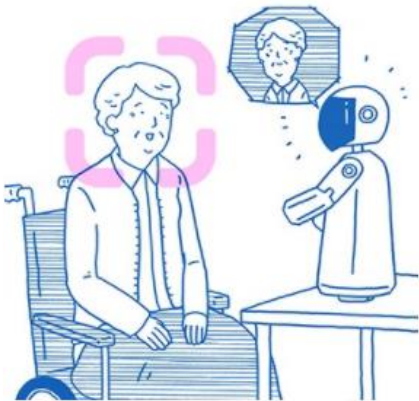
Estimate the facial expression from the facial image

Features

- Can estimate 5 expressions (neutral, happiness, surprise, anger and sadness).
- Can estimate the expression degree based on positive expressions (happiness) and negative expressions (anger and sadness).

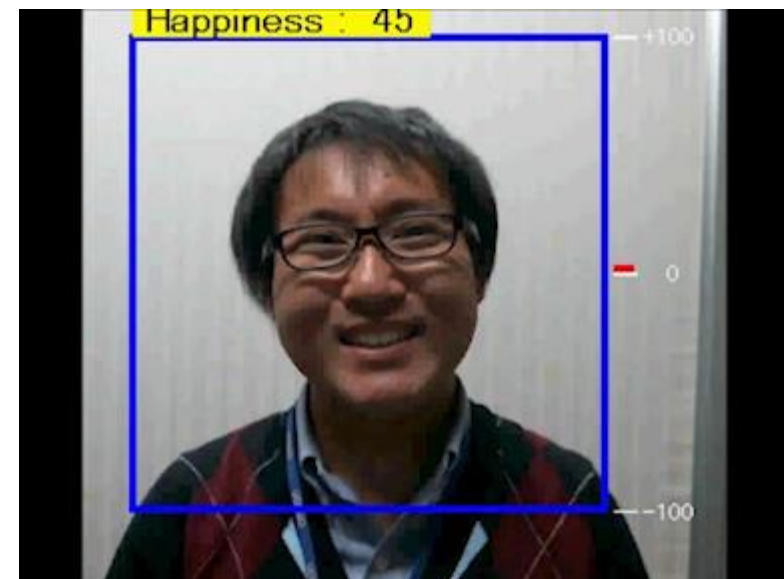


Application example



- Communication robot
- Training tool

Enjoy a new lifestyle with robots that can identify and support people



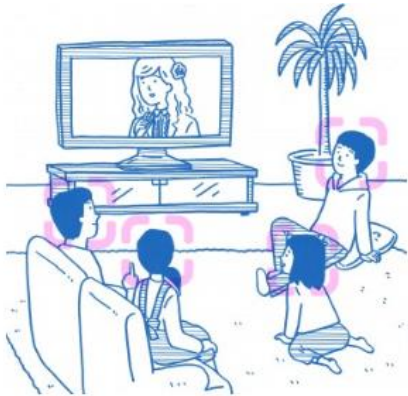
Function - Gaze/Blink estimation -

Can detect the position of the eyes and mouth with OMRON's model fitting technology and estimate the gaze direction and blink degree of the eyes.

Features

- Can estimate the gaze direction on both horizontal and vertical axis.
- Can quantify the blink degree of the eyes.
- Can be used for real time estimation in various devices.

Application example



- Digital signage
- Home appliance

Detect how long the people is looking at the screen and where is the most attractive for him/her



Detect human bodies that cannot be detected through face detection

Features

- Can detect small, back-facing or backlit bodies
- Can detect squatting bodies.
- Can detect bodies in real time on embedded devices.
- Can be implemented in various equipment.

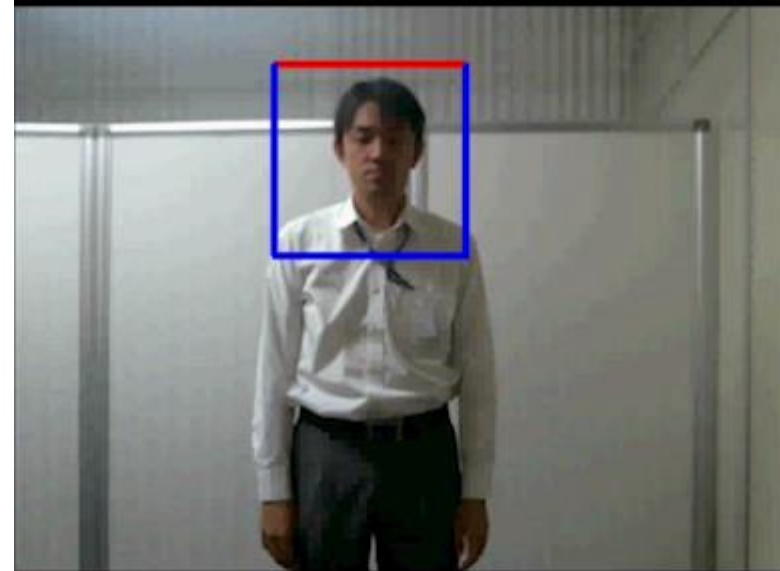


Application example



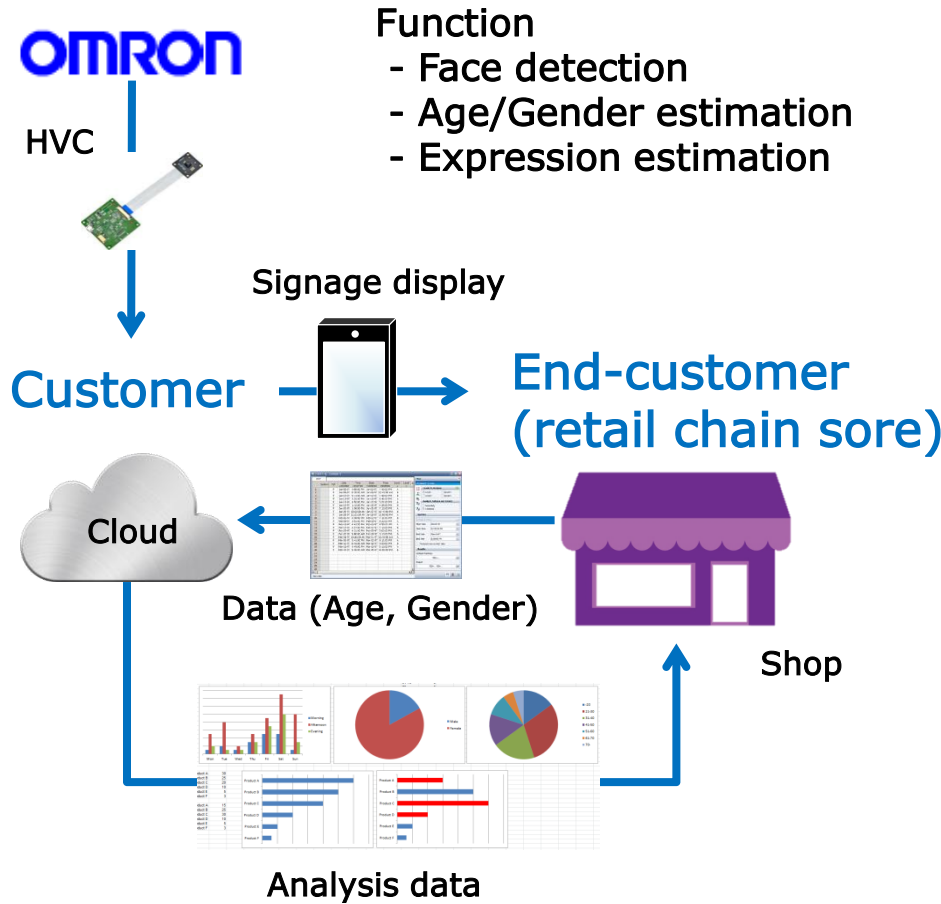
- Air conditioner
- Lighting control
- Elevator

Detect people's location to optimize comfort and energy saving



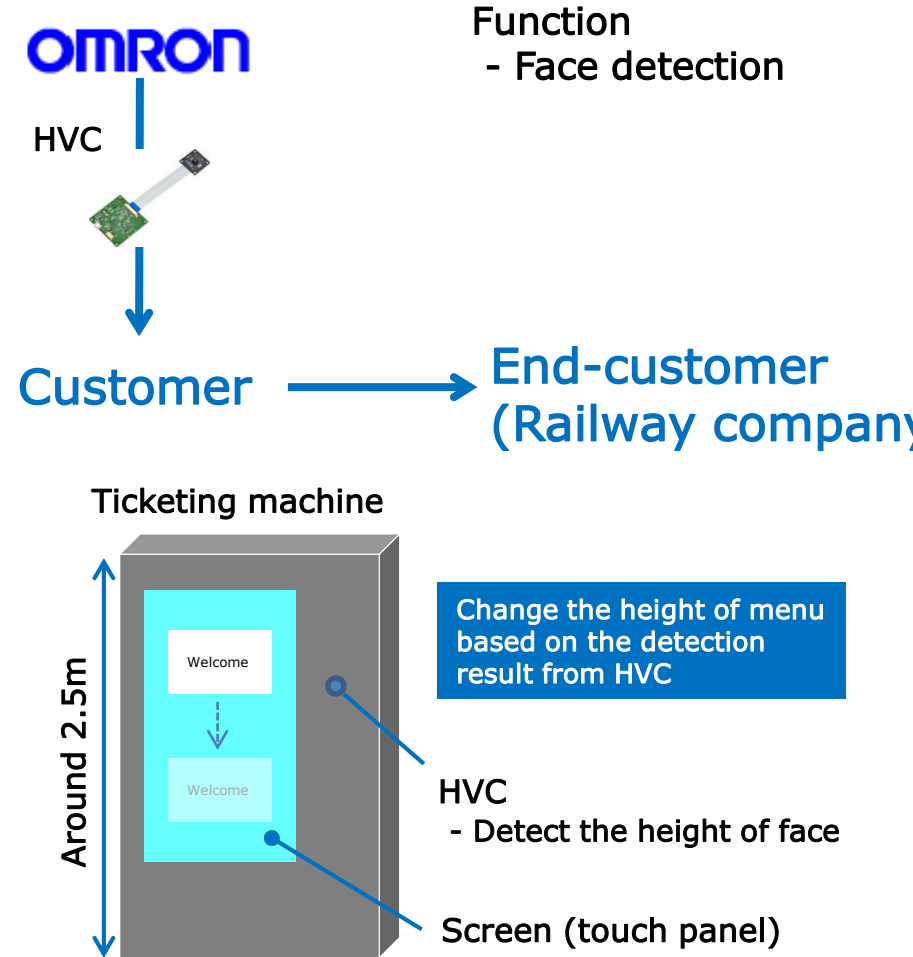
Actual application example - 1

Collect marketing data



The end customer can get marketing data (age/gender distribution).

Adjust equipment



The customer can produce user-friendly device.

Actual application example -2

Customer analysis in retail store

OMRON

HVC



Function

- Face detection
- Age/Gender estimation

Customer



Shopping mall
Super market

Simple reception system

OMRON

HVC



Function

- Face recognition

Customer



Company



When the guest arrive at the reception, they register their face. And when they leave, this system will check their face and give them automatic sign out.

The key of this product is that the time between registration and recognition is very short (face will not change). And also it is allowed to suggest several candidates (accuracy is not critical application). The end customer can simplify visitor registration (cut labor cost) and secure confidential information.



Customer Segmentation

Who are your customers? Men or women, Baby Boomers, GenX or Millennials?

This module device identifies the gender, the age group and how long visitors stay looking at a given shelf, display, or shop window.

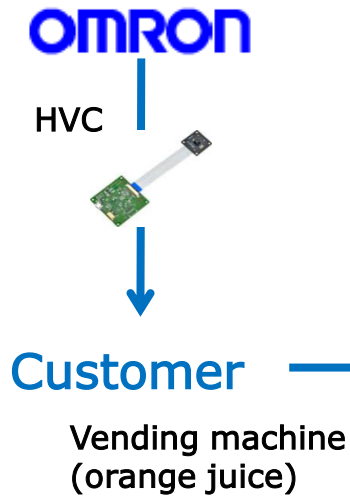
YOU WILL BE ABLE TO ANALYZE

- Number of people who stop to look at the window, display or promotion, classified by gender and age group.
- How long they remain looking at the promotion.
- Effectiveness of the promotions, according to the visitors attracted.
- What target market is attracted by each product or promotion (gender and age group).

The end customer can get marketing data (age/gender distribution).

Actual application example -3

Change advertisement



- Function
- Face detection
 - Age/Gender estimation

Shopping mall
Super market
Office

Change the advertisement based on age/gender estimation during serving orange juice

Retail

Interactive Kiosk

Digital Signage

Access Control

Communication Robot

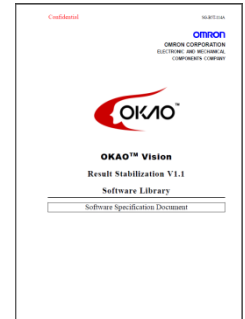
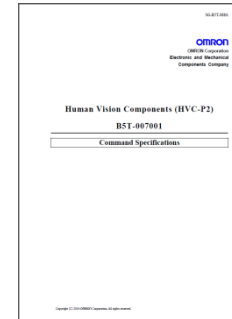
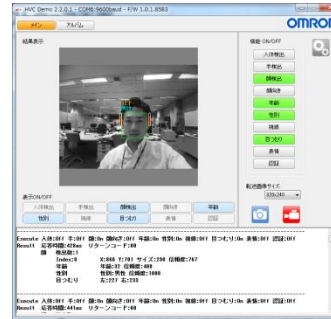
Various customers are investigating in various applications.

Our support

OMRON provides demo software, command specification and sample code together with HVC.



+



HVC

Evaluation software

Command specification

Sample code

- The customer starts evaluation **as soon as they receive product.**
- We can sell **from 1pcs.**
- No additional license fee and special contract.

Visit here!!

http://www.omron.com/ecb/products/mobile/hvc_p2/

<https://www.avnet.com/wps/portal/abacus/manufacturers/m/omron/products/hvc-p2-image-sensor/>



HVC-P2 B5T-007001 image sensor

The HVC-P2 B5T-007001 from Omron is a built-in human condition recognition unit dubbed a 'Human Vision Components' (HVC) system, with a maximum recognition speed 10 times greater than that of previous models.

The HVC is an image-sensing unit incorporating its proprietary "OKAOB Vision" technology for recognizing human face expression, gender, age, gaze and blink into a camera module. The HVC-P2 boasts a maximum recognition speed 10 times that of a previous model introduced in March 2014, making it possible to detect a human body four times per second (*), keeping track of a person within a detection area.

Customers can also choose from two camera heads, a long-distance detection type and a wide-angle detection type, depending on their specific application purposes. A piece of equipment embedded with the HVC-P2 can detect and presume attributes and conditions of a user coming in its vicinity, without the user knowing the presence of a camera, making it possible to provide services deemed most suitable in view of the user's attributes.

(*) Data based on a camera head placed within a 7.4-meter distance from a human body.

If you want to experience the Omron HVC-P2 in action, [click here to request a demo from one of our technical specialists.](#)

[BUY ONLINE](#)



Engineers' insight Machine vision with Omron's HVC

Giving machines the power of vision gives them the ability to interact with people in a much more natural way, but integrating this capability was previously a complex and difficult task. With Omron's Human Vision Components that's all changed.



[READ THE BLOG POST](#)



Resources

[Omron HVC-P2 flyer \(PDF\)](#)



[Ask an expert](#)



Omron

Avnet Abacus is an authorised Omron distributor throughout Europe.

Founded in 1933, Omron is a global leader in electromechanical and sensing technology. Its sensor portfolio includes MEMS sensing for pressure, flow, vibration and thermal. Its switch range includes tact, rocker & microswitches, and DIP. A full range of relays is also offered including solid state, power, signal and automotive.



Product categories

[Filter](#)[Interconnect](#)[Sensors and transducers](#)[Switches and relays](#)

Omron products and solutions

Learn more about the latest products and solutions from Omron.

[SEE ALL](#)

Omron

HVC-P2 B5T-007001
image sensor

Omron

2SMPB barometric
pressure sensors

Omron

D6T non-contact
temperature sensor

Omron

2JCIE-BL01
environment sensor

Thank You
Grazie !



17/04/2015 v.4.0

Omron Electronics Components Europe B.V.
Gabriele Fulco - Marketing Department