MITSUBISHI ELECTRIC
Changes for the Better

INFRARED SENSORS
MeIDIR

INFRARED SENSORS

Highly precise detection of people and objects using sensor technologies installed in satellites
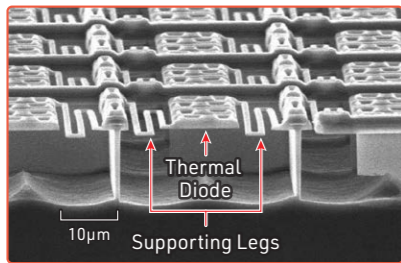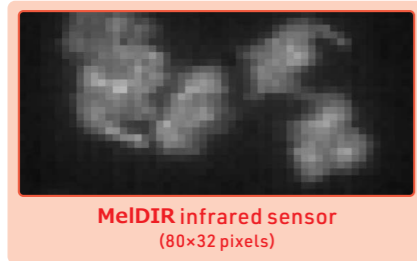
Infrared Sensor
MelDIR

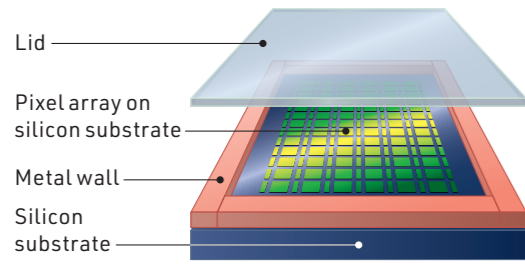Please visit our website for further details.

Features

1 High pixel count and high temperature-resolution enable highly precise understanding of people/object movement

MelDIR infrared sensor
(80×32 pixels)

Conventional thermopile
(16×16 pixels)

Illustration Image

Mitsubishi Electric Original Pixel Structure

1) The supporting legs are ultrathin thanks to the introduction of an innovative microfabrication technique. This makes it possible to transfer energy more efficiently without releasing heat, thereby enabling the pixel count to be increased and achieving higher image resolution.

2) The generation of electromagnetic noise is minimized by mounting the thermal diode and high-performance amplifier on the same chip, achieving high temperature-resolution.

Thermal Diode
10μm
Supporting Legs

2 Vacuum-sealing, Chip-scale Packaging Contributes to Compact Space-saving Size

Lid
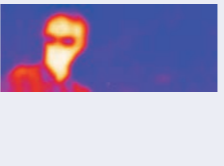Pixel array on silicon substrate
Metal wall
Silicon substrate

Vacuum-sealing, Chip-scale technology

1) Chip-scale packaging technology developed in-house eliminates the use of ceramic package and achieves vacuum state performance.

2) New packaging technology reduces product size to approximately 80% compared to conventional products＊1, enabling greater compactness and space savings.

＊1: Compared to general 16x16 pixel thermopiles available in market.

Specifications

Type No.	MIR8060 series		MIR8032 series
	MIR8060B3★	MIR8060B1	MIR8032B1
Pixels	80 × 60 pixels	80 × 60 pixels	80 × 32 pixels
Field of View (FOV)	78°× 53° (Typ.)	78°× 53° (Typ.)	78°× 29° (Typ.)
Frame rate	4 / 8 fps (selective)	4 / 8 fps (selective)	4 fps (fixed)
Temp. resolution (NETD＊²)	250 mK (Typ.)	100 mK (Typ.)	100 mK (Typ.)
Operating voltage	3.3 V	3.3 V	3.3 V
Current consumption	50mA (Max.)	50mA (Max.)	50mA (Max.)
Product dimensions	19.5 × 13.5 × 9.5 mm	19.5 × 13.5 × 9.5 mm	19.5 × 13.5 × 9.5 mm
Detectable temp. range	-5 ℃ ～ +200 ℃	-5 ℃ ～ +60 ℃	-5 ℃ ～ +60 ℃
Interface	Serial Peripheral Interface (SPI)	Serial Peripheral Interface (SPI)	Serial Peripheral Interface (SPI)

＊2: Noise Equivalent Temperature Difference

★: New Product

Application of Infrared Sensor

The following are possible areas of application for the Infrared Sensor. With the exception of HVAC, none of these applications have yet been tested and no products are currently under development or available for purchase. Accordingly, there are no claims are made as to the ability of the Infrared Sensor to achieve success in these applications.

Silhouette detection (movement, posture, fever) ≪≪≪≪≪≪≪≪ **Both temperature and silhouette** ≫≫≫≫≫≫≫≫ **Temperature measurement**

Security
- Detects intruders, etc.

Care
- Detects posture
- Detects abnormal body surface temperature*

HVAC
- Measures room temperature
- Detects the position of person

Body surface temperature measurement
- Measures body surface temperature*

People count
- Counts the number of people
- Detects behavior

Care robot
- Detects movement/posture
- Detects body surface temperature*

Kitchen/Home appliances
- Measures temperature of food being cooked
- Detects people

Raising livestock
- Measures surface temperature of livestock

Elevator/Escalator
- Detects congestion

Toilets
- Detects possible falls
- Detects abnormal movement/posture

Bath
- Measures temperature
- Detects abnormal posture

Equipment monitoring
- Monitors machine temperature

Light
- Detects the movement of people

Drone
- Detects people
- Measures temperature

Mobile
- Measures body surface temperature*
- Detects gestures

Fire detection
- Detects possible fire outbreaks
- Detects people

Animal damage detection
- Detects the presence of animal damage

Smart speaker
- Detects room temperature distribution and presence of people, and instructs various home appliances

Car cabin
- Detects presence of children
- Detects driver's possible condition

Health/beauty
- Measures body and face surface temperature* distribution

Home appliance
- Gesture-based operation

Factory safety/Electric fence
- Detects people
- Detects possible falls

Farm
- Controls crop/environment temperature

★: This cannot be used for medical diagnosis.

Examples of use by Mitsubishi Electric
(These products are available for purchase and use only in Japan.)

AI×Care service
kizkia-Knight™

An infrared sensor has been fitted on the toilet monitoring system (kizkia-Knight T). This system monitors a user in the toilet in nursing care facilities, etc. while ensuring privacy.
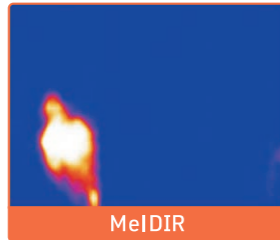
Room AC
Kirigamine

i-See Sensor

The i-See Sensor equipped with MelDIR features "Touch Airflow" which allows the user to adjust the airflow simply by touching the place where the user wants the airflow to be delivered while viewing the thermal image of the room on the user's smartphone.
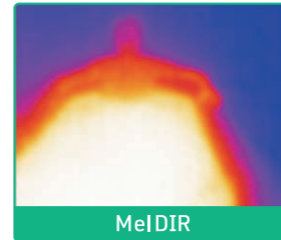
Infrared Sensor MelDIR Thermal Images

Security

- Detects heat sources in the dark
- Distinguishes between heat sources and a person
- Detects people
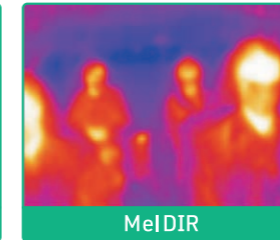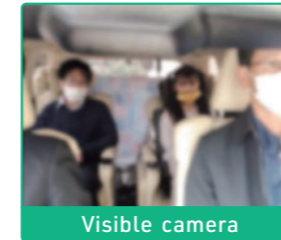- Assesses a person's behavior

Visible camera | MelDIR

Bath*

- Privacy protection
- May aid in predicting heat shock
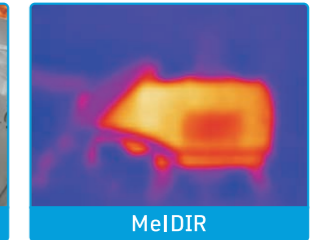- May aid in detecting drowning

Visible camera | MelDIR

Car cabin

- Child presence detection
- Measures passenger body surface temperature*

Visible camera | MelDIR

Equipment monitoring

- Monitors the temperature of machines and equipment
- Detects hotspots

Visible camera | MelDIR
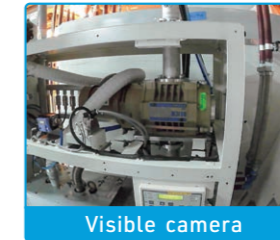
People count

- Counts the number of people
- Detects abnormal behavior
- Detects people flow
- Measures stay time

Visible camera | MelDIR
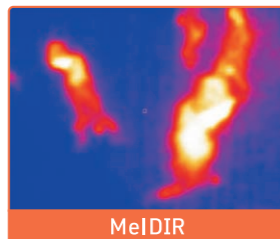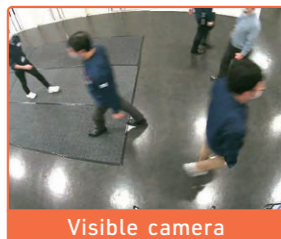
HVAC

- Counts the number of people
- Detects the position of person
- Measures room temperature

Visible camera | MelDIR
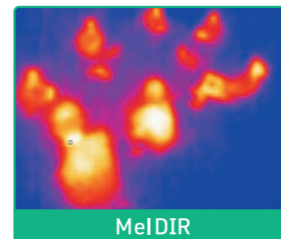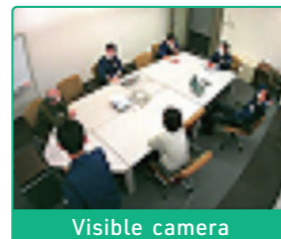
Kitchen

- Measures the temperature of food being cooked
- Detects people
- Detects the number of stoves in use
- May detect open flame

Visible camera | MelDIR

Care

Detects patient movement

- Posture
- Behavior (getting up, falling)
- Detects abnormal body surface temperature*

Visible camera | MelDIR
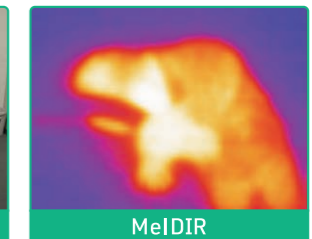
★: This cannot be used for medical diagnosis.

AI Infrared sensor MelDIR × Deep Leaning

Provides a detection algorithm based on deep learning of AI that takes advantage of the features of infrared sensor MelDIR
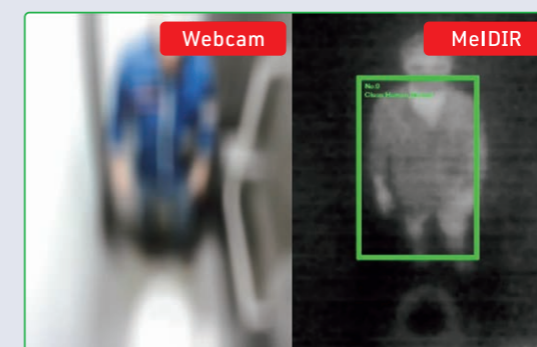
Features

- Uses thermal imagery to protect privacy
- Since MelDIR detects human shape, it can detect with high accuracy even with a small amount of calculation
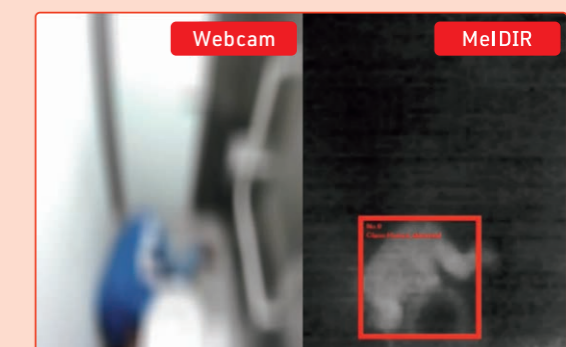- System cost is reduced by edge AI that can operate with a general-purpose microcontroller
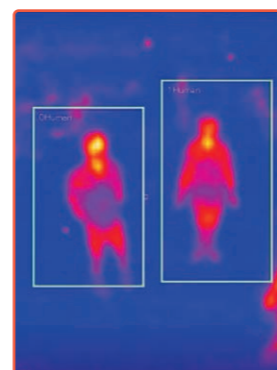
Detection example using deep-learning algorithm

[example of possible bathroom fall]

Webcam | MelDIR

Normal posture detection

Webcam | MelDIR

Abnormal posture detection

User-support tools that contribute to reducing customer development time

Product planning

Proposal

Propose use for each application

System configuration

Installation example

Monitoring example

Technology development

Demo Kit

Provide hardware and image display software required to evaluate **MelDIR**

Demo kit EVA series

Viewer

Product development

Reference Design

Software/hardware design support

Hardware information

Gerber data

BOM lists

Software information

Reference cords

Detection algorithm
(Learning of human/posture/action)

Documents

Application notes

Manuals

INFRARED SENSORS
MelDIR

Mitsubishi Electric Infrared Sensors Website

www.MitsubishiElectric.com/semiconductors/infraredsensor/

New publication effective Mar., 2024.
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